

**Thames Tideway Tunnel**  
Thames Water Utilities Limited



# Application for Development Consent

Application Reference Number: WWO10001

## Final Report on Site Selection Process

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### **Volume 23**

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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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- Volume 2:** Background papers
  - 1. *Site selection methodology paper* (Summer 2011)
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- Volume 3:** Acton Storm Tanks
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- Volume 20:** Earl Pumping Station
- Volume 21:** Deptford Church Street (formerly Borthwick Wharf Foreshore)
- Volume 22:** Greenwich Pumping Station
- Volume 23:** Abbey Mills Pumping Station (this document)

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# Thames Tideway Tunnel

## Final Report on Site Selection Process Volume 23: Abbey Mills Pumping Station

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# 1 Introduction

## 1.1 The Thames Tideway Tunnel project in context

- 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 section 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	Abbey Mills Pumping Station	To drive the main tunnel to King's Stairs Gardens
Phase two consultation	Abbey Mills Pumping Station	To receive the main tunnel from Chambers Wharf

Phase	Site name	Site use
Section 48 publicity	Abbey Mills Pumping Station	As above
Submission of the application	Abbey Mills Pumping Station	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 the use of 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.

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## 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 section 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 section of the tunnel route was created by conducting a desktop survey of the land in the London Borough of Newham.
- 2.2.2 In total, three 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 three sites identified on the long list of potentially suitable main tunnel sites for the eastern section of the tunnel route, all three were assessed as potentially suitable and passed to the draft short list. No sites were eliminated as unsuitable.

### 2.3 Assessment of the draft short list sites

- 2.3.1 The three 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 three sites on the short list, all three were assessed as potentially suitable as a main tunnel drive or reception/intermediate sites and passed to the final short list.

### 2.4 Assessment of the final short list sites

- 2.4.1 The three 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 site:

- a. S84NM: Abbey Mills Pumping Station
- b. S85NM: Three Mills Green
- c. S86NM: Three Mills Studios.

- 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.

#### S84NM: Abbey Mills Pumping Station

- 2.4.4 Site S84NM is located in the southern part of the Abbey Mills Pumping Station on a more open part of the Thames Water's operational site. There are a number of allotments within the site boundary that lie to the west and abut the Prescott Channel.
- 2.4.5 The site is bounded to the west by the Prescott Channel, to the east by the Channelsea River, to the northwest by residential properties, and to the north by the Greenway. The site is located in the London Borough of Newham
- 2.4.6 The site was assessed for use as a main tunnel drive and main tunnel reception site.
- 2.4.7 **Engineering:** The site was considered **suitable** for use as either a main tunnel drive or reception site. The area is large enough and might have river access. There are no particular constraints from third-party assets and there is no need for any demolition.
- 2.4.8 River access would be constrained as it is shallow, narrow and winding, with only limited access at each tide, which would limit the type of barge and number of movements.

- 2.4.9 **Planning:** The site was considered **suitable** for use as either a main tunnel drive or reception site. There are a number of applicable designations and sensitive receptors in the vicinity of the site. However, careful consideration of the location of some of the construction works and the site access and appropriate mitigation should avoid an unacceptable level of impact.
- 2.4.10 **Environment:** Overall, the site was considered **suitable** for use as either a main tunnel drive or reception site. It was considered **suitable** from the perspective archaeology, built heritage and townscape, water resources, ecology, flood risk, air quality and noise. However, the site was considered **less suitable** from the perspectives of road transport and land quality.
- 2.4.11 **Socio-economic and community:** The site was considered **less suitable** for use as a main tunnel drive site as this would likely lead to the loss or displacement of some of the allotments, which could be difficult to relocate or otherwise mitigate. Some indirect impacts would also be likely on the Three Mills Studio due to its proximity to the main area of works, and the Kingsland Further Education College, a small number of business premises, Three Mills Green, and a number of residential properties could also be affected.
- 2.4.12 The site was considered **suitable** for use as a main tunnel reception site as it appeared that the allotments would only be partly affected by the road access and the proximity to the construction activity, which would likely affect the tranquillity and enjoyment of the allotments. Nearby residential, educational and commercial uses as above could also experience disruption, but it was likely this could be mitigated.
- 2.4.13 **Property:** Assessed the site as suitable as a main tunnel drive or reception site as the site is owned by Thames Water. If the site were used as a main tunnel drive site, a slight redesign should be undertaken in order to avoid relocating allotment holders.
- S85NM: Three Mills Green**
- 2.4.14 Site S85NM is located on the northern half of the Three Mills Island, on an area of land known as Three Mills Green. The site is bounded to the east by the Prescott Channel, including a lock and sluices, to the south by Three Mills Studios, and to the west by the Three Mills Wall River. The site is located in the London Borough of Newham.
- 2.4.15 The site was assessed for use as a main tunnel drive or main tunnel reception site.
- 2.4.16 **Engineering:** The site was considered **suitable** for use as a main tunnel drive site or reception site. The site is of sufficient size and has the potential for jetty/wharfage facilities. There would likely be limitations on the use of river access as barge movements would be restricted. Road access would be via a traffic-calmed road approximately 7m wide. There could be weight restrictions on the bridge crossing.
- 2.4.17 **Planning:** The site was considered **less suitable** for use as either a main tunnel drive or reception site. A number of planning and environmental

designations applied to the site. Of these, open space, heritage and nature conservation were of most significance. Use of the site could be mitigated; however, the impact of the loss of open space and the local planning authority's requirement for replacement facilities would require further investigation.

- 2.4.18 **Environment:** Overall, the site was considered **suitable** for use as either a main tunnel drive or reception site. It was considered **suitable** from the perspectives of transport, archaeology, built heritage, townscape, surface water, ecology, flood risk, air quality and noise. However, it was considered **less suitable** from the perspectives of hydrogeology and land quality.
- 2.4.19 **Socio-economic and community:** The site was considered **not suitable** as a main tunnel drive site as it appeared that it would lead to the temporary loss of the Three Mills Green area of public open space during the construction period, which would likely have a significant effect on community cohesion and the health and well-being of the local population. There would also potentially be impacts on residents in properties to the north of the site and businesses located opposite to the south and west. The site was considered **less suitable** for use as a main tunnel reception site. Using the site for this purpose had the potential to affect the same receptors, but the impacts would likely be less than for a main tunnel site due to the reduced scope of work.
- 2.4.20 **Property:** The site was considered **suitable** for use as a main tunnel drive or reception site as the acquisition costs were likely to be acceptable. However, selection of this site would likely raise a large number of objections.

### **S86NM: Three Mills Studios**

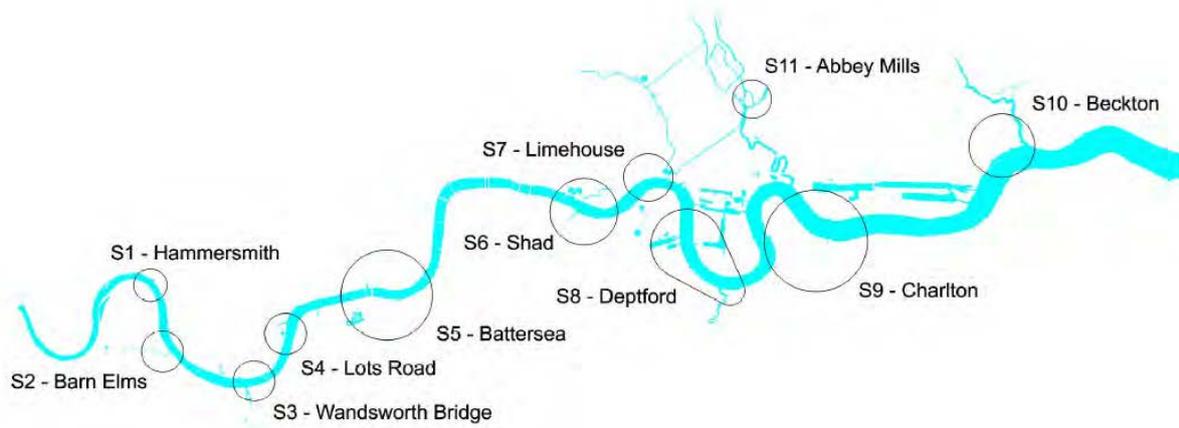
- 2.4.21 Site S86NM is located on the southern half of the Three Mills Island and is currently in use as the Three Mills Studios. The site is broadly square and surrounded by watercourses on three sides and an area of open space to the north.
- 2.4.22 The site is bounded to the east by the Prescott Channel, to the south by the Channelsea River, to the west by the Three Mills Wall River and the River Lee, and to the north by the Three Mills Green, which is a grassed, open space, fringed with trees. The site is located in the London Borough of Newham.
- 2.4.23 The site was assessed for use as a main tunnel drive or main tunnel reception site.
- 2.4.24 **Engineering:** The site was considered **less suitable** for use as a main tunnel drive site because of the significant demolition and enabling works that would be necessary. Also, there would be restrictions on use of the river. The site was considered **suitable** for use as a main tunnel reception site as it would be of sufficient size and require less demolition and fewer enabling works.

- 2.4.25 **Planning:** The site was considered **less suitable** for use as either a main tunnel drive or reception site as it was subject to numerous planning and environmental designations and significant mitigation would be required.
- 2.4.26 **Environment:** Overall, the site was considered **less suitable** for use as either a main tunnel drive or reception site. It was considered **suitable** from the perspectives of transport, townscape, surface water, ecology, air quality and noise. However, it was considered **less suitable** from the perspectives of archaeology, built heritage, hydrogeology, flood risk and land quality.
- 2.4.27 **Socio-economic and community:** The site was considered **not suitable** for use as a main tunnel drive site as it appeared that use of the site would lead to the temporary loss of the whole Three Mills Studios site, which could have livelihood implications for business owners and employees. The use of the site could also impact on Three Mills Green – an area of public open space. The site was considered **less suitable** for use as a main tunnel reception site as only approximately half of the site would be required therefore some of the studio buildings could remain. However, the nature of the creative media business suggests that it was unlikely that this would provide a suitable working environment, which would force the businesses to relocate or close.
- 2.4.28 **Property:** The site was considered **less suitable** for use as both a main tunnel drive or reception site as acquisition and associated disturbance costs were expected to be moderate to high for both options.

## 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.

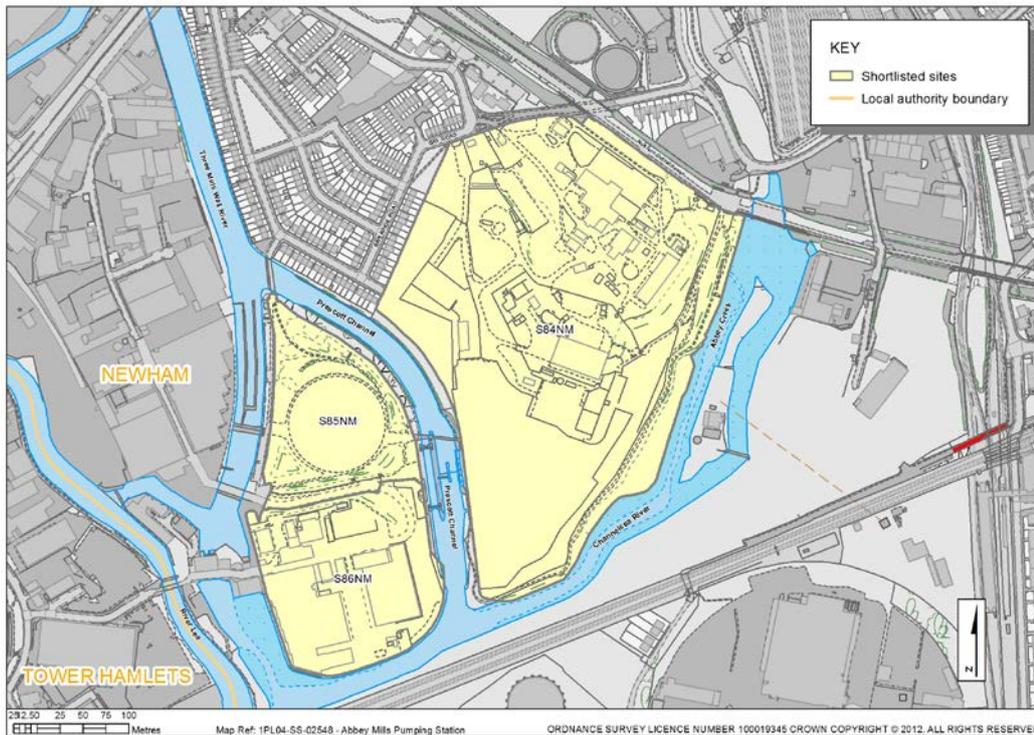
2.5.6 Multidisciplinary workshops were held to identify the most suitable main tunnel site from those shortlisted within each zone, taking into account the conclusions reached in the site suitability reports, as described above.

2.5.7 There were three shortlisted sites in Zone S11:

- a. S84NM: Abbey Mills Pumping Station
- b. S85NM: Three Mills Green
- c. Site S86NM: Three Mills Studios.

2.5.8 Figure 2.2 shows the location of the shortlisted sites in Zone S11 – Abbey Mills.

**Figure 2.2 Zone S11 shortlisted sites**



2.5.9 From the three shortlisted sites, **S84NM: Abbey Mills Pumping Station** was identified as the preferred location for a main tunnel drive or reception site in Zone S11. The reasons are summarised below (not in order of importance):

- a. S84NM offers the advantages of making use of existing Thames Water land and avoids the need to impact the existing businesses on the other shortlisted sites.
- b. The most significant impacts and risks associated with this site relate to the existing road access route through the adjacent housing estate, the impact of the site on allotments within the site boundary and the desire to provide wharfage access for excavated material barges. In overall terms, it was considered that this site could be developed in accordance with planning policy.
- c. On balance, the alternative sites, S85NM and S86NM, are considered likely to result in greater impacts and are therefore, on balance, less suitable.
- d. S85NM: Three Mills Green is considered less suitable from a planning perspective and not suitable/less suitable from a community perspective, depending on whether a main drive or reception site is provided. S86NM: Three Mills Studios is considered less suitable for a main drive site by engineering, planning, environment and property disciplines and not suitable by community. It is also considered less suitable for a reception site by planning, environment, community and property disciplines. Importantly, use of either site would be likely to result in conflict with planning policy in the *Newham Unitary Development Plan*.

- 2.5.10 Therefore, in Zone S11 site S84NM: Abbey Mills Pumping Station was judged to be the least constrained and most suitable either as a main tunnel drive or main tunnel reception site.
- 2.5.11 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.
- 2.5.12 The drive strategy for the eastern section of the main tunnel was influenced by the change in geology from Thanet Sands to Chalk in the Tower Bridge area at which it is desirable to change type of TBM. A main tunnel site was therefore required in Zones S6 or S7.
- 2.5.13 There was a preference for a site in Zone S6 over Zone S7. In Zone S6, S54SK: King's Stairs Gardens was identified as the most suitable main tunnel site at phase one consultation, but was assessed as only suitable for a main tunnel reception site. This meant that the eastern section of the main tunnel needed to be driven from S84NM: Abbey Mills Pumping Station in Zone S11.
- 2.5.14 At a multidisciplinary workshop **S84NM: Abbey Mills Pumping Station** was selected as our phase one consultation preferred main tunnel drive site from which to construct the eastern section of the main tunnel. The reasons are summarised below (not in order of importance):
- Abbey Mills Pumping Station site is owned by Thames Water and should be utilised as far as is reasonably practicable.
  - Driving the main tunnel from Abbey Mills Pumping Station would reduce the impact on public open space and residential amenity at King's Stairs Gardens, although a long connection tunnel to pick up three CSOs would still be constructed from the King's Stairs Gardens site and a second connection tunnel to pick up a fourth CSO would also be received at the site. The neighbouring residential uses would therefore still be affected.
  - The Abbey Mills Pumping Station site is relatively unconstrained compared to King's Stairs Gardens, particularly in terms of its operational nature, and there are fewer sensitive receptors in the area. It is, however, located within a conservation area.
  - It was more likely that noise and air quality impacts could be adequately mitigated for a main tunnel drive shaft site at Abbey Mills Pumping Station than at King's Stairs Gardens.
  - There could be a compensation cost for replacing open space at King's Stairs Gardens.
- 2.5.15 Table 2.1 below sets out the preferred site and use.

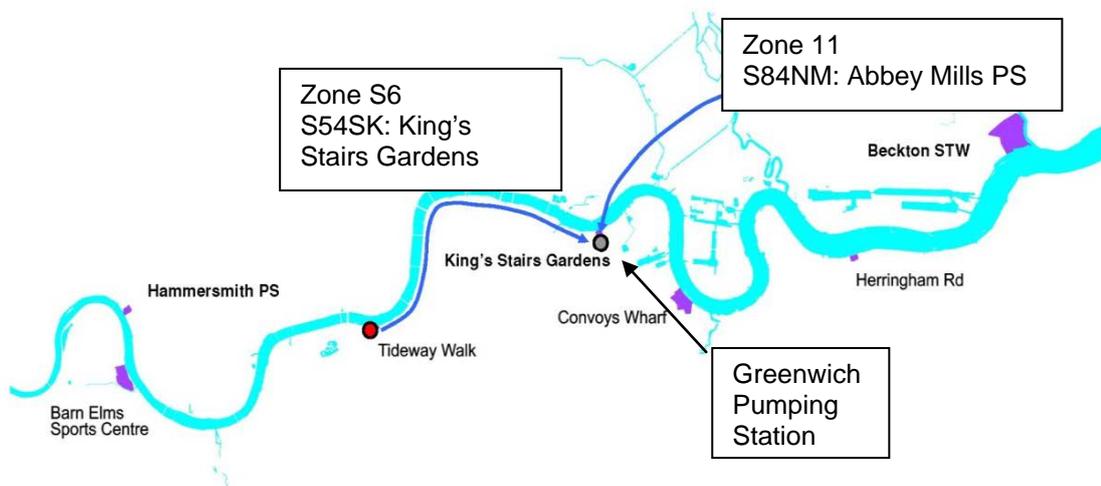
**Table 2.1 Preferred site and use for phase one consultation**

**Site:** S84NM: Abbey Mills Pumping Station

**Use:** To drive the eastern section of the main tunnel to King's Stairs Gardens (S54SK)

- 2.5.16 We also confirmed the following at the same time and by the same process:
- S54SK: King's Stairs Gardens in Zone S6 as a preferred main tunnel reception site (see Volume 18, Section 2). This site would be used to receive the central section of the main tunnel driven from Tideway Walk (S79WH with S80WH - see Volume 13, Section 2) and the eastern section of the main tunnel driven from Abbey Mills Pumping Station (S84NM). This site would also be used to drive two CSO connection tunnels: one to Greenwich Pumping Station and the other to Druid Street
- 2.5.17 Figure 2.3 sets out the preferred phase one consultation drive strategy for the eastern sections of the main tunnel.

**Figure 2.3 Phase one consultation main tunnel drive strategy**



- 2.5.18 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.

## 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 western 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 on-going scheme design and/or any new information received
  - c. preparation of a new *Engineering options report – Abbey Mills route* (Summer 2011) with revised tunnelling drive options
  - d. a multidisciplinary optioneering workshop to consider the preferred site in Zone S 11 and the *Engineering options report – Abbey Mills route* (Summer 2011)
  - e. 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 Abbey Mills Pumping Station 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. the need to maintain nearby footpath access
  - b. loss of green space, including allotments
  - c. disruption to residents from construction works
  - d. impact of construction traffic
  - e. design of the operational buildings
  - f. odour impacts in the surrounding area.
- 3.2.2 The main comments received in support of the phase one consultation preferred site included:

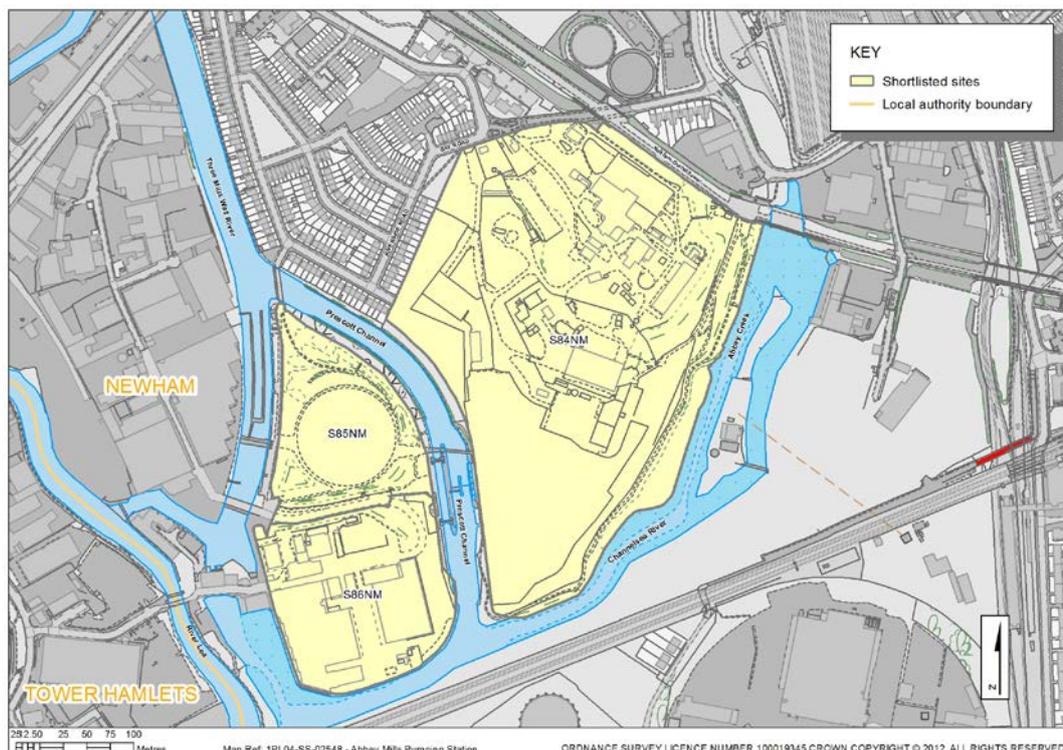
### 3 Phase two consultation preferred main tunnel site: Scheme development and site selection process

- a. it will cause least disruption of the three sites consulted on
- b. the proposal is supported by Lee Valley Regional Park Authority.

## 3.3 Back-check process

3.3.1 Following our review of the feedback received during phase one consultation, we held a multidisciplinary workshop to review the selection of all our preferred sites and drive options for the eastern section of the main tunnel. There was no information that would have led us to review the shortlisted sites in Zone S11 (S85NM: Three Mills Green and S86NM: Three Mills Studios, which remained constrained by numerous planning designations as well as environmental and community impacts); therefore, S84NM: Abbey Mills Pumping Station remained the most suitable main tunnel drive or reception site in Zone S11.

**Figure 3.1 Zone S11 shortlisted main tunnel sites**



3.3.2 Whilst our preferred site (S84NM) in Zone S11 did not change, we did review the main tunnel drive options; especially as we carried out a back-check in Zones S6 and S7. This is relevant to S84NM: Abbey Mills Pumping Station because there is an interrelationship between either Zones S6 or S7 and Zone S11 in the consideration of the of the eastern drive options.

3.3.3 As set out in Volume 18, Section 3, the result of the back-check of Zone S6 was that we changed from our preferred site of S54SK: King's Stairs Gardens to S76SK: Chambers Wharf. Also, as at phase one consultation, we still preferred a main tunnel site in Zone S6 - Shad over Zone S7 – Limehouse. This change of preferred site in Zone S6 then required a review of the eastern main tunnel drive options in Zone S6 and Zone S11.

This review process would determine the use of S84NM: Abbey Mills Pumping Station site (ie, the site would remain a main tunnel drive site or change to become a main tunnel reception site, receiving the main tunnel driven from S76SK: Chambers Wharf).

#### Engineering assumptions

- 3.3.4 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.
- 3.3.5 The outcome of this review was that the size of construction site required for a main tunnel drive shaft in Zones S0<sup>1</sup> to S4 (which covered the majority of the section of the tunnel that must be constructed predominantly in London Clay) was reduced from 18,000m<sup>2</sup> to 15,000m<sup>2</sup>. This change allowed the back-check process to review sites that were previously considered too small for main tunnel drive sites. This change did not, however, affect the sites in S11 (or Zones S6 and 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.

### 3.4 Phase two consultation preferred site

- 3.4.1 Following the completion of the review the drive options for the eastern section of the main tunnel, on the basis of the assessments described above and professional judgement, it was agreed by all disciplines that **S84NM: Abbey Mills Pumping Station** should remain the preferred main tunnel site for phase two consultation. We believe the site to be the most appropriate, subject to further engagement with stakeholders and design development.
- 3.4.2 Having identified the preferred sites in the main tunnel zones, we then considered the tunnel drive options (ie, how to connect these sites to construct the main tunnel).

#### Tunnelling strategy

- 3.4.3 In summary, in our multidisciplinary workshop we selected S84NM: Abbey Mills Pumping Station as the most suitable main tunnel drive or reception/intermediate site for Zone S11. At the same time and using the same process we also identified S76SK: Chambers Wharf as the most suitable main tunnel drive or reception site in Zone S6 and S7 (see Volume 18) and C33XV+ CL005: Greenwich Pumping Station as the most

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<sup>1</sup> The creation of a new zone (S0) at the western end of the main tunnel is covered in detail Section 6 of the Main Report (Volume 1)

suitable site to drive or receive the Greenwich connection tunnel (see Volume 22).

3.4.4 Our workshop then discussed the tunnelling option comparisons using the most suitable sites listed in paragraph 3.4.7 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 as Option A1, 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.

3.4.5 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 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

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

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).

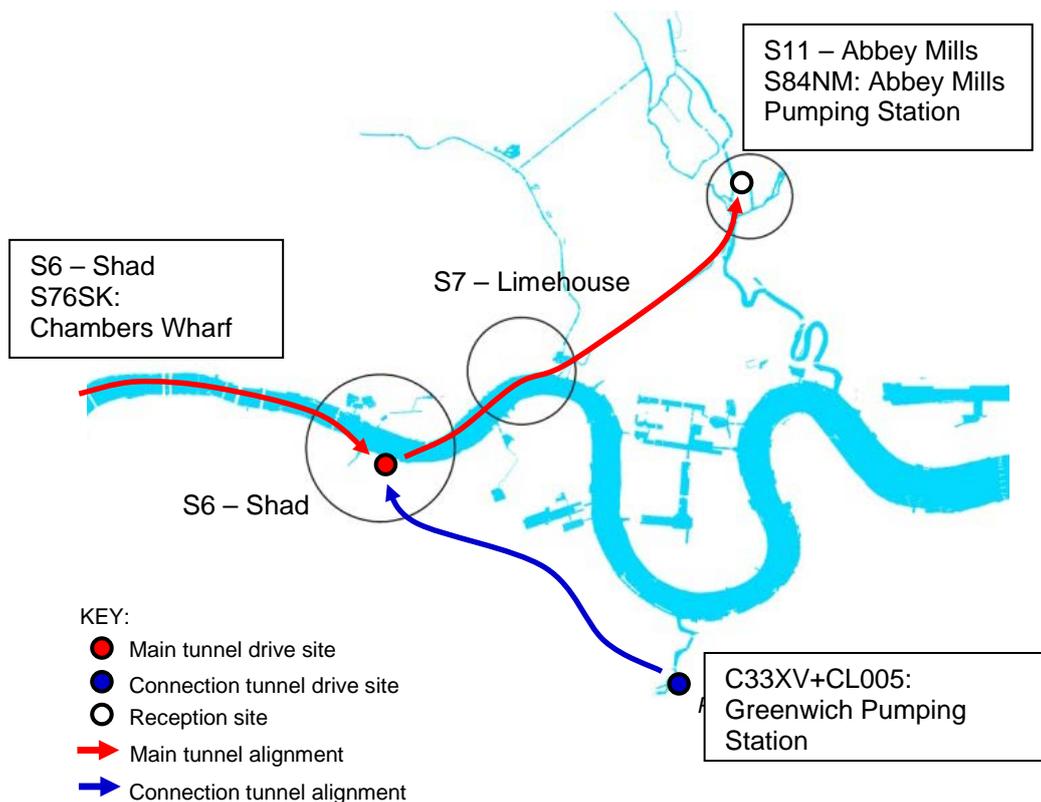
3.4.6 Table 3.3 below sets out a summary of the preferred site and use.

**Table 3.1 Preferred site and use for phase two consultation**

**Site:** S84NM: Abbey Mills Pumping Station

**Use:** To receive the eastern section of the main tunnel driven from Chambers Wharf (S76SK)

**Figure 3.2 Phase two consultation preferred sites and tunnelling strategy for the eastern section of the main tunnel and Greenwich connection tunnel**



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## 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 on-going 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 Abbey Mills Pumping Station 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 and changes to the proposed use of the preferred site since phase one consultation
  - b. Query why shortlisted sites have not been identified
  - c. Site selection should avoid sites in residential and/or densely populated areas/ the scale of effects on the local area and community resulting from the selection of this site is unacceptable/has not been properly considered
  - d. The drive strategy and associated use of this site needs to be reconsidered; specifically instead of Chambers Wharf
  - e. The reasons for selecting this preferred site are flawed/questionable.
- 4.2.2 The main comments received in support of the phase two consultation preferred site included:
- a. Support for the use of the site/support the changes to the proposed use of the preferred site since phase one consultation

- b. The site is a suitable size and/or has sufficient capacity to accommodate the proposals
- c. The site is already an operational Thames Water site/is owned by Thames Water
- d. The effects associated with selection of this site can be managed through mitigation
- e. Qualified support subject to clarification being provided as to why the Lee Tunnel shaft cannot be used as the reception shaft instead of constructing a new shaft.

4.2.3 We recognised the concerns that were raised, including impact on the local environment and site specific matters, and took these into account in 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 S84NM: Abbey Mills Pumping Station remained the most suitable drive main tunnel site to construct the eastern sections of the main tunnel.

### **4.3 Consideration of project design or new information**

4.3.1 We received feedback from the Lee Tunnel project (currently under construction), which was that whilst barging of excavated spoil from a shaft at Abbey Mills is technically feasible, much larger volumes of spoil would arise if Abbey Mills were a main tunnel drive site and this amount could not be transported by barge. This is because of the limited tidal window and the time needed to navigate the tortuous River Lea up to Abbey Mills, and the inability of barges to operate at Abbey Mills at all during certain tidal conditions. This reinforces the assessment that Abbey Mills is not suitable as a main tunnel drive site.

4.3.2 It was confirmed that the Abbey Mills Pumping Station site is not designated as open space in the London Borough of Newham Core Strategy adopted in January 2012; however, it remains Green Space under the saved Unitary Development Plan policy. It is within an area of search for a new area of Metropolitan Open Land along the Lower Lea Valley, but the precise boundary had not yet been defined.

4.3.3 Having considered this new information, we believed S84NM: Abbey Mills Pumping Station remained the most suitable main tunnel reception site.

## 4.4 Summary of the tunnelling drive options

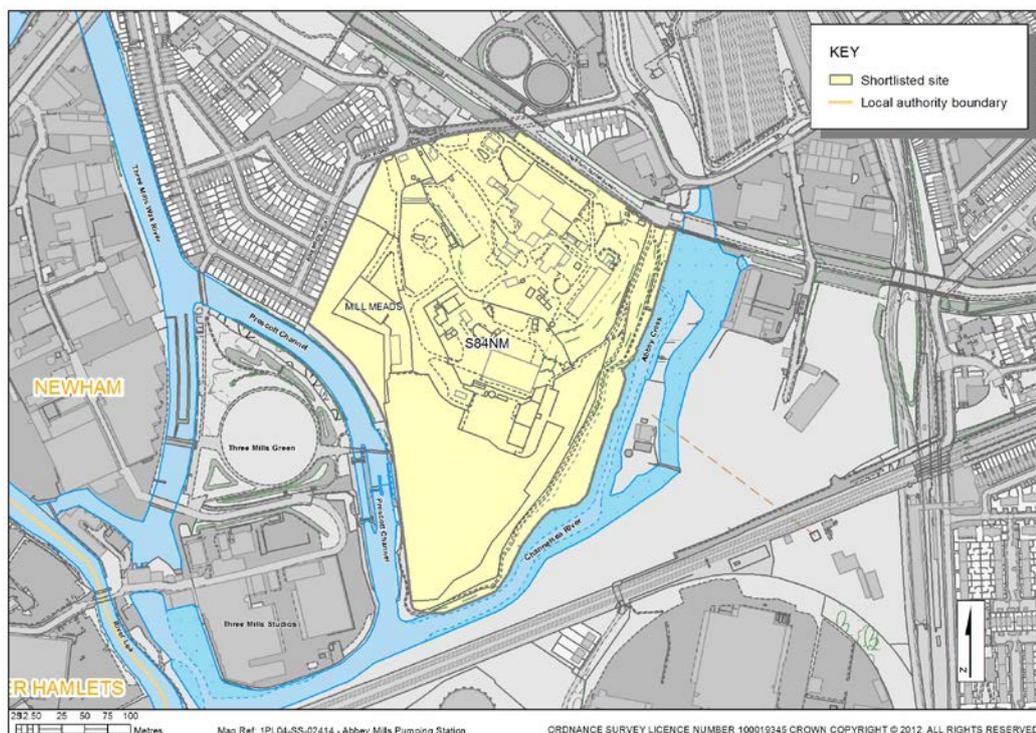
4.4.1 As part of our review, we considered the drive options for the eastern section of the tunnel, which included all the sites in Zone S11. We had technical concerns about two of the shortlisted sites, so re-reviewed all three sites in the SSMP Tables 2.2 and 2.3 assessments as set out in the *Site selection methodology paper*.

4.4.2 The three shortlisted sites are as follows:

- a. S84NM: Abbey Mills Pumping Station
- b. S85NM: Three Mills Green
- c. S86NM: Three Mills Studios.

4.4.3 At SSMP Table 2.3, with the benefit of additional technical information, it was confirmed that, for S85NM: Three Mills Green and S86NM: Three Mills Studios, it would be technically difficult to transfer all the flows from the main tunnel via either of these sites under Prescott Channel and connect them to the Lee Tunnel shaft F, which is located within S84NM: Abbey Mills Pumping Station. Therefore, it was concluded that S85NM and S86NM should not be on the final short list of sites. This meant that after the review S84NM: Abbey Mills Pumping Station was the only shortlisted site.

**Figure 4.1 Zone S11 shortlisted main tunnel site**



## 4.5 Proposed site and use for Section 48 publicity

- 4.5.1 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. **S84NM: Abbey Mills Pumping Station** remained the proposed main tunnel reception site to receive the eastern section of the main tunnel driven from Chambers Wharf (S76SK) for Section 48 publicity for the following reasons (not in order of importance):
- a. The site is a brownfield site with operational Thames Water works.
  - b. This site is adjacent to Lee Tunnel shaft F which would be the most efficient way to transfer the flows from the Thames Tideway Tunnel to the Lee Tunnel for transfer to the Beckton Sewage Treatment Works.
  - c. There are a number of applicable planning designations in the vicinity of the site. However, careful consideration of the location of some of the construction works and site access and appropriate mitigation should avoid an unacceptable level of impact.
- 4.5.2 Table 4.1 below sets out the proposed site and use.

**Table 4.1 Proposed site and use for Section 48 publicity**

<p><b>Site:</b> S84NM: Abbey Mills Pumping Station</p> <p><b>Use:</b> To receive the eastern section of the main tunnel driven from Chambers Wharf (S76SK)</p>
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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 Zone S11 for the eastern sections of the main tunnel as set out in Volume 1, Section 6.6
- b. consideration of any on-going project design and/or new technical information
- c. final review comprising multidisciplinary workshops and reviews to re-consider the shortlisted sites, main tunnel drive options, 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. Due to its location, the site should be explored as main drive site.
- b. The tunnelling strategy and associated use of this site needs to be reconsidered. The site should be used as a main tunnel drive site because it is in the middle of an industrial area and it is an opportunity to provide a future asset by improving river access.

5.2.2 The main comments received in support of the proposed site included:

- a. Qualified support subject to further clarification regarding use of the 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 new technical information relevant to site selection.

## 5.4 Final review of shortlisted main tunnel site in Zone S11

5.4.1 In this instance, as explained in Section 4.4, S84NM: Abbey Mills Pumping Station was the only main tunnel in Zone S11. S84NM was subsequently identified as the main tunnel drive or reception site in Zone S11. The site was then used to review the tunnelling drive options below, which is the final part of the process in determining the selected site and use.

## 5.5 Final review of tunnelling drive options

5.5.1 Having established the most suitable site in each zone for each site use (ie, drive or reception), we then reviewed the drive options. The drive options are set out in *Engineering options report – Abbey Mills route* (Spring 2012) and explained in Volume 1, Section 6.6 (also see Volume 1, Section 7.6 for an update). The drive options were reduced down to either driving the main tunnel from either S76SK: Chambers Wharf in Zone S6 or S84NM: Abbey Mills Pumping Station in Zone S11.

5.5.2 In summary the preference was for S84NM: Abbey Mills Pumping Station to receive the main tunnel drive from S76SK: Chambers Wharf for the following reasons (not in order of importance):

- a. S76SK is accessible with large barges as it is situated on the main channel of the River Thames.
- b. Driving the main tunnel from S76SK would avoid impacts from barges berthing in the Channelsea River/Prescott Channel to service a main tunnel drive site at S84NM and the associated pollution and upstream flood risk. Use of S76SK would however impact on the foreshore and intertidal habitats.
- c. Driving the main tunnel from S76SK would avoid residential and community impacts from the increased HGV movements associated with a main tunnel drive site along the roads leading to Abbey Mills (Gay Lane and Abbey Road) as it is likely that most excavated material would have to be removed by road. In comparison a high proportion of the excavated material can be removed by barge from S76SK, thereby reducing the HGV movements on local roads.
- d. Driving the main tunnel from S76SK would avoid highly undesirable delivery risks associated with trying to use smaller barges on the River Lee to transport excavated materials away from S84NM.

5.5.3 At Chambers Wharf (S76SK) 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 Abbey Mills Pumping Station (S84NM), so in turn this means the Greenwich connection tunnel would have to be driven from Greenwich Pumping Station (C33XV+ CL005) to Chambers Wharf (see Volume 18, Section 5.5 for more detail).

5 Post Section 48 publicity: Review and confirmation of selected main tunnel site for the application

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5.5.4 Overall, it was concluded that S84NM: Abbey Mills Pumping Station should be selected as the main tunnel reception site to receive the main tunnel driven from Chambers Wharf.

**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, **S84NM: Abbey Mills Pumping Station** was selected as the main tunnel reception site for the application for the following reasons (not in order of importance):

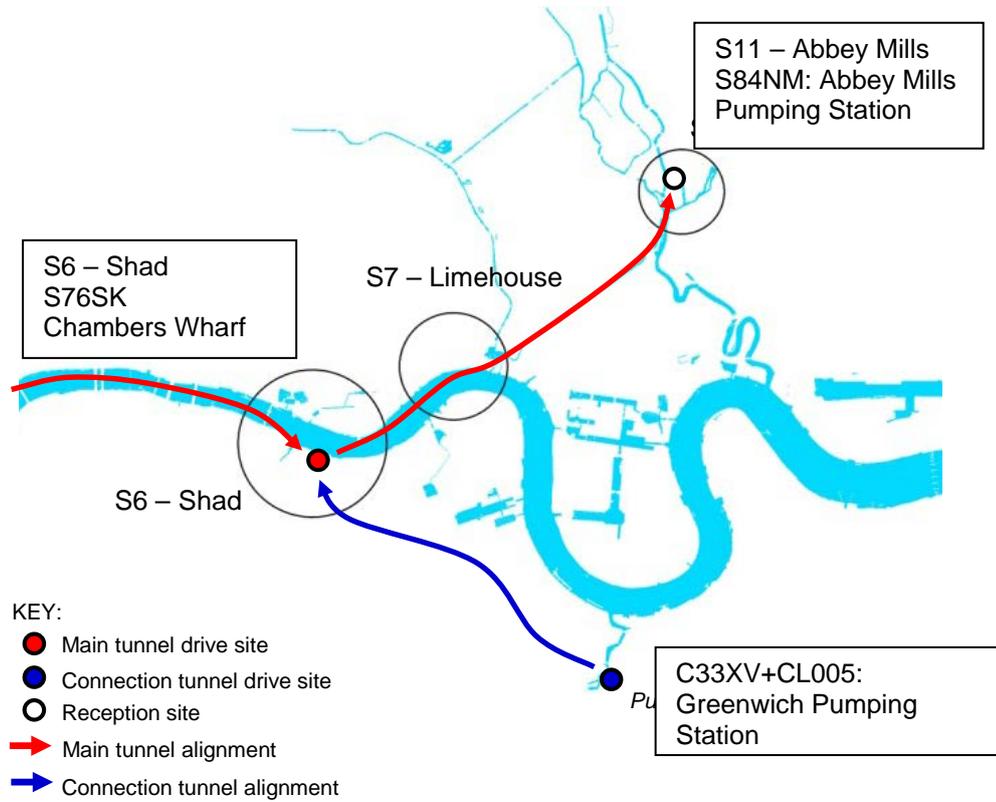
- a. It is an available brownfield site with operational Thames Water works.
- b. This site is adjacent to Lee Tunnel shaft F which would be the most efficient way to transfer the flows from the Thames Tideway Tunnel to the Lee Tunnel for transfer to the Beckton Sewage Treatment Works.
- c. There are a number of applicable planning designations in the vicinity of the site. However, careful consideration of the location of some of the construction works and site access and appropriate mitigation should avoid an unacceptable level of impact.

5.6.3 Table 5.1 below sets out the selected site and use. Figure 5.2 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**

<p><b>Site:</b> S84NM: Abbey Mills Pumping Station</p> <p><b>Use:</b> To receive the eastern section of the main tunnel driven from Chambers Wharf (S76SK)</p>
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**Figure 5.1 Sites and tunnelling strategy for the eastern section of the main tunnel and Greenwich connection tunnel**



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Clearwater Court, Vastern Road, Reading RG1 8DB

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