25 Greenwich Pumping Station

25.1 Introduction

25.1.1 This section of the non-technical summary presents the preliminary environmental assessment for the Thames Tunnel project at Greenwich Pumping Station (Figure 25.1).

25.1.2 At this site it is proposed that the existing Greenwich Pumping Station Storm Relief Sewer would be linked to the proposed Thames Tunnel through a shaft and a long underground connection tunnel. Currently, the existing combined sewer overflow discharges approximately 51 times a year. The total volume of this discharge is 8,322,500m$^3$ each year.

25.1.3 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.

25.1.4 The environmental topics which have been assessed for this site are listed in the ‘Assessment’ section (25.4). Preliminary assessment findings are then presented topic by topic.

25.2 Site context

25.2.1 The site is shown as site number 21 on Figure 28.1.

25.2.2 The site is located within the London Borough of Greenwich (Figure 25.1). It is also close to the London Borough of Lewisham.

Figure 25.1 Greenwich Pumping Station site location
25.2.3 The site is located within the existing Thames Water pumping station site. The proposed construction site includes the Phoenix/Harts Wharf to the north. Approximately two hectares is required for the temporary construction works, a smaller area is required for the permanent works. The area is indicated by the red line shown on Figure 25.2.

25.2.4 Access to the site would be from Norman Road to the east and Greenwich High Road to the south.

Figure 25.2 Aerial photograph of Greenwich Pumping Station*

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

25.3 Proposed development

25.3.1 The proposal is to intercept the existing combined sewer overflow. 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 Thames Tunnel. For a typical year, this would reduce flows from the combined sewer overflow at this site to an average of four spills a year at total volume of 571,500m$^3$ a year.

25.3.2 In order for this interception and long connection tunnel to be built, construction works at this site would take approximately five and a half years.

25.3.3 A shaft with an internal diameter of approximately 17m and approximately 44m deep would be constructed. Once the shaft is constructed, a tunnel boring machine would be launched through the base of it to construct the connection tunnel to the main tunnel. The connection tunnel would run west from Greenwich to Chambers Wharf via Deptford Church Street and Earl Pumping Station.
25.3.4 Most of the construction would take place from 8am to 6pm, Monday to Friday. Excavation for the connection tunnel would require 24 hour working.

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

25.3.6 Figure 25.3 shows an indicative plan of the construction works.

**Figure 25.3 Indicative plan of construction works for Greenwich Pumping Station**

25.3.7 Once the works at this site have been built, a number of permanent features would be visible including the shaft, the finished level of which would be about 1m above ground level (Figure 25.4). There would be a kiosk housing equipment to control equipment located in the below ground chambers. There would also be ventilation equipment to ensure that the air within the tunnel is continuously circulated. The electrical kiosk and most of the ventilation equipment would be located in the old beam engine house, which is currently disused and located within the grounds of the pumping station.
25.3.8 Ventilation equipment would include electrical fans and odour control units. Treated air would be released through existing vents in the beam engine building. An additional ventilation column would be located on top of the shaft. This would be used on rare occasions to release pressure from the tunnel when the tunnel is filling rapidly. There would be no new lighting at night on the site.

25.3.9 Once the project is built and operational, access to the site would be required for maintenance purposes. Access for routine maintenance would be required every three to six months. More substantial maintenance work would be required every ten years.

**Figure 25.4 Greenwich Pumping Station indicative plan of built development**

25.4 **Assessment**

25.4.1 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

25.4.2 In the following sections, information about the preliminary assessment of each of these topics is presented.

25.4.3 As part of the assessment process, consideration has been given to known major developments that may change future environmental conditions. Several major developments in the vicinity are assumed to be completed during the construction period including the Movement development, a mixed scheme comprising residential, commercial and community uses to the east of the pumping station. The future environmental conditions are however not anticipated to change significantly from those which exist today as a result of other developments.

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

25.5 Air quality and odour

25.5.1 The site is located within the London Borough of Greenwich 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 residential dwellings on Greenwich High Road as well as the future occupiers of the new residential developments to be constructed in the vicinity of the site. There are also the occupiers of commercial premises (Norman House and those west of the site) and users of the Greenwich West Community and Arts Centre to the east of the site and the Devonshire Drive Baptist Church.

25.5.2 Based on this preliminary assessment, it is considered that the overall effect on local air quality from construction road traffic and construction plant is likely to be minor adverse at the residential properties, Community and Arts Centre and the Baptist Church, and negligible at the commercial premises. In terms of construction dust, this is likely to have a minor adverse effect at the closest residential and commercial premises and a negligible effect elsewhere, taking account of the dust control measures in the Code of Construction Practice.

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

25.5.4 Based on this preliminary assessment, it is considered that further measures are not required.
25.6 **Ecology – aquatic**

25.6.1 The combined sewer overflow outfall discharges directly into the designated River Thames and Tidal Tributaries. The Site of Metropolitan Importance includes the tidal reaches of the Deptford Creek, which lies adjacent to the site. Data indicates a reasonably high diversity of fish species (Figure 25.5), but invertebrate diversity is limited.

25.6.2 Construction effects would be managed in accordance with the Code of Construction Practice. With the Code in place and based on assessment findings at this stage, it is anticipated that effects arising from the presence of a campshed, if barging is used at this site, and associated barge movements in the Deptford Creek would be minor adverse for habitats and fish. There would also be minor adverse effects on fish from noise and vibration disturbance and increased sediment in the water causing blanketing of habitat and decreased visibility. All other effects on mammals, fish and invertebrates are considered to be negligible.

25.6.3 It is anticipated that the reduction in fish mortality that would result from improved oxygenation of the water is considered a moderate beneficial effect for the River Thames. There is also considered to be a moderate beneficial effect through increased distribution of rare and/or pollution sensitive fish species, and a similar minor beneficial effect on invertebrates in the longer term of operation. Improved water quality would also result in minor beneficial local improvements in invertebrate diversity and abundance in the longer term of operation. Effects on habitats will be assessed and reported in the Environmental Statement.

25.6.4 Measures are included within the Code of Construction Practice to manage construction effects on aquatic ecology, and no further mitigation during construction is considered to be possible at this stage.

**Figure 25.5** Common bream were found at a number of sites during the aquatic ecology surveys in autumn 2010
25.7 **Ecology – terrestrial**

25.7.1 The site comprises hardstanding, buildings, amenity grassland, scattered trees, shrub planting, scrub and poor semi-improved grassland. Invasive plants are also present on site and these will be removed prior to construction where required. The site is of some interest to invertebrates. Buildings, vegetation and the foreshore on and adjacent to the site has the potential to provide a roosting, foraging and commuting resource for bats, nesting and foraging resource for breeding birds including black redstarts, and resting and foraging habitat for wintering birds. The nearest site designated for ecology is 60m away.

25.7.2 Surveys are ongoing and will be reported in the Environmental Statement.

25.7.3 Based on the preliminary assessment findings and given the localised nature of the works, no significant effects on designated sites are anticipated during construction (aquatic ecology effects are considered in section 25.6). Site clearance would have a site level adverse effect on habitats and invertebrates. The effects on bats, breeding birds (black redstart) and wintering birds will be assessed and reported in the Environmental Statement.

25.7.4 It is anticipated that operational activity would be limited to occasional maintenance work, which is considered unlikely to have significant effects on terrestrial ecology. A brown roof is proposed on the shaft.

25.7.5 In addition to measures in the Code of Construction Practice, measures to address adverse effects during construction are likely to include reinstatement and replacement of habitat. Any further measures, such as species specific habitat creation or disturbance minimisation, will be formulated subject to survey results and reported in the Environmental Statement.

25.8 **Historic environment**

25.8.1 The site includes the Greenwich Pumping Station buildings, which include the Grade II listed beam engine house (Figure 25.6), and a Grade II listed coal shed (of high heritage asset significance), and cooling tank (of medium heritage asset significance). The site also contains an early 20th-century electricity substation (of medium heritage asset significance) and a Grade II listed 19th-century railway viaduct over Deptford Creek (of high heritage asset significance). The Ashburnham Triangle Conservation Area (of high heritage asset significance) lies immediately to the south and the site itself lies within an Archaeological Priority Area. A Grade II listed brick-built railway viaduct over Deptford Creek also lies in the northern part of the site. There are further listed buildings in the vicinity of the site, including a number of buildings on Greenwich High Road.
25.8.2 The site lies within a locally designated Area of Archaeological Potential, with the highest potential being for palaeoenvironmental remains (e.g. organic remains such as pollens or plant fossils), of low or medium heritage asset significance, and post-medieval 18th–19th footings and/or cellars of buildings (of low heritage asset significance). The site also has a moderate potential to contain the remains of later medieval revetments or wharves, of low or medium heritage asset significance. Potential for prehistoric, Roman and early medieval remains is considered to be low as the site lay outside the main areas of settlement in these periods.

25.8.3 The listed north beam engine house would house ventilation structures associated with the scheme. Modifications to the building would result in a minor adverse effect, whilst bringing this derelict building back into use would potentially have a moderate or major beneficial effect. The listed coal sheds would be removed temporarily and reinstated, resulting in a major, but temporary, adverse effect. Construction works would entail deep excavations which would entirely remove any buried assets within the footprint of each excavation. If any such assets were found to be present, then this would comprise a high magnitude of impact and would give rise to a minor adverse effect on palaeoenvironmental remains and post-medieval remains, and a minor or moderate adverse effect on later medieval remains.

25.8.4 To mitigate the effects on above ground structures to be removed, these would be recorded in line with accepted standards to form preservation by record, and the modifications to the north beam engine house would employ appropriate techniques and materials. 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.

25.8.5 Effects on the historic environment arising from the operation of the Thames Tunnel infrastructure at Greenwich Pumping Station, on the setting of above ground heritage assets such as the Grade II listed beam engine houses and the Ashburnham Conservation Area, will be assessed and presented in the Environmental Statement. Any mitigation requirements will also be presented.
25.9 **Land quality**

25.9.1 A search of historical and environmental data indicates that there are no potentially contaminating activities on site (other than the pumping station) that are judged to have impacted the site directly. Historical mapping has identified a number of potentially contaminating off site uses including the railway line; gas, tar and chemical works. It is however considered unlikely that these activities have significantly contaminated the soils in the location of the site. Ground investigations have recorded no on-site soil contamination although groundwater contamination has been recorded. Desk based studies have identified a high risk from unexploded ordnance.

25.9.2 Based on preliminary assessment findings, 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. The preliminary assessment therefore identified no need for mitigation during the construction phase. The Environmental Statement will consider information from ground investigations and the potential for foreshore sediment contamination.

25.9.3 During operation there would be negligible effect on future users and a slight effect on the built environment. The assessment identified no need for mitigation during the operational phase.
25.10 Noise and vibration

25.10.1 The site is dominated by road traffic and rail noise and the operation of the industrial units in the area. The nearest locations to the site which are sensitive to noise and vibration are residential premises located to the south and east of the site. Based on this preliminary assessment, significant noise effects arising from construction activities are predicted at residential properties at Hatfield House, Torrent Lodge, Block E, Greenwich High Street and The Movement (proposed development) and at the commercial building Norman House. No significant vibration effects arising from construction activities are predicted at any of the areas considered in the assessment. No significant effects as a result of the operation of the site are predicted.

25.10.2 Information relating to the project wide assessment of predicted groundborne noise and vibration impacts arising from the operation of tunnel boring machine and the temporary construction railway serving the tunnel boring machine during construction of the Greenwich Connection Tunnel is contained in section 5.5.

25.10.3 During construction activities, 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 for example through suitable siting of equipment on site.

25.10.4 It is anticipated that additional mitigation would be required to address significant noise effects. This could include the use of localised screens and enclosures to reduce noise from particularly noisy, static operations.

25.10.5 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.

25.11 Socio-economics

25.11.1 The site comprises Thames Water’s operational land and a builder’s yard, bisected by a public footpath. Residential and commercial uses, including an office building and industrial premises surround the site (Figure 25.7). A new mixed-use development is being constructed to the south west.

25.11.2 During construction, there are considered to be major adverse effects on the amenity of nearby residents and moderate adverse effects arising from displacement of business activity. There are not anticipated to be any operational socio-economic significant effects resulting from the use of the site.

25.11.3 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 amenity effects which have been identified in this preliminary assessment.
25.11.4 For the operational phase, there are not expected to be any socio-economic effects at Greenwich Pumping Station which require mitigation.

Figure 25.7 Commercial buildings on the opposite bank of Deptford Creek

25.12 Townscape and visual

25.12.1 The site is characterised by large areas of hard standing surrounding the operational pumping station and is generally in a fair condition.

25.12.2 Based on preliminary assessment findings, during the construction phase, the removal of existing structures and vegetation and the presence of cranes and plant would have a moderate adverse townscape effect on the character of the site and the Ashburnham Triangle Conservation Area. There would be a minor adverse effect on Creekside Industrial and Greenwich Residential. Once operational, preliminary assessment findings indicate that since the majority of structures would be housed within the existing Beam Engine House or below ground, it is likely that the scheme would give rise to negligible effects on townscape character areas.

25.12.3 In terms of visual amenity, preliminary assessment findings indicate that during the construction phase due to the visibility of hoardings, construction activity, cranes and building demolition, there is likely to be a major adverse visual effect on the view from Deptford Creek. There would be a moderate adverse effect on the views from Blackheath Point and Greenwich High Road. There would be a minor adverse effect on views from Greenwich High Road, Norman Street and Deptford Creek due to the visibility of construction traffic and intermittent visibility of cranes. Once operational, preliminary assessment findings indicate due to the majority of structures being housed within the existing Beam Engine House or below ground it is judged that the scheme would give rise to negligible effects on visual amenity.
25.12.4 Measures to be employed during the construction phase are being incorporated into the proposals, for example, through protection of trees. In terms of operation, a process of iterative design and assessment has been employed to reduce adverse effects and maximise beneficial effects. It is likely that townscape and visual effects during operation would be negligible and therefore no further mitigation is proposed. Any remaining operational effects will depend on the final architectural and landscape design and will be reported in the Environmental Statement.

25.13 Transport

25.13.1 The Greenwich Pumping Station site has good public transport accessibility being located within close proximity of Greenwich Docklands Light Rail and mainline station. There would be access points on Greenwich High Road (A206) and Norman Road (B208).

25.13.2 During construction, the number of heavy goods vehicle movements would be moderate to high. The nature of the construction site layout at this location is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian facilities are expected to be moderate adverse (due to the risk of conflict with vehicles around the site access points) and on cyclist amenity and safety are expected to be minor adverse. It is considered that there would be a negligible effect on rail and river passenger services and a minor adverse effect is expected on bus 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.

25.13.3 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 involve the provision of safe crossing points for pedestrians and traffic signal optimisation to improve pedestrian crossing times and junction capacity. Mitigation is not required for the operational phase.

25.14 Water resources - ground water

25.14.1 The proposed connection tunnel drive shaft 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 medium value, the lower aquifer, defined as high value and abstractions from the lower aquifer, defined as very high value.
25.14.2 Construction effects on the upper aquifer would be the physical obstruction to groundwater flow and the potential of opening of a pathway for pollution. The effect on groundwater flow is considered to be negligible. Contamination to the groundwater has been identified at the site and a risk based approach would be used to identify appropriate remediation. Construction effects on the lower aquifer would include dewatering, which could affect 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. These effects will be subject to further assessment.

25.14.3 Once operational, potential effects include obstruction to groundwater flow and the risk from seepage into and out of the shaft. These effects are considered to be negligible for the upper aquifer and minor adverse for the lower aquifer at this stage.

25.14.4 Monitoring of groundwater levels and water quality would continue during construction.

25.15 Water resources – surface water

25.15.1 The site is located adjacent to Deptford Creek, approximately 600 metres from the River Thames.

25.15.2 The section of the River Thames closest to the site lies within a zone of the river defined by the Environment Agency as the Thames Middle waterbody (including Deptford Creek). This 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 designated water dependent conservation sites with 2 kilometres of the site.

25.15.3 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 additional mitigation would therefore be required.

25.15.4 There is also potential for partial river bed loss from any construction in Deptford Creek and for campsheds to change the river flows, which could lead to scour at the flood defences. The effects would be temporary during construction as some natural foreshore restoration would occur after temporary construction structures are removed. Any mitigation options required will be identified in the Environmental Statement.

25.15.5 Once operational, the scheme would reduce the number of discharges to a predicted level of four spills per year once the tunnel is in place.

25.15.6 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 96 days of risk of exposure per year. In addition, the tonnage of sewage derived litter can be expected to be reduced from approximately 2,100 tonnes to 315 tonnes per year.
25.16 Flood risk

25.16.1 The main source of flood risk to the site is tidal risk from Deptford Creek and the River Thames. The site is located within the ‘high probability’ flood zone, however it benefits from local flood defences which run along the eastern bank of Deptford Creek. The site may also be at risk of localised surface water ponding.

25.16.2 The route of the connection tunnel associated with this site passes beneath the existing tidal flood defences to the west of the site. The works required to construct the tunnel could affect the local flood defences and further studies are being completed to assess potential impacts. No changes are proposed to the existing flood defences therefore they would continue to provide their current standard of flood protection.

25.16.3 The effects of changes in scour and flow regimes would be reduced through good practice design of the temporary structures. Any increases in hard standing and the resultant increase in surface water runoff would be mitigated for in accordance with current planning policy.

25.17 Further information

25.17.1 Further information regarding preliminary assessment findings for Greenwich Pumping Station can be found in Volume 26 of the Preliminary Environmental Information Report.