20 Blackfriars Bridge Foreshore

20.1 Introduction

20.1.1 This section of the non-technical summary presents the preliminary environmental assessment for the Thames Tunnel project at Blackfriars Bridge Foreshore (Figure 20.1).

20.1.2 At this site it is proposed that the existing northern Low Level Sewer No.1 and the Fleet storm relief combined sewer overflow would be linked to the proposed main tunnel through a shaft. Currently, the existing combined sewer overflow discharges approximately 20 times a year. The total volume of this discharge is 522,300m$^3$ each year.

20.1.3 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.

20.1.4 The environmental topics which have been assessed for this site are listed in the ‘Assessment’ section (20.4). Preliminary assessment findings are then presented topic by topic.

20.2 Site context

20.2.1 The site is shown as site number 15 on Figure 28.1.

20.2.2 The site is located within the City of London (Figure 20.1). It is also close to the City of Westminster and across the river from Southwark.

Figure 20.1 Blackfriars Bridge Foreshore site location
20.2.3 The site is located in the River Thames and on a section of the pavement and roadway of Victoria Embankment (A3211).

20.2.4 Approximately three hectares is required for both the temporary construction works. This is indicated by the red line shown on Figure 20.2. The area of land required for the permanent works would be substantially smaller than that required for the construction.

20.2.5 Within the site area is the vessel President and Blackfriars Millennium Pier which would be relocated before construction starts. The relocation of the President would be temporary and it would move back to its existing position when construction has finished. The pier would be permanently relocated to an area east of the rail bridge indicated by the red line in Figure 20.2.

20.2.6 Vehicular access to the site would be directly off Victoria Embankment (A3211). The Thames Path is a public right of way and runs along the southern pavement of Victoria Embankment, along Paul’s Walk, through the northern extent of the site.

20.2.7 To the north of the site are Victoria Embankment (A3211) and the Blackfriars Underpass. To the east is Blackfriars Bridge and to the south and west is the River Thames.

*Figure 20.2 Aerial photograph of Blackfriars Bridge Foreshore*

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

20.3.1 The proposal is to intercept the existing Fleet 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 four times a year and flows to an average of approximately 36,800 m³ a year.

20.3.2 In order for this interception to be achieved, construction works at this site would take approximately five years.

20.3.3 A shaft with an internal diameter of approximately 24 m and approximately 53 m deep would be constructed. Through an interception chamber, flows from the existing low level sewer and the Fleet storm relief sewer would be diverted into the shaft and hence the main tunnel, located deep underneath the River Thames.

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

20.3.5 In order to manage and mitigate 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.

20.3.6 Figure 20.3 shows an indicative plan of the construction works.

**Figure 20.3 Indicative plan of construction works for Blackfriars Bridge Foreshore**
20.3.7 Once the works at this site have been built, a number of permanent features would remain (Figure 20.4 and Figure 20.5). There would be an area built out onto the foreshore which would form part of the public realm. Periodic access would be required for inspection and maintenance purposes into the shaft and the tunnel. Access for maintenance purposes would be required every three to six months. Once every ten years more substantial maintenance work would be required.

20.3.8 There would be two kiosks to control equipment located in the below ground chambers. There would also be seven ventilation columns; five at 4 metres high would be located in the west of the new area of land created within the foreshore and two at 6m high would be located in the east of the new area of land created within the foreshore. 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.

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

**Figure 20.4 Blackfriars Bridge Foreshore indicative plan of built development – image 1 of 2**
20.4 Assessment

20.4.1 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

20.4.2 In the following sections, information about the preliminary assessment of each of these topics is presented.
20.4.3 As part of the assessment process, consideration has been given to known major developments that may change future environmental conditions. It has been assumed that construction works at Blackfriars Station would be finished before Thames Tunnel construction starts. There is the potential for a hotel development at No. 1 Puddle Dock and an office development at Bridge House along Queen Victoria Street but the timescales for these developments are unknown at present.

20.4.4 An application for the proposed Thames River Park from Paul's Walk to Three Cranes Walk and from Hanseatic Walk to Water Lane was submitted to the City of London in July 2011 and is awaiting determination. Details of the scheme are being reviewed however the proposal has not been included in the assessment to date.

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

20.5 **Air quality and odour**

20.5.1 The Blackfriars Bridge Foreshore site is located within the City of London Corporation Air Quality Management Area. Local monitoring data 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 offices and commercial properties, The Crowne Plaza Hotel (corner of New Bridge Street and Watergate) and residential dwellings at River Court. There is also the proposed hotel development at No. 1 Puddle Dock.

20.5.2 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 Crowne Plaza Hotel and negligible at the commercial/office premises. In terms of construction dust, this is likely to have a minor adverse effect at the commercial/office properties and a negligible effect elsewhere, taking account of the dust control measures in the Code of Construction Practice.

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

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

20.6 **Ecology – aquatic**

20.6.1 The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. Only a small area of gravel foreshore is present near Blackfriars Bridge, which is classified as mudflat. Surveys and background data searches indicate that a low diversity of fish and invertebrates are present (Figure 20.6). Occasional observations of common seal and harbour porpoise have been made.
20.6.2 Construction effects would be managed by the Code of Construction Practice. With the Code in place it is anticipated that the 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 adhere to the river bed with a potential risk of flooding to the barge during high tide. With these works, there would be a moderate adverse effect on habitats and minor adverse effects on fish and invertebrates. All other effects are considered negligible.

20.6.3 During operation, the permanent loss of habitat would have a moderate adverse effect on habitats, and minor adverse effects on fish and invertebrates. Interception of the combined sewer overflow at this site would significantly reduce the occurrence of low dissolved oxygen events which result in fish mortality. This is considered to be a moderate beneficial effect. Improvements in water quality in the local area are predicted to lead to an increase in the diversity and abundance of the invertebrate community and contribute to an increase in the distribution of pollution sensitive fish and invertebrate species throughout the River Thames.

20.6.4 The presence of structures, both during construction and operation, within the river may have an effect on migrating fish through altered river flows. This will be assessed and reported in the Environmental Statement.

20.6.5 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 20.6 Flounder were found at the site during the aquatic ecology surveys in autumn 2010
20.7 **Ecology – terrestrial**

20.7.1 Habitat on site is limited to several semi-mature trees and where possible this habitat would be reinstated at the end of the construction period. No significant effects are anticipated on terrestrial ecology for either construction or operation (aquatic ecology effects are considered in section 20.6).

20.8 **Historic environment**

20.8.1 The site comprises part of the Thames foreshore and Victoria Embankment river wall. The river wall and associated lamp standards are Grade II listed within the western part of the site (these assets are of high heritage asset significance). The eastern section of the wall, constructed in the 1960s, is unlisted. The site is partially located beneath the Grade II listed 19th-century Blackfriars Bridge (of high heritage asset significance). The site also includes the permanently moored navy ship, the President, built in 1917 (of high heritage asset significance). The site lies within the locally designated Whitefriars Conservation Area (of high heritage asset significance). A 20th-century former fire service pump house at the eastern end of the Millennium Pier is considered to be of low heritage asset significance.

20.8.2 There are also a number of listed buildings nearby, including gate piers to the Inner Temple Garden, Carmelite House, Sion College and the City of London School (all Grade II listed and of high heritage asset significance).

20.8.3 The site lies within the locally designated City of London Archaeological Priority Area and potential for the site in terms of buried archaeological heritage is high for post-medieval 18th and 19th century industrial and riverside remains (which would be of low or medium heritage asset significance if present). There is a low to moderate potential for Roman hulked vessels (one was uncovered adjacent to the site in the 1960s), which would be of high asset significance, or very high if well preserved, if present. Potential for prehistoric and medieval remains is considered to be low as the site lay within the Thames channel in these periods. Palaeoenvironmental remains (e.g. organic remains, such as pollens or plant fossils) are likely to have been removed by erosion.

20.8.4 Based on preliminary assessment findings, the removal of part of the river wall parapet within the site is likely to have a major adverse effect for the listed section and its lamp standards, and a moderate adverse effect for the unlisted section. Removal of the pump house would constitute a minor adverse effect. There would be no impact on Blackfriars Bridge or the President, the latter would be temporarily relocated. Construction works would entail deep excavations which would entirely remove any assets present within the footprint of each area of construction. If any such assets were found to be present, this is likely to give rise to a minor to moderate adverse effect for post-medieval industrial and riverside remains. There would be a major adverse effect if a Roman ship was found to be present.
20.8.5 To mitigate the effect on the river wall and lamp standards, the structures would be recorded and photographed in line with accepted standards to form preservation by record, with the lamp standards reinstated where possible. 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 predicted 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.

20.8.6 Effects on the historic environment arising from the operation of the Thames Tunnel infrastructure at Blackfriars Bridge Foreshore, on assets including the Whitehall Conservation Area and nearby listed structures, will be assessed and presented in the Environmental Statement. This may include effects on the historic setting of heritage assets and 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 in the Environmental Statement.

20.9 Land quality

20.9.1 A search of historical and environmental data indicates no contaminative activities on site which could have caused contamination in the area. The search identified pockets of historical industrial activities in the vicinity of the site that in the most cases have ceased. None of the sources nearby are considered to have significantly impacted upon the site. Previous ground investigations close to the site have recorded no significant soils and groundwater contamination. Part of the ongoing ground investigations includes the assessment of foreshore sediment contamination. Desk based surveys have identified a high risk from unexploded ordnance.

20.9.2 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. Based on the preliminary assessment findings, mitigation measures during the construction phase are not considered necessary although this will be clarified subject to further investigations and reported in the Environmental Statement.

20.9.3 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.
20.10 **Noise and vibration**

20.10.1 A noise survey has been carried out for the site. The site is dominated by road traffic and rail noise. The nearest locations to the site which are sensitive to noise and vibration are on the upper floors of the buildings on Kings Bench Walk, to the north west of site.

20.10.2 Based on preliminary assessment findings, significant noise effects arising from construction activities are predicted at Sion Hall. No significant effects from vibration (during construction or during the operation of the site) are predicted.

20.10.3 During construction, the contractor would be required to follow best practice (as described in the Code of Construction Practice) at all times to reduce the noise and vibration effects upon the local community.

20.10.4 Beyond best practice measures it is anticipated that further measures would be required to address significant noise effects during construction. This could include the use of localised screens and enclosures to reduce noise from particularly noisy, static operations.

20.10.5 The next stage of the assessment will profile the variation in construction noise levels across the programme of work with the aim of refining mitigation design and seeking to reduce the significant effects of construction noise and vibration. Further details of mitigation measures will be provided in the Environmental Statement including the significance of residual effects once mitigation has been taken into account.

20.11 **Socio-economics**

20.11.1 The site comprises a stretch of pavement that forms part of the Thames Path together with a specialist sports facility and an area of foreshore on the River Thames where the vessel President and the Blackfriars Millennium Pier are located. Open space (Inner Temple Gardens) and commercial office buildings surround the site, and there are residential dwellings beyond the open space. The site and surrounding area is very well used for a range of purposes including walking, cycling, sightseeing by tourists and passive recreation.

20.11.2 During construction, there is considered to be a moderate adverse effect arising from the displacement of the specialist sports facility, and minor adverse effects arising from the disruption to the businesses on Blackfriars Millennium Pier, disruption to the Thames Path and amenity effects on its users. Amenity effects on users of the Blackfriars Millennium Pier, the vessel President, and Inner Temple Gardens are considered to be negligible. Once operational, there would be a moderate beneficial effect resulting from the gain in publicly accessible space associated with the extension to the pavement, comprising the Thames Path, and a negligible effect on users of the Blackfriars Millennium Pier as a result of its permanent relocation to the east of Blackfriars Bridge.
20.11.3 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 effects which have been identified in this preliminary assessment.

20.11.4 For the operational phase, there are not expected to be any socio-economic effects at Blackfriars Bridge Foreshore which require mitigation.

20.12 Townscape and Visual

20.12.1 The site is located within the Whitefriars Conservation Area in the City of London. It comprises a stretch of pavement along Victoria Embankment, Blackfriars Millennium Pier, a stretch of Grade II listed river wall and lamp standards. A number of mature London plane trees protected by Tree Preservation Orders also line the embankment. The site lies within the London View Management Framework and is nationally valued, being experienced by a large number of people. The surrounding townscape is a mix of historic and modern commercial, administrative and residential premises.

20.12.2 Based on preliminary assessment findings, it is likely that during the construction phase, the presence of construction activity and the cofferdam would have a major adverse effect on townscape areas including the site, the River Thames Central London Reach, and Whitefriars and Temples Conservation Areas. Moderate adverse effects are likely on the townscape on the opposite river bank and a minor adverse effect on other townscape areas. Once the scheme is operational it is anticipated that there would be minor to moderate adverse townscape effects on areas including the site and character areas along the river due to new structures within an area that was previously part of the river. There would be minor adverse effects on one character area. The exact extent of effects will be refined for the Environmental Statement based on the final design.

20.12.3 In terms of visual amenity, during the construction phase there would be major adverse effects on viewpoints including from the opposite river bank, Blackfriars Bridge and Waterloo Bridge, due to the visibility of the cofferdam and construction activity. There would be moderate adverse effects on five viewpoints, including from Millennium Bridge and receptors to the north of the site, and minor adverse effects on four viewpoints. Once operational there would be moderate adverse visual effects on the view from Tudor Street, minor to moderate adverse effects on viewpoints including from the opposite river bank and Blackfriars Bridge, and minor or negligible adverse effects on remaining viewpoints due to the new river wall and structures.

20.12.4 Mitigation measures during the construction phase are being incorporated into the proposals, for example through use of capped and directional lighting when required and the presence of hoarding. For the operational phase, a process of iterative design and assessment has been employed to reduce adverse effects. Remaining operational effects will depend on the architectural and landscape design and will be reported in the Environmental Statement.
20.13 Transport

20.13.1 The Blackfriars Bridge Foreshore site has excellent public transport accessibility being located within close proximity of Blackfriars National Rail and London Underground stations. The site is on the south side of Upper Thames Street / Victoria Embankment at the Blackfriars Underpass and construction vehicle access is proposed via the westbound slip road from the Blackfriars Road (A201) junction and from Victoria Embankment (Figure 20.7). The Blackfriars Millennium Pier would be permanently relocated (Figure 20.8).

Figure 20.7 Traffic along Victoria Embankment, looking east towards Blackfriars Bridge

20.13.2 During construction, the number of heavy goods vehicle movements would be moderate with the effect on road network operation and delay being moderate adverse due to the need for diversion routes and highway layout changes causing delays to journey time. Effects on pedestrian amenity and safety are expected to be moderate adverse (due to loss of footway and local diversions) while effects on cyclists would be minor adverse. A minor adverse effect is expected on river passenger services as a consequence of the relocation of the Blackfriars Millennium Pier. Due to the diversion of bus routes and delays to journey time the effects on bus services is considered to be moderate adverse.

20.13.3 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.

20.13.4 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 safe crossing points for pedestrians and cyclists along the diversion routes and measures to ensure bus service frequency. Mitigation is not required for the operational phase.
20.14 Water resources - ground water

20.14.1 The proposed shaft would pass through the upper aquifer but would not penetrate the lower aquifer beneath. Interception infrastructure would penetrate the upper aquifer. The main receptors are the upper aquifer which is defined as being of medium value, the lower aquifer which is defined as being high value and the nearby private abstractions are defined as being of very high value.

20.14.2 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible. Dewatering may be required for limited periods during construction of the base of the shaft. This may have an impact on the lower aquifer the significance of this is being studied. Once operational the potential effects would be obstruction to groundwater flow and the seepage to and from the shaft. These effects are considered to be negligible with the inclusion of embedded design measures.

20.14.3 Monitoring of groundwater levels and quality would continue throughout construction.

20.15 Water resources – surface water

20.15.1 The site is located within the River Thames within the Thames Middle waterbody, as classified under the Thames River Basin Management Plan. The Thames Middle waterbody is currently classified under the Water Framework Directive as being at moderate potential status, with a status objective of good potential by 2027. There are no nationally or locally designated water-dependent conservation sites within 2 kilometres of the site.
20.15.2 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.

20.15.3 There is also potential for the reduction in the width of the river 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 that is required will be identified in the Environmental Statement.

20.15.4 Once operational the scheme would reduce the number of discharges from the Fleet Main combined sewer overflow (Figure 20.9) to a predicted level of four spills once the tunnel is in place.

20.15.5 This reduction 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 64 days of risk of exposure each year. In addition, the tonnage of sewage derived litter can be expected to be reduced from 131 tonnes to 9 tonnes per year.

Figure 20.9 Fleet combined sewer overflow
20.16 **Flood risk**

20.16.1 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. The proposed construction site may be at risk of surface water flooding in the future due to runoff generated on the land to the north of the site. This risk is considered to be low due to ground levels at the site which would mean other areas would flood before the site.

20.16.2 The work required to construct the shaft and weir chamber would require the local flood defences (Figure 20.10) to be taken down; during construction the temporary works would act as the flood defences and the permanent works would provide local flood defence when complete. The effects of changes in scour and deposition would be reduced through good practice design of the temporary and permanent structures.

**Figure 20.10 View of existing flood walls west of Blackfriars Bridge**

20.17 **Further information**

20.17.1 Further information regarding preliminary assessment findings for Blackfriars Bridge Foreshore can be found in Volume 21 of the Preliminary Environmental Information Report.