# Thames Tideway Tunnel

## Section 48: Project description and environmental information report

### List of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Section 48: Project description and environmental information</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>The Thames Tideway Tunnel project</td>
<td>2</td>
</tr>
<tr>
<td>1.3</td>
<td>The proposed solution</td>
<td>3</td>
</tr>
<tr>
<td>1.4</td>
<td>The assessment process</td>
<td>7</td>
</tr>
<tr>
<td>1.5</td>
<td>Environmental baseline information</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Project-wide effects</td>
<td>11</td>
</tr>
<tr>
<td>2.1</td>
<td>Introduction</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>Air quality</td>
<td>11</td>
</tr>
<tr>
<td>2.3</td>
<td>Ecology – aquatic</td>
<td>11</td>
</tr>
<tr>
<td>2.4</td>
<td>Historic environment</td>
<td>12</td>
</tr>
<tr>
<td>2.5</td>
<td>Noise and vibration</td>
<td>13</td>
</tr>
<tr>
<td>2.6</td>
<td>Socio-economics</td>
<td>13</td>
</tr>
<tr>
<td>2.7</td>
<td>Transport</td>
<td>13</td>
</tr>
<tr>
<td>2.8</td>
<td>Water resources – groundwater</td>
<td>14</td>
</tr>
<tr>
<td>2.9</td>
<td>Water resources – surface water</td>
<td>14</td>
</tr>
<tr>
<td>2.10</td>
<td>Water resources – flood risk</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Acton Storm Tanks</td>
<td>16</td>
</tr>
<tr>
<td>3.1</td>
<td>Location and context of proposed development</td>
<td>16</td>
</tr>
<tr>
<td>3.2</td>
<td>Nature of the proposed development</td>
<td>18</td>
</tr>
<tr>
<td>3.3</td>
<td>Environmental effects</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Hammersmith Pumping Station</td>
<td>26</td>
</tr>
<tr>
<td>4.1</td>
<td>Location and context of proposed development</td>
<td>26</td>
</tr>
<tr>
<td>4.2</td>
<td>Nature of proposed development</td>
<td>28</td>
</tr>
<tr>
<td>4.3</td>
<td>Environmental effects</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Barn Elms</td>
<td>37</td>
</tr>
<tr>
<td>5.1</td>
<td>Location and context of proposed development</td>
<td>37</td>
</tr>
<tr>
<td>5.2</td>
<td>Proposed development</td>
<td>39</td>
</tr>
<tr>
<td>5.3</td>
<td>Environmental effects</td>
<td>41</td>
</tr>
</tbody>
</table>
6 Putney Embankment Foreshore ................................................................. 48
   6.1 Location and context of proposed development ................................. 48
   6.2 Nature of proposed development ..................................................... 50
   6.3 Environmental effects ..................................................................... 53
7 Carnwath Road Riverside ....................................................................... 60
   7.1 Location and context of development ................................................. 60
   7.2 Nature of the proposed development ............................................... 62
   7.3 Environmental effects ..................................................................... 64
8 Dormay Street .......................................................................................... 71
   8.1 Location and context of proposed development ................................. 71
   8.2 Nature of the proposed development ............................................... 73
   8.3 Environmental effects ..................................................................... 75
9 King George's Park .................................................................................. 82
   9.1 Location and context of proposed development ................................... 82
   9.2 Nature of the proposed development ............................................... 84
   9.3 Environmental effects ..................................................................... 86
10 Falconbrook Pumping Station ................................................................. 93
   10.1 Location and context of proposed development ............................... 93
   10.2 Nature of the proposed development .............................................. 95
   10.3 Environmental effects ................................................................... 97
11 Cremorne Wharf Depot .......................................................................... 103
   11.1 Location and context of proposed development ............................... 103
   11.2 Nature of the proposed development .............................................. 105
   11.3 Environmental effects ................................................................... 107
12 Chelsea Embankment Foreshore ............................................................. 114
   12.1 Location and context of proposed development ............................... 114
   12.2 Nature of the proposed development .............................................. 116
   12.3 Environmental effects ................................................................... 118
13 Kirtling Street .......................................................................................... 126
   13.1 Location and context of proposed development ............................... 126
   13.2 Nature of the proposed development .............................................. 128
   13.3 Environmental effects ................................................................... 130
14 Heathwall Pumping Station .................................................................... 137
   14.1 Location and context of proposed development ............................... 137
   14.2 Nature of proposed development ................................................... 139
   14.3 Environmental effects ................................................................... 141
15 Albert Embankment Foreshore ............................................................... 148
   15.1 Location and context of proposed development ............................... 148
15.2 Nature of the proposed development .................................................. 150
15.3 Environmental effects ........................................................................ 154

16 Victoria Embankment Foreshore ............................................................ 162
16.1 Location and context of proposed development .................................. 162
16.2 Nature of the proposed development .................................................. 164
16.3 Environmental effects ........................................................................ 166

17 Blackfriars Bridge Foreshore ................................................................. 174
17.1 Location and context of proposed development .................................. 174
17.2 Nature of the proposed development .................................................. 176
17.3 Environmental effects ........................................................................ 178

18 Shad Thames Pumping Station ............................................................... 185
18.1 Location and context of proposed development .................................. 185
18.2 Nature of the proposed development .................................................. 187
18.3 Environmental effects ........................................................................ 189

19 Chambers Wharf .................................................................................... 193
19.1 Location and context of proposed development .................................. 193
19.2 Nature of the proposed development .................................................. 195
19.3 Environmental effects ........................................................................ 198

20 Earl Pumping Station ............................................................................. 204
20.1 Location and context of proposed development .................................. 204
20.2 Nature of proposed development ........................................................ 206
20.3 Environmental effects ........................................................................ 208

21 Deptford Church Street .......................................................................... 214
21.1 Location and context of proposed development .................................. 214
21.2 Nature of the proposed development .................................................. 216
21.3 Environmental effects ........................................................................ 218

22 Greenwich Pumping Station ................................................................. 225
22.1 Location and context of proposed development .................................. 225
22.2 Nature of proposed development ........................................................ 227
22.3 Environmental effects ........................................................................ 229

23 King Edward Memorial Park Foreshore ................................................. 236
23.1 Location and context of proposed development .................................. 236
23.2 Nature of the proposed development .................................................. 238
23.3 Environmental effects ........................................................................ 240

24 Bekesbourne Street ................................................................................ 248
24.1 Location and context of proposed development .................................. 248
24.2 Nature of the proposed development .................................................. 250
24.3 Environmental effects ........................................................................ 251
25 Abbey Mills Pumping Station ................................................................. 253
  25.1 Location and context of proposed development ............................... 253
  25.2 Nature of the proposed development ............................................... 255
  25.3 Environmental effects ..................................................................... 257
26 Beckton Sewage Treatment Works ...................................................... 263
  26.1 Location and context of proposed development ............................... 263
  26.2 Nature of the proposed development ............................................... 265
  26.3 Environmental effects ..................................................................... 266

List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>6</td>
</tr>
<tr>
<td>3.1</td>
<td>17</td>
</tr>
<tr>
<td>3.2</td>
<td>17</td>
</tr>
<tr>
<td>3.3</td>
<td>20</td>
</tr>
<tr>
<td>4.1</td>
<td>27</td>
</tr>
<tr>
<td>4.2</td>
<td>27</td>
</tr>
<tr>
<td>4.3</td>
<td>30</td>
</tr>
<tr>
<td>5.1</td>
<td>38</td>
</tr>
<tr>
<td>5.2</td>
<td>39</td>
</tr>
<tr>
<td>5.3</td>
<td>41</td>
</tr>
<tr>
<td>6.1</td>
<td>49</td>
</tr>
<tr>
<td>6.2</td>
<td>50</td>
</tr>
<tr>
<td>6.3</td>
<td>52</td>
</tr>
<tr>
<td>7.1</td>
<td>61</td>
</tr>
<tr>
<td>7.2</td>
<td>61</td>
</tr>
<tr>
<td>7.3</td>
<td>64</td>
</tr>
<tr>
<td>8.1</td>
<td>72</td>
</tr>
<tr>
<td>8.2</td>
<td>72</td>
</tr>
<tr>
<td>8.3</td>
<td>75</td>
</tr>
<tr>
<td>9.1</td>
<td>83</td>
</tr>
<tr>
<td>9.2</td>
<td>83</td>
</tr>
<tr>
<td>9.3</td>
<td>86</td>
</tr>
<tr>
<td>10.1</td>
<td>94</td>
</tr>
</tbody>
</table>
Figure 10.2  Falconbrook Pumping Station – aerial photograph ............................... 94
Figure 10.3  Falconbrook Pumping Station – illustrative visualisation ...................... 97
Figure 11.1  Cremorne Wharf Depot– site location and context ............................. 104
Figure 11.2  Cremorne Wharf Depot – aerial photograph ...................................... 104
Figure 11.3  Cremorne Wharf Depot – illustrative visualisation .............................. 107
Figure 12.1  Chelsea Embankment Foreshore – site location and context ................. 115
Figure 12.2  Chelsea Embankment Foreshore – aerial photograph .......................... 116
Figure 12.3  Chelsea Embankment Foreshore – illustrative visualisation .................. 118
Figure 13.1  Kirtling Street – site location and context ............................................ 127
Figure 13.2  Kirtling Street – aerial photograph ...................................................... 127
Figure 13.3  Kirtling Street – illustrative visualisation .............................................. 130
Figure 14.1  Heathwall Pumping Station – site location and context ...................... 138
Figure 14.2  Heathwall Pumping Station – aerial photograph ................................... 138
Figure 14.3  Heathwall Pumping Station – illustrative visualisation ........................ 141
Figure 15.1  Albert Embankment Foreshore – site location and context ................. 149
Figure 15.2  Albert Embankment Foreshore – aerial photograph ............................ 150
Figure 15.3  Albert Embankment Foreshore – illustrative visualisation .................... 153
Figure 16.1  Victoria Embankment Foreshore – site location and context ............... 163
Figure 16.2  Victoria Embankment Foreshore – aerial photograph .......................... 164
Figure 16.3  Victoria Embankment Foreshore – illustrative visualisation .................. 166
Figure 17.1  Blackfriars Bridge Foreshore – site location and context .................... 175
Figure 17.2  Blackfriars Bridge Foreshore – aerial photograph ............................... 175
Figure 17.3  Blackfriars Bridge Foreshore – illustrative visualisation ........................ 178
Figure 18.1  Shad Thames Pumping Station – site location and context ................... 186
Figure 18.2  Shad Thames Pumping Station – aerial photograph ............................. 187
Figure 18.3  Shad Thames Pumping Station – illustrative visualisation ..................... 189
Figure 19.1  Chambers Wharf – site location and context ...................................... 194
Figure 19.2  Chambers Wharf – aerial photograph .................................................. 194
Figure 19.3  Chambers Wharf – illustrative visualisation ........................................ 197
Figure 20.1  Earl Pumping Station – site location and context .............................. 205
Figure 20.2  Earl Pumping Station – aerial photograph .......................................... 205
Figure 20.3  Earl Pumping Station – illustrative visualisation ................................ 207
Figure 21.1  Deptford Church Street – site location and context ............................ 215
Figure 21.2  Deptford Church Street – aerial photograph ........................................ 215
Figure 21.3  Deptford Church Street – illustrative visualisation .............................. 218
Figure 22.1  Greenwich Pumping Station – site location and context .................... 226
Figure 22.2  Greenwich Pumping Station – aerial photograph ............................... 226
Figure 22.3  Greenwich Pumping Station – illustrative visualisation ....................... 229
Figure 23.1  King Edward Memorial Park Foreshore – site location and context .... 237
Figure 23.2  King Edward Memorial Park Foreshore – aerial photograph ............ 238
Figure 23.3  King Edward Memorial Park Foreshore – illustrative visualisation ..... 240
Figure 24.1  Bekesbourne Street – site location and context .................................. 249
Figure 24.2  Bekesbourne Street – aerial photograph ............................................ 249
Figure 25.1  Abbey Mills Pumping Station – site location and context .................... 254
Figure 25.2  Abbey Mills Pumping Station – aerial photograph .............................. 255
Figure 25.3  Abbey Mills Pumping Station – illustrative visualisation .................... 257
Figure 26.1  Beckton Sewage Treatment Works – site location and context ......... 264
Figure 26.2  Beckton Sewage Treatment Works – aerial photograph .................... 264
1 Introduction

1.1 Introduction

1.1.1 This report has been prepared to support the publicising of the proposed application for a development consent order for the Thames Tideway Tunnel project (the 'project') under Section 48 of the Planning Act 2008.

1.1.2 Regulation 4 of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 requires the applicant to publish a notice of the proposed application which must include (amongst other things) a statement that the documents, plans and maps showing the nature and location of the proposed development are available for inspection. This report forms one of the documents being made available for that purpose.

1.1.3 The purpose of the project is to reduce and limit pollution from combined sewer overflows into the Thames Tideway (the tidal reaches of the River Thames). The project is an environmental impact assessment (EIA) development for the purposes of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations). An **Environmental Statement** will be submitted with the application for development consent for the project and will contain a full assessment of the likely significant effects of the project on the environment.

1.1.4 This report provides a description of the project, including the activities that will take place during the construction and operational phases. Environmental effects are described to assist stakeholders in understanding the nature and location of the proposed development; however it is not an **Environmental Statement** for the purposes of the EIA Regulations. The environmental information presented in this report follows the scope set out in the Scoping report published in March 2011 and the **Preliminary environmental information report (PEIR)** that was published during the phase two public consultation on the project, which took place from November 2011 to February 2012. Both reports are available on the project website.

1.1.5 The background to the project and an overview of the proposed scheme are described in Sections 1.2 and 1.3. In Section 1.4, an overview is given of the environmental impact assessment process which is being applied for the project. Section 1.5 provides a brief description of the environmental baseline information. Section 2 provides an overview of the anticipated project-wide effects. The remaining sections describe the nature and location of the development, describing the site context, the construction and operation phases and setting out information on the likely environmental effects at each of the proposed sites for the construction and operation of the project.

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1 Introduction

1.2 The Thames Tideway Tunnel project

Background

1.2.1 London’s sewer system was designed by Sir Joseph Bazalgette in the 1850s to handle wastewater and rainwater runoff by means of a combined collection system. In order to prevent the sewers from flooding when overloaded, particularly during periods of heavy rainfall, combined sewer overflows were incorporated to discharge excess flows from the sewers into the Thames Tideway.

1.2.2 The capacity of the original and subsequently extended combined sewer system has now been substantially exceeded. Discharges of combined sewage (untreated sewage mixed with rainwater) into the Thames Tideway currently occur more than 50 times in a typical year, at an estimated volume of 39 million cubic metres.

1.2.3 Discharges must be reduced in order to comply with relevant wastewater legislation. The UK Government is required to meet the requirements of the Urban Waste Water Treatment Directive and the Water Framework Directive. Thames Water must meet the requirements of the related UK Urban Waste Water Treatment Regulations 1994 in respect of collecting and treating sewage within its area, and the requirements of the Water Environment (England and Wales) Regulations 2003 in respect of reaching good chemical and ecological status in inland and coastal waters by 2015.

1.2.4 Solutions to the problem of wastewater discharges into the Thames Tideway have been under examination for more than ten years. The Thames Tideway Tunnel project has been determined to be the most technologically sound and cost-effective means of controlling discharges and satisfying regulatory requirements. This has been confirmed by independent studies and by Thames Water.

1.2.5 In February 2012, the Department for Environment, Food and Rural Affairs (Defra) published the Thames Tunnel Evidence Assessment – Final Report, which considered whether the need for the Thames Tideway Tunnel project has been verifiably assessed according to comprehensive and appropriate scientific standards and methods. The report concluded that the evidence base for the project is comprehensive and that it adequately covers relevant issues. It also stated that, given the extensive range of evidence gathered and reviewed, in general it was produced to appropriate scientific standards and using verifiable methods.

Statement. A review of the background of reasonable alternatives to the project concluded that the best way to resolve the issue of frequent spills of combined sewage into the Thames Tideway would be to develop the Thames Tideway Tunnel, which is considered to be the most cost-effective and timely solution to address the problem.

1.2.7 Further information on the need for the project is provided in the Needs report, which is available on the project website.

1.3 The proposed solution

Overview

1.3.1 The project comprises a wastewater storage and transfer tunnel (the ‘main tunnel’) between Thames Water’s existing operational sites at Acton Storm Tanks and Abbey Mills Pumping Station that would capture combined sewage flows from 34 combined sewer overflows identified as ‘unsatisfactory’ by the Environment Agency. The flows would be stored in the main tunnel system and transferred to Beckton Sewage Treatment Works for treatment.

1.3.2 The Thames Tideway Tunnel project comprises two main elements:
   a. tunnels
      i  main
      ii  connection
   b. sites
      i  main tunnel sites
      ii  combined sewer overflow sites
      iii  Beckton Sewage Treatment Works
      iv  system modifications.

Main tunnel

1.3.3 The horizontal alignment of the main tunnel would generally follow the River Thames where possible and practical, because:
   a. It is an efficient route to connect the combined sewer overflows located on the north and south banks of the river.
   b. It would allow the use of the river for construction transport (material supply and removal), where practicable and economic.
   c. It would minimise the number of structures the tunnel would pass beneath and so reduce the number of third parties affected.

1.3.4 The route of the main tunnel would take the shortest line from Acton Storm Tanks to the River Thames and stay mostly beneath the river from west London to Rotherhithe. It would then divert from beneath the River Thames to the northeast via the Limehouse Cut and terminate at Abbey Mills Pumping Station, where it would connect to the Lee Tunnel. The captured combined sewage would then be transferred to Beckton Sewage Treatment Works via the Lee Tunnel. An overview of the tunnel...
alignment, including details of the geology that the tunnel would pass through, is provided at Figure 1.1.

1.3.5 The main tunnel would be approximately 25km long with a nominal internal diameter of between 6.5 and 7.2m. The approximate depth of the tunnel would be between 30m in west London and 65m in east London in order to provide sufficient clearance to existing tunnels and facilities under the capital.

1.3.6 Shafts would be constructed down to the appropriate depth and tunnel boring machines would be used to construct the main tunnel. The tunnel boring machines would start from shafts known as ‘drive shafts’ and would be removed at shafts known as ‘reception shafts’. A shaft may serve as both a drive shaft and a reception shaft.

**Connection tunnels**

1.3.7 Two long connection tunnels would be required in order to connect five intercepted combined sewer overflows to the main tunnel as the interception points are some distance away from the main tunnel. The tunnels are known as the Frogmore connection tunnel (approximately 2.6m in internal diameter and approximately 1.1km long) situated in Wandsworth, and the Greenwich connection tunnel (approximately 5m in internal diameter and approximately 4.6km long) which would pass through Southwark, Lewisham and Greenwich.

1.3.8 A series of short connection tunnels would also be required to connect combined sewer overflows that are closer to the main tunnel.

**Sites**

**Main tunnel sites**

1.3.9 Main tunnel sites would be used for the construction and operation of the main tunnel and can be classified according to whether they are the start or end point of a tunnel boring machine route. Start points are known as ‘drive sites’ and end points are known as ‘reception sites’. Shafts would be constructed down to the appropriate depth and the tunnel boring machines would be driven from the drive shafts and removed from the reception shafts.

**Combined sewer overflow sites**

1.3.10 Combined sewer overflow sites would be used for works to intercept and control existing combined sewer overflows and connect them to the main tunnel. Each combined sewer overflow site would temporarily accommodate the construction equipment and activities required to create the combined sewer overflow interception and control facilities. They would also house the permanent structures required for the operation, ventilation and maintenance of the combined sewer overflows, which would include:

a. ventilation structures, air extraction fans, odour treatment facilities, and ventilation columns

b. a means of access and space adjacent to the interception location and drop structures for periodic inspection and maintenance
c. a kiosk structure to house control equipment.

1.3.11 All construction sites would be restored on completion of the works by means of levelling, in-filling, landscaping and making good.

**Beckton Sewage Treatment Works**

1.3.12 Upgrades at Beckton Sewage Treatment Works are also required as part of the project to enable the works to cater for the additional volume of combined sewage flows over and above those from the Lee Tunnel.

1.3.13 The overflow from the Lee Tunnel, which was constructed as part of the Lee Tunnel project, would be re-configured. This would require the construction of two shafts and connection tunnels as well as the installation of two additional pumps, associated culverts, pipelines and tunnels.

**System modifications**

1.3.14 Other works are also required in order to integrate the project into the existing sewerage system. This includes small scale in-sewer modification works, routine inspections of sewers, and minor street works that would be undertaken at or in the vicinity of existing Thames Water combined sewer overflow sites and associated infrastructure. These other works would be subject to the usual notification procedures for affected streets and would be of limited duration.
Figure 1.1 Thames Tideway Tunnel site overview
1.4 The assessment process

1.4.1 As stated in para.1.1.4, the purpose of this report is to provide environmental information in order to assist stakeholders in understanding the nature and location of the proposed development. The environmental information presented in this report draws on the environmental impact assessment for the project, however this report is not an *Environmental Statement*.

1.4.2 Section 2 presents information on the project-wide environmental effects. Sections 3 onwards present information on environmental effects for each site. The following topics are included in the assessments:

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.

1.4.3 For all the above list of topics which are included in the assessment, baseline information has been gathered, this is described in Section 1.5. The assessment is based on existing environmental conditions, taking account of other factors that may change conditions over time. For example, approved development projects near to a specific Thames Tideway Tunnel site may be developed before construction of the Thames Tideway Tunnel commences. This could introduce new residential occupiers who are factored into the assessment accordingly.

1.4.4 The assessment process identifies how the existing environment may be affected by the construction and operation of the proposed Thames Tideway Tunnel development. This has been undertaken for each site, and for some environmental topics, at a project-wide scale.

1.4.5 For each site, information on the location and context of each site is described together with information on construction and operation of the proposed development. The assessment is based on project plans such as clearance and demolition plans, construction plans, access plans for construction and operation, plans of the permanent layout and landscaping. These plans are included in a separate *Book of plans* and should be referred to when reviewing each site.

1.4.6 During the construction phase, environmental controls would be implemented through a *Code of construction practice*, part of the documentation being published at the Section 48 stage. This *Code of
construction practice is draft and continuing to develop. This document is being provided voluntarily at this stage so that stakeholders have an indication as to the activities that are anticipated to be undertaken as part of the project to manage construction impacts on the environment. The Code of construction practice will support the Development consent order (DCO) application for the Thames Tideway Tunnel project. This Code includes standards and procedures for managing construction site activities, environmental monitoring and a stakeholder communication strategy. Site-specific controls would also be put in place during the construction phase in response to the wide range of sites across the route of the main tunnel.

1.5 Environmental baseline information

Air quality

1.5.1 Existing and base case conditions have been established through a review of air quality data collected from local authorities. In addition, baseline monitoring has been established at all the proposed sites using diffusion tubes. Background data have also been collected from the Defra website. Odour complaint data have been collected from local authorities and Thames Water’s customer services department to determine whether there are any existing odour issues at the sites; this has been supported by baseline monitoring. The project-wide assessment considers the effects of the project on the wider air quality at borough and city-level.

Ecology – aquatic

1.5.2 The understanding of existing conditions, establishing the base case, and the way in which the assessment has been shaped are based on field survey data collected for the project, consultation with stakeholders and background data obtained from sources such as the Environment Agency. A programme of field surveys for habitats, fish, invertebrates and algae were undertaken in 2010, 2011 and 2012.

Ecology – terrestrial

1.5.3 Existing data sources have been reviewed from Greenspace Information for Greater London (GiGL) as well as information from stakeholders. An initial phase 1 ecology survey has then been undertaken for each site. Based on this, the need for further surveys was identified on a site by site basis. Across the project, this has included surveys for badgers, otter and water vole, bats, wintering and breeding birds including black redstarts, reptiles, invertebrates and invasive plants.

Historic environment

1.5.4 For each site-specific assessment, documentary and cartographic sources, including results from any archaeological investigations within the site and a study area around it were examined in order to determine the likely nature, extent, preservation and significance of any heritage assets that may be present. The project-wide assessment places individual built and buried heritage assets into a broader assessment framework to
1 Introduction

ensure such assets are considered in an integrated manner as part of a wider historic environment of past and present landscapes following guidance.

**Land quality**

1.5.5 For each site assessment, a detailed review of historic maps was undertaken to identify likely contaminating land uses both on and close to each site. Additional data have also been supplied by local authorities.

1.5.6 At some sites, particularly those with a previous development history, it has been possible to use contamination data from existing boreholes or other investigations. Foreshore sediments in the vicinity of most foreshore sites have been sampled and at a few sites it has been possible to use data from intrusive site investigations undertaken as part of the Thames Tideway Tunnel project.

**Noise and vibration**

1.5.7 Data to describe the noise and vibration existing and base case conditions were taken from a desk-based review of site information and baseline surveys of noise around the sites. Noise sensitive locations at which measurements have been taken include residential areas, other noise sensitive buildings and/or public amenities around the project at locations that could be exposed to construction or operational noise. The results have been used to compare against the estimated noise levels associated with the construction and operation of the development.

**Socio-economics**

1.5.8 Data and information have been obtained from a wide range of sources including desk-based data collection, reconnaissance field surveys and information provided by stakeholders. Data have been collected at different spatial levels according to the nature of the potential effect to be assessed and the particular requirements for the site-specific condition in question. For example census data have been used to determine travel to work areas, borough level information, such as employment land surveys, used to determine employment floorspace supply and vacancies, and field surveys to seek to verify local conditions.

**Townscape and visual**

1.5.9 Existing data sources have been reviewed to inform understanding about site-specific conditions, for example conservation area appraisals. Field survey data has then been obtained to identify the physical attributes of the townscape and character of each area and to take a photographic record. Visual surveys have been undertaken in summer and winter.

1.5.10 Verifiable photographs were taken for the visual assessment during daytime and night time for construction phase photomontages as required and during daytime for operational photomontages and also at night time where agreed with stakeholders. All verifiable photographs were taken during winter. Surveying of the camera location and photographic reference points was undertaken for each of the verifiable photography
viewpoints. This allowed the creation of a photo-real model to allow an assessment of effects with and without the development in place.

**Transport**

1.5.11 Existing transport conditions at each site have been established and agreed with Transport for London and the Local Highways Authorities to provide the base case against which the potential effects arising from the construction and operation of the project can be assessed.

1.5.12 Establishing existing conditions has been informed by site visits, collation of available information from Transport for London and the Local Highways Authorities and other sources and an extensive suite of field surveys.

1.5.13 For borough level and project-wide assessments, reference has been made where appropriate to Transport for London's existing sub-regional models to examine the strategic effects of wider traffic or public transport service diversions. The areas examined have been agreed with Transport for London and the Local Highways Authorities and include borough roads and parts of the Transport for London Road Network likely to be affected by the project. The intention is to provide consistency with other work already undertaken by Transport for London and consistency across the assessment of borough level and project-wide effects.

**Water resources – groundwater**

1.5.14 A combination of desk-based sources and field surveys (groundwater quality and level monitoring) has been used to provide a comprehensive data set of conditions across all sites, strata and land quality conditions at sites and along the tunnel alignment.

**Water resources – surface water**

1.5.15 Baseline data have been collected from sources including the Thames River Basin Management Plan, Automatic Quality Monitoring Station (AQMS) and spot sample water quality data for the Tideway, (as supplied by the EA), computational model simulations of both the sewer network (including CSO operation) and the water quality conditions of the Tideway. Data on Dissolved Oxygen (DO) levels have been collected from AQMS for key rainfall events to inform the project-wide assessment. These DO levels have been plotted with half-tide correction to obtain a representation of the DO profile along the length of the Tidal Thames over time.

**Water resources – flood risk**

1.5.16 The potential impact on flood risk arising from the project during the construction and operational phases throughout the Thames Tideway has been assessed using data supplied by the Environment Agency and local authorities. Computer modelling has been undertaken to determine the changes in extreme water levels within the Tideway whilst site-specific physical modelling, using scaled models, has also been completed for Blackfriars Bridge Foreshore, Victoria Embankment Foreshore and King Edward Memorial Park Foreshore.
2 Project-wide effects

2.1 Introduction

2.1.1 The objective of the Thames Tideway Tunnel project is to improve water quality within the Tidal Thames through the capture of wastewater discharges from combined sewer overflows. Given the extent and nature of the project with many sites in close proximity to one another and considering the project as a whole, significant environmental effects of the project are likely to be experienced over an area which is wider than the immediate vicinity of each development site.

2.1.2 The assessment of project-wide effects has therefore considered the effects of works experienced over an area wider than the vicinity of an individual site. It also considers effects, arising from tunnelling activities, experienced along the route of the main tunnel and connection tunnels.

2.1.3 The following topics have been scoped out of this project-wide assessment as they are considered not to give rise to effects at a project-wide level i.e., beyond the vicinity of each development site: land quality, terrestrial ecology and townscape and visual effects.

2.2 Air quality

2.2.1 A qualitative assessment has been undertaken at all the sites for construction dust. A quantitative assessment has been undertaken at all the sites for emissions from road traffic, river barges and plant during construction. This includes consideration of cumulative effects arising from other projects. Some significant effects have been predicted at certain individual Thames Tideway Tunnel project sites. However, these effects are specific to a small number of sites and are not significant on a project-wide scale.

2.2.2 The effects of the Thames Tideway Tunnel project on air quality during the construction phase are not considered to be significant on a project-wide level.

2.2.3 A quantitative assessment has been undertaken at all the sites for operational odour emissions. No significant effects are anticipated either at a site or project-wide level.

2.3 Ecology – aquatic

2.3.1 There would be a reduction in the extent, and some consolidation, of approximately 6ha of subtidal and intertidal habitat and associated temporary reduction in the extent of habitat for fish and invertebrates due to the presence of temporary structures in the river. However, at a project-wide scale this is considered to be of no more than minor significance. Measures would be put in place to ensure that the removal of temporary structures would enable the intertidal habitat to be restored following
2 Project-wide effects

Following the restoration and removal of temporary structures the intertidal and subtidal habitats are expected to recover and be available for colonisation by fish, invertebrates and algae.

2.3.2 There is potential for some disruption of fish movement (particularly juvenile fish) due to the occupation of the intertidal zone by temporary structures. However, bespoke modelling of fish movements through the estuary demonstrates that effects would be negligible, and in some locations the structures would benefit fish migration by offering refuges against tidal currents. There would be a further modification or loss of habitat associated with the installation of scour protection.

2.3.3 One of the most far-reaching significant beneficial effects of the project is that predicted on fish populations, realised through a reduction in wastewater entering the River Thames and a consequent reduction in the occurrence of low dissolved oxygen related fish mortalities.

2.3.4 There would also be beneficial effects on river habitats and the River Thames and Tidal Tributaries Site of Metropolitan Importance due to improvement in habitat quality.

2.3.5 Benefits would include an increase in the distribution of pollution sensitive fish species and an improvement in the quality of foraging habitat in the medium-term (six years and upwards).

2.3.6 In the medium-term (six years and upwards) there would be improvements in invertebrate populations as a result of improved dissolved oxygen and reductions in ammonia.

2.3.7 The potential for disruption of fish movement (particularly juvenile fish) due to the occupation of the intertidal zone by permanent structures is not expected to be significant, and in some locations the structures would benefit fish migration.

2.3.8 There would be a loss of approximately 1.3ha of subtidal and intertidal habitat due to the presence of permanent structures in the river. It is anticipated that this effect would be offset by a combination of quantitative and qualitative habitat enhancements and habitat creation/compensation schemes.

2.4 Historic environment

2.4.1 No significant project-wide effects have been identified upon the historic environment during the construction phase. Whilst adverse effects would arise from impacts upon heritage assets common to a number of sites (eg, prehistoric activity and post-medieval industrial archaeology along the river), any cumulative effect on these assets would not give rise to a significant project-wide effect. The site-specific mitigation proposed at each Thames Tideway Tunnel project site is considered sufficient to remove the adverse effects on these assets.
2 Project-wide effects

2.5 Noise and vibration

2.5.1 Noise and vibration effects are relatively localised around a fixed source. Given the separation of the sites it is not anticipated that there would be project-wide effects resulting from the summation of noise or vibration effects from individual sites.

2.5.2 Groundborne noise and vibration from the construction of the main tunnel and the Frogmore and Greenwich connection tunnels have been assessed. The construction processes considered include both the operation of the tunnel boring machines and the temporary construction railway providing materials and equipment to the tunnel face. No significant adverse project-wide effects have been identified as a result of these processes.

2.5.3 No project-wide effects are anticipated during the operational phase of the project.

2.6 Socio-economics

2.6.1 Significant beneficial project-wide effects have been identified as arising as a result of the creation of additional employment opportunities for construction workers and barge operation related workers in the construction phase. These effects are as a result of the construction work as a whole and would last for the duration of the construction period.

2.6.2 The proposed development is expected to directly create over 4,000 jobs at the peak of the construction phase and a further 5,000 jobs indirectly. It is estimated that the project would generate the equivalent of 19,000 employment years, acting as a stimulus for London’s wider economy as well as communities along the Thames Tideway Tunnel project route.

2.6.3 Once operational, there are likely to be lasting significant beneficial project-wide effects on a significant number of recreational users of the River Thames in the operational phase.

2.7 Transport

2.7.1 All the Thames Tideway Tunnel project sites have generally good public transport accessibility, with access available for construction workers to London Underground and/or London bus services local to each site. Construction vehicle routes to all the sites would utilise the Transport for London Road Network as far as possible, in order to limit the amount of construction traffic needing to use local roads other than for direct access to the sites.

2.7.2 During construction, the number of heavy goods vehicle movements associated with the project would be low compared to existing London-wide traffic levels and overall construction traffic is not expected to have a significant effect on road network operation and delay. Similarly the number of construction workers using the public transport network would be low compared to existing London-wide public transport usage and it is thus expected that there would be no significant effect on the wider public
transport network. Effects on the pedestrian and cyclist networks overall are not expected to be significant. The overall effect on river passenger services and river navigation patterns is also expected to be negligible.

2.7.3 During the operational phase there would be very occasional vehicle trips to and from the sites for maintenance activities and these would not have a significant effect on the London-wide transport networks.

2.8 **Water resources – groundwater**

2.8.1 Dewatering to lower groundwater levels in the central area of the tunnel to enable the construction of shafts would be required and is likely to lead to adverse effects on groundwater in this area for up to four years. In addition, adverse effects could arise as a result of deterioration of groundwater quality by the dewatering of the Thanet Sands formation, mobilisation of contamination and by the mixing of groundwater types in the central and eastern areas. The significance of these effects would be reduced by site-specific mitigation measures such as, ground treatment at shafts or measures such as lowering pumps at licensed sources to reduce effects on licence holders, and remediation.

2.8.2 No significant adverse project-wide effects have been identified with respect to groundwater resources in the operational phase. This is because the proposed development has been designed to minimise obstruction of groundwater flow and to minimise seepage both to and from the shafts and tunnels.

2.9 **Water resources – surface water**

2.9.1 As indicated in para. 2.1.1, the objective of the Thames Tideway Tunnel project is to improve water quality within the Tidal Thames through the capture of wastewater discharges from combined sewer overflows. Existing water quality within the Tidal Thames is monitored by the Environment Agency, which classifies the water quality under the Water Framework Directive. The Environment Agency currently classifies the water quality as being of moderate potential, with a target to reach good potential by 2027.

2.9.2 The volume of sewage discharged into the Tidal Thames has been calculated through the use of computer models, which have also been used to assess the effect that the Thames Tideway Tunnel project would have in reducing spills from the combined sewer overflows and how this would affect dissolved oxygen levels in the river. Currently a total volume of around 39 million m$^3$ of sewage is discharged into the Tidal Thames annually, via the combined sewer overflows. This is discharged over a duration of approximately 5,600 hours a year and includes approximately 10,000 tonnes of sewage derived litter. This exposes river users to pathogens for a maximum of four days after a spill event, which amounts to up to two thirds of the year where river users are at risk of being exposed to pathogens. The combined sewer overflows currently have the effect of causing the Tidal Thames to fail the dissolved oxygen standards set by the Environment Agency for the whole River Thames.
2 Project-wide effects

2.9.3 Existing and base case water quality conditions have been determined from several sources comprising: observed data; data used to determine current conditions of the Thames Tideway and other waterbodies relevant to each site in the Thames River Basin Management Plan; computational model simulations of the sewer network (including combined sewer overflow operation) and water quality conditions of the Thames Tideway. Assessment of the effects of the construction works has not identified any significant project-wide effects.

2.9.4 The operation of the tunnel would have a significant beneficial project-wide effect, with discharges from the combined sewer overflows being reduced by approximately 94%, in combination with the operation of the Lee Tunnel and the upgrade works to five sewage treatment works (Mogden, Crossness, Beckton, Long Reach and Riverside) which are currently underway. This would reduce the number of days during which river users are at risk from sewage borne pathogens and the volume of sewage derived litter would also reduce. The reduction in combined sewer overflows would also allow compliance with the Urban Waste Water Treatment Directive and contribute towards meeting the requirements of the Water Framework Directive.

2.10 Water resources – flood risk

2.10.1 The modelling results confirm that the project’s impact on extreme flood levels in the Thames Tideway is likely to be minimal. The results show that minor changes in peak water levels are likely to be experienced throughout the Thames Tideway; minor increases in level typically occur in the lower reaches of the Thames Tideway and minor reductions typically occur in the upper reaches.

2.10.2 Appropriate measures have been included within the design to ensure that adverse effects are unlikely to arise. The foreshore sites would provide an equivalent level of flood defence to the existing situation and the design would include provision for the defences to be raised in the future, if required. The new flood defences which are constructed would reduce the risk of a defence breach or failure occurring at that specific location. Additional measures include optimising the profile of new structures to reduce scour and the provision of scour protection adjacent to these structures.

2.10.3 Surface water runoff would be restricted by the use of a mix of attenuation techniques to ensure there is no increase in flood risk to the surrounding area, in accordance with national planning policy framework requirements and the Mayor’s ‘Essential Standard’ for surface water management.
3 Acton Storm Tanks

3.1 Location and context of proposed development

3.1.1 The proposed development site is located in the London Borough of Ealing. It is also close to the London Borough of Hammersmith and Fulham to the east, and the London Borough of Hounslow to the south. It is an inland site within the Thames Water operational storm tanks and associated pumping station. The site location and context are shown in Figure 3.1 and Figure 3.2.

3.1.2 It is proposed to use the site as a main tunnel reception site and combined sewer overflow interception site.

3.1.3 The site is bounded to the north by Canham Road. The east and southeast of the site are bounded by Warple Way and the south and west by a private car park. The surrounding area is predominantly residential with the nearest properties located on the southern extent of Canham Road (immediately north of the site) and high rise flats to the east on Warple Way. Acton Park Industrial Estate is to the north and adjacent to the site. The nearest recreational use is a community hall which lies approximately 4m to the northwest of the site. Southfield Primary School lies approximately 90m to the south of site.

3.1.4 Existing access to the site is via a small access road that intersects with Canham Road, at the junction with Warple Way. Acton Central National Rail Station on the London Overground North London Line railway is approximately 750m to the northwest.

3.1.5 The site is in the Ealing Air Quality Management Area and adjacent to the Hammersmith Air Quality Management Area, both declared for nitrogen dioxide. It is not within or adjacent to any areas designated for nature conservation or heritage, and there are no listed buildings on-site or in the surrounding area.

3.1.6 The main flood risk to the site is from the tidal River Thames which is located approximately 1.5km away. Most of the site lies within the low probability flood zone, although a portion of the south of the site is protected by flood defences.
3 Acton Storm Tanks

Figure 3.1 Acton Storm Tanks – site location and context

Figure 3.2 Acton Storm Tanks – aerial photograph
3.2 **Nature of the proposed development**

3.2.1 This section describes the construction and operation of the proposed development at Acton Storm Tanks. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 3 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

3.2.2 The proposal is to intercept the existing Acton Storm Relief combined sewer overflow, which currently discharges approximately 29 times in a typical year. The total volume discharged is approximately 312,000m$^3$ in a typical year. The existing sewer is shown on Figure 3.1. This site would also function as a main tunnel reception site and is where the main tunnel boring machine from Carnwath Road Riverside would be removed. Prior to site clearance, advanced planting would be carried out along the Warple Way frontage to provide visual screening to nearby residential premises.

3.2.3 A main tunnel shaft with an internal diameter of approximately 15m and approximately 31m deep would be constructed within the two northernmost storm tanks. There would also be an interception chamber and other structures, including culverts to intercept flows from the combined sewer overflow to the main tunnel. The four remaining storm tanks would be isolated.

3.2.4 The construction phase would last approximately three and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required outside these standard working hours, as set out in the *Code of construction practice*.

3.2.5 The tunnel secondary lining phase would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level and would last approximately six months.

3.2.6 Vehicle access to the site during construction would be via a new access off Canham Road, with vehicles travelling from the Vale via the stretch of Warple Way located north of Canham Road and onto Stanley Gardens. This arrangement is shown in the illustrative construction phasing plans (see Section 3 of the *Section 48: Book of plans*). This one-way route would avoid traffic accessing the site via the residential section of Warple Way located to the south of Canham Road, and would instead pass through the predominantly industrial area to the north of the site. A new temporary access point would be created for Thames Water off Warple Way to allow for the infrequent maintenance of the existing screening facilities during the construction period.
3 Acton Storm Tanks

3.2.7 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

3.2.8 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance at this site the construction of hoarding around the site area to reduce noise and advanced planting to screen the site.

**Operation**

3.2.9 With the Thames Tideway Tunnel project in place and operational, in a typical year, there would be no discharges from the combined sewer overflow.

3.2.10 A 15m high ventilation column would be located within the northwest of the site in the two former northernmost storm tanks, which would be filled up to ground level. Three ventilation structures approximately 3.5m high would also be constructed as well as a fourth ventilation structure approximately 10m high (see permanent works layout plan in Section 3 of the Section 48: Book of plans). A swale would be provided along the northeast boundary of the permanent works area. This feature would contribute to the project commitment to sustainable urban drainage.

3.2.11 The southern part of the Canham Road footpath in the western section would be widened to improve the public realm. The boundary fencing would be renewed and replaced.

3.2.12 Landscaping and means of enclosure would be provided along with an area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and the site would be accessed via a new permanent access off Canham Road.

3.2.13 A visualisation illustrating how the completed works could be developed is provided in Figure 3.3.
3.3 **Environmental effects**

3.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

3.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

3.3.3 The Acton Storm Tanks site is located within the London Borough of Ealing Air Quality Management Area. Local monitoring data indicates that there are currently exceedences of the air quality standards for nitrogen dioxide in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupiers of nearby residential dwellings, commercial and industrial premises to the north of Canham Road and on Warple Way, and Southfield Primary School.

3.3.4 It is considered that the overall effect on local air quality from construction road traffic and construction plant is likely to be negligible at the residential
properties, Southfield Primary School, and at the commercial and industrial premises. In terms of construction dust, this is likely to give rise to a minor adverse effect at the closest residential properties and commercial and industrial premises, and a negligible effect at Southfield Primary School, taking account of the dust control measures in the Code of construction practice.

3.3.5 The effect of odours released from the ventilation column is likely to be negligible.

Ecology – aquatic

3.3.6 The Acton Storm Relief sewer overflow currently discharges into the reaches of the River Thames and Tidal Tributaries Site of Metropolitan Importance and also into the Chiswick Eyot Site of Metropolitan Importance. Seals are known to use the Eyot for temporarily resting out of the water. Data indicate a high diversity of freshwater and estuarine fish species. Invertebrates may include the depressed river mussel, a notable species of mussel.

3.3.7 There would be no in-river works associated with this site. No further consideration of the impacts associated with construction has therefore been undertaken.

3.3.8 During operation, the reduction in fish mortality that would result from improved oxygenation of the water is considered a moderate beneficial effect. In the longer term after the tunnel is operational, there would also be moderate beneficial effects in terms of an increase in the distribution of pollution sensitive fish species, and increased invertebrate diversity and abundance and distribution of rare and/or pollution sensitive invertebrate species. There would be a negligible effect on mammals.

3.3.9 No mitigation is required at this site given the beneficial effects predicted.

Ecology – terrestrial

3.3.10 The site includes existing buildings and hardstanding, amenity grassland, scattered trees and dense scrub. Spoil and wood piles are also present. The site and surrounding area have some local value for breeding birds however the quality of the habitat is considered to be sub-optimal to support a notable population or assemblage of species. Surveys indicate low level use of the site by bats and there is no evidence of a bat roost on the site. No reptiles were found during surveys.

3.3.11 No significant effects on designated sites are anticipated (aquatic ecology effects are considered in the section above). Advanced planting would provide replacement trees in advance of site clearance. While there would-be temporary loss of grassland and scrub during construction, improved habitat would be provided once construction works have been completed resulting in a minor beneficial effect to local habitats and to birds, bats and creating potential habitat for invertebrates.

3.3.12 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan,
including monitoring, would be a requirement of the *Code of construction practice*.

3.3.13 As operational activity would be limited to occasional maintenance works, this would not give rise to significant effects on terrestrial ecology.

**Historic environment**

3.3.14 The site does not contain any nationally or locally designated heritage assets, nor are there any in the immediate vicinity. The site is occupied by six large modern storm tanks and associated buildings dating to the 20th century, along with fragmentary remains associated with the earlier 19th-century sewage works. These are of low heritage significance. The Bedford Park Conservation Area, a high value heritage asset, lies 125m to the south of the site. The main potential in terms of buried archaeological heritage is for footings of structures associated with the 19th-century sewage works, including the pump house. This would be of low heritage asset significance if present. The site is considered to have low potential for earlier archaeological remains as it lies outside of the main settlement areas in these periods and archaeological finds to date have been sparse.

3.3.15 During construction there may be localised impacts to late 19th century machinery and removal of an inscribed granite slab, resulting in a minor adverse effect. Deep excavations would entirely remove any buried heritage assets. This would constitute a minor adverse effect for any surviving 19th–20th century structural remains.

3.3.16 The desk-based study of the site suggests that no heritage assets of very high significance are anticipated that might merit a mitigation strategy of permanent preservation in situ. Minor effects have been identified on potential archaeological resources for which an archaeological watching brief prior to and during construction would achieve preservation by record. The resulting residual effects would be negligible. There are no above ground heritage assets within the assessment area and therefore for both construction and operation, effects on historic setting have not been assessed.

**Land quality**

3.3.17 A search of historical and environmental data identified two contaminative uses on site. The site was developed as a sewage treatment works in the mid 1890s; this included filter beds in a similar position to the present storm tanks. The filter beds and other infrastructure such as a pump house were extended to cover the majority of the existing site throughout the 20th century. The filter beds were replaced by the existing storm tanks during the 1980s. A railway which was dismantled in the 1960s/70s, formerly occupied an area adjacent to the western extent of the site. The area adjacent to the north and east of the site has a manufacturing history dating back to the early part of the twentieth century, although it has now been largely redeveloped for housing.

3.3.18 The main contamination risk is likely to be associated with the on-site use as a sewage pumping station which includes an above ground fuel tank
and the former railway. Desk-based surveys have identified a low/medium risk from unexploded ordnance.

3.3.19 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 *Code of construction practice* outlines a risk-based approach to defining any required remediation, and given this and the assessment findings, mitigation measures during the construction phase are not considered necessary.

3.3.20 During operation there would be negligible effect on future users and the built environment and therefore does not require mitigation.

**Noise and vibration**

3.3.21 The site is dominated by road traffic noise. The nearest locations to the site which are sensitive to noise and vibration are the residential properties on Canham Road to the north.

3.3.22 Significant noise effects arising from construction activities are predicted at residential properties at Edison Court and Telsa Court. No significant vibration effects arising from construction activities are predicted. No significant effects as a result of the operation of the site are predicted.

3.3.23 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. For example, this may include suitable siting of equipment.

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

**Socio-economics**

3.3.25 Residential properties surround the site to the north, east and south. There are also commercial and factory buildings located within Acton Park Industrial Estate to the north. There are two main semi-private amenity spaces situated beyond Warple Way, to the east of the site. The site is wholly used for the storage and transfer of overflow storm water. Site operatives attend the site on a regular basis.

3.3.26 During construction, there are considered to be effects on the amenity of some nearby residents arising from dust and noise effects. Amenity effects on users of the two semi-private open spaces are considered to be negligible. There are no anticipated socio-economic effects as a result of the operation of the Thames Tideway Tunnel project.
**Townscape and visual**

3.3.27 The site comprises concrete storm tanks set into the ground, semi-mature trees and boundary fencing. Although the condition of townscape within the site is good, it is of low value due to its industrial usage.

3.3.28 Advanced planting along the Warple Way frontage would help screen the construction works, however there would remain a minor adverse townscape effect on the site and residences on Warple Way due to the intensity of construction activity and site clearance. Capped and directional lighting for construction works would avoid light pollution on the site and surrounding area. Once the scheme is operational there would be minor beneficial effects on the site and residential area on Warple Way due to the removal of two storm tanks and improved structures and boundary treatment.

3.3.29 In terms of visual amenity, during the construction phase there would be a major adverse effect at one of the viewpoints on Canham Road to the north of the site. This is due to the foreground visibility of hoardings and construction activity. There would be a moderate adverse effect from the viewpoint at Warple Way and Canham Road. Once operational there would be improvements in visual impacts due to infilling of two of the storm tanks and improved boundary treatment. This includes a moderate beneficial effect for the Canham Road / Stanley Gardens viewpoint. Improvements are also anticipated to four viewpoints including from residences to the east and south of the site based on a high quality architectural and landscape design.

**Transport**

3.3.30 The Acton Storm Tanks site has poor public transport accessibility being located 750m from Acton Central National Rail Station and 1 kilometre from Turnham Green Underground Station. A number of bus stops are located within 500m of the site. The site is on the southern side of Canham Road and construction vehicle access is proposed from a new access directly off Canham Road.

3.3.31 During construction, the number of heavy goods vehicle movements would be moderate. 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 due to junction modifications and delays to journey time. Effects on pedestrian and cyclist amenity and safety are expected to be minor adverse. A negligible effect is expected on public transport services. During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities. These would have a negligible effect on the surrounding transport networks.

**Water resources – groundwater**

3.3.32 The shaft would pass through the upper aquifer and into the underlying non aquifer (London Clay). The shaft would not penetrate the lower aquifer beneath (Chalk). The interception chamber would sit in the upper aquifer. The most sensitive aspect with regard to groundwater is the upper aquifer which is defined as being of medium value.
3.3.33 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow. This is anticipated to be negligible.

3.3.34 No soil or groundwater contamination has been identified on site to date. Should any be encountered, this would be dealt with using a risk based approach and appropriate remediation ahead of construction. The effect on groundwater quality is considered to be negligible.

3.3.35 Groundwater monitoring of water levels and water quality would continue during construction.

**Water resources – surface water**

3.3.36 The site is located over 1km north of the River Thames. The section of the River Thames closest to the site lies within the Thames Upper waterbody, as classified under the Thames River Basin Management Plan. There is also the possibility for effects on the downstream Thames Middle waterbody. 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. There are no water dependent designated conservation sites within two kilometres of the site.

3.3.37 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 further mitigation would therefore be required.

3.3.38 Once the tunnel is operational, it is predicted that there would be no spills to the river from the Acton Storm Relief sewer in a typical year with a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 116 days to zero per year. In addition, the tonnage of sewage derived litter can be expected to be reduced to zero for a typical year.

**Flood risk**

3.3.39 The site is located within several flood zone classifications, associated with the tidal River Thames. The existing tank structures lie within the high probability flood zone, and the remaining parts of the site lie within the medium and low probability flood zones. However the entire site is protected by tidal flood defences which run along the banks of the Thames. The site may be at risk of localised surface water flooding due to runoff generated by land surrounding the site.

3.3.40 No works are proposed to the existing flood defences. The current level of protection afforded by the defences would therefore be maintained on the site. The risk of the site flooding once the scheme is in operation from tidal events is therefore considered to be negligible. Any increases in hard standing and the resultant increase in surface water runoff would be attenuated sufficiently to achieve the Mayor’s Essential Standard.
4 Hammersmith Pumping Station

4.1 Location and context of proposed development

4.1.1 The proposed development site is located in the London Borough of Hammersmith and Fulham. It comprises a vacant former industrial site known as Hammersmith Embankment which is currently under development, part of the Thames Water Hammersmith Pumping Station site and a small area of roadway. The site location and context are shown in Figure 4.1 and Figure 4.2.

4.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

4.1.3 The site is bounded to the north by Chancellor’s Road, to the east by Distillery Road, and to the south, beyond the remainder of the cleared site, by Winslow Road. The surrounding area is predominately residential in character. On the north side of Chancellor’s Road there are mainly two-storey dwellings. Distillery Road separates the site from Frank Banfield Park to the northeast, which includes a children’s play area. There are modern office developments, both to the north and south of the site. The small highway works site is located at the junction of Distillery Road and Chancellor’s Road.

4.1.4 Existing access to the site is from Chancellor’s Road and from Distillery Road. Hammersmith Underground stations (two stations) are located approximately 500m and 800m north. Kensington Olympia railway station is approximately 1.7km to the northeast. The Thames Path public right of way largely extends from the western section of Chancellor’s Road outside the area of the site and leads to the river.

4.1.5 The site lies within the Hammersmith Air Quality Management Area declared for nitrogen dioxide. It is near to the River Thames and tidal tributaries which are designated for nature conservation. There are no other sites designated for nature conservation in the vicinity. The whole site is within the Fulham Reach Conservation Area and there are no listed buildings within the site or the surrounding area. The southwest part of the site lies within the Winslow Road Archaeological Priority Zone.

4.1.6 The main flood risk to the site is from the tidal River Thames which is located approximately 200m from the site. The site lies within the ‘high probability’ flood zone, although it is protected by defences.
Figure 4.1 Hammersmith Pumping Station – site location and context

Figure 4.2 Hammersmith Pumping Station – aerial photograph
4.2 **Nature of proposed development**

4.2.1 This section describes the construction and operation of the proposed development at Hammersmith Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 4 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

4.2.2 The proposal is to intercept the existing Hammersmith Pumping Station combined sewer overflow, which currently discharges approximately 50 times in a typical year. The total volume discharged is approximately 2,208,000m³ in a typical year. The existing sewer is shown on Figure 4.1.

4.2.3 A drop shaft with an internal diameter of approximately 11m and approximately 33m deep would be constructed. From the base of the shaft there would be a connection tunnel which would join up with the main tunnel. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.

4.2.4 The construction phase would last approximately three years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the *Code of construction practice*.

4.2.5 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level and would last for approximately six months.

4.2.6 Vehicle access to the site during construction would be via a new access off Distillery Road as shown on the construction phasing plans for this site (see Section 4 of the *Section 48: Book of plans*). Vehicles would be travelling from the Hammersmith Flyover (A4), around the Hammersmith roundabout, down Fulham Palace Road (A219) and Chancellor’s Road.

4.2.7 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.
**Operation**

**4.2.8** With the Thames Tideway Tunnel project in place and operational, in a typical year, flows from the combined sewer overflow would be reduced to an average of approximately 103,600m³, one to three spill events a year.

**4.2.9** Approximately six ventilation columns of between 8.5m and 9m high would be clustered adjacent to the southeast corner of the pumping station (see permanent works layout plan in Section 4 of the *Section 48: Book of plans*). Additional ventilation columns of between 4m – 9m within the eastern end of the pumping station compound are proposed. On the southwestern corner of the pumping station there would be a ventilation structure of up to 4.5m in height.

**4.2.10** An area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be constructed. The majority of the site would remain an operational pumping station. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Distillery Road.

**4.2.11** Landscaping would be provided including the replacement of the boundary wall. A brown roof is also proposed on the ventilation structure to encourage local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted.

**4.2.12** A visualisation illustrating how the completed works could be developed is provided in Figure 4.3.
4.3 Environmental effects

4.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

4.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

4.3.3 The Hammersmith Pumping Station site is located within the London Borough of Hammersmith and Fulham Air Quality Management Area. Local monitoring data indicates that there are currently exceedences of the air quality standard for nitrogen dioxide in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupiers of nearby residential dwellings on Chancellor’s Road and Fulham Palace Road as well as the future occupiers of the new Fulham Reach development to be located directly adjacent to the site. There is
also Charing Cross Hospital, the occupants of commercial premises on Fulham Palace Road and the users of Frank Banfield Park which contains a playground and children’s centre.

4.3.4 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 along Chancellor’s Road, the new Fulham Reach development and the children’s centre and negligible elsewhere. In terms of construction dust, this is likely to be a minor adverse effect at the residential properties within approximately 10 metres of the site boundary and a negligible effect elsewhere, taking account of the dust control measures in the *Code of construction practice*.

4.3.5 The effect of odours released from the ventilation structure is likely to be negligible.

4.3.6 It is considered that mitigation measures are not required.

**Ecology – aquatic**

4.3.7 The sewage outfall that would be intercepted by the works currently discharges into the freshwater reaches of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. The in-river habitat at the site comprises a large area of gravel foreshore, which is exposed at low tide, and underlain by pebbles and shingle. The vertical river wall is vegetated. A range of important freshwater fish species are present, but invertebrate diversity is limited.

4.3.8 There would be no in-river works associated with this site and no significant effects on aquatic ecology are anticipated. No further consideration of the impacts associated with construction has been undertaken for aquatic ecology.

4.3.9 During operation the reduction in fish mortality that would result from improved oxygenation of the water is considered a moderate beneficial effect. Once the tunnel has been operational for six years, there would be minor beneficial effects from increased distribution of rare and/or pollution sensitive invertebrate and fish species as well as local improvements in invertebrate diversity and abundance. The effects on mammals are negligible during operation.

4.3.10 No mitigation is required at this site because no adverse effects are anticipated.

**Ecology – terrestrial**

4.3.11 The site currently comprises buildings, hardstanding and gravel with trees and scattered scrub, and tall vegetation on the boundary and adjacent to the site. Surveys indicate low level use of the site and surrounding area by bats (common pipistrelle and soprano pipistrelle). Habitat on and adjacent to the site provides a foraging and nesting resource for birds, although the quality of the habitat is considered to be sub-optimal to support a notable population or assemblage of species. As noted in para.4.3.3, part of the site is included in the Fulham Reach redevelopment scheme.
4.3.12 No significant effects on designated sites are anticipated (aquatic ecology effects are considered in the section above). Trees to be removed during construction would be replaced and the proposal includes a brown roof to promote local biodiversity resulting in minor beneficial effects on terrestrial ecology.

4.3.13 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

4.3.14 As operational activity would be limited to occasional maintenance works, this would not give rise to significant effects on terrestrial ecology.

Historic environment

4.3.15 There are no nationally designated heritage assets within the site, nor are there any within the immediate vicinity. The nearest listed building is a Grade II listed nurse’s home 160m to the southeast. The site includes currently undeveloped land around the 1960s Hammersmith Pumping Station which is of low heritage asset significance. The site is located within the Fulham Reach Conservation Area (of high heritage asset significance).

4.3.16 Part of the site lies within a locally designated Archaeological Priority Area, and the main potential in terms of buried heritage is for localised survival of early medieval (Saxon) settlement remains. This would be of high heritage asset significance if present. There is also potential for remains of post-medieval 19th century house footings and for 17th century remains of glass-bead manufacturing and brick manufacturing.

4.3.17 Construction works would entail deep excavations. This would entirely remove the assets within the footprint of each area of construction. For any surviving Saxon settlement remains there would be a major adverse effect (if present) and a minor adverse effect for post-medieval building remains. There would be moderate and major adverse effects, respectively, on remains of brick and glass-bead manufacturing, if found to be present. Operational activities at the site would not give rise to any effects on buried heritage assets.

4.3.18 The desk-based study of the site suggests that no heritage assets of very high significance are anticipated that might merit a mitigation strategy of permanent preservation in situ. The adverse effects identified 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. The resulting residual effects would be negligible.

4.3.19 Effects on the setting of historic assets such as the Fulham Reach Conservation Area and Hammersmith Bridge, would be minor adverse due to the visibility of construction works. Once operational and taking account
4 Hammersmith Pumping Station

of the Fulham Reach development, there would be minor beneficial effects.

Land quality

4.3.20 A review of maps from the late 19th century indicate that the site and surrounding vacant plot area were the location of a large distillery, which included various process buildings, chimneys and tanks. Housing formerly occupied the northern tip of the site in the late 19th century. To the north-west, two wharfs fronting the River Thames were also present. The surrounding area was a mix of residential properties and open land although this had become almost entirely developed by the early 20th century into residential properties.

4.3.21 Previous ground investigations of the site have recorded significant soil or groundwater contamination. It is understood that removal of contaminated soil from the surrounding area may have taken place. Desk-based surveys have identified a low/medium risk from unexploded ordnance.

4.3.22 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

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

Noise and vibration

4.3.24 The nearest locations to the site which are sensitive to noise and vibration are the residential dwellings on Chancellor’s Road. These are located north of the site. Some of these dwellings would be screened from the construction works by the existing pumping station building.

4.3.25 Significant noise effects arising from construction activities are predicted at residential properties in the Fulham Reach development (proposed development). No significant vibration effects arising from construction activities are predicted. No significant effects as a result of the operation of the site are predicted.

4.3.26 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.

Socio-economics

4.3.27 The site comprises currently vacant land subject to a proposal for a mainly residential development, as part of the Fulham Reach development site and Thames Water’s Hammersmith Pumping Station. Frank Banfield Park
and its playground, residential dwellings and the remainder of the vacant Fulham Reach development site surround the site. Frank Banfield Park and playground are considered to be well used for active and passive recreation.

4.3.28 During construction there are considered to be moderate adverse effects on the amenity of nearby residents and minor adverse effects on the amenity of users of Frank Banfield Park and playground. There are not anticipated to be any operational socio-economic effects resulting from the use of the site.

**Townscape and visual**

4.3.29 The site is located within the existing Hammersmith Pumping Station and partially within a disused and cleared area of land in a fair to poor condition.

4.3.30 During construction the intensity of construction activity would result in a moderate adverse effect on the townscape of Frank Banfield Park. There would be minor adverse effects on Fulham Reach Conversation Area. Once operational there would be a negligible effect on all townscape character areas due to the low height and positioning of the components adjacent to existing infrastructure.

4.3.31 In terms of visual amenity, during the construction phase there would be a major adverse effect on planned residences in the Fulham Reach development due to the scale and proximity of construction works. Moderate adverse effects are likely on the viewpoint looking south west from 24-26 Chancellors Road and from the viewpoint looking south west from Frank Banfield Park. For all other viewpoints, effects would not be significant. Operational effects have not been assessed on the basis that there would not be any significant effects due to the low height of the above ground structures and their location within the Hammersmith Pumping Station operational compound.

**Transport**

4.3.32 The Hammersmith Pumping Station site has excellent public transport accessibility being located within close proximity of Hammersmith Underground and bus stations. The site is on the western side of Distillery Road and construction vehicle access is proposed via the A4, Fulham Palace Road and along Chancellor’s Road before accessing Distillery Road.

4.3.33 During construction, the number of heavy goods vehicle movements would be comparatively low. The nature of the construction site layout at this location is considered likely to result in a negligible effect on road network operation and delay. Effects on pedestrian and cyclist amenity and safety are expected to be minor adverse. A negligible effect is expected on public transport 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.
4.3.34 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 include the provision of safe crossing points for pedestrians, signage at the site access to warn of the potential conflicting vehicle/pedestrian/cycle movements and a safety audit at the site access. Mitigation is not required for the operational phase.

**Water resources – groundwater**

4.3.35 The proposed shaft would pass through the upper aquifer and into the underlying non-aquifer (London Clay). Neither the shaft nor the connection tunnel penetrates the lower aquifer beneath (Chalk). Associated interception infrastructure would sit in the upper aquifer. The main receptor is the upper aquifer and is defined as being of medium value.

4.3.36 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow. This is anticipated to have a negligible effect.

4.3.37 No soil or groundwater contamination has been identified on site to date but should any be encountered, this would be dealt with using a risk-based approach and appropriate remediation ahead of construction. The effect on groundwater quality is considered to be negligible.

4.3.38 Groundwater monitoring of water levels and water quality carried out for the baseline would continue during construction.

**Water resources – surface water**

4.3.39 The site is located 100m from the River Thames. The section of the River Thames closest to the site lies within Thames Upper waterbody, as classified under the Thames River Basin Management Plan. There is also the possibility for effects on the downstream Thames Middle waterbody. 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. There are a number of nationally and locally designated water-dependent conservation sites within 2km of the site.

4.3.40 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.

4.3.41 Once operational, the scheme would reduce the number of spills to a predicted maximum level of three spills per year once the tunnel is in place. This reduction would have a beneficial effect on water quality.

4.3.42 The number of risk days for river users being exposed to pathogens would be reduced by up to 188 days of risk of exposure. In addition, the tonnage of sewage derived litter can be expected to be reduced from approximately 600 tonnes to 24 tonnes per year.
Flood risk

4.3.43 The main source of flood risk to the site is the tidal River Thames. The site is located within the ‘high probability’ flood zone, although it is protected by flood defences which run along the river bank. The site may be at risk of localised surface water flooding due to runoff generated by the surrounding land.

4.3.44 The current level of protection afforded by existing defences would be maintained on the site. No changes are proposed to the percentage of hard standing on the site and this area would continue to be served by the local drainage system.
5 Barn Elms

5.1 Location and context of proposed development

5.1.1 The proposed development site is located within the London Borough of Richmond, and is also close to the London Borough of Wandsworth. It comprises land within the Barn Elms Schools Sports Centre and Barn Elms playing fields, and a small area of roadway. The site location and context are shown in Figure 5.1 and Figure 5.2.

5.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

5.1.3 The site is located in the eastern extremity of the Barn Elms Schools Sports Centre playing fields, which form the western boundary of the site. It is bounded to the north by Queen Elizabeth Walk, to the east by the Thames Path public right of way and to the south, southeast by the Beverley Brook. The small roadway element of the site is located at the junction of Queen Elizabeth Walk and Rocks Lane.

5.1.4 The River Thames lies to the east and Leaders Gardens to the southeast. In addition to the Barn Elms Sports Centre there are a number of recreational uses in the local area. The Barn Elms Boathouse lies to the north east of the site, whilst to the southeast lies an existing Scout hut, a Learning Disability Centre, and the Wandsworth Sea Cadets Corps building. The nearest residential properties are located beyond the Beverley Brook to the south of the site at Stockhurst Close and the flats at Horne Way, and the properties to the west of the proposed access road on Queen Elizabeth Walk.

5.1.5 There is no existing direct road access to the site. The Barn Elms Schools Sports Centre is accessed off Queen Elizabeth Walk, which then joins the A306 (Rocks Lane). There are no London Underground stations in the immediate vicinity. Barnes railway station is approximately 1km southwest of the site. The Thames Path public right of way is located to the east of the site along the bank of the River Thames.

5.1.6 The site is in the Richmond upon Thames Air Quality Management Area and close to the Wandsworth Air Quality Management Area, both declared for nitrogen dioxide. It lies within Barnes Common Archaeological Priority Area and is adjacent to Putney Embankment Conservation Area. There are no listed buildings within the site.

5.1.7 The London Wetland Centre Site of Special Scientific Interest lies to the north of the site. Barnes Common Local Nature Reserve is located to the southwest of the site. There are four Sites of Importance for Nature Conservation in the vicinity of the site: Barn Elms Playing Fields, Putney Lower Common, the River Thames and tidal tributaries, and Beverley Brook. There are no known heritage assets in the surrounding area.

5.1.8 The main flood risk to the site is from the River Thames and Beverley Brook. The site lies within the ‘high probability’ flood zone, although it is
protected from the River Thames by flood defences. The site is not defended for flood risk from the Beverley Brook.

**Figure 5.1 Barn Elms – site location and context**
5.2 Proposed development

5.2.1 This section describes the construction and operation of the proposed development at Barn Elms. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 5 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation and targeted consultation can be found in the Section48 Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

5.2.2 The proposal is to intercept the existing West Putney Storm Relief combined sewer overflow, which currently discharges approximately 26 times in a typical year. The total volume of discharge is approximately 34,300m³ in a typical year. The existing sewer is shown on Figure 5.1.

5.2.3 A drop shaft with an internal diameter of approximately 6m and approximately 34m deep would be constructed. From the base of the shaft there would be a connection tunnel which would join with the main tunnel. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.
5.2.4 The construction phase would last approximately two and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the *Code of construction practice*.

5.2.5 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level and would last for approximately six months.

5.2.6 Vehicle access to the site during construction would be via a new permanent access route constructed along the northern and eastern perimeters of the Barn Elms Schools Playing Fields as shown on the construction phasing plans for this site (see Section 5 of the *Section 48: Book of plans*). Vehicles would access Queen Elizabeth Walk from Upper Richmond Road (A205) via Rocks Lane (A306) before passing through a narrow section of private road which currently serves the playing fields. This section of private road would be shared between construction vehicles and third parties. The remainder of the construction access route would be fenced off to provide a segregated access route. This route would require the demolition of an existing changing room facility with the provision of new replacement changing room facilities, and the relocation of a number of track and field facilities within the existing Barn Elms Sports Centre grounds.

5.2.7 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

5.2.8 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an annual average of approximately 1,500m³.

5.2.9 An integrated electrical control kiosk and ventilation column would be located within the southeast of the site (see permanent works layout plan in Section 5 of the *Section 48: Book of plans*). A brown roof and habitat wall are proposed on parts of the structure to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted. The use of suitable materials on the walls would similarly attract different animals and insects.

5.2.10 Landscaping would be provided, along with an area of elevated hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes. This would be accessible to users of the playing fields, except during times of maintenance when it would be temporarily fenced off. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would
be required. Access would be via the same access route from Queen Elizabeth Walk described above, which would not be removed after construction although the width would be reduced.

5.2.11 A visualisation illustrating how the completed works could be developed is provided in Figure 5.3.

**Figure 5.3 Barn Elms – illustrative visualisation**

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5.3 **Environmental effects**

5.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para 1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

5.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

5.3.3 The Barn Elms site is located within the London Borough of Richmond upon Thames Air Quality Management Area. Local monitoring data indicates that there are currently exceedences of the air quality objectives at roadside locations in the vicinity of the site. The nearest receptors
which may be sensitive are users of the playing fields, Barn Elms Schools Sports Centre and local clubs (for example, Barn Elms Boathouse and Sea Cadets Corps) and occupiers of nearby residential dwellings on Horne Way, at 3, 5 and 7 Queen Elizabeth Walk and at the junction of Rocks Lane and Queen Elizabeth Walk. The London Wetland Centre (which is a Site of Special Scientific Interest) is also considered in this assessment.

5.3.4 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 London Wetland Centre and residential properties. There is considered to be a negligible effect on users of the Barn Elms School Sports Centre, Barn Elms Boathouse and playing fields. Construction dust is likely to have a minor adverse effect on nearby residential properties, users of the Barn Elms Boathouse, and on the Barn Elms School Sports Centre and London Wetland Centre. A negligible effect is predicted elsewhere, taking account of the dust control measures in the Code of construction practice.

5.3.5 The effect of odour from air released from the ventilation column during operation is likely to be negligible.

5.3.6 It is considered that further measures are not required.

Ecology – aquatic

5.3.7 The West Putney Storm Relief Sewer outfall that would be intercepted, currently discharges into the freshwater reaches of the River Thames and Tidal Tributaries Site of Metropolitan Importance, and is within 10 metres of two Sites of Borough Importance. The intertidal area is dominated by pebbles and shingle. Above the exposed foreshore area, there is a river wall which supports vegetation. Surveys and data searches indicate a high diversity of fish and invertebrates.

5.3.8 During construction, no significant effects are likely to occur. The site is inland and controls would be in place via the Code of construction practice to prevent water pollution occurring. Noise and vibration levels would not give rise to effects on aquatic ecology. Once the tunnel is built and operating, there would be improvements to the river which in turn would improve conditions for river ecology, notably fish (moderate beneficial effects) and invertebrates (minor beneficial effects). Given the beneficial nature of effects at the site no mitigation is required.

Ecology – terrestrial

5.3.9 Survey results indicate a lack of otters, water voles and reptiles on and within the vicinity of the site. There is evidence of foraging by badgers, but no setts. Based on survey results, the area is used relatively intensively by bats, breeding birds and wintering birds.

5.3.10 Clearance of the site and limited removal of mature trees would have an adverse effect on habitats and on bats and breeding and wintering birds. There would be no effects on the Barn Elms School Sports Centre Playing Field Site of Importance for Nature Conservation (SINC) as the proposed development site avoids this. As the construction works would be set apart from the London Wetland Centre Site of Special Scientific Interest,
potential impact from intermittent construction traffic would not be significant.

5.3.11 Lighting which may be required during construction would include measures to prevent disturbance to local ecology as set out in the Code of construction practice. The external surfaces of the proposed integrated electrical control kiosk and ventilation column would be finished to incorporate measures to promote biodiversity, including a brown roof.

5.3.12 Once the tunnel is built and operational, no adverse effects on terrestrial ecology are likely.

**Historic environment**

5.3.13 There are no nationally designated heritage assets within the site, nor are there any within the immediate vicinity. Barn Elms School Sports Centre Playing Fields originally formed part of the Barn Elms medieval manorial estate and are of medium heritage asset significance. The site of the manor house lies to the north, outside the site.

5.3.14 The eastern part of the site lies within the locally designated Barnes Common Archaeological Priority Area, and the main potential in terms of buried heritage is for palaeoenvironmental remains (eg, organic remains, such as pollens or plant fossils) and for isolated prehistoric artefacts. There is also potential for post-medieval remains of pavilions, pump houses and tanks dating from the mid-19th century, and for remains of post-medieval ponds and water management features. The site has a moderate potential to contain later medieval agricultural remains, flood defences and fish ponds. There is a limited potential for the remains of prehistoric boats, trackways or structures.

5.3.15 During construction, site stripping would potentially truncate archaeological remains which may be beneath the topsoil. Deep excavations would remove any assets should these be present. This would give rise to a minor adverse effect on palaeoenvironmental, isolated prehistoric artefacts, later medieval and post-medieval remains. There would be a major adverse effect on any prehistoric boats, trackways or structural remains should these be present.

5.3.16 Adverse effects could be successfully mitigated by a programme of archaeological investigation before and/or during construction. This would include subsequent dissemination of the results and so achieve preservation by record. The resulting residual effects would be negligible.

5.3.17 There are no known buried or above ground heritage assets in the assessment area whose setting would be significantly adversely affected. Both construction and operational effects for the historic character and setting of above ground heritage assets for this site have therefore been scoped out of the assessment.

**Land quality**

5.3.18 A search of historical and environmental data shows that the site has been parkland or in other recreational use since mapped records began, with areas of residential development and pockets of industrial activity
surrounding the site. No contaminative uses are known to have taken place at the site. There is a record of a tank (use not specified) being present in the 1950s. However, even if a historic spillage of a contaminating substance had occurred, given the time elapsed this is unlikely to represent an ongoing contamination risk.

5.3.19 Previous ground investigations have recorded no significant soil or groundwater contamination. Desk-based surveys have identified a low to medium risk from unexploded ordnance.

5.3.20 In the unlikely event that contamination is found during further site investigations or during construction, there could be a slight adverse effect on construction workers due to the potential for exposure to contaminated soils or other materials. There would be a negligible effect on the built fabric of the existing combined sewer overflow as it is unlikely that contaminants contained in subsurface materials would affect buried structures.

5.3.21 During operation there would be a negligible effect on future site users and the built environment (both the proposed Thames Tideway Tunnel project development and the existing combined sewer overflow). Given that no significant effects are predicted during construction or operation, no mitigation is required.

**Noise and vibration**

5.3.22 The nearest location to the site which is sensitive to noise is the residential street, Horne Way. Significant noise effects arising from construction activities are predicted at residential properties at Huntingford House, Lancaster House, Jay House and Stockhurst Close. No significant effects from vibration during construction are predicted. No significant noise or vibration effects are predicted during operation.

5.3.23 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 on the local community for example through suitable siting of equipment on site.

5.3.24 In order to address significant noise effects, additional mitigation may be required. For example, localised screens and enclosures may be considered to reduce noise from particularly noisy, static operations.

**Socio-economics**

5.3.25 The Barn Elms School Sports Centre and playing fields are well used for a range of purposes by local schools and private sports clubs. The Barn Elms Boathouse, a Scouts Hut, the towpath forming the Thames Path and national cycle route, and the Beverley Brook footpath are all located in the vicinity of the site. Residential properties are located to the south of the site beyond the Beverley Brook.

5.3.26 During construction, there would be minor adverse effects on users of the sports pitches arising from land take and negligible effects on users of the Barn Elms School Sports Centre arising from land take and demolition/provision of an alternative facility. Amenity impacts on users of
the Barn Elms School Sports Centre, nearby residents and users of the London Wetland Centre would result in minor adverse effects. Amenity impacts on users of the Barn Elms Boathouse, Beverley Brook footpath, Thames Path and national cycle route would result in negligible effects. Once operational, there would be negligible effects on recreational opportunities arising from the small area of land take for the above ground built structures.

5.3.27 Construction effects would be managed in accordance with the Code of construction practice. The operational layout of the development is being designed to minimise land take and effects on the Barn Elms School Sports Centre playing fields.

**Townscape and visual**

5.3.28 The site is located in the east of Barn Elms playing fields. It comprises grassland and mature trees. The condition of the townscape is generally good.

5.3.29 During the construction phase there would be a high quality planted hoarding to help screen views into the site. However, the scale and intensity of construction activity would have a major adverse effect on the townscape character of the site. There would be a moderate adverse effect on the surrounding Barn Elms recreational area. Elsewhere at Leaders Gardens, residential areas at Putney and Barnes Common, there would be minor adverse effects on townscape.

5.3.30 Once operational there would be a minor adverse effect on the townscape character of the site due to the introduction of built elements within a recreational green space. All other operational townscape effects would be negligible.

5.3.31 In terms of visual amenity during construction, due to the visibility of the construction site there would be moderate adverse effects on the panoramic views from residences along Horne Way and from views from the Barn Elms Barn Elms School Sports Centre playing fields. All other effects assessed would be minor adverse or negligible and therefore not significant.

5.3.32 Once operational, due to the filtered view beyond the tree line all visual effects would be negligible.

**Transport**

5.3.33 The Barn Elms site has poor public transport accessibility with no railway or underground stations within close proximity. However, there are bus stops in the local area which serve Putney and Hammersmith. Construction vehicle access to the site is proposed from Upper Richmond Road (A205) south of the site, along Rocks Lane and then towards the site via a new access from Queen Elizabeth Walk.

5.3.34 During construction, the number of heavy goods vehicle movements would be comparatively low. However, construction activity is considered likely to result in a minor adverse effect on road network operation and delay and a negligible effect on road users on Queen Elizabeth Walk. Effects on
pedestrian amenity and safety are expected to be moderate adverse (due to the footway diversion and increased vehicle flows) and negligible on cyclists. A minor adverse effect is expected on parking during construction due to temporary parking suspension on Rocks Lane, and a negligible effect is expected on public transport. During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities and these would have a negligible effect on the surrounding transport networks.

5.3.35 The project is being designed to limit the effects on transport networks as far as possible. At this location, mitigation measures during construction would take the form of traffic management measures to manage vehicles accessing and exiting the site. The site access would be designed to ensure the safety of road users or pedestrians is not affected. Mitigation is not required for the operational phase.

**Water resources – groundwater**

5.3.36 The shaft would pass through the upper aquifer and into the underlying London Clay. The interception chamber would be located in the upper aquifer, which is the most sensitive in terms of groundwater.

5.3.37 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible.

5.3.38 Monitoring of water levels and water quality would be undertaken during construction and operation.

**Water resources – surface water**

5.3.39 The site is located within 100m of the River Thames and approximately 20m north of the Beverley Brook. The London Wetland Centre, which is a designated Site of Special Scientific Interest, is located immediately to the north and there are a number of other nationally and locally designated water-dependent conservation sites within 2km of the site.

5.3.40 Water quality in the River Thames near the site is currently classified as ‘moderate’ with an objective to reach ‘good’ status by 2027.

5.3.41 Construction effects on surface water resources would be managed in accordance with measures contained in the *Code of construction practice*. With the *Code of construction practice* in place it is anticipated that effects from site runoff and the risk of contaminants entering drains would not be significant. Therefore no further mitigation would be required.

5.3.42 Once operational, the scheme would reduce the number of discharges from the West Putney Storm Relief combined sewer overflow, from the current average level of 26 spills a year (113 hours duration and 34,300 m$^3$) to a predicted level of one spill a year (4 hours and 1,500 m$^3$) once the tunnel is in place. This reduction would give rise to a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 132 days. In addition, the tonnage of sewage derived litter would be expected to be reduced from approximately 9 tonnes to less than half a tonne a year.
Flood risk

5.3.43 The main source of flood risk to the site is from the tidal River Thames. The site is located within the ‘high probability’ flood zone, although it is protected by flood defences which run along the banks of the Thames. The site is also located adjacent to the Beverley Brook, however a tide barrier situated at the confluence with the River Thames prevents tidal flows affecting the water levels in the Brook. The Beverley Brook’s channel capacity is sufficient to contain extreme fluvial flood events at this location. Therefore the risk to the site from fluvial flooding is considered to be low.

5.3.44 The site may be at risk of localised surface water flooding due to runoff generated by the land surrounding the site.

5.3.45 The current level of protection afforded by the defences would be maintained on the site during both construction and operation. Any increases in hard standing and the resultant increase in surface water runoff would be attenuated in accordance with current planning policy including the Mayor’s Essential Standard.
6 Putney Embankment Foreshore

6.1 Location and context of proposed development

6.1.1 The proposed development site is located in the London Borough of Wandsworth. It comprises an area of foreshore adjacent to the Embankment predominantly west of Putney Bridge, with a further site area (Putney Embankment Temporary Slipway) to the west of Putney Pier. The site location and context are shown in Figure 6.1 and Figure 6.2.

6.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

6.1.3 The main site is bounded by the River Thames to the north, with the site extending to the east of Putney Bridge. Embankment and the Lower Richmond Road form the southern boundary of the site. The western boundary of the site is within the River Thames, near Putney Pier. The wider area comprises residential, commercial and retail uses, including Putney town centre. The Putney Embankment Temporary Slipway portion of the site is bounded by Embankment to the south and the River Thames on all other sides. The nearest residential receptors to the main site are Kenilworth Court Houses and the existing houseboats, whilst the houses on Ruvigny Gardens are the nearest to the temporary slipway site. The Constitutional Club and a restaurant lie to the south near both sites.

6.1.4 Existing access to the site is from Embankment. The site is close to both Putney High Street (A219) and the Transport for London Road Network (A205, Upper Richmond Road). Putney Bridge Underground station is approximately 600m to the northeast and Putney railway station is approximately 700m to the southeast. Between the main site and the site of the temporary slipway is an existing pier which currently has two residential moorings. The Thames Path public right of way runs along the southern boundary of the site.

6.1.5 The River Thames and its tidal tributaries are important for nature conservation. The site is not adjacent to any other areas designated for nature conservation. The site is in the Wandsworth Air Quality Management Area, declared for nitrogen dioxide. Putney Bridge and three bollards on the junction of Lower Richmond Road are Grade II listed, and the site lies within both the Wandsworth Thames Riverside Archaeological Priority Area and the Putney Embankment Conservation Area.

6.1.6 There are several listed buildings in the vicinity, including the Grade II* St Mary’s Church to the southeast, the Grade II listed White Lion Hotel to the south and the Dukes Head public house to the northwest and Putney Bridge to the East.

6.1.7 The site lies within the Thames Tideway foreshore and hence is considered to be functional flood plain, where water has to flow, or be stored, during times of flood.
Figure 6.1 Putney Embankment Foreshore – site location and context
6.2 Nature of proposed development

6.2.1 This section describes the construction and operation of the proposed development at Putney Embankment Foreshore. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 6 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation and targeted consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

6.2.2 The proposal is to intercept the existing Putney Bridge combined sewer overflow, which currently discharges approximately 33 times in a typical year. The total discharge volume is approximately 68,100 m$^3$ in a typical year. The existing sewer is shown on Figure 6.1.

6.2.3 A cofferdam would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct the drop shaft.

6.2.4 A drop shaft with an internal diameter of approximately 6 m and approximately 36 m deep would be constructed. From the base of the
shaft there would be a connection tunnel which would join up with the main tunnel. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow. A temporary slipway would be constructed as a replacement to the existing public drawdock whilst this facility is unavailable during the project construction works.

6.2.5 The construction phase would last approximately three years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the Code of construction practice.

6.2.6 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level and last approximately three months.

6.2.7 Excavated material from the construction of the drop shaft and connection tunnel would be transported away from the site by barge.

6.2.8 Vehicle access to the main site during construction would be via an access off the Embankment, with vehicles travelling to and from the site via Lower Richmond Road as shown on the construction phasing plans for this site (see Section 6 of the Section 48: Book of plans). During the construction of the temporary slipway, vehicles would enter off Lower Richmond Road via Glendarvon Street, and exit site via the Embankment, turning onto Thames Place and then Lower Richmond Road.

6.2.9 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

6.2.10 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case the screening of static plant, use of vibratory piling and provision of hoarding on the temporary cofferdam.

Operation

6.2.11 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an annual average discharge of approximately 1,600m³, one spill event a year.

6.2.12 A ventilation column between 4m and 8m high would be sited within the area of permanent hardstanding and a separate, smaller ventilation column approximately 6m high would be located on Putney Bridge. An electrical and control kiosk would be constructed on Waterman’s Green and a secondary smaller kiosk constructed on the area of permanent hardstanding (see parameter plan in Section 6 of the Section 48: Book of plans).
6.2.13 Scour protection would be constructed along the line of the new river wall (to protect the new structure) and this would also serve to prevent scour from any new outfall.

6.2.14 A permanent structure comprising an area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be constructed within the foreshore. This would be publicly accessible, except during times of maintenance when it would be temporarily fenced off. The existing public drawdock would also be reinstated and landscaping would be provided.

6.2.15 Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and maintenance vehicles would come to and from the site off the Embankment via Lower Richmond Road.

6.2.16 A brown roof, to promote local biodiversity, is proposed on the electrical and control kiosk located on Waterman’s Green. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted.

6.2.17 A visualisation illustrating how the completed works could be developed is provided in Figure 6.3.

**Figure 6.3 Putney Embankment Foreshore – illustrative visualisation**
6.3 Environmental effects

6.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

6.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

6.3.3 The Putney Embankment Foreshore site is located within the London Borough of Wandsworth 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 receptors which may be sensitive to the development are occupiers of nearby residential dwellings and commercial/office premises (on Lower Richmond Road, Glendarvon Street and Embankment) as well as users of St Mary’s Church.

6.3.4 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 St Mary’s Church, and negligible at the commercial/office premises. In term of construction dust, this is likely to have a minor adverse effect at the residential and commercial/office properties within approximately 10m of the site boundary and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

6.3.5 The effects of odours released from the ventilation column are likely to be negligible.

6.3.6 It is considered that further measures are not required.

Ecology – aquatic

6.3.7 The majority of this site is located within the River Thames and Tidal Tributaries Site of Metropolitan Importance. The in-river habitat at the site comprises gravel foreshore that is exposed at low tide, dominated by pebbles, shingle and sand. The river in this location is confined by a man-made vertical river wall, which is vegetated in some areas, and by bridge abutments, above exposed banks. Surveys and data searches indicate low diversity of fish and invertebrates at this site.

6.3.8 Construction effects would be managed in accordance with the Code of construction practice. With the Code of construction practice in place it is anticipated that loss of habitat due to the presence of in-river structures would have a moderate adverse effect. Disturbance and compaction of in-river habitat would have a minor adverse effect. The loss of habitat for fish and invertebrates would have a minor adverse effect, as would
disturbance and compaction of sediment for invertebrates. All other effects on fish, invertebrates and mammals would be negligible. The loss of habitat due to the presence of permanent in-river structures would have a minor adverse effect. During operation, reduction in nutrient levels entering the river would have a moderate beneficial effect for fish. There would also be a minor beneficial effect on invertebrate diversity and abundance. There would be a minor beneficial effect on the distribution of pollution sensitive fish and invertebrate species. All other effects on mammals, fish and invertebrates would be negligible. Operational lighting would be capped and directional (avoiding lighting into the river) to avoid effects on aquatic ecology.

6.3.9 Modelling results indicate that the presence of structures within the river during both construction and operation would not have a significant adverse effect on migrating fish through altered river flows.

6.3.10 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.

Ecology – terrestrial

6.3.11 The majority of the site lies within the River Thames and Tidal Tributaries Site of Importance. There are mature trees on and adjacent to the site. The results of bat surveys indicate that a small number of soprano pipistrelle and common pipistrelle bats pass through the site. The trees on and adjacent to the site are limited in extent and have the potential to support a small number of nesting birds. A survey of wintering bird survey has indicated that the foreshore is used by a range of species.

6.3.12 No significant effects on designated sites are anticipated during construction (aquatic ecology effects are considered in the section above). Trees removed during constructed would be replaced resulting in a negligible effect. It is not anticipated that there would be a significant effect on bat populations based on current usage of the site and surrounds. Similarly, there is not likely to be a significant change in bird populations, including wintering birds, during construction. A brown roof is proposed on the electrical and control kiosk to promote local biodiversity.

6.3.13 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

6.3.14 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. Operational activity would be limited to occasional maintenance work which is considered unlikely to have significant effects on terrestrial ecology.

Historic environment

6.3.15 The site comprises part of the south bank of the Thames foreshore and Putney Embankment river wall, and includes a late 19th-century draw dock and cobbled slipway. The site lies within the Putney Embankment
Conservation Area and the eastern edge of the site runs beneath the Grade II listed Putney Bridge where two late 19th-century Bazalgette screens to the sewer outfall are located. The site also includes a group of Grade II listed bollards. These designated heritage assets are all of high asset significance. Listed buildings in the vicinity include the Grade II listed White Lion Hotel 40m to the south and the Grade II* Church of St Mary the Virgin 20m to the southeast.

6.3.16 The site lies within a locally designated Archaeological Priority Area and the main potential is for post-medieval remains of barge beds, flood defences and construction debris associated with Putney Bridge, which would be of medium asset significance. Post-medieval foreshore silts, isolated pottery and building materials might also be present. The remains of medieval revetments or other riverside structures would be of low or medium heritage asset significance. Medieval or post-medieval construction debris and isolated artefacts would be of low heritage asset significance. The potential for palaeoenvironmental remains (e.g., organic remains such as pollens or plant fossils) and buried assets of earlier periods is considered to be low due to probable past scouring from river flows.

6.3.17 Construction works would involve removal of the existing sewer outfalls that form part of Putney Bridge, resulting in a major adverse effect. There would be no other direct effects on the bridge itself. The cobbled slipway would be taken out of use during construction (with a replacement slipway provided a short distance upstream), with some localised removal of cobble stones, resulting in a moderate adverse effect. Construction works would entail deep excavations which would entirely remove archaeological assets within the construction footprint. If such assets were present, this would comprise a high magnitude of impact and would give rise to a minor or moderate effect on the remains of medieval or post-medieval revetments or riverside structures, and a minor adverse effect on isolated artefacts. There would be a moderate adverse effect on the setting of the Putney Embankment Conservation Area during construction, Bishops Park Conservation Area and Putney Bridge. These effects are due to the scale and intensity of construction activity including the temporary in-river working area (cofferdam).

6.3.18 The effects on the sewer outfalls and slipway would be mitigated through standing structure recording and photographic survey in line with accepted practice, and reuse of the slipway cobbles where possible, or use of other sympathetic 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. Any 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. The resulting residual effects would be negligible for below ground archaeology and minor for above ground assets.
6.3.19 Once operational, scour protection around foreshore structures would prevent scour affecting heritage assets. There are likely to be minor adverse effects on the setting of Putney Bridge, Putney Embankment Conservation Area and Putney Bridge Conservation Area due to the presence nearby of the permanent foreshore structure, ventilation column and kiosk close to the bridge.

**Land quality**

6.3.20 A search of historical and environmental data indicates that the site has no former uses which are likely to have caused contamination in the area. No potential contaminative sources were identified at or in the immediate vicinity of the site during a walkover survey and previous ground investigations close to the site have recorded no significant soil contamination. Part of the ongoing ground investigations includes the assessment of foreshore sediment contamination. Desk-based surveys have identified a low to medium risk from unexploded ordnance.

6.3.21 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the *Code of construction practice* means that no need for mitigation during the construction phase is identified.

6.3.22 During operation there would be negligible effect on future users and the built environment and mitigation would not be required.

**Noise and vibration**

6.3.23 The site is dominated by road traffic noise. The nearest locations to the site which are sensitive to noise and vibration are residential houseboats at Putney Pier to the north west of the site; residential dwellings at Kenilworth Court and Richmond Mansions, located to the south of the site; the Star and Garter Mansions and residential moorings to the west; and the new Putney Wharf Tower development to the south east of the site. St. Mary’s Church has also been identified as sensitive to noise. The nearest locations to the temporary slipway construction area which are sensitive to noise and vibration are residential dwellings at Ruvigny Mansions and Ruvigny Gardens, and a boat builders on the Embankment.

6.3.24 Significant noise and vibration effects arising from construction activities are predicted at residential houseboats at Putney Pier and Star and Garter Mansions. There are significant vibration effects expected at Kenilworth Court. No significant effects as a result of the construction of the temporary slipway or operation of the site are predicted.

6.3.25 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 on the local community for example through suitable siting of equipment on site.
Further measures to address significant noise and vibration effects during construction may include localised screens and enclosures to reduce noise from particularly noisy, static operations.

**Socio-economics**

During construction, there are considered to be moderate adverse effects on the amenity of restaurant and retail business customers and, in turn on the operators of these businesses. Residents could experience similar moderate adverse amenity effects. The temporary relocation of the slipway and disruption to the river foreshore are considered to also have minor adverse effects. The loss of use of a small area of open space, disruption to a section of the Thames Path and amenity effects on users of the Thames Path and national cycle route are considered to be negligible. Once operational, there would be minor beneficial effects resulting from the gain in publicly accessible space associated with the Thames Path.

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

**Townscape and visual**

The site is located within a nationally valued historical and cultural stretch of the River Thames, experienced by large numbers of people and is generally in a good condition.

During construction, the use of a temporary retaining wall in the river to create a dry working area and hoardings, and the intensity of construction activity would have major adverse townscape effects on the site and on stretches of river frontage by Bishops Park, Putney and Fulham Palace Reach and Wandsworth and Sands End Reach. There would also be a major adverse effect on Putney Embankment Conservation Area. Moderate adverse effects are likely on the Putney Bridge Conservation Area due to the scale and intensity of construction activity. There would also be minor or negligible effects in the remaining areas included in the assessment. Once operational, the change in townscape due to the permanent foreshore structure in what was previously part of the river would result in minor adverse effects.

In terms of visual amenity, due to the prominence of the construction works, there would be major adverse visual effects on four viewpoints namely Kenilworth Court, Putney Bridge, the Embankment and Prior Gardens Bank. There would be moderate adverse visual effects on viewpoints including Carrara Wharf, Putney High Street and Lower Richmond Road also due to the visibility of the construction works.

Once operational, due to the visibility of the new river wall and above ground structures, there would be minor adverse effects on residential uses at Carrara Wharf and Kenilworth Court.

**Transport**

The Putney Embankment Foreshore site has excellent public transport accessibility. It is located close to extensive bus services, Putney Pier
which is served by the Transport for London River Bus and Putney Rail Station. The site is located on the Embankment just west of Putney Bridge and construction vehicle access is proposed via the A3 and Putney Bridge Road before routing along Lower Richmond Road and accessing the site from the Lower Richmond Road/Embankment junction. The site of the temporary slipway construction works is located on the Embankment west of the main construction site and construction vehicle access is proposed via Lower Richmond Road, Glendarvon Street and Embankment. Vehicle egress from the temporary slipway construction site is proposed via Embankment, Thames Place and Lower Richmond Road.

6.3.34 During construction, the number of heavy goods vehicle movements would be comparatively low. However, the nature of the construction site layout at this location would require minor highway layout changes and a minor change to traffic operation on Embankment, resulting in a moderate adverse effect on road network operation and delay.

6.3.35 There are a small number of river services that operate from Putney Pier during peak hours and access to the pier is likely to remain unchanged during the construction period although a minor adverse effect on services may be expected as a result of the proposed works.

6.3.36 Effects on pedestrian amenity and safety are expected to be moderate adverse and minor adverse for cyclist amenity and safety.

6.3.37 Negligible effects are expected on residents, pedestrians, cyclists and other road users along Glendarvon Street. Minor adverse effects are expected on parking along Glendarvon Street.

6.3.38 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.

6.3.39 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 a safety audit of the site access and the provision of a traffic marshal to manage potential conflicts between construction vehicles and pedestrians. It is also proposed to provide a traffic marshal during the operational phase to manage access when large maintenance vehicles are required to access the site through the Lower Richmond Road/Embankment junction.

**Water resources – groundwater**

6.3.40 The proposed shaft would pass through the upper aquifer and into the underlying non aquifer (London Clay). The shaft does not penetrate the principal aquifer beneath (Chalk). Associated interception infrastructure would sit in the upper aquifer founded into the London Clay. The main receptor is the upper aquifer and is defined as being of medium value.

6.3.41 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be
negligible due to the inclusion of design measures to reduce groundwater effects.

6.3.42 No soil or groundwater contamination has been identified on site to date but should any be encountered, this would be dealt with using a risk based approach and appropriate remediation ahead of construction. The effect on groundwater quality is considered to be negligible.

6.3.43 Groundwater monitoring of water levels and water quality would continue during construction.

**Water resources – surface water**

6.3.44 The site is located in the River Thames foreshore within the Thames Upper waterbody, as classified under the Thames River Basin Management Plan. There is also the possibility for effects on the downstream Thames Middle 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. There are a number of nationally and locally designated water-dependent conservation sites within 2 kilometres of the proposed site.

6.3.45 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.

6.3.46 Once operational, the scheme would reduce the number of discharges from the Putney Bridge combined sewer overflow to a predicted level of one spill per year once the tunnel is in place.

6.3.47 This reduction would be a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 104 days of risk of exposure. In addition, the tonnage of sewage derived litter can be expected to be reduced by approximately 17 tonnes to less than half a tonne per year.

**Flood risk**

6.3.48 Most of the site is located within the Thames foreshore and so is inundated daily by tidal flows. The adjacent terrestrial parts of the site may also be at risk of surface water flooding due to runoff generated from the land to the south.

6.3.49 Flood defences would be constructed during the construction and operational phases to provide the equivalent level of flood protection to adjacent areas as that provided by the current flood defences, while maintaining the existing defences to the south of the Embankment. The finished ground level of the site, other than the boat ramp, would also be above the design flood level and so the risk of the operational site flooding from tidal events is negligible.
7 Carnwath Road Riverside

7.1 Location and context of development

7.1.1 The proposed development site is located within the London Borough of Hammersmith and Fulham. It comprises the River Thames foreshore, the safeguarded Hurlingham Wharf, Whiffin Wharf, a small area of roadway and the Carnwath Road industrial estate, as well as extending into the River Thames. The site location and context are shown in Figure 7.1 and Figure 7.2.

7.1.2 It is proposed to use the site as a main tunnel drive site, main tunnel reception site and connection tunnel reception site.

7.1.3 The site is bounded to the north by Carnwath Road, including the Piper Building and Piper Centre. To the south of Carnwath Road, on the eastern side of the site there is a residential block overlooking the site and the River Thames. To the west there are blocks of residential accommodation. On the opposite side of Carnwath Road are purpose built industrial units. Philpot Square, a four storey residential block, is located on the eastern side of Peterborough Road. A small highway works site for this scheme is located at the junction of Wandsworth Bridge Road and Carnwath Road to undertake alterations to the junction to facilitate vehicle movements.

7.1.4 Existing road access to the site is via Carnwath Road. Putney Bridge Underground station is approximately 1.1km to the west and Imperial Wharf railway station is approximately 1.3km to the east. The Thames Path public right of way currently runs along the perimeter of the western boundary of the site, then along Carnwath Road before passing down the western edge of the existing Carnwath Road Industrial Estate and along the riverside edge of Carnwath Road Industrial Estate.

7.1.5 The site is within the London Borough of Hammersmith and Fulham Air Quality Management Area declared for nitrogen dioxide and particulate matter. The River Thames and its tidal tributaries (including the foreshore at Carnwath Road Riverside) are important for nature conservation. The site is within the Sands End Conservation Area. There are no other designations for nature conservation or heritage within or surrounding the site.

7.1.6 The main flood risk to the site is from the tidal River Thames. The site lies partially within the River Thames and hence is considered to be functional flood plain, where water has to flow, or be stored, during times of flood. The area of the site which lies behind the flood defences has ‘high probability’ of flooding, although it is protected by the flood defences.
Figure 7.1 Carnwath Road Riverside – site location and context

Figure 7.2 Carnwath Road Riverside – aerial photograph
7.2 Nature of the proposed development

7.2.1 This section describes the construction and operation of the proposed development at Carnwath Road Riverside. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 7 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the Phase Two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

7.2.2 The proposal is to drive the tunnel boring machine from this site to Acton Storm Tanks. In addition, the tunnel boring machine used to excavate the main tunnel driven from Kirtling Street and the tunnel boring machine used to excavate the connection tunnel from Dormay Street would be removed at Carnwath Road Riverside. There is no combined sewer overflow at this site and therefore there is no interception.

7.2.3 A main tunnel shaft with an internal diameter of approximately 25m and approximately 42m deep would be constructed. Once the shaft is constructed, the Tunnel Boring Machine would be brought to the site, constructed and lowered into the base of shaft; it would then be driven west to Acton Storm Tanks.

7.2.4 The construction phase would last approximately six years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the Code of construction practice.

7.2.5 Construction for the tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel, but with supporting activity at ground level, and last approximately three years. An acoustic shed would be erected over the shaft during the tunnelling and secondary lining construction phases.

7.2.6 Excavated tunnel material would be removed from the site and aggregates brought into the site by barges using the river, a campshed or a jetty would be used to moor barges.

7.2.7 Vehicle access to the site during construction would be via two new access points off Carnwath Road as shown on the construction phasing plans for this site (see Section 7 of the Section 48: Book of plans). Access would be through a left turn in, right turn out system, as this would avoid construction traffic travelling via the residential roads located to the west and north. The Thames Path public right of way would be temporarily diverted, so that it extends further along Carnwath Road before turning towards the river along the eastern edge of the site.
7.2.8 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

7.2.9 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case constructing a shed over the shaft construction area to reduce noise effects and use of extensive noise insulation or enclosing much of the equipment.

**Operation**

7.2.10 A 15m high ventilation column would be sited in the south eastern corner of Whiffin Wharf. A building to house air management plant and equipment, approximately 5.5m high would be located within the northeastern corner of Whiffin Wharf (see permanent works layout plan in Section 7 of the Section 48: Book of plans), approximate dimensions are 20m long by 8m wide. The ventilation column and building to house air management plant and equipment would be positioned so as not to prejudice the operation of the safeguarded Hurlingham Wharf and reduce the impact on the future use of Whiffin Wharf.

7.2.11 An area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be retained. This would be publicly accessible with tree planting and landscaped for use as an area of public realm along this riverside area, except during times of maintenance when it would be temporarily fenced off. The rest of the site would be secured with temporary hoarding for the development by others or, in the case of Hurlingham Wharf, available to be brought forward for wharf related operations. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Carnwath Road.

7.2.12 Landscaping would be provided, including the creation of a new public open space. A brown roof is also proposed on the building to house air management plant and equipment to promote local biodiversity. Covering the roof with materials such as low nutrient rubble and gravels, would provide the opportunity for natural colonisation of brown field plants of particular value to insects and birds.

7.2.13 A visualisation showing how the completed works would look is provided in Figure 7.3.
7.3 **Environmental effects**

7.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

7.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

7.3.3 The Carnwath Road Riverside site is located within the London Borough of Hammersmith and Fulham 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 receptors which may be sensitive to the development are occupiers of the residential dwellings (adjacent to the site and in Carnwath Road, Philpot Square and Wandsworth Bridge Road), commercial/leisure premises (adjacent to the site and in the Piper Building north of the site) as well as pupils and staff at Thomas’s London Day School.
7 Carnwath Road Riverside

7.3.4 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 negligible at the school and commercial/leisure premises. In terms of construction dust, taking account of the dust control measures in the *Code of construction practice*, there is likely to be a minor adverse effect on adjacent residential and commercial properties (Nos 5, 50 and 89-101 Carnwath Rd) and a negligible effect is predicated at other residential properties and at Thomas’ School.

7.3.5 The effects of odours released from the ventilation column are likely to be negligible.

7.3.6 It is considered that mitigation measures are unlikely to be required.

**Ecology – aquatic**

7.3.7 The proposed construction works would include a jetty or a levelled area on the river bed adjacent to the landward edge of site. This would provide a level surface onto which barges could rest on low tide. Without this, there is a risk that barges could stick to the river bed and be flooded as the tide rises. This feature would be located in the River Thames and Tidal Tributaries Site of Metropolitan Importance. The intertidal habitat is relatively narrow in this section of the river due to development on either bank, and the river is confined by a man-made vertical river wall. Data searches indicate that the site has a relatively high diversity of freshwater and estuarine fish species.

7.3.8 Construction effects would be managed in accordance with the *Code of construction practice*. With the *Code of construction practice* in place and based on the assessment to date it is anticipated there would be minor adverse effects on designated sites and habitats. Effects on mammals would be negligible. Effects on fish from light spillage would be minor adverse, whilst all other effects on fish would be minor adverse. All effects on invertebrates are considered to be negligible.

7.3.9 Modelling results indicate that the presence of structures within the river during construction would not have a significant adverse effect on migrating fish through altered river flows.

7.3.10 There is no combined sewer overflow outfall discharge at this site, and so the scheme would have no effect on aquatic habitats during operation.

7.3.11 Measures are included within the *Code of construction practice* to manage construction effects, and no further mitigation during construction is considered necessary.

**Ecology – terrestrial**

7.3.12 The site mainly comprises buildings and bare ground with a small area of dense scrub and a few scattered trees, and an area of foreshore.

7.3.13 Survey results indicate low levels of bat activity and that bat roosts on or adjacent to the site are unlikely. Surveys for black redstarts were undertaken however there were no observations suggesting the site is not
used by them for foraging or nesting. Wintering bird activity was recorded on the foreshore.

7.3.14 No adverse effects on designated sites are anticipated due to the localised nature of construction activities and their distance from designated sites (aquatic ecology effects are considered in the section above). There would be no significant habitat loss on site and effects on bats and wintering birds are likely to be negligible. A brown roof is proposed on the ventilation building which would promote local biodiversity.

7.3.15 Lighting during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

7.3.16 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. Operational activity would be limited to occasional maintenance work which is considered unlikely to have significant effects on terrestrial ecology.

Historic environment

7.3.17 The site does not contain any nationally designated heritage assets, nor are there any in the near vicinity. The site lies within the locally designated Sands End Conservation Area (of high heritage asset significance). The Thames river wall (of low heritage asset significance) and part of the Thames foreshore lie within the southern part of the site. The main potential in terms of buried heritage is for palaeoenvironmental remains, eg organic remains such as pollens or plant fossils, of low or medium heritage asset significance, and for post-medieval remains, including the footings of an early 20th century ambulance centre and industrial buildings (of low or medium heritage asset significance). There is also an uncertain, probably moderate potential for isolated prehistoric artefacts (of low heritage asset significance).

7.3.18 Construction works would entail deep excavations which would entirely remove any assets which may be present within the footprint of these works. This would comprise a minor adverse effect for palaeoenvironmental remains and prehistoric artefacts, and a minor or moderate adverse effect for post-medieval remains.

7.3.19 The desk-based study of the site suggests that no heritage assets of very high significance are anticipated that might merit a mitigation strategy of permanent preservation in situ. Any adverse effects which may arise 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. The resulting residual effects would be negligible.

7.3.20 Construction works are likely to have a moderate adverse effect on the historic character of the Sands End conservation area. More remote heritage assets such as Wandsworth Park would have a minor adverse effect. Once operational, there would be beneficial effects on Sands End
conservation area (moderate) and on the setting of Wandsworth Bridge and of Hurlingham conservation area (both minor beneficial). This is due to the good design of the scheme at this site and particularly the river frontage at a scale appropriate to the local character.

Land quality

7.3.21 A search of historical and environmental data indicates that the site was developed as wharves which occupied both the site and the adjacent sites to the east and west. The wharves were subsequently utilised as other industrial activities from the 1950s through to the 1980s. These included cement works, a petroleum depot and asphalt works. The surrounding area has also been subject to a number of commercial and industrial works through the 20th century. This has included the filling in of a gravel pit, chemical works, concrete works, laundry, and warehousing. Remnants of this still exist (notably to the northwest of the site).

7.3.22 There is presently no ground investigation data for the area, although local authority consultation has recorded some contamination of the adjacent retail park with tars and associated contaminants. It is considered that the foreshore sediments would not be significantly affected by contamination. Desk-based surveys have identified a low/medium risk from unexploded ordnance.

7.3.23 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. Ground investigations are proposed on the site and would enable the presence of contamination to be further defined. Measures within the Code of construction practice, including risk assessment and remediation, would ensure that there would be no significant adverse effects during construction.

7.3.24 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.

Noise and vibration

7.3.25 Noise conditions in the area of the site are dominated by road traffic noise and the operation of the industrial and commercial units to the east and west of the site. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings located to the north, east and west of the site.

7.3.26 Significant noise effects arising from construction activities are predicted at some residential properties close to the site on Carnwath Road and Philpot Square. No significant vibration effects arising from construction activities are predicted. No significant effects as a result of the operation of the site are predicted.

7.3.27 During construction activities, a substantial amount of additional noise mitigation is being proposed. In addition, 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 on the local community for example through suitable siting of equipment on site.

**Socio-economics**

7.3.28 The site principally comprises three parcels of land; two wharves, both of which are vacant or in temporary use and an industrial estate. The Thames Path also runs through the site area. Residential dwellings and commercial/light industrial uses, including retail businesses and small offices surround the site. The Thames Path is moderately well used by local residents and employees.

7.3.29 During construction there are likely to be major adverse effects on the amenity of residents of nearby properties and moderate adverse effects arising from the displacement of business activity. The temporary diversion of a section of the Thames Path, amenity impacts on Thames Path users and the temporary loss of industrial employment land are considered to have negligible effects. Socio-economics effects once the tunnel is built and operational are considered to be negligible.

7.3.30 For the operational phase, there are not expected to be any socio-economic effects at Carnwath Road Riverside which require mitigation.

**Townscape and visual**

7.3.31 The site is located within the Sands End Conservation Area on the north bank of the River Thames, to the south of a large residential area surrounding significant open spaces including Hurlingham Park and South Park. Disused wharves and commercial premises dominate the site to the east and west. The surrounding townscape is predominately residential with the exception of some commercial units in the vicinity.

7.3.32 During construction, the scale and intensity of works, which includes an acoustic enclosure to attenuate noise effects, would generate moderate adverse townscape effects on the site (at night only), on the River Thames, Fulham Residential, Point Pleasant residential and Wandsworth Park. Effects on other townscape character areas assessed would be minor adverse or negligible and therefore not significant. Once operational, there would be beneficial townscape effects on the site and surrounding townscape areas due to the creation of new public realm and high quality buildings.

7.3.33 In terms of visual amenity, during the construction phase there would be major adverse visual effects on residential viewpoints south west from Carnwath Road, north west from Smugglers Way and north east from Eastfields Avenue. This would result from the visibility of construction activity and continuous loading of barges. There would be moderate adverse effects on the view east from the Thames path and minor adverse effects at Point Pleasant, Bell Lane Spit and at specific views from the Thames Path resulting from background visibility of construction activity. Once operational effects would be moderate and minor beneficial due to new public realm and the high quality design of the ventilation building.
Transport

7.3.34 The Carnwath Road Riverside site has poor public transport accessibility being located over 1km from National Rail and Underground stations. The site is on the south side of Carnwath Road and construction vehicle access is proposed via the A4 or A40, A217 and King’s Road (A308) to the north of the site and the A217 and A3 to the south.

7.3.35 Excavated main shaft and tunnel material would be removed from the site and aggregates brought into the site by barges using the river, all other materials would be transported by road. During construction, the number of heavy goods vehicle movements would be moderate. 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 and cyclist amenity and safety are expected to be minor adverse on account of the loss of footway and widened junctions. A negligible effect is expected on bus, 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.

7.3.36 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 modifying junction signal timings and the protection of pedestrian routes providing safe crossing points where appropriate. Mitigation is not required for the operational phase.

Water resources – groundwater

7.3.37 The shaft would pass through the upper aquifer and into the underlying non aquifer (London Clay). The shaft would not penetrate the lower aquifer beneath (Chalk). There is one licensed groundwater abstraction situated in the upper aquifer in the nearby area. The most sensitive aspect with regard to groundwater is the upper aquifer which is defined as being of medium value.

7.3.38 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible.

7.3.39 The groundwaters at the site could be contaminated and this will be determined by site investigation. If contamination is identified, this would be dealt with using a risk based approach and appropriate remediation ahead of construction. The effect on groundwater quality is considered to be negligible.

7.3.40 Groundwater monitoring of water levels and water quality would continue during construction.

Water resources – surface water

7.3.41 The site is located in the River Thames foreshore within the Thames Upper waterbody, as classified under the Thames River Basin Management Plan. There is also the possibility for effects on the
downstream Thames Middle 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. There are a number of nationally and locally designated water dependent conservation sites within 2km of the proposed site.

7.3.42 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.

**Flood risk**

7.3.43 The main source of flood risk to the site is the tidal River Thames and the site is located within the 'high probability' flood zone, although it is protected by flood defences which run along the river bank. The site may be at risk of localised surface water flooding due to runoff generated by land to the north. The current level of protection afforded by the defences would be maintained on the site during both construction and operation. No changes are proposed to the percentage of hard standing on the site and it is intended that this area would continue to be served by the local drainage system.
8 Dormay Street

8.1 Location and context of proposed development

8.1.1 The proposed development site is located in the London Borough of Wandsworth. It comprises part of the Frogmore Industrial Complex and Causeway Island, and the junction of the Causeway, Armoury Way and Dormay Street. The site location and context are shown in Figure 8.1 and Figure 8.2.

8.1.2 It is proposed to use the site as a combined sewer overflow interception and connection tunnel drive site.

8.1.3 The site is bounded by railway lines and a vehicle storage area to the north, and the Causeway to the east, beyond which is the River Wandle. The south of the site backs onto clusters of industrial buildings along Dormay Street including Wentworth House (a Grade II listed building). A public house, the Armoury, and a row of cottages and terraced properties are located further south at the junction of Dormay Street and Armoury Way. A London Borough of Wandsworth maintenance depot is to the west. Bell Lane Creek runs through the centre of the site. The wider area is mixed, comprising commercial, industrial and residential uses.

8.1.4 Existing access to the site is from Dormay Street. By road, the site is close to Putney Bridge Road (A3209), Armoury Way and Old York Road. East Putney Underground station is approximately 1.25km to the west and Wandsworth Town railway station is approximately 500m to the east. The Thames Path public right of way runs west - east to the north of the site.

8.1.5 The site lies within Wandsworth Air Quality Management Area for nitrogen dioxide and particulate matter. The River Thames and its tidal tributaries which are important for nature conservation are immediately to the east and north of the site. There are no other areas designated for nature conservation in the vicinity. There are no listed buildings within the site although it is in the Archaeological Priority Area which covers the River Thames and River Wandle floodplains. The Grade II listed Wentworth House lies to the south of the site.

8.1.6 The main flood risk to the site is from the tidal River Thames, Bell Lane Creek and the River Wandle. The site lies within the 'high probability' flood zone, although it is protected in part of the site by flood defences. The northern part of the site is not defended from flooding originating from Bell Lane Creek.
Figure 8.1 Dormay Street – site location and context

Figure 8.2 Dormay Street – aerial photograph
8.2 **Nature of the proposed development**

8.2.1 This section describes the construction and operation of the proposed development at Dormay Street. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 8 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

8.2.2 The proposal is to intercept the existing Frogmore Storm Relief – Bell Lane Creek combined sewer overflow, which currently discharges approximately 26 times in a typical year. The total volume discharged is approximately 17,300 m³ in a typical year. It is also proposed to connect with the Frogmore connection tunnel from this site. The existing sewer is shown on Figure 8.1.

8.2.3 A drop shaft with an internal diameter of approximately 12m and approximately 24m deep would be constructed. From the base of the shaft there would be a connection tunnel (Frogmore connection tunnel). There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow. The tunnel boring machine would be launched through the base of the shaft at Dormay Street to drive the Frogmore connection tunnel sequentially south to King George’s Park and north to Carnwath Road Riverside.

8.2.4 The construction phase would last approximately three years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the *Code of construction practice*.

8.2.5 Construction of the connection tunnel and the secondary lining phase would require continuous 24 hour working which would mainly take place underground within the tunnel but with supporting activity at ground level and would last for approximately six months in total.

8.2.6 Vehicle access to the site during construction would be via a new access off Dormay Street, with vehicles travelling from Armoury Way (A3) as shown on the construction phasing plans for this site (see Section 8 of the *Section 48: Book of plans*). Heavy construction vehicles would use a temporary bridge over Bell Lane Creek to access the northern part of the site, and light vehicles only would access this part of the site from a new entrance from The Causeway.

8.2.7 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in
relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

8.2.8 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance at this site replacement tree and scrub planting and limiting the use of breaking equipment during demolition to limit disturbance on to local residents.

**Operation**

8.2.9 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average discharge of approximately 500m³, one spill event a year.

8.2.10 A ventilation column would be incorporated within an electrical and control kiosk located centrally within the site near to the south of the Bell Lane Creek river wall (see permanent works layout plan in Section 8 of the Section 48: Book of plans). The electrical and control kiosk would have a maximum height of approximately 6m. A smaller diameter ventilation column would be sited to the west of the kiosk measuring approximately 6m in height.

8.2.11 An area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be provided. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Dormay Street.

8.2.12 A brown roof is proposed on the electrical and control kiosk to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted.

8.2.13 A visualisation illustrating how the completed works could be developed is provided in Figure 8.3.
8.3 Environmental effects

8.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

8.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

8.3.3 The Dormay Street site is located within the London Borough of Wandsworth Air Quality Management Area. Local monitoring data indicates that there are currently exceedences of the air quality standard for nitrogen dioxide in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupants of nearby residential dwellings (between Dormay Street and Frogmore and on Frogmore Street), and the adjacent commercial and industrial premises.

8.3.4 The overall effect on local air quality from construction road traffic and construction plant is likely to be minor adverse at the nearby residential
properties and negligible at the commercial and industrial premises. In terms of construction dust, this is likely to have a minor adverse effect at the commercial buildings within 10m of the site and a negligible effect at the residential and industrial premises, taking account of the dust control measures in the Code of construction practice. It is considered that further measures are not required.

8.3.5 The effect of odour from air released from the ventilation column, which may occur periodically when the tunnel is filling, is likely to be negligible.

Ecology – aquatic

8.3.6 The sewage outfall that would be intercepted by the development currently discharges into Bell Lane Creek, which is part of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. The Creek is a muddy channel, with an intertidal area exposed at low tide. The channel is underlain by pebbles, silt, cobbles and shingle. The banks are artificial, made of vertical concrete, steel sheet piles and brick and they support a limited amount of green algae. There are several small areas of marginal reedbed close to the creek mouth. There is no marginal vegetation in the vicinity of the outfall. The site has some value for fish species, and supports only pollution-tolerant invertebrates.

8.3.7 Construction effects would be managed in accordance with a Code of construction practice. With the Code of construction practice in place and based on assessment findings, landtake, disturbance and compaction of habitats from construction of the temporary bridge, would result in minor adverse effects. Pollution of habitats due to spillages would be negligible. Effects on fish would be minor adverse. Effects on invertebrates and mammals would be negligible.

8.3.8 It is anticipated that during operation, the reduction in fish mortality that would result from improved oxygenation of the water would have a moderate beneficial effect. In the longer term of operation there would be a moderate beneficial effect through increased distribution of rare and/or pollution sensitive fish species. Effects on invertebrates would be minor beneficial and negligible on mammals. No mitigation is required during operation since effects would be beneficial.

Ecology – terrestrial

8.3.9 Bell Lane Creek, which is part of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance, runs through the site. The site mainly comprises buildings, hardstanding and foreshore habitat, small areas of short perennial vegetation, scattered trees and dense scrub. There is a small area of potential reptile habitat.

8.3.10 Survey results indicate that the area is used by common pipistrelle bats and soprano pipistrelle bats for foraging and commuting. Breeding birds and wintering birds use the site area including the scrub adjacent to the river. The habitat on site was considered to offer potential for black redstarts, however they were not recorded during surveys and consequently it is considered that the site and immediately surrounds are of negligible value for black redstart.
8.3.11 During construction, no adverse effects are anticipated on designated sites due to their distance from the construction site and the relatively localised nature of the proposed works (aquatic ecology effects are considered in the section above). Habitat and trees removed during construction would be replaced and therefore the temporary loss of habitat is not considered to be significant. In addition, a brown roof is proposed on the electrical and control kiosk to promote local biodiversity. There would be no significant changes likely in the local population of bats, wintering or breeding birds as a result of the construction works and therefore effects would be negligible.

8.3.12 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to prevent disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

8.3.13 Operational activity would be limited to occasional maintenance works, which are unlikely to have significant effects on terrestrial ecology.

**Historic environment**

8.3.14 The site contains no nationally designated heritage assets. The grade II listed early 18th-century Wentworth House lies approximately 40m to the south of the site. There is little above ground heritage interest within the site, although a 19th century barge bed and boundary wall are present.

8.3.15 The site lies within a locally designated Archaeological Priority Area and the main potential in terms of buried heritage is for palaeoenvironmental remains eg organic remains such as pollens or plant fossils within the Wandle floodplain alluvium, which would be of low or medium heritage asset significance. There is also potential for evidence of prehistoric activity (of low to high heritage asset significance depending on the nature and condition of any finds), and post-medieval 18th–19th century footings of industrial buildings (of low heritage asset significance). There is also a moderate potential for later medieval waterfront features of low or medium heritage asset significance.

8.3.16 Piling for the temporary bridge could remove parts of the 19th century barge bed, constituting a moderate adverse effect. Construction works would entail deep excavations which would entirely remove any buried assets within the excavation footprint if any such assets were present. If such assets were present, this would comprise a high magnitude of impact and would give rise to a minor adverse effect on palaeoenvironmental remains and post-medieval remains, a minor to major adverse effect on prehistoric remains, and a minor or moderate adverse effect on later medieval remains.

8.3.17 Mitigation would be through targeted archaeological excavation and recording. 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. Adverse effects which may arise could be successfully mitigated by a suitable programme of archaeological investigation before and/or during construction and
subsequent dissemination of the results and so achieve preservation by
record. The resulting residual effects would be negligible.

8.3.18 In terms of setting, during construction effects would range from negligible
to minor adverse due to the visibility of the works. Once operational, all
effects on setting would be minor beneficial as the proposed development
would open up vistas and improve the architectural quality of the setting of
Wandsworth Town Conservation Area and Wentworth House, a listed
building.

**Land quality**

8.3.19 Historical and environmental data indicates that there is potential for
historical contamination sources at the site. The site has been used as a
depot and for electricity works. Causeway Island may have below ground
material linked with the filling in of part of Bell Lane Creek. Historical data
also shows that the local area was heavily industrialised from the late 19th
century onwards, with surrounding uses including a sizeable gas works,
tar works and wharves. However, previous ground investigations have
recorded no significant contamination of the soils on site. Although some
contamination of groundwater in the northern part of the site has been
identified. Desk-based surveys have identified a low to medium risk from
unexploded ordnance.

8.3.20 Based on assessment findings, there could be a slight adverse effect on
construction workers due to the potential for exposure to contaminated
soils or other materials, although any exposure risk would be short-term
limited to the construction period. 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. Ground
investigation will be undertaken in due course, although the approach to
risk assessment and remediation contained within the *Code of
construction practice* means that no need for mitigation during the
construction phase is identified.

8.3.21 During operation there would be a negligible effect on future users of the
site and on built structures within the site and no mitigation would be
required.

**Noise and vibration**

8.3.22 The site is subject to road traffic and rail noise. The nearest locations to
the site which are sensitive to noise and vibration are residential dwellings
to the south of the site along the A3 and Armoury Way and between
Dormay Street and Frogmore.

8.3.23 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 Frogmore Connection
Tunnel is contained in Section 2.5.

8.3.24 No significant effects from vibration during construction are predicted. No
significant noise effects arising from construction activities are predicted.
8.3.25 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 on the local community for example through suitable siting of equipment on site.

8.3.26 No significant effects from noise or vibration during the operation of the site are predicted.

**Socio-economics**

8.3.27 The site is currently occupied by a civil engineering contractor, which would vacate the site in early 2012, and a Council depot. The Wandle Trail and a national cycle route pass adjacent to the site along a private road. These are moderately well used for walking and cycling. Industrial and storage uses immediately surround the site.

8.3.28 During construction, there would be minor adverse effects arising from the loss of employment land. There would also be minor effects on amenity on users of the Wandle Trail and the national cycle route. The temporary reduction in the area of the Council depot would have a negligible effect.

8.3.29 Once operational, there would be a negligible effect on the availability of employment land resulting from the presence of operational structures on the site.

**Townscape and visual**

8.3.30 The site comprises two industrial buildings, a storage shelter and river wall which are generally in poor condition. The surrounding townscape is a mix of industrial, commercial and residential properties.

8.3.31 The scale and intensity of construction activity would have a minor adverse effect on the character of the site and the Dormay Street industrial character area. Other townscape effects would be negligible.

8.3.32 Operational townscape effects have not been assessed since the townscape changes post construction would be limited.

8.3.33 In terms of visual amenity, there would be moderate adverse effects on viewpoints from recreational users including a national cycle route and from the confluence of Bell Lane Creek and the River Wandle. All other visual amenity effects, including from residential viewpoints, would be negligible. As with townscape, changes to the site once operational would be limited and therefore an operational assessment of visual effects has not been carried out.

**Transport**

8.3.34 The site has very good public transport accessibility, being located in close proximity to a number of high frequency bus stops and within 800m of Wandsworth Town Rail Station and the Wandsworth Riverside Quarter pier.

8.3.35 Construction vehicle access is proposed via the A3 and Upper Richmond Road (A205), Armoury Way and then Dormay Street. During construction, the number of heavy goods vehicle movements would be moderate to high (at peak times). Negligible effects on road network operation and delay or
to pedestrian and cyclist amenity are predicted. A negligible effect is expected on public transport and river passenger services.

8.3.36 During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities, which would have a negligible effect on the surrounding transport networks.

8.3.37 The project is being designed to limit effects on the transport networks as far as possible. At this location, mitigation measures during construction would involve the provision of safe crossing points for pedestrians and cyclists where needed. Mitigation is not required for the operational phase.

**Water resources – groundwater**

8.3.38 The shaft would pass through the upper aquifer, which is of medium value, and into the underlying London Clay (which is not an aquifer). The shaft would not penetrate the lower chalk aquifer beneath. Associated interception infrastructure would be located in the upper aquifer.

8.3.39 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flows. This effect is anticipated to be negligible due to the inclusion of design measures to reduce groundwater effects.

8.3.40 No soil or groundwater contamination has been identified on site to date but should any be encountered, the risks would be assessed and appropriate remediation undertaken. The effect on groundwater quality is considered to be negligible.

8.3.41 Groundwater monitoring of water levels and water quality would be undertaken during construction and operation.

**Water resources – surface water**

8.3.42 The site spans Bell Lane Creek, which forms the tidal section of the River Wandle. It joins the River Thames approximately 250m north of the site.

8.3.43 The River Thames in the vicinity of the site is classed as being of ‘moderate’ status, with a status objective of ‘good’ by 2027. The River Wandle (including the Bell Lane Creek) is classed as being of ‘poor’ status, with a status objective of ‘good’ by 2027. There are a number of nationally and locally designated water-dependent conservation sites within 2km of the site.

8.3.44 Construction effects would be managed via the *Code of construction practice*. With the *Code of construction practice* in place effects on surface water resources from surface water runoff and potential contamination of the drainage system are not expected to be significant.

8.3.45 No mitigation would be required during construction in terms of water quality.

8.3.46 Once operational, the scheme would reduce the number of discharges from the Frogmore Storm Relief – Bell Lane combined sewer overflow to a predicted level of one spill a year. 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 104 days per year. In addition, the tonnage of sewage derived litter could be expected to be reduced from 4 tonnes to less than a tenth of a tonne per year.

**Flood risk**

8.3.47 The southern section of the site is located on the banks of Bell Lane Creek, a tidal inlet of the River Thames, and is within the ‘high probability’ flood zone. However, it is protected from tidal flooding by the Thames Barrier and local flood defences. The northern section of the site, on Causeway Island, is also located within the ‘high probability’ flood zone but no formal flood defences are present here. The current level of protection afforded by the defences would be maintained on the site during construction and operation.
9 King George’s Park

9.1 Location and context of proposed development

9.1.1 The proposed development site is located in the London Borough of Wandsworth. The site comprises the northern end of King George’s Park, adjacent to the entrance from Buckhold Road. The site location and context are shown in Figure 9.1 and Figure 9.2.

9.1.2 It is proposed to use the site as a combined sewer overflow interception and connection tunnel reception site.

9.1.3 The site is bounded by Buckhold Road to the west and north, and Neville Gill Close to the east. The south of the site is bounded by the main body of King George’s Park. The park includes a children’s nursery, recreational facilities such as tennis courts, a lake and open space. The nearest residential properties are on Buckhold Road. The Southside shopping centre is located to the east, opposite the park.

9.1.4 Existing access to the site is from various pedestrian park entrances, with the entrance on Buckhold Road being the closest. Two footpaths pass through the site. East Putney London Underground station and Wandsworth Town national rail station are 1.5km to the northwest and 1.3km to the northeast, respectively. There is also a designated London Cycle Route that runs along Neville Gill Close.

9.1.5 The site is in the Wandsworth Air Quality Management Area declared for nitrogen dioxide. King George’s Park (including the site) is designated for nature conservation. The site lies within the River Wandle Archaeological Priority Area. It is not within or adjacent to a conservation area and does not include any listed buildings. The closest listed building is the Grade II Down Lodge located to the southwest.

9.1.6 The main flood risk to the site is from the tidal River Thames and the River Wandle, which are located approximately 800m and 200m away respectively. The site lies within the ‘high probability’ flood zone; it is protected from the River Thames by flood defences but is not defended from the River Wandle.
Figure 9.1 King George’s Park – site location and context

Figure 9.2 King George’s Park – aerial photograph
9.2 **Nature of the proposed development**

9.2.1 This section describes the construction and operation of the proposed development at King George’s Park. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 9 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

9.2.2 The proposal is to intercept the existing Frogmore Storm Relief – Buckhold Road combined sewer overflow, which currently discharges approximately 19 times in a typical year. The total volume discharged is approximately 85,600m³ in a typical year. The existing sewer is shown on Figure 9.1. It would also be used as a reception site for the Frogmore connection tunnel.

9.2.3 A drop shaft with an internal diameter of approximately 9m and approximately 20m deep would be constructed. The shaft would be located towards the eastern side of the site. From the base of the shaft there would be a connection tunnel (the Frogmore connection tunnel) which would connect King George’s Park to Carnwath Road Riverside via the Dormay Street combined sewer overflow shaft. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow. The tunnel boring machine used to excavate the Frogmore connection tunnel driven from Dormay Street would be removed at King George’s Park.

9.2.4 The construction phase would last approximately two and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. It is not anticipated that there would be construction work outside these times.

9.2.5 Vehicle access to the site during construction would be via a new access off Neville Gill Close, with vehicles travelling from Buckhold Road (A218) via Wandsworth High Street as shown on the construction phasing plans for this site (see Section 9 of the *Section 48: Book of plans*).

9.2.6 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

9.2.7 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance high quality hoarding and advance planting in the park.
Operation

9.2.8 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average of approximately 1,500 m$^3$ a year.

9.2.9 A 6m high ventilation column and an electrical and control kiosk approximately 3m high would be located on the eastern side of the site towards Neville Gill Close (see site works permanent works layout in Section 9 of the Section 48: Book of plans). A further ventilation column of between 4m and 8m high would be located in the vicinity of the shaft.

9.2.10 Landscaping would be provided, integrating the proposed structures into the surrounding park. The existing ground levels would be re-contoured to ensure that the permanent works would not create any additional flood risk within the flood plain. In addition, in consultation with the local council, pedestrian accesses would be improved in the north of the Park so as to link with future adjacent developments and improve pedestrian access, such improvements would also benefit from enhanced tree planting to assist integration of these proposals within the Park.

9.2.11 A brown roof is proposed on the electrical and control kiosk to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted.

9.2.12 There would be an area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes. This would be publicly accessible, except during times of maintenance when it would be temporarily fenced off. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via a new access off Neville Gill Close.

9.2.13 Permanent pedestrian access off the junction of Buckhold Road and Neville Gill Close would be provided. It is likely that the existing access off Buckhold Road would not be retained.

9.2.14 A visualisation illustrating how the completed works could be developed is provided in Figure 9.3.
9.3 **Environmental effects**

9.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

9.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

9.3.3 The King George’s Park site is located within the London Borough of Wandsworth Air Quality Management Area. Local monitoring data indicates that there are currently exceedences of air quality standards in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupiers of nearby residential dwellings (on Buckhold Road) and commercial and office premises including Southside shopping centre and the new Business Village, as well as users of a nearby day centre, nursery, clinic, West Hill Centre (adult college) and Army Cadet Force building, and visitors to the children’s zoo in the park.
9.3.4 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 park, day centre and clinic and negligible elsewhere. In terms of construction dust, this is likely to have a minor adverse effect on the park, Army Cadet Force building, Business Village, shopping centre and day centre and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

9.3.5 The effect of odour from air released from the ventilation column, which may happen from time to time when the tunnel is filling, is likely to be negligible.

9.3.6 It is considered that further mitigation measures are not required.

Ecology – aquatic

9.3.7 The sewage outfall that would be intercepted currently discharges into a section of the River Wandle which is covered beneath the Southside shopping centre. The non-tidal River Wandle is designated as a Site of Borough Importance. The downstream Wandle is part of the River Thames and Tidal Tributaries Site of Metropolitan Importance.

9.3.8 There would be no in-river works associated with this site. No further consideration of the impacts associated with construction has therefore been undertaken for aquatic ecology.

9.3.9 During operation, reduction in nutrient levels entering the river would have a moderate beneficial effect on habitats. The reduction in fish mortality that would result from improved oxygenation of the water is also considered a moderate beneficial effect. There would also be a moderate beneficial effect through increased distribution of rare and/or pollution sensitive fish species. Effects on invertebrates would be minor beneficial. Effects on mammals would be negligible.

9.3.10 No mitigation is required at this site because no adverse effects are anticipated.

Ecology – terrestrial

9.3.11 The site is within King George’s Park Site of Importance for Nature Conservation. The site comprises hardstanding, amenity grassland, scattered trees and introduced shrub. These habitats continue into the wider park and include a large ornamental lake.

9.3.12 While the construction works include the removal of trees, on the basis that there would be advanced planting provided in the wider park, trees would be planted before tree removal takes place thereby providing replacement habitat before it is lost. Upon completion of construction, additional trees would be planted within the site resulting in a net gain in trees planted in the park.

9.3.13 Surveys undertaken for bats indicate a large number of common pipistrelle and soprano pipistrelle and a common pipistrelle tree roost towards the northern end of the park. With advanced tree planting and also the provision of species specific bat boxes, no significant effects on populations of bats are likely as a result of the construction works.
9.3.14 There is an assemblage of birds of value to the park. As with bats, advanced tree planting would provide replacement habitat resulting in negligible effects. A brown roof is proposed on the electrical and control kiosk to promote local biodiversity.

9.3.15 Lighting which may be required during construction would be controlled through measures included in the *Code of construction practice* to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the *Code of construction practice*.

9.3.16 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. It is anticipated that operational activity would be limited to occasional maintenance works, which are considered unlikely to have significant effects on terrestrial ecology.

**Historic environment**

9.3.17 The site is located within King George’s Park, which was established in the 1920s, and is of medium heritage asset significance. The site contains no nationally designated heritage assets. Down Lodge, a Grade II listed building, constructed in the mid to late 18th century, lies around 160m to the southwest.

9.3.18 The site lies within an Archaeological Priority Area and the main potential in terms of buried heritage is for palaeoenvironmental remains (eg organic remains such as pollens or plant fossils) of low or medium heritage asset significance, and post-medieval drainage ditches of low or negligible heritage asset significance. The potential for earlier (prehistoric, Roman and medieval) remains is considered to be low, as the site lay outside the known areas of settlement in these periods.

9.3.19 Deep excavations would entirely remove any buried heritage assets within the footprint of the excavation. If any buried assets were present, this would lead to a minor or moderate adverse effect on palaeoenvironmental remains, and a minor adverse effect on post-medieval ditch remains. Major effects may arise in the event that there is a prehistoric settlement or timber structure. Construction works would entail removal (which may potentially be relocated within the park) of the ornamental gateway and removal of a section of the railings at the northern end of the park which would together would have a moderate adverse effect.

9.3.20 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. 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. Mitigation would be a basic visual record prior to the start of construction for above ground assets affected. The resulting residual effects would be negligible.

9.3.21 There are no above ground heritage assets within the assessment area whose settings would be significantly adversely affected. Both construction
and operational effects for the historic character and setting of above
ground heritage assets have therefore been scoped out of the
assessment.

**Land quality**

9.3.22 A search of historical and environmental data indicates that the site has
not been subject to significant previous contaminative uses. Historical
mapping indicates that the site has remained undeveloped since the late
19th century. No potential contaminative sources were identified at or in
the immediate vicinity of the site during a walkover survey. Although some
minor commercial and light industrial buildings are located on the opposite
side of Buckhold Road. Previous ground investigations have recorded no
significant soil contamination. Low levels of groundwater contamination
levels have been recorded. Desk-based surveys have identified a medium
to high risk from unexploded ordnance.

9.3.23 There could be a slight adverse effect on construction workers due to the
potential for exposure to contaminated soils or other materials, although
any exposure risk would be short-term limited to the construction period.
There would be a negligible effect built structures, such as existing
sewerage infrastructure at the site, as it is considered unlikely that
contaminants contained in subsurface materials would affect buried
structures. Ground investigation will be undertaken in due course,
although the approach to risk assessment and remediation contained
within the *Code of construction practice* means that no need for mitigation
during the construction phase is identified.

9.3.24 During operation there would be a negligible effect on future users and the
built environment and no mitigation is required.

**Noise and vibration**

9.3.25 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
Albon House.

9.3.26 No significant noise or vibration effects arising from construction activities
are predicted. No significant effects as a result of the operation of the site
are predicted.

9.3.27 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 noise and vibration effects upon the local community for
example through suitable siting of equipment on site.

**Socio-economics**

9.3.28 The site comprises an area of green open space, forming part of a larger
park. Within the park to the south of the site are a Children’s Centre and
playground, and ornamental lake. Residential dwellings and other uses,
including the Penfold Day Centre, Southside shopping centre and
business units surround the rest of the site. The open space is moderately
well used for informal recreation.
9.3.29 During construction, there would be moderate adverse effects on the amenity of users of the Children’s Centre and the amenity of users of King George’s Park open space. There would be minor adverse effects on the amenity of nearby residents and on users of King George’s Park open space as a result of temporary loss of use of an area of open space. The amenity impacts on users of the Penfold Day Centre would be negligible. Once operational, there would be a negligible effect resulting from the loss of open space associated with the permanent operational structures.

9.3.30 For the operational phase no socio-economic effects requiring mitigation are predicted.

**Townscape and visual**

9.3.31 The site is located in the northern tip of King George’s Park, adjacent to Buckhold Road and Neville Gill Close. It comprises open grassland and mature trees. The condition of the townscape is generally good.

9.3.32 While advanced planting is proposed in the wider park area to help screen views into the site and a high quality planted hoarding would be put in place during construction to help screen views into the site, in townscape terms the clearance of vegetation from within the site and general construction activity would have significant adverse effects on the character of the site and the King George’s Park character area. There would also be moderate adverse effects on King George’s Park heritage green space and Wandsworth Town residential area.

9.3.33 Once operational, there would minor improvements to the site and surrounding area through maturing advanced tree planting as well as replacement on-site tree planting. In addition, a new high quality public realm would be created.

9.3.34 In terms of visual amenity, during construction there would be major adverse visual effects from a single viewpoint at Buckhold Road due to visibility of the site from tree clearance along that frontage and the scale and intensity of construction activity. There would be significant adverse effects from several viewpoints within the park and from several viewpoints along Neville Gill Close. Other visual effects would be minor adverse or negligible and therefore not significant.

9.3.35 Once operational, there would initially be minor beneficial or negligible effects. Once tree planting has matured, beneficial effects would be enhanced.

**Transport**

9.3.36 The King George’s Park site has good public transport accessibility being located within close proximity of bus stops serving Putney, Clapham Junction, Vauxhall and Wimbledon. The site is on the west side of Neville Gill Close and construction vehicle access is proposed via Wandsworth High Street (A3), Buckhold Road (A218) and Neville Gill Close.

9.3.37 During construction, the number of heavy goods vehicle movements would be comparatively low. Construction traffic and the site layout are considered likely to result in a minor adverse effect on road network.
operation and delay. Effects on pedestrian and cyclist amenity and safety are expected to be minor adverse and negligible, respectively. A negligible effect is expected on public transport services. During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities and these would have a negligible effect on the surrounding transport networks.

9.3.38 The project is being designed to limit the effects on transport networks as far as possible. At this location, mitigation measures during the construction phase would include provision of safe crossing points for pedestrians across the site access. Mitigation is not required for the operational phase.

Water resources – groundwater

9.3.39 The proposed shaft would pass through the upper aquifer, which is of medium value, and into the underlying London Clay (which is not an aquifer). The shaft does not penetrate the lower chalk aquifer beneath. Associated interception infrastructure would be located in the upper aquifer.

9.3.40 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible.

9.3.41 No soil or groundwater contamination has been identified on site to date but should any be encountered, the risks would be assessed and appropriate remediation undertaken. The effect on groundwater quality is predicted to be negligible.

9.3.42 Monitoring of groundwater levels and quality would be undertaken during construction.

Water resources – surface water

9.3.43 The site is located 200 metres to the east of the River Wandle and one kilometre south of the River Thames. In addition to these two watercourses, there is a lake located within King George’s Park; which is an artificial lake and not linked to the Wandle or its tributaries.

9.3.44 The section of the River Thames closest to the site, and a stretch downstream which could also be affected, are classified as being of ‘moderate’ quality status, with a status objective of ‘good’ by 2027. The River Wandle is classed as being of ‘poor’ status, with an overall status objective of ‘good’ by 2027. There are a number of nationally and locally designated water-dependent conservation sites within 2km of the site.

9.3.45 Construction effects would be managed via the Code of construction practice. With the Code of construction practice in place effects on surface water resources from surface water runoff and potential contamination of the drainage system are not expected to be significant. No mitigation would therefore be required.

9.3.46 Once operational, the scheme would reduce the number of discharges from the Frogmore Storm Relief – Buckhold Road combined sewer overflow to a predicted level of one spill per year. 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 80 days per year. In addition, the tonnage of sewage derived litter could be expected to be reduced from approximately 22 tonnes to less than one tonne per year.

**Flood risk**

9.3.47 The main source of flood risk to the site is from the tidal River Thames and in particular the River Wandle. The site is located within the ‘high probability’ flood zone, although it is protected from tidal flooding by defences which run along the banks of the Thames.

9.3.48 During extreme fluvial flood events, the River Wandle could burst its banks and flood the park area. The development could therefore potentially reduce the volume of flood storage within the Park. As far as possible the design is being configured to ensure there would be no increase in flood risk throughout the surrounding area due to the development.

9.3.49 The hard standing areas surrounding the shaft could potentially increase surface water runoff from the site, and appropriate mitigation measures would be developed to attenuate surface water runoff in line with current policy requirements including the Mayor's Essential Standard.
10 Falconbrook Pumping Station

10.1 Location and context of proposed development

10.1.1 The proposed development site is located in the London Borough of Wandsworth. It comprises the Thames Water Falconbrook Pumping Station, a disused toilet block to the west and a small section of roadway. The site location and context are shown in Figure 10.1 and Figure 10.2.

10.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

10.1.3 The proposed development site comprises two areas. The main site is located south of York Gardens Children’s Centre and Adventure Playground. Immediately south of the main site is York Gardens Library and Community Centre. The second, smaller site is located a short distance north of the main site. York Road (A3205) forms the western boundary to both sites with York Gardens extending to the north, east and south.

10.1.4 Existing access to Falconbrook Pumping Station is via York Gardens to the east. Access to the Transport for London Road Network (the A3205 York Road) is via Lavender Road, Darien Road, Ingrave Street and Falcon Road. There are no Underground stations in the near vicinity. Clapham Junction railway station is approximately 800m to the southeast. The Thames Path public right of way runs to the northwest of the site.

10.1.5 The site lies within the Wandsworth Air Quality Management Area, declared for nitrogen dioxide and particulate matter. York Gardens is a Site of Local Importance for Nature Conservation. The site is near to the River Thames and tidal tributaries, also designated for nature conservation.

10.1.6 The site is located within the Wandsworth Archaeological Priority Area. There are no listed buildings or conservation areas within or adjacent to the site.

10.1.7 The main flood risk to the site is from the tidal River Thames which is located approximately 150m from the site. The site lies within the ‘high probability’ flood zone, although it is protected by flood defences.
Figure 10.1 Falconbrook Pumping Station – site location and context

Figure 10.2 Falconbrook Pumping Station – aerial photograph
10.2 Nature of the proposed development

10.2.1 This section describes the construction and operation of the proposed development at Falconbrook Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 10 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

10.2.2 The proposal is to intercept the existing Falconbrook Pumping Station combined sewer overflow, which currently discharges approximately 40 times in a typical year. The total discharge volume is approximately 708,900m³ in a typical year. The existing sewer is shown on Figure 10.1.

10.2.3 A drop shaft with an internal diameter of approximately 9m and approximately 40m deep would be constructed. From the base of the shaft there would be a connection tunnel which would join up with the main tunnel. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.

10.2.4 The construction phase would last approximately three years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the Code of construction practice.

10.2.5 Construction of the tunnel and installation of the secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level and would last approximately six months.

10.2.6 Vehicle access to the site during construction would be via a new access off York Road (A3205), with vehicles travelling south from York Road as shown on the construction phasing plans for this site (see Section 10 of the Section 48: Book of plans). A second entrance would be constructed to enable vehicles to exit the site by turning left onto York Road. This would avoid construction traffic accessing the site via residential roads located to the east.

10.2.7 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and the approach to ecological and heritage issues.
10.2.8 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case advanced planting of trees to screen the site and provide ecological habitat.

**Operation**

10.2.9 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average discharge of approximately 56,200m³, four spill events a year.

10.2.10 Within the pumping station compound, permanent structures would be located namely: a ventilation structure with a maximum height of 3m; a main ventilation column of between 4m and 8m high; a further ventilation column approximately 6m high and a valve chamber (see site works permanent works layout plan in Section 10 of the **Section 48: Book of plans**).

10.2.11 An area of hardstanding and landscaping would be constructed. The cover of the shaft located outside and to the west of the pumping station compound would be hard landscaped to enable access into the shaft and tunnel for inspection and maintenance purposes. This would be publicly accessible, except during times of maintenance when it would be temporarily fenced off. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via York Road.

10.2.12 A visualisation illustrating how the completed works could be developed is provided in Figure 10.3.
10.3 Environmental effects

10.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

10.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project's website.

Air quality and odour

10.3.3 The site is located within the London Borough of Wandsworth 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 receptors which may be sensitive to the development are occupiers of nearby residential dwellings to the east and south of the site and future occupiers of the new residential development (York Place) on the current Bridges Court Car Park. Other sensitive groups include users of York Gardens Library and Community Centre, York Gardens Adventure Playground, Battersea Chapel and Thames Christian College, and the
occupiers of the commercial/office premises to the west of the site on York Road.

10.3.4 The overall effect on local air quality from construction road traffic and construction plant is likely to be moderate adverse at York Gardens Library and Community Centre and minor adverse at York Place and York Gardens, and negligible at the commercial/office premises and playground. In terms of construction dust, this is likely to have a minor adverse effect at York Gardens and the Library and Community Centre (within approximately 10 metres of the site), and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

10.3.5 The effect of odour due to release of air from the ventilation structure, which may occur from time to time when the tunnel is filling, is likely to be negligible.

10.3.6 It is considered that mitigation measures are not required.

Ecology – aquatic

10.3.7 The Falconbrook Pumping Station combined sewer overflow currently discharges into the reaches of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. Several important freshwater fish species are present but invertebrate diversity is limited.

10.3.8 There would be no in river works associated with this site. No assessment of the impacts associated with construction has therefore been undertaken for aquatic ecology.

10.3.9 During operation, the reduction in fish mortality that would result from improved oxygenation of the water is considered to be a moderate beneficial effect. There would also be improvements on the distribution of rare and/or pollution sensitive fish species which be moderate beneficial in the longer term. There would also be minor beneficial on invertebrates. Effects on mammals would be negligible.

10.3.10 No mitigation is required at this site because no adverse effects are anticipated.

Ecology – terrestrial

10.3.11 The site comprises buildings and hardstanding with a small area of tall plants typical of disturbed habitats, shrubs and occasional scattered trees. Surveys indicate the use of the site and surrounding area by common pipistrelle bats for foraging. There is potential for the site and surrounds to be of local value to birds. There are no ecologically designated sites of relevance to the terrestrial ecology assessment within 500 metres of the site (aquatic ecology effects are considered in the section above).

10.3.12 On the basis that there would be advanced planting provided adjacent to the site before tree removal takes place, replacement habitat would be provided before it is lost. Within the site, trees lost would be replaced once construction has been completed.
10.3.13 With advanced tree planting and also the provision of species specific bat boxes, no significant effects on populations of bats are likely as a result of the construction works. A brown roof is proposed on the electrical and control kiosk to promote local biodiversity. In the longer term, there would be enhanced habitats for bats and also birds.

10.3.14 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

10.3.15 Operational activity would be limited to occasional maintenance work, which is considered unlikely to have significant effects on terrestrial ecology.

Historic environment

10.3.16 The site contains no nationally designated heritage assets, nor are there any in the immediate vicinity. The site includes no above ground features of historic significance. The site lies within a locally designated Archaeological Priority Area and the main potential for buried heritage is in the form of palaeoenvironmental remains eg organic remains such as pollens or plant fossils, which would be of low heritage asset significance, and for the remains of post-medieval 19th-century footings and/or cellars of terraced houses (of low heritage asset significance). York Road, which forms the western site boundary, has medieval origins and there may have been a bridge and small settlement where it crossed the Falconbrook. The site therefore has a moderate potential for the remains of later medieval settlement (of medium heritage asset significance).

10.3.17 The construction works would entail deep excavations which would remove any buried assets within the footprint of each excavation. This would be a minor adverse effect on palaeoenvironmental and post-medieval remains, and a moderate adverse effect for later medieval remains, if present.

10.3.18 The desk-based study suggests that no heritage assets of very high significance are anticipated that might merit a mitigation strategy of permanent preservation in situ. The adverse effects which may arise due to the presence of archaeological resources 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. The resulting residual effects would be negligible.

10.3.19 There are no above ground heritage assets within the assessment area whose settings would be significantly adversely affected. Both construction and operational effects for the historic character and setting of above ground heritage assets for this site have therefore been scoped out of the assessment.
Land quality

10.3.20 A search of historical and environmental data indicates that the only on-site contaminative uses since mapped sources began are the existing sewage pumping station and electrical substation. Historically the surrounding area was industrial in nature to the west of the site and a mix of residential and community uses to the east. There is no ground investigation data available for the area. Desk-based surveys have identified a low to medium risk from unexploded ordnance.

10.3.21 Based on assessment findings, there could be a slight adverse effect on construction workers due to the potential for exposure to contaminated soils or other materials, although any exposure risk would be short-term and limited to the construction period. There is likely to be a negligible effect on the built environment as it is considered unlikely that contaminants contained in subsurface materials would affect buried structures, including those of the existing pumping station. Ground investigations are proposed on the site and would enable the presence of contamination to be further defined. Measures within the Code of construction practice, including risk assessment and remediation, would ensure that there would be no significant adverse effects during construction.

10.3.22 During operation there would be negligible effect on future users and the built environment and no mitigation is required.

Noise and vibration

10.3.23 Noise conditions around the site are dominated by road traffic and rail noise. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings at Pennethorne House to the east and Arthur Newton House to the southeast, and buildings such as York Road community centre to the south and a children’s centre and adventure playground to the north.

10.3.24 No significant noise or vibration effects arising from construction activities are predicted. No significant noise or vibration effects as a result of the operation of the development are predicted.

10.3.25 During construction activities, the contractor would be required to follow best practice as set out 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.

Socio-economics

10.3.26 During construction, there would be moderate adverse amenity effects to users of the York Gardens Adventure Playground, York Gardens Library and Community Centre, and residents. Amenity effects on users of York Gardens public open space are considered to be minor adverse. Effects of disruption to commercial, office and retail premises would be negligible. No operational effects are predicted.

10.3.27 No operational mitigation is required.
**Townscape and visual**

10.3.28 The surrounding townscape is predominately residential with a number of high rise buildings to the east and south. The condition of the townscape within the site is generally fair to poor.

10.3.29 During the construction phase there would be a high quality planted hoarding to help screen views into the site. However, during the construction phase, site clearance and the scale and intensity of construction activity is likely to result in a moderate adverse effect on the character of the site. Effects on the townscape character on York Gardens have been reduced through advanced planting. Effects on other townscape areas in the vicinity would be minor adverse or negligible. Once operational, the site would be landscaped resulting in minor beneficial effects compared to existing conditions.

10.3.30 In terms of visual amenity, during the construction phase, advanced planting would help screen views into the site. There would remain a major adverse effect on views from the new development on York Road, and moderate adverse effects on views from Pennethorne House and the centre of York Gardens. Minor adverse effects are likely on other surrounding viewpoints for example from Fairchild Close, Newcomen Road and Bridges Court. Once operational, as the advanced planting matures and due to the visibility of new public realm, there would be minor beneficial effects on surrounding viewpoints, including from Pennethorne House, Newcomen Road and the centre and southern parts of York Gardens.

**Transport**

10.3.31 The Falconbrook Pumping Station site has good public transport accessibility being located within close proximity of bus stops with regular services and within 650 metres of Clapham Junction National Rail station. The site is on the east side of York Road (A3205) and construction vehicle access is proposed via Wandsworth Bridge Gyratory in the west and the Vauxhall Cross in the east, with construction site access directly off York Road. Operational site access would revert to the existing route via York Gardens.

10.3.32 During construction, the number of heavy goods vehicle movements would be comparatively low. The nature of the construction site layout at this location (which would require some highway layout changes) is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian and cyclist amenity and safety are expected to be negligible. A negligible effect is expected on bus services and other public transport. During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities, which would have a negligible effect on the surrounding transport networks.

10.3.33 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 include safe pedestrian crossing points, a road safety audit, and the possible provision of traffic marshalls to assist...
with certain vehicle movements at the site access points on York Road. Mitigation is not required for the operational phase.

**Water resources – groundwater**

10.3.34 The proposed shaft would pass through the upper aquifer, which is defined as being of medium value and into the underlying London Clay (which is not an aquifer). The shaft would not penetrate the lower chalk aquifer beneath. Associated interception infrastructure would be located within the upper aquifer and extend into the London Clay.

10.3.35 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible.

10.3.36 No soil or groundwater contamination has been identified on site to date but should any be encountered, the risks would be assessed and appropriate remediation would be undertaken. The effect on groundwater quality is considered to be negligible.

10.3.37 Monitoring of groundwater levels and quality would be carried out before and during construction.

**Water resources – surface water**

10.3.38 The site is located approximately 200 metres east of the River Thames.

10.3.39 The River Thames closest to the site is classified as being of ‘moderate’ status in terms of quality, with a status objective of ‘good’ by 2027. There are no water dependent designated conservation sites within 2 kilometres of the site.

10.3.40 Construction effects would be managed via the *Code of construction practice*. With the *Code of construction practice* in place effects on surface water resources from surface water runoff and potential contamination of the drainage system are not expected to be significant. Therefore no mitigation would be required during construction.

10.3.41 Once operational, the scheme would reduce the number of discharges from the Falconbrook Pumping Station combined sewer overflow to a predicted level of four spills in a typical year, once the tunnel is in place. This reduction would give rise to a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 152 days per year. In addition, the tonnage of sewage derived litter could be expected to be reduced from approximately 180 tonnes to 14 tonnes per year.

**Flood risk**

10.3.42 The main source of flood risk to the site is from the tidal River Thames and the site is located within the ‘high probability’ flood zone. However, it is protected by flood defences which run along the river bank. The site may also be at risk of localised surface water ponding.
11 Cremorne Wharf Depot

11 Location and context of proposed development

11.1 The proposed development site is located in the Royal Borough of Kensington and Chelsea. It comprises a council depot, the safeguarded Cremorne Wharf and the Thames Water Lots Road Pumping Station. The site location and context are shown in Figure 11.1 and Figure 11.2.

11.1.1 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

11.1.2 The site is bounded to the north by Chelsea Wharf (which consists of mixed commercial and residential use), to the east by the River Thames, to the south by the Circadian development (Lots Road Power Station) site, and to the west by Lots Road.

11.1.3 Existing access to the site is from Lots Road through the depot entrance, with a separate exit to the southwest of the Grade II listed Lots Road Pumping Station. Fulham Broadway London Underground Station is 1.7km to the northwest, and Imperial Wharf Station 0.5km to the southwest, providing both London Overground and national rail services. The Thames Path public right of way runs to the north of the site along Lots Road.

11.1.4 The site is located in the Royal Borough of Kensington and Chelsea Air Quality Management Area declared for nitrogen dioxide and particulate matter.

11.1.5 The surrounding area includes the adjacent River Thames and Chelsea Creek (which are important for nature conservation) and the Battersea Park Nature Areas Local Nature Reserve, located on the opposite side of the river. The site does not lie within a Conservation Area; however the Thames Conservation Area is located adjacent to the site. There are several listed buildings located to the northeast of the site along Cheyne Walk.

11.1.6 The main flood risk to the site is from the tidal River Thames. The site is located in a ‘high probability’ flood zone, although it is protected by flood defences.
Figure 11.1 Cremorne Wharf Depot– site location and context

Figure 11.2 Cremorne Wharf Depot – aerial photograph
11.2 Nature of the proposed development

11.2.1 This section describes the construction and operation of the proposed development at Cremorne Wharf Depot. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 11 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

11.2.2 The proposal is to intercept the existing Lots Road Pumping Station combined sewer overflow, which currently discharges approximately 38 times in a typical year. The total volume discharged is approximately 1,100,000m³ in a typical year. The existing sewer is shown on Figure 11.1.

11.2.3 A drop shaft with an internal diameter of approximately 8m and approximately 45m deep would be constructed. From the base of the drop shaft there would be a connection tunnel which would join up with the main tunnel. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow to the main tunnel.

11.2.4 The construction phase would last approximately three years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm on Saturdays. However, some works would be required beyond these standard working hours, as set out in the Code of construction practice.

11.2.5 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level.

11.2.6 Vehicle access to the site during construction would be via Cheyne Walk and Cremorne Road (A3212), which are part of the Transport for London road network and then along Lots Road to the existing access as shown on the construction phasing plans for this site (see Section 11 of the Section 48: Book of plans). The existing access comprises an entrance and an exit either side of the pumping station, forming a one-way route within the site. This is used by large vehicles for the existing depot use and would be used only as left-in, right-out.

11.2.7 It is intended to re-use the existing campshed at this site however this may require some refurbishment before being suitable for use by barges.

11.2.8 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in
relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

11.2.9 In addition to the *Code of construction practice* a number of additional steps are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case a high quality hoarding and solid gates to reduce noise and visual effects.

**Operation**

11.2.10 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average of approximately 92,000m³.

11.2.11 Two ventilation columns between 4m and 8m in height are proposed to be situated in the southern corner of the site (see permanent works layout plan in Section 11 of the *Section 48: Book of plans*). The electrical and control equipment would be installed within the existing Thames Water owned Grade II listed Lots Road Pumping Station and a connection made to an existing ventilation column.

11.2.12 The site would be restored with a reinstated council depot and safeguarded wharf in accordance with existing planning policy. Thames Water would retain a right of access over the structures and would install temporary security fencing on parts of the areas when they are required for maintenance. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via the existing entrances on Lots Road.

11.2.13 A visualisation illustrating how the completed works could be developed, including how the council depot could be reinstated, is provided in Figure 11.3.
11.3 **Environmental effects**

11.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

11.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

11.3.3 The Cremorne Wharf Depot site is located within the Royal Borough of Kensington and Chelsea 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 receptors who may be sensitive to the development are occupiers of nearby residential dwellings at Chelsea Wharf and on Lots Road as well as the future occupiers of the new Lots Road Power Station development. Other sensitive uses in the vicinity of the site are office and commercial premises and users of Cremorne Gardens and the river (such as the local canoe club).
11.3.4 It is considered that the overall effect on local air quality from construction road traffic, river barges and construction plant is likely to be moderate to minor adverse at the proposed Lots Road Power Station development, minor adverse at the existing residential properties on Lots Road and at Chelsea Wharf, and minor adverse at the commercial/office development at Chelsea Wharf and at the public gardens. In terms of construction dust, there is likely to be a minor adverse effect at the residential and commercial/office properties and on the Thames Path in the immediate vicinity of the site and a negligible effect elsewhere, taking account of the dust control measures in the *Code of construction practice*.

11.3.5 The effects of odours released from the ventilation column, during tunnel operation, are likely to be negligible.

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

**Ecology – aquatic**

11.3.7 The foreshore adjacent to the site falls within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. The site is located approximately 400m upstream of Battersea Bridge, on the north bank of the Thames. The Chelsea Creek discharges into the Thames at this point, and around this there is a small area of mudflat made up of exposed silt and mud. A survey has been undertaken at the site to understand the aquatic ecology present within the river at this location. A diverse assemblage of fish species occurs in the river at this location. Invertebrate species are limited to those that are pollution-tolerant.

11.3.8 Construction effects would be managed in accordance with the *Code of construction practice*. With the *Code of construction practice* in place it is anticipated that during construction including barging and associated activities, blanketing of feeding areas and reduced visibility from increased suspended sediment would give rise to a minor adverse effect. All other effects on fish, habitats, mammals and invertebrates are considered to be negligible.

11.3.9 It is anticipated that during operation, the permanent loss of an area of river habitat is considered to have a minor adverse effect on both habitats and fish and a negligible effect on invertebrates. Other effects on invertebrates, from improved water quality, would all be minor beneficial in the longer term of operation. The reduction in fish mortality that would result from improved oxygenation of the water is considered a moderate beneficial effect. There is also considered to be a moderate beneficial effect through increased distribution of rare and/or pollution sensitive fish species. The effect on mammals would be negligible.

11.3.10 Modelling results indicate that the presence of structures within the river during construction would not have a significant adverse effect on migrating fish through altered river flows.

**Ecology – terrestrial**

11.3.11 The site comprises buildings and hardstanding, a tree and the river wall, and an area of foreshore habitat.
11.3.12 While the site is of value to bats and wintering birds, no significant change in population of these species is likely as a result of construction works and therefore effects would be negligible.

11.3.13 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

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

**Historic environment**

11.3.15 The site is located on industrial land on the north bank of the River Thames adjacent to the locally designated Thames Conservation Area (which is of high heritage asset significance). Lots Road Pumping Station is Grade II listed (of high heritage asset significance) and located within the site. There are no other nationally designated heritage assets within the immediate vicinity of the site.

11.3.16 There is little of heritage value within the site itself, with the existing 19th century river wall and brick outfall tunnel being of low heritage significance. The main potential in terms of buried heritage is for palaeoenvironmental remains, eg organic remains such as pollens or plant fossils, of low or medium heritage asset significance, and the remains of post-medieval industrial buildings and 19th century houses and industrial processing (of low heritage asset significance). There is moderate potential for previously unrecorded prehistoric remains (of medium or high heritage asset significance).

11.3.17 A section of a brick outfall tunnel would be dismantled, constituting a medium magnitude of impact, resulting in a minor adverse effect. Construction works would entail deep excavations which would entirely remove the assets within the footprint of each excavation. If any such assets were present, this would comprise a high magnitude of impact and would give rise to a minor adverse effect for palaeoenvironmental remains and remains of industrial buildings/houses. There would be a moderate to major adverse effect for prehistoric remains (if present). The reuse of the 1930s campshed during construction would be a minor beneficial effect.

11.3.18 The desk-based study of the site suggests that no heritage assets of very high significance are anticipated that might merit a mitigation strategy of permanent preservation in situ. Any 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. The resulting residual effects would be negligible.

11.3.19 During construction, a moderate adverse effect on the setting of the River Thames Conservation Area is likely. Other effects on setting, including on the listed Lots Road Pumping Station would be minor adverse. All setting
effects would be minor beneficial once operational due to the quality of the finished site works.

**Land quality**

11.3.20 A search of historical and environmental data indicates that a number of nearby historical contamination sources. Overall the search highlights that the site was in industrial use since the late 19th century and was utilised as a rubber works, wharf and more recently as a waste facility. The surrounding river frontage has a history of industrial/commercial development including a power station and wharves since the late 19th century. Ground investigations have recorded contamination of soils and groundwater at the site. Desk-based surveys have identified a medium/high risk from unexploded ordnance.

11.3.21 Based on the assessment, 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

11.3.22 During operation it is anticipated that there would be a negligible effect on future users and the built environment. The assessment identified no need for mitigation during the operational phase.

**Noise and vibration**

11.3.23 The site is dominated by road traffic noise. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings along Lots Road to the north of the site.

11.3.24 Significant noise effects arising from construction activities are predicted at residential properties on Lots Road, at Chelsea Wharf and at the proposed Lots Road Power Station development. No significant vibration effects arising from construction have been identified and no significant effects as a result of the operation of the site are predicted.

11.3.25 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 for example through suitable siting of equipment on site.

**Socio-economics**

11.3.26 The site is occupied by an existing council waste transfer depot and is designated as employment land; as a site for waste management; and as a safeguarded wharf (although since March 2011 waste management and wharf activities have not taken place with the site used for dustcarts and road salt). Fronting the site is a Thames Water owned pumping station, the Thames Path and a national cycle route running along Lots Road,
residential and commercial properties and the Cremorne Riverside Activity Centre. The site is currently used for the storage of civic amenity equipment and stores.

11.3.27 During construction there are considered to be moderate adverse effects on the amenity of nearby residents, predominately relating to future residents in planned developments. There are considered to be minor adverse effects arising from the displacement of the council’s operations, the loss of employment land, and users of the Cremorne Riverside Activity Centre as a result of using barges. Amenity effects on users of the Thames Path and national cycle route are considered to be negligible. There are no anticipated operational effects as a result of the works at Cremorne Wharf Depot.

**Townscape and visual**

11.3.28 The site is located within the Cremorne Wharf council depot, to the west of Battersea Bridge and adjacent to the Thames Conservation Area. The surrounding townscape is a mixture of industrial and residential premises including some newly built developments along the riverfront. The townscape of the site is in a poor condition.

11.3.29 During construction, the scale and intensity of activity would result in a moderate adverse townscape effect on the River Thames - Chelsea and Battersea Reach character area. Effects on other townscape areas would be minor adverse. Once operational, the council depot building would be replaced; the effect on townscape would be negligible.

11.3.30 In terms of visual amenity, during construction minor adverse effects are likely from views for all (four) residential viewpoints assessed. This is due to the visibility of the cleared site, hoardings and construction activity. Once operational, the change to the existing site would result in negligible effects on visual amenity.

**Transport**

11.3.31 The Cremorne Wharf Depot site has moderate public transport accessibility with numerous bus routes within the local area. The closest London Underground station is Fulham Broadway, approximately 2km away. Vehicle access is proposed from Lots Road.

11.3.32 During construction, the number of heavy goods vehicle movements would be comparatively low. Construction activity is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian facilities are expected to be minor adverse due to a footpath diversion increasing journey time; similar effects on cyclist amenity and safety and car users are expected due potential journey delays and parking bay suspension. A negligible effect is expected on public transport and river services within the area. 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.
11.3.33 The project is being designed to limit the effects on the transport networks as far as possible and no further mitigation is proposed at this site. Mitigation is not required for the operational phase.

**Water resources – groundwater**

11.3.34 The proposed shaft and connection tunnel would pass through the upper aquifer and the underlying non aquifer. The shaft would not reach the lower aquifer (Chalk) beneath. The 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.

11.3.35 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible. No dewatering is proposed at the site so no effects are anticipated on the lower aquifer. The site contains low levels of contamination in groundwater, this would be dealt with using a risk based approach and the application of appropriate remediation ahead of construction.

11.3.36 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 due to the inclusion of design measures to reduce groundwater effects.

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

**Water resources – surface water**

11.3.38 The site is located immediately behind the flood defences at Cremorne Wharf. Chelsea Creek lies approximately 55 metres to the south of the site.

11.3.39 The section of the River Thames closest to the site lies within Thames Middle waterbody. 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 Chelsea Creek is not assessed under the Water Framework Directive, but it is a tributary of the Thames Upper waterbody, which has a target status of ‘good’ by 2017. The Battersea Park Local Nature Reserve is located within the vicinity of Cremorne Wharf Depot and is water dependent.

11.3.40 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.

11.3.41 Once operational, the scheme would reduce the number of discharges from the Lots Road Pumping Station combined sewer overflow to a
predicted level of four spills per year on average once the tunnel is operational.

11.3.42 This reduction would be a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 152 days of risk of exposure per year. The tonnage of sewage derived litter can be expected to be reduced from approximately 286 tonnes to 20 tonnes per year.

Flood risk

11.3.43 The main source of flood risk to the site is the tidal River Thames. The site is located within the ‘high probability’ flood zone, however it is protected by flood defences aligned along the edge of the site. The current level of protection afforded by the defences would be maintained on the site and no changes to flood risk are anticipated.
12 Chelsea Embankment Foreshore

12.1 Location and context of proposed development

12.1.1 The proposed development site is located in the Royal Borough of Kensington and Chelsea. It comprises River Thames foreshore, sections of Chelsea Embankment roadway and pavement, and a small section of Ranelagh Gardens. The site location and context are shown in Figure 12.1 and Figure 12.2.

12.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

12.1.3 The site is bounded to the north by the Royal Hospital Chelsea and its South Grounds, and Ranelagh Gardens. To the east are Chelsea Bridge Gardens and Chelsea Bridge, and residential properties, with the Lister Hospital to the northeast. The River Thames bounds the site to the east, south and west.

12.1.4 Existing access to the site is directly from Chelsea Embankment, close to the junction with Chelsea Road Bridge. Sloane Square Underground station is approximately 1km to the north. There are no railway stations in the near vicinity. The Thames Path public right of way runs along the southern pavement of Chelsea Embankment which falls within the site.

12.1.5 The site is within the Kensington and Chelsea Air Quality Management Area declared for nitrogen dioxide and particulate matter. The River Thames and its tidal tributaries are important for nature conservation. There are no listed buildings within the site, although it is in both the Thames and the Royal Hospital Conservation Areas.

12.1.6 Chelsea Embankment is Grade II listed to the west of the site. Other nearby Grade II listed structures include Chelsea Bridge, a sewer vent in the pavement, listed entrance gates on Royal Hospital Road, the War Memorial obelisk in the grounds of the Royal Hospital and the Grade II registered historic park and garden (Royal Hospital, Chelsea and Ranelagh Gardens) immediately to the north. Also nearby are the Ranelagh Gardens and Battersea Park Sites of Importance for Nature Conservation.

12.1.7 The site lies within the Thames Tideway foreshore and hence is considered to be functional flood plain, where water has to flow, or be stored, during times of flood.
Figure 12.1 Chelsea Embankment Foreshore – site location and context
12.2 Nature of the proposed development

12.2.1 This section describes the construction and operation of the proposed development at Chelsea Embankment Foreshore. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 12 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

12.2.2 The proposal is to intercept the existing Ranelagh combined sewer overflow at Ranelagh, which currently discharges approximately 26 times a year. The total volume discharged is approximately 283,000m³ in a typical year. The existing sewer is shown on Figure 12.1.

12.2.3 A cofferdam and a campshed would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct the drop shaft.

12.2.4 A drop shaft with an internal diameter of approximately 12m and approximately 45m deep would be constructed. An overflow weir chamber
to control the northern Low Level Sewer No. 1 under Chelsea Embankment, an interception chamber on the Ranelagh combined sewer overflow and two connection culverts would be constructed to link the flows to the drop shaft.

12.2.5 The construction phase would last approximately four years. Most of the surface level construction activity would take place from 8am to 6pm on weekdays and 8pm to 1pm on Saturdays. However, some works may be required beyond these standard working hours as set out in the Code of construction practice.

12.2.6 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level.

12.2.7 Excavated material from the construction of the drop shaft and connection tunnel would be transported away from the site by barge.

12.2.8 Vehicle access to the site during construction would be via Chelsea Embankment (A3212) shown on the construction phasing plans for this site (see Section 12 of the Section 48: Book of plans). Construction traffic would access the site by travelling west along Chelsea Embankment (A3212) and turning left into the site through a new entrance. Traffic leaving the site would turn left from the new entrance onto Chelsea Embankment (A3212) and continue westbound. During each phase of construction, two-way traffic along Chelsea Embankment (A3212) would be maintained by reducing the width of traffic lanes so that one lane in each direction would remain open.

12.2.9 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

Operation

12.2.10 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average of approximately 18,500m³, two spill events a year.

12.2.11 The structures required to intercept the Ranelagh combined sewer overflow and connection to the northern low level sewer No.1 are proposed to be housed in a structure extending out into the river from the existing embankment. The Northern Low level Sewer No.1 connection would be constructed within the existing eastbound carriageway and northern pavement of Chelsea Embankment (A3212).

12.2.12 The proposed above-ground structures located on the new in river structure include two ventilation columns between 4m and 8m in height and two small diameter ventilation columns approximately 6m height, located on Chelsea Embankment above the overflow weir. There would also be electrical and control equipment housed within two new kiosks.
12 Chelsea Embankment Foreshore

(see permanent works layout plan in Section 12 of the Section 48: Book of plans).

12.2.13 Scour protection would be constructed along the line of the new river wall (to protect the new structure) and a new apron would serve to prevent scour from any new outfall. Thames Water would retain a right of access over the structures and would install temporary security fencing on parts of the areas when they are required for maintenance. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Chelsea Embankment (A3212).

12.2.14 It is proposed that the new area covering the main tunnel shaft would be landscaped to form an area of public realm.

12.2.15 A visualisation illustrating how the completed works could be developed is provided in Figure 12.3.

**Figure 12.3 Chelsea Embankment Foreshore – illustrative visualisation**

12.3 **Environmental effects**

12.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.
12.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

12.3.3 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 receptors which may be sensitive to the development are occupiers of nearby residential dwellings and the Royal Hospital Chelsea and Lister Hospital, as well as users of the adjacent Ranelagh Gardens and Royal Hospital Chelsea South Grounds.

12.3.4 It is considered that the overall effect on local air quality from construction road traffic, river barges and construction plant is likely to be negligible at all receptors. Similarly, in terms of construction dust, there are likely to be negligible effects at all these locations, taking account of the dust control measures in the Code of construction practice.

12.3.5 The effects of odours released from the ventilation structure are likely to be negligible.

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

**Ecology – aquatic**

12.3.7 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.

12.3.8 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 of construction practice 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.

12.3.9 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.

12.3.10 Modelling results indicate that the presence of structures within the river during both construction and operation would not have a significant adverse effect on migrating fish through altered river flows.

12.3.11 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.

**Ecology – terrestrial**

12.3.12 The site comprises hardstanding, scattered trees and foreshore habitat and is of value for There are five Sites of Importance for Nature Conservation within 500m of the site including the adjacent Ranelagh Gardens, which is of Borough importance.

12.3.13 Surveys indicate low levels of bat activity, predominantly by common pipistrelle bats. Wintering birds were recorded during surveys. Existing sources of potential disturbance to wintering birds is high from traffic and pedestrians along the Embankment. The site and surrounding area provides foraging habitat and nesting potential for breeding birds. No significant effects on designated sites are anticipated (aquatic ecology effects are considered in the section above). 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. All trees removed would be replaced.

12.3.14 Due to the relatively limited ecological resources present, habitat loss and disturbance effects to bats and wintering and breeding birds would be negligible.

12.3.15 Lighting which may be required during construction would be controlled through measures included in the *Code of construction practice* to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the *Code of construction practice*.

12.3.16 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. Operational activity would be limited to occasional maintenance work which is considered unlikely to have significant effects on terrestrial ecology.

**Historic environment**

12.3.17 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).

12.3.18 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 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.

12.3.19 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 re-deposited prehistoric artefacts (of low heritage asset significance), and moderate potential for evidence of prehistoric activity (of medium heritage asset significance).

12.3.20 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.

12.3.21 Aside from the low potential of medieval fish traps which, if found, would be subject to a major adverse effect, all other effects on buried heritage assets would be minor adverse. The removal of above ground heritage assets would have adverse effects including the localised temporary removal of the brick boundary wall on the Grade II registered Ranelagh Gardens (major adverse). The parapet of the existing river wall would be locally dismantled and the nineteenth century outfall apron which the existing Ranelagh Sewer discharges onto removed, leading to a moderate adverse effect.

12.3.22 The prominence of the construction works on this visibly exposed foreshore site would have moderate adverse effects on historic setting, including the Royal Hospital Conservation Area, the setting of the Grade II Chelsea Bridge and the setting of the Chelsea Embankment and river walls.

12.3.23 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. The resulting residual effects would be negligible.
12.3.24 In terms of setting, while careful detailed design would integrate the structure into the historic context, the projection of the foreshore structure into the river along this stretch of the Embankment is likely to give rise to moderate adverse effects on the setting of Chelsea Bridge during operation and minor adverse effects on the Thames Conservation Area and several other assets. However, there would be moderate beneficial effects on the setting of the Royal Hospital through enhancing the main historic axis of the Hospital, and minor beneficial effects on the setting of assets including the Royal Hospital Conservation Area and Bull Ring Gate.

**Land quality**

12.3.25 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.

12.3.26 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the *Code of construction practice* means that no need for mitigation during the construction phase is identified.

12.3.27 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.

**Noise and vibration**

12.3.28 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, together with Royal Hospital Chelsea and Lister Hospital, Ranelagh Gardens and Royal Hospital Chelsea South Grounds.

12.3.29 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.

12.3.30 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.

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

12.3.32 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.

12.3.33 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.

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

Townscape and visual

12.3.35 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 Chelsea South Grounds on the north bank, and Battersea Park and Battersea Power Station on the south bank.

12.3.36 During construction the scale and 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. Effects on other townscape character areas assessed are generally moderate adverse. 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 adverse townscape effects are anticipated on Queenstown Road - Residential, Royal Hospital Conservation Area - Grounds and Battersea Park Conservation Area.

12.3.37 In terms of visual amenity, during the construction phase there would be major adverse effects on views from the northern and southern end of Chelsea Bridge, from the Thames Path in Battersea Park and from the Royal Hospital. This is due to the visibility of construction activity located in a strong linear stretch of the river. Effects from other viewpoints assessed would generally be moderate adverse.

12.3.38 Once operational, visibility of the foreshore structure and above ground structures projecting into the river, currently characterised by a long consistent sweep) and above ground structures into the previous undeveloped river channel would result in minor adverse effects.
Transport

12.3.39 The Chelsea Embankment Foreshore 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.

12.3.40 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 users and cyclist amenity and safety are expected to be major to moderate adverse due to footway closures and local diversions resulting in delays to journey time. A minor adverse effect is expected on park users due to pedestrian diversions and the loss of a footway. Negligible effects are expected on bus, 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.

12.3.41 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 would take the form of the provision of safe crossing points for pedestrians and cyclists in the vicinity of the diversion routes and traffic signal optimisation to improve pedestrian crossing times and junction capacity. Mitigation is not required for the operational phase.

Water resources – groundwater

12.3.42 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.

12.3.43 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.

12.3.44 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.

12.3.45 Monitoring of groundwater levels and quality would continue throughout construction and operation.
Water resources – surface water

12.3.46 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.

12.3.47 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.

12.3.48 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. Scour protection is proposed for the permanent works in a zone adjacent to the outerface of the new river wall.

12.3.49 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.

Flood risk

12.3.50 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.

12.3.51 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.

12.3.52 Flood defence levels along the Thames frontage would be maintained during both construction and operation, with the cofferdam forming the tidal defence during construction.
13 Kirtling Street

13.1 Location and context of proposed development

13.1.1 The proposed development site is located in the London Borough of Wandsworth. It is proposed to use the site as a main tunnel double drive site. The site comprises four parcels of land as well as an area extending into the River Thames. The southern parcel of the site is bounded by Kirtling Street, Cringle Street and Battersea Park Road and contains industrial premises and offices including the former Cable and Wireless building. Immediately north is a former depot, bounded by Cringle Street to the south and Kirtling Street to the west, north and east. North again is a depository used by the Victoria and Albert Museum which fronts onto the River Thames. Immediately west and extending south as far as Cringle Street is a concrete batching plant. The batching plant includes a jetty at the safeguarded Cringle Wharf which falls within the riverward portion of the proposed development site. The site location and context are shown in Figure 13.1 and Figure 13.2.

13.1.2 Beyond the site to the east is the Tideway Walk (Riverlight) development, currently under construction. Hoarding has been erected around this site and construction has commenced for this residential-led mixed used development. To the west of the Kirtling Street site and on the northern side of Cringle Street is Cringle Dock waste transfer station which fronts onto the River Thames. On the southern side of Cringle Street is the Thames Water ring main pumping station. Further west is the Grade II* Battersea Power Station, which was decommissioned in the early 1980s. Battersea Park Road and Kirtling Street form the southern boundary of the site.

13.1.3 Existing access to the site is from Nine Elms Lane, Battersea Park Road via Cringle Street, and Kirtling Street. Vauxhall Underground station is approximately 1.1km to the northeast and Battersea Park railway station is approximately 800m to the west. The Thames Path public right of way runs along the northeast edge of the site, through the site along Cringle Street, and down Kirtling Street.

13.1.4 The site lies within the Wandsworth Air Quality Management Area, declared for nitrogen dioxide and particulate matter. The River Thames and its tributaries (including the foreshore at Kirtling Street) are important for nature conservation. Battersea Power Station is a designated Site of Importance for Nature Conservation.

13.1.5 The site is not within or adjacent to a Conservation Area and there are no listed buildings on site. It falls within the Wandsworth Archaeological Priority Area.

13.1.6 The main flood risk to the site is from the tidal River Thames. The site is in the ‘high probability’ flood zone, although it is protected by flood defences.
Figure 13.1 Kirtling Street – site location and context

Figure 13.2 Kirtling Street – aerial photograph
13.2 **Nature of the proposed development**

13.2.1 This section describes the construction and operation of the proposed development at Kirtling Street. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 13 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

13.2.2 The proposal is to drive two tunnel boring machines from this site westwards to Carnwath Road Riverside and eastwards to Chambers Wharf. There is no combined sewer overflow at this site and therefore no interception.

13.2.3 A main tunnel shaft with an internal diameter of approximately 30m and approximately 48m deep would be constructed within the site of the concrete batching plant. Once the shaft is constructed, the tunnel boring machines would be launched from the base of the shaft.

13.2.4 The construction phase would last approximately six years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the *Code of construction practice*.

13.2.5 Excavation for the tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel and last approximately three years. An acoustic shed would be erected over the shaft during the tunnelling and secondary lining construction phases.

13.2.6 Excavated material from construction of the main tunnel would be transported by barge from a purpose built temporary jetty. The sand and aggregates for main tunnel secondary lining would be imported to the site via barge.

13.2.7 Vehicle access to the site during construction would be via three access points, two off Cringle Street and one off Kirtling Street, with vehicles travelling to and from Nine Elms Lane as shown on the construction phasing plans for this site (see Section 13 of the *Section 48: Book of plans*). The northern arm of Kirtling Street would be closed to the public during construction in order to provide an internal site access road.

13.2.8 During construction it is intended that the existing concrete batching plant at the safeguarded Cringle Wharf would be relocated towards the southern portion of the existing compound. Once construction is complete, it would be reinstated back to its current location and a new dedicated access created to allow maintenance activities associated with the main tunnel to be undertaken.
13.2.9 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

13.2.10 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case the construction of acoustic sheds to cover the main tunnel shaft during the tunnel construction and secondary lining phases, enclosure of conveyors and the screening of static plant.

**Operation**

13.2.11 One ventilation structure, integrating a ventilation column and an electrical and control kiosk, between 4m and 6m high would be sited towards the western edge of the site within Cringle Wharf (see site works permanent works layout plan in Section 13 of the Section 48: Book of plans). The ventilation structure would be positioned so as not to prejudice the operations of the safeguarded wharf and also the possibility of the future provision of a riverside walkway. The ventilation kiosk would be fitted with carbon filters to ensure the air passing out has no noticeable odour.

13.2.12 Tree planting is proposed along the western side Kirtling Street adjacent to the concrete batching plant site. An area of hardstanding would be provided to enable access into the shaft and tunnel for inspection and maintenance purposes. This would form part of the existing operational wharf and would not be publicly accessible. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Kirtling Street. The rest of the site would be secured with temporary hoarding for development by others.

13.2.13 A visualisation illustrating how the completed works could be developed, including how the site may be used by other following construction, is provided in Figure 13.3.

13.2.14 Once operational the existing use as a concrete batching plant would be reinstated.
13.3 Environmental effects

13.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

13.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

13.3.3 The Kirtling Street site is located within the London Borough of Wandsworth 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 receptors which may be sensitive to the development are occupiers of nearby residential dwellings including the existing houseboats at Nine Elms Pier and proposed new residential developments adjacent to the site. There are also the occupiers of the offices along the riverside, in Nine Elms Lane and commercial / industrial premises to the east, west and south of the site.
13.3.4 It is considered that the overall effect on local air quality from construction road traffic, river barges and construction plant is likely to be moderate adverse for No 33 Nine Elms Lane, minor adverse for the houseboats and at the Tideway Walk (Riverlight) under construction and proposed Embassy Gardens residential developments and negligible at the office, commercial and industrial premises. In term of construction dust, this is likely to have a minor adverse effect at the closest residential properties and office/commercial premises within approximately 50m of the site boundary, and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

13.3.5 The effects of odours released from the ventilation structure are likely to be negligible.

13.3.6 It is considered that mitigation measures are not required.

**Ecology – aquatic**

13.3.7 The site extends into the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. There is no marginal vegetation and relatively little intertidal habitat. The vertical river wall does not appear to support communities of macro or microalgae. The site has a relatively high diversity of freshwater and estuarine fish species. It supports mainly pollution-tolerant invertebrates.

13.3.8 Construction effects would be managed in accordance with the Code of construction practice. With the Code of construction practice in place, the effects of compaction and disturbance on the river habitat would have a minor adverse effect. There would also be minor adverse effects on fish as a result of disturbance due to lighting of the river, death or disturbance from noise and vibration and effects from increased suspended sediment. All other effects on fish, mammals and invertebrates are considered to be negligible.

13.3.9 Modelling results indicate that the presence of structures in the river during construction to allow for barging from this double drive site would not have an adverse effect on the migration of fish.

13.3.10 There is no combined sewer overflow outfall discharge at this site, and so there would be no operational effects on aquatic ecology.

**Ecology – terrestrial**

13.3.11 The site comprises buildings, hardstanding, foreshore habitat, a small area of short perennial vegetation, spoil piles and introduced shrubs.

13.3.12 The site and surrounding area is used by a large number of common pipistrelle as a foraging and commuting site. Other bat species have also been recorded although more infrequently. Black redstart was not recorded within the site however, a single black redstart was recorded near to the site towards Battersea Power Station, which is a known breeding area for black redstart and designated as a Site of Importance for Nature Conservation. Surveys indicate a range of wintering birds using the riverward area of the site.
13.3.13 No significant effects on designated sites or species are likely and therefore no mitigation measures are required.

13.3.14 Lighting required during construction at this main double drive site would be controlled through measures included in the *Code of construction practice* to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the *Code of construction practice*.

13.3.15 Operational activity would be limited to occasional maintenance work, which is considered unlikely to have significant effects on terrestrial ecology.

**Historic environment**

13.3.16 The site does not contain any nationally designated heritage assets. The closest statutorily listed buildings to the site comprise the Grade II* listed Battersea Power Station, approximately 160m to the west (an asset of high asset significance), and the Grade II listed mid-19th century Battersea water pumping station approximately 100m to the west (of high heritage asset significance). The site is occupied by industrial units and yards, including late 19th century/early 20th century buildings of medium heritage asset significance. The northern part of the site is located on the southern foreshore of the Thames and includes a pier structure dating to the 1950s.

13.3.17 The site is located within a locally designated Archaeological Priority Area and the main potential in terms of buried heritage is for palaeoenvironmental remains eg organic remains such as pollens or plant fossils, of low or medium heritage asset significance, and for the remains of post-medieval 19th century docks and a lead works (of low or medium heritage asset significance). There is also a moderate to high potential for prehistoric remains and for Saxon fish traps, of medium or high heritage asset significance, and moderate potential for isolated, redeposited prehistoric remains of low asset significance.

13.3.18 Demolition of late 19th/early 20th century buildings are likely to give rise to a major adverse effect. Construction works would entail deep excavations which would entirely remove any archaeological assets within the footprint of each excavation. If such assets were present, this would comprise a high magnitude of impact and lead to a minor adverse effect on palaeoenvironmental remains and prehistoric artefacts, a minor or moderate adverse effect for post-medieval remains, and major adverse effects on prehistoric settlement evidence and Saxon fish traps. Moderate adverse effects are likely on post-medieval remains including the footings of industrial buildings and yards. All other effects on buried assets would be minor adverse.

13.3.19 In terms of historic setting, there would be minor adverse effects during construction on the Grade II* Battersea Power Station and on two conservation areas. Once operational, there would be no significant adverse effects.
13.3.20 To mitigate the effect on the buildings to be demolished, the structures 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 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. The resulting residual effects would be negligible.

**Land quality**

13.3.21 A search of historical and environmental data has identified contaminative on site uses, notably two paint and colour works, various other engineering works, depots and a concrete batching works. Historical information has identified numerous industrial and commercial activities including Battersea Power station and a sizable gas works immediately to the south. Historic industrial activities both on and adjacent to the site may have, to some degree, impacted the soils beneath the site. This is supported by previous ground investigations close to the site which have recorded localised soil and groundwater contamination. Desk-based surveys have identified a medium-high risk from unexploded ordnance.

13.3.22 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. Assessment findings indicate that it is likely to be a negligible effect on the built environment as it is considered unlikely that contaminants contained in subsurface materials would affect buried structures. Ground investigation will be undertaken in advance of construction commencing, although the approach to risk assessment and remediation contained within the *Code of construction practice* means that no need for mitigation during the construction phase is identified.

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

**Noise and vibration**

13.3.24 The site is dominated by traffic noise and noise from industrial units in the area. The nearest locations to the site which are sensitive to noise and vibration are the houseboats moored directly to the north and north east of the site and residential properties at Elm Quay.

13.3.25 Significant noise effects arising from construction activities are predicted at new residential properties at Tideway Walk (Riverlight) under construction and the houseboats at Nine Elms Pier. No significant vibration effects are predicted and no significant effects as a result of the operation of the site are predicted.

13.3.26 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 noise and vibration effects on the local community for example through suitable siting of equipment on site.

**Socio-economics**

13.3.27 The site comprises land accommodating a mix of vacant and occupied industrial premises, an office complex (Brooks Court) and a stretch of pavement that forms part of the Thames Path (which would be diverted as a consequence of other developments). Commercial and industrial uses surround the site. Houseboats are moored to the north of the site. The Tideway Walk (Riverlight) development is located to the east. The Thames Path is lightly used for walking and cycling.

13.3.28 During construction, there are considered to be moderate adverse amenity effects on some nearby residents and moderate adverse effects arising from the displacement of the businesses at Brooks Court. There are also considered to be moderate or major adverse effects on the concrete batching works depending on the degree to which the proposed construction activity has an effect on the continued operation of the works. Amenity impacts on users of the Thames Path are considered to result in a negligible effect.

**Townscape and visual**

13.3.29 The site is located to the north of Nine Elms Lane and comprises a mix of industrial and commercial premises in a poor condition. The surrounding townscape is dominated by industrial and commercial land use which is undergoing transformation into mixed use developments.

13.3.30 This double drive main site is on a prominent river frontage location. The construction would include an acoustic enclosure as well as large scale construction equipment; this is likely to have a moderate adverse townscape effect on the character of the site at night and on the townscape effect on the character of the surrounding area. Major adverse effects have been identified on the townscape of St. George’s Wharf Residential due to the combined effects of this site with the downstream, Thames Tideway Tunnel project site at Heathwall Pumping Station.

13.3.31 Once the scheme is operational there are likely to be minor beneficial townscape effects on the character of the site and surrounding area due to the clearance of buildings.

13.3.32 In terms of visual amenity, during the construction phase as a result of the scale, intensity and duration of construction activity, there is likely to be a major adverse effect on viewpoints from the Tideway Walk (Riverlight) development, currently under construction. There would be moderate adverse effects on some views including from Grosvenor Road and Nine Elms Lane. Effects elsewhere would be minor adverse or negligible such as from Vauxhall Bridge. Once operational, due to the visibility of cleared buildings and the publicly accessible waterfront there would be moderate beneficial effects on views from Grosvenor Road, the Thames Path and Nine Elms Lane.
13.3.33 The Kirtling Street site has moderate public transport accessibility with local bus stops serving Marylebone Station, Waterloo Station, Vauxhall Bus Station and Clapham Junction Station. Vauxhall Underground and bus stations are located 1.1km from the site. The site is on the north side of Nine Elms Lane and construction vehicle access is proposed via Vauxhall Cross in the east and Battersea Park Road in the west with site accesses located on Cringle Street and Kirtling Street.

13.3.34 As with all main tunnel drive sites, excavated shaft and tunnel material and aggregates will be transported by barge and all other materials would be transported by road.

13.3.35 During construction, the number of heavy goods vehicle movements would be comparatively high. The nature of the construction site layout at this location means that junction modifications, traffic diversions and parking restrictions would be required which is considered likely to result in a moderate adverse effect on road network operation and delay. Effects on pedestrian amenity are expected to be moderate adverse due to the loss of footways and local diversions which would increase journey times. A minor adverse effect is expected on cyclist amenity, bus services and commercial use of the river by neighbouring businesses and there would be a negligible effect on rail 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.

13.3.36 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 would include 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.

13.3.37 The proposed shaft would pass through the upper aquifer and penetrate the top of the lower aquifer beneath. Associated interception infrastructure would sit in the upper aquifer. The main receptors are the upper aquifer defined as being of medium value, the lower aquifer defined as being of high value and the nearby public abstractions, defined as being of very high value.

13.3.38 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible. The site contains low levels of contamination in groundwater, this would be dealt with using a risk based approach and appropriate remediation ahead of construction. No soil contamination has been identified. Dewatering of the lower aquifer during construction would impact groundwater availability and could induce groundwater movement.
13.3.39 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.

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

**Water resources – surface water**

13.3.41 Part of the construction 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. Battersea Park Local Nature Reserve is located within 2 kilometres of the site and is water dependent.

13.3.42 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.

13.3.43 There is also potential for the new jetty to lead to local scour of the foreshore. The effects of scour would be largely temporary as some natural foreshore restoration once the jetty is removed.

**Flood risk**

13.3.44 The main source of flood risk to the site is the tidal River Thames and the site is located within the ‘high probability’ flood zone, although it is protected by flood defences which run along the river bank. Flood defence levels along the Thames frontage would be maintained during both construction and operation,

13.3.45 The site may be at risk of localised surface water flooding due to runoff generated by land to the south of the site. No changes are proposed to the percentage of hard standing on the site and this area would continue to be served by the local drainage system.
14 Heathwall Pumping Station

14.1 Location and context of proposed development

14.1.1 The proposed development site is located in the London Borough of Wandsworth. It comprises Thames Water’s Heathwall Pumping Station, and incorporates the safeguarded Middle Wharf. The site location and context are shown in Figure 14.1 and Figure 14.2.

14.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

14.1.3 The site is bounded to the north by the River Thames, to the east by open space and Elm Quay residential block beyond, to the south by Nine Elms Lane, and to the west by the Tideway Walk (Riverlight) development (under construction).

14.1.4 Existing access to the site is from Nine Elms Lane, (A3205). Vauxhall Underground and railway station is almost 1km to the northeast. Queenstown Road and Battersea Park railway stations are approximately 1.3km to the southwest and 1km to the southwest, respectively. Thames Path public right of way runs around the eastern (William Henry Walk), southern (Nine Elms Lane) and western boundaries (Tideway Walk).

14.1.5 The site is within the Wandsworth Air Quality Management Area, declared for nitrogen dioxide. The River Thames and its tributaries (including the foreshore at Heathwall Pumping Station) are designated for nature conservation.

14.1.6 The site does not lie within and is not adjacent to a Conservation Area. There are no listed buildings within or in close proximity to the site although it is within the Wandsworth Archaeological Priority Area.

14.1.7 The site is located partially within the Thames Tideway foreshore and hence is considered functional floodplain, where water has to flow, or be stored, during times of flood.
Figure 14.1 Heathwall Pumping Station – site location and context

Figure 14.2 Heathwall Pumping Station – aerial photograph
14.2 **Nature of proposed development**

14.2.1 This section describes the construction and operation of the proposed development at Heathwall Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 14 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

14.2.2 The proposal is to intercept the existing Heathwall Pumping Station and South West Storm Relief combined sewer overflows, which together currently discharge approximately 46 times a year. The total volume discharged is approximately 880,000m³ in a typical year. The existing sewers are shown on Figure 14.1.

14.2.3 A cofferdam and campsheds would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct structures associated with the interception of the Heathwall Pumping Station combined sewer overflow.

14.2.4 A drop shaft with an internal diameter of approximately 16m and approximately 46m deep would be constructed. From the base of the shaft there would be a short connection tunnel which would join up with the main tunnel. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.

14.2.5 The construction phase would last approximately two and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. However, some works would be required beyond these standard working hours, as set out in the *Code of construction practice*.

14.2.6 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level and would last approximately four months.

14.2.7 Vehicle access to the site during construction would be via two site access points from Nine Elms Lane as shown on the construction phasing plans for this site (see Section 14 of the *Section 48: Book of plans*). Access would be through a left turn in, left turn out system.

14.2.8 During construction it would be necessary to relocate temporarily the Battersea Barge a short distance westwards and once works have been completed it would be reinstated to its current location; such arrangements are currently being discussed.
14.2.9 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

14.2.10 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case provision of hoarding and the screening of static plant to reduce noise.

**Operation**

14.2.11 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflows to an average of approximately 66,400m$^3$.

14.2.12 There would be a total of three ventilation columns of between 4m and 8m high sited within the existing boundary of the Heathwall Pumping Station (see site works permanent works layout plan in Section 14 of the *Section 48: Book of plans*). A passive ventilation unit of approximately 1m high is also proposed within the Thames Water compound. These structures would be positioned so as not to prejudice the operations of the safeguarded wharf and also the possibility of the future provision of a Thames Path.

14.2.13 Scour protection would be constructed along the line of the new river wall (to protect the new structure) and would serve to prevent scour from any new outfall.

14.2.14 There would be a ‘permissive’ arrangement for pedestrian access to run along the riverside via the proposed foreshore structure. The current route of the Thames Path along Nine Elms Lane would remain. An area of permanent hardstanding projecting into the River Thames would provide additional public space. The rest of the site would remain inaccessible to the public as Thames Water operational land.

14.2.15 The area of hardstanding in the foreshore would also provide access into the shaft and tunnel for inspection and maintenance purposes. This area would be temporarily fenced off during times of maintenance. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Nine Elms Lane.

14.2.16 A visualisation illustrating how the completed works could be developed is provided in Figure 14.3.
14.3 Environmental effects

14.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

14.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

14.3.3 The Heathwall Pumping Station site is located within the London Borough of Wandsworth Air Quality Management Area. Local monitoring data indicates there are currently exceedences of air quality standards in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupiers of residential dwellings, the nearest of which are the houseboats moored close to the site as well as the future dwellings in the new Tideway Walk (Riverlight) and Nine Elms Parkside developments, all close to the site. There are also occupiers of offices along the riverside in Nine Elms Lane and to the south of the site and the
industrial premises to the west of the site who may be sensitive to the development.

14.3.4 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 existing residential properties at Elm Quay and proposed developments at Tideway Walk (Riverlight) and Nine Elms Parkside and negligible at the commercial and industrial premises. In terms of construction dust, this is likely to have a minor adverse effect on residential dwellings within 10m of the site and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

14.3.5 The effects of odour from air released from the ventilation column, which might occur from time to time when the tunnel is filling, is likely to be negligible.

14.3.6 It is considered that mitigation measures are not required.

Ecology – aquatic

14.3.7 The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. There is a large area of gravel foreshore exposed at low tide, which is underlain mostly by pebbles. There is a vertical river wall. The site is of medium value for fish species, but has limited pollution-tolerant invertebrate diversity of low to medium value.

14.3.8 Construction effects would be managed in accordance with the Code of construction practice. With the code, it is anticipated that during construction the loss and disturbance of river habitat, including nursery habitat would have minor adverse effects. The loss of habitat for fish, because of disturbance and compaction, is also considered to be a minor adverse effect. All other construction effects on mammals, fish and invertebrates would be negligible.

14.3.9 It is anticipated that during operation, the permanent loss of habitat would be a minor adverse effect. The reduction in nutrient levels entering the river would have a moderate beneficial effect on fish through reduced mortality. Increased diversity and abundance of invertebrates would be a minor beneficial effect. In the longer term of operation an increased distribution of pollution-sensitive fish would be a moderate beneficial effect and there would be a minor beneficial effect through an increased distribution of invertebrates. Effects on mammals would be negligible.

14.3.10 Modelling results indicate that the presence of structures within the river during both construction and operation would not have a significant adverse effect on migrating fish through altered river flows.

14.3.11 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.
Ecology – terrestrial

14.3.12 The site mainly comprises buildings and hardstanding with foreshore habitat and trees adjacent to the site.

14.3.13 The site and surrounding area is used by a large number of common pipistrelle as a foraging and commuting site. Other bat species have also been recorded although more infrequently. Black redstart was not recorded within or adjacent to the site (a single black redstart was recorded near to the site towards Battersea Power Station for the nearby Kirtling Street site). Surveys indicate a range of wintering birds using the riverward area of the site.

14.3.14 No significant effects on designated sites or species are likely and therefore no mitigation measures are required.

14.3.15 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

14.3.16 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. Operational activity would be limited to occasional maintenance work which is considered unlikely to have significant effects on terrestrial ecology.

Historic environment

14.3.17 The site does not contain any nationally designated heritage assets, nor are there any in the immediate vicinity. Grade II* listed Battersea Power Station is located approximately 500m to the southwest. The site has no historic value in terms of above ground structures. The site is located within a locally designated Archaeological Priority Area and the main potential in terms of buried heritage is for palaeoenvironmental remains (e.g., organic remains, such as pollens or plant fossils) and remains of post-medieval 18th–19th industrial buildings and docks, which would be of low or medium heritage asset significance. There is also a moderate to high potential for prehistoric remains and for Saxon fish traps, of medium or high heritage asset significance.

14.3.18 Construction works would entail deep excavations which would entirely remove any assets within the footprint of each excavation. If such assets were present, this would comprise a high magnitude of impact and would give rise to a minor adverse effect on palaeoenvironmental and prehistoric remains, moderate adverse effects on post-medieval remains and eighteenth and nineteenth century remains including barge beds, wharves and jetties, and a major adverse effect for prehistoric settlement evidence and Saxon fish traps.

14.3.19 The desk-based study of the site suggests that no 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. The resulting residual effects would be negligible.

14.3.20 Effects on the historic setting during construction would be minor adverse on the Grade II* Battersea Power Station with other setting effects also minor adverse. Once operational, there would similarly be no significant adverse effects on setting.

Land quality

14.3.21 A search of historical and environmental data indicates contaminative on site uses including an unidentified industrial works and the presence of a tank with unknown contents. In addition to the Heathwall Pumping Station, the site also comprises a wharf and jetty. The wharf at Heathwall is Middle Wharf and was formerly a concrete batching works but since being purchased by Thames Water has been cleared. It is still though, a designated safeguarded wharf. A waste transfer station at Cringle Dock is located 350m to the west. Historically the surrounding area has been, and still is, predominantly industrial with pockets of commercial properties. Notably, there was an extensive gas works located approximately 25m south of the site.

14.3.22 Historic industrial activities both on and adjacent to the site could have affected the soils beneath the site. Although previous ground investigations do not show the presence of significant soil or groundwater contamination at the site. Some contamination of groundwater has been identified to the west (near Kirtling Street). Desk-based surveys have identified a medium to high risk from unexploded ordnance.

14.3.23 There could be a slight adverse effect on construction workers due to the potential for exposure to contaminated soils or other materials, although any exposure risk would be short-term limited to the construction period. There would be a negligible effect on built structures within or close to the site, such as the existing Pumping Station, as it is considered unlikely that contaminants contained in subsurface materials would affect buried structures. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

14.3.24 During operation there would be a negligible effect from contamination on future users and on built structures, including the new Thames Tideway Tunnel project infrastructure and no mitigation is proposed.

Noise and vibration

14.3.25 The site is subject to distant road traffic noise along Nine Elms Lane to the south. The nearest locations to the site which are sensitive to noise and vibration are Elm Quay, an apartment complex to the east, the new Tideway Walk (Riverlight) residential units being constructed to the west and residential houseboats to the north west. Significant noise effects arising from construction activities are predicted at the residential properties at Elm Quay and Tideway Walk (Riverlight). No significant effects from vibration during construction of the site are predicted.
14.3.26 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.

14.3.27 There would be no significant effects from noise or vibration during operation.

**Socio-economics**

14.3.28 The Thames Path, open space and residential properties surround the site and are used for walking, cycling, and passive recreation.

14.3.29 During construction there would be moderate adverse effects on the amenity of nearby existing and future residents. Amenity impacts on users of the Thames Path and open space would result in negligible effects.

14.3.30 Once operational, there would be a minor beneficial effect resulting from the gain in publicly accessible space associated with the re-routing of the Thames Path and creation of a new area of public realm adjacent to the path in the foreshore.

14.3.31 No mitigation is required for operational effects on socio-economics.

**Townscape and visual**

14.3.32 The existing townscape within the site is poor. Townscape components within the site include a complex of cabins, a stretch of river wall, a jetty, and an electrical substation. The surrounding townscape of the south bank of the river is dominated by industrial and commercial buildings, undergoing transformation into residential-led mixed use schemes. In contrast, the north bank is generally made up of established residential areas.

14.3.33 The scale and intensity of construction activity would have a major adverse effect on the townscape of St. George’s Wharf Residential due to the combined effects of this site with the upstream, Thames Tideway Tunnel project site at Kirtling Street. There would be moderate adverse effect on townscape character areas for the River Thames – Nine Elms Reach, Residential and Commercial, Battersea Industrial and Pimlico Residential, on the opposite side of the river. Once operational, there would minor beneficial townscape effects due to the creation of riverside public realm and the screening of some existing structures.

14.3.34 In terms of visual amenity, during the construction phase as a result of the scale and intensity of construction works, there is likely to be a major adverse effect on viewpoints from the Tideway Walk (Riverlight) development, currently under construction.

14.3.35 There would be moderate adverse effects on some views including from Grosvenor Road and Nine Elms Lane. Effects elsewhere would be minor adverse or negligible such as from Vauxhall Bridge. Once operational, there would be minor beneficial effects due to the visibility of a newly created area of high quality public realm, river wall, boundary treatments and also new tree planting along Nine Elms Lane.
Transport

14.3.36 The Heathwall Pumping Station site has moderate public transport accessibility, being located within close proximity of local bus stops along Nine Elms Lane, and Vauxhall Underground, Rail and bus station just over 1km from the site. The site is on the north side of Nine Elms Lane from which there would be two site access points.

14.3.37 During construction, the number of heavy goods vehicle movements would be comparatively low. However, construction activity is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian and cyclist amenity and safety are considered to be minor adverse and a negligible effect is expected on public transport and river passenger services. During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities and these would have a negligible effect on the surrounding transport networks.

14.3.38 The project is being designed to limit the effects on the transport networks as far as possible. At this location, mitigation measures would be required during the construction phase which would include providing safe crossing points for pedestrians and undertaking a safety audit of the site access points. Mitigation is not required for the operational phase.

Water resources – groundwater

14.3.39 The shaft and connection tunnel would pass through the upper aquifer, which is of medium value, through the underlying London Clay (which is not an aquifer) and into the top of the lower chalk aquifer beneath, which is of high value. Associated interception infrastructure would sit in the upper aquifer and extend into the London Clay. There are a number of nearby public abstractions, which are of very high value.

14.3.40 Construction and operational effects on the upper aquifer would be limited to physical obstruction to groundwater flow. This is anticipated to have a negligible effect. Dewatering of the lower aquifer during construction could impact on groundwater availability and induce groundwater movement.

14.3.41 Monitoring of groundwater levels and quality would be undertaken during construction.

Water resources – surface water

14.3.42 The site is partially located within the River Thames foreshore. The River Thames at this point is classified as being of ‘moderate’ quality status, with a status objective of ‘good’ by 2027. Battersea Park Local Nature Reserve is located within 2km of the site and is water dependent.

14.3.43 Construction effects would be controlled via the Code of construction practice. With this in place it is anticipated that effects on water resources from surface water runoff and contaminants entering the drainage system would not be significant. No further mitigation would therefore be required to address effects on surface water quality.

14.3.44 There is also potential for changes in river flows due to the presence of structures in the foreshore. This could lead to scour of the flood defences.
although the operational structures would be protected by appropriate scour protection. After construction and once the temporary cofferdam is removed, some natural foreshore restoration would occur.

14.3.45 Once operational, the scheme would reduce the number of discharges from the Southwest Storm Relief Sewer combined sewer overflow to a predicted level of one spill per year once the tunnel is in place. The scheme would also reduce the number of discharges from the Heathwall Pumping Station combined sewer overflow to a predicted level of approximately 66,400m$^3$ in five spills a year once the tunnel is in place.

14.3.46 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 164 days per year. In addition, the tonnage of sewage derived litter could be expected to be reduced from 200 tonnes to 16 tonnes per year.

**Flood risk**

14.3.47 The main source of flood risk to site is from the tidal River Thames. The part of the site located within the foreshore is designated as the 'functional floodplain' which is inundated twice a day with the rising tide. The eastern part of the site is located within the 'high probability' flood zone, although it is protected by existing flood defences. The eastern part of the site may also be at risk from localised surface water flooding due to runoff generated by the land to the south of the site.

14.3.48 In order to protect the site from flooding, defences would be constructed during both the construction and operational phases to provide a level of protection equal to the existing defences along the river frontage.
15 Albert Embankment Foreshore

15.1 Location and context of proposed development

15.1.1 The proposed development site is located within the London Borough of Lambeth and is also close to the London Borough of Wandsworth. It comprises the River Thames foreshore under, and on both sides of, Vauxhall Bridge, and the Lack’s Dock access and slipway. The site location and context are shown in Figure 15.1 and Figure 15.2.

15.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

15.1.3 The site is bounded by the River Thames to the north, south and west. Peninsula Heights residential apartments are to the northeast of the site (north of Tintagel House) and the Vauxhall Cross building is to the east. There are two other high-rise office buildings (Camelford House and Tintagel House) and the residential Bridge House located immediately southeast of the site.

15.1.4 Existing access to the site is from Albert Embankment (A3036), close to the junction with Vauxhall Bridge. Vauxhall Underground, railway and bus stations are to the southeast. The Thames Path public right of way runs along the river bank, part of which lies within the site.

15.1.5 The site is within the Lambeth Air Quality Management Area declared for nitrogen dioxide. The River Thames and its tidal tributaries (including the foreshore at Albert Embankment) are important for nature conservation. There are no land based sites designated for nature conservation in the near vicinity. The site is within the Albert Embankment Conservation Area, which is also a designated Area of Archaeological Priority. The southern part of the site is located beneath the Grade II* listed Vauxhall Bridge. The surrounding area has four Grade II listed public benches near the northern end of the site (immediately north of Peninsula Heights).

15.1.6 The site lies within the Thames Tideway foreshore and hence is considered to be functional flood plain, where water has to flow, or be stored, during times of flood.
Figure 15.1 Albert Embankment Foreshore – site location and context
15.2 **Nature of the proposed development**

15.2.1 This section describes the construction and operation of the proposed development at Albert Embankment Foreshore. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 15 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation and targeted consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

15.2.2 The proposal is to intercept the existing combined sewer overflows: Clapham Storm Relief Sewer and Brixton Storm Relief Sewer, which currently discharge approximately 33 times in a typical year. The total volume discharged is approximately 277,300m$^3$ in a typical year. The existing sewers are shown on Figure 15.1.

15.2.3 Two coffer dams and a campshed would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct the drop shaft and the interception chamber.
15.2.4 A drop shaft with an internal diameter of approximately 16m and approximately 47m deep would be constructed. From the base of the drop shaft there would be a short connection tunnel which would join up with the main tunnel. There would also be a separate interception chamber, connection culvert and other structures to divert flows from the two combined sewer overflow to the main tunnel. Two cofferdam areas would be constructed either side of Lack’s Dock to provide a construction platform to build the drop shaft structure and the interception chamber structure.

15.2.5 The construction phase would last approximately three and a half years. Most of the surface level construction activity would take place from 8am to 6pm on weekdays and 8am to 1pm on Saturdays. However, some works would be required beyond these standard working hours as set out in the Code of construction practice.

15.2.6 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level.

15.2.7 Excavated material from the construction of the drop shaft, interception chamber and connection tunnel would be transported away from the site by barge.

15.2.8 There are two alternative options proposed for the primary access point for construction vehicles: via Lack’s Dock; or via a temporary road access off Albert Embankment and between Camelford House and Tintagel House (see Section 15 of the Section 48: Book of plans). Thames Water anticipates applying for both construction access options in the alternative, with only one being granted development consent.

15.2.9 For the first construction access option, via Lack’s Dock, the existing access would be widened from Albert Embankment necessitating the removal of a low wall, shrubs and a security kiosk. Access to the interception chamber during construction would be via a ramped access from the foreshore in front of the Vauxhall Cross building. The use of Lack’s Dock may give rise to a conflict between construction vehicle movements and Duck Tours vehicles which use the dock to gain access to the river.

15.2.10 For the second construction access option, routed between Camelford House and Tintagel House, this would require the removal of sections of boundary wall, river wall and river wall parapet, steps, trees and shrubs together with a total of approximately eight parking spaces in Tintagel House and Camelford House car park. Access to the basement car park would be reduced to one way access. Works would be undertaken to the ramp to the Camelford House underground car park to facilitate access to the car park and temporary traffic lights provided to manage one way access. Lack’s Dock would still be used for occasional access for construction plant accessing the interception structure. As in the first option, access to the interception chamber during construction would be via a ramped access from the foreshore in front of the Vauxhall Cross building.
15.2.11 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

15.2.12 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the Clapham Storm Relief Sewer combined sewer overflow to an average of approximately 7,900 m$^3$, one spill event a year. The number of discharges from the Brixton Storm Relief Sewer would be reduced to an average of approximately 5,700 m$^3$, one spill event a year.

15.2.13 The drop shaft and interception chamber would be housed in two structures extending into the foreshore; the ‘shaft structure’ and the ‘interception chamber structure’. The structures would form new areas of land surrounded by a new river wall forming the flood defence. Electrical and control equipment would be housed within two new kiosks, one located on each foreshore structure.

15.2.14 Two ventilation columns of between 4m and 8m high would sit on top of the paved area on the shaft structure and would provide ventilation for the tunnel. For the ventilation of the interception chamber there would be two small diameter ventilation columns, approximately 6m high, located on the foreshore structure. A third ventilation column, approximately 6m high, would be located to the south of the interception chamber structure. Terraces would also be provided around the interception structure. The terraces would provide inter-tidal habitat and would be embedded into the foreshore by the use of rocks and boulders in order to provide habitat for fish species.

15.2.15 Scour protection would be constructed along the line of the new river wall (to protect the new structure) and a new apron would serve to prevent scour from the proposed new outfall (see permanent works layout plan in Section 15 of the *Section 48: Book of plans*).

15.2.16 Thames Water would retain a right of access over the structures and would install temporary security fencing on parts of the areas when they are required for maintenance. The area above the interception chamber would be secured to limit access for maintenance only. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Lack’s Dock off Albert Embankment.

15.2.17 It is proposed that the new area covering the drop shaft would be landscaped to form an area of public realm which would be accessible apart from when maintenance is required and provide an extension of the Thames Path in this location.

15.2.18 A visualisation illustrating how the completed works could be developed is provided in Figure 15.3.
Figure 15.3 Albert Embankment Foreshore – illustrative visualisation
15.3 Environmental effects

15.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

15.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

15.3.3 The Albert Embankment Foreshore site is located within the London Borough of Lambeth 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 receptors which may be sensitive to the development are occupiers of nearby residential dwellings (the closest are located in Peninsula Heights to the north and Bridge House to the south east of the site), commercial/office premises (including the Vauxhall Cross, Camelford House and Tintagel House) and users of Albert Embankment Gardens and Spring Gardens Park.

15.3.4 For both of the access options under consideration, 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 closest residential properties and negligible at the commercial/offices premises and at the parks (Albert Embankment Gardens and Spring Gardens Park). In terms of construction dust, this is likely to have a minor adverse effect on the closest residential properties and commercial/office premises and a negligible effect at the parks, taking account of the dust control measures in the Code of construction practice.

15.3.5 The effect of any odours released from the ventilation columns is likely to be negligible.

15.3.6 It is considered that mitigation measures are not required.

Ecology – aquatic

15.3.7 The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. It comprises an area of foreshore dominated by pebbles, with some sand, shingle and large stones. The river in this location is confined by a constructed vertical river wall with no marginal vegetation and limited intertidal habitat, and it is on the boundary of the freshwater and brackish zones. Surveys and data searches indicate low diversity of fish and invertebrates present.

15.3.8 During construction there would 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. It is anticipated that these works would have a moderate adverse effect on habitats whilst disturbance and compaction would have a minor adverse effect on habitats. For fish and invertebrates the loss of habitat from landtake would be minor adverse. All other effects on mammals, fish and invertebrates would be negligible.

15.3.9 Inter-tidal terraces have been incorporated into the foreshore interception structures to recreate habitat for aquatic ecology. Nevertheless, there would be a permanent loss of inter-tidal habitat which would have a moderate adverse effect on habitats, and minor adverse effects on fish and invertebrate species. The reduction in the occurrence of low dissolved oxygen related fish mortalities would have a moderate beneficial effect while reduced nutrient levels entering the river would be minor beneficial. Improved local invertebrate diversity and abundance would also be minor beneficial. In the longer term, an increase in pollution sensitive fish and invertebrates would be of minor beneficial effect. Other effects on invertebrates and mammals would be negligible.

15.3.10 Modelling results indicate that the presence of structures within the river during both during construction and operation would not have a significant adverse effect on migrating fish through altered river flows.

15.3.11 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.

Ecology – terrestrial

15.3.12 The site comprises hardstanding, semi-mature and ornamental scattered trees and foreshore habitat. A small number of common bats are known to pass through the site along the River Thames.

15.3.13 Based on survey results, it is considered that the site is likely to be used by a small number of bats and predominantly by common pipistrelle. Wintering bird surveys indicate use of the intertidal foreshore for foraging and resting by a range of species including mallard and gulls.

15.3.14 No significant terrestrial ecology effects on designated sites are anticipated during construction (aquatic ecology effects are considered in the section above). The site lies within the River Thames Tidal Tributaries Site of Nature Conservation which is considered under the assessment of aquatic ecology.

15.3.15 Site clearance would not result in a significant loss of terrestrial ecology habitat. No significant change is likely on the bat or wintering bird populations as a result of small scale changes to habitats.

15.3.16 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.
15.3.17 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. Operational activity would be limited to occasional maintenance work which is considered unlikely to have significant effects on terrestrial ecology.

**Historic environment**

15.3.18 The southern part of the site is located beneath the Grade II* listed Vauxhall Bridge (of high heritage asset significance). There are no further nationally designated assets within the site or its immediate vicinity. The majority of the site is located within the locally designated Albert Embankment Conservation Area (of high heritage asset significance). The site includes the 19th century embankment river wall and Lack’s Dock slipway (both of medium heritage asset significance).

15.3.19 The eastern part of the site lies within the North Lambeth and Lambeth Palace Archaeological Priority Area. The main potential for the site in terms of buried heritage is for prehistoric remains on the foreshore. A prehistoric Mesolithic timber structure (of high heritage asset significance) was recently exposed by river scour. There is also potential for remains associated with a medieval jetty or wharf (of low or medium heritage asset significance) and for post-medieval industrial remains, which may include waste material, jetties or anchor points (of low heritage asset significance).

15.3.20 Removal of post-medieval river outflows and brick slipway would have a major adverse effect. Removal of unlisted sections of the river wall would have a moderate adverse effect. Construction works would entail deep excavations which would entirely remove the assets within the footprint of each excavation. If heritage assets are present, this would comprise a high magnitude of impact and would give rise to a potentially major adverse effect on any prehistoric structures (minor or moderate adverse on isolated artefacts). A minor or moderate adverse effect would be anticipated for medieval and post-medieval structural remains.

15.3.21 To mitigate the effect on the above ground assets, the structures would be recorded and photographed in line with accepted standards to form preservation by record. This would reduce effects to negligible. 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. The resulting residual effects would be negligible.

15.3.22 In terms of setting, the construction works would partially obscure views from the southern end of Vauxhall Bridge west towards the Millbank Conservation Area. This would result in a moderate adverse effect. Minor adverse effects on Albert Embankment and Millbank conservation areas would arise due to changes in their setting from the presence of construction activity. Once operational, the foreshore structure would contrast with the line of the bridge and formal arrangement of the adjacent embankment resulting in minor adverse effects on the setting of Vauxhall.
Land quality

15.3.23 A search of historical and environmental data indicates a number of contaminative industrial on site uses. Uses include gas works, wharves and the Lack’s Dock which has been situated within the site boundary from 1896 to present day. Historically the area around the site has been used for the location of a number of industrial activities, particularly oil and gas works located to the south and south west of the site and a current fuel filling station to the north east. There is the potential for these activities to have impacted upon the foreshore, however given the time since most of these processes were active and processes associated with the river flow, these risks are considered to be low. Part of the ongoing ground investigations includes the assessment of foreshore sediment contamination. Desk-based surveys have identified a high risk from unexploded ordnance.

15.3.24 Based on 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.

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

Noise and vibration

15.3.26 The site is dominated by road and rail traffic noise. The nearest locations to the site which are sensitive to noise and vibration are the residential dwellings at Peninsula Heights (north east of the site) and Bridge House (south east of the site) and offices at Camelford House and Vauxhall Cross (east of the site).

15.3.27 For both of the access options under consideration, noise effects arise from the construction activities rather than construction traffic and significant effects are predicted at the office premises at Camelford House, Tintagel House and Vauxhall Cross. No significant vibration effects are predicted during construction and no significant noise or vibration effects as a result of the operation of the site are predicted.

15.3.28 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 for example through suitable siting of equipment on site.

Socio-economics

15.3.29 The site comprises a privately used slipway (Lack’s Dock), the access route between Camelford House and Tintagel House (for the second access option) a stretch of pavement that forms part of the Thames Path,
Section 48: Project description and environmental information report

and an area of foreshore on the River Thames. Residential and commercial uses, including offices, surround the site. The site and surrounding area is moderately well used for a range of purposes including walking, cycling and passive recreation, and a tour operator (Duck Tours) launches and recovers amphibious vehicles from Lack’s Dock all year round.

15.3.30 During construction, for both access options under consideration, there are considered to be minor adverse effects on the amenity of users of the nearby offices and minor adverse effects arising from disturbance to the tour operator and disruption to users of the Thames Path. Once operational, there would be a minor beneficial effect on recreational opportunities resulting from the gain in publicly accessible space associated with the extension to the pavement comprising the Thames Path.

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

Townscape and visual

15.3.32 The site is located within the Albert Embankment Conservation Area and partly beneath the Grade II* listed Vauxhall Bridge. The townscape within the site is poor comprising a stretch of pavement, an area of foreshore, several trees and a stretch of river wall. The site is located within a regionally valued stretch of the River Thames and provides the setting to a number of conservation areas. The surrounding townscape combines historic and contemporary styles, comprising commercial, administrative and residential premises.

15.3.33 During the construction phase, the presence of construction activity and the cofferdam on this prominent riverside location would have a major adverse effect on townscape character areas including the site, the River Thames - Vauxhall and Pimlico Reach, Albert Embankment (commercial), St. George’s Wharf and the Residential Waterfront (west). There would be a moderate adverse effect on the River Thames - Nine Elms Reach, Nine Elms (residential) and Westminster (residential). Once operational, there would be moderate beneficial townscape effects on the character of the site. All other operational townscape effects on visual amenity would not be significant.

15.3.34 In terms of visual amenity, it is likely that during the construction phase major adverse effects would be occur on recreational viewpoints from the Thames Path outside Peninsula Heights, from Vauxhall Bridge and at open space along Millbank. For residential viewpoints, moderate adverse effects are likely from residences on Nine Elms Lane and Grosvenor Road. Once operational, there would be minor to moderate beneficial effects on views from the Thames path outside Peninsula Heights and from the southern end of Vauxhall Bridge due to the visibility of the newly created high quality public realm. Other effects would not be significant.
Transport

15.3.35 The Albert Embankment Foreshore site has excellent public transport accessibility being located within close proximity of Vauxhall Rail, Underground and Bus station. The site is on the west side of Albert Embankment (A3036), adjacent to Vauxhall Bridge Road and construction vehicle access is proposed via the A202 and A3036 via Vauxhall Cross.

15.3.36 The two temporary construction access options between Albert Embankment and the construction site are: first, via Lack’s Dock; and second, in the alternative, via an east-west route between Camelford House and Tintagel House.

15.3.37 For both access options under consideration, during construction, the number of heavy goods vehicle movements would be moderate. 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 and cyclist amenity and safety are expected to be moderate adverse due to local diversions and possible conflicts at the two site access options on Lack’s Dock and at Camelford House respectively. The latter access option would also give rise to a moderate adverse effect on users of car parking at Camelford House.

15.3.38 For both access options, a negligible effect is expected on public transport and a minor adverse effect on 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.

15.3.39 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 would take the form of having a traffic marshal stationed at the site access entrance to manage potential conflicts between construction vehicles, Duck Tours vehicles and those vehicles accessing Camelford House. Mitigation is not required for the operational phase.

Water resources – groundwater

15.3.40 The proposed shaft would pass through the upper aquifer with the base of the shaft founded in the lower aquifer. Associated interception infrastructure would penetrate the upper aquifer. Both the upper and lower aquifers are sensitive environmental receptors. The lower aquifer is of high value and abstractions from it of very high value, while the upper aquifer is considered to be of medium value.

15.3.41 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and these are anticipated to be negligible. Construction effects on the lower aquifer could impact groundwater resources and induce groundwater movement. Due to the sensitivity of the lower aquifer effects have been assessed as moderate adverse on groundwater resources but major adverse on groundwater quality (as a result of induced groundwater flow). The effects of construction on groundwater quality require further assessment. The results of further
assessment would inform the development of further design and mitigation measures.

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

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

**Water resources – surface water**

15.3.44 The site is located in the River Thames foreshore 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’ by 2027. There are no nationally or locally designated water-dependent conservation sites within 2 kilometres of the site.

15.3.45 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.

15.3.46 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 that is required will be identified in the **Environmental Statement**.

15.3.47 Currently the Clapham Storm Relief and Brixton Storm Relief combined sewer overflows both discharge into the Thames at the site. For the purposes of this assessment, they have been considered to operate as a single outfall. Once operational, the scheme would reduce the number to a predicted level of one spill a year once the tunnel is in place. This reduction would be a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 112 days of risk of exposure annually. In addition, the tonnage of sewage derived litter can be expected to be reduced from 70 tonnes to less than four tonnes per year.

**Flood risk**

15.3.48 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.

15.3.49 The proposed site may also be at risk of surface water flooding in the future due to runoff generated from land to the south and east. The presence of structures within the foreshore could impact flow within the
River Thames and the work required to construct the tunnel beneath the site could potentially affect the local flood defences.

15.3.50 During construction, a temporary structure would be built to provide the equivalent level of flood protection as that provided by the current flood defences. During operation, the ground level at the northern part of the site would be set above the design flood level. In the southern part of the site, new flood defences would be constructed to provide the equivalent protection level as the existing defences.

15.3.51 The effects of changes in scour and the rate sediments are deposited would be reduced through good practice design of the temporary and permanent structures. The terracing design of the southern section of the site has been designed to ensure stable tidal water flows.
16 Victoria Embankment Foreshore

16.1 Location and context of proposed development

16.1.1 The proposed development site is located in the City of Westminster. The site is located in the foreshore of the River Thames, with part of the site extending west onto a section of pavement and roadway of Victoria Embankment (A3211). A permanently moored boat, the Tattershall Castle (a floating bar and restaurant) is located within the site area. The site location and context are shown in Figure 16.1 and Figure 16.2.

16.1.2 It is proposed to use the site as a combined sewer overflow interception site and connection tunnel drive site.

16.1.3 The site is bounded to the north, east and south by the River Thames and to the west by the A3211 (Victoria Embankment). To the north is the restaurant ship Hispaniola, and beyond that Hungerford Bridge/Golden Jubilee footbridges and Embankment Pier. Two moorings lie within the southern boundary of the site. Another is located to the south of the site along with Whitehall Stairs which extend into the river and support the RAF memorial. The closest buildings to the site, which include some residential properties, are those to the west of the Whitehall Gardens (Grade II registered park and gardens) and comprise the Grade II* Whitehall Court and National Liberal Club. Whitehall Gardens are also designated as a Site of Importance for Nature Conservation.

16.1.4 The A3211 road extends along Victoria Embankment adjacent to the site. Both national rail and underground access is available close to the site with Embankment Underground Station located approximately 200m to the north, and Charing Cross Station approximately 300m northwest. The Thames Path National Trail and Public Right of Way runs along the footpath of Victoria Embankment.

16.1.5 The site is located within the City of Westminster Air Quality Management Area declared for nitrogen dioxide and particulate matter. The foreshore part of the site is within the River Thames and tidal tributaries Site of Metropolitan Importance. In terms of heritage, the river wall and numerous lamp standards along the riverfront are Grade II listed. The site is located within the Whitehall Conservation Area, and the Lundenwic and Thorney Island Area of Archaeological Priority. To the south lies the Palace of Westminster, Westminster Abbey and St Margaret's Church World Heritage Site. There is a Grade II listed memorial to Bazalgette to the north.

16.1.6 The site is in the Thames Tideway foreshore and hence is considered to be a functional flood plain where water has to flow, or be stored, during times of flood.
Figure 16.1 Victoria Embankment Foreshore – site location and context
16.2 Nature of the proposed development

16.2.1 This section describes the construction and operation of the proposed development at Victoria Embankment Foreshore. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 16 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation and targeted consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

16.2.2 The proposal is to control the existing Regent Street combined sewer overflow, which currently discharges approximately four times in a typical year. The total discharged volume is approximately 22,200m$^3$ in a typical year. The combined sewer overflow would be controlled by connecting the northern Low Level Sewer No.1 to the main tunnel. The existing sewer is shown on Figure 16.1.

16.2.3 These works, along with works at the Blackfriars Bridge Foreshore and Chelsea Embankment Foreshore sites, mean that additional sites are not needed to intercept ten other combined sewer overflows along the northern embankment.
16.2.4 A cofferdam and a campshed would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct the drop shaft.

16.2.5 A drop shaft with an internal diameter of approximately 13m and approximately 50m deep would be constructed. An overflow weir chamber to control the northern Low Level Sewer No. 1 and connection culvert would be constructed to link the flows to the drop shaft. A short connection tunnel would link the drop shaft to the main tunnel.

16.2.6 During construction the Tattershall Castle would be temporarily relocated to a new mooring to the south of the Victoria Embankment Foreshore site.

16.2.7 The construction phase would last approximately four years. Most of the surface level construction activity would take place from 8am to 6pm on weekdays and 8am to 1pm on Saturdays. However, some works would be required beyond these standard working hours, as set out in the Code of construction practice.

16.2.8 Construction of the connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level.

16.2.9 Excavated material from the construction of the drop shaft and connection tunnel would be transported away from the site by barge.

16.2.10 Vehicle access to the site during construction would be via the westbound carriageway of the Victoria Embankment (A3211), turning left into the site through a new entrance as shown on the construction phasing plans for this site (see Section 16 of the Section 48: Book of plans). Traffic leaving the site would turn left onto the westbound carriageway of the Victoria Embankment (A3211) from a second new exit. During intermittent lane closures along Victoria Embankment (A3211) in some construction phases, two-way traffic would be maintained by reducing the width of traffic lanes so that one lane in each direction would remain open.

16.2.11 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

Operation

16.2.12 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would remove all discharges from the Regent Street combined sewer overflow.

16.2.13 The overflow weir chamber is proposed to be housed in a structure extending out into the river from the existing embankment with the drop shaft located further into the river (see Section 16 of the Section 48: Book of plans). The structure would form a new area of land surrounded by a new river wall forming the flood defence.
16.2.14 The proposed above-ground structures located on the new in-river structures would include two main ventilation columns between 4m and 8m high, a small diameter ventilation column to the interception chamber approximately 6m high, an electrical and control equipment kiosk and an entrance feature structure (see permanent works layout plan in Section 16 of the Section 48: Book of plans).

16.2.15 Scour protection would be constructed along the line of the new river wall (to protect the new structure) and a new apron would serve to prevent scour from any new outfall.

16.2.16 Thames Water would retain a right of access over the structures and would install temporary security fencing on parts of the areas when they are required for maintenance. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Victoria Embankment (A3211).

16.2.17 It is proposed that the new area covering the main shaft would be landscaped to form an area of public realm. A visualisation illustrating how the completed works could be developed is provided in Figure 16.3.

Figure 16.3 Victoria Embankment Foreshore – illustrative visualisation

16.3 Environmental effects

16.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.
16.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

16.3.3 The Victoria Embankment Foreshore site is located within the City of Westminster 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 receptors which may be sensitive to the development are occupiers of the nearby residential dwellings (in Whitehall Court), commercial/office premises, two permanently moored vessels (the Hispaniola and relocated Tattershall Castle) and The Royal Horseguards Hotel, and users of the Whitehall Gardens / Victoria Embankment Gardens.

16.3.4 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 Whitehall Court, the Hispaniola, Whitehall Gardens, the National Liberal Club and The Royal Horseguards Hotel and negligible elsewhere. In terms of construction dust, this is likely to have a negligible effect at all locations, taking account of the dust control measures in the Code of construction practice.

16.3.5 The effects of odours released from the ventilation column are likely to be negligible.

16.3.6 It is considered that mitigation measures are not required.

Ecology – aquatic

16.3.7 The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. There is a thin area of sand and gravel foreshore exposed at low tide. The river in this location is confined by a man-made vertical river wall with no marginal vegetation and limited intertidal habitat. Aquatic ecology surveys have been undertaken at the site. Surveys and data searches indicate a low diversity of fish, whilst pollution-sensitive invertebrates are present.

16.3.8 Construction effects would be managed in accordance with the Code of construction practice. With the Code of construction practice in place, during construction there would be a loss of foreshore habitat. This is due to a retaining wall to create a dry working area within the river, termed a cofferdam, 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 site for barges to rest on during low tide. This ensures that barges sit on a stable loading platform and also do not become stuck in the river bed with a potential risk of flooding to the barge during high tide. It is anticipated that the cofferdam and campshed would have a moderate adverse effect on habitats, whilst disturbance and compaction would have a minor adverse effect on habitats. For fish and invertebrates the loss of habitat from landtake would be minor adverse. So too would
death from landtake for invertebrates. All other effects on mammals, fish and invertebrates would be negligible.

16.3.9 During operation, the permanent loss of river habitat is considered to be a moderate adverse effect on habitats and minor adverse effects on fish and invertebrates. The reduction in nutrient levels entering this heavily modified stretch of the river is considered to have a minor beneficial effect on habitats. Similarly, it would have a minor beneficial effect on fish, through reduced fish kills and local improvement in invertebrate diversity and abundance. There would be a minor beneficial increase in pollution tolerant and/or rare fish and invertebrate species in the longer term of operation. Effects on mammals would be negligible.

16.3.10 Modelling results indicate that the presence of structures, both during construction and operation, within the river would not have a significant adverse effect on migrating fish through altered river flows.

16.3.11 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.

**Ecology – terrestrial**

16.3.12 The site comprises hardstanding and habitat is limited to eight semi-mature trees. No significant adverse effects on terrestrial ecology are anticipated for either construction or operation (aquatic ecology effects are considered in the section above).

**Historic environment**

16.3.13 The site lies within the locally designated Whitehall Conservation Area and comprises part of the north bank of the Thames and the Victoria Embankment river wall, which is Grade II listed, and a number of Grade II listed cast iron lamp standards (all of high heritage asset significance). The river wall forms part of Sir Joseph Bazalgette’s grand embankment scheme, built in 1864–70. The permanently moored vessel, Tattershall Castle, which is on the National Historic Ships register also lies within the site and is of medium heritage asset significance. There are a number of heritage features in the vicinity, the closest of which are the Grade II listed Bazalgette Memorial of c. 1891 (of high heritage asset significance) and Victoria Embankment Gardens, a Grade II* registered park and garden (of high heritage asset significance) on the opposite side of the carriageway. The World Heritage Site of Palace of Westminster, Westminster Abbey and St Margaret’s Church lies around 450m to the south of the site, and is also of high asset significance.

16.3.14 Potential for archaeological remains in the channel is considered to be low due to probable dredging although there is high potential for palaeoenvironmental remains (eg organic remains such as pollen and plant fossils) of low heritage asset significance within any surviving channel silt. The main potential in terms of buried heritage assets is on the landward side of the river wall, behind the embankment construction, where there is a moderate potential for post-medieval piled structures, barge beds and jetties, of low heritage asset significance.
16.3.15 During construction, there would be a major adverse effect from temporary removal of the Grade II lamp stands, Grade II listed catenary lamp stands and the Grade II listed ‘Sphinx’ bench seats (all of which would be reinstated post construction). The parapet of the river wall would be locally dismantled, constituting a major adverse effect. There is anticipated to be a negligible effect on the relocation of the Tattershall Castle in terms of the historic environment. Construction works would entail deep excavations which would entirely remove the assets within the footprint of each excavation. If such assets were present, this would comprise a high magnitude of impact and would give rise to a minor adverse effect on palaeoenvironmental remains and post-medieval remains. There is high potential for buried structures associated with the Victoria Embankment the disturbance of which would have a moderate adverse effect.

16.3.16 To mitigate the effect on the listed river wall, bench seats and lamp stands, these assets 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 identified 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. The resulting residual effects would be negligible, with the exception of effects on the river wall which would be moderate adverse and the lamp stands which would be minor adverse.

16.3.17 Major adverse effects are predicted on the Grade I Embankment wall due to construction activity within its setting. Moderate adverse effects have been identified for the Whitehall Conservation Area. Minor adverse effects are predicted on the World Heritage site of the Palace of Westminster and Westminster Abbey including St Margaret’s Church, the Savoy Conservation Area, Victoria Embankment Gardens and the Tattershall Castel and Hispaniola due to construction activity within their settings. No mitigation is possible due to the highly visible nature of the works.

16.3.18 Once operational there are likely to be minor adverse effects on the historic character and appearance of Whitehall Conservation Area and the setting of the river wall and associated heritage assets, due to the presence of the foreshore structure. No mitigation is possible, over and above that already embedded in the scheme in terms of high quality design, due to the visibility of the operational infrastructure.

Land quality

16.3.19 A search of historical and environmental data indicates no contaminative on site uses. The nearest identified potential contamination source relates to the railway land to the north which is not considered to be a significant ongoing pollution source that may affect 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.

16.3.20 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 is likely to be a negligible effect on the built environment as it is considered unlikely that contaminants contained in subsurface materials would affect buried structures. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

16.3.21 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.

Noise and vibration

16.3.22 The site is dominated by road traffic and rail noise. The nearest locations to the site which are sensitive to noise and vibration are the residential dwellings at Whitehall Court, located to the west of the site.

16.3.23 No significant noise or vibration effects arising from construction activities are predicted. No significant noise or vibration effects during the operation of the site are predicted.

16.3.24 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 noise and vibration effects on the local community for example through suitable siting of equipment on site.

16.3.25 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.

Socio-economics

16.3.26 The site comprises a stretch of pavement that forms part of the Thames Path and an area of foreshore on the River Thames accommodating a moored vessel containing a pub with bars and meeting rooms – The Tattershall Castle. Open space (Whitehall Garden) and commercial uses, including The Hispaniola restaurant vessel, are close to site, and there are residential dwellings beyond the open space (Whitehall Court). The site and surrounding area is well used for a range of purposes including walking, cycling, sightseeing by tourists and passive recreation.

16.3.27 During construction, there are considered to be minor adverse effects on amenity of users of the restaurant boats and on users of the Thames Path due to disruption to the path. Amenity effects on users of the Thames Path and users of Whitehall Garden and displacement of the Tattershall Castle are considered to be negligible. Once operational, there would be a minor beneficial effect resulting from the gain in publicly accessible
space associated with the extension to the pavement comprising the Thames Path.

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

**Townscape and visual**

16.3.29 The site is located on the north bank of the river within the Whitehall Conservation Area. The townscape character of the site is in a good condition, characterised by Grade II listed lamp standards, an historic riverside stone wall, an avenue of mature London plane trees and two permanently moored vessels.

16.3.30 During the construction phase the scale and intensity of construction activity on this prominent foreshore site is likely to result in a major adverse townscape effect on the character of the site and character areas for the River Thames - Victoria Embankment Gardens and Jubilee Gardens Reach, River Thames – Central London Reach, Temples Conservation Area, Whitefriars Conservation Area and the South Bank Conservation Area. There would be moderate adverse effects on the Victoria Embankment Administrative character area and minor effects on the River Thames – House of Parliament character area and Westminster Abbey and Parliament Square character area. Once operational, there would be minor adverse townscape effects on the site and generally on surrounding townscape character areas due to introduction of the foreshore structure and above ground structures in an area previously part of the river. Effects have been reduced through a high quality design in keeping with the townscape character.

16.3.31 In terms of visual amenity, given this visually prominent foreshore site in a sensitive heritage location, during construction there would be several major adverse effects from surrounding viewpoints including from the Thames path, Golden Jubilee footbridge and Jubilee Gardens. There are likely to be moderate adverse effects on viewpoints from the Thames path, Waterloo Bridge and Royal Festival Hall.

16.3.32 Once operational there would be minor adverse visual effects on viewpoints including from the Golden Jubilee footbridge with other visual effects minor adverse. These effects are due to the visibility of the new structure extending into the river and above ground structures.

**Transport**

16.3.33 The Victoria Embankment Foreshore site has excellent public transport accessibility with Embankment London Underground station within close proximity together with numerous bus routes and Charing Cross National Rail station. The site is located to the south of the Hungerford Bridge and Golden Jubilee footbridges. Vehicle access is proposed from Victoria Embankment (A3211).

16.3.34 During construction, the number of heavy goods vehicle movements would be moderate. The nature of the construction site in this location would require highway layout changes and diversion routes which is considered likely to result in a minor adverse effect on road network operation and
delay and a moderate adverse effect on coaches and service vehicles in the vicinity of the site. Effects on pedestrian facilities are expected to be major adverse and minor adverse on cyclist amenity and safety. A negligible effect is expected on public transport 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.

16.3.35 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 would include the provision of safe crossing points for pedestrians and cyclists along the diversion routes, traffic signal optimisation to improve pedestrian crossing time and junction capacity, and measures to ensure the frequency of bus services. Mitigation is not required for the operational phase.

**Water resources – groundwater**

16.3.36 The proposed shaft would pass through the upper aquifer through the underlying non aquifer and into the central beds of the Lambeth Group below. The shaft would not penetrate the lower aquifer beneath. Associated interception infrastructure would be founded in 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 of high value.

16.3.37 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible. Construction effects on the lower aquifer would relate to dewatering which has the potential to affect groundwater resource and induce groundwater movement.

16.3.38 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 due to embedded design measures.

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

**Water resources – surface water**

16.3.40 The site is located in the River Thames foreshore within the Thames Middle waterbody, as classified under the Thames River Basin Management Plan. The Thames Middle waterbody is current classified 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.

16.3.41 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.
16.3.42 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. Scour protection is proposed for the permanent works in a zone adjacent to the outerface of the new river wall.

16.3.43 Once operational, the scheme would reduce the number of discharges from the Regents Street combined sewer overflow to a predicted level of no spills for a typical year once the tunnel is in place. This reduction would be a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 32 days of risk of exposure each year. In addition, the tonnage of sewage derived litter can be expected to be reduced from six tonnes to zero tonnes per year.

**Flood risk**

16.3.44 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.

16.3.45 The site may also be at risk of surface water flooding in the future due to runoff generated from land to the west.

16.3.46 Flood defence levels along the Thames frontage would be maintained during both construction and operation, with the cofferdam forming the tidal defence during construction.
17 Blackfriars Bridge Foreshore

17.1 Location and context of proposed development

17.1.1 The proposed development site is located in the City of London and is also close to the City of Westminster. It comprises a section of the River Thames to the west and east of Blackfriars Bridge (A201), sections of the Victoria Embankment slip road up to Blackfriars Bridge and areas of the pavement along Victoria Embankment and Paul’s Walk. The site context and location are shown in Figure 17.1 and Figure 17.2.

17.1.2 It is proposed to use the site as a combined sewer overflow interception site.

17.1.3 The site is bounded to the north by the A3211 (Victoria Embankment / Blackfriars Underpass / Upper Thames Street), beyond which are multi-storey office buildings. It is bounded to the east, south and west by the River Thames. To the west of Blackfriars Bridge is the President and further to the west is Chrysanthemum Pier. There are two parts to the site: the main construction site is located to the west of, and under, Blackfriars Road Bridge. A second, smaller site is located to the east of Blackfriars Rail Bridge for the construction of a replacement Blackfriars Millennium Pier which is within the main construction site.

17.1.4 Existing access to the site is from the Blackfriars Bridge junction, from the westbound off-slip road to Victoria Embankment. Blackfriars Underground and Overground stations are approximately 120m to the northeast of the site. The Thames Path public right of way runs through the site along the footpaths of Victoria Embankment and Paul’s Walk.

17.1.5 The site is located in the City of London Air Quality Management Area declared for nitrogen dioxide and particulate matter. The River Thames and its tidal tributaries (including the foreshore at Blackfriars Bridge) are a Site of Importance for Nature Conservation. Blackfriars Bridge and the Embankment Wall with cast iron lamp standards on Victoria Embankment are Grade II listed.

17.1.6 The site is also within the Whitefriars Conservation Area and the City of London Archaeological Priority Area. It lies within a protected strategic view of St Paul’s Cathedral and River Prospects from Blackfriars Bridge and the South Bank. Part of the Temples Conservation Area is adjacent to the site. There are also a number of listed buildings nearby, including Carmelite House, Sion College, the City of London School and the gate piers to the Inner Temple Garden (all Grade II listed and of high heritage asset significance).

17.1.7 The site lies within the Thames Tideway foreshore and hence is considered to be functional flood plain, where water has to flow, or be stored, during times of flood.
Figure 17.1 Blackfriars Bridge Foreshore – site location and context

Figure 17.2 Blackfriars Bridge Foreshore – aerial photograph
17.2 **Nature of the proposed development**

17.2.1 This section describes the construction and operation of the proposed development at Blackfriars Bridge Foreshore. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 17 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

17.2.2 The proposal is to intercept the existing Fleet Main combined sewer overflow, which currently discharges approximately 20 times a year. The total volume discharged is approximately 520,000m³ in a typical year. The northern Low Level Sewer No.1 would also be connected to the tunnel. The existing sewers are shown on Figure 17.1.

17.2.3 A cofferdam would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct the drop shaft.

17.2.4 A drop shaft with an internal diameter of approximately 24m and approximately 53m deep would be constructed. An overflow weir chamber to connect to the northern Low Level Sewer No. 1, an interception chamber to connect to the Fleet Main combined sewer overflow and two connection culverts would be constructed to link the flows to the shaft. The Blackfriars Bridge shaft would be constructed on the line of the main tunnel that would run from Kirtling Street to Chambers Wharf (therefore a connection tunnel would not be constructed at this site). The works would require the relocation of the specialist sports facility.

17.2.5 The construction phase would last approximately four and a half years. Most of the surface level construction activity would take place from 8am to 6pm on weekdays and 8am to 1pm on Saturdays. However, some works would be required beyond these hours as set out in the Code of construction practice. This includes extended working hours during major concrete pours.

17.2.6 Excavated material from the construction of the drop shaft and connection tunnel would be transported away from the site by barge.

17.2.7 The construction would be undertaken in three phases; during phases one and two, construction traffic would access the site from an entrance from the westbound ramp leading down from Blackfriars Bridge and would leave via a left turn onto westbound Victoria Embankment (A3211) as shown on the construction phasing plans for this site (see Section 17 of the Section 48: Book of plans). During construction of phase three, the westbound ramp from Blackfriars Bridge would be closed and construction traffic would access the site by turning left from Blackfriars underpass.
17.2.8 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

17.2.9 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average of approximately 36,800m³, four discharges a year. By making a connection to the Low Level sewer at this location, as well as at the Victoria Embankment Foreshore and Chelsea Embankment Foreshore sites, 10 other combined sewer overflows along the northern embankment are indirectly controlled, avoiding the need for works to these combined sewer overflows.

17.2.10 The structures required to intercept the Fleet Main combined sewer overflow and northern Low Level Sewer No.1 are proposed to be housed in a structure extending out into the river from the existing embankment with the shaft located at the western end of the structure. The structures would form new areas of land surrounded by a new river wall forming the flood defence.

17.2.11 The proposed above-ground structures located on the new in-river structures would include electrical and control equipment located under the ramp up to Blackfriars Bridge, along with replacement public toilets and access to the specialist sports facility. An additional electrical and control kiosk would be located towards the north-west corner of the foreshore structure. There would also be five ventilation columns between 4m and 8m in height which would sit on top of the raised paved area at the western end of the site. A further two ventilation columns would be located further east towards Blackfriars Bridge. One column would be between 4m and 8m in height while the other would have a maximum height of 6m. It is proposed that the new area covering the drop shaft would be landscaped to form an area of new public realm.

17.2.12 Scour protection would be constructed along the line of the new river wall (to protect the new structure) and a new apron would serve to prevent scour from any new outfall (see permanent works layout plan in Section 17 of the Section 48: Book of plans).

17.2.13 Thames Water would retain a right of access over the structures and would install temporary security fencing on parts of the areas when they are required for maintenance. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Victoria Embankment (A3211).

17.2.14 A visualisation illustrating how the completed works could be developed is provided in Figure 17.3.
17.3 Environmental effects

17.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

17.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

17.3.3 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 locations which 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.
17.3.4 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 to negligible at the residential properties and Crowne Plaza Hotel, and minor adverse at the commercial/office premises (Sion Hall and No. 60 Victoria Embankment). In terms of construction dust, this is likely to have a negligible effect at all properties, taking account of the dust control measures in the Code of construction practice. The effects of odours released from the ventilation column are likely to be negligible.

17.3.5 It is considered that mitigation measures are not required.

Ecology – aquatic

17.3.6 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. Occasional observations of common seal and harbour porpoise have been made.

17.3.7 Construction effects would be managed by the Code of construction practice. With the Code of construction practice 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. With these works, there would be a minor adverse effect on habitats and minor adverse effects on fish and invertebrates. All other effects are considered negligible.

17.3.8 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. Along this heavily modified stretch of the river, there would generally be minor benefits to fish over time. 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.

17.3.9 Modelling results indicate that the presence of structures within the river during both during construction and operation would not have a significant adverse effect on migrating fish through altered river flows.

17.3.10 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.

Ecology – terrestrial

17.3.11 Habitat on site is limited to several semi-mature trees which would be replaced 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 the section above).
Historic environment

17.3.12 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 Blackfriars Millennium Pier is considered to be of low heritage asset significance. 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).

17.3.13 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 moderate to high potential for Roman ship remains (one was uncovered adjacent to the site in the 1960s), which would be of medium asset significance. 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.

17.3.14 The temporary removal of the listed lamp standards and benches would have major adverse effects as would removal of part of the listed river wall. Moderate adverse effects are likely on the unlisted part of the river wall and the unlisted pump house. Other effects, such as the removal of the pontoons and dolphins (free standing structures for mooring vessels) would be minor adverse.

17.3.15 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 adverse effect on post-medieval industrial and riverside remains and major adverse effect if Roman ship remains were to be found.

17.3.16 To mitigate the effect on the river wall, lamp standards and benches, the structures would be recorded and photographed in line with accepted standards to form preservation by record; and the lamp standards and benches would be reinstated. This would reduce effects to negligible for the lamp standards and benches and minor adverse for the river wall. 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. The resulting residual effects would be negligible.

17.3.17 During construction, the scale and prominence of construction at this site would lead to major adverse effects on the Embankment wall and moderate adverse effects on the Whitefriars Conservation Area and Blackfriars Bridge due to construction activity within their settings. It is considered that once operational, there would remain an adverse effect due to the introduction of this structure along the river in this sensitive historic setting. Effects would range from minor to moderate adverse. There would be a moderate beneficial effect on the setting of Embankment wall due to improvements to the adjacent 1960s section of wall.

Land quality

17.3.18 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.

17.3.19 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 approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

17.3.20 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.

Noise and vibration

17.3.21 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.

17.3.22 There are no significant noise effects predicted to arise from construction activities. No significant effects from vibration (during construction or during the operation of the site) are predicted.

17.3.23 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.
17 Blackfriars Bridge Foreshore

**Socio-economics**

17.3.24 The site comprises a stretch of pavement that forms part of the Thames Path together with a specialist sports facility (located beneath the westbound ramp off Blackfriars Bridge) 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.

17.3.25 During construction, there is considered to be a moderate adverse effect to users 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.

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

**Townscape and visual**

17.3.27 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.

17.3.28 During the construction phase, the scale and intensity of construction activity on this prominent riverside location, including a cofferdam, would have a major adverse effect on townscape areas including the main site, the River Thames Central London Reach, and Whitefriars and Temples Conservation Areas. Significant adverse effects are likely on the townscape further upstream from the site and a minor adverse effect on other townscape areas. Once the scheme is operational it is anticipated that there would be minor or negligible adverse townscape effects on the site and character areas along the river due to new structures within an area that was previously part of the river.

17.3.29 In terms of visual amenity, during the construction phase there would be negligible effects on designated views. There would be major adverse effects on viewpoints including from the opposite river bank, Blackfriars Bridge and from Gabriel’s Wharf, due to the visibility of the cofferdam and
construction activity. There would be moderate adverse effects on four viewpoints, including from Waterloo Bridge, from the Thames Path opposite Inner Temple Gardens and from office buildings along Victoria Embankment. Other effects would be minor adverse.

17.3.30 Once operational, minor adverse visual effects are likely to remain due to visibility of the new river wall and above ground structures.

**Transport**

17.3.31 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. The Blackfriars Millennium Pier would be permanently relocated.

17.3.32 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) and similar effects on cyclists due to an increase in journey time. 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.

17.3.33 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.

17.3.34 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 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.

**Water resources – groundwater**

17.3.35 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.

17.3.36 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 and a temporary adverse effect on the lower aquifer in respect of water levels is likely. 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.

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

**Water resources – surface water**

17.3.38 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.

17.3.39 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.

17.3.40 The reduction in the width of the river to change the river flows may lead
some scour but the new structures would be protected by scour protection
along the outer face of the new river wall. The effects of scour would be
largely temporary during construction as some natural foreshore
restoration would occur after temporary construction structures are
removed.

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

17.3.42 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.

**Flood risk**

17.3.43 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 also 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.

17.3.44 Flood defence levels along the Thames frontage would be maintained
during both construction and operation, with the cofferdam forming the
tidal defence during construction.
18 Shad Thames Pumping Station

18.1 Location and context of proposed development

18.1.1 The proposed development site is located in the London Borough of Southwark. It comprises the Thames Water Shad Thames Pumping Station and some adjacent land including a section of Maguire Street. It is a mixed residential and commercial area. The site location and context are shown in Figure 18.1 and Figure 18.2.

18.1.2 It is proposed to use the site as a system modification site.

18.1.3 The site is bounded to the north by Wheat Wharf, to the west by a private car park serving Vanilla and Sesame Court and to the South by Tamarind Court. The Clove Building immediately to the east of Maguire Street is a commercial building which includes the Design Museum.

18.1.4 Existing access to the pumping station is from Maguire Street, via a one way system along Shad Thames and Gainsford Street. London Bridge Station (Underground and Overground stations) is approximately 1km to the west and Bermondsey Overground Station is approximately 1km to the east.

18.1.5 The site is within the Southwark Air Quality Management Area declared for nitrogen dioxide and particulate matter. The site lies within the Tower Bridge Conservation Area and the St Saviours Dock Conservation Area is located to the east of the site. The site lies within the Borough, Bermondsey and Riverside Archaeological Priority Zone. Wheat Wharf is Grade II listed and adjacent to the site. There are no areas designated for nature conservation on-site and although the nearby River Thames is designated for aquatic ecology there are no other designated ecological sites close to the site.

18.1.6 The main source of flood risk to the site is from the tidal River Thames which is located approximately 50m from the site. The site lies within the high probability flood zone, although it is protected by flood defences.
Figure 18.1 Shad Thames Pumping Station – site location and context
18.2 Nature of the proposed development

18.2.1 This section describes the construction and operation of the proposed development at Shad Thames Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 18 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

18.2.2 The proposal is to control the existing Shad Thames Pumping Station combined sewer overflow, which currently discharges approximately 15 times in a typical year. It would not be intercepted by the main tunnel, but flows would be indirectly controlled by the works at this site. The total volume discharged is approximately 92,000m$^3$ in a typical year. The existing sewer is shown on Figure 18.1.

18.2.3 The works include modifications to the pumps and internal pipe work, demolition of the existing three storey facilities building behind the existing pumping station, construction of a new electrical switchgear and facilities
building, provision of new pumps, modifications to existing sewers and construction of a new vehicle access to Maguire Street.

18.2.4 The construction phase would last approximately one and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm on Saturday.

18.2.5 Vehicle access to the site during construction would be via Jamaica Road (A200), Shad Thames and Maguire Street as shown on the construction phasing plans for this site (see Section 18 of the Section 48: Book of plans). The suspension of parking in Maguire Street would be required when sewers are modified in Maguire Street, although local access would be maintained.

18.2.6 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

18.2.7 With the proposed modifications in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average volume of approximately 71,300m$^3$, four spill events a year.

18.2.8 A new electrical switchgear and facilities building would be present on site and together with the existing pumping station include all relevant pumping and electrical equipment (see permanent works layout plan in Section 18 of the Section 48: Book of plans). A small diameter ventilation column approximately 9.5m high would be located at the southern end of the new building. The site would not be publicly accessible. There would be no change to the type of operational maintenance involved with the existing pumping station.

18.2.9 A visualisation illustrating how the completed works could be developed is provided in Figure 18.3.
18.3 Environmental effects

18.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

18.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project's website.

Air quality and odour

18.3.3 The assessment has identified that there are no significant construction effects anticipated in respect of air quality or odour. The Code of construction practice contains a series of measures to limit emissions and reduce effects from construction activities, as far as reasonably practicable.

18.3.4 There are no significant operational odour effects as there would be no air released from the Thames Tideway Tunnel project at this site. No significant local air quality effects are anticipated as traffic requirements for the operational site would be low.
Ecology – aquatic

18.3.5 The construction phase has not been assessed for aquatic ecology. This is because significant effects are not anticipated as there would be no in-river construction works associated with this site, which is located 50m inland from the River Thames.

18.3.6 Once operational, there are likely to be minor beneficial effects on fish at Shad Thames due to the interception of the combined sewer overflow. This would lead to a reduction in low dissolved oxygen related fish mortalities, an increase in pollution sensitive fish species and improvement in the quality of foraging habitat. No significant improvement on invertebrates is likely due to the interception of the combined sewer overflow.

Ecology – terrestrial

18.3.7 Habitat at this site comprises buildings and hardstanding which are not considered to have biodiversity value. The introduced shrub is small in extent, easily recreated and of low ecological value due to the low species diversity and extent.

18.3.8 Survey results indicate that levels of bat activity across the site are generally low, although the area is currently used for foraging and commuting by a small number of bats. Black redstart surveys were carried out but no recordings were made.

18.3.9 No significant change in habitat quality and area on site is likely as the habitats to be removed are of negligible value. Survey and data information indicates little ecological activity at this site resulting in negligible effects.

Historic environment

18.3.10 The site lies within the Tower Bridge Conservation Area and within the Borough, Bermondsey and River Archaeological Priority Zone. The Grade II listed Wheat Wharf lies adjacent to the site.

18.3.11 The main potential for the site in terms of buried heritage is palaeoenvironmental remains and remains from the 17th century. There is also moderate potential for prehistoric finds. Construction would entail excavations which would entirely remove the assets within the footprint of each excavation. If such assets were present would compromise a moderate adverse effect on prehistoric structures and a minor adverse effect on palaeoenvironmental, isolated prehistoric and 17th century and later remains. Moderate adverse effects are predicted due to partial demolition and alteration of the street frontage of the unlisted Shad Thames Pumping Station.

18.3.12 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 identified 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. A programme of building recording and dissemination of the results would mitigate the effect on the Pumping Station. The residual effects would be negligible.

18.3.13 Minor adverse effects have been identified on Tower Bridge Conservation Area and Wheat Wharf due to construction activity within their settings. No significant historic environment effects are predicted during operation as the only visible above ground structure would be the replacement building, which would be similar in size and character to the building demolished during construction. This would detract slightly from the historic character and setting of Tower Bridge Conservation Area and Wheat Wharf but would not result in significant adverse effects.

Noise and vibration

18.3.14 Significant adverse daytime noise effects have been identified at Tamarind Court for approximately one month as a result of in-road works and demolition. No significant vibration effects have been identified as a result of construction works. While measures included in the Code of construction practice to reduce effects such as appropriate hoarding heights and screening for static plant, significant adverse effects during construction would remain.

18.3.15 The noise assessment has identified that there are no significant operational noise and vibration effects anticipated from the operation of machinery, maintenance activities and tunnel filling events. This is because predicted noise and vibration levels would be below thresholds that would cause an adverse effect.

Socio-economics

18.3.16 Whilst there are significant noise and visual effects, it is not considered that additional amenity effects would arise due to the short duration of the aforementioned effects.

18.3.17 The operational phase has not been assessed for socio-economics. This is because significant effects are not anticipated as the permanent works would be within the Shad Thames Pumping Station compound and operational activities would not significantly affect the amenity of nearby receptors.

Townscape and visual

18.3.18 The townscape and visual assessment has identified significant adverse effects from construction activity and demolition of buildings. While measures to reduce effects include high quality hoardings, the townscape character of the site would still be adversely affected, as would views from residences in Vanilla and Sesame Court.

18.3.19 No significant townscape and visual effects are predicted during operation as the only visible above ground structure would be the replacement building, which would be similar in size and character to the building demolished during construction.
Transport

18.3.20 There are no significant construction effects anticipated in respect of transport. The Code of construction practice contains a series of measures to reduce transport effects from construction activities, as far as reasonably practicable.

18.3.21 There are unlikely to be any significant effects on transport because vehicle movements would be restricted to occasional maintenance visits during the operational phase and associated disruption to parking and highway operation would be temporary.

Water resources (surface and flood risk)

18.3.22 There are no significant construction effects anticipated in respect of surface water and flood risk. The Code of construction practice includes measures to protect existing watercourses, ensure water flowing from the site would be of an acceptable quality and ensure that flood risk to and from the site would not change.

18.3.23 Once operational, there are likely to be significant beneficial effects on the River Thames. There would be improved water quality in the vicinity of the intercepted Shad Thames Pumping Station combined sewer overflow which discharges into the River Thames, as a result of reduced pollution loading, reduced exposure to pathogens and reduced sewerage derived litter.
19 Chambers Wharf

19.1 Location and context of proposed development

19.1.1 The proposed development site is located on the southern bank of the River Thames in the London Borough of Southwark. It comprises previously developed and substantially cleared land, an area of foreshore and a small area of highway works. The site location and context are shown in Figure 19.1 and Figure 19.2.

19.1.2 It is proposed to use the site as a main tunnel drive and reception site.

19.1.3 The site, which has planning permission for residential redevelopment, is bounded to the north by the River Thames, to the east by Loftie Street, to the west by East Lane and Bermondsey Wall West, and to the south by Chambers Street. Luna House and Axis House are residential blocks of up to eight storeys to the west of the site. On the riverbank to the north of Loftie Street are two three story residential blocks in Fountain Green Square. On the southern side of Chambers Street, there is an area of cleared brownfield land also part of the approved residential redevelopment. Further south is St Michael's Catholic College. A small highway works site is in Bevington Street at the junction with Chambers Street.

19.1.4 Existing access to the site is from Jamaica Road (A200) via Chambers Street. Bermondsey London Underground station lies 0.5km to the south east, on Jamaica Road. London Bridge Station, 1.3km to the west provides national rail and underground services. The Thames Path, a Public Right of Way, runs along Loftie Street and Chambers Street.

19.1.5 The site is within an Air Quality Management Area which covers the northern part of the London Borough of Southwark, declared for nitrogen dioxide and particulate matter. The whole site is within the Borough, Bermondsey and River Archaeological Priority Zone.

19.1.6 The River Thames and its tidal tributaries (including the foreshore at Chambers Wharf) are a site of importance for nature conservation. There are no land based nature conservation designations within the site. No conservation areas or listed buildings are on-site. St Saviour’s Dock and Alfred Salter (Wilson Grove) Conservation Areas are immediately adjacent to the west and to the east of the site, respectively. Four Grade II listed buildings are nearby namely: East Lane Stairs, Bermondsey Wall West, 48 Farncombe Street, and Riverside School.

19.1.7 The main flood risk to the site is from the tidal River Thames. The terrestrial part of the site lies within the high probability flood zone, although it is protected by flood defences.
Figure 19.1 Chambers Wharf – site location and context

Figure 19.2 Chambers Wharf – aerial photograph
19.2 **Nature of the proposed development**

19.2.1 This section describes the construction and operation of the proposed development at Chambers Wharf. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 19 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

19.2.2 The proposal is to use the site as a main tunnel drive site, a main tunnel reception site and a reception site for the Greenwich connection tunnel. There is no combined sewer overflow at this site and therefore no interception.

19.2.3 A cofferdam would be constructed within the foreshore and barges used to transport the fill material required to construct a working platform from which to construct the main tunnel shaft. Barges would moor adjacent to the site and thus allow the excavated material from the main tunnel shaft and main tunnel construction to be transported away from the site by barge. In addition, it is proposed that the aggregates required for secondary lining the tunnel would be transported to the site by barge.

19.2.4 A main tunnel shaft with an internal diameter of approximately 25m and approximately 57m deep would be constructed. Once completed a tunnel boring machine would be lowered into the shaft to drive the main tunnel to Abbey Mills Pumping Station. The same shaft would also receive the tunnel boring machines from both Kirtling Street and Greenwich Pumping Station. The construction phase also includes the demolition of the existing jetty and the construction of a new river wall.

19.2.5 The construction phase would last approximately six years. Most of the surface level construction activity would take place from 8am to 6pm on weekdays and 8am to 1pm on Saturdays. However, some works would be required beyond these hours as set out in the *Code of construction practice*.

19.2.6 Construction of the tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level, and would last approximately three years. An acoustic shed would be erected over the shaft during the tunnelling and secondary lining construction phases.

19.2.7 Vehicle access to the site during construction would be via Jamaica Road (A200), travelling along Bevington Street and turning right into the site from an existing entrance on Chambers Street as shown on the construction phasing plans for this site (see Section 19 of the *Section 48: Book of plans*). Traffic would leave the site via the same route.
19.2.8 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

19.2.9 In addition to the *Code of construction practice* a number of additional steps are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case by building an acoustic shed to cover the main tunnel shaft, the enclosure of conveyors and by providing hoarding of a suitable height to reduce both noise and the visual effects.

**Operation**

19.2.10 Once the works at this site have been built, most of the infrastructure would be below ground. Above ground structures would include three ventilation columns between 4 and 8m in height and an electrical and control kiosk (see permanent works layout plan in Section 19 of the *Section 48: Book of plans*).

19.2.11 An area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be provided. This would be publicly accessible, once the proposed residential development at the site is completed, except during times of maintenance when it would be temporarily fenced off. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Loftie Street.

19.2.12 Landscaping at this site would be undertaken by others as part of the approved planning application for a residential development at Chambers Wharf.

19.2.13 A visualisation illustrating how the completed works could be developed is provided in Figure 19.3.
19.3 **Environmental effects**

19.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

19.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

19.3.3 The site is located within the London Borough of Southwark Air Quality Management Area. The nearest receptors which may be sensitive to the development are at the nearby residential dwellings immediately to the east and west of the site and pupils and staff at St Michael’s Catholic School to the south west and Riverside Primary School to the south.

19.3.4 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, St Michael’s Catholic School and Riverside Primary School and negligible at other premises. In terms of construction dust, this is likely to have a minor adverse effect at the residential properties and St Michael’s School and negligible at other properties, taking account of the dust control measures in the *Code of construction practice*.

19.3.5 The effects of odours released from the ventilation column are likely to be negligible and it mitigation measures are not likely to be required.

**Ecology – aquatic**

19.3.6 The site is located within the brackish zone of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. The river habitat is primarily shingle. Surveys and data searches indicate low diversity of fish and invertebrates present.

19.3.7 With the *Code of construction practice* in place and based on assessment findings it is anticipated that the loss of habitat due to the presence of the temporary construction area in the river at this main drive site to allow for barging would have a moderate adverse effect on habitats and minor adverse effects on fish and invertebrates. The increase in suspended sediment is considered to have a minor adverse effect on fish, due to blanketing of feeding areas. All other effects on mammals, fish and invertebrates are considered negligible.

19.3.8 Modelling results indicate that the presence of temporary structures in the river during construction is unlikely to have an adverse effect on the migration of fish.
19.3.9 There is no combined sewer overflow outfall discharge at this site, and so there are no operational effects on aquatic ecology to consider for the purpose of this site assessment.

Ecology – terrestrial

19.3.10 The site mainly comprises buildings with an area of ephemeral short perennial vegetation, scattered scrub, rubble piles and foreshore. Japanese knotweed, an invasive plant, is also present on site and would be removed prior to construction where required.

19.3.11 Surveys indicate very low levels of bat use of the site and surrounds and this is likely to be due to the very limited extent of vegetation and hence limited foraging habitat for bats. There were no observations from surveys of black redstarts. Wintering birds were recorded foraging and resting on the riverward section of the site. As a result, there would be no adverse effects on these species. No significant effects on designated sites are anticipated (aquatic ecology effects are considered in the section above).

19.3.12 Lighting required during construction at this main drive site would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, is included as a requirement within the Code of construction practice. A brown roof is proposed on the electrical kiosk to promote local biodiversity.

19.3.13 Operational activity would be limited to occasional maintenance work, which is considered unlikely to have significant effects on terrestrial ecology.

Historic environment

19.3.14 The site contains no nationally designated heritage assets. The nearest listed structure to the site is the Grade II listed East Lane Stairs approximately 30m to the west. The site is immediately adjacent to the locally designated St Saviours Dock Conservation Area.

19.3.15 The site comprises foreshore and an area of open ground with a single modern building in the south-western corner. No above ground heritage interest has been identified within the site itself.

19.3.16 The site is within the locally designated Borough, Bermondsey and River Archaeological Priority Zone. Archaeological surveys of the foreshore in the past have revealed prehistoric and post-medieval remains. The main potential in terms of buried heritage is for palaeoenvironmental remains (eg organic remains such as pollens or plant fossils, of low or medium heritage asset significance), prehistoric artefacts (of low heritage asset significance), and remains of post-medieval buildings and riverfront industry (of low or medium heritage asset significance). Prehistoric structures, of high heritage asset significance, might also be present.

19.3.17 Construction works would entail deep excavations which would remove any archaeological assets within the footprint of each area of excavation. If any are present, this would give rise to major adverse effects on
prehistoric occupation and associated palaeoenvironmental data, on Roman remains and on Medieval remains.

19.3.18 The desk-based study of the site suggests that no 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. The resulting residual effects would be negligible.

19.3.19 While effects on the historic setting of Tower Bridge and Tower Bridge Conservation Area and also St. Saviours Dock Conservation Area during construction would be minor adverse, once operational, there would be minor improvements on the setting due to the removal of the wharf and redundant buildings.

Land quality

19.3.20 A search of historical and environmental data indicates one potentially contaminative on site use to be the previous wharf usage. Historically industrial activities have been undertaken in close proximity to the site and other surrounding areas. This includes a dock immediately east of the site boundary, a medicine factory to the south and a flour mill to the west. A former vehicle repair garage is also understood to have recently operated on the south side of Chambers Road.

19.3.21 It is considered unlikely that the activities in the surrounding area have significantly affected the soils in the location of the site. However, contamination from the docks located adjacent to the site may have impacted the soils beneath the site. Ground investigations show the presence of some soil and groundwater contamination. Part of the ongoing ground investigations includes further assessment of foreshore sediment contamination. Desk-based studies have identified a low/medium risk from unexploded ordnance on the cleared site and high risk on the foreshore.

19.3.22 Initial surveys of the site identified a small amount of asbestos amongst a pile of existing waste material left by the previous site occupants. All of this material would be removed using appropriately consented procedures during 2012.

19.3.23 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.
19.3.24 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.

**Noise and vibration**

19.3.25 The current noise conditions are dominated by road traffic noise. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings located to the east and west of the site.

19.3.26 Significant noise effects arising from construction activities are predicted at residential properties at Luna House and Axis Court. No significant effects from vibration (during construction) or during the operation of the site are predicted.

19.3.27 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.

**Socio-economics**

19.3.28 Residential dwellings and community uses, including three schools, and a semi-private open space are located in the vicinity of the site. The Thames Path and a national cycle route run to the south of the site and are moderately well used in this location.

19.3.29 During construction, there are likely to be adverse effects on the amenity of nearby residents, and minor adverse effects on the amenity of pupils and teachers at local schools and users of the small area of open space. Amenity impacts on users of the Thames Path and national cycle route are considered to have negligible effects. There are no socio-economic effects anticipated as a result of the operation of the Chambers Wharf site.

**Townscape and visual**

19.3.30 The site sits partially within the river corridor and a post-industrial plot in a poor condition including a piled deck over the river. The site is partially located within a protected London Panorama from Greenwich Park.

19.3.31 During construction the scale, intensity and duration of site activity, which includes an acoustic enclosure to attenuate noise, on this exposed river front location would have a moderate adverse effect on townscape character areas including the River Thames – Wapping Reach, Wapping Pierhead Conservation Area, Bermondsey Wall East residential and St. Saviours Dock Conservation Area. There would be minor adverse or negligible effects elsewhere in the assessment area. Once operational, due to the clearance of derelict structures, there would be minor beneficial townscape effects including the site, River Thames – East London Reach, Hermitage Wall Residential, Bermondsey Wall East Residential and St Saviour’s Dock Conservation Area.

19.3.32 In terms of visual amenity, while there would be high quality hoarding to screen views into the site during the construction, at a limited number of viewpoints, major adverse effects would remain at viewpoints from Fountain Green Square, Chambers Street, Flockton Street and from newly
built residences on Chambers Street. These effects are due to the scale and prominence of the construction works including visibility at night of the construction site. The assessment also indicates there would be a moderate adverse effect on residential viewpoints including from St. Katherine’s Way, Wapping High Street and Llewellyn Street due to the visibility of hoardings and heavy goods vehicles. Once operational, due to the removal of derelict structures, there would be minor beneficial visual effects on viewpoints including from St. Katherine’s Way, Wapping High Street and Fountain Green Square. There would be negligible effects on the London Panorama from Greenwich Park during both construction and operation.

Transport

19.3.33 The Chambers Wharf site has good public transport accessibility being located within close proximity of Greenwich Docklands Light Rail station and Bermondsey Underground station. The site is located on Chambers Street which is accessed from Bevington Street which connects to Jamaica Road (A200). During construction, vehicles would enter and egress onto Chambers Street in a right in, left out arrangement.

19.3.34 During construction, barges would be used to remove the main tunnel and shaft excavated material and bring aggregates to the site, the number of heavy goods vehicle movements would be moderate. 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. The effects on pedestrian facilities are expected to be minor adverse (due to the loss of footway and local diversions resulting in delays to journey time) and cyclist amenity and safety are expected to be minor adverse. A negligible effect is expected on public transport and minor adverse effect on river operators and 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.

19.3.35 The project has been 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 include signal optimisation to improve pedestrian crossing time and junction capacity. Mitigation is not required for the operational phase.

Water resources –groundwater

19.3.36 The proposed tunnel drive and reception shaft would pass through both the upper and lower aquifers. The main receptors are the upper aquifer which is defined as being of medium value, the lower aquifer, which is defined as being of high value and abstractions from the lower aquifer, defined as being of very high value.

19.3.37 Construction effects on the upper aquifer would include physical obstruction to groundwater flow and potential opening of a pathway for pollution; these effects are anticipated to be negligible. Construction effects on the lower aquifer relate to dewatering and contamination. Dewatering would impact groundwater resources and could induce
groundwater movement although this would be minimized by the use of a technique known as internal dewatering (where water is pumped from within the shaft as it is formed). Due to the sensitivity of the lower aquifer dewatering effects have been assessed as adverse on both groundwater resources and quality.

19.3.38 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 in terms of the upper aquifer and minor adverse for the lower aquifer.

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

Water resources – surface water

19.3.40 The site is located partially in the River Thames foreshore within the Thames Middle waterbody, as classified under the Thames River Basin Management Plan. The Thames Middle waterbody is currently classified as being at moderate potential status, with a status objective of good potential by 2027. There are no internationally designated water conservation sites within 2 kilometres of the site.

19.3.41 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.

19.3.42 There is also potential for the loss in river bed from the construction to change the river flows, which could lead to temporary scour around the temporary cofferdam. Natural foreshore restoration is anticipated to occur once the coffer dam is removed.

Flood risk

19.3.43 The main source of flood risk to the site is the tidal River Thames and the site is located within the ‘high probability’ flood zone, although the terrestrial part is protected by flood defences which run along the northern extent of the site, landward of the existing piled decking jetty.

19.3.44 In order to protect the site from flooding, defence levels would be maintained during both the construction and operational phases. These new defences would provide a level of protection equal to that provided by the current defences and would tie into the existing defence structures. No changes are proposed to the percentage of hard standing on the site.
20 Earl Pumping Station

20.1 Location and context of proposed development

20.1.1 The proposed development site is located in the London Borough of Lewisham. It is also close to the London Borough of Southwark boundary to the north and west. It comprises the Thames Water Earl Pumping Station and adjacent industrial land. The site location and context are shown in Figure 20.1 and Figure 20.2.

20.1.2 It is proposed to use the site as a combined sewer overflow interception site.

20.1.3 The site is bounded to the north by Chilton Grove, to the east by Yeoman Street and to the west by Croft Street. Occupied commercial/industrial units and a row of two-storey terraced houses with gardens are adjacent to the southern site boundary. Immediately west of the site on Croft Street is a five storey block of flats and a large industrial unit.

20.1.4 Existing access to the site is from Chiltern Street to the north, Yeoman Street to the east, via Plough Way and Lower Road (A200), and Croft Street to the west. Surrey Quays Underground Station is approximately 500m to the northwest.

20.1.5 The site is within the Lewisham Air Quality Management Area declared for nitrogen dioxide and particulate matter. It is within the northwest edge of the Deptford - Strand, Sayes Court and the Royal Naval Dockyard Area of Archaeological Priority. There are no areas designated for nature conservation on or close to the site. There are no conservation areas or listed structures on or adjacent to the site.

20.1.6 The main flood risk to the site is from the tidal River Thames which is located approximately 600m from the site. The site lies within the high probability flood zone, although it is protected by flood defences.
Figure 20.1 Earl Pumping Station – site location and context

Figure 20.2 Earl Pumping Station – aerial photograph
20.2 **Nature of proposed development**

20.2.1 This section describes the construction and operation of the proposed development at Earl Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 20 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

20.2.2 The proposal is to intercept the existing Earl Pumping Station combined sewer overflow, which currently discharges approximately 26 times a year. The total volume discharged is approximately 539,000m$^3$ in a typical year. The existing sewer is shown on Figure 21.1.

20.2.3 A drop shaft with an internal diameter of approximately 17m and approximately 51m deep would be constructed. Once constructed, the base of this shaft would join up with the long connection tunnel from Greenwich Pumping Station to Chambers Wharf. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.

20.2.4 The construction phase would last approximately four years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm on Saturday. However, some works would be required beyond these hours through extended standard working hours, as set out in the *Code of construction practice*.

20.2.5 Vehicle access to the site during construction would be via a new access on Yeoman Street as shown on the construction phasing plans for this site (see Section 20 of the *Section 48: Book of plans*). Traffic leaving the site would leave via a new access on Croft Street. This one-way system would increase safety within the site by reducing the need for construction vehicles to manoeuvre within the site and would also increase safety on neighbouring roads.

20.2.6 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

20.2.7 Once the Thames Tideway Tunnel project is operational, in a typical year flows from the combined sewer overflow would reduce to an average of approximately 50,500m$^3$. 
20.2.8 A number of permanent structures would be present on site including a shaft building which would extend approximately 3m above ground level with access covers on top of the structure. This would be located in the southwest of the site (see permanent works layout plan in Section 20 of the Section 48: Book of plans). A valve chamber, also extending approximately 3m high, would be located to the west of the existing pumping station buildings. The valve chamber incorporates the main ventilation column. Electrical and control equipment would be housed within the existing pumping station. A small diameter ventilation column, between 4m and 8m high, would be located to the west of the existing pumping station building. A ventilation structure approximately 4m and 6m high would be sited above the shaft.

20.2.9 An area of hardstanding to enable access to the shaft and tunnel for inspection and maintenance purposes would be constructed. The site would not be publicly accessible. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Croft Street.

20.2.10 A brown roof is proposed on the shaft building to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation by plants of value to insects and birds, would be promoted.

20.2.11 A visualisation illustrating how the completed works could be developed is provided in Figure 20.3.

**Figure 20.3 Earl Pumping Station – illustrative visualisation**
20.3 Environmental effects

20.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

20.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

20.3.3 The site is located within one of the London Borough of Lewisham’s Air Quality Management Areas and adjacent to the London Borough of Greenwich’s Air Quality Management Area. The nearest receptors which may be sensitive to the development are occupiers of nearby residential dwellings on Chilton Grove and Croft Street as well as the future occupiers of the planned new Cannon Wharf development. There are also commercial and industrial premises adjacent to the site.

20.3.4 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 on Yeoman St and commercial properties on Plough Way and Lower Road and negligible at other premises. Taking account of the dust control measures in the Code of construction practice there are likely to be minor adverse effects arising from construction dust at residential properties on Chilton Grove, Croft St and commercial premises on Yeoman St.

20.3.5 The effects of odours released from the ventilation structure are likely to be negligible.

20.3.6 It is considered that mitigation measures are not required.

Ecology – aquatic

20.3.7 The sewage outfall that would be intercepted currently discharges into the brackish zone of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. Greenland Dock Site of Borough Importance lies within 200m of the Pumping Station site. Data indicates a reasonably high diversity of fish species, but invertebrate diversity is limited.

20.3.8 There would be no in river works associated with this site. No further consideration of the impacts associated with construction has therefore been undertaken for aquatic ecology.

20.3.9 During operation, the reduction in fish mortality that would result from improved oxygenation of the water is considered to be a moderate beneficial effect. Effects on invertebrate diversity and abundance and the increase in the distribution of pollution sensitive invertebrate species would be minor beneficial over time. An increase in pollution sensitive fish
species is considered to be a moderate beneficial effect in the longer term of operation. Effects on habitats and mammals would be negligible.

20.3.10 No mitigation is required at this site because only beneficial effects are anticipated.

Ecology – terrestrial

20.3.11 The majority of the site is hardstanding and buildings with scattered trees and scrub. The site is of value for common nesting bird species and has limited potential for black redstart. Japanese knotweed, an invasive plant, is present on site and would be removed prior to construction. There are three Sites of Importance for Nature Conservation within 500m of the site.

20.3.12 No significant effects are anticipated on designated sites due to the distance and isolation of these sites from Earl Pumping Station (aquatic ecology effects are considered in the section above). Site clearance would result in the loss of a small area of scrub vegetation, which would also result in a limited loss of bird nesting and foraging resource. However, given that there would be replacement habitat once construction works had been completed, no change in the population of breeding birds which may forage and nest in the site is likely.

20.3.13 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

20.3.14 It is anticipated that operational activity would be limited to occasional maintenance work, which is considered unlikely to have significant effects on terrestrial ecology. Brown roofs are proposed on the shaft and valve chamber which would promote local biodiversity.

Historic environment

20.3.15 Neither the site nor immediate vicinity contain any nationally designated heritage assets. The site comprises industrial land, partially occupied by the 1940s Thames Water Earl Pumping Station. No assets with heritage significance have been identified. The site lies within a locally designated Archaeological Priority Area and the main archaeological potential for the site is for buried 19th-century footings of former houses, factory buildings and/or associated yards (which if present would be of low heritage asset significance). The underlying alluvium has moderate potential for palaeoenvironmental remains, eg organic remains, such as pollen or plant fossils, which if present would be of low to medium heritage asset significance, and an uncertain, probably low potential, for evidence of prehistoric activity (which if present would be of high heritage asset significance).

20.3.16 Construction works would entail deep excavations which would entirely remove any archaeological assets within the footprint of each area of excavation. If such assets were present, this would comprise a high magnitude of impact which would give rise to a minor adverse effect for surviving 19th century remains and palaeoenvironmental remains, and a
major adverse effect for any finds related to prehistoric activity or settlement, if present, without a suitable mitigation strategy in place. No effects are predicted on the Pumping Station building.

20.3.17 The desk-based study of the site suggests that no heritage assets of any 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. The resulting residual effects would be negligible.

20.3.18 No effects on the historic environment arising from the operation of the Thames Tideway Tunnel project infrastructure at Earl Pumping Station are predicted.

20.3.19 There are no above ground heritage assets within the assessment area whose settings would be significantly adversely affected. Both construction and operational effects for the historic character and setting of above ground heritage assets for this site have therefore been scoped out of the assessment.

Land quality

20.3.20 A search of historical and environmental data indicates that the northern part of the site was first developed with housing and the southern area was shown to be occupied by part of a large tar works which extended to the south. Several potential contamination sources have been identified historically both within the site and in the vicinity of the site. This included industrial operations such as timber works and tar works. Previous ground investigations of a site approximately 80m to the east recorded contamination of groundwater and recent ground investigations have revealed some hydrocarbon pollution of the sands and gravels. Desk-based studies have identified a low/medium risk from unexploded ordnance.

20.3.21 Based on assessment findings, there may be a slight adverse effect on construction workers due to the potential for exposure to contaminated soils or other materials, 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. An approach to risk assessment and remediation is included within the Code of construction practice. The assessment has therefore identified no need for mitigation during the construction phase.

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

Noise and vibration

20.3.23 The noise environment is dominated by road traffic noise and noise from the industrial units. The nearest locations to the site which are sensitive to
20 Earl Pumping Station

noise and vibration are residences to the north, west and south and industrial units to the east.

20.3.24 Significant noise effects arising from construction activities are predicted at residential properties on Yeoman Street, Chilton Grove, Croft Street and at commercial premises on Yeoman Street. Significant vibration effects arising from construction activities are predicted at residential properties on Chilton Grove and Croft Street. No significant effects as a result of the operation of the site are predicted.

20.3.25 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 on the local community for example through suitable siting of equipment on site.

Socio-economics

20.3.26 The site comprises Thames Water’s operational land and land currently occupied by three industrial/warehousing businesses. Residential dwellings and other industrial/warehousing premises surround the site. It is estimated that the business space within the site accommodates work space for up to 24 employees.

20.3.27 During construction, there are considered to be moderate adverse effects on amenity of nearby residents and minor adverse effects in relation to the displacement of businesses on site. There are no anticipated operational effects as a result of the works at Earl Pumping Station.

Townscape and visual

20.3.28 The site comprises pumping station buildings, warehouses, hardstanding and five mature London plane trees, and is generally in a fair condition. The surrounding townscape is a mix of industrial premises and 20th / 21st century residential properties.

20.3.29 During construction due to site activity and hoardings there are likely to be moderate adverse effects on the site and Rotherhithe Mixed Residential and Cannon Wharf Business Area. Once operational, there would be minor beneficial due to the removal of industrial buildings, well-designed above ground structures and improved boundary treatment.

20.3.30 In terms of visual amenity, during construction there are likely to be moderate adverse effects on viewpoints to the north and south of the site and minor adverse effects on viewpoints from residences surrounding the site due to the visibility of construction activity. Once operational, there would be minor beneficial visual effects due to the visibility of new structures and high quality boundary treatments.

Transport

20.3.31 The site has moderate public transport accessibility. Public transport within the vicinity of the site includes the River Bus from Greenland Pier, bus services and London Overground and Underground station from Surrey Quays and from Canada Water. Vehicle access is proposed along Plough Way (B206) onto Yeoman Street. The site would have two
vehicular access points, with entry from Yeoman Street and exit onto Croft Street.

20.3.32 During construction, the number of heavy goods vehicle movements would be comparatively low. Due to the location of the construction site and the need to make modifications to the highway layout, vehicle activity is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian and cyclist amenity and safety are expected to be minor adverse. A negligible effect is expected on public transport 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.

20.3.33 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 may be required and may take the form of traffic signal optimisation at local junctions to improve pedestrian crossing times and junction capacity. Mitigation is not required for the operational phase.

**Water resources – groundwater**

20.3.34 The proposed shaft would pass through the upper 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 of high value.

20.3.35 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and this is anticipated to be negligible. Construction effects on the lower aquifer would relate to dewatering which could impact groundwater resources and induce groundwater movement. Internal dewatering (pumped from within the shaft) is proposed to reduce the impacts on groundwater levels in adjacent areas.

20.3.36 Once operational the potential effects would be obstruction to groundwater flow and seepage to and from the shaft. Embedded design measures, such as secondary lining would ensure that these effects are negligible.

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

**Water resources – surface water**

20.3.38 The site is located within Thames Water’s Earl Pumping Station and lies 200 metres southwest from the River Thames and the Surrey Commercial Docks.

20.3.39 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. This is currently classified under the Water Framework Directive as being at moderate potential status, with a status objective of good potential by 2027. The Lavender Pond Local Nature Reserve is located within 2 kilometres of the site and is water dependent.
20.3.40 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.

20.3.41 Once operational, the scheme would reduce the number of discharges from the Earl Pumping Station combined sewer overflow to a predicted level of four spills per year once the tunnel is in place.

20.3.42 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 104 days of risk of exposure per year. In addition, the tonnage of sewage derived litter can be expected to be reduced from approximately 137 tonnes to 16 tonnes per year.

Flood risk

20.3.43 The main source of flood risk to the site is the tidal River Thames and the site is located within the 'high probability' flood zone, although it is protected by flood defences which run along the river bank.

20.3.44 The site may be at risk of localised surface water ponding during extreme rainfall events. However no changes are proposed to the percentage of hard standing on the site and this area would continue to be served by the local drainage system.

20.3.45 Though not in the immediate vicinity of the site, the route of the Greenwich Pumping Station connection tunnel passes beneath the Thames tidal flood defences approximately 600m to the east of the site. The work required to construct the tunnel could affect the local flood defences.
21 Deptford Church Street

21.1 Location and context of proposed development

21.1.1 The proposed development site is located within the London Borough of Lewisham and is also close to the London Borough of Greenwich. The site comprises an area of public open space with a number of trees. The proposed development also includes four small highway works sites on Deptford Church Street (two to the north and two to the south of the main site) for bus stop relocations. The site location and context are shown in Figure 21.1 and Figure 21.2.

21.1.2 It is proposed to use the site as a combined sewer overflow interception site.

21.1.3 The site is bounded by the Grade I listed St Paul’s Church to the north, and by Deptford Church Street to the east, beyond which is the Sue Godfrey Nature Reserve, and residential properties. St Joseph’s Roman Catholic Primary School is located to the southwest of the site.

21.1.4 Existing access to the site is from Coffey Street and Crossfield Street. There are no Underground stations located in the vicinity. Deptford Bridge and Deptford railway stations are approximately 600m to the south and 200m to the west, respectively.

21.1.5 The site is within the Lewisham Air Quality Management Area, declared for particulate matter and nitrogen dioxide. The site is in the St Paul’s Churchyard and Crossfield Open Space Site of Nature Conservation Importance, and also the Lewisham Area of Archaeological Priority. The site lies within the St Paul’s Conservation Area and is adjacent to the Deptford High Street Conservation Area to the west. A Grade II listed mid 19th-century London to Greenwich Railway viaduct is located to the southeast of the site.

21.1.6 Other listed structures close to the site include the Grade II listed walls of the Grade I listed St Paul’s Church churchyard, to the north of the site, and the Grade II listed walls of the former graveyard belonging to the Old Baptist Chapel.

21.1.7 The main flood risk to the site is from the tidal River Thames and Deptford Creek which are located approximately 650m and 300m from the site respectively. The site lies within the ‘low probability’ and ‘medium probability’ flood zones, although it is protected by flood defences which run along the river banks.
Figure 21.1 Deptford Church Street – site location and context

Figure 21.2 Deptford Church Street – aerial photograph
21.2 Nature of the proposed development

21.2.1 This section describes the construction and operation of the proposed development at Deptford Church Street. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 21 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

21.2.2 The proposal is to intercept the existing Deptford Storm Relief combined sewer overflow, which currently discharges approximately 36 times in a typical year. The total volume discharged is approximately 1,471,500 m$^3$ in a typical year. The existing sewer is shown on Figure 22.1.

21.2.3 A drop shaft with an internal diameter of approximately 17 m and approximately 48 metres deep would be constructed. Once constructed, the base of the shaft would join up with the long connection tunnel from Greenwich Pumping Station. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.

21.2.4 The construction phase would last approximately three and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm Saturday. However, some works would be required beyond these standard working hours as set out in the Code of construction practice. This includes extended working hours during major concrete pours.

21.2.5 Vehicle access during construction would be via a temporary access on Crossfield Street, exiting via a temporary egress on Coffey Street as shown on the construction phasing plans for this site (see Section 21 of the Section 48: Book of plans). The one way system ensures safety on site, reducing the need for vehicles to turn within the site. The controlled access for vehicles entering and leaving the site is also safe for pedestrians and vehicles on surrounding roads and footpaths.

21.2.6 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

21.2.7 In addition to the Code of construction practice a number of additional steps are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case the use of high quality hoarding to screen the site.
Operation

21.2.8 With the Thames Tideway Tunnel project in place and operational, in a
typical year, this would reduce flows from the combined sewer overflow to
an average volume of approximately 161,300m³, four spill events a year.

21.2.9 Four ventilation columns, between 4m and 8m high, would be sited within
the open space close to the boundary with Crossfield Street. Another
small diameter column would be on the northeastern corner of the open
space, on the footpath fronting Deptford Church Street (see permanent
works layout plan in Section 21 of the Section 48: Book of plans). This
column would be approximately 6m high. A kiosk, housing electrical
control panels and electrical equipment would be located along the
eastern boundary of the open space fronting Deptford Church Street.

21.2.10 An area of hardstanding would be constructed to enable access into the
shaft and tunnel for inspection and maintenance purposes. This would be
publicly accessible, except during times of maintenance when it would be
temporarily fenced off. Access for maintenance would be required every
two to six months. Once every ten years more substantial maintenance
work would be required and access would be via Coffey Street.

21.2.11 A brown roof is proposed on the kiosk structure. A brown roof is
specifically designed to promote local biodiversity through covering the
roofs of buildings with particular materials. This often comprises rubble
and gravels, which are low in nutrients and promote natural colonisation of
brown field plant species, which are of particular value to insects and
birds.

21.2.12 A visualisation illustrating how the completed works could be developed is
provided in Figure 21.3.
21.3 **Environmental effects**

21.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

21.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

21.3.3 The Deptford Church Street site is located within one of the London Borough of Lewisham Air Quality Management Areas. Local monitoring data indicates that there are currently exceedences of the air quality standards in the vicinity of the site. The nearest receptors which might be sensitive to the development are occupiers of nearby residential dwellings to the east of the site (between Deptford Church Street and Bronze Street) and nearby office and commercial properties to the south and west of the site. Additionally there are the pupils and staff at St Joseph’s Catholic Primary School and users of the nearby playground, leisure centre, library and St Paul’s Church.
21.3.4 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 and school, and negligible at the church, commercial/office premises, playground and leisure centre. In terms of construction dust, this is likely to have a negligible effect at all locations, taking account of the dust control measures in the *Code of construction practice*.

21.3.5 The effects of odours released from the ventilation structure are likely to be negligible.

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

**Ecology – aquatic**

21.3.7 The sewage outfall that would be intercepted currently discharges into the River Thames and Tidal Tributaries Site of Metropolitan Importance. The river habitat at the discharge point west of Borthwick Wharf is an area of gravel foreshore, underlain by cobbles and pebbles with some boulders and sand. Data indicates a reasonably high diversity of fish species, but invertebrate diversity is limited.

21.3.8 There would be no in river works associated with this site. No further consideration of the impacts associated with construction has therefore been undertaken for aquatic ecology.

21.3.9 During operation, the reduction in fish mortality that would result from improved oxygenation of the water in the vicinity of the site is considered a moderate beneficial effect. There is also considered to be a moderate beneficial effect through increased distribution of rare and/or pollution sensitive fish species in the longer term of operation. Increased invertebrate diversity, abundance and presence of rare and pollution sensitive species is considered to have minor beneficial effects in the longer term of operation. Effects on mammals would be negligible.

21.3.10 No mitigation is required at this site because only beneficial effects are anticipated.

**Ecology – terrestrial**

21.3.11 The site lies within the St Paul’s Churchyard and Crossfield Street Open Space Site of Importance for Nature Conservation. Amenity grassland, scattered trees and scrub are present on site.

21.3.12 Surveys undertaken recorded two species of bats, namely common pipistrelle and soprano pipistrelle. Both species were recorded in small numbers. There is no evidence of common pipistrelle or soprano pipistrelle to be roosting within the survey area, or close to it.

21.3.13 Site clearance would result in the loss of a small area of habitat. This would be reinstated once construction works had been completed resulting in a negligible effect on habitat. No change in populations of bats or of breeding birds which may utilise the site are likely as a result of temporary displacement of foraging habitat from the site to the
surrounding area. Habitat on site would be reinstated resulting in a negligible effect on these species.

21.3.14 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

21.3.15 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 kiosk which would promote local biodiversity.

**Historic environment**

21.3.16 The site consists of a plot of open space which is currently unoccupied apart from an early–mid 19th century boundary wall (of low heritage asset significance), which runs through the eastern part of the site. The site contains no nationally designated heritage assets. The Grade I listed Church of St. Paul (of high heritage asset significance) lies to the north of the site. The churchyard walls are Grade II listed (of high heritage asset significance). There is no evidence to suggest that the burial ground ever extended into the site. A Grade II listed Railway Viaduct is located approximately 15m to the south. The site is located within the locally designated St. Paul’s Conservation Area (of high heritage asset significance).

21.3.17 The site lies within the Upper Deptford Archaeological Priority Area and the main potential in terms of buried heritage is for post-medieval 18th, 19th and early 20th century house footings, of low heritage asset significance. The site has generally low potential for prehistoric, Roman and medieval remains, as it lay outside the main areas of settlement in these periods.

21.3.18 The 19th century brick wall within the site would be removed during construction, resulting in a minor adverse effect. Construction works would entail deep excavations which would entirely remove the assets within the footprint of each area of construction. If any such assets were found to be present then this would comprise a high magnitude of impact and would lead to a minor adverse effect on post-medieval remains.

21.3.19 To mitigate the effect on the wall, the structure would be recorded in line with accepted standards to form preservation by record. The residual effect would be negligible. 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. Any 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. This mitigation would reduce the residual effect to negligible.
21.3.20 In terms of setting, there would be a moderate adverse effect on the setting of St. Paul’s Church Conservation area, including the Church. Due to the highly visible nature of the construction works, no mitigation is possible. Once operational, this would become a moderate beneficial effect as a quality design would positively enhance this area of open space and hence of setting of the Church and character of the conservation area.

Land quality

21.3.21 A search of historical and environmental data indicates no contaminative on site uses. The site was previously occupied by housing which was cleared during the 1970s. Historically the surrounding area has been developed for a number of industrial/commercial properties, notably towards the east and south of the site. There is also a borough depot and railway line located less than 15m south of the site. Desk-based studies have identified a low/medium risk from unexploded ordnance.

21.3.22 Based on 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

21.3.23 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.

Noise and vibration

21.3.24 The site is characterised by road traffic and rail noise. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings at Congers House and Farrer House, St Joseph’s Primary School to the south and St Paul’s Church to the north.

21.3.25 Significant noise effects arising from construction activities are predicted at St Paul’s church, however, no significant vibration effects are predicted at any of the areas considered in the construction assessment. No significant effects as a result of the operation of the site are predicted.

21.3.26 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.

Socio-economics

21.3.27 The site comprises the entire Crossfield Street open space. Residential dwellings, commercial properties, other open spaces and community facilities, including St Paul’s Church and St Joseph’s Primary School
surround the site. The Crossfield Street open space is lightly used for walking and passive recreation. The adjacent open spaces are moderately used.

21.3.28 During construction, there are considered to be moderate adverse effects on nearby residents, pupils at St Joseph’s Primary School and users of St Paul’s Church and Sue Godfrey Nature Park. The loss of Crossfield Street open space and amenity impacts on its users are considered to result in negligible effects. There are not anticipated to be any operational socio-economic effects resulting from the use of the site.

**Townscape and visual**

21.3.29 The site is located within the St. Paul’s Conservation Area and comprises a triangle of open space adjacent to the Grade I listed Church of St. Paul, surrounded by roads. The open space is characterised by amenity grassland and scattered mature trees in a fair condition. The surrounding townscape is dominated by a mix of industrial, residential and small scale commercial premises.

21.3.30 During the construction phase there would be a high quality planted hoarding to help screen views into the site, however, due to the clearance of trees and the scale and intensity of construction activity there would be a major adverse townscape effect on townscape character areas at the site and St. Paul’s Conservation Area. There would be minor adverse townscape effects on Creek Road Residential and Laban Centre and Bronze Street Open Space, Creekside Residential and Deptford. Subject to agreement with local stakeholders, advanced planting would provide screening around the site and also contribute towards local biodiversity. Once operational, there would be minor beneficial townscape effects on the site and St. Paul’s Conservation Area due to the introduction of high quality public realm.

21.3.31 In terms of visual amenity, due to the visibility of construction works, there are likely to be major adverse effects on viewpoints including views from Berthon Street at the junction with Deptford Church Street, Deptford High Street close to Diamond Way and views from the steps of St. Paul’s Church due to the visibility of the construction works. There would be moderate adverse effects on viewpoints including from Deptford Church Street, south of the railway and Bronze Street. Minor adverse visual effects are likely elsewhere including the view from Ferranti Park. Once operational there would be minor beneficial effects due to high quality landscaping.

**Transport**

21.3.32 The Deptford Church Street site has moderate public transport accessibility and is within close proximity to Deptford National Rail station and Deptford Bridge DLR station. Vehicle access is proposed from Crossfield Street, with egress onto Coffey Street.

21.3.33 During construction, the number of heavy goods vehicle movements would be moderate. Due to the location and nature of the construction site it is considered likely to result in a moderate adverse effect on road network
operation and delay due to the necessary diversion routes, highway layout changes and delays to journey time. Effects on pedestrian facilities are expected to be moderate adverse as a result of the loss of footways, and minor adverse effects on cyclists due to modifications to traffic lanes and local diversions. A minor adverse effect is also expected on the bus network within the area as a consequence of the effects on the highway network. A negligible effect is expected on rail and river 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.

21.3.34 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 take the form of safe crossing points for pedestrians and cyclists on the diversion routes, junction signal optimisation and measures to ensure the frequency of bus services. Mitigation is not required for the operational phase.

Water resources – groundwater

21.3.35 The shaft would pass through the upper aquifer and into the lower aquifer. Associated interception infrastructure would penetrate the upper aquifer. Both the upper and lower aquifers are sensitive environmental receptors. The lower aquifer is of high value and the nearby Thames Water Utilities public water abstractions from it of very high value, while the upper aquifer is considered to be of medium value.

21.3.36 Construction effects on the upper aquifer would be the physical obstruction of groundwater, which is anticipated to be negligible. Dewatering would impact groundwater resources and could induce groundwater movement although this would be minimized by the use of a technique known as internal dewatering (where water is pumped from within the shaft as it is formed). Due to the sensitivity of the lower aquifer dewatering effects have been assessed as adverse on both groundwater resources and groundwater quality.

21.3.37 At the operational phase, the main potential effects are the 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.

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

Water resources – surface water

21.3.39 The site is located a kilometre south of the River Thames and 300 metres west of Deptford Creek. The section of the River Thames closest to the site lies within a zone of the river defined by the Environment Agency as Thames Middle waterbody, which is current classified under the Water Framework Directive as being at moderate potential status, with a status objective of good potential by 2027. Deptford Creek is not assessed under the Water Framework Directive however, as it forms part of the Thames Middle, which has a target status of Good by 2027, the Deptford
Creek should also be assumed to have a target status of Good. There are no nationally or locally designated water-dependent conservation sites within 2 kilometres of the site.

21.3.40 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 not significant. No mitigation would therefore be required.

21.3.41 Once operational, the scheme would reduce the number of discharges from the Deptford Storm Relief combined sewer overflow to a predicted level of four spills per year.

21.3.42 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 128 days per year. In addition, the tonnage of sewage derived litter can be expected to be reduced from approximately 370 tonnes to 30 tonnes per year.

**Flood risk**

21.3.43 The main source of flood risk to the site is the tidal River Thames. The site lies within the ‘low probability’ and ‘medium probability’ flood zones, although it is protected by flood defences which run along the river banks.

21.3.44 The site may also be at risk of localised surface water flooding due to runoff generated by land surrounding the site.

21.3.45 The site is currently has no formal surface water drainage system. The potential increase in surface water runoff due to the proposed addition of hard standing areas on site would be attenuated in accordance with current planning policy requirements including the Mayor’s Essential Standard.
22 Greenwich Pumping Station

22.1 Location and context of proposed development

22.1.1 The proposed development site lies on the western boundary of the London Borough of Greenwich and is close to the London Borough of Lewisham to the west. The site comprises the existing Greenwich Pumping Station Thames Water site and Phoenix/Harts Wharf to the north. The site location and context are shown in Figure 3.1 and Figure 22.2.

22.1.2 It is proposed to use the site as a combined sewer overflow interception and connection tunnel drive site.

22.1.3 The site is bounded to the north by a vehicle repair garage and offices. Norman Road forms the eastern boundary, with Norman House forming the southeast boundary. To the east of Norman Road is the disused Greenwich Industrial Estate (for which a mixed use development has planning permission). To the south of the site is Greenwich High Road, with residential properties. Immediately to the southwest of the site lies the 40 Greenwich High Road development. The site is bounded to the west by Deptford Creek.

22.1.4 Existing access to the site is from Norman Road (B208), and to the south, Greenwich High Road (A206). Greenwich railway station is approximately 300m to the northeast. The cycleway which passes through the site is a permissive path.

22.1.5 The site is within the Greenwich Air Quality Management Area declared for nitrogen dioxide. There are no areas designated for nature conservation within the site. The site contains three Grade II listed buildings associated with the Deptford Sewage Pumping Station (the original name for the Greenwich Pumping Station). The railway viaduct running from the platform of Greenwich Railway Station to Deptford Creek is Grade II listed as is the railway viaduct which continues west from Deptford Creek. The site also lies within an Archaeological Priority Area, and Ashburnham Triangle conservation area lies to the south of Greenwich High Road.

22.1.6 Deptford Creek at the western boundary of the site is part of the River Thames and tidal tributaries Site of Importance for Nature Conservation. There are also three Local Nature Reserves in the vicinity of the site; the Sue Godfrey Nature Park, Brookmill Road and Mudchute Park Farm.

22.1.7 The main flood risk to the site is from the tidal River Thames and Deptford Creek which is located adjacent to the site. The site lies within the 'high probability' flood zone, although it is protected by flood defences.
Figure 22.1 Greenwich Pumping Station – site location and context

Figure 22.2 Greenwich Pumping Station – aerial photograph
22.2 **Nature of proposed development**

22.2.1 This section describes the construction and operation of the proposed development at Greenwich Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 22 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

22.2.2 The proposal is to intercept the existing Greenwich Pumping Station combined sewer overflow, which currently discharges approximately 51 times a year. The total volume discharged is approximately 8,300,000 m$^3$ in a typical year. The Greenwich connection tunnel would also be driven from this site to Chambers Wharf. The existing sewer is shown on Figure 22.1.

22.2.3 A drop shaft with an internal diameter of approximately 17m and approximately 46m deep would be constructed. Once the shaft is constructed, the tunnel boring machine would be launched through the base of the shaft north via Deptford Church Street and Earl Pumping Station to Chambers Wharf. There would also be an interception chamber, connection culvert and other structures to divert flows from the combined sewer overflow.

22.2.4 The construction phase would last approximately five and half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm on Saturday. However, some works would be required beyond these standard working hours as set out in the *Code of construction practice*.

22.2.5 Construction of the Greenwich connection tunnel and installation of secondary lining would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level.

22.2.6 Vehicle access to the site during construction would be via a number of access points off Norman Road as shown on the construction phasing plans for this site (see Section 22 of the *Section 48: Book of plans*). Most of the access points make use of existing entrances; however one new entrance would be created. Light vehicles would access the site from the existing entrance on Greenwich High Road. This access and egress arrangement allows the continuous operation of Greenwich Pumping Station throughout the construction period.

22.2.7 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would follow in order to reduce the effects of the construction activities on the surrounding area, in relation to
noise, dust, traffic, contaminated land, waste management, water management and ecological and heritage issues.

22.2.8 A number of measures are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case by building an acoustic shed over the shaft construction site.

**Operation**

22.2.9 With the Thames Tideway Tunnel project in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average of approximately 570,000m³ or four spill events a year.

22.2.10 A number of permanent features would be visible including the shaft, the finished level of which would be about 1m above ground level (see permanent works layout plan in Section 22 of the *Section 48: Book of plans*). The shaft would be located to the northeast of the existing pumping station building, and a ventilation structure would be located on top of the shaft structure. The interception chamber would also extend approximately 1m above ground level and would be located to the rear of the existing pumping station building. Ventilation equipment and electrical and control equipment would be housed within the disused Engine Beam House (part of the Grade II listed building).

22.2.11 Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via Norman Road.

22.2.12 A brown roof is proposed on top of the shaft to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted.

22.2.13 A visualisation illustrating how the completed works could be developed is provided in Figure 23.2
22.3 Environmental effects

22.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

22.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

Air quality and odour

22.3.3 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 receptors which 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 to the 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.
22.3.4 It is considered that the overall effect on local air quality from construction road traffic and construction plant is likely to be moderate to minor adverse at the residential and commercial properties on Greenwich High Road, minor adverse at Greenwich Industrial Estate and negligible elsewhere. In terms of construction dust, this is likely to have a minor adverse effect at the closest residential premises and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

22.3.5 The effects of odours released from the ventilation column are likely to be negligible.

22.3.6 It is considered that further measures are not required.

**Ecology – aquatic**

22.3.7 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, but invertebrate diversity is limited.

22.3.8 On the basis that there would be no barging at this site and hence no in-river works, there would be no construction effects on aquatic ecology.

22.3.9 Once operational, there would be a reduction in fish mortality from improved oxygenation of the water; this would have a moderate beneficial effect on fish including increased distribution of rare and/or pollution sensitive fish species. Improved water quality would result in minor beneficial local improvements in invertebrate diversity and abundance in the longer term of operation.

**Ecology – terrestrial**

22.3.10 The site comprises hardstanding, buildings, amenity grassland, scattered trees, shrub planting, scrub and poor semi-improved grassland. The nearest site designated for ecology is approximately 60m away.

22.3.11 Surveys indicate that the vegetation within the survey area is used by a high number of common and soprano pipistrelle bats as a foraging resource. A range of breeding birds were recorded within the site area. Black redstart surveys were carried out but there were no observations. Wintering birds surveys indicate a range of birds utilizing Deptford Creek adjacent to the site.

22.3.12 Given the localised nature of the works, no significant effects on designated sites are anticipated during construction (aquatic ecology effects are considered in the section above). No significant change in habitat quality or area is likely since habitat removed for construction would be reinstated once construction works had been completed. No significant change in the population of bats, breeding birds or wintering birds is likely.

22.3.13 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan,
including monitoring, would be a requirement of the *Code of construction practice*.

22.3.14 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 cover.

**Historic environment**

22.3.15 The site includes the Greenwich Pumping Station buildings, which include the Grade II listed beam engine house, 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.

22.3.16 The site lies within a locally designated Area of Archaeological Potential, with the highest potential being for palaeoenvironmental remains (eg 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.

22.3.17 The listed north beam engine house would house ventilation structures associated with the scheme. While modifications to the building are considered likely to result in a moderate adverse effect, this would be reduced to negligible through a standing structure survey to form preservation by situ. In addition, bringing this derelict building back into use would be beneficial. The listed coal sheds would be retained throughout the construction phase. 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 moderate adverse effects on buried mid / late nineteenth century pumping station infrastructure. There is low potential for burials associated with a possible Baptist chapel which, if present, would have a major adverse effect. All other effects on buried heritage assets would be minor adverse or negligible.

22.3.18 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 identified 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. The resulting residual effects would be negligible.

22.3.19 During construction there are likely to be minor adverse effects on setting due to the use of the area as a works compound detracting from the historic character of the pumping station and also the Ashburnham Triangle Conservation Area and setting of the railway viaduct. Once operational there would be a minor beneficial effect on the setting of the Grade II listed Beam Engine House and the setting of the wider Pumping Station and the railway viaduct.

**Land quality**

22.3.20 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.

22.3.21 Based on 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the *Code of construction practice* means that no need for mitigation during the construction phase is identified.

22.3.22 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.

**Noise and vibration**

22.3.23 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. Significant noise effects arising from construction activities are predicted at residential properties at Block E, Greenwich High Street and The Movement (proposed development). 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.

22.3.24 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.

**Socio-economics**

22.3.25 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. A new mixed-use development is being constructed to the south west.

22.3.26 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.

22.3.27 For the operational phase, there are not expected to be any socio-economic effects at Greenwich Pumping Station which require mitigation.

**Townscape and visual**

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

22.3.29 During the construction phase, the removal of existing structures and vegetation and the scale, intensity and duration of the construction works would have a minor adverse townscape effect on the character of the site, Creekside Industrial area and the Ashburnham Triangle Conservation Area. Once operational, effects would be negligible as there would be limited change to the existing townscape.

22.3.30 In terms of visual amenity, during construction, major adverse visual effects are likely on views from planned dwellings in the Greenwich Industrial Estate, planned dwellings at 43-81 Greenwich High Road. Moderate adverse effects are likely at residences on Greenwich High Road close to Egerton Drive, planned dwellings on Creekside East development and from the footbridge over Deptford Creek. All other effects would be minor adverse or negligible. Once operational, the majority of structures would be housed within the existing Beam Engine House or below ground resulting in negligible effects on visual amenity.

**Transport**

22.3.31 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).

22.3.32 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 moderate adverse effect on road network operation and delay. Effects on pedestrian facilities and on cyclist amenity and safety are expected to be minor adverse (due to the risk of conflict with vehicles around the site access points). It is considered that there would be a negligible effect on bus, 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.

22.3.33 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 would 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.

**Water resources – groundwater**

22.3.34 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.

22.3.35 Construction effects on the upper aquifer would be the physical obstruction to groundwater flow and the potential of opening 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. Dewatering would impact groundwater resources and could induce groundwater movement although this would be minimized by the use of a technique known as internal dewatering (where water is pumped from within the shaft as it is formed). Due to the sensitivity of the lower aquifer dewatering effects have been assessed as adverse on both groundwater resources and groundwater quality.

22.3.36 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.

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

**Water resources – surface water**

22.3.38 The site is located adjacent to Deptford Creek and is approximately 600 metres from the River Thames, connected to it by the Creek.

22.3.39 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.

22.3.40 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.

22.3.41 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.

22.3.42 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.

**Flood risk**

22.3.43 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.

22.3.44 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. No changes are proposed to the existing flood defences therefore they would continue to provide their current standard of flood protection.

22.3.45 Any increases in hard standing and the resultant increase in surface water runoff would be attenuated for in accordance with current planning policy including the Mayor’s Essential Standard.
23 King Edward Memorial Park Foreshore

23.1 Location and context of proposed development

23.1.1 The proposed development site is located within the London Borough of Tower Hamlets. The site comprises an area of the River Thames foreshore, a portion of King Edward Memorial Park and a section of Glamis Road and its junction with The Highway (A1203). The park is a recreational area containing large grassed areas with pedestrian paths, tennis courts, bowling greens, a children’s play area, a bandstand, and paved seating areas. The site location and context are shown in Figure 3.1 and Figure 23.2.

23.1.2 It is proposed to use the site as a combined sewer overflow interception site.

23.1.3 The site is bounded to the north by the park and the Highway (A1203) lies beyond this. A modern block of residential flats known as Free Trade Wharf abuts the park to the northeast. The River Thames forms the southern boundary of the site. To the southwest of the site is Shadwell Basin Outdoor Activity Centre.

23.1.4 Existing access to the site is from Glamis Road. Shadwell Docklands Light Railway station is approximately 700m to the northwest of the site and Wapping London Overground and Limehouse national rail and Dockland Light Railway stations are approximately 650m to the southwest and 1km to the northeast, respectively. The Thames Path which runs adjacent to the foreshore is the main pedestrian route through the park, but this portion is not a public right of way and at night, when the park is closed, the Thames Path is diverted around the park via The Highway.

23.1.5 The site is within the Tower Hamlets Air Quality Management Area declared for nitrogen dioxide. The River Thames and tidal tributaries (including the foreshore at King Edward Memorial Park) are a site of importance for nature conservation. The site is within the Wapping Conservation Area and is adjacent to the St Paul’s Church Conservation Area. Parts of the site are also in the Thames Riverside Area of Archaeological Importance.

23.1.6 Shadwell Basin to the west of the site is a Site of Importance for Nature Conservation. The Grade II listed air shaft to the Rotherhithe Thames Tideway Tunnel project and Shadwell Dock Stairs are immediately adjacent to the site.

23.1.7 The main flood risk to the site is from the tidal River Thames. The terrestrial part of the site lies within the high probability flood zone, although it is protected by flood defences.
Figure 23.1 King Edward Memorial Park Foreshore – site location and context
23.2 Nature of the proposed development

23.2.1 This section describes the construction and operation of the proposed development at King Edward Memorial Park Foreshore. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 23 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

23.2.2 The proposal is to intercept the existing North East Storm Relief Sewer combined sewer overflow, which currently discharges approximately 31 times in a typical year. The total volume discharged is approximately 782,400m$^3$ in a typical year. The existing sewer is shown on Figure 23.1.

23.2.3 A cofferdam area would be constructed in the foreshore of the river in front of King Edward Memorial Park to provide a construction platform to build a drop shaft with an internal diameter of approximately 20m and approximately 60m deep. The base of the shaft would join up with the
main tunnel. Flows from the existing CSO would be diverted via an interception chamber into the new shaft and then into the main tunnel.

23.2.4 The coffer dam would also provide the opportunity for the import of coffer dam fill material and export of excavated material from the shaft by barge.

23.2.5 The construction phase would last approximately four and a half years. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday. However, some limited works would be required beyond these standard working hours as set out in the *Code of construction practice*.

23.2.6 Vehicle access to the site during construction would be from a new entrance on Glamis Road as shown on the construction phasing plans for this site (see Section 23 of the *Section 48: Book of plans*). Traffic would leave the site via the same route.

23.2.7 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and ecological and heritage issues.

23.2.8 In addition to the *Code of construction practice* a number of additional steps are proposed to reduce the potential impact on local residents and the environment during construction, for instance in this case by providing planting on the hoardings to screen the construction site.

**Operation**

23.2.9 With the Thames Tideway Tunnel project in place and operational, in a typical year, flows from the combined sewer overflow would be reduced to an average volume of approximately 84,300m³ or four spill events a year.

23.2.10 The drop shaft and interception chamber would be housed in a structure extending into the foreshore which would form a new area of land surrounded by a new river wall forming the new flood defence. Three ventilation columns, one approximately 6m high and the other pair between 4m and 8m high, would be sited on the permanent structure in the foreshore. A kiosk, housing electrical equipment, would be located along the eastern boundary of the park, adjacent to Free Trade Wharf. The kiosk would be approximately 3m high (see permanent works layout plan in Section 23 of the *Section 48: Book of plans*).

23.2.11 Scour protection would be constructed around the base of the new river wall (to protect the new structure) and this would also serve to prevent scour from the new outfall.

23.2.12 An area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be constructed. This would be publicly accessible, except during times of maintenance when it would be temporarily fenced off. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via the access road from Glamis Road.
23.2.13 A brown roof is proposed on the kiosk to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted.

23.2.14 A visualisation illustrating how the completed works could be developed is provided in Figure 23.3.

**Figure 23.3 King Edward Memorial Park Foreshore – illustrative visualisation**

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### 23.3 Environmental effects

23.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

23.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

23.3.3 The site is located within the London Borough of Tower Hamlets Air Quality Management Area. Local monitoring data indicates that there are
currently exceedences of the air quality standard for nitrogen dioxide in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupiers of nearby residential dwellings and offices, and users of the park (including playgrounds and tennis courts) and the Shadwell Basin Outdoor Activity Centre.

23.3.4 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 Free Trade Wharf and Shadwell Basin residential properties and Pier Head School, and negligible at the nearby activity centre and the park. In terms of construction dust, this is likely to have a minor adverse effect at the residential properties within 10m of the site, the Shadwell Basin Outdoor Activity Centre and the park, and a negligible effect elsewhere, taking account of the dust control measures in the Code of construction practice.

23.3.5 The effect of odours released from the ventilation column is likely to be negligible.

23.3.6 It is considered that mitigation measures are not required.

Ecology – aquatic

23.3.7 The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. The site is adjacent to the Shadwell Basin Site of Importance for Nature Conservation. A narrow strip of foreshore exists, dominated by cobbles and pebbles. The river in this location is confined by a man-made vertical river wall. Surveys and data searches indicate relatively low diversity of fish and invertebrates.

23.3.8 Construction effects would be managed in accordance with the Code of construction practice. With the Code of construction practice in place the loss of habitat due to the presence of a temporary construction area in the river would have a moderate adverse effect on habitats including loss of fish nursery habitat. Other effects including disturbance and compaction of the river habitat on fish and invertebrates would be minor adverse. All other effects on mammals, fish and invertebrates are considered to be negligible.

23.3.9 Once operational, the permanent loss of river habitat would constitute a moderate adverse effect on habitats and resulting moderate adverse effect on fish. Interception of the combined sewer overflow at this site would significantly reduce the occurrence of low dissolved oxygen events which result in fish mortality, which 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 invertebrates and contribute to an increase in the distribution of pollution sensitive fish and invertebrate species throughout the River Thames, which would minor beneficial in the longer term of operation.

23.3.10 Modelling results indicate that the presence of structures, both during construction and operation, within the river would not have a significant adverse effect on migrating fish through altered river flows.
23.3.11 The extent of the physical works in the river has been reduced as far as practicable for the construction and operational phases and there are no further on-site measures to significantly reduce adverse effects.

**Ecology – terrestrial**

23.3.12 The site comprises buildings, hardstanding, foreshore habitat, amenity grassland, scattered trees, a boundary tree line and shrub planting. There is also a pond and wildflower planting area within the wider King Edward Memorial Park. The habitats on site may be of value to roosting and foraging bats and wintering birds.

23.3.13 No significant effects on designated sites are anticipated (aquatic ecology effects are considered in the section above). Site clearance would result in the loss of vegetation on site which would have a minor adverse effect.

23.3.14 Survey results indicate that there is bat activity, likely to be for commuting or foraging purposes along the River Thames and embankment within the survey area. Surveys for wintering birds indicate use of the intertidal foreshore for foraging by mallard, black-headed gull, common gull, lesser black-backed gull and herring gull. The anchored buoys and barges were used as resting sites by great black-backed gull. There are limited nesting or foraging opportunities for birds are present on the site. Birds may use the scattered trees for nesting purposes and are likely to comprise species common to the area. A brown roof is proposed on the kiosk building to promote local biodiversity.

23.3.15 Measures to reduce the effects include advanced planting in the wider park area, subject to agreement with local stakeholders. This would reduce the minor adverse effects on habitat loss, bats and birds from minor to negligible with potential for beneficial effects if measures to promote ecology are included such as bat boxes.

23.3.16 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

23.3.17 Permanent lighting which may be required would be designed to avoid adverse effects on ecology. 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 kiosk which would promote local biodiversity.

**Historic environment**

23.3.18 The site contains no nationally designated heritage assets. King Edward Memorial Park was established in 1922 and is of low heritage asset significance. The southern area of the site includes the 19th/20th century embankment river wall (of low heritage asset significance), foreshore and Thames channel. The site lies within the Wapping Wall Conservation Area (of high heritage asset significance). The Grade II listed early 20th century Rotherhithe Tunnel ventilation shaft lies immediately outside the proposed construction site, and a Grade II listed slipway lies...
approximately 35m to the west (both are assets of high heritage asset significance).

23.3.19 The site lies within a locally designated Archaeological Priority Area and the main potential is for the remains of post-medieval 18th-19th century construction debris, ship building material, and remains of post-medieval industrial buildings (of low or medium heritage asset significance) and for medieval riverfront activity (of low to high heritage asset significance depending on the nature and condition of finds). There is also a high potential for palaeoenvironmental remains (e.g., organic remains such as pollens or plant fossils of low or medium heritage asset significance) and an uncertain, possibly moderate potential for prehistoric remains (of low or medium heritage asset significance).

23.3.20 The parapet of the existing river wall would be demolished, constituting a minor adverse effect. Construction works would entail deep excavations which would entirely remove the assets within the footprint of each area of excavation. If such assets were present, this would comprise a high magnitude of impact and would give rise to major adverse effects on any prehistoric settlement remains, on medieval remains including fish traps, ship building and barge beds should these be present.

23.3.21 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 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. The residual effects during construction phase would therefore be reduced to negligible.

23.3.22 During construction, there are likely to be adverse effects on historic setting including a minor adverse effect on the character of the Park due to the removal of trees and prominence of the construction site extending into the foreshore, and a moderate adverse effect on the character and appearance of Wapping Wall Conservation Area. No mitigation is possible to reduce these effects. Once operational, there would generally be improvements to the historic setting resulting from a high quality finished design of the structures.

Land quality

23.3.23 A search of historical and environmental data indicates the presence of a wharf on site. Historically the area around the site has been used for the location of a number of industrial activities including further wharves, engineering works and an oil depot. There is the potential for these activities to have impacted upon the foreshore site, however given the time since most of these processes were active and processes associated with the river flow, these risks are considered to be low.

23.3.24 Previous ground investigations show no significant soil or groundwater contamination and only low levels of sediment contamination in
comparison with approved Port Of London Authority guidelines. Ground investigations are underway to confirm the sediment quality. Desk-based surveys have identified a high risk from unexploded ordnance.

23.3.25 Based on 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. Ground investigation will be undertaken in due course, although the approach to risk assessment and remediation contained within the *Code of construction practice* means that no need for mitigation during the construction phase is identified.

23.3.26 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.

**Noise and vibration**

23.3.27 The noise environment is dominated by road traffic noise. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings at Free Trade Wharf to the north east and properties on Shadwell Pierhead, Glamis Road, Abbotshades Road and Glamis Place which are to the south, west, south east (across the River Thames) and north respectively.

23.3.28 Significant noise and vibration effects arising from construction activities are predicted at residential properties at Free Trade Wharf (south) and Prospect Wharf. No significant effects as a result of the operation of the site are predicted.

23.3.29 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 on the local community for example through suitable siting of equipment on site.

**Socio-economics**

23.3.30 The proposed construction site includes an area of green open space, part of a hard-surfaced sports area, a works compound and an area of foreshore on the River Thames as well as a section of the Thames Path. Within the wider park are other areas used for sports including football, tennis and a bowling green as well as a children’s playground and bandstand. Residential dwellings and the Shadwell Basin Outdoor Activity Centre surround the site. The site and surrounding area is well used for a range of purposes including walking, cycling, active and passive recreation and river-borne activities.

23.3.31 During construction, there are considered to be moderate adverse effects arising from the loss of facilities within King Edward Memorial Park and amenity impacts on its users and from amenity impacts on residents and users of Shadwell Basin Outdoor Activity Centre. There are considered to be minor adverse effects arising from amenity impacts on users of the
Thames Path and negligible effects from the diversion of the Thames Path. 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.

23.3.32 For the operational phase, there are not expected to be any socio-economic effects at King Edward Memorial Park which require mitigation.

**Townscape and visual**

23.3.33 The site is located in Wapping Wall Conservation Area, immediately east of the Rotherhithe Tunnel. The majority of the park is in a good condition; it is located within an important stretch of the River Thames which is valued at a regional level.

23.3.34 A high quality planted hoarding is proposed during construction which would help to reduce the prominence of the construction site for users of the park. However, the scale and intensity of construction activity on this prominent riverside frontage would have major adverse townscape effects on the character of the Rotherhithe Street Residential character area. There would be moderate adverse effects on the River Thames – East London Reach with minor adverse or negligible effects on other townscape areas. Once operational, there would be minor beneficial townscape effects due to the creation of new high quality public realm incorporating large species of tree along the river frontage.

23.3.35 In terms of visual amenity during construction, there are likely to be significant adverse effects from viewpoints from residential areas including Free Trade Wharf at the eastern edge of the Park (major), Sovereign Crescent and Trafalgar Court (both moderate adverse).

23.3.36 From viewpoints representing recreation use, there would be major adverse effects from the Thames path and from the Old Salt Quay public house due to the visibility of the cofferdam works. From Free Trade Wharf and from the eastern edge of the Park, there would be moderate adverse effects.

23.3.37 Effects on visual intrusion could be mitigated with advanced planting in the wider park to help screen views; this could be implemented subject to agreement from local stakeholders. Once operational, there would be minor to moderate beneficial visual effects on viewpoints including from Sovereign Crescent, Trafalgar Court and King Edward Memorial Park due to the filtered visibility of new structures and public realm. There would be negligible to minor beneficial effects on viewpoints at Limehouse Basin and King’s Stairs Garden.

**Transport**

23.3.38 The site has moderate public transport accessibility being located within close proximity of a number of local bus services and the Shadwell DLR Station. The site is on the east side of Glamis Road and construction vehicle access is proposed via the A1203 and new access road.

23.3.39 During construction, the number of heavy goods vehicle movements would be comparatively low. However, the nature of the construction site layout
at this location would result in temporary highway layout changes including junction modifications and the temporary removal of traffic calming features along Glamis Road which is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian and cyclist amenity and safety are expected to be minor adverse due to the loss of footways, local diversions and delays to journey time. 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.

23.3.40 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 include traffic signal optimisation to improve pedestrian crossing time and junction capacity, and undertaking a road safety audit. Mitigation is not required for the operational phase.

**Water resources – groundwater**

23.3.41 The proposed shaft would pass through both the upper and lower aquifers. Associated interception infrastructure would penetrate the upper aquifer. Both the upper and lower aquifers are sensitive environmental receptors. The upper aquifer is defined as being of medium value and the lower aquifer is defined as being of high value.

23.3.42 Construction effects on the upper aquifer would include physical obstruction to flow and creation of a pathway for pollution. Embedded design measures are anticipated to ensure that potential effects associated with obstruction of flow are negligible. The application of a risk based approach to remediation of identified contaminated groundwater would ensure that potential pollution effects are also negligible. Dewatering would impact groundwater resources in the lower aquifer and could induce groundwater movement although this would be minimized by the use of a technique known as internal dewatering (where water is pumped from within the shaft as it is formed). Due to the sensitivity of the lower aquifer dewatering effects have been assessed as adverse on both groundwater resources and groundwater quality.

23.3.43 Operational effects on the upper aquifer resulting from obstruction of groundwater flow and seepage to and from the shaft on the upper aquifer would be negligible. Operational effects on the lower aquifer would be minor adverse.

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

**Water resources – surface water**

23.3.45 The site is located in the River Thames foreshore within a zone of the river defined by the Environment Agency as the Thames Middle waterbody, as classified under the Thames River Basin Management Plan. This is currently classified as being at moderate potential status, with a status objective of good potential by 2027. The Lavender Pond Local Nature Reserve is located within 2 km of the site and is water-dependent.
23.3.46 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.

23.3.47 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. Scour protection is proposed for the permanent works in a zone adjacent to the outerface of the new river wall.

23.3.48 Once operational, the scheme would reduce the number of discharges from the North East Storm Relief Sewer combined sewer overflow, from the current level of 31 spills a year on average to a predicted level of four spills per year once the tunnel is in place.

23.3.49 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 108 days. In addition, the tonnage of sewage derived litter can be expected to be reduced by approximately 200 tonnes to 20 tonnes per year.

**Flood Risk**

23.3.50 The majority of the site is within the tidal River Thames.

23.3.51 Flood defences would be constructed during both the construction and operational phases to provide a level of protection equal to the existing defences located along the promenade, and ground levels on the site would also be above the design flood level. The effects of changes in scour and deposition would be reduced to an appropriate level through good practice design of the temporary and permanent structures. No significant flood risk effects have been identified.
24 Bekesbourne Street

24.1 Location and context of proposed development

24.1.1 The proposed development site is located in the London Borough of Tower Hamlets. It comprises a section of Bekesbourne Street and its junction with Ratcliffe Lane. The site location and context are shown in Figure 24.1 and Figure 24.2.

24.1.2 It is proposed to use the site as a system modification site.

24.1.3 The site is bounded to the north by Limehouse Station and the Docklands Light Railway, to the west and south by three to four storey housing and the east by John Scurr House, a six storey block of flats.

24.1.4 Existing access to the Bekesbourne Street site is via Ratcliffe Lane or via Bekesbourne Street itself to the north. Limehouse Docklands Light Railway Station is immediately to the north of the site.

24.1.5 The site is within the Air Quality Management Area for Tower Hamlets declared for nitrogen dioxide and particulate matter. The northern end of the site adjacent to Limehouse Station is within the York Square Conservation Area. The site is not within the Tower Hamlets Archaeological Priority Area and there are no areas designated for nature conservation on-site or adjacent to the site. The site lies within the low probability flood zone and is also protected by flood defences.
Figure 24.1 Bekesbourne Street – site location and context

Figure 24.2 Bekesbourne Street – aerial photograph
24.2 **Nature of the proposed development**

24.2.1 This section describes the construction and operation of the proposed development at Bekesbourne Street. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 24 of the *Section 48: Book of plans*. A table listing the changes to the proposals as a result of the phase two consultation can be found in the *Section 48: Pre-application publicity report*. The proposed *Code of construction practice*, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

**Construction activities**

24.2.2 The proposal is to control the existing Holloway Storm Relief combined sewer overflow, which currently discharges approximately eight times in a typical year. It would not be intercepted by the main tunnel but flows would be indirectly controlled by the works at this site. The total volume discharged is approximately 8,000m³ in a typical year. The existing sewer is shown on Figure 24.1.

24.2.3 The works include construction of a 5m internal diameter chamber to allow a controlled gate within the sewer and installation of an electrical and control kiosk.

24.2.4 The construction phase would last approximately seven months. Most of the surface level construction activity would take place from 8am to 6pm Monday to Friday and 8am to 1pm on Saturday.

24.2.5 Vehicle access to the site during construction would be via Commercial Road (A13) turning into Branch Road (A101), right into Ratcliffe Lane and left into Bekesbourne Street. Road and footpath diversions would be required along Bekesbourne Street and suspension of parking bays would be required.

24.2.6 The construction activities at the site would be managed in accordance with the proposed *Code of construction practice*. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

24.2.7 With the proposed modifications in place and operational, in a typical year, this would reduce flows from the combined sewer overflow to an average of approximately 7000m³, over two spill events a year.

24.2.8 The site would be reinstated to its current condition, although access covers would be required in the road and a new electrical and control kiosk would be present on site.
24.3 **Environmental effects**

24.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the Environmental Statement which will support the application for a development consent order.

24.3.2 Background information on the methodology and assessment process is available in the Preliminary environmental information report, published as part of the phase two consultation exercise, available on the project’s website.

**Ecology – aquatic**

24.3.3 Construction effects for aquatic ecology at the Bekesbourne Street site have not been assessed as the site is land based. Once operational, control of the combined sewer overflow at this site would help to reduce the occurrence of low dissolved oxygen events which result in fish mortality. These improvements in water quality in the local area would also contribute towards diversity and abundance of invertebrates and contribute to the distribution of pollution sensitive fish.

**Ecology – terrestrial**

24.3.4 Construction and operational effects for terrestrial ecology at Bekesbourne Street site have not been assessed as there are no notable species or habitats known to be present, or the potential for them to be present, on or adjacent to the site.

**Historic environment**

24.3.5 During construction, there would be limited potential for significant adverse effects on buried heritage assets. There is low to potential for evidence of a prehistoric settlement which, if present, would be subject to a major adverse effect. All other effects would be minor adverse and therefore not significant. All effects could be mitigated and reduced to negligible through an archaeological watching brief prior to and during construction to achieve preservation by record.

24.3.6 Operational effects for buried heritage assets have not been assessed on the basis that this would not involve any activities below ground aside from maintenance.

24.3.7 There are no above ground heritage assets within the assessment area whose settings would be significantly adversely affected. Both construction and operational effects for the historic character and setting of above ground heritage assets for this site have therefore not been assessed.

**Noise and vibration**

24.3.8 The assessment has identified significant adverse daytime noise effects at John Scurr House and No. 8 Bekesbourne Street (approximately six
months), and Nos. 1-11 and 10-14 Bekesbourne Street (approximately two months) as a result of the set-up works. While measures included in the *Code of construction practice* to reduce effects include suitable screening/enclosures for relevant plant, significant adverse effects during daytime construction activities would remain. No vibration effects are predicted.

**Townscape and visual**

24.3.9 The townscape and visual assessment has identified moderate adverse effects from construction activity on the townscape character of the site. Given the localised nature of the construction works, effects on the surrounding townscape would be minor adverse or negligible. Visual effects would be moderate adverse for residential views from Bekesbourne Street. All other views into the site would be minor adverse or negligible.

24.3.10 Given the low height and size of the above ground structures and the reinstatement of the construction site, operational effects on townscape and visual amenity would be negligible.

**Transport**

24.3.11 The *Code of construction practice* contains a series of measures to reduce transport effects from construction activities, as far as reasonably practicable. Significant adverse effects have been identified for vehicle parking on Bekesbourne Street. During the construction phase it would be necessary to suspend 15 private car parking bays which are associated with John Scurr House. This would result in a reduction in parking capacity for vehicles permitted to park in these bays.

24.3.12 Significant adverse effects have been identified for vehicle parking on Bekesbourne Street during the operational phase. In order to accommodate an electrical and control kiosk it would be necessary to permanently suspend two private parking bays on the western side of the street. This would reduce the number of bays available to permit holders.

24.3.13 There are no other significant operational effects anticipated in respect to transport because transport demands created by the development in the operational phase would be low and associated disruption to parking and highway operation caused by access during maintenance events would be temporary and infrequent.

**Water resources (surface)**

24.3.14 Once operational, there would be significant beneficial effects on the water quality of the River Thames at the vicinity of the site, as a result of the modifications of the Holloway Storm Relief combined sewer overflow. There would be a reduced pollution loading, reduced exposure to pathogens and reduced sewerage derived litter.
25 Abbey Mills Pumping Station

25.1 Location and context of proposed development

25.1.1 The proposed development site is located in the London Borough of Newham. It comprises an area of Thames Water operational land at Abbey Mills Pumping Station. The site lies adjacent to the River Lee. The site location and context are shown in Figure 25.1 and Figure 25.2.

25.1.2 It is proposed to use the site as a main tunnel reception site.

25.1.3 The site is bounded to the north by the operational pumping station infrastructure and buildings. To the east of the site lies the Channelsea River, beyond which are areas of disused land, land and buildings used as a mosque, and the Channelsea Business Centre, located on Canning Road. To the southeast of the site is the Channelsea River and Abbey Creek. To the west, the site is bounded by the Prescott Channel, Three Mills Lock and allotments. The River Lee is tidal to the south of Three Mills Lock, and non-tidal to the north.

25.1.4 The surrounding land is predominantly industrial with residential areas to the north of the site. Land to the west of the site, known as Three Mills Island, comprises a landscaped grassed area and warehouses including Three Mills Studio.

25.1.5 Existing access to the site is from the A11 via Abbey Lane, Gay Road and the road within the site. West Ham Underground and railway station is approximately 400m to the southeast, and Stratford Underground and railway station is approximately 1.5km to the northeast. The Greenway, a Public Right of Way (footpath and cycleway) lies to the north of the site. At the southern boundary of the site a Public Right of Way runs along the Prescott Channel (via a bridge), and continues to the west of the site, along the eastern margin of the Three Mills Wall River to Three Mills Island.

25.1.6 The site does not lie within an Air Quality Management Area; however, as a result of previous exceedances of air quality objectives the London Borough of Newham has declared the main roads within the Borough as Air Quality Management Areas for both nitrogen dioxide and particulate matter.

25.1.1 The site is within the Three Mills Conservation Area, and the Lee Valley Archaeological Priority Area. There are no listed buildings within the site but several listed buildings are located north of the site within the pumping station complex including the Grade II* listed original pumping station, Station A.

25.1.2 The site itself is not designated for nature conservation, but the surrounding watercourses (Prescott Channel, Channelsea River and Abbey Creek) are designated as Sites of Importance for Nature.
Conservation. The site is located within the Lee Valley Regional Park Authority boundary.

25.1.3 The main flood risk to the site is from the tidal River Thames, River Lee and tributaries (Prescott Channel and Channelsea River) which are located adjacent to the site. The site lies within the ‘high probability’ flood zone, although it is protected by flood defences.

**Figure 25.1 Abbey Mills Pumping Station – site location and context**
25.2 Nature of the proposed development

25.2.1 This section describes the construction and operation of the proposed development at Abbey Mills Pumping Station. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 25 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

25.2.2 At this site, it is proposed that the main tunnel would be connected to the Lee Tunnel, which is currently under construction. The discharges from the combined sewer overflows, collected by the main tunnel would be transferred via the Lee Tunnel to Beckton Sewage Treatment Works. The Abbey Mills combined sewer overflow is being intercepted by the Lee tunnel.

25.2.3 The main tunnel shaft, with an internal diameter of approximately 20m and approximately 67m deep, would be the reception point for the tunnel boring machine driven from Chambers Wharf to Abbey Mills. The shaft would be constructed adjacent to the Lee Tunnel shaft within the
operational pumping station site. A short length of tunnel would be constructed between the two shafts.

25.2.4 The construction phase would last approximately four years. Most of the surface level construction activity would take place from 8am to 6pm, Monday to Friday. However, secondary lining of the main tunnel and connection to the Lee Tunnel shaft would require continuous 24 hour working that would mainly take place underground within the tunnel but with supporting activity at ground level.

25.2.5 Construction traffic would access the site from The High Street (A11), turning right into Abbey Lane and turning left into the site via an existing entrance to the pumping station from Gay Road as shown on the illustrative construction phasing plans (see Section 25 of the Section 48: Book of plans). Traffic would leave the site via the same route.

25.2.6 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and approach to ecological and heritage issues.

**Operation**

25.2.7 Three ventilation structures up to 5m high, and one column approximately 8m high would be sited above the shaft. A fence would be constructed around the main tunnel and Lee Tunnel shafts. Fans and filters for odour treatment constructed as part of the Lee Tunnel would be utilised (see permanent works layout plan in Section 25 of the Section 48: Book of plans). The site would remain a Thames Water operational site.

25.2.8 An area of hardstanding to enable access into the shaft and tunnel for inspection and maintenance purposes would be constructed. Access for maintenance would be required every three to six months. Once every ten years more substantial maintenance work would be required and access would be via the existing pumping station entrance.

25.2.9 A visualisation illustrating how the completed works could be developed is provided in Figure 25.3.
25.3 **Environmental effects**

25.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para. 1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

25.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project's website.

**Air quality and odour**

25.3.3 The site is located close to one of London Borough of Newham’s Air Quality Management Areas. Local monitoring data indicates that there are currently exceedences of the air quality standards in the vicinity of the site. The nearest receptors which may be sensitive to the development are occupiers of nearby dwellings (in Riverside Road and Gay Road/Abbey Road/Abbey Lane), users of the allotments adjacent to the western site boundary, the London School of Performing Arts and commercial/office premises on Three Mills Island.
25.3.4 It is considered that the overall effect on local air quality from construction road traffic and construction plant are likely to be negligible at the residential properties and at the London School of Performing Arts, the allotments and commercial/office premises. In terms of construction dust, there is likely to be a negligible effect at the closest residential properties and allotments as well as at the London School of Performing Arts and commercial/office premises, taking account of the dust control measures in the *Code of construction practice*.

25.3.5 The effects of odours released from the ventilation column is likely to be negligible at all receptors.

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

**Ecology – aquatic**

25.3.7 It is assumed that there would be no in-river works at this site during construction. In operational terms, the combined sewer overflow interception is being undertaken as part of the Lee Tunnel scheme and so site-specific operational aquatic ecology effects would not occur as a direct result of the works at this site.

**Ecology – terrestrial**

25.3.8 The site comprises hard-standing, cleared areas and limited vegetation. There are buildings, trees, amenity grassland and foreshore habitat adjacent to the site.

25.3.9 Surveys indicate no evidence of water voles or otters. Common pipistrelle bats use the site and surrounding area. A range of breeding birds were recorded within the site and surrounding area including species of conservation concern such as grey wagtails. Wintering birds were recorded along the Channelsea River and Abbey Creek. Black redstarts were not recorded during surveys. Similarly, no reptiles were found.

25.3.10 There are two designated sites in proximity to the site as well as the River Thames and tidal tributaries Site of Nature Conservation Importance partially within the site. However, no habitat would be lost from these sites and due to the localised nature of the proposed works no other effects are anticipated. The loss of habitat on site and reinstatement once construction works have been undertaken would result in a negligible effect. No significant change in populations of bats and birds (wintering and breeding) are anticipated as a result of the construction works and therefore effects would be negligible.

25.3.11 Lighting which may be required during construction would be controlled through measures included in the *Code of construction practice* to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the *Code of construction practice*.

25.3.12 It is anticipated that operational activity would be limited to occasional maintenance work, which is considered unlikely to have significant effects on terrestrial ecology.
Historic environment

25.3.13 Neither the site nor immediate vicinity contains any nationally designated heritage assets. A group of listed buildings forming part of the 19th-century Abbey Mills Pumping Station are located approximately 130m away.

25.3.14 The site lies within the locally designated Three Mills Conservation Area (of high heritage asset significance) and within an Archaeological Priority Area. The main potential in terms of buried heritage is for palaeoenvironmental remains (eg organic remains such as pollens or plant fossils), of low or medium heritage asset significance, and for evidence of prehistoric settlement (of moderate or high heritage asset significance). There is also moderate potential for later medieval marshland reclamation remains, such as drainage ditches and river walls (of low heritage asset significance).

25.3.15 Construction works would entail deep excavations which would remove any assets within the footprint of each area of construction. If any such assets were found to be present, then this would give rise to a minor adverse effect for palaeoenvironmental remains, a major adverse effect for prehistoric settlement remains with minor adverse effects for other buried heritage assets.

25.3.16 The desk-based study of the site suggests that no 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. The resulting residual effects would be negligible.

25.3.17 During construction, minor adverse effects on setting have been identified including the Three Mills Conservation Area. Once operational, effects on setting would be minor beneficial.

Land quality

25.3.18 A search of historical and environmental data indicates that no potentially contaminating activities (other than the pumping station) that have existed on-site. The historical mapping has identified a number of potentially contaminating off site uses. Previous industrial activities in close to the site include various engineering works, chemical works, oil works and a gas works. Previous ground investigations have recorded soil and groundwater contamination at the site. Desk-based studies have identified a medium/high risk from unexploded ordnance.

25.3.19 Based on 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. Further ground investigation will be undertaken in due course, although the approach to
risk assessment and remediation contained within the Code of construction practice means that no need for mitigation during the construction phase is identified.

25.3.20 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.

**Noise and vibration**

25.3.21 The noise environment is dominated by road traffic. The nearest locations to the site which are sensitive to noise and vibration are the residential dwellings on Riverside Road to the north of the site.

25.3.22 No significant noise or vibration effects arising from construction activities are predicted at any of the receptors considered in the assessment. No significant effects as a result of the operation of the site are predicted.

25.3.23 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 noise and vibration effects on the local community for example through suitable siting of equipment on site.

25.3.24 It is anticipated that no mitigation would be required to address noise and vibration effects.

**Socio-economics**

25.3.25 The site comprises land within Thames Water’s Abbey Mills Pumping Station. Allotments, the Three Mills Studios, residential dwellings, and watercourses surround the site.

25.3.26 During construction, there are likely to be minor adverse effects on residents and allotment users, primarily due to visual effects arising during the construction phase, and negligible effects to the amenity of occupants and employees of the Three Mills Studio. There are not anticipated to be any socio-economic effects arising from the operation of the site.

**Townscape and visual**

25.3.27 The site is located within the Three Mills Conservation Area and is surrounded by a predominantly industrial townscape with some residential areas to the east and northwest. The site is dominated by areas of hard standing surrounding the operational pumping stations.

25.3.28 During the construction phase due to site clearance works and construction activity there would be a moderate adverse townscape effect on Three Mills Green character area. Effects on the character townscape character at the site, Three Mills Studio and the Three Mills Wall River Residential Area would be minor adverse. No mitigation beyond measures already incorporated is possible due to the scale and intensity of construction works. Effects once operational would be negligible due to the low height of above ground structures.

25.3.29 In terms of visual amenity, during construction there is likely to be a moderate adverse effect on one recreational viewpoint: the view from Three Mills Green due to the visibility of construction activity. There would
be a moderate adverse effects on one residential viewpoint, namely from Gay Road and on one recreational viewpoint, from the footpath of the Channelsea River and Prescott Channel. All other effects on visual amenity would be minor adverse or negligible. No mitigation beyond measures already incorporated is possible due to the scale and intensity of construction works. Once operational there would be negligible effects from all viewpoints.

**Transport**

25.3.30 The site has good public transport accessibility being located within close proximity of a number of bus services on Stratford High Street and Pudding Mill DLR Station located just over 1km from the site. The site is on the south side of Abbey Lane and construction vehicle access is proposed via the A11 and A12, and the A11 and A1202.

25.3.31 During construction, the number of heavy goods vehicle movements would be moderate. 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 amenity and safety and cyclists are expected to be minor adverse. A negligible effect is expected on public transport services. During the operational phase there would be occasional vehicle trips to and from the site for maintenance activities but these would have a negligible effect on the surrounding transport networks.

25.3.32 The project is being designed to limit the effects on the transport networks as far as possible. At this location, likely mitigation measures would take the form of a review of signal timings, road markings and pedestrian facilities at the Stratford High Street / Abbey Lane junction as well as a road safety audit. Mitigation is not required for the operational phase.

**Water resources – groundwater**

25.3.33 The proposed reception shaft would pass through the upper and lower aquifers. Both the upper and lower aquifers are sensitive environmental receptors. The lower aquifer is of high value and abstractions from it of very high value, while the upper aquifer is considered to be of medium value.

25.3.34 Construction effects on the upper aquifer would include physical obstruction to flow and creation of a pathway for pollution. The application of a risk based approach to remediation of identified contaminated groundwater would ensure that potential effects are negligible. Dewatering would impact groundwater resources and could induce groundwater movement although this would be minimized by the use of a technique known as internal dewatering (where water is pumped from within the shaft as it is formed). Due to the sensitivity of the lower aquifer dewatering effects have been assessed as adverse on both groundwater resources and groundwater quality.

25.3.35 Once operational, effects of obstruction of groundwater flow and seepage to and from the shaft on the upper aquifer would be negligible and effects on the lower aquifer minor adverse.
25.3.36 Monitoring of groundwater levels and water quality would continue during construction.

**Water resources – surface water**

25.3.37 The site is located adjacent to the Channelsea River at the point where the section of the Channelsea River known as the Prescott Channel and the Abbey Creek join.

25.3.38 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 the Channelsea River). 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 in proximity to the proposed site that could be affected by construction.

25.3.39 The assessment has not identified potential effects on surface water resources from the proposed construction works as all construction site drainage would drain to the existing drainage system. No mitigation would therefore be required.

**Flood risk**

25.3.40 The main source of flood risk to the site is the Channelsea River and the Prescott Channel. The site is located within the ‘high probability’ flood zone, although it is protected by flood defences which run along the river banks.

25.3.41 The shaft would be situated on higher ground within the centre of the site, where ground levels are significantly above design flood levels. The risk of the operational site flooding from tidal events is therefore negligible. The proposed works include some changes to ground levels and redefinition of the flood defence line around the south of the site.

25.3.42 Any increases in surface water runoff would be attenuated in compliance with the Mayor’s Essential Standard.
Section 48: Project description and environmental information report

26 Beckton Sewage Treatment Works

26.1 Location and context of proposed development

26.1.1 The proposed development site is located in the London Borough of Newham, and is also close to the London Borough of Barking and Dagenham. It comprises an area totally contained within the Thames Water’ Beckton Sewage Treatment Works. The site location and context are shown in Figure 26.1 and Figure 26.2.

26.1.2 The proposals at this site are for new infrastructure to transfer sewage from the tunnel to the sewage treatment works for treatment and a new siphon tunnel connected to the Tideway CSO.

26.1.3 The site itself is surrounded by operational infrastructure associated with the sewage treatment works. The site is bound by the A13 (Alfred’s Way) trunk road to the north and Barking Creek to the east. The sewage treatment works’ eastern boundary is the tidal confluence of the River Roding (Barking Creek) and the River Thames. East of Barking Creek is a large timber yard and other warehouses. To the south of the sewage treatment works is the River Thames, the northern outfall sewer, Gallions Reach Retail Park, business parks and vacant land. To the west there is land under development for the sewage treatment works extension, the A1020 (Royal Docks Road) and a mixture of business parks and retail parks beyond. To the north of the sewage treatment works is Jenkins Lane waste transfer station, a cinema and retail complex and the A13 (Alfred’s Way) trunk road. There are residential properties in the vicinity of the site.

26.1.4 Existing access to the site is via Jenkins Lane which joins on to the A13. There are no underground stations in the vicinity of the site. Gallions Reach Docklands Light Railway (DLR) station is located approximately 1km to the southwest. A green chain route and a recreational permissive footpath (which is a Public Right of Way (PRoW)) are located along the Barking Creek to the east.

26.1.5 The site lies within the River Thames and tidal tributaries and the Beckton Lands South Sites of Importance Nature Conservation (SINC), and also the Greenway and the Old Fort Nature Reserve SINC. The Ripple local nature reserve (LNR) is nearby (within 2km of the site). There is a Grade II listed chimney within the site and the Roding Valley Archaeology Priority Area extends across the site.

26.1.6 The main flood risk to the site is from the tidal River Thames, and tidal Barking Creek. The site lies within a ‘high probability’ flood zone, although it is protected by flood defences.
Figure 26.1 Beckton Sewage Treatment Works – site location and context

Figure 26.2 Beckton Sewage Treatment Works – aerial photograph
26.2 Nature of the proposed development

26.2.1 This section describes the construction and operation of the proposed development at Beckton Sewage Treatment Works. Plans of the proposed development at this site, including the construction phasing plan and permanent works layout, are contained in Section 26 of the Section 48: Book of plans. A table listing the changes to the proposals as a result of the phase two consultation can be found in the Section 48: Pre-application publicity report. The proposed Code of construction practice, which sets out the measures that would be applied throughout the construction period, forms part of the documentation being published at the Section 48 stage.

Construction activities

26.2.2 As part of a separate project, Beckton Sewage Treatment Works is being upgraded to cater for additional flows from the London Tideway Tunnels and future population growth. The Thames Tideway Tunnel would collect combined sewer overflows along the length of the tunnel and deliver these flows via the Lee Tunnel to Beckton Sewage Treatment Works.

26.2.3 The majority of the works required at Beckton Sewage Treatment Works are currently under construction as part of the Lee Tunnel project. However, some additional works would be constructed as part of the Thames Tideway Tunnel project. This includes the construction of two shafts and a siphon tunnel to transfer tunnel overflows to the Lee Tunnel overflow shaft. Two pumps would also be installed in the Tideway Pumping Station, in addition to pumps already being installed as part of the Lee Tunnel project. Works would also be undertaken to transfer the flows from the Tideway Pumping Station to the inlet works of the Sewage Treatment Works, where additional equipment would also be installed.

26.2.4 The construction phase would last approximately five and a half years. Most of the surface level construction activity would take place during standard working hours. However, some works are likely to be required beyond these standard working hours as set out in the Code of construction practice.

26.2.5 The siphon tunnel excavation would require continuous 24 hour working that would mainly take place underground but with supporting activity at ground level.

26.2.6 Vehicle access to the site during construction would be via Alfred’s Way (A13), through the existing sewage treatment works entrance off Jenkins Lane as shown on the construction phasing plans for this site (see Section 26 of the Section 48: Book of plans). Traffic would leave the site via the same route.

26.2.7 The construction activities at the site would be managed in accordance with the proposed Code of construction practice. This
document specifies the measures the appointed contractor would have to follow in order to reduce the effects of the construction activities on the surrounding area, in relation to noise, dust, traffic, contaminated land, waste management, water management and the approach to ecological and heritage issues.

**Operation**

26.2.8 Most of the infrastructure would be below ground and therefore not visible although the top of the two shafts would be between 4m and 5m above ground level (see permanent works layout plan in Section 26 of the *Section 48: Book of plans*). The valve chamber would be approximately 2m above ground level and the grit removal gantries would be approximately 4m above the existing structure and adjacent to existing gantries. A pipeline and a single storey building would also be visible.

26.2.9 Areas of hardstanding would be constructed to enable access into the infrastructure for inspection and maintenance purposes. The site would remain a Thames Water operational site.

**26.3 Environmental effects**

26.3.1 This section describes the environmental effects, as informed by the environmental impact assessment process, associated with the proposed scheme and is included to assist stakeholders in understanding the nature and location of the proposed development. As stated in para.1.1.4 this information does not represent the *Environmental Statement* which will support the application for a development consent order.

26.3.2 Background information on the methodology and assessment process is available in the *Preliminary environmental information report*, published as part of the phase two consultation exercise, available on the project’s website.

**Air quality and odour**

26.3.3 The site is not located within an Air Quality Management Areas although the A13 corridor to the north of the site falls within of one of the London Borough of Newham Air Quality Management Areas. The nearest receptors which may be sensitive to the development are occupiers of commercial premises within 150- 200 metres of the site.

26.3.4 It is considered that overall effect on local air quality at the commercial properties from construction road traffic and construction plant is likely to be negligible. The effect is also likely to be negligible at these premises with regard to construction dust.

26.3.5 The effects of odours released from the site would have a minor adverse effect.
26.3.6 Based on this assessment, it is considered that mitigation measures are not required.

**Ecology – aquatic**

26.3.7 The sewage outfall at Beckton currently discharges into the brackish zone of the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. The habitat is identified as the UK Biodiversity Action Plan priority habitat mudflat and forms one of the most extensive areas of intertidal mudflat in this part of the River Thames. Data shows that fish and invertebrate diversity at the site is low.

26.3.8 There would be no in-river works associated with this site. No further consideration of the impacts associated with construction at this site has therefore been undertaken for aquatic ecology.

26.3.9 During operation, the Thames Tideway Tunnel project scheme would lead to an increase in the volume of effluent discharge from Beckton Sewage Treatment Works as flows from the Thames Tideway Tunnel project would be treated here. This could potentially lead to very local changes in water salinity and increase the potential for scour at the outfall. It is however anticipated that the effects on all aquatic ecology receptors: habitats, mammals, fish and invertebrates would be negligible.

26.3.10 No mitigation is required at this site because adverse effects are not considered likely.

**Ecology – terrestrial**

26.3.11 The site comprises buildings and hardstanding, semi-improved grassland and scrub. Beckton Lands South Site of Importance for Nature Conservation lies within and adjacent to the site. A section of grassland and scrub in The Greenway and Old Ford Nature Reserve Site of Importance for Nature Conservation is also located within the site.

26.3.12 Site clearance would result in the loss of a small area of semi-improved grassland and scrub from the Nature Reserve. This would have a negligible effect since reinstatement would take place once construction had finished.

26.3.13 Surveys indicate a lack of bats present on the site. The loss of nesting and foraging habitat is not likely to have an adverse effect on breeding birds which are likely to be displaced to other similar habitat within the wider Beckton compound. This would also apply to wintering birds such as wren, robin and finches.

26.3.14 There would be no change in populations of bats and birds (wintering and breeding) due to temporary habitat loss on site as there is considered to be sufficient alternative habitat in the surrounding area and therefore effects are likely to be negligible.
26.3.15 Lighting which may be required during construction would be controlled through measures included in the Code of construction practice to avoid disturbance to local ecology. A landscape and ecology management plan, including monitoring, would be a requirement of the Code of construction practice.

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

**Historic environment**

26.3.17 The site mainly contains modern sewage treatment works infrastructure, although there is a 19th century Grade II listed chimney which formed part of the sewage works (of high heritage asset significance). There are no other nationally designated heritage assets in the vicinity of the site. The site lies within a locally designated Archaeological Priority Area and the main potential is for palaeoenvironmental remains, eg organic remains of low or medium heritage asset significance, and prehistoric remains, including isolated artefacts (of low heritage asset significance) and occupation evidence and/or structures or trackways (of high heritage asset significance). There is also moderate potential for post-medieval remains of drainage ditches/river walls (northwestern area) and 19th century reclamation and flood defences and an outfall reservoir (of low heritage asset significance).

26.3.18 Construction works would entail deep excavations which would entirely remove the predicted 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, a minor to major adverse effect for prehistoric remains and Roman remains (depending the nature and condition of remains), and a minor adverse effect on post-medieval remains.

26.3.19 The desk-based study of the site suggests that no 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. The resulting residual effects would be negligible.

26.3.20 The only physical effects on above ground assets would be to the Bazalgette Northern Outfall Sewer resulting in a minor adverse effect. Mitigation through visual recording would reduce this to negligible.

26.3.21 There are no above ground heritage assets whose settings would be significantly adversely affected. Both construction and
operational effects for the historic character and setting of above ground heritage assets would therefore be negligible.

**Land quality**

26.3.22 The site was first developed in the 1860s as part of Bazalgette’s London Sewer upgrade in the middle 19th century. It has grown considerably to the modern day layout. The area to the south has a long history of industrialisation including a gas works (some of which is still present to the south of Gallions Reach Shopping Centre) and various other engineering works. Numerous tanks, chimneys, rail sidings and other potentially contaminative activities are present in this area. Previous ground investigations have recorded some soils and groundwater contamination within the Sewage Treatment works site. Desk-based surveys have identified a low/medium risk from unexploded ordnance.

26.3.23 Based on 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 approach to risk assessment and remediation contained within the *Code of construction practice* means that no need for mitigation during the construction phase is identified.

26.3.24 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.

**Noise and vibration**

26.3.25 All works are to be undertaken within the existing Beckton Sewage Treatment Works which is over 300m from the closest noise and vibration sensitive locations. No significant effects noise or vibration effects are therefore predicted as a result of the construction and operation of the site.

**Townscape and visual**

26.3.26 The townscape and visual assessment of construction effects has been scoped out of the assessment due to the nature of the proposed works which would be in keeping with existing activities at the site. The assessment of operational effects has also been scoped out due to the low height of operational structures set amongst existing industrial structures similar in character.

**Transport**

26.3.27 The site has low public transport accessibility. Vehicle access is direct from the A13 via a grade-separated roundabout and allows access and egress in both directions.
26.3.28 During construction, the number of heavy goods vehicle movements would be consistent with current levels. Given the location of the site, construction activity is considered likely to result in a minor adverse effect on road network operation and delay. Effects on pedestrian facilities and cyclist amenity and safety are expected to be negligible. A negligible effect is also expected on rail, bus 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.

26.3.29 The project is being designed to limit the effects on the transport networks as far as possible and no further mitigation is proposed at this site. Mitigation is not required for the operational phase.

Water resources – groundwater

26.3.30 Two shafts and parts of the connection tunnels would pass through the upper aquifer and into the surface of the lower aquifer. The main receptors are the lower aquifer, which is defined as being high value and the upper aquifer, which is defined as being of medium value.

26.3.31 Construction effects on the upper aquifer would include physical obstruction to flow and creation of a pathway for pollution. The application of a risk based approach to remediation of identified contaminated groundwater would ensure that these effects are negligible. Dewatering would impact groundwater resources and could induce groundwater movement although this would be minimized by the use of a technique known as internal dewatering (where water is pumped from within the shaft as it is formed). Due to the sensitivity of the lower aquifer dewatering effects have been assessed as adverse on both groundwater resources and groundwater quality.

26.3.32 At the operational phase, the main potential effects are the obstruction to groundwater flow and the risk from seepage from the shafts and connection tunnels. These are considered to be negligible for the upper aquifer and minor adverse for the lower aquifer.

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

Water resources – surface water

26.3.34 The site is located adjacent to the point where the River Thames and the River Roding (also known as the Barking Creek) meet. The Crossness Local Nature Reserve is located within 2 kilometres of the site and is water-dependent.

26.3.35 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 the River Roding). 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 within the proposed site that could be affected by construction.

26.3.36 The assessment has not identified potential effects on surface water resources from the proposed construction works at this site as all construction site drainage would drain to the existing sewer system. No mitigation would therefore be required.

**Flood risk**

26.3.37 The main source of flood risk to the site is the tidal River Thames and Barking Creek. The site is located within the ‘high probability’ flood zone, although it is protected by flood defences which run along the river banks.

26.3.38 The proposed works on the site do not include any modifications to the existing flood defence structures, and a residual risk of tidal flooding in the event of a local flood defence breach would remain for the operational site.
For further information or to comment on our proposals please see our website: www.thamestunnelconsultation.co.uk

It is very important that you understand the information we have provided. If you need further information in another language, braille, large print or audio format please contact us on 0800 0721 086.