

Thames Tideway Tunnel
Thames Water Utilities Limited



Application for Development Consent

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Final Report on Site Selection Process

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**Thames
Tideway Tunnel**



Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Final Report on Site Selection Process

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Thames Tideway Tunnel

Final Report on Site Selection Process Volume 18: Chambers Wharf (formerly King's Stairs Gardens)

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1 Introduction

1.1 Introduction to the Thames Tideway Tunnel project

- 1.1.1 At present, untreated sewage mixed with rainwater (combined sewage) regularly overflows into the tidal reaches of the River Thames from London's Victorian sewerage system via combined sewer overflows (CSOs).
- 1.1.2 Combined sewage discharges must be reduced in order to comply with relevant wastewater legislation. The primary objective of the proposed Thames Tideway Tunnel project (the 'project') is to control discharges from CSOs in order to meet the requirements of the European Union's Urban Waste Water Treatment Directive (91/271/EEC) (UWWTD) and the related United Kingdom legislation.
- 1.1.3 The Environment Agency has identified 34 'unsatisfactory' CSOs that the project needs to address. The project would control CSO discharges by intercepting and diverting combined sewage flows into a new storage and transfer tunnel. The 'main tunnel' would run from west London to Abbey Mills in the east where it would connect to the Lee Tunnel. The Lee Tunnel would then transfer the flows to Beckton Sewage Treatment Works for treatment.

1.2 Introduction to this volume

- 1.2.1 The *Site selection methodology paper* states that the project team shall produce a final report that sets out the site selection process in full. This *Final Report on Site Selection Process* was prepared for that purpose. Volume 1 of this report explains our approach to identifying the sites required to construct and operate the project and includes a glossary of relevant terminology. Volume 2 comprises the complete *Site selection methodology paper* and *Site selection background technical paper*, which were the main documents that guided the site selection process. Volumes 3 to 23 describe the site selection process for each of the sites considered on the Abbey Mills route.
- 1.2.2 This volume sets out the site selection process that was followed to identify the most suitable site to construct the eastern sections of the main tunnel at each phase of the pre-application process. This is summarised below in Table 1.1.

Table 1.1 Summary of sites identified at each phase of the pre-application process

Phase	Site name	Site use
Phase one consultation	King's Stairs Gardens	To receive the main tunnel from Tideway Walk to the west, receive the main tunnel from Abbey Mills Pumping Station to the east and drive two CSO connection tunnels: one to Greenwich

Phase	Site name	Site use
		Pumping Station and the other to Druid Street
Phase two consultation	Chambers Wharf	To receive the main tunnel from Kirtling Street to the west, drive the main tunnel eastwards to Abbey Mills Pumping Station and receive the CSO connection tunnel from Greenwich Pumping Station. (NB: Druid Street CSO site was replaced by modifications at the existing Shad Thames Pumping Station therefore no connection tunnel was required)
Section 48 publicity	Chambers Wharf	As above
Submission of the application	Chambers Wharf	As above

1.2.3 This volume is structured as follows:

- a. This section describes the type of site needed and summarises how the *Site selection methodology paper* was applied at each stage of the pre-application process.
- b. Section 2 explains how we identified our preferred main tunnel site for phase one consultation.
- c. Section 3 details the post phase one consultation site selection review and explains why we changed our main tunnel site for phase two consultation.
- d. Section 4 describes the post phase two consultation site selection review and how we confirmed our proposed main tunnel site for Section 48 publicity.
- e. Section 5 describes the post Section 48 publicity site selection review and confirms our selected main tunnel site for the application.

1.3 Type of site

1.3.1 We needed to identify a series of suitable sites to allow us to build and operate the main tunnel. The main tunnel would transfer the collected overflows to the Abbey Mills Pumping Station, which would then be transferred via the Lee Tunnel (under construction) to Beckton Sewage Treatment Works.

1.3.2 Larger sites are required where a tunnel boring machine (TBM) would be inserted into the ground (known as main tunnel drive sites). This type of site would need to handle all the materials excavated by the TBM as it constructs that section of the tunnel. Smaller sites are required to remove the TBM from the ground at the end of a tunnel drive (known as main tunnel reception/intermediate sites). A more detailed description of the

different types and sizes of site required to construct and operate the project can be found in the *Site selection background technical paper*.

1.4 Site selection process

- 1.4.1 The *Site selection methodology paper* recognises the vital complementary relationship between the site selection process and engineering design developments. Accordingly, as the site selection process progressed it was increasingly important to compare sites against engineering requirements. A fundamental consideration was the need to identify enough sites in the right locations to enable the project to be built.
- 1.4.2 All potential sites were identified in accordance with our *Site selection methodology paper*, which involved a ‘sieving’ approach that commenced with the identification of all potentially suitable areas of land (excluding concentrated residential sites and World Heritage Sites). The main tunnel sites went through levels of increasingly detailed assessments. All the assessments were informed by a multidisciplinary approach that took into account engineering, planning, environmental, community and property considerations and our teams’ professional judgement.
- 1.4.3 Prior to phase one consultation, we applied our multidisciplinary sieving approach to all the assessments outlined in the *Site selection methodology paper* (summarised at paragraph 2.1.2) for all three main tunnel route options under consideration at this stage of the pre-application process. This process is set out below in Section 2. In Volume 1, Section 4 there is a more detailed discussion of the tunnelling options and comparisons for the main tunnel on the three proposed routes.
- 1.4.4 Following phase one consultation, we reviewed the preferred site and decided to carry out a ‘back-check’ (as set out in the *Site selection methodology paper*) in order to review the preferred and shortlisted sites prior to phase two consultation. This back-check involved a repeat of each relevant stage of our site selection process to reconsider which sites would be most suitable to construct the main tunnel, including a re-examination of main tunnel drive options, to identify the preferred main tunnel site and use. The back-check utilised the same multidisciplinary approach that was followed prior to phase one consultation. The results of this back-check process are presented below in Section 3 and superseded all previous assessments undertaken prior to phase one consultation and reported in Section 2. This is the result of the iterative nature of the process. In Volume 1, Section 6 there is a more detailed discussion of the tunnelling options and comparisons for the main tunnel on the preferred Abbey Mills route.
- 1.4.5 Following phase two consultation, we reviewed the possible main tunnel sites. This involved re-checking the selection of sites identified as most suitable main tunnel sites associated with the preferred Abbey Mills route in order to confirm the proposed main tunnel sites and uses for Section 48 publicity. This process is set out below in Section 4 (also see Volume 1, Section 7 for tunnelling review).

- 1.4.6 Following Section 48 publicity, we reviewed our proposals having regard to the feedback from the publicity exercise. The purpose of this review was to define and decide any changes to our final proposals for the application. Every proposed main tunnel site on the Abbey Mills route was re-checked in order to confirm its selection for the application. This process is set out in Section 5. In Volume 1, Section 8 there is a review of tunnelling options and comparisons for the main tunnel on proposed Abbey Mills route.

2 Phase one consultation preferred main tunnel site: Site selection process

2.1 Introduction

- 2.1.1 This section explains how the *Site selection methodology paper* was implemented in order to arrive at the preferred main tunnel site for the eastern sections of the tunnel for phase one consultation. This stage took place from Spring 2009 to Summer 2010.
- 2.1.2 In order to arrive at the preferred site for phase one consultation, the site selection process comprised:
- a. identification of sites for inclusion on a long list
 - b. assessment of sites on the long list to create a draft short list
 - c. assessment of the draft shortlisted sites to create a final short list
 - d. preparation of detailed site suitability reports for each final shortlisted site; preparation of the *Engineering options report* (Spring 2010) with the tunnelling drive options
 - e. a multidisciplinary optioneering workshop to consider the suitability of each of the shortlisted sites for each use (drive and/or reception/intermediate, depending on site size) in each main tunnel zone. The workshop then used these sites to consider the tunnelling options to determine the preferred phase one consultation main tunnel site and use (see Volume 1, Section 4 for detailed discussion of tunnelling drive options and comparisons).
- 2.1.3 The assessments described in this section were based on the information available at the time and the related stage in the pre-application process. The assessments in this section comprise a historic representation of the process and all of the assessments have been superseded by the ones set out in Section 3.

2.2 Assessment of the long list sites

- 2.2.1 The long list of potential main tunnel sites for the eastern sections of the tunnel route was created by conducting a desktop survey of the land in the London boroughs of Southwark and Tower Hamlets and the City of London.
- 2.2.2 In total, 116 sites were included on the long lists. The sites were assessed having regard to the high-level considerations set out in Table 2.2 of the *Site selection methodology paper* (hereafter referred to as SSMP Table 2.2), which included engineering (site size, site features, availability of a jetty/wharf, and access), planning and environment (heritage, landscape/townscape, open space and ecology), and community and property (neighbouring land uses, site use, Special Land/Crown land and acquisition costs) considerations.

- 2.2.3 Sites that were determined to be the least constrained in light of the SSMP Table 2.2 considerations passed to the draft short list. This did not necessarily mean that these main tunnel sites were ultimately judged to be suitable, but rather that no significant constraints were identified in relation to the high-level considerations set out in SSMP Table 2.2. Sites that were judged to be more constrained were not retained on the draft short list for more detailed assessment.
- 2.2.4 We then determined how the size of the sites that were retained at this stage would be assessed under the next stage of assessment. For some sites, this included examining neighbouring sites to see if they could be used together. The SSMP Table 2.2 assessments and plans are available on request and form part of our extensive evidence base.
- 2.2.5 Of the 116 sites identified on the long list of potentially suitable main tunnel sites for the eastern sections of the tunnel route, 12 were assessed as potentially suitable and passed to the draft short list, and 104 sites were eliminated as unsuitable.

2.3 Assessment of the draft short list sites

- 2.3.1 The remaining 12 draft short list main tunnel sites identified as potentially suitable at SSMP Table 2.2 were further assessed by the engineering, planning, environment, community and property disciplines. Regard was taken of the considerations set out in Table 2.3 of the *Site selection methodology paper* (hereafter referred to as SSMP Table 2.3) which included: engineering (site size, distance and route to the river, jetty/wharf facilities, means of road/rail access, site features, site efficiency, tunnelling and systems engineering requirements); planning and environment (planning applications/permissions, London Plan/UDP/LDF allocations or special policy areas, heritage designations, landscape/open space designations, ecological designation, transport and amenity); property (ownership of site, tenant on site, estimated acquisition cost, Crown land and special land, access and material transfer rights) and community (proximity to sensitive receptors, social, economic, health and equality considerations). This stage of the process built on the information gathered and the assessments undertaken at long list stage but focussed on more detailed local considerations.
- 2.3.2 At this stage, we also consulted with each of the London boroughs and pan-London stakeholders, such as the Environment Agency and English Heritage, to seek their views on the suitability of the sites for the short list.
- 2.3.3 As with the SSMP Table 2.2 assessment, sites that were assessed as the least constrained in light of the SSMP Table 2.3 considerations were retained on the short list and passed to the next stage of assessment. This did not necessarily mean that a site was ultimately judged suitable, but rather that no significant constraints were identified in relation to the considerations set out at SSMP Table 2.3. Sites that were judged to be more constrained were not retained on the short list for more detailed assessment. The decision of whether or not to retain a site on the short list was taken at a multidisciplinary workshop. The SSMP Table 2.3

assessments and plans are available on request and form part of our extensive evidence base.

- 2.3.4 Of the 12 sites on the draft short list, initially only one (S020T: Shadwell Basin) was assessed as potentially suitable as either a main tunnel drive or reception/intermediate site. However, a number of engineering factors were subsequently identified that made this site difficult to use and potentially undesirable. It was therefore necessary to revisit the draft short list to identify additional potential locations for main drive sites in the Tower Bridge area to accommodate the risk of the S020T: Shadwell Basin site not being suitable as a main tunnel drive site. As a result, two further sites, S54SK: King's Stairs Gardens and S021T: King Edward Memorial Park, were additionally taken forward for assessment as main tunnel drive sites (on the basis that they represented the sites on the draft short list large enough for a main tunnel drive).
- 2.3.5 Therefore, three main tunnel sites and two main tunnel reception/intermediate sites passed to the final short list.

2.4 Assessment of the final short list sites

- 2.4.1 The five sites identified for the inclusion on the final short list and assessment at the next stage were:

Suitable for use as a main tunnel drive or reception/intermediate site:

- a. S020T: Shadwell Basin
- b. S021T: King Edward Memorial Park
- c. S54SK: King's Stairs Gardens.

Suitable as main tunnel reception/intermediate sites only:

- a. S024T and S025T: Heckford Street
- b. S036T: Limehouse Basin

- 2.4.2 A site suitability report was prepared for each of these final shortlisted sites. These reports contained an assessment of each site's suitability in light of engineering, planning, environment, community and property considerations. At this stage in the process, no comparisons were drawn between other sites; they were assessed in isolation and with no regard to tunnelling strategy. Sites were evaluated by each discipline using our teams' technical knowledge and professional judgement as appropriate, and assessed as suitable, less suitable or not suitable from that discipline's perspective based on the available information at this stage of the pre-application process.
- 2.4.3 A summary of the conclusions of each discipline's assessment from the site suitability reports is provided below.

S020T: Shadwell Basin

- 2.4.4 Site S020T is irregular in shape and accessible from Newlands Quay, Couldnards Quay, and Wapping Wall. The surrounding area is predominantly residential, and all buildings are oriented to overlook the

basin. The site is located in Wapping in the London Borough of Tower Hamlets.

- 2.4.5 **Engineering:** This site was considered **less suitable** for use as a main tunnel drive site because of its distance from the river, the significant preparatory works needed to construct the shaft and the considerable difficulties of moving barges to and within the site. The site was also considered **less suitable** for use as a main tunnel reception/intermediate site for similar reasons.
- 2.4.6 **Planning:** This site was considered **not suitable** for use as either a main tunnel drive or reception/intermediate site. A series of planning designations apply to the site and it was unlikely that mitigation measures would balance out the potential cumulative adverse impacts of the proposed construction works on this site.
- 2.4.7 **Environment:** Overall, the site was considered **less suitable** for use as either a main tunnel drive or reception/intermediate site, and further investigation would be required as to whether transport, built heritage and townscape, ecology, flood risk, surface water, noise, air quality and land quality impacts could all be adequately mitigated.
- 2.4.8 **Socio-economic and community:** The site was considered **less suitable** for use as either a main tunnel drive or reception/intermediate site from a community impacts perspective as it was likely to have a significant detrimental impact on the large number of residents living in the surrounding residential properties, and likely to lead to the loss or displacement of the Shadwell Basin Outdoor Activity Centre, which could be quite difficult to relocate or otherwise mitigate.
- 2.4.9 **Property:** The site was considered **suitable** for use as both a main tunnel drive and reception/intermediate site, although subject to acquisition risk, which would be proportionately greater in respect of a main tunnel drive site.

S021T: King Edward Memorial Park

- 2.4.10 Site S021T is an area of public open space. The park is irregular in shape and has numerous entrances, accessed primarily from The Highway (A1203) and Glamis Road. The site is located in Wapping in the London Borough of Tower Hamlets.
- 2.4.11 **Engineering:** This site was considered **suitable** for use as either as a main tunnel drive or reception/intermediate site. It is sufficiently large to readily accommodate the required construction facilities, has good road access and good potential for jetty/wharf facilities.
- 2.4.12 **Planning:** The site was considered **not suitable** for use as a main tunnel drive site. The site is a well-maintained public park, which has facilities for a variety of sport and leisure activities. Its use as a main tunnel drive site would result in the temporary loss of a significant area of the park and the remaining areas of open space might not be useable, given the level of construction activity proposed and the potential associated impacts of noise, dust and traffic movements. Replacement open space would likely be required by the council and this could be problematic in this location,

due to an existing deficiency and the scale of the area that would be associated with the main tunnel drive site.

- 2.4.13 This site was considered **less suitable** for use as a main tunnel reception site as it would result in the temporary loss of around a third of the public open space, and would impact on the continued integrity and enjoyment of the remaining areas of the park.
- 2.4.14 **Environment:** Overall, the site was considered **suitable** for use as either a main tunnel drive or reception/intermediate site, although mitigation would be required.
- 2.4.15 Based on current information, all site options were **suitable** from the perspectives of transport, archaeology, water resources, flood risk, and land quality. All site options were considered **less suitable** from the perspectives of built heritage and townscape, noise and air quality.
- 2.4.16 **Socio-economic and community:** The site was considered **not suitable** for use as a main tunnel drive site. It was likely that there would be significant impacts on the park and users of the sports and leisure facilities. Mitigation was likely to involve finding acceptable alternative facilities easily accessible to the local community. The site was considered **less suitable** for use as a reception/intermediate site. Although use of the site is likely to have similar impacts to those identified for a main tunnel drive site, their magnitude is likely to be reduced due to the smaller scale of works.
- 2.4.17 **Property:** The site was considered **suitable** for use as either a main tunnel drive or reception/intermediate site, although the potential acquisition risk would be proportionately greater for the larger main tunnel drive site.

S54SK: King's Stairs Gardens

- 2.4.18 Site S54SK is a public park known as King's Stairs Gardens. The site is located in the London Borough of Southwark.
- 2.4.19 **Engineering:** This site was considered **suitable** for use as either a main tunnel drive or reception/intermediate site because it is large enough to accommodate all the site facilities, no demolition other than the playground would be required, and wharf/jetty facilities could be provided.
- 2.4.20 **Planning:** This site was considered **suitable** for use as a main tunnel drive or reception/intermediate site, subject to appropriate mitigation measures. A number of designations in the Unitary Development Plan apply to the site and it might be possible to mitigate potential impacts with appropriate measures, but this would require further consideration. Potential impacts on residential amenity should be considered further and, in particular, the potential to relocate construction works within the site to increase the separation distance between the works and the facades of adjacent dwellings. There would be a loss of amenity space. Notwithstanding the metropolitan park deficiency area, which affects the borough as a whole, the immediate area is well served by parks and open spaces, especially Southwark Park.

- 2.4.21 **Environment:** Overall, the site was considered **suitable** for use as a main tunnel drive or reception/intermediate site, although mitigation would be required. Based on the information available at the time, the site was considered **suitable** from the perspectives of transport, archaeology, built heritage, water resources, flood risk and land quality. The site was considered **less suitable** from the perspectives of townscape, ecology, air quality and noise.
- 2.4.22 **Socio-economic and community:** This site was considered **not suitable** for use as a main tunnel drive site from a community impacts point of view, as it was likely that using the majority of King's Stairs Gardens would have a severe impact on the local community. It was considered **less suitable** for use as a main tunnel reception/intermediate site, despite the fact that only approximately half the site would be used. There could be a number of significant impacts on the local community, including impacts on the playground located on the site, dense residential properties adjacent to the site to both the east and west, as well as two churches adjacent to the site.
- 2.4.23 **Property:** The site was considered **less suitable** for use as a main tunnel drive site and **suitable** as a main tunnel reception/intermediate site.

S024T and S025T: Heckford Street

- 2.4.24 S024T and S025T together make up the Heckford Street site. The site is accessed from Heckford Street, which adjoins The Highway (A1203). The site is roughly rectangular in shape. Both areas of the site are currently occupied by commercial buildings, warehouses and offices that are one to two storeys high, with associated parking areas. The site is located in the London Borough of Tower Hamlets.
- 2.4.25 **Engineering:** This site was considered **less suitable** for use as a split main tunnel reception/intermediate site because the impact on third-party assets could be significant. The warehouses within both areas of the site (S024T and S025T) would need to be demolished in order to construct the shaft. The site is a minimum of 100m away from the river and multi-storey residential buildings and the Rotherhithe Tunnel lie between the site and the river.
- 2.4.26 **Planning:** The sites were considered **suitable** for use as a split main tunnel reception/intermediate site. There were few planning designations that applied to the site and it was considered that, with appropriate mitigation measures, it was unlikely that these designations would be unacceptably impacted on. However, implementation of the future mixed-use redevelopment of the Highway Business Park could present a constraint to the use of the site for the project, and the status of the development proposals would require on-going monitoring.
- 2.4.27 **Environment:** Overall, the site was considered **suitable** for use as a split main tunnel reception/intermediate site, although mitigation would be required. Based on the information available at the time, the site was considered **suitable** from the perspectives of transport, archaeology, built heritage, townscape, water resources, ecology, and flood risk, and **less suitable** from the perspectives of air quality, noise and land quality.

2.4.28 **Socio-economic and community:** The site was considered **less suitable** for use as a main tunnel reception/intermediate site from a community impacts perspective, due to the combined number of potential impacts likely to occur. Foremost among these was the likely loss of several commercial units onsite, which would require businesses to relocate. This could impact on the livelihoods of owners, operators and employees. Mitigation could involve discussions regarding relocation and/or compensation.

2.4.29 **Property:** The site was considered **suitable** for use as a main tunnel reception site.

S036T: Limehouse Basin

2.4.30 Site S036T is Limehouse Basin, which is located north of Narrow Street and can be accessed from the south via the River Thames, via a swing bridge and lock. The site is a well-used marina with three large pontoons. The site is surrounded on all sides by modern, high-rise blocks of flats ranging from three to 12-storeys in height, with habitable rooms and balconies overlooking the basin. In addition, the Cruising Association Members Club is located to the east and a boat keepers' office to the south of the site. The DLR line runs along the northern boundary of the site behind apartments in Basin Approach. The site is located in the London Borough of Tower Hamlets.

2.4.31 **Engineering:** This site was considered **not suitable** for use as a main tunnel reception/intermediate site because of the requirements for extensive enabling and reinstatement works prior to and following construction. The site does not have good vehicular access and a neighbouring building might need to be demolished to create sufficient access to the site. There are residential buildings and other third-party assets in close proximity to the site.

2.4.32 **Planning:** This site was considered **not suitable** for use as a main tunnel reception/intermediate site. A series of planning designations apply to the site and it appears unlikely that any mitigation measures would balance out the cumulative adverse effects of the proposed construction works on this site.

2.4.33 **Environment:** Overall, the site was considered **less suitable** for use as a main tunnel reception/intermediate site. The site was considered **suitable** from the perspectives of transport, archaeology and hydrogeology, and **less suitable** from the perspectives of built heritage, townscape, surface water, ecology, flood risk, air quality, noise, and land quality.

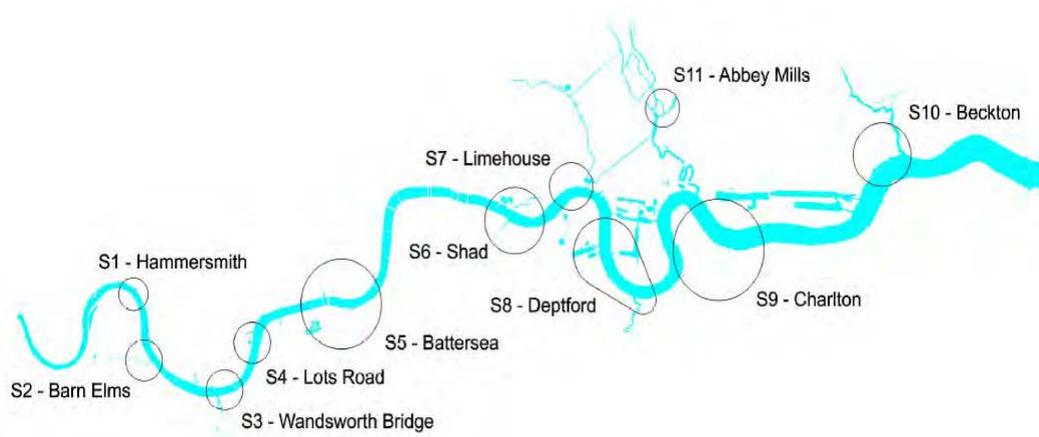
2.4.34 **Socio-economic and community:** This site was considered **less suitable** for use as a main tunnel reception/intermediate site, as it appeared likely that it would have significant impacts on the use of the basin as a marina and the surrounding dense residential development, which would be difficult to mitigate. Also, following the use of the site, the need to maintain permanent access and place a concrete structure in the marina would decrease the area of the basin and would likely reduce the number of pontoons available.

- 2.4.35 **Property:** The site was considered **less suitable** as a main tunnel reception/ intermediate site. Disadvantages included the potential classification of the site as special land, which would require a ministerial procedure to acquire; temporary and permanent disturbance to marina operations and the potential for high discretionary purchase costs.

2.5 Phase one consultation preferred site

- 2.5.1 Consideration of the main tunnel sites up until short list stage focussed principally on each as an individual site in isolation from the assessment of tunnel drive and alignment options (ie, how the tunnel would be constructed and the route it would take). However, due to the nature of the project, it was necessary to select a package of main tunnel sites, having regard to how they would work in combination and in relation to the tunnel alignment and CSO connections.
- 2.5.2 The *Engineering options report* (Spring 2010) describes the process of identifying the tunnelling options, taking into account engineering requirements. The main points are summarised below.
- 2.5.3 The engineering team considered possible drive options – the combination of ways in which the tunnel could be constructed by ‘driving’ between combinations of shortlisted main tunnel sites – paying particular attention to changes in ground conditions and the requirement for different types of tunnelling machines, as well as construction risks and timescales.
- 2.5.4 To manage the total number of combinations of tunnel drive and reception/intermediate site options that together make up a ‘drive option’, the available shortlisted main tunnel sites were grouped together in zones. The zones were based on the geographical locations of the sites along the line of the River Thames and numbered and named for convenient referencing, as illustrated in Figure 2.1 below.

Figure 2.1 Location of site zones



- 2.5.5 Our preferred route for the main tunnel runs from west London to Abbey Mills Pumping Station and involves Zones S1 to S7 and Zone S11. Zones S8 to S10 were only required for the previously considered River Thames

and Rotherhithe routes, which did not become our preferred option and are not considered further in this volume.

2.5.6 Multidisciplinary workshops were held to identify the most suitable main tunnel site from those shortlisted within each zone, taking into account the conclusions reached in the site suitability reports, as described above.

2.5.7 The following main tunnel sites for either use were identified as the most suitable in Zones S6 to S7:

- a. Zone S6 – S54SK: King’s Stairs Gardens (suitable for use as a main tunnel drive or main tunnel reception/intermediate site)
- b. Zone S7 – S021T: King Edward Memorial Park (suitable for use as either a main tunnel drive or main tunnel reception/intermediate site).

2.5.8 A series of comparisons were then made to determine how best to use the potential sites identified across all the zones to construct the main tunnel.

2.5.9 An important consideration in relation to Zones S6 and S7 is that downstream of Tower Bridge, the geology through which the tunnel would be constructed changes and it would be highly desirable to change the type of TBM used to construct the tunnel. This is further explained in the *Site selection background technical paper* (see Volume 2). As a result, we identified a possible need for a main tunnel site in the area downstream of Tower Bridge.

2.5.10 However this meant we only required one main tunnel site in either Zone S6 or Zone S7. The site comparisons are discussed in Volume 1, Section 4.14.

2.5.11 At a multidisciplinary workshop **S54SK: King’s Stairs Gardens** was selected as our phase one consultation preferred main tunnel site from which to construct the eastern sections of the main tunnel and drive two CSO connection tunnels. The reasons are summarised below (not in order of importance):

- a. Use of King Edward Memorial Park would extend the length of the main tunnel drive and increase the challenges associated with tunnelling in Chalk.
- b. In planning policy terms, a distinction could be made between the two sites in relation to the availability of alternative public open space in the vicinity. King Edward Memorial Park is located in an area that has been defined as a public open space deficiency area. Therefore, identifying locations in which to provide suitable replacement facilities in order to mitigate the temporary loss of a portion of King Edward Memorial Park would be difficult, if not impossible. In comparison, Southwark Park is located immediately to the south of King’s Stairs Gardens and is considered a useable local alternative.
- c. Although use of King Edward Memorial Park would avoid the creation of a separate CSO site to intercept the North East Storm Relief Sewer that runs beneath the park, cost and programme issues associated with the longer tunnel drive to this site outweighed the potential benefit.

- d. King Edward Memorial Park is within a conservation area. At this stage of the site selection process, no conservation areas would be affected by the use of King's Stairs Gardens. It also appeared that there would be less opportunity to mitigate townscape impacts at King Edward Memorial Park.
- e. In environmental terms, the use of either site had the potential to give rise to noise disturbance and air quality impacts and would require extensive mitigation measures.
- f. For both sites, use of special parliamentary procedures might be needed to secure them.

2.5.12 Table 2.1 below sets out the preferred site and use.

Table 2.1 Preferred site and use for phase one consultation

Site: S54SK: King's Stairs Gardens

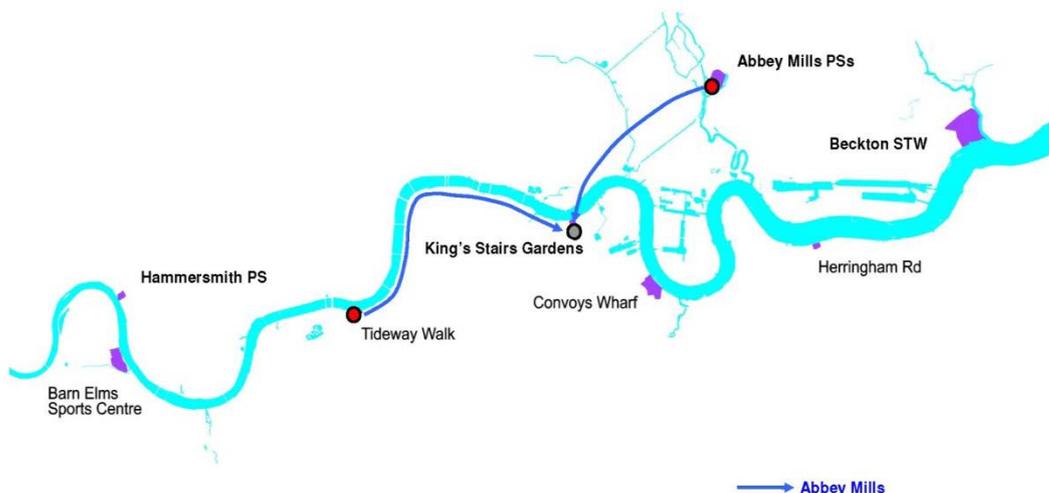
Use: To receive the central section of the main tunnel driven from Tideway Walk (S79WH with S80WH) and the eastern section of the main tunnel driven from Abbey Mills Pumping Station (S84NM). The site would also be used to drive two CSO connection tunnels: one to Greenwich Pumping Station and the other to Druid Street

2.5.13 We also confirmed the following at the same time and by using the same process:

- a. S79WH with S80WH: Tideway Walk in Zone S5 as a preferred main tunnel drive site (see Volume 13) – this site would be used to drive the main tunnel to King's Stairs Gardens
- b. S84NM: Abbey Mills Pumping Station in Zone S11 as a preferred main tunnel drive site (see Volume 23) – this site would be used to drive the main tunnel to King's Stairs Gardens.

2.5.14 Figure 2.2 sets out the preferred phase one consultation drive strategy for the eastern sections of the main tunnel on the Abbey Mills route.

Figure 2.2 Phase one consultation main tunnel drive strategy



- 2.5.15 A more detailed discussion of the tunnelling options and comparisons for the main tunnel sites for all routes at this stage of the pre-application process are presented in Volume 1, Section 4.

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3 Phase two consultation preferred main tunnel site: Scheme development and site selection process

3.1 Introduction

3.1.1 This section explains how we implemented the *Site selection methodology paper* in order to arrive at the preferred main tunnel site for the eastern sections of the tunnel route for phase two consultation. This stage took place from Winter 2010 to Autumn 2011.

3.1.2 Following phase one consultation and prior to phase two consultation, the site selection process comprised:

- a. a review of comments from phase one consultation
- b. consideration of any ongoing scheme design and/or any new information received
- c. a back-check exercise to review the sites listed in Section 2 along with any potential new sites or a combination of sites
- d. application of the assessment process outlined in 2.1.2, including the preparation of a new *Engineering options report – Abbey Mills route* (Summer 2011) with revised tunnelling drive options
- e. a multidisciplinary optioneering workshop to consider the detailed contents of the site suitability report for each shortlisted site and the *Engineering options report – Abbey Mills route* (Summer 2011)
- f. comparison of sites to identify the preferred main tunnel site and use (drive or reception/intermediate) for phase two consultation (also see Volume 1, Section 6 for the pre-phase two consultation discussion of tunnelling drive options).

3.1.3 The assessments described in this section were based on the information available at the time and the related stage in the pre-application process.

3.2 Summary of phase one consultation feedback

3.2.1 Details of the consultation comments related to our proposed use of the King's Stairs Gardens site and our responses are provided in the *Report on phase one consultation*. The main concerns raised relevant to site selection can be summarised as follows:

- a. loss of green space and valued local amenity in a densely populated and deprived part of London
- b. impact on residential amenity and property values
- c. the impact on the wildlife, vegetation and mature trees
- d. impact on footpaths, including the Thames Path
- e. impact on existing heritage features

f. design of our permanent proposals.

3.2.2 The main comments received in support of the phase one consultation preferred site included:

- a. agreement that this is the best choice of site
- b. Southwark Park can compensate for the temporary loss of green space at King's Stairs Gardens
- c. after-use designs are acceptable.

3.3 Back-check process

3.3.1 During phase one, an important change of circumstances emerged in relation to a brownfield site known as Chambers Wharf, located to the west of King's Stairs Gardens. Prior to the launch of our phase one consultation, we were aware that a developer had secured planning approval for housing on the Chambers Wharf site and appeared to have started work on this permission (demolition and site clearance had commenced). Since then, the site had been put up for sale and we purchased the site, in conjunction with property developers St James Group Limited (part of Berkeley Group), as a possible alternative to King's Stairs Gardens.

3.3.2 Post phase one consultation, the London Borough of Southwark also designated King's Stairs Gardens a conservation area, although this did not change the planning discipline's assessment of the site's suitability.

3.3.3 In response to the change in circumstances of the Chambers Wharf site, feedback we received during phase one consultation, a number of engineering design developments and the availability of new technical information, we undertook a back-check to review our selection of S54SK: King's Stairs Gardens as our preferred site.

3.3.4 The back-check involved a targeted repeat of each relevant stage of our site selection process (as set out in the *Site selection methodology paper*) to reconsider which site would be the most suitable main tunnel drive site in Zones S6 and S7 for the construction of the eastern sections of the main tunnel.

3.3.5 The main factors that triggered the back-check process were as follows:

- a. potential availability of Chambers Wharf, which had previously been considered unavailable, as the redevelopment of the site had started and the site was being cleared
- b. various consultees' comments that challenged the use of King's Stairs Gardens as a main tunnel site due to the potential impact on the surrounding environment and community.

Engineering assumptions

3.3.6 As part of the back-check process, the engineering assumptions from the initial phase of site selection were reviewed to see if any of the design

developments or new technical information altered the original assumptions.

3.3.7 The outcome of this review was that the size of construction site required for a main tunnel drive site in Zones S0 to S4 (which covered the majority of the section of the tunnel that must be constructed predominantly in London Clay) was reduced from 18,000m² to 15,000m². This change did not, however, affect the sites in Zones S6 to S7, which would predominantly be constructed in Chalk. This is because the excavated material for a construction site in Chalk needs to go through a slurry process, which requires a larger handling and storage area than is required for a construction site in London Clay.

3.3.8 The following section outlines the results of each stage of the back-check process.

Assessment of the back-check long list

3.3.9 The original long list of main tunnel sites in Zones S6 and S7 comprised 116 sites. These sites were reviewed alongside any newly identified sites to determine the 'scope' of the back-checking exercise (ie, which sites would be reassessed as a result of the relevant changes of circumstances or new information that had emerged). The scoping exercise found that we needed to reassess the following 19 sites:

- a. S50SK: St James Church, St James' Road
- b. S54SK: King's Stairs Gardens
- c. S55SK: Southwark Park, Jamaica Road
- d. S76SK: Chambers Wharf
- e. S003T: Car Park, Vaughan Way/East Smithfield
- f. S004T: Car Park, Vaughan Way/Asher Way
- g. S009T: John Orwell Sports Centre, Tench Street
- h. S010T: Wapping Gardens, Tench Street
- i. S011T: Waterside Gardens, Wapping High Street
- j. S012T: Tobacco Dock, Wapping Lane/Pennington Street
- k. S013T: Princes Court Business Estate, Wapping Lane
- l. S014T: Princes Court Business Estate, Wapping Lane
- m. S015T: Industrial building, Wapping Lane
- n. S016T: Open space, rear of Garnet Street
- o. S020T: Shadwell Basin
- p. S021T: King Edward Memorial Park
- q. S024T: The Highway Trading Centre, Heckford Street
- r. S025T: The Highway Business Park, Heckford Street
- s. S036T: Limehouse Basin

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- 3.3.10 All the other sites on the original long list were scoped out as there had been no change in circumstances to necessitate a reappraisal. The potential group of sites listed above was put on the back-check long list. It should be noted that at this stage, we also considered alternative sites suggested by consultees. However, besides the sites listed above, none were judged to be feasible, mainly due to size and/or location.
- 3.3.11 The back-check long list sites were then assessed against the high-level considerations set out in SSMP Table 2.2 which included engineering (site size, site features, availability of a jetty/wharf and access), planning and environment (heritage, landscape/townscape, open space and ecology) and community and property (neighbouring land uses, site use, Special Land/Crown land and acquisition costs) considerations.
- 3.3.12 Table 3.1 below provides a summary of the outcome of the back-check assessment of the back-check long list of sites. Sites that were determined to be the least constrained in light of the SSMP Table 2.2 considerations passed to the draft short list. This did not necessarily mean that these sites were ultimately judged suitable, but rather that no significant constraints were identified in relation to the high-level considerations set out in SSMP Table 2.2. Sites that were judged to be more constrained were not retained on the draft short list for more detailed assessment. The main rationale for excluding these sites at this stage is summarised below in Table 3.1.

Table 3.1 Long list to draft short list for main tunnel sites in Zones S6 and S7 (SSMP Table 2.2 assessment)

Site ID	Site name/description	Recommendation and rationale
S50SK	St James Church, St James' Road	Recommendation: Not to short list. Rationale: A church on the site would likely preclude the use of this site.
S54SK	King's Stairs Gardens	Recommendation: To draft short list as a main tunnel site and main tunnel reception/intermediate site.
S55SK	Southwark Park, Jamaica Road	Recommendation: To draft short list as a main tunnel reception/intermediate site.
S76SK	Chambers Wharf	Recommendation: To draft short list as a main tunnel site, a main tunnel reception/intermediate site and a main tunnel reception/intermediate site with a CSO connection tunnel drive.
S003T	Car Park, Vaughan Way/East Smithfield	Recommendation: To draft short list as a split main tunnel

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Site ID	Site name/description	Recommendation and rationale
		reception/ intermediate site with S004T.
S004T	Car Park, Vaughan Way/ Asher Way	Recommendation: To draft short list as a split main tunnel reception/intermediate site with S003T.
S009T	John Orwell Sports Centre, Tench Street	Recommendation: To draft short list as a main tunnel and main tunnel reception/intermediate site.
S010T	Wapping Gardens, Tench Street	Recommendation: To draft short list as a main tunnel reception/intermediate site.
S011T	Waterside Gardens, Wapping High Street	Recommendation: To draft short list as a main tunnel reception/intermediate site.
S012T	Tobacco Dock, Wapping Lane/Pennington Street	Recommendation: Not to short list. Rationale: The site includes a Grade I listed building that cannot be demolished. Furthermore, this building has been newly converted to shopping complex.
S013T	Princes Court Business Estate, Wapping Lane	Recommendation: Not to short list. Rationale: The site would be too small without S014T. However, there are employment and operational linkages to S014T; therefore it was likely that there would be an impact on the local economy.
S014T	Princes Court Business Estate, Wapping Lane	Recommendation: Not to short list. Rationale: This site includes a residential block, which could possibly be excluded, but without this area the site would be too small. Also, the site appeared to be interrelated to S013T and it seemed unlikely that parts of the site could be used without disrupting the operations of the

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Site ID	Site name/description	Recommendation and rationale
		business park.
S015T	Industrial building, Wapping Lane	Recommendation: Not to short list. Rationale: The site is currently being redeveloped for residential use.
S016T	Open space, rear of Garnet Street	Recommendation: To draft short list as a main tunnel reception/intermediate site.
S020T	Shadwell Basin	Recommendation: To draft short list as a main tunnel and main tunnel reception/intermediate site.
S021T	King Edward Memorial Park	Recommendation: To draft short list as a main tunnel and main tunnel reception/intermediate site.
S024T	Heckford Street	Recommendation: To draft short list as a split main tunnel reception/intermediate site with S025T.
S025T	Heckford Street	Recommendation: To draft short list as a split main tunnel reception/intermediate site with S024T.
S036T	Limehouse Basin	Recommendation: To draft short list as a main tunnel reception/intermediate site.

NB. The site ID and site name/description were used as an internal mechanism to record and describe the site but could be updated as necessary.

- 3.3.13 Of the 19 sites on the long list, 14 were assessed as potentially suitable and passed to the draft short list. Five sites were eliminated as unsuitable.

Assessment of the back-check draft short list sites

- 3.3.14 The 14 back-check draft shortlisted sites were further assessed by the engineering, planning, environment, community and property disciplines, having regard to the considerations set out in SSMP Table 2.3 which included: engineering (site size, distance and route to the river, jetty/wharf facilities, means of road/rail access, site features, site efficiency, tunnelling and systems engineering requirements); planning and environment (planning applications/permissions, London Plan/UDP/LDF allocations or special policy areas, heritage designations, landscape/open space designations, ecological designation, transport and amenity); property (ownership of site, tenant on site, estimated acquisition cost, Crown land and special land, access and material transfer rights) and community

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(proximity to sensitive receptors, social, economic, health and equality considerations).

3.3.15 Table 3.2 below summarises the outcome of the SSMP Table 2.3 back-check assessment of the draft short list of sites. Sites that were assessed as being the least constrained in light of the SSMP Table 2.3 considerations were retained on the short list and passed to the next stage of assessment. This did not necessarily mean that a site was ultimately judged suitable, but rather that no significant constraints were identified in relation to the considerations set out at SSMP Table 2.3. Sites that were judged to be more constrained were not retained on the short list for more detailed assessment. The decision of whether or not to retain a site on the short list was taken at a multidisciplinary workshop. The main rationale for excluding sites at this stage is summarised below in Table 3.2.

Table 3.2 Draft short list to final short list for main tunnel sites in Zones S6 and S7 (SSMP Table 2.3 assessment)

Site ID	Site name/description	Recommendation and rationale
S54SK	King's Stairs Gardens	Recommendation: Retain on short list as a main tunnel drive site and main tunnel reception/intermediate site.
S55SK	Southwark Park, Jamaica Road	Recommendation: Not to short list. Rationale: <ul style="list-style-type: none"> • Engineering: Tunnelling and hydraulic considerations make this site less favourable. No direct access to the river. • Planning/Environment – Impact on a large number of designations (more than S54SK), such as Metropolitan Open Land, Site of Importance for Nature Conservation and Historic Park and Garden. • Community: Temporary loss of park, impact on park users and a wide number of sensitive receptors.
S76SK	Chambers Wharf	Recommendation: Retain on short list as a main tunnel drive site, a main tunnel reception/intermediate site and a main tunnel reception/intermediate site with a CSO connection tunnel drive.
S003T with S004T	Car park of businesses, Vaughan Way/East Smithfield	Recommendation: Not to short list. Rationale: <ul style="list-style-type: none"> • Engineering: Tunnelling and hydraulic considerations.

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Site ID	Site name/description	Recommendation and rationale
		<ul style="list-style-type: none"> Property: Impact on existing businesses and acquisition risks. Community: Impact on operation of existing businesses.
S009T	John Orwell Sports Centre, Tench Street	<p>Recommendation: Not to short list.</p> <p>Rationale:</p> <ul style="list-style-type: none"> Community: Potential partial loss of sports and leisure facilities through use of this site is likely to impact on community cohesion, health and wellbeing, equalities considerations as well as a number of potentially sensitive receptors in the surrounding area. Planning/Environment: There are a number of constraints to the use of this site, mainly transport and amenity impacts. The adjacent site is also a designated Site of Nature Conservation Importance, Conservation Area and Public Open Space. Property: There is a risk of special land procedures and Rule 5 Equivalent Reinstatement.
S010T	Wapping Gardens, Tench Street	<p>Recommendation: Not to short list.</p> <p>Rationale:</p> <ul style="list-style-type: none"> Planning/Environment: There are significant constraints to the use of the site with the site designated Public Open Space, a site of Nature Conservation Importance and located within a Conservation Area. Furthermore, road access to site is difficult. Property: Risk of special land procedures and equivalent reinstatement. Community: Potential partial loss of public open space, sports and leisure facilities through use of this site is likely to impact on community cohesion, health and well-being, equalities considerations as well as

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Site ID	Site name/description	Recommendation and rationale
		a number of potentially sensitive receptors in the surrounding area.
S011T	Waterside Gardens, Wapping High Street	<p>Recommendation: Not to short list.</p> <p>Rationale:</p> <ul style="list-style-type: none"> • Engineering: Site presents a number of engineering constraints including poor access over canal and under railway bridge. • Community: Potential cumulative impact on sensitive receptors including nearby residential properties, community facilities, open space, playground and tennis courts. Use of the site could therefore affect community cohesion, the local economy, the health and wellbeing of the local community and could disproportionately impact on equalities groups.
S016T	Open space, rear of Garnet Street	<p>Recommendation: Not to short list.</p> <p>Rationale:</p> <ul style="list-style-type: none"> • Engineering: Access to the site is poor. • Community: Temporary partial loss of the public open space could impact on community cohesion, health and wellbeing, as well as equalities considerations.
S020T	Shadwell Basin	Recommendation: Retain on short list as a main tunnel drive site and a main tunnel reception/intermediate site.
S021T	King Edward Memorial Park	Recommendation: Retain on short list as a main tunnel drive site and a main tunnel reception/intermediate site.
S024T and S025T	Heckford Street	Recommendation: Retain on short list as a split main tunnel reception/intermediate site.
S036T	Limehouse Basin	Recommendation: Retain on short list as a main tunnel reception/intermediate site.

NB. The site ID and site name/description were used as an internal mechanism to record and describe the site but could be updated as necessary.

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3.3.16 Of the 14 sites on the back-check short list, six were assessed as potentially suitable and passed to the back-check final short list and eight sites did not proceed to the back-check final short list.

Assessment of the back-check final short list sites

3.3.17 Following the back-check, the six final shortlisted sites identified for assessment at the next stage were as follows:

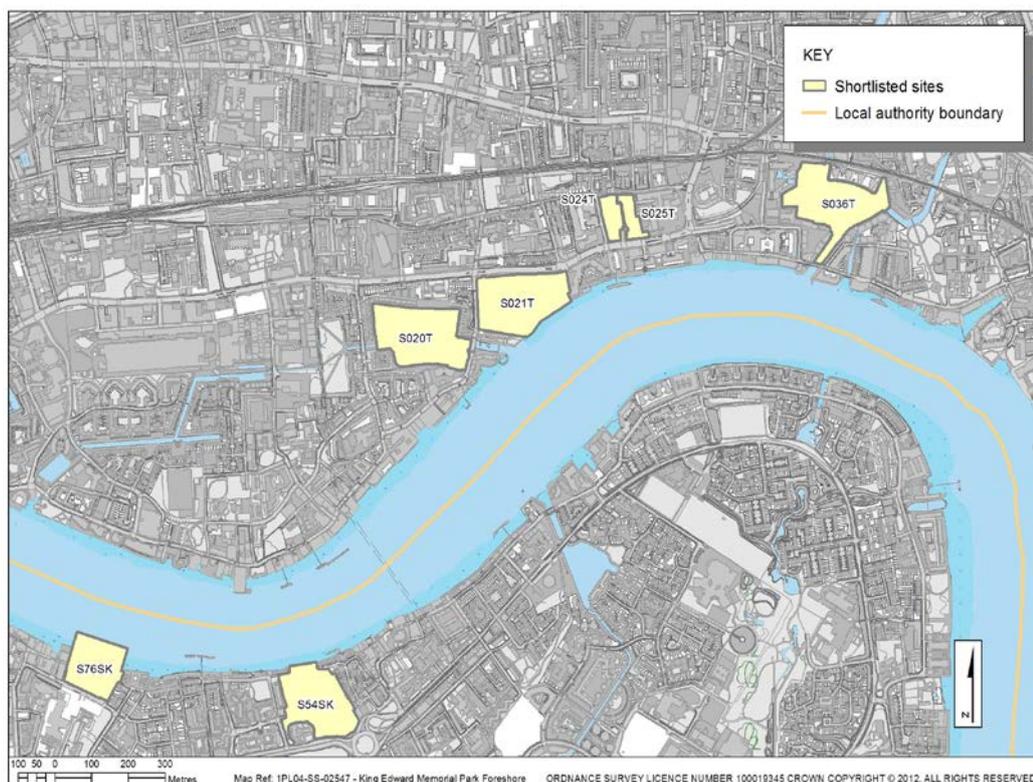
Sites identified as suitable for main tunnel drive or reception/ intermediate sites:

- a. S020T: Shadwell Basin (re-evaluation of phase one assessment)
- b. S021T: King Edward Memorial Park (re-evaluation of phase one assessment)
- c. S54SK: King's Stairs Gardens (one additional site layout assessed)
- d. S76SK: Chambers Wharf (new site).

Sites identified as suitable for main tunnel reception/ intermediate sites only:

- e. S024T and S025: Heckford Street (re-evaluation of phase one assessment)
 - f. S036T: Limehouse Basin (re-evaluation of phase one assessment)
- 3.3.18 Figure 3.1 shows the location of the shortlisted sites in Zones S6 and S7 that could potentially be used in the tunnelling strategies for the construction of the eastern section of the main tunnel.

Figure 3.1 Location of shortlisted main tunnel sites in Zones S6 and S7



3.3.19 For the shortlisted sites listed above where the construction layouts considered at phase one were still applicable, the site suitability reports produced for these sites were re-evaluated to consider whether any new information would have a bearing on any of the disciplines' recommendations. This review supersedes the previous assessments set out in Section 2. We prepared new site suitability report for the S76SK: Chambers Wharf site and S54SK: King's Stairs Gardens we added another site layout option (south side of the site) for assessment.

3.3.20 These site suitability reports contain an assessment of each site's suitability in the light of engineering, planning, environment, community and property considerations. At this stage in the process, no comparisons were drawn between sites; they were assessed in isolation and with no regard to tunnelling strategy. Sites were evaluated by each discipline using our teams' technical knowledge and professional judgement as appropriate, and assessed as suitable, less suitable or not suitable from that discipline's perspective.

3.3.21 A summary of the conclusions of each discipline's assessment from the site suitability reports is provided below.

S020T: Shadwell Basin

3.3.22 Site S020T is irregular in shape and accessible from Newlands Quay, Couldnards Quay, and Wapping Wall. The surrounding area is predominantly residential, and all buildings are oriented to overlook the basin. The site is located in Wapping in the London Borough of Tower Hamlets.

3.3.23 The phase one site suitability report was reviewed by all disciplines for the following uses: main tunnel drive and main tunnel reception/intermediate site. This resulted in slight changes to some of the assessments as specified below, but they did not materially alter the overall assessment.

3.3.24 **Engineering:** This site was considered **less suitable** for use as a main tunnel drive site because of its distance from the river, the significant preparatory works needed to construct the shaft and the considerable difficulties of moving barges to and within the site. The assessment of the site's suitability for use as a main tunnel reception/intermediate site was changed to **suitable** as it was agreed that distance from the river was not really significant for this option.

3.3.25 **Planning:** This site was considered **not suitable** for use as either a main tunnel drive or reception/intermediate site at phase one. A series of planning designations apply to the site and some of the UDP planning policies had been superseded by the *London Borough of Tower Hamlets Core Strategy*. However, there were no significant changes that would alter the original assessment for both options that it was unlikely that mitigation measures would balance out the potential cumulative adverse impacts of the proposed construction works on this site.

3.3.26 **Environment:** Overall, the site was considered **less suitable** for use as either a main tunnel drive or reception/intermediate site at phase one, and these recommendations remained unchanged.

3.3.27 **Socio-economic and community:** The site was considered **less suitable** for use as either a main tunnel drive or reception/intermediate site at phase one, and these recommendations remained unchanged.

3.3.28 **Property:** The site was considered **suitable** for use as both a main tunnel drive and reception/intermediate site at phase one. However, the assessment for the main tunnel drive site was changed to **less suitable** on the grounds of special land acquisition risks and the potentially high discretionary purchase costs.

S021T: King Edward Memorial Park

3.3.29 Site S021T is an area of public open space. The park is irregular in shape and has numerous entrances, accessed primarily from The Highway (A1203) and Glamis Road. The site is located in Wapping in the London Borough of Tower Hamlets.

3.3.30 The phase one site suitability report was reviewed by all disciplines for the following uses: main tunnel drive and main tunnel reception/ intermediate site. New information and engineering design developments since the phase one assessments led to a number of changes to the recommendations, details of which are set out below.

3.3.31 **Engineering:** This site was considered **suitable** for use as either as a main tunnel drive or reception/intermediate site at phase one. It is sufficiently large to readily accommodate the required construction facilities, has good road access and good potential for jetty/wharf facilities. The UK Power networks (nee EDF) cable tunnel is no longer a constraint at this site. However, this did not change the engineering assessment.

3.3.32 **Planning:** The site was considered **not suitable** for use as a main tunnel drive site and considered **less suitable** for use as a main tunnel reception/intermediate site at phase one. The site is a well-maintained public park, which has facilities for a variety of sport and leisure activities. Its use as a main tunnel drive site would result in the temporary loss of a significant area of the park and the remaining areas of open space might not be useable, given the level of construction activity proposed and the potential associated impacts of noise, dust and traffic movements. Replacement open space would likely be required by the council and this could be problematic in this location, due to an existing deficiency and the scale of the area that would be associated with the main tunnel drive site. Use of the site as a main tunnel reception site as it would result in the temporary loss of around a third of the public open space, and would impact on the continued integrity and enjoyment of the remaining areas of the park.

3.3.33 Some UDP policies had been superseded by the *London Borough of Tower Hamlets Core Strategy* and some Interim Planning Guidance policies also became relevant. Two additional minor planning applications, specifically for the Rotherhithe Vent Shaft, were of relevance. However, none of these changes in circumstances changed the assessment.

- 3.3.34 **Environment:** Overall, the site was considered **suitable** for use as either a main tunnel drive or reception/intermediate site at phase one, although mitigation would be required. However, the recommendation for the site's use as either a main tunnel drive or reception/intermediate site with jetty options changed to **less suitable**, while the recommendation for a reception/intermediate site without jetty facilities remained unchanged as **suitable**.
- 3.3.35 **Socio-economic and community:** The site was considered **not suitable** for use as a main tunnel drive site and **less suitable** for both reception/intermediate options at phase one. These recommendations remained unchanged as it was likely that there would be significant impacts on the park and users of the sports and leisure facilities.
- 3.3.36 **Property:** The site was considered **suitable** for use as a main tunnel reception/intermediate site at phase one and this recommendation remained unchanged. However, the assessment of the main tunnel drive site was changed from **suitable** to **less suitable** on the grounds of special land acquisition risks and the potentially high discretionary purchase costs.

S54SK: King's Stairs Gardens

- 3.3.37 Site S54SK is a public park known as King's Stairs Gardens. The site is located in the London Borough of Southwark.
- 3.3.38 This site suitability report was reviewed and updated by all disciplines to include assessment of an additional potential construction site layout for a main tunnel reception/intermediate site to the south of the site. Overall, the site was therefore reassessed as:
- a main tunnel drive site
 - a main tunnel reception/intermediate site – north side of site
 - a main tunnel reception/intermediate site – south side of site
 - a main tunnel reception/intermediate site with CSO connection tunnel.
- 3.3.39 **Engineering:** This site was considered as **suitable** for use as a main tunnel drive site because it is large enough to fit all the site facilities, no demolition other than the playground would be required, and wharf/jetty facilities could be provided. For these reasons, this site was also considered suitable as a main tunnel reception/intermediate site (north side of site) and a reception site with a CSO connection tunnel.
- 3.3.40 However, the option for a reception/intermediate layout south side of the site was considered **less suitable** due to potential issues associated with the alignment of the main tunnel.
- 3.3.41 **Planning:** The site was considered **less suitable** for use as a main tunnel drive or reception/intermediate site under all scenarios. A number of planning designations in the adopted Core Strategy applied to the site, including its designation as Metropolitan Open Land and as a conservation area. The site is also surrounded by sensitive receptors, including residential dwellings, a church, a convent and the Bosco Centre, which includes a nursery and college.

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- 3.3.42 The use of King's Stairs Gardens would result in a loss of amenity space. However, the immediate area is well served by parks and open spaces, especially Southwark Park.
- 3.3.43 **Environment:** Overall, the site was considered **suitable** for use as a main tunnel drive or main tunnel reception/intermediate site (for both options or with a CSO connection tunnel). Based on the information available at the time, the site was considered **suitable** from the perspectives of transport, archaeology, built heritage, water resources (hydrogeology and surface water), flood risk and land quality (for all main tunnel reception/intermediate site options). The site was considered **less suitable** from the perspectives of townscape, ecology, air quality, and noise (for all site options). Although the site was **suitable** from the perspective of land quality for the other site layout options, it was considered **less suitable** under the south reception/intermediate site layout.
- 3.3.44 **Socio-economic and community:** This site was considered **not suitable** for use as a main tunnel drive site or a main tunnel reception/intermediate site with CSO connection tunnel site as the temporary loss of the majority of King's Stairs Gardens was considered likely to have a severe impact on the local community. The temporary loss of the playground onsite and the potential impact on the dense residential properties adjacent to the site to the east and west, as well as the church, convent and Bosco Centre adjacent to the south of the site, compounded the potential community impact. Both these options would also involve substantial tunnelling works onsite and a large jetty in the river.
- 3.3.45 The site was considered **less suitable** for use as a main tunnel reception/intermediate site to the north and south, despite the fact that only approximately half of the gardens would be used due to the impacts on the receptors outlined previously. However, these options would not involve onsite tunnelling works or a jetty in the river.
- 3.3.46 **Property:** The site was considered **less suitable** for use as a main tunnel drive site. A special parliamentary procedure might be required as the foreshore was likely to be Crown land. Furthermore, acquisition costs could be significant, but possibly acceptable. However, the site was considered **suitable** for use as a main tunnel reception/intermediate site under all layout options. Acquisition costs were likely to be acceptable and the site is undeveloped. As with the main tunnel drive option, a special parliamentary procedure might be required.

S76SK: Chambers Wharf

- 3.3.47 Site S76SK comprises vacant sites either side of Chambers Street. The northern part of the site fronts onto the River Thames.
- 3.3.48 The wider area is largely residential in character.
- 3.3.49 The western edge of the site is formed primarily by the rear of two residential properties, Luna House and Axis Court. Luna House fronts the river with Axis Court located to its rear, which fronts East Lane. Properties to the rear of these buildings overlook this site. The eastern edge of the site is bounded by Loftie Street and the south by Chambers Street. St

3 Phase two consultation preferred main tunnel site: Scheme development and site selection process

- Michael's Roman Catholic Secondary School is located to the southwest of the site and further residential dwellings are located to the southeast
- 3.3.50 Additional land to the south of Chambers Street is required to use the site as a main tunnel drive site. This land is located to the east of St Michael's Roman Catholic School, adjacent to green space on the corner of Chambers Street and Bevington Street. The land would house temporary offices and welfare facilities including parking, and no permanent structures would be left on this part of the site.
- 3.3.51 The site is located in the London Borough of Southwark. The site was assessed for the following uses: main tunnel drive and main tunnel reception/intermediate site with and without a CSO connection tunnel drive.
- 3.3.52 **Engineering:** The site was considered **suitable** for use as a main tunnel reception/intermediate site and a reception/intermediate site with a CSO connection as it is of sufficient size and limited demolition would be required. There is an existing wharf and jetty facilities could be provided. The site was also considered **suitable** for use as a main tunnel drive site, although the site would need to be extended into the river by providing a temporary deck or cofferdam of sufficient size to include all the site facilities. This structure would also provide access to river transport.
- 3.3.53 **Planning:** The site was considered **less suitable** for use as a main tunnel drive site and a reception/intermediate site with CSO connection. A number of planning designations apply to the site and it was considered that, with appropriate mitigation measures, it was unlikely that these designations would be unacceptably impacted on. However, the site – in particular the land to the south of Chambers Street is in close proximity to St Michael's Roman Catholic Secondary School, which was considered to be a particularly sensitive receptor both to the construction works and the associated road traffic movements. The principle of using the river to transport construction materials could be acceptable, but would need further investigation to avoid unacceptable impacts on navigation, hydrology and biodiversity in order to accord with London Plan policy relating to the Blue Ribbon Network.
- 3.3.54 The site was also considered **less suitable** for use as a reception/intermediate site without appropriate mitigation measures, although this site configuration would not require jetty facilities.
- 3.3.55 **Environment:** Overall, the site was considered **suitable** for use as a main tunnel drive or reception/intermediate site or a reception/intermediate site with CSO connection, although mitigation would be required.
- 3.3.56 Based on the information available at the time, the site was considered **suitable** for use as a main tunnel site, a reception/intermediate site or a reception/intermediate site with CSO connection tunnel from the perspectives of transport, archaeology, built heritage, townscape and water resources (hydrogeology).
- 3.3.57 The site was, however, considered **less suitable** as a main tunnel site, a reception/intermediate site or a reception/intermediate site with CSO connection tunnel from the perspectives of flood risk, ecology, air quality,

and noise and land quality. The site was also considered **less suitable** as a main tunnel site from the perspective of water resources.

- 3.3.58 **Socio-economic and community:** This site was considered **less suitable** as a main tunnel drive site due to the close proximity of a large number of residential properties either adjacent, overlooking or opposite the works area. In addition, works appeared likely to impact on properties in the vicinity and potentially St Michaels Roman Catholic Secondary School and Riverside Primary School.
- 3.3.59 This site was also considered **less suitable** for a reception/intermediate site, both with and without a CSO connection tunnel. The reduced scope of work and area of land required suggested that it could be possible to manage some of the most disruptive construction works within the site to increase the separation distance between the works and the residential properties adjacent to the east and west. It should also be possible to mitigate potential impacts on other residential properties in the vicinity and prevent disruption to St Michael's Roman Catholic Secondary School.
- 3.3.60 **Property:** The site was considered **suitable** as a main tunnel drive or reception/intermediate site, with or without a CSO connection tunnel. The site is not a developed site, and was recently cleared for redevelopment. Furthermore, the land is under Thames Water ownership. However, the foreshore was likely to be Crown land and the riverbed owned by the PLA. Also, the permanent structure would need to be located so as to minimise the impact on redeveloping the remaining site.

S024T and S025T: Heckford Street

- 3.3.61 S024T and S025T together make up the Heckford Street site. The site is accessed from Heckford Street, which adjoins The Highway (A1203). The site is roughly rectangular in shape. Both areas of the site are currently occupied by commercial buildings, warehouses and offices that are one to two storeys high, with associated parking areas. The site is located in the London Borough of Tower Hamlets.
- 3.3.62 The phase one site suitability report was reviewed and updated where necessary by all disciplines to take into account new information. The site was assessed for use as a split main tunnel reception/intermediate site.
- 3.3.63 **Engineering:** This site was considered **less suitable** for use as a split main tunnel reception/intermediate site at phase one because the impact on third-party assets could be significant. The warehouses within both sites (S024T and S025T) would need to be demolished in order to construct the shaft. The site is a minimum of 100m away from the river and multi storey residential buildings and the Rotherhithe Tunnel lie between the site and the river. This recommendation remained unchanged.
- 3.3.64 **Planning:** The sites were considered **suitable** for use as a split main tunnel reception/intermediate site at phase one. However, this was amended to **less suitable** following further consideration of the potential impact on the planning designations and policies that apply both on and adjacent to the Heckford Street site. Those relating to protection of

employment uses as well as heritage and residential amenity considerations were of most relevance to the proposed development. The Heckford Street sites are in existing employment use and fall within a local industrial location and a designation to enhance and protect existing uses. The loss of employment facilities without suitable justification and replacement elsewhere in this area would be contrary to planning policy.

- 3.3.65 The current status of the residential redevelopment proposals for the site was uncertain at this stage but we understood that pre-application discussions between the applicant and the council had commenced, and a planning application could be expected in the near future. If this were the case, use of the site for the project could delay the redevelopment and adjust the footprint of the site, which is available for redevelopment.
- 3.3.66 **Environment:** Overall, the site was considered **suitable** for use as a split main tunnel reception/intermediate site at phase one, although mitigation would be required. Based on the information available at the time, the site was considered **suitable** from the perspectives of transport, archaeology, built heritage, townscape, water resources, ecology and flood risk, and **less suitable** from the perspectives of air quality, noise and land quality. These recommendations remained unchanged.
- 3.3.67 **Socio-economic and community:** This site was considered **less suitable** for use as a split main tunnel reception/intermediate site at phase one, due to the combined number of potential impacts likely to occur. Foremost among these was the likely loss of several commercial units on site which would require businesses to relocate. This could impact on the livelihoods of owners, operators and employees. Mitigation could involve discussions regarding relocation and/or compensation. This recommendation remained unchanged.
- 3.3.68 **Property:** The site was considered **suitable** for use as a split main tunnel reception/intermediate site at phase one. The acquisition costs were likely to be significant but acceptable and the site did not include Crown land or special land. However, if planning permission for mainly residential development of both parts of the site were granted, the assessment would change to less suitable. If permission were granted and implemented prior to acquisition, the assessment would change to **not suitable**.

S036T: Limehouse Basin

- 3.3.69 Site S036T is Limehouse Basin, which is located north of Narrow Street and can be accessed from the south via the River Thames, via a swing bridge and lock. The site is a well-used marina with three large pontoons. The site is surrounded on all sides by modern, high-rise blocks of flats ranging from three to 12-storeys in height, with habitable rooms and balconies overlooking the basin. In addition, the Cruising Association Members Club is located to the east and a boat keepers' office to the south of the site. The DLR line runs along the northern boundary of the site behind apartments in Basin Approach. The site is located in the London Borough of Tower Hamlets.
- 3.3.70 The phase one site suitability report was reviewed by all disciplines for the following uses: main tunnel reception/intermediate site. This resulted in

slight changes to some of the assessments as specified below, but they did not materially alter the overall assessment

- 3.3.71 **Engineering:** This site was considered **not suitable** for use as a main tunnel reception/intermediate site at phase one because of the requirements for extensive enabling and reinstatement works prior to and following construction. The site does not have good vehicular access and a neighbouring building might need to be demolished to create sufficient access to the site. There are residential buildings and other third-party assets in close proximity to the site. This recommendation remained unchanged.
- 3.3.72 **Planning:** This site was considered **not suitable** for use as a main tunnel reception/intermediate site at phase one. A series of planning designations apply to the site and it appears unlikely that any mitigation measures would balance out the cumulative adverse effects of the proposed construction works on this site.
- 3.3.73 Some UDP policies had been superseded by the *London Borough of Tower Hamlets Core Strategy* and some Interim Planning Guidance policies also became relevant. An Environmental Impact Assessment screening opinion for additional moorings for water taxis had been issued, and a planning application to change the use of leisure moorings to residential moorings had been approved. However, there were no significant changes that altered the assessment or conclusion.
- 3.3.74 **Environment:** Overall, the site was considered **less suitable** for use as a main tunnel reception/intermediate site at phase one. The site was considered **suitable** from the perspectives of transport, archaeology and hydrogeology, and **less suitable** from the perspectives of built heritage, townscape, surface water, ecology, flood risk, air quality, noise, and land quality. These recommendations remained unchanged.
- 3.3.75 **Socio-economic and community:** This site was considered **less suitable** for use as a main tunnel reception/intermediate site at phase one, as it appeared likely that it would have significant impacts on the use of the basin as a marina and the surrounding dense residential development, which would be difficult to mitigate. Also, following the use of the site, the need to maintain permanent access and place a concrete structure in the marina would decrease the area of the basin and would likely reduce the number of pontoons available. This recommendation remained unchanged.
- 3.3.76 **Property:** The site was considered **less suitable** as a main tunnel reception/intermediate site at phase one. Disadvantages included the potential classification of the site as special land, which would require a ministerial procedure to acquire; temporary and permanent disturbance to marina operations and the potential for high discretionary purchase costs. This recommendation remained unchanged.

3.4 Phase two consultation preferred site

- 3.4.1 Following the completion of the back-check process, we held a multidisciplinary workshop to identify the most suitable sites in main tunnel Zones S6 and S7. This workshop took into account the site suitability report findings, potential drive options, feedback received during phase one consultation and interim engagement (carried out after phase one consultation and before phase two consultation).
- 3.4.2 In Zone S6, Chambers Wharf (S76SK) was identified as the most suitable main tunnel drive and reception/intermediate site in preference to King's Stairs Gardens (S54SK). While in Zone S7 King Edward Memorial Park (S021T) was identified as the most suitable main tunnel drive site in preference to Shadwell Basin (S020T) and as the most suitable reception/intermediate site in preference to sites at Shadwell Basin (S020T), Limehouse Basin (S036T) or Heckford Street (S024T and S025T).
- 3.4.3 In Zones S6 and S7, we considered the most suitable sites for each type of use (ie, main tunnel drive or reception/intermediate site) and potential drive options in the *Engineering options report – Abbey Mills route* (Summer 2011). The preferred main tunnel site and use was determined by carrying out a series of comparisons of the sites identified as most suitable in Zones S6 and S7. These comparisons involved comparing drive options based on the various uses (ie, the way in which the sites could be used to construct the tunnel) to identify a preferred main tunnel site. These are explained in Volume 1, Section 6.
- 3.4.4 On the basis of the assessments described above, the tunnelling comparisons between Zones S6 and S7 and professional judgement, it was agreed by all disciplines that **S76SK: Chambers Wharf** should become the phase two preferred main tunnel drive site. We believed this to be the most appropriate site, subject to further engagement with stakeholders, further design development and phase two consultation.
- 3.4.5 In summary, S76SK: Chambers Wharf was identified as the preferred site for the following reasons (not in order of importance):
- a. It is an available and feasible brownfield site that has been earmarked for redevelopment, whereas King Edward Memorial Park is a greenfield site.
 - b. Use of the site would potentially delay but otherwise not interfere with the future redevelopment plans for this cleared site.
 - c. The site has direct river access through the construction of the cofferdam.
 - d. Use of Chambers Wharf would likely cause less disruption to the Thames Path as it is already diverted around the site.
 - e. Use of this site would have less impact on the natural and built environment than would likely be the case at King Edward Memorial Park.

- f. Planning policies are more favourable to the use of the Chambers Wharf than King Edward Memorial Park.
- g. Use of this site presents fewer programme risks and enabling works could be progressed more readily.

3.4.6 The workshop also recognised that at Chambers Wharf there are a number of residential properties in close proximity to the proposed works, and mitigation would be required to reduce the potential impacts of construction activities.

3.4.7 Having identified the preferred sites in the main tunnel zones, we then considered the tunnelling drive options (ie, how to connect these sites to construct the main tunnel).

Tunnelling strategy

3.4.8 In summary, in our multidisciplinary workshop we selected S76SK: Chambers Wharf as the most suitable main tunnel drive or reception/intermediate site for Zones S6 and S7. At the same time and using the same process we also identified S84: Abbey Mills Pumping Station as the most suitable main tunnel drive or reception site in Zone S11 (see Volume 23) and C33XV+ CL005: Greenwich Pumping Station as the most suitable site to drive or receive the Greenwich connection tunnel (see Volume 22).

3.4.9 Our workshop then discussed the tunnelling option comparisons using the most suitable sites listed in paragraph 3.4.10 above. We considered the three drive options to construct the eastern sections of the main tunnel and the Greenwich connection tunnel, which is required to pick up the Earl Pumping Station, Deptford Storm Relief and Greenwich Pumping Station CSOs and connect them to the main tunnel. The options are summarised as follows:

- a. **Option A1:** Drive the main tunnel from S84NM: Abbey Mills Pumping Station to S76SK: Chambers Wharf; receive the main tunnel from Kirtling Street and drive the connection tunnel from S76SK: Chambers Wharf to C33XV and CL005: Greenwich Pumping Station. **Option A2 was the same**, but reversed the drive of the connection tunnel to drive it from C33XV and CL005: Greenwich Pumping Station to S76SK: Chambers Wharf.
- b. **Option B:** Drive the main tunnel from S84NM: Abbey Mills Pumping Station to S76SK: Chambers Wharf; drive the main tunnel from S76SK: Chambers Wharf to Kirtling Street and receive the connection tunnel at S76SK: Chambers Wharf from C33XV+ CL005: Greenwich Pumping Station.
- c. **Option C:** Drive the main tunnel from S76SK: Chambers Wharf to S84NM: Abbey Mills Pumping Station; receive the main tunnel from Kirtling Street and drive the connection tunnel from C33XV+ CL005: Greenwich Pumping Station to S76SK: Chambers Wharf.

3.4.10 On balance, based on the assessment of the above drive options, we preferred Option C, ie, to drive the eastern section of the main tunnel from

3 Phase two consultation preferred main tunnel site: Scheme development and site selection process

S76SK: Chambers Wharf to S84NM: Abbey Mills Pumping Station and drive the connection tunnel from C33XV + CL005: Greenwich Pumping Station to S76SK: Chambers Wharf. The key reasons for this decision are summarised below:

- a. Further technical work and discussions with the Lee Tunnel project team, which is building a shaft at S84NM: Abbey Mills Pumping Station, showed that transporting materials to and from the site by the River Lee and Bow Creek was at worst not feasible and at best highly undesirable where materials needed to be transported daily over a two- to three-year period. This level of barge movements would be required if this site were used as main tunnel drive site, given the volume of excavated material that would be produced by the 24 hour per day tunnelling.
- b. At S76SK: Chambers Wharf, 1,500 tonne or potentially larger barges could be used on the River Thames to remove excavated material produced by a main tunnel drive site, whereas at S84NM: Abbey Mills Pumping Station there were more constraints in using Bow Creek to remove excavated material due to the fact that only small 350 tonne barges could be used during a short tidal window. Even smaller barges were used for the Lee Tunnel project. Having smaller capacity barges increases the number required, which would add considerable complexity and risk.
- c. Using S76SK: Chambers Wharf as the main tunnel drive site would avoid the need to construct campsheds and wharf facilities in Channelsea River, which would avoid the potential health and safety risks associated with moving the contaminated materials in the river bed. It would also mean less impact on the foreshore ecology and water resources at Abbey Mills.
- d. Driving the connection tunnel from Greenwich would mean that the main tunnel could be driven from Chambers Wharf, which would allow excavated materials from the larger main tunnel to be removed by river (see Volume 1, Main report, Section 6.6, Comparison 3 and Section 6.8 for the Greenwich connection tunnel).

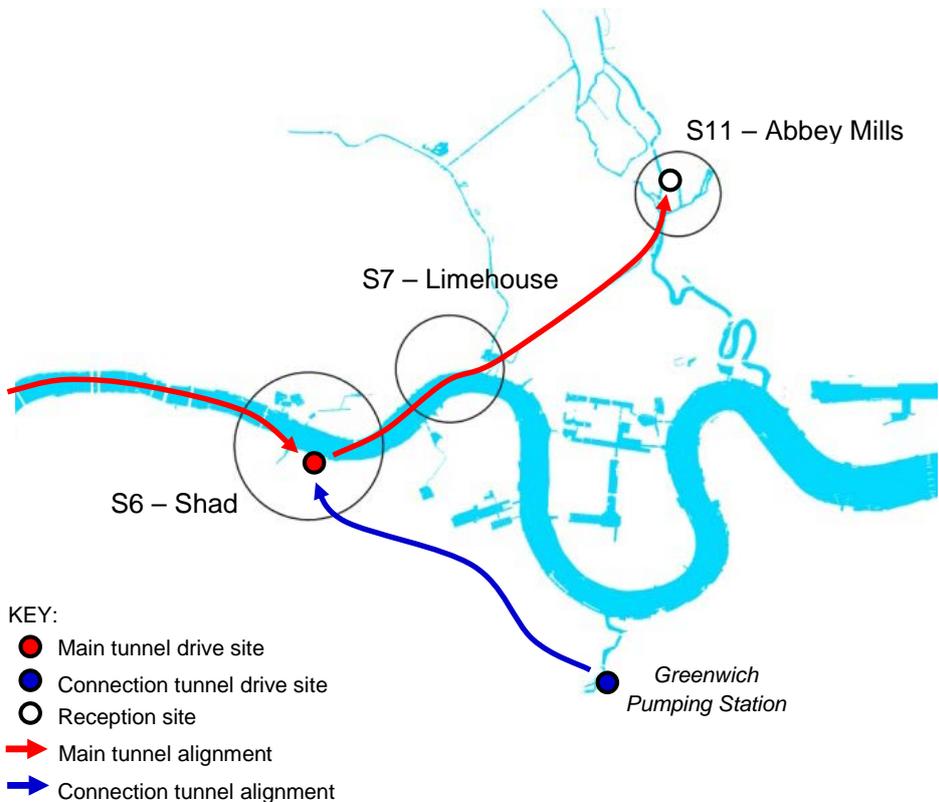
3.4.11 Table 3.3 below sets out a summary of the preferred site and use.

Table 3.3 Preferred site and use for phase two consultation

Site: S76SK: Chambers Wharf

Use: To construct the eastern sections of the main tunnel to drive the main tunnel to Abbey Mills Pumping Station (S84NM) and to receive the main tunnel from Kirtling Street (S72WH/S93WH) and the Greenwich connection tunnel from Greenwich Pumping Station (C33XV + CL005)

Figure 3.2 Preferred sites and tunnelling strategy for the eastern section of the main tunnel and the Greenwich connection tunnel



4 Post phase two consultation: Review and confirmation of proposed main tunnel site for Section 48 publicity

4.1 Introduction to the review

- 4.1.1 This section explains how we implemented the requirement in the *Site selection methodology paper* to review the preferred site following phase two consultation and prior to Section 48 publicity. This stage took place from Spring 2012 to Summer 2012.
- 4.1.2 The review at this stage of the site selection process comprised:
- a. a review of comments from phase two consultation related to main tunnel sites and tunnelling options associated with Zones S1 to S4 for the western sections of the main tunnel as set out in the *Engineering options report - Abbey Mills route* (Spring 2012)
 - b. consideration of any ongoing scheme design and/or new technical information
 - c. multidisciplinary workshops and reviews to identify the proposed main tunnel site and use for Section 48 publicity.
- 4.1.3 The assessments described in Section 4 were based on the information available at the time and the related stage in the pre-application process.

4.2 Summary of phase two consultation feedback

- 4.2.1 Details of the consultation comments related to the proposed use of the Chambers Wharf site and our responses are provided in the *Report on phase two consultation*. The main concerns raised relevant to site selection can be summarised as follows:
- a. object to the use of this preferred site
 - b. the reasons for selecting this preferred site are flawed/questionable; should avoid sites in residential and/or densely populated areas and sites that are close to sensitive receptors, including schools (St Michael's School and Riverside Primary School)
 - c. the site is too small and does not have sufficient capacity for the works and would need to be extended 50m into the River Thames in order to accommodate the proposals
 - d. question the need for a site here as there is no CSO
 - e. alternative site suggestions included King's Stairs Gardens and Abbey Mills Pumping Station
 - f. alternative drive strategies were suggested for the eastern section of the main tunnel and the Greenwich connection tunnel

4 Post phase two consultation: Review and confirmation of proposed main tunnel site for Section 48 publicity

- 4.2.2 The main comments received in support of the phase two consultation preferred site included:
- a. support for the use of the preferred site since phase one consultation. The site is more suitable than the shortlisted King's Stairs Gardens site
 - b. the physical characteristics of the site make it suitable: it is currently vacant and available for redevelopment; it is a brownfield site; it has good access to the road and the River Thames; no trees would be removed.
- 4.2.3 We recognised the concerns that were raised, including potential impact upon residential properties and St Michael's School and Riverside Primary School, and took these into account when developing the scheme, including measures which could be put in place to minimise any significant potential impacts.
- 4.2.4 In light of comments received suggesting alternative drive options prior to Section 48 publicity, we reviewed our tunnelling strategy and prepared a revised *Engineering options report - Abbey Mills route* (Spring 2012). This report concluded that the suggested alternatives would not add any new drive options, so the potentially feasible main tunnel drive options remained the same as those in the *Engineering options report - Abbey Mills route* (Summer 2011) set out prior to phase two consultation. Despite there being no new options, we still checked the sites and tunnelling drive options to ensure our assessments were still valid. This process did not lead to different sites or tunnelling strategy for the western section of the main tunnel (see Volume 1, Sections 6 and 7).
- 4.2.5 Having taken all comments received during phase two consultation into account, we believed S76SK: Chambers Wharf remained the most suitable main tunnel drive site to construct the eastern sections of the main tunnel.

4.3 Consideration of project design or new information

- 4.3.1 Planning permission was granted for a mixed use residential development on the Chambers Wharf site (application number: 07/AP/1262). The consented development also included a site to the south of Chambers Street that we did not propose to be part of our site.
- 4.3.2 London Borough of Southwark had also designated King's Stairs Gardens as a local Site of Importance for Nature Conservation in the adopted *Canada Water Area Action Plan*. King's Stairs Gardens was also dedicated as a Village Green under the *Commons Act 2006*.
- 4.3.3 Having considered this new information, we believed S76SK: Chambers Wharf remained the most suitable main tunnel drive site to construct the eastern sections of the main tunnel.

4.4 Proposed site and use for Section 48 publicity

- 4.4.1 Having completed the site selection review described above, we held a further multidisciplinary workshop prior to Section 48 publicity. On balance, the review process did not identify any additional considerations that would have caused us to change our preferred site from phase two consultation. **S76SK: Chambers Wharf** remained the proposed drive main tunnel site to construct the eastern sections of the main tunnel for Section 48 publicity for the following reasons (not in order of importance):
- a. The is an available and feasible brownfield site that has already been earmarked for redevelopment. However, we considered that our works could be constructed so as not to affect the approved residential development.
 - b. The site would have direct river access through the construction of a cofferdam, which would allow use of barges to transport construction materials in order to reduce the number of vehicles required to service the site.
 - c. The site is closer to the change of geology than the other shortlisted sites and would therefore reduce the tunnelling risks across different types of geology, especially from the Lambeth Group and Thanet Sand Formation, to chalk.
 - d. The site would not cause disruption to the Thames Path because it is already diverted around the site, therefore no diversion works would be required.
 - e. There are fewer planning and environmental policy designations on the Chambers Wharf site, in comparison to the other shortlisted sites.
 - f. There would be less impact on the River Thames foreshore intertidal habitats at Chambers Wharf than similar habitats in the River Lee if a site at Abbey Mills Pumping Station was used to drive the main tunnel.
- 4.4.2 Table 4.1 below sets out the proposed site and use.

Table 4.1 Proposed site and use for Section 48 publicity

Site: S76SK: Chambers Wharf

Use: To construct the eastern sections of the main tunnel to drive the main tunnel to Abbey Mills Pumping Station (S84NM) and to receive the main tunnel from Kirtling Street (S72WH/S93WH) and the Greenwich connection tunnel from Greenwich Pumping Station (C33XV+ CL005)

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5 Post Section 48 publicity: Review and final selection of main tunnel site for the application

5.1 Introduction to the review

- 5.1.1 This section explains how we conducted a site selection review in order to arrive at the final selection of sites to be included in the application. This stage took place during Autumn 2012.
- 5.1.2 The final site selection review comprised:
- a. review of comments from Section 48 publicity related to main tunnel sites and tunnelling options associated with Zones S6 and S7 for the eastern sections of the main tunnel as set out in Volume 1, Section 6.6
 - b. consideration of any ongoing project design and/or new technical information
 - c. final review of shortlisted sites in Zones S6 and S7 which comprised multidisciplinary workshops and reviews to re-consider the various site and main tunnel drive comparisons and the rationale for selecting the main tunnel site and its use for the application.

5.2 Summary of Section 48 publicity feedback

- 5.2.1 Details of the comments to Section 48 publicity related to this site and our responses are provided in the *Consultation Report*. The main concerns raised relevant to site selection can be summarised as follows:
- a. Object to the use of the proposed site. Reasons included: it will endanger a World Heritage Site's status; effect on residential amenity; risk to safety of local children; proximity of the site to a school; and exacerbation of existing traffic problems.
 - b. The preferred site put forward at phase one consultation, Abbey Mills Pumping Station, is more suitable as a main tunnel drive site and hence the drive options should be re-examined.
 - c. Reasons for changing the preferred site since phase one consultation are unclear/unjustified/unsatisfactory.
 - d. There are other more suitable alternative sites available in the local area.
 - e. The site is too small and does not have sufficient capacity to accommodate the proposals.
- 5.2.2 The main comments received in support of the proposed site included:
- a. Support the use of the proposed site.
- 5.2.3 Relevant Section 48 publicity comments were taken into account in the review of shortlisted main tunnel sites set out in Section 5.4 below.

5.3 Consideration of project design or new information

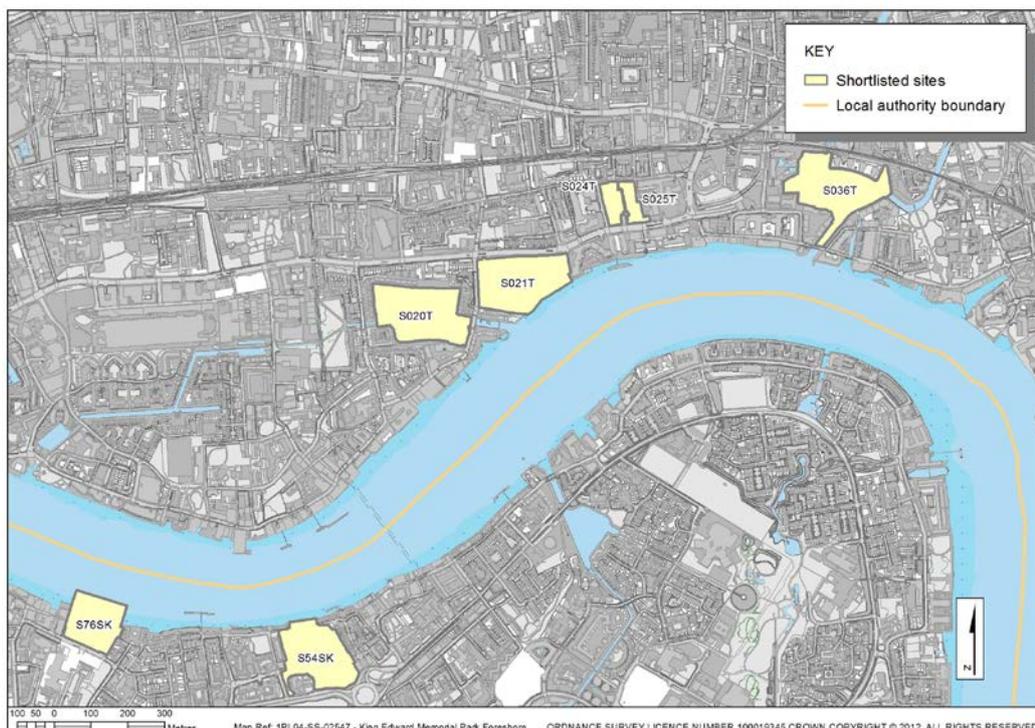
5.3.1 The review of this site confirmed that there was no new project design issues and/or information relevant to site selection.

5.4 Final review of shortlisted main tunnel sites in Zones S6 and S7

5.4.1 As part of the final review process, all the phase two shortlisted sites in main tunnel Zones S6 and S7 were once again reviewed and compared following Section 48 publicity. For the avoidance of doubt, we did not re-review phase one shortlisted sites because we undertook a back-check following phase one consultation that generated an updated shortlist of sites, based on new information and this superseded the shortlist drawn up prior to phase one consultation. We reviewed the shortlisted site assessments presented in Section 3, which remain valid. To avoid unnecessary repetition, site specific points have not been reproduced in this section.

5.4.2 Below is a summary of the final list of shortlisted sites by main tunnel zone and illustrated in Figure 5.1.

Figure 5.1 Shortlisted main tunnel sites in Zone S6 and S7



Zone S6 Shad

5.4.3 Two sites were shortlisted in Zone S6 Shad, both as suitable for use as either a main tunnel drive or reception/intermediate sites:

- S54SK: King's Stairs Gardens
- S76SK: Chambers Wharf

- 5.4.4 The following is a summary of the points which distinguish between the two shortlisted sites in Zone S6.
- 5.4.5 Chambers Wharf is an available and feasible brownfield site that has already been earmarked for redevelopment; while King's Stairs Gardens is a greenfield site, designated as an open space, Site of Importance for Nature Conservation, Metropolitan Open Land, a Village Green and within a Conservation Area, which indicates that the local authority affords a high level of protection to this land. The acquisition risks associated with the use of Chambers Wharf are therefore less than for King's Stairs Gardens and use of a site at Chambers Wharf would also have less impact on the natural terrestrial environment.
- 5.4.6 Chambers Wharf has better river access which provides significant benefits for construction logistics. Whereas, new wharfage/jetties would need to be constructed at King's Stairs Gardens to allow the removal of excavated materials and delivery of construction materials to site by river.
- 5.4.7 It is recognised that the use of either Chambers Wharf or King's Stairs Gardens would have a number of impacts on the local community. Use of Chambers Wharf would impact upon the adjacent residential areas that overlook the site, as well as further properties in the vicinity and St Michael's Roman Catholic School. Use of King's Stairs Gardens would affect the users of this area of public open space, the residential properties opposite the gardens, and the church and Bosco Centre located within the gardens. On balance, it is considered that the use of Chambers Wharf would have less of an impact on the local community, given the brownfield nature of the site and taking into consideration the consented plans for redevelopment.
- 5.4.8 The use of Chambers Wharf would not lead to the loss of trees, grassland or other terrestrial habitats that would be associated with the use of King's Stairs Gardens. There would be some temporary loss of intertidal foreshore habitats during construction at Chambers Wharf but these habitats would be fully reinstated following completion of the construction works.
- 5.4.9 Use of Chambers Wharf would not prevent the consented residential development from being implemented. Our proposals for use of the site have been designed in consultation with the residential developer to ensure that it would be also possible to construct the approved residential development on this site. The site to the south of Chambers Street would not be used for the project.
- 5.4.10 Use of Chambers Wharf is likely to cause less disruption to the Thames Path as it is already diverted around the site and would not require any further diversions, whereas at King's Stairs Gardens a new diversion would be required.
- 5.4.11 Chambers Wharf is closer to the predicted change in geology, hence closer to the point where different tunnelling machines should be used. This reduces the risk of tunnelling across different types of geology, specifically from the Lambeth Group and Thanet Sand Formation to Chalk with a sub-optimal tunnelling machine. The use of Chambers Wharf would

however require the Greenwich connection tunnel to be slightly longer as it is further from Greenwich Pumping Station than King's Stairs Gardens.

- 5.4.12 The overall preference expressed during the review and comparison of sites available in Zone S6 was for S76SK: Chambers Wharf.

Zone S7 Limehouse

- 5.4.13 Two sites were shortlisted in Zone S7 Limehouse as potentially suitable for use as a main tunnel drive site:

- a. S020T: Shadwell Basin
- b. S021T: King Edward Memorial Park

- 5.4.14 It is noted that, all disciplines expressed considerable difficulties and hence significant risk associated with the available sites in this zone.

- 5.4.15 Four sites were shortlisted in Zone S7 as potentially suitable for use as a main tunnel reception/intermediate site:

- a. S020T: Shadwell Basin
- b. S021T: King Edward Memorial Park
- c. S024T/S025T: Heckford Street site (split main tunnel site)
- d. S036T: Limehouse Basin

- 5.4.16 The following is a summary of the points which distinguish between the shortlisted sites in Zone S7.

- 5.4.17 The use of Shadwell Basin as a main tunnel drive or reception/intermediate site would require the basin to be partially filled in to form a working site platform and, because the original lock gates have been removed, all excavated materials would have to be moved by road. This work would also affect the use of the basin by the local community and sailing clubs.

- 5.4.18 A series of planning designations are applicable to the Shadwell Basin site and it is unlikely that any mitigation measures would balance out the adverse effects of the proposed construction works on these planning designations. The basin site is surrounded and overlooked by a large number of residential properties. There are also listed buildings (including a church) and recreational facilities in close proximity to the site. The use of the basin is also likely to lead to substantial ecological impact within a Site of Local Importance for Nature Conservation and, use of the basin as a main tunnel drive site may lead to the loss or displacement of the Shadwell Basin Outdoor Activity Centre.

- 5.4.19 King Edward Memorial Park site has numerous planning and environmental designations and is well used and valued by the local community. A main tunnel drive site would require a temporary worksite which would utilise most of the park, this would leave little public amenity space within an area that is considered to have few alternatives. The park is also surrounded by residential properties on three sides, but at slightly greater distance compared to Shadwell Basin.

- 5.4.20 A main tunnel reception/intermediate site in King Edward Memorial Park would require a temporary worksite which would still utilise a significant proportion of the park and affect the remainder.
- 5.4.21 The use of Limehouse Basin as a main tunnel reception/intermediate site would require the basin to be partially filled in to form a working site platform. This would also affect the use of the basin by the local community, marina and sailing clubs. This would also result in land take from Limehouse Basin which is part of London Canal's Site of Metropolitan Importance for Nature Conservation. There are residential properties in very close proximity to the site. Furthermore, the risks associated with increasing the length of a tunnel drive in Chalk to the Limehouse Basin site are considered to be a very significant project risk that should be eliminated if possible.
- 5.4.22 The Heckford Street site has a number of planning designations and policies related to protection of employment as well as heritage and residential amenity that are applicable both on and adjacent to the site. The Heckford Street site is in existing employment use and falls within a local industrial location and a designation for the enhancement and protection of existing uses. A number of buildings would need to be demolished and the existing businesses relocated which could impact on the local community and local economy and would involve significant property acquisition costs. There are also residential properties in close proximity to the Heckford Street site and it is not located adjacent to the river.
- 5.4.23 It is recognised that using either Shadwell Basin or King Edward Memorial Park as a main tunnel drive site would occupy a substantial area and mitigation on this scale would be very difficult. The preference expressed during the workshop, in respect of the sites available in Zone S7 for use as a main tunnel drive site, was S021T: King Edward Memorial Park. A preference was also expressed for the use of S024T/S025T: Heckford Street as a main tunnel reception/intermediate site.

Summary of sites by zones

- 5.4.24 In summary the most suitable site for each use within Zones S6 and S7 were confirmed as:
- a. Zone S6 - S76SK: Chambers Wharf for use as a main tunnel drive and/or main tunnel reception/intermediate site
 - b. Zone S7 - S021T: King Edward Memorial Park for use as a main tunnel drive site and S024T/S025T: Heckford Street site as a reception/intermediate site.
- 5.4.25 At the same time, and using the same process, S84NM: Abbey Mills Pumping Station was confirmed as the most suitable main tunnel drive or reception site in Zone S11.

5.5 Final review of tunnelling drive options

- 5.5.1 Having established the most suitable site in each zone for each site use (i.e. drive or reception), we then reviewed the drive options as further concerns were raised by the Section 48 publicity feedback.
- 5.5.2 We acknowledged that following phase two consultation the drive options were reviewed (see Volume 1, Section 7.6). This review included preparation of a revised *Engineering options report - Abbey Mills route* (Spring 2012), the results of which dismissed the feasibility of the suggested alternative drive options and concluded that the potentially feasible main tunnel drive options remained the same as those arrived at in the previous *Engineering options report – Abbey Mills route* (Summer 2011). Therefore, the drive options explained in Volume 1, Table 6.2 remained valid and, specifically in relation to the eastern section of the tunnel, a main tunnel drive site was required in one of the three eastern zones (Zones S6, S7 or S11).
- 5.5.3 The review determined that an option utilising a main tunnel drive site in Zone S7 was not preferred as a drive strategy, due to difficulties identified in relation to the use of S021T: King Edward Memorial Park, which would require the use of almost the entire park. In ruling out use of a main drive site in Zone S7, the review was then able to address the main concern raised in Section 48 publicity feedback, which related to the direction of the main tunnel drive between S76SK: Chambers Wharf in Zone S6 and S84NM: Abbey Mills Pumping Station in Zone S11. The sequence of drive option comparisons associated with Zones S6 and S11 were reviewed and the results are presented below.
- 5.5.4 To assist the understanding of the results of the review, the drive options facilitated by Zones S6 and S11 (four options in total) are illustrated in Figures 5.2 to 5.5 below. These figures are followed by the analysis that eventually led us to select the drive option for the eastern section of the tunnel.

Option A (A1 and A2)

Figure 5.2 Option A1 (Greenwich connection tunnel driven from Zone S6 Shad)

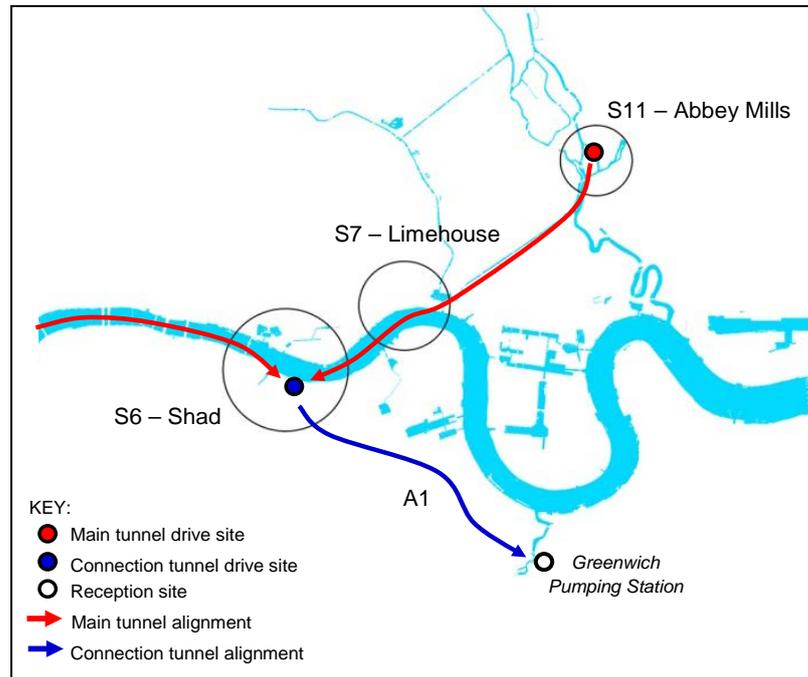
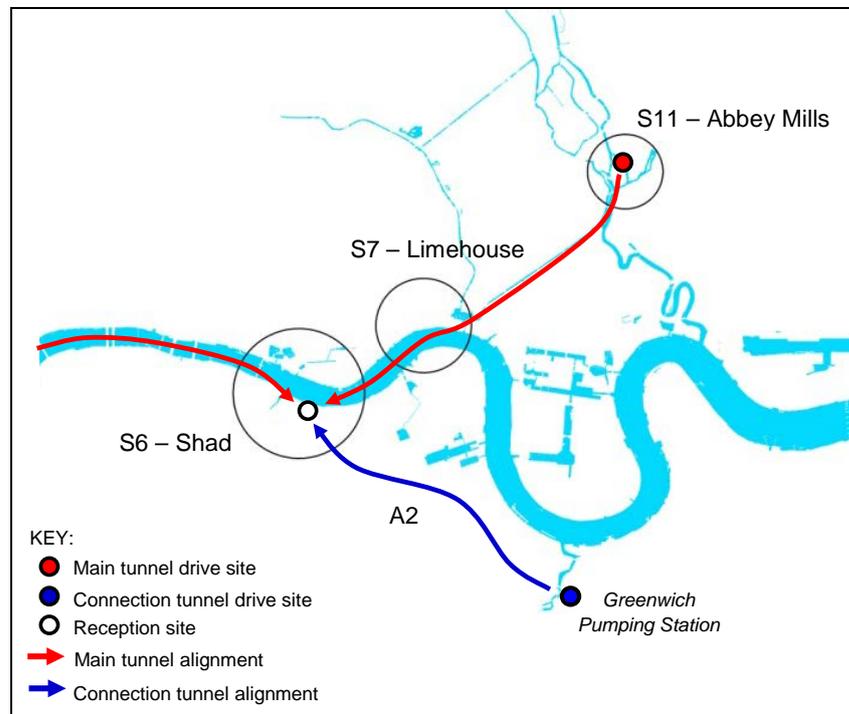
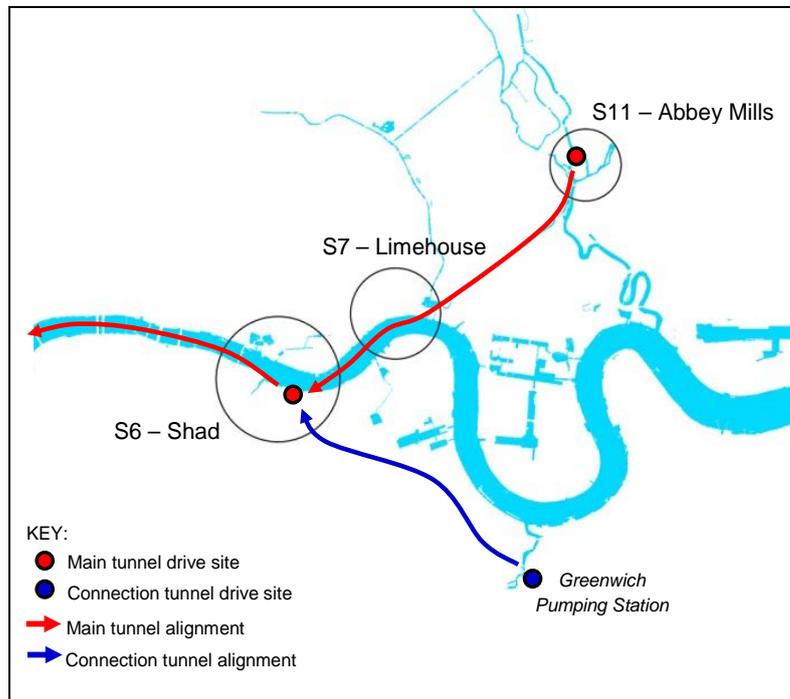


Figure 5.3 Option A2 (Greenwich connection tunnel received in Zone S6 Shad)



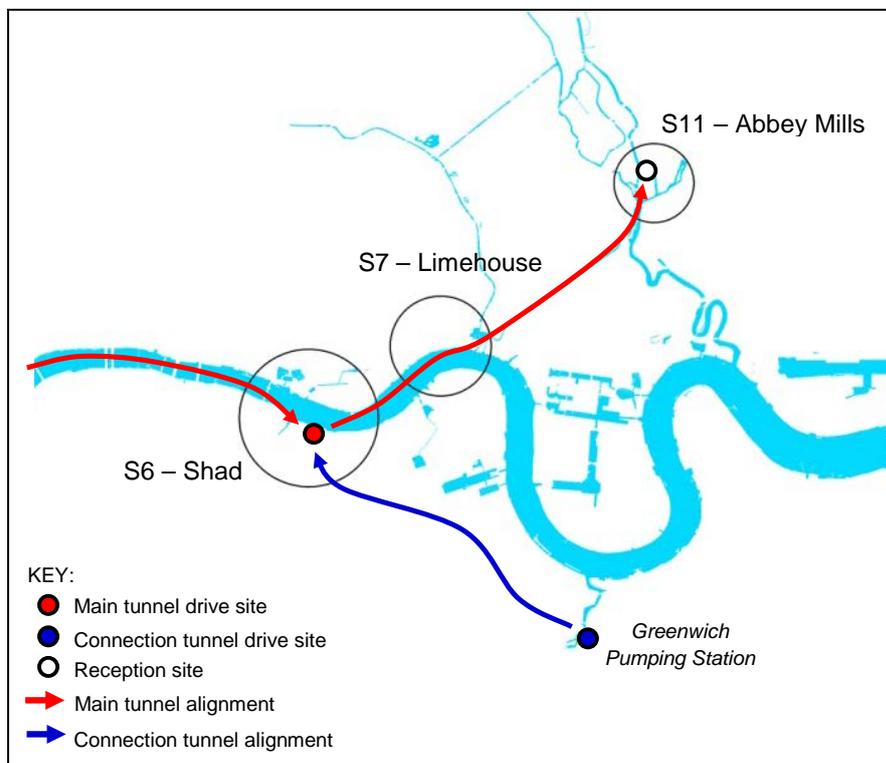
Option B

Figure 5.4 Option B - Drive from Zone S11 to Zone S6 (and drive from Greenwich Pumping Station to Zone S6)



Option C

Figure 5.5 Option C- Drive from Zone S6 to Zone S11 (and drive from Greenwich Pumping Station to Zone S6)



5.5.5 In order to identify the selected drive option and site a series of comparisons and decisions had to be made. The analysis of the drive options illustrated in Figures 5.2 to 5.5 are summarised below.

First comparison of options A1/A2 vs C

Options A1/A2

5.5.6 This option would utilise Abbey Mills Pumping Station as a main tunnel drive site. Chambers Wharf would be used a reception site to receive the TBM from Abbey Mills Pumping Station and the TBM from the drive site in Zone S5 Battersea (Kirtling Street). There is also an alternative sub-options in respect of the drive direction of the connection tunnel between Chambers Wharf and Greenwich Pumping Station.

5.5.7 The points in favour of using Abbey Mills as a main tunnel drive site Options A1/A2 were:

- a. it would avoid the need for a temporary cofferdam to extend the site at Chambers Wharf and would therefore also avoid jetty demolition, and additional work in a strategic policy area and area of archaeological area interest
- b. it would reduce the residential and community impacts at Chambers Wharf and along the roads leading to the site
- c. it would minimise local impacts around the Greenwich Pumping Station site including HGV traffic on local roads (Option A1)
- d. it would minimise discretionary purchase costs at Chambers Wharf (Option A2).

Option C

5.5.8 This option would utilise Chambers Wharf as a main tunnel drive site and Abbey Mills Pumping Station as a main tunnel reception site. Chambers Wharf would also be used to receive the TBM from Zone S5 Battersea (Kirtling Street) and receive the connection tunnel from Greenwich Pumping Station.

5.5.9 The point in favour of using Chambers Wharf as a main tunnel drive site Option C were:

- a. it would avoid impacts from barges berthing in the Channelsea River/Prescott Channel including pollution and flood risk
- b. it would allow the use of large barges
- c. it would avoid residential and community impacts from increased HGV movements along the roads leading to Abbey Mills (Gay Lane and Abbey Road)
- d. it would avoid undesirable delivery risks associated with trying to use smaller barges on the River Lee.

5.5.10 Overall, driving the main tunnel from Chambers Wharf was the preferred drive option and Option A1/A2 was eliminated.

Second comparison of options B vs C

Options B

- 5.5.11 This option would utilise Chambers Wharf as a main tunnel reception site, with Abbey Mills Pumping Station as a main tunnel drive site and a connection tunnel driven from Greenwich Pumping Station:
- 5.5.12 The only point in favour of Option B:
- a. it would avoid construction risks associated with a double drive site in Zone S5.
- 5.5.13 The points in favour of Option C relative to Option B:
- a. it would avoid impacts from barges berthing in the Channelsea River/Prescott Channel including pollution and flood risk
 - b. large barges can be used at Chambers Wharf
 - c. it would avoid residential and community impacts from increased HGV movements along the roads leading to Abbey Mills (Gay Lane and Abbey Road)
 - d. it would avoid highly undesirable delivery risks associated with trying to use smaller barges on the River Lee.

Conclusions

- 5.5.14 Overall Option C illustrated in Figure 5.5 was the selected tunnelling strategy for the eastern section of the main tunnel and Greenwich connection tunnel.
- 5.5.15 At S76SK: Chambers Wharf the main tunnel is within Chalk and the site is only large enough to support one tunnel drive in one direction. As noted above, the preference was to drive the main tunnel from Chambers Wharf to S84NM: Abbey Mills Pumping Station; therefore, in turn, this means the Greenwich connection tunnel would have to be driven from Greenwich Pumping Station with additional logistical land at Phoenix Wharf (C33XV+CL005) to Chambers Wharf.
- 5.5.16 Overall, it was concluded that S76SK: Chambers Wharf should be selected as the main tunnel site to drive the main tunnel to Abbey Mills Pumping Station (see Volume 23), receive the main tunnel from S72WH/S93WH: Kirtling Street (see Volume 16) and receive the Greenwich connection tunnel from Greenwich Pumping Station (see Volume 22).

5.6 Selected site for the application

- 5.6.1 In summary, we reviewed and considered:
- a. Section 48 publicity feedback
 - b. any relevant changes and/or new information
 - c. shortlisted site and tunnelling drive option comparisons.
- 5.6.2 The final site selection review described above culminated in a final multidisciplinary workshop prior to the submission of the application. On

balance, the review process and workshop did not identify any considerations that would have caused us to change our site from Section 48 publicity. Therefore, **S76SK: Chambers Wharf** was selected as the main tunnel site for the application for the following reasons (not in order of importance):

- a. It is an available and feasible brownfield site that has already been earmarked for redevelopment and our works could be constructed so as not to affect the approved residential development.
- b. The site would have direct river access through the construction of the cofferdam, which would allow use of barges or ships to transport construction materials in order to reduce the number of vehicles required to service the site.
- c. This site is closer to the change geology than the other shortlisted sites and would therefore reduce the tunnelling risks across different types of geology, especially from the Lambeth Group and Thanet Sand Formation to Chalk.
- d. The site would not cause disruption to the Thames Path because it is already diverted around the site, therefore no diversion works would be required.
- e. There are fewer planning and environmental policy designations on the Chambers Wharf site when compared to the other shortlisted sites.
- f. There would be less impact on the River Thames foreshore intertidal habitats at Chambers Wharf than similar habitats in the River Lee if a site at Abbey Mills Pumping Station was used to drive the main tunnel.

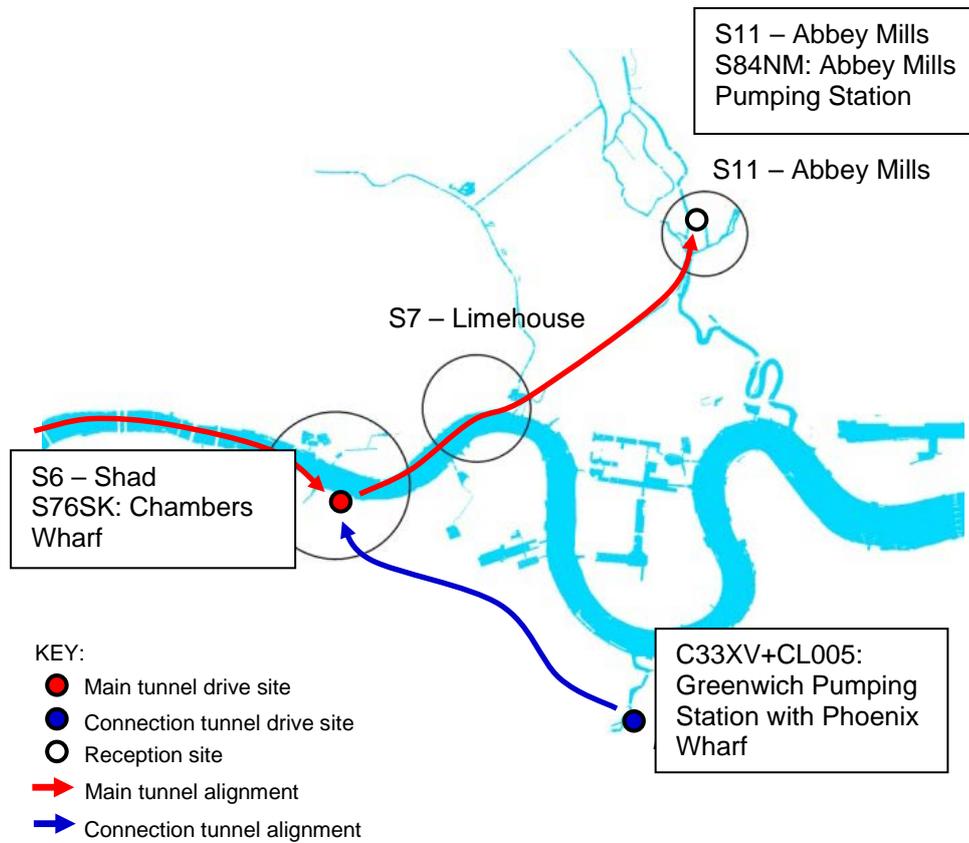
5.6.3 Table 5.1 below sets out the selected site and use. Figure 5.6 illustrates the selected sites and tunnelling strategy for the construction of the eastern sections of the main tunnel and Greenwich connection tunnel.

Table 5.1 Selected site and use for the application

Site: S76SK: Chambers Wharf

Use: To construct the eastern sections of the main tunnel to drive the main tunnel to Abbey Mills Pumping Station (S84NM) and to receive the main tunnel from Kirtling Street (S72WH/S93WH). The site would also be used to receive the Greenwich connection tunnel from Greenwich Pumping Station (C33XV+ CL005).

Figure 5.6 Sites and tunnelling strategy for the eastern section of the main tunnel and Greenwich connection tunnel



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