Appendix W – Abbey Mills Pumping Station

W.1 Introduction

W.2 Introduction

W.2.1 This appendix sets out the site selection process that we used and our rationale for identifying our preferred phase one and phase two consultation sites for constructing the eastern sections of the main tunnel.

Type of site

W.2.2 We need to identify a series of suitable worksites to allow us to build the main tunnel. The main tunnel will transfer the collected overflows to the Abbey Mills Pumping Station and they will then transfer via the Lee Tunnel (under construction) to Beckton Sewage Treatment Works.

W.2.3 Larger sites are required where a TBM will be inserted into the ground (known as a main tunnel drive site). This type of worksite will need to handle all the materials excavated by the TBM as it constructs a section of the tunnel. Smaller sites are required to remove the TBM from the ground at the end of a tunnel drive (known as a main tunnel reception/intermediate site). A more detailed description of the different types of worksite required to construct and operate the Thames Tunnel and the size requirements of these sites can be found in the Site selection background technical paper.

Site selection process

W.2.4 All potential worksites have been identified in accordance with our Site selection methodology paper (SSM), which involved a ‘sieving’ approach, commencing with identification of all potentially suitable areas of land (excluding concentrated residential sites and World Heritage Sites) and passing these sites through increasingly detailed levels of assessment to move from a long list to a draft short list, a final short list and finally a list of preferred sites for phase one consultation.

W.2.5 The SSM recognises the vital complementary relationship between the site selection process and engineering design developments. Accordingly, as the site selection process has progressed, it has been increasingly important to compare sites against engineering requirements. A fundamental consideration is the need to identify sufficient sites, in the right locations, to enable the scheme to be built.

Preferred site for phase one and phase two consultation

W.2.6 The table below identifies our preferred phase one and phase two consultation site. Section W.2 in this appendix provides the details of how we identified our preferred phase one site. Sections W.3 to W.5 provide details of how we have changed our proposals to use this site for phase two consultation.
Phase one consultation site:
Abbey Mills Pumping Station

Phase two consultation site:
Abbey Mills Pumping Station

W.3  Site selection up to phase one consultation

Assessment of the long list sites

W.3.1 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 within the London boroughs of Newham.

W.3.2 In total, three sites were included on the long list as potential sites for main tunnel shafts. These sites were assessed having regard to the high-level considerations set out in Table 2.2 of the SSM (hereafter referred to as Table 2.2) including engineering (site size, site features, availability of jetty/wharf and access), planning and environment (policy, heritage, landscape/townscape, open space and ecological) community and property (neighbouring land uses, site use, Special Land/Crown Land and acquisition costs) considerations.

W.3.3 Sites which were assessed as being the least constrained when considered against Table 2.2 considerations passed to the next stage of assessment. This did not necessarily mean that these sites would ultimately be judged as suitable for use as a main tunnel shaft site, but that no significant constraints were identified in relation to the high-level considerations addressed at Table 2.2. Sites that were judged to be more constrained were not recommended to be retained on the draft short list for more detailed assessment. Full details of these assessments are provided in the Table 2.2 assessment tables and accompanying plans.

W.3.4 Of the three sites identified on the long list of potentially suitable sites for main tunnel sites at the eastern end of the tunnel route, all three were assessed as potentially suitable and passed to the draft short list. None were eliminated at this stage as being unsuitable.

Assessment of draft short list sites

W.3.5 The three draft short list sites identified as potentially suitable in Table 2.2 were then further assessed by the engineering, planning, environment, community and property disciplines, having regard to the considerations set out in Table 2.3 of the SSM (hereafter referred to as Table 2.3). This stage of the process built on the information gathered and assessment undertaken at long list stage but focussed on more detailed local considerations.

W.3.6 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 sites for the short list.
W.3.7 As with the Table 2.2 assessment, sites which were assessed as being the least constrained when considered against Table 2.3 considerations were retained on the short list to pass to the next stage of assessment. This did not necessarily mean that a site would ultimately be judged as suitable, but that no significant constraints were identified in relation to the considerations addressed at Table 2.3. Sites that were judged to be more constrained were not recommended to be retained on the short list for more detailed assessment. Full details are provided in the Table 2.3 assessment tables and accompanying plans.

W.3.8 Of the three sites on the draft short list, all three were assessed as potentially suitable for use as either main tunnel drive or reception sites. All of these sites passed to the final short list.

Assessment of the final short list sites

W.3.9 The three final shortlisted sites retained for more detailed assessment as potential main tunnel sites were:

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

W.3.10 A site suitability report (SSR) was prepared for each of these final shortlisted sites. These reports contained an assessment of each site's suitability, having regard to engineering, planning, environment, community and property considerations. At this stage in the process, sites were assessed in isolation without comparison to other sites or regard to tunnelling strategy. Sites were evaluated by each discipline, using technical knowledge and professional judgement as appropriate, and assessed as either suitable, less suitable or not suitable from that discipline's perspective.

W.3.11 A summary of the conclusions of each discipline's assessment from the site suitability reports is provided below.

**S84NM: Abbey Mills Pumping Station**

W.3.12 Site S84NM is located in the southern part of the Abbey Mills Pumping Station on a more open part of the operational site, flanked by watercourses. The site is within the London Borough of Newham. Within the site boundary, to the west and abutting the Prescott Channel, are a number of allotments.

W.3.13 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.

W.3.14 The site was assessed for use as a main tunnel drive and main tunnel reception site.

W.3.15 **Engineering:** Assessed the site as suitable for use as either a main tunnel drive or reception site, because the area is large enough, river access may be possible, there are no particular constraints on third-party assets and there is no need for any demolition.
W.3.16 River access would be constrained by being shallow, narrow and winding, with only limited access on each tide, and this would limit the number and type of barge movements.

W.3.17 **Planning:** Assessed the site as *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 siting of some of the construction works and site access, combined with appropriate mitigation, should ensure an unacceptable level of impact is avoided.

W.3.18 **Environment:** Overall, the site was assessed as *suitable* for both types of site. The site was considered likely to be suitable from the perspective of archaeology, built heritage and townscape, water resources, ecology, flood risk, air quality and noise. However, the site is *less suitable* from the perspective of road transport and land quality.

W.3.19 **Socio-economic and community:** Assessed the site as *less suitable* for use as a main tunnel drive site as this is likely to lead to the loss or displacement of some of the allotments, which may be quite difficult to relocate or otherwise mitigate. There are also likely to be some indirect impacts on the Three Mills Studio due to its proximity to the main area of works, while the Kingsland Further Education College, a small number of business premises, Three Mills Green and a number of residential properties may also be affected.

W.3.20 The site was assessed as *suitable* for use as a smaller main tunnel reception site as the allotments appear only likely to be impacted in part by the road access and the proximity to the construction activity, which appears likely to affect the tranquillity and enjoyment of the allotments. There may also be impact relating to disruption of the nearby residential, educational and commercial purposes as above, but it is likely these can be mitigated.

W.3.21 **Property:** Assessed the site as *suitable* for use as a main tunnel drive or reception site as the site is owned by Thames Water. If the site is used as a main tunnel drive site, a slight redesign should be undertaken to avoid having to relocate allotment holders.

**S85NM: Three Mills Green**

W.3.22 The proposed site is located on the northern half of the Three Mills Island, on an area of land known as the Three Mills Green, within the London Borough of Newham. The site is flanked on the eastern and western boundaries by watercourses, with studios to the south.

W.3.23 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 the site is bounded by the Three Mills Wall River.

W.3.24 The site was assessed for use as a main tunnel drive and main tunnel reception site.

W.3.25 **Engineering:** Assessed the site as *suitable* for use as a main tunnel drive site. The site is of sufficient size and has the potential for jetty/wharfage facilities, but there would likely be limitations in the use of river
access as barge movements would be restricted. The site was assessed as **suitable** for a main tunnel reception site as it would be of sufficient size. Road access would be through a traffic-calmed road approximately 7m wide and there may be weight restrictions on the bridge crossing.

**W.3.26  Planning:** Assessed the site as **less suitable** for use as either a main tunnel drive or reception site. There are a number of planning and environmental designations. Of these, open space and those relating to heritage and nature conservation are of most significance. Use of the site with mitigation may be considered acceptable; however, the impact of the loss of open space and the requirement for replacement facilities by the local planning authority would require further investigation.

**W.3.27  Environment:** Overall, the site was assessed as **suitable** for both types of site. The site was considered likely to be suitable from the perspective of transport, archaeology, built heritage, townscape, surface water, ecology, flood risk, air quality and noise. However, the site is **less suitable** from the perspective of hydrogeology and land quality.

**W.3.28  Socio-economic and community:** Assessed the site as **not suitable** for use as a main tunnel drive site as use of the site appears likely to lead to the temporary loss of the Three Mills Green area of public open space during the construction period, which is likely to have a significant effect on community cohesion and the health and wellbeing of the local population. There are also potential impacts to 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. The use of the site for this purpose has the potential to affect the same receptors, but the impacts are likely to be less than for a main shaft site, due to the reduced scope of work.

**W.3.29  Property:** Assessed the site as **suitable** for use as a main tunnel drive or reception site as the acquisition costs are likely to be acceptable. However, selection of this site is likely to raise a large number of objections.

**S86NM: Three Mills Studios**

**W.3.30** S86NM is located on the southern half of the Three Mills Island and would occupy the site currently in use as the Three Mills Studios. The site is broadly square and is surrounded by watercourses on three sides and an area of open space to the north.

**W.3.31** The site is bound to the east by the Prescott Channel, to the south by Channelsea River, to the west by the Three Mills Wall River and the River Lee and to the north is the Three Mills Green, comprising a grassed, open space, fringed by trees.

**W.3.32** The site was assessed for use as a main tunnel drive and main tunnel reception site.

**W.3.33  Engineering:** Assessed the site as **less suitable** for 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 assessed as suitable for a main tunnel reception site as it would be of sufficient size and require less demolition and enabling works.

W.3.34 **Planning:** Assessed the site as less suitable for use as either a main tunnel drive or reception site as it is subject to numerous planning and environmental designations and significant mitigation would be required.

W.3.35 **Environment:** Overall, the site was assessed as less suitable for both types of site. The site was considered likely to be suitable from the perspective of transport, townscape, surface water, ecology, air quality and noise. However, the site is less suitable from the perspective of archaeology, built heritage, hydrogeology, flood risk and land quality.

W.3.36 **Socio-economic and community:** Assessed the site as not suitable for use as a main tunnel drive site as use of the site appears likely to 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. Only around half of the site is required and so some of the studio buildings could remain. However, the nature of the creative media business suggests that this is unlikely to provide a suitable working environment, thereby also forcing the businesses to relocate or close.

W.3.37 **Property:** Assessed the site as less suitable for use as both a main tunnel drive or reception site as acquisition and associated disturbance costs are expected to be in the range of moderate to high for both options.

**Identification of the preferred site**

W.3.38 Consideration of the main tunnel sites up until shortlist stage principally focussed on each as an individual site in isolation from the assessment of tunnel drive and alignment options (ie, how the tunnel will be constructed and the route it will take). However, due to the nature of the scheme, it is necessary to select a package of main tunnel sites, paying attention to how they will work in combination and in relation to the tunnel alignment and CSO connections.

W.3.39 The *Engineering Options Report* describes the process of identifying the tunnelling options, taking into account engineering requirements. The main points are summarised below.

W.3.40 The engineering team took into consideration 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, construction risks and timescales.

W.3.41 In general, for all drive strategies, we require sites to build the main tunnel at:

- each end of the main tunnel in west and east London
- suitable intervals along the route of the main tunnel
Appendix W – Abbey Mills Pumping Station

- locations where the type of geology that the main tunnel goes through changes.

W.3.42 The type of geology changes along the length of the main tunnel, with clay in the west, sands and gravels in central London and chalk in the east. The main tunnel will be built using tunnel boring machines (TBMs). Different types of TBMs will be used for different types of ground conditions.

W.3.43 To manage the total number of combinations of tunnel drive and reception site options, which 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, as shown in Figure W.1 below. The zones were numbered and named for convenient referencing as shown in the figure.

Figure W.1 Location of site zones

W.3.44 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 are not our preferred option so are not considered further in this appendix.

W.3.45 Multidisciplinary workshops were held to identify the most suitable main tunnel shortlisted site within each zone, taking into account the conclusions reached in the site suitability reports, as described above.

W.3.46 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 for a number of reasons, which are summarised below:

- Site 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.

- The most significant impacts and risks associated with this site relate to the existing road access route though 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.

- On balance, the alternative sites, S85NM and S86NM, are considered likely to result in greater impacts and are therefore, on balance, less suitable.

- Site 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.

Therefore, site S84NM: Abbey Mills Pumping Station was judged to be the least constrained and most suitable site for either a main tunnel drive or reception site.

Figure W.2 shows the location of the preferred and shortlisted sites in Zone S11 – Abbey Mills.

**Figure W.2 Preferred and shortlisted main tunnel sites**
Drive strategy

W.3.49 The drive strategy for the eastern section of the main tunnel was influenced by the change in geology from sands to chalk in the Tower Bridge area. This change in the ground conditions through which the tunnel will be created means it is desirable to change TBM in this area. A main tunnel site is therefore required in zones S6 or S7.

W.3.50 The main tunnel site identified in this zone as most suitable at phase one consultation, S54SK: King’s Stairs Gardens, was however only assessed as suitable for use as a main tunnel reception site. This therefore requires the eastern section of the main tunnel to be driven from S84NM: Abbey Mills Pumping Station.

W.3.51 The main considerations in favour of using Abbey Mills Pumping Station as a main tunnel drive site were identified as follows:

- Abbey Mills Pumping Station site is owned by Thames Water and should be fully utilised as far as is reasonably practicable.
- Driving the main tunnel from Abbey Mills Pumping Station would reduce impact on public open space and residential amenity at King’s Stairs Gardens, although long connection tunnels to pick up three CSOs would still be constructed from the King’s Stairs Gardens site, meaning that an impact on neighbouring residential uses would still occur.
- The Abbey Mills Pumping Station site is relatively unconstrained when compared to King’s Stairs Gardens, particularly in terms of its operational nature and there being fewer sensitive receptors in the vicinity. It is, however, located within a conservation area.
- Noise and air quality impacts are more likely to be adequately mitigated for a main tunnel drive shaft site at Abbey Mills Pumping Station than at King’s Stairs Gardens.
- There may be a compensation cost for the replacement of open space at King’s Stairs Gardens.

W.3.52 Based on the above issues, the preference was to drive from Abbey Mills Pumping Station to King’s Stairs Gardens.

W.4 Review of site selection following phase one consultation

Phase one consultation responses

W.4.1 As part of the site selection methodology, all feedback received during the phase one consultation was reviewed and taken into account in the development of our scheme for phase two.

W.4.2 The main issues and concerns raised during phase one consultation in relation to the Abbey Mills Pumping Station site are summarised below.

W.4.3 The main issues raised included:

- the need to maintain nearby footpath access
- loss of green space, including allotments
Appendix W – Abbey Mills Pumping Station

• disruption to residents from construction works
• impact of construction traffic
• design of the operational buildings
• odour impacts in the surrounding area.

W.4.4 The main comments received in support included:
• it will cause least disruption of the three sites consulted upon
• the proposal is supported by Lee Valley Regional Park Authority.

W.4.5 More detail on the consultation responses relating to this site and our response to the comments received are provided in the Report on phase one consultation.

Back-check process

W.4.6 Following our review of the feedback received during phase one consultation, a multidisciplinary workshop was held to review the selection of all our preferred sites and drive options. It was decided that S84NM: Abbey Mills Pumping Station remained our preferred main tunnel site for the construction of the eastern section of the main tunnel.

W.4.7 However, due to a number of engineering design developments and the availability of new technical information, and in response to the feedback we received during the phase one consultation, we undertook a back-check to review our preferred site in Zone S6 – S7, S54SK: King’s Stairs Gardens. This review resulted in a change of preferred site to a new site, S76SK: Chambers Wharf – see Appendix R for full details.

W.4.8 This change in preferred site had implications for the drive strategy for the eastern section of the main tunnel as Chambers Wharf was assessed as suitable for use as either a main tunnel single drive or reception site.

Tunnelling strategy

W.4.9 The main report discusses the tunnelling options and drive option comparisons that involve Abbey Mills (see main report, Section 6.6, Comparison 3, options A–C).

W.4.10 In summary, for Zone S11 – Abbey Mills, we selected S84: Abbey Mills Pumping Station as the most suitable main tunnel drive or reception site. In zones S6 – Shad and S7 – Limehouse, we selected S76SK: Chambers Wharf as the most suitable site main tunnel drive or reception site (see Appendix R) but due to site size and programme, this site can only support a drive in one direction. We selected Greenwich Pumping Station as the most suitable site to drive or receive the Greenwich connection tunnel (see Appendix V).

W.4.11 A workshop was held, using the most suitable sites listed in paragraph W.3.10, to discuss tunnelling option comparisons. The three drive options under consideration involved construction of the eastern sections of the main tunnel and also considered the Greenwich connection tunnel required to pick up the Earl Pumping Station CSO and Greenwich
Pumping Station CSOs so they can be connected to the main tunnel.

Summary of the options:

- **Option A1:** Drive the main tunnel from S84NM: Abbey Mills Pumping Station to S76SK: Chambers Wharf and drive the connection tunnel from S76SK: Chambers Wharf to C33XV: Greenwich Pumping Station. Option A2 is the same, but would reverse the drive of the connection tunnel so it would be driven from C33XV: Greenwich Pumping Station.

- **Option B:** Drive the main tunnel from S84NM: Abbey Mills Pumping Station to S76SK: Chambers Wharf and drive the connection tunnel from C33XV: Greenwich Pumping Station to S76SK: Chambers Wharf.

- **Option C:** Drive the main tunnel from S76SK: Chambers Wharf to S84NM: Abbey Mills Pumping Station and drive the connection tunnel from C33XV: Greenwich Pumping Station to S76SK: Chambers Wharf.

W.4.12 On balance, based on the above drive options assessment, it was decided to drive the eastern section of the main tunnel from S76SK: Chambers Wharf to S84NM: Abbey Mills Pumping Station (see main report, Section 6.6, and Comparison 3, options A-C). A summary of the key reasons for this decision:

- Further technical work and discussions with the Lee Tunnel project team and Olympic Delivery Authority on their experience for the Olympic Park has shown that transporting materials to and from S84NM: Abbey Mills Pumping Station by the River Lee is highly undesirable when material needs to be transported daily over a two- to three-year period. This level of barge movements would be required if the site was used as main tunnel drive site, given the volume of excavated material that would be produced.

- At S84NM: Abbey Mills Pumping Station there are 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, while at S76SK: Chambers Wharf, 1,500 tonne barges or potentially larger ones can be used on the River Thames to remove excavated material produced by a main tunnel drive site.

- Use of S76SK: Chambers Wharf as the main tunnel drive site avoids the need to work in Channelsea River, which avoids the potential health and safety risks associated with the contaminated materials in the river. It also means less impact on the foreshore ecology and water resources at Abbey Mills.

- Work to construct campsheds and wharf facilities in the Channelsea River at S84NM: Abbey Mills Pumping Station has been assessed as introducing high health and safety risks, including the handling of contaminated materials. This risk does not exist at S76SK: Chambers Wharf.

W.4.13 Discussions associated with the Greenwich connection tunnel are discussed in the main report (see Section 6.6, Comparison 3 and Section 6.8).
W.4.14 Figure W.2 below shows the preferred sites and tunnelling strategy for the construction of the eastern section of the main tunnel.

**Figure W.3 Preferred sites and tunnelling strategy for eastern section of the main tunnel and Greenwich connection tunnel**

W.5 Site development

W.5.1 Following the selection of Abbey Mills Pumping Station as our preferred site, further feedback from stakeholders and ongoing scheme development work have contributed to a number of refinements to the site.

Engagement with stakeholders

W.5.2 Engagement with stakeholders has been ongoing and has continued beyond the phase one consultation period. This has resulted in continual development of our proposals to take on board the comments made by stakeholders.

W.5.3 In particular, we have had regular meetings and workshops with officers from the London Borough of Newham and London Thames Gateway Development Corporation, TfL, the Environment Agency and English Heritage with respect to developing the design and construction of our works and the scope of our environmental assessments. To ensure our design process is transparent, we undertook a series of design reviews, hosted and chaired by the Design Council CABE (formerly the Commission for Architecture and the Built Environment). The review for Abbey Mills Pumping Station were attended by the London Borough of Newham and our pan-London stakeholders.
Construction layout

W.5.4 In response to stakeholder engagement, phase one consultation responses and scheme development, the construction layout of the site has been altered to minimise impact on the local community and environment, and is guided by operational and functional requirements. A particular factor at this site that has influenced the layout is as follows:

- If the Lee Tunnel is able to use barges on the River Lee via Bow Creek and the Prescott Channel to export materials from its shaft construction, similar arrangements could be used for construction activities at this site. Our site layout has changed to reflect this.

W.5.5 Further information on the construction logistics and the site layouts for the construction and operational phases can be found in the Abbey Mills Pumping Station site information paper.

Design

W.5.6 Since phase one consultation, we have progressed the design for the permanent use and appearance of the structures at Abbey Mills Pumping Station. The design of the permanent proposals follows our scheme-wide principles and takes into account comments made and ongoing engagement with the London Borough of Newham and other technical consultees.

W.5.7 Full details of design development for the Abbey Mills Pumping Station site are provided in the Design development report.

Phase two consultation

W.6.1 A final preferred sites workshop was held in summer 2011 to verify the choice of preferred sites and to consider any outcomes of further engagement and scheme development. The conclusion reached was that site S84NM: Abbey Mills Pumping Station should remain the preferred site for a main tunnel site to construct the eastern section of the main tunnel. However, the use of the site would be changed from a main drive site to a main tunnel reception site to receive the TBM used to construct the eastern section of the main tunnel driven from S76SK: Chambers Wharf.

W.6.2 Phase two consultation will provide an opportunity for the public to comment on our revised preferred site and scheme for the Thames Tunnel project, before we publicise our proposed application.