Appendix G – Carnwath Road Riverside (formerly Barn Elms)

G.1 Introduction

G.1.1 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 western sections of the main tunnel.

Type of site

G.1.2 We need to identify a series of suitable worksites to allow us to build the main tunnel into which the flows from the combined sewer overflows (CSOs) being intercepted by the project will be collected. 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.

G.1.3 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

G.1.4 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.

G.1.5 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

G.1.6 The table below identifies our preferred phase one and phase two consultation sites. Section G.2 in this appendix provides the details of how we identified our preferred phase one site. Sections G.3 to G.5 provide details of why we have identified a different main tunnel preferred site for phase two consultation.
Site selection up to phase one consultation

Assessment of the long list sites

The long list of potential main tunnel sites for the western sections of the tunnel route was created by conducting a desktop survey of the land within the London boroughs of Hounslow, Hammersmith and Fulham, Richmond-upon-Thames, Wandsworth and the Royal Borough of Kensington and Chelsea.

In total, 200 sites were included on the long list as potential main tunnel sites. 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 (heritage, landscape/townscape, open space and ecological) community and property (neighbouring land uses, site use, Special Land/Crown Land and acquisition costs) considerations.

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 main tunnel shaft sites, 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.

For sites not excluded at this stage, we then determined how these sites would be assessed at the Table 2.3 assessment based on size. For some sites, this also included examining neighbouring sites to see if they could be used together. Full details of these assessments are provided in the Table 2.2 assessment tables and accompanying plans.

Of the 200 sites identified on the long list of potentially suitable sites for main tunnel shafts at the western end of the tunnel route, 29 were assessed as potentially suitable and passed to the draft short list, while 171 sites were eliminated as being unsuitable.

Assessment of draft short list sites

The 29 draft short list sites identified as potentially suitable at 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.

G.2.7 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.

G.2.8 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 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.

G.2.9 Of the 29 sites on the draft short list, one was assessed as potentially suitable for use as a main tunnel drive or reception shaft site, while eight were assessed as suitable for main tunnel reception/intermediate shaft sites. All of these sites passed to the final short list. The remaining 20 sites did not proceed to the final short list.

Assessment of the final short list sites

G.2.10 The nine final shortlisted sites retained for more detailed assessment as potential main tunnel shaft sites were:

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

- S17RD: Barn Elms.

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

- S13RD: St Paul’s School playing fields
- S33HF: Vacant land and Thames Water Hammersmith Pumping Station, Chancellors Road
- S18WH: Feathers Wharf, The Causeway
- S69HF: Whiffin Wharf and Hurlingham Wharf, Carnwath Road
- S70HF: Carnwath Road Industrial Estate, Carnwath Road
- S72HF: Fulham Depot, next to Wandsworth Bridge, off Townmead Road
- S76HF: Imperial Wharf, Imperial Crescent/Townmead Road – construction site
- S08KC: Foreshore, Chelsea Wharf

G.2.11 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.

G.2.12 A summary of the conclusions of each discipline’s assessment from the site suitability reports is provided below.

**S17RD: Barn Elms**

G.2.13 Site S17RD forms part of the Barn Elms Sports Centre, off Queen Elizabeth Walk. The site is situated in the most easterly area of the London Borough of Richmond upon Thames, and adjoins the London Borough of Wandsworth along its southern boundary.

G.2.14 **Engineering:** Assessed the site as **suitable** for use as a main tunnel drive site. This was predominantly due to the good site size, river access and good access to the local road network.

G.2.15 **Planning:** Assessed the site as **suitable**. There are a series of planning designations that are applicable to the site. However, it was felt that the potential impacts or conflicts with planning policy could be mitigated and that the opportunity to combine a main tunnel shaft site with work to connect the local CSO, known as the West Putney Storm Relief, at this site could result in more effective and efficient use of the land via the need for only one construction site in this area rather than two.

G.2.16 **Environment:** Overall, the site was assessed as **suitable**. The site was considered likely to be **suitable** from the perspective of transport, hydrology, surface water, built heritage, townscape, flood risk, noise, air quality and land quality. However, the site is **less suitable** from the perspective of ecology and archaeology.

G.2.17 **Socio-economic and community:** Assessed the site as **suitable** for use as a main tunnel drive site. Potential impacts on the local community were highlighted, in particular, the impact of works on people living in local residential property, recreational river users, users of the scout hut and boat club and the temporary loss of a portion of the playing fields, especially given the apparent high usage by local clubs. The general amenity value of the site was also recognised.

G.2.18 **Property:** Assessed the site as **suitable** for use as a main tunnel drive site.

**S13RD: St Paul’s School playing fields**

G.2.19 Site S13RD occupies the playing fields of St Paul’s School, positioned to the east of the school complex, within the London Borough of Richmond. The site is bounded to the north by the River Thames and to the east by the Castelnau main road. St Paul’s school is to the west of the site. The area is primarily residential in character, with property to the east and south.

G.2.20 **Engineering:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. The site is large in size and with no
constraints in terms of demolition or third-party assets. Temporary and permanent access is possible and the site and the shaft can be positioned to minimise the tunnel impacts on Wandsworth Bridge.

G.2.21 **Planning:** Assessed the site as **less suitable** for use as a main tunnel reception/intermediate site. Use of the site would result in the loss of a school playing field and area of Metropolitan Open Land for a lengthy period of time, some of it permanently. Impacts on residential amenity can be restricted by locating the construction works to maximise separation distances to sensitive receptors. The significance of the proposed school redevelopment and improvements of the playing fields are uncertain at this stage, and would require further consideration. Visual impacts on the Castelnau Conservation Area are also likely.

G.2.22 **Environment:** Overall, the site was assessed as **suitable** as a main tunnel reception/intermediate site. The site was considered likely to be **suitable** from the perspective of archaeology, water resources, ecology, flood risk and air quality. However, the site is **less suitable** from the perspective of transport, built heritage, townscape, noise and land quality. Mitigation will need to be considered for noise, air quality, land quality and built heritage and townscape.

G.2.23 **Socio-economic and community:** Assessed the site as **less suitable** for use as a main tunnel reception/intermediate site. Use of the site will result in the temporary loss of playing fields for St Paul’s School and potential disruption to schooling due to noise, dust and vibration produced during construction. It appears likely there will also be impacts on local residents and traffic and pedestrian movements including users of the Thames Path.

G.2.24 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site as the site is undeveloped and there will likely be acceptable acquisition costs. However will need to make early contact with St Paul’s school.

**S33HF: Vacant land and Thames Water Hammersmith Pumping Station, Chancellors Road**

G.2.25 S33HF is located on a vacant former industrial site known as Hammersmith Embankment, located in the London Borough of Hammersmith and Fulham, approximately 250m downstream from Hammersmith Bridge. The site is rectangular in shape and contains hard surfaced areas with areas of vegetation. It also contains a Thames Water pumping station.

G.2.26 The site is bounded by the River Thames to the west, to the north by Chancellors Road, to the east by Distillery Road and to the south by Winslow Road. The surrounding area is predominately residential but includes a mix of other uses.

G.2.27 **Engineering:** Assessed the site as **suitable** for use as main tunnel reception/intermediate site as it is of sufficient size and has good access possibilities. Any tunnel diversion from the river is likely to be minimal.
because of the site’s location adjacent to the river. Furthermore, no third-party assets are likely to be affected by the construction.

G.2.28 **Planning:** Assessed the site as **suitable**. There are relatively few planning designations that are applicable to the site, and it is considered that with appropriate mitigation measures, these designations are unlikely to be unacceptably impacted upon. Implementation of the existing approved redevelopment may present a constraint to the use, but this is subject to further discussions with the site owner (and the council). Potential impacts on residential amenity should be considered further, including the potential to relocate construction works within the site to increase the separation distance between the works and the front facades of dwellings.

G.2.29 **Environment:** Overall, the site was assessed as **suitable** as a main tunnel reception/intermediate site. The site was considered likely to be **suitable** from the perspective of transport, archaeology, built heritage and townscape, water resources, and ecology. However, the site is **less suitable** from the perspective of flood risk, noise and land quality, and adequate mitigation measures will need to be provided to make the site suitable for use.

G.2.30 **Socio-economic and community:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. Use of the site would have potential for disruption to residential properties in the vicinity but mitigation should reduce these impacts. It appears unlikely there will be impacts on Frank Banfield Park. Impacts on the local economy may also arise due to the presence of local businesses in the works area. The connection culvert may also cause disruption to a public footpath.

G.2.31 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site on the grounds of cost, on the basis that it is acquired before development commences. The site is adjacent to a Thames Water facility and is currently undeveloped. However, if development commences before acquisition, costs are likely to be very high and acquisition may not be possible.

**S18WH: Feathers Wharf, The Causeway**

G.2.32 The site S18WH is located in the foreshore of the River Thames, in the London Borough of Wandsworth. The site is bounded by the River Thames to the north, Cory Environmental Western Riverside Solid Waste Transfer Station (WTS) (including a significant new building under construction) to the east, ‘The Causeway’ road to the south, and mud flats to the west. A channel leading to the Thames runs along the western boundary of the site (the River Wandle)

G.2.33 **Engineering:** Assessed the site as **less suitable** for use as main tunnel reception/intermediate site as the site is narrow and has overhead working height restrictions due to third-party assets.

G.2.34 **Planning:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. There are a number of planning and environmental designations relating to the site but it is considered that,
with appropriate mitigation measures, these designations are unlikely to be unacceptably impacted upon. A potential mixed-use development to be located on the site may pose a constraint to works. The site works could be located to increase separation distance to riverside walk and cycle routes.

G.2.35 **Environment:** Overall, the site was assessed as **suitable** as a main tunnel reception/intermediate site, with or without a CSO connection. The site was considered likely to be **suitable** from the perspectives of transport, built heritage, townscape, water resources, ecology, flood risk, noise and air quality. However, the site is **less suitable** from the perspectives of archaeology and land quality. Adequate mitigation measures for archaeology and land quality will need to be provided to make the site suitable for use.

G.2.36 **Socio-economic and community:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site as it is unlikely to have unacceptable impacts on the local community. Mitigation may be required to reduce impacts on the Thames Path. A storage area for the adjacent waste transfer facility would also need to be accommodated on site or temporarily relocated.

G.2.37 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. However, dialogue with the landowners should take place in order to assess the potential impacts on the neighbouring waste transfer facility. If the impacts are likely to be minimal, the acquisition costs should be acceptable. Resistance to the proposal might cause difficult negotiations against the background of Special Land procedures.

**S69HF: Whiffin Wharf and Hurlingham Wharf, Carnwath Road**

G.2.38 Site S69HF is known as Whiffin Wharf and Hurlingham Wharf, located in the London Borough of Hammersmith and Fulham. The site is relatively flat, derelict and currently vacant, comprising hardstanding. The surrounding area is characterised by a mix of industrial uses and residential properties.

G.2.39 **Engineering:** Assessed the site as **suitable** for use as main tunnel reception/intermediate site, as the site is adequate in size and has good road access. It is also a vacant industrial site with hardstanding, therefore simplifying set-up.

G.2.40 **Planning:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. The site is the subject of a number of onsite and adjacent sensitive receptors, such as a conservation area, a site of metropolitan importance for nature conservation (River Thames), and residential properties. Movement of some site activities to the east of the site adjacent to Carnwath Road Industrial Estate would increase the separation distance between residential properties and the construction works. Furthermore, reduced site working hours would limit impacts upon adjacent designations.
G.2.41 **Environment:** Overall, the site was assessed as **suitable** for use as a main tunnel reception/intermediate site. The site was considered likely to be **suitable** from the perspectives of transport, built heritage, townscape, water resources, ecology, flood risk and air quality. However, the site is **less suitable** from the perspectives of archaeology, noise and land quality. Site suitability will depend on whether archaeology, noise and land quality impacts can be adequately mitigated.

G.2.42 **Socio-economic and community:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. As the site is vacant land, the use of the site appears likely to have a limited impact on the local community. The greatest potential for a negative impact appears to be from noise upon the residents adjacent and overlooking the site to the west. It would be important to consider mitigating any disruption to the Thames Path, which runs around the site on the west, north and east borders.

G.2.43 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site as the site is undeveloped and there will likely be acceptable acquisition costs. However, the site is likely to be redeveloped at some point, which may cause acquisition costs to be unacceptable.

**S70HF: Carnwath Road Industrial Estate, Carnwath Road**

G.2.44 Site S70HF is known as Carnwath Road Industrial Estate, located in the London Borough of Hammersmith and Fulham. Existing access to the site is taken from Carnwath Road. The site is an established industrial estate, with a number of light industrial/retail businesses in current operation. The surrounding area is characterised by a mix of industrial uses and residential properties.

G.2.45 **Engineering:** Assessed the site as **suitable** for use as main tunnel reception/intermediate site as the site is adequate in size and has good road access. There is also enough room to avoid a proposed National Grid cable tunnel.

G.2.46 **Planning:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. The site is the subject of a number of onsite and adjacent sensitive receptors, such as a conservation area, a site of metropolitan importance for nature conservation (River Thames), and residential properties. The current proposed layout would allow sufficient separation distance between residential properties and the construction works. Mitigation to reduce impacts on the conservation area may also be required.

G.2.47 **Environment:** Overall, the site was assessed as **suitable** for use as a main tunnel reception/intermediate site. The site was considered likely to be **suitable** from the perspectives of transport, archaeology, built heritage, townscape, water resources, ecology, and air quality. However, the site is **less suitable** from the perspectives of noise, flood risk and land quality. Site suitability will depend on whether noise, flood risk and land quality impacts can be adequately mitigated.
G.2.48 **Socio-economic and community:** Assessed the site as **less suitable** for use as a main tunnel reception/intermediate site. Use of the site will result in an adverse impact on the businesses currently using the site. Noise and visual impacts to households in the overlooking high-density residential properties may need to be addressed through mitigation. Works may also result in diversion of the Thames Path.

G.2.49 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site as there will likely be acceptable acquisition costs. However, eight businesses will need to be temporarily or permanently displayed and thereby incurring compensation claims for disturbance.

**S72HF: Fulham Depot, next to Wandsworth Bridge, off Townmead Road**

G.2.50 Site S72WF covers sites known as Swedish Wharf, Comely Wharf and Albert Wharf, located in the London Borough of Hammersmith and Fulham. Existing access to the site is taken from Townmead Road and Wandsworth Bridge.

G.2.51 The site is covered in a mix of industrial buildings, warehouses, a motor car auction business and a company known as Fuel Oils Ltd and its associated oil tanks. The surrounding area is characterised by a mix of large warehouses, retail units, a supermarket and residential properties.

G.2.52 **Engineering:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site because it is of adequate size and has good vehicular access.

G.2.53 **Planning:** The site is considered **suitable** for use as a main tunnel reception/intermediate site. The site is the subject of a number of onsite and adjacent sensitive receptors, such as a conservation area and nature conservation area, and residential properties. However, the proposed construction layout should provide sufficient separation between the site and residential properties and, combined with other mitigation measures, the impact on residential amenity should not be unacceptable.

G.2.54 **Environment:** Overall, the site was assessed as **suitable** as a main tunnel reception/intermediate site, although mitigation would be required. The site was considered likely to be **suitable** from the perspective of transport, archaeology, built heritage, townscape, water resources, ecology, air quality and flood risk. However, the site is **less suitable** from the perspective of noise and land quality. Mitigation may include noise barriers and remediation of any contamination within the site.

G.2.55 **Socio-economic and community:** Assessed the site as **suitable** as a main tunnel reception/intermediate site, although mitigation against loss of business activity may be required. Apart from this, use of the site is likely to have a limited impact on the local community as there are few potential sensitive receptors in its immediate vicinity. However, noise mitigation will be required to reduce impacts on residential receptors to the north.

G.2.56 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site. The acquisition costs of using this site should
not be unacceptable. However, use of the site would result in the loss of at least two businesses.

**S76HF: Imperial Wharf, Imperial Crescent/Townmead Road – construction site**

G.2.57 Site S76HF comprises public open space to the south of Imperial Wharf, located in the London Borough of Hammersmith and Fulham. The site comprises a new park associated with a recently completed, high-density residential development, also known as Imperial Wharf. The surrounding area is largely residential.

G.2.58 **Engineering:** Assessed the site as **suitable** as a main tunnel reception/intermediate site because it is a large area with good road access and would not require any demolition.

G.2.59 **Planning:** Assessed the site as **less suitable** for use as a main tunnel reception/intermediate site. The site is the subject of a number of onsite and adjacent sensitive receptors, such as public open space, a conservation area, a nature conservation area and residential properties. Arrangement of the works away from the residential properties would increase separation distance and, combined with mitigation, could reduce the effects on these receptors and create a link from Townmead Road through the site to the river frontage. Loss of public open space may be a concern as the site is located within an area of public open space deficiency.

G.2.60 **Environment:** Overall, the site was assessed as **less suitable** for use as a main tunnel reception/intermediate site. The site was considered likely to be **suitable** from the perspectives of transport, water resources, ecology and flood risk. However, the site is **less suitable** from the perspectives of archaeology, built heritage, townscape, air quality, noise, and land quality. Site suitability will depend on whether these impacts can be adequately mitigated.

G.2.61 **Socio-economic and community:** Assessed the site as **not suitable** for use as a main tunnel reception/intermediate site. Use of the site appears likely to cause significant disruption to the high-density residential developments to the north, south and west. Imperial Wharf residents and the wider local community also stand to temporarily lose part of the riverside landscaped open green space.

G.2.62 **Property:** Assessed the site as **suitable** for use as a main tunnel reception/intermediate site as the site is undeveloped and there will likely be acceptable acquisition costs.

**S08KC: Foreshore, Chelsea Wharf**

G.2.63 Site S08KC is situated on the foreshore of the River Thames within the Royal Borough of Kensington and Chelsea.

G.2.64 To the northwest of the site is a recycling centre. Further to the north is a newly built give-storey residential building. To the southwest is the now disused Lots Road Power Station, likely to be redeveloped. The site is bordered on the east, south and west by the River Thames.
Appendix G – Carnwath Road Riverside (formerly Barn Elms)

Phase two scheme development report
Part two: Appendices

G.2.65 *Engineering:* The site was assessed as **suitable** for use as a main tunnel reception/intermediate site because it is relatively unrestricted in size and shape, with good proximity to the main tunnel. The site also has good access provision through Cremorne Gardens or by river.

G.2.66 *Planning:* On balance, the site was assessed as being **less suitable** for use as a main tunnel reception/intermediate site. This is because of the visual impacts and loss of amenity to both Cremorne Gardens and nearby residential receptors with limited scope for mitigation. Loss of open space may also result from the site access through the gardens.

G.2.67 *Environment:* Overall, the site was assessed as **less suitable** for use as a main tunnel reception/intermediate site. The site was considered likely to be **suitable** from the perspectives of transport, water resources (groundwater), land quality and air quality. However, the site was considered **less suitable** from the perspective of archaeology, built heritage and townscape, surface water, ecology, noise and flood risk. Substantial mitigation would be required to limit the impacts associated with using this site, particularly the considerable heritage and ecological risks associated with the foreshore at this location.

G.2.68 *Socio-economic and community:* The site was assessed as **suitable** for use as a main tunnel reception/intermediate site. Use of the site will have impacts associated with access through Cremorne Gardens both during and after construction. There will also be construction impacts on both the gardens and the nearby residential development. There will also be disruption to the recycling centre and its associated pier facility.

G.2.69 *Property:* The site was assessed as **suitable** for use as a main tunnel reception/intermediate site. Being an undeveloped site, there is likely to be an acceptable acquisition cost. However, a special ministerial procedure may be required to acquire this.

**Identification of the preferred site**

G.2.70 Consideration of the main tunnel sites up until short list 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.

G.2.71 The *Engineering options report* describes the process of identifying the tunnelling options, taking into account engineering requirements. The main points are summarised below.

G.2.72 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.

G.2.73 To manage the total number of combinations of tunnel drive and reception/intermediate 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 G.1 below. The zones were numbered and named for convenient referencing, as shown in Figure G.1.

**Figure G.1 Location of site zones**

G.2.74 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.

G.2.75 Multidisciplinary workshops were held to identify the most suitable main tunnel shortlisted site within each zone, taking into account the conclusions reached in the SSRs, as described previously.

G.2.76 The following sites were identified as the most suitable for zones S1 to S4, which make up the western section of the main tunnel:

- **Zone S1 – S33HF**: Hammersmith Pumping Station (suitable for use as a main tunnel reception/intermediate site only)
- **Zone S2 – S17RD**: Barn Elms (suitable for use as either a main tunnel drive or reception/intermediate site)
- **Zones S3 and S4** only contained sites identified as suitable for use as reception/intermediate sites. As a main tunnel drive site is required in Zone S5, due to the change in geology in this location and restrictions in the tunnel drive length, no reception/intermediate sites are required in zones S3 and S4 to support the tunnel drive options.

G.2.77 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.

G.2.78 The change in geology and restrictions in the tunnel drive length means it is desirable to have a main tunnel shaft site in Zone S5 as it is desirable to change the type of tunnel boring machine (TBM) used. To support the tunnelling strategy for the eastern end of the tunnel, the site in Zone S5 (S79WH with S80WH: Tideway Walk) was identified as a main tunnel drive site. It was therefore concluded that a main tunnel drive site would
be required in zones S1–S4 to construct the western section of the tunnel. The alternative would have been for site S79WH with S80WH: Tideway Walk to be used as a double drive site (ie, used to construct the tunnel concurrently in both an easterly and westerly direction) and this site was assessed as not suitable for use as this type of site.

G.2.79 Zone S2 was identified as the only suitable location for a main tunnel site to drive the main tunnel to zones S1 and S5 because there were no suitable main tunnel drive sites identified in zones S1, S3 or S4. The two drives from Zone S2 would, however, be completed sequentially, using a single TBM.

G.2.80 A main tunnel reception site would therefore be required in Zone S1 to receive the TBM.

G.2.81 S17RD: Barn Elms had been identified as suitable for use as a main tunnel drive site, and the suitability of this site was further reviewed at a subsequent multidisciplinary workshop at which all our preferred sites were reviewed.

G.2.82 The site at Barn Elms was confirmed as our preferred site for a main tunnel site from which to construct the western sections of the main tunnel, for a number of reasons, which are summarised below.

- The site was considered suitable for a main site from the point of view of all disciplines: engineering, planning, environment, community and property.

- This site offers the opportunity to combine the requirements of the main tunnel drive site with that for the CS05X West Putney Storm Relief. The CSO drop shaft could be incorporated into the main tunnel drive shaft, therefore eliminating a separate CSO drop shaft along with a further connection tunnel to the West Putney Storm Relief CSO.

- S17RD is a very large area and the required working site area would only occupy the south-eastern corner of the site, adjacent to the river. Jetty access would need to allow for maintaining the Thames Path, which runs along the eastern boundary of the site.

- It was considered that the existing site constraints could be addressed adequately by positioning the site activities appropriately and providing suitable construction mitigation to reduce the impact on the surroundings. Among other things, it would be important to consider the impact of any floodlighting upon residential areas and to position works accordingly, and to consider further the most appropriate access. In particular, it was believed that conformity with the Richmond upon Thames Unitary Development Plan policies ENV1 and ENV11, which relate to Metropolitan Open Land and open space, could be achieved on the basis that the use would be predominantly temporary, appropriate mitigation could be provided to reduce potential impacts on views and openness, and construction activities could be confined within a relatively small area of a much larger site.

G.2.83 S17RD was therefore identified as the preferred site in zones S1 – S4 for a main tunnel site from which to construct the western end of the main
tunnel. This site would also be used to connect the West Putney Storm Relief Sewer to the main tunnel.

G.2.84 At the same time, and using the same process, site S33HF: Hammersmith Pumping Station was identified as a preferred reception site for the main tunnel in Zone S1, and S79WH with S80WH: Tideway Walk as a preferred reception site for the western section of the main tunnel in Zone S5.

G.3 Review of site selection following phase one consultation

Phase one consultation responses

G.3.1 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 consultation.

G.3.2 The main issues and concerns raised during phase one consultation in relation to the preferred main tunnel drive site S17RD: Barn Elms are summarised below.

G.3.3 The main issues raised included:

- further justification requested as to how the site was selected, including why brownfield alternatives and solutions where the drive site and CSO site were split have not been explored
- disruption to water-based recreation, including the Oxford/Cambridge boat race and other major river events
- impact of the loss of green space, playing pitches and Metropolitan Open Land
- impact on community fundraising for upgrade of the site
- access should not be disrupted along footpaths, including the Thames Path
- impact of increased congestion caused by HGVs and concern about proposed access routes
- impact on the environment, the area’s tranquillity, biodiversity and wildlife.

G.3.4 The main comments received in support included:

- the best choice for the location of the site, in comparison to alternatives consulted on which would cause more disruption to the community
- site is advantageous because two activities can be combined in one site. Although sports fields would be affected, many would remain the same
- location of the site by the river allows materials and spoil to be transported by barges
- obvious choice, given large amounts of land
• least impact on the historic environment as it combines both requirements in a single location.

G.3.5 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

G.3.6 In response to the feedback we received during the 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 S17RD: Barn Elms as our preferred site. These design developments and changes in circumstances are described in paragraph G.3.8 below.

G.3.7 This ‘back-check’ involved a targeted repeat of each relevant stage of our site selection process (as detailed in the Site selection methodology paper) to reconsider which site would be the most suitable main tunnel drive site between zones S1 – S4.

G.3.8 The main factors which triggered this back-check process were as follows:

• In reviewing potential sites, we were aware that London Borough of Hammersmith and Fulham had changed the designation from mixed use to residential of our preferred site Hammersmith Pumping Station site. Also the developers had submitted a new planning application for a residential development on this vacant and cleared site, except for the Hammersmith Pumping Station itself. Planning permission is likely to be granted and construction to start before the end of this year. We therefore determined there was a high risk and cost of not being able to obtain an area at our preferred site that would be large enough to accommodate a main tunnel reception site, drive a connection tunnel to Acton Storm Tanks (to connect the Acton CSO to the main tunnel) and intercept Hammersmith Pumping Station CSO. We therefore needed to review potential main tunnel sites between Hammersmith Bridge and Albert Bridge (main tunnel zones S1 – S4, see Figure G2 below).

• Design developments and further modelling work found that the long connection tunnel proposed between the Acton Storm Tanks and Hammersmith Pumping Station sites would need to be a similar width to the main tunnel. We therefore decided to extend the main tunnel to Acton Storm Tanks. This would therefore potentially alter our tunnelling options for the western section of the main tunnel.

• Technical study on barge movements at Barn Elms confirmed only 350t barges could be used. This created additional health and safety risks for river users and logistical issues due to the short tidal window.

• Various consultees’ comments on the impacts of the proposed use of Barn Elms site as a main tunnel drive site, the engineering assumptions on which site selection decisions were based and the tunnelling strategy for the western section of the main tunnel.
G.3.9 The above factors led to a review of potential sites and tunnelling strategy for the western end of the tunnel. This also resulted in the creation of a new Zone S0 to address the extension of the main tunnel to Acton Storm Tanks.

**Figure G.2 Revised main tunnel shaft zones including new zone S0**

![Map of revised main tunnel shaft zones including new zone S0](image)

**Engineering assumptions**

G.3.10 As part of the back-check process, the engineering assumptions which had been used during the initial phase of site selection were reviewed to see if any of the design developments or new technical information altered any of the original assumptions.

G.3.11 The outcome of this review was that for zones S0 – S4 (covering the majority of the section of the tunnel to be constructed predominantly in London Clay), the size of construction site required for a main tunnel drive was reduced from 18,000m² to 15,000m². This important change allowed the back-check process to review sites previously considered too small for a main tunnel drive site. At the same time, it was established that the size of site required for a double drive site (i.e., tunnelling in two directions concurrently from one shaft) could be 20,000m².

G.3.12 The following section outlines the results from each stage of the back-check process.

**Assessment of the back-check long list**

G.3.13 The original long list sites for main tunnel drive sites in zones S1 – S4 contained 200 sites. These sites were reviewed alongside any newly identified sites to determine the ‘scope’ of the back-checking exercise (i.e., which sites would be subject to reassessment as a result of the relevant change of circumstances or new information that had emerged). The result of this scoping exercise found we needed to reassess the following eight sites:

- S17RD: Barn Elms
- S72HF: Fulham Depot, next to Wandsworth Bridge
• S73HF: Townmead Road
• S76HF: Imperial Wharf
• S87HF: Carnwath Road Riverside – new site (combination of two previous sites: S69HF and S70HF)
• S17WH: Land between Osiers Road, Enterprise Way and Bell Lane Creek
• S18WH: Feathers Wharf, The Causeway
• S08KC: Foreshore, Chelsea Wharf
• S09KC: Foreshore, Cheyne Wharf.

G.3.14 All the other sites on the original long list were scoped out as there had been no change in circumstances necessitating a reappraisal. In the case of S33HF: Vacant land and Thames Water Hammersmith Pumping Station, Chancellors Road, our monitoring revealed that this site was no longer available for use as a main tunnel site. Therefore, we did not include this in our back-check process. The potential group of sites listed above were put on the back-check long list. It should be noted that at this stage, consideration was also given to alternative sites suggested by consultees. However, besides the sites listed above, none were judged to be feasible, mainly due to site size and/or location.

G.3.15 The back-check long list sites were then assessed against the engineering, planning, environment, community and property considerations set out in Table 2.2.

G.3.16 The table below summarises the outcome of the ‘back-check’ assessment of the back-check long list of sites. 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, 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 passed to the back-check draft short list for more detailed assessment. The main rationale for the exclusion of these sites at this stage is summarised in the table below.

Table G.1 Long list to draft short list for main tunnel sites in zones 1 – 4 (Table 2.2 assessment)

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site name/ description</th>
<th>Recommendation and rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>S17RD</td>
<td>Barn Elms</td>
<td><strong>Recommendation</strong>: To draft shortlist as a main tunnel site and main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S72HF</td>
<td>Fulham Depot, next to Wandsworth Bridge</td>
<td><strong>Recommendation</strong>: To draft shortlist as a split main tunnel site with S73HF and a main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>Site ID</td>
<td>Site name/ description</td>
<td>Recommendation and rationale</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>S73HF</td>
<td>Townmead Road</td>
<td><strong>Recommendation:</strong> To draft shortlist as a split main tunnel site with S72HF and a main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S76HF</td>
<td>Imperial Park</td>
<td><strong>Recommendation:</strong> To draft shortlist as a main tunnel site and main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S87HF</td>
<td>Carnwath Road Riverside</td>
<td><strong>Recommendation:</strong> To draft shortlist as a main tunnel site and main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S17WH</td>
<td>Land between Osiers Road, Enterprise Way and Bell Lane Creek</td>
<td><strong>Recommendation:</strong> To draft shortlist as a main tunnel site, a split main tunnel site with S18WH and a main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S18WH</td>
<td>Feathers Wharf, The Causeway</td>
<td><strong>Recommendation:</strong> To draft shortlist as a split main tunnel site with S17WH and a main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S08KC</td>
<td>Foreshore, Chelsea Wharf</td>
<td>Recommendation: To draft shortlist as a split main tunnel site with S09KC and a main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S09KC</td>
<td>Foreshore, Cheyne Wharf</td>
<td><strong>Recommendation:</strong> To draft shortlist as a main tunnel site and a main tunnel reception/intermediate site.</td>
</tr>
</tbody>
</table>

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

G.3.17 Full details are provided in back-check Table 2.2 assessment tables and accompanying plans.

G.3.18 Of the eight sites identified, all eight were assessed as potentially suitable and passed to the draft short list. None were eliminated as being unsuitable.

**Assessment of the back-check draft short list sites**

G.3.19 The eight back-check draft shortlisted sites 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.

G.3.20 The table below summarises the outcome of the ‘back-check’ assessment of the draft short list of sites. Sites which were assessed as being the least constrained when considered against Table 2.3 considerations were retained on the back-check 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 back-check short list for more detailed assessment.

G.3.21 The main rationale for the exclusion of these sites at this stage is summarised below.

**Table G.2 Draft short list to final short list for main tunnel sites in zones 1 – 4 (Table 2.3 assessment)**

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site name/ description</th>
<th>Recommendation and rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>S17RD</td>
<td>Barn Elms</td>
<td><strong>Recommendation:</strong> Retain on short list as a main tunnel site and main tunnel reception/intermediate site.</td>
</tr>
<tr>
<td>S72HF</td>
<td>Fulham Depot, next to Wandsworth Bridge</td>
<td><strong>Recommendation:</strong> Retain on short list as a main tunnel reception/intermediate site.</td>
</tr>
</tbody>
</table>
| S72HF with S73HF | Fulham Depot, next to Wandsworth Bridge | **Recommendation:** Not to shortlist  
**Rationale:**  
- Property – The combined acquisition costs with S73HF are likely to be significant, especially given the value of any planning permissions would be based on residential and supermarket uses. |
| S73HF   | Townmead Road          | **Recommendation:** Not to shortlist  
**Rationale:**  
- Property – The acquisition costs are likely to be significant, especially given the value of any planning permissions would be based on residential and supermarket uses. |
| S76HF   | Imperial Park, Imperial Crescent/Townmead Road | **Recommendation:** Not to shortlist  
**Rationale:**  
- Planning/Environment – Use of the site would conflict with numerous planning designations including Imperial Wharf Open Space of borough-wide importance.  
- Community – Potential impact on high density residential area and community cohesion due to loss of open space. |
<p>| S87HF   | Carnwath Road Riverside | <strong>Recommendation:</strong> Retain on short list as a main tunnel site and main tunnel reception/intermediate site. |</p>
<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site name/ description</th>
<th>Recommendation and rationale</th>
</tr>
</thead>
</table>
| S17WH  | Land between Osiers Road, Enterprise Way and Bell Lane Creek | **Recommendation:** Not to shortlist  
**Rationale:**  
- Planning/Environment – The construction of a high-density residential development has started on the site.  
- Property – Site is not available as development has started on the site.  
- Community – Use of the site will have a large impact on high rise flats. |
| S18WH  | Feathers Wharf, the Causeway | **Recommendation:** Retain on short list |
| S18WH with S17WH | Feathers Wharf, The Causeway | **Recommendation:** Not to shortlist  
**Rationale:**  
- Planning/Environment – The construction of a high density residential development has started on site S17WH.  
- Property – Site is not available as development has started on site S17WH.  
- Community – Use of the site will have a large impact on high rise flats on S17WH. |
| S08KC with S09KC | Foreshore, Chelsea Wharf | **Recommendation:** Not to shortlist for consideration as a split main tunnel site with S09KC.  
**Rationale:**  
- Engineering – Access to these sites is problematic.  
- Property – There are several disadvantages from a property perspective particularly associated with site S09KC which means the split site with S08KC is unsuitable on grounds of acquisition cost and likely complexity, as well as residential moorings on the site for up to 60 houseboats.  
- Community – Use of these sites are likely to have numerous impacts on community cohesion, health and well-being, and equality considerations, particularly in relation to the existing large houseboat community on the site. |
<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site name/ description</th>
<th>Recommendation and rationale</th>
</tr>
</thead>
</table>
| S08KC   | Foreshore, Chelsea Wharf | **Recommendation:** Not to shortlist for consideration as a main tunnel reception/intermediate site  
**Rationale:**  
- Engineering – Access is very constrained and alternatives (e.g., Cremorne Gardens, canoe club or adjacent buildings) are unlikely to be acceptable.  
- Property – There is some risk for foreshore sites, but only if the Crown or PLA do not agree to the acquisition as a CPO is not possible.  
- Community – Concern about impact on Cremorne Gardens, the canoe club, a residential area and large houseboat community. |
| S09KC   | Foreshore, Cheyne Wharf | **Recommendation:** Not to shortlist for consideration as a main tunnel site or a main tunnel reception/intermediate site.  
**Rationale:**  
- Property – There are several disadvantages from a property perspective and therefore the site is considered unsuitable on grounds of acquisition cost and likely complexity, as well as residential moorings on the site for up to 60 houseboats.  
- Community – Use of S09KC is likely to have numerous impacts on community cohesion, health and well-being, and equality considerations particularly in relation to the existing houseboat community on the site, which make this a less suitable site from a community point of view. |

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

G.3.22 Full details are provided in back-check Table 2.3 assessment tables and accompanying plans.

G.3.23 Of the eight sites on the back-check draft short list, four were assessed as potentially suitable and passed to the final short list while four sites were not shortlisted.
Assessment of the back-check final short list sites

G.3.24 Following the back-check, the four final shortlisted sites identified for assessment at the next stage were as follows.

Sites identified as suitable for use as main tunnel drive or reception/intermediate sites:
- S17RD: Barn Elms
- S87HF: Carnwath Road Riverside.

Sites identified as suitable for use as reception/intermediate sites only:
- S18WH: Feathers Wharf
- S72HF: Fulham Depot.

G.3.25 For some of the sites listed above, the construction layouts considered at phase one are still applicable for consideration at phase two. The SSRs produced for these sites were therefore re-evaluated to consider if any new information would have a bearing on any of the disciplines recommendations. Those sites for which we are proposing new configurations and new sites, we conducted a new assessment.

S18WH: Feathers Wharf

G.3.26 While a number of development plan documents have been adopted since the pre-phase SSR was completed, the updated policies do not have an impact on the final planning assessment conclusion which remains suitable.

G.3.27 All other discipline recommendations remain unchanged.

S72WH: Fulham Depot

G.3.28 There are no significant changes to the planning assessment. While there has been a new planning application and the Hammersmith and Fulham Core Strategy has now been adopted, there is no change to the planning assessment conclusion which remains suitable.

G.3.29 All other discipline recommendations remain unchanged.

S17RD: Barn Elms

G.3.30 At phase one consultation, we considered a worksite in the corner of Barn Elms playing fields and at the outlet of Beverly Brook into the River Thames. However, as part of the back-check process, we revised the site area for the SSR assessments, which elongated the worksite so it would have less impact on the adjacent playing fields and move the worksite further north adjacent to the Boat House to be further away from the residential area around Horne Way. We also assessed three access options to the site from 1 – Rocks Lane, 2 – Queen Elizabeth Walk and 3 – Mill Hill Road (across Lower Putney Common and over Beverley Brook). All disciplines except property, although it was marginal, thought the most suitable access to the worksite was from Rocks Lane. This would involve a dedicated access route to the construction site and enable segregation.
from the adjacent third-parties, which would be safer than the other two access route options.

G.3.31 The site was assessed for use as a single and double main tunnel drive site and a reception/intermediate site. All site options would also include the interception of the West Putney CSO, which is located in the corner of Barn Elms near the outlet of Beverley Brook, into the River Thames.

G.3.32 **Engineering:** Assessed the site as suitable for a main tunnel reception/intermediate site and a single and double main tunnel drive site with the preferred access option 1 – off Rocks Lane. The site is of suitable size and offers the opportunity for the increased size requirements associated with a double drive main tunnel site. It is also clear and predominantly level, with minimal enabling works required.

G.3.33 For the main tunnel drive sites, there is suitable river frontage to build jetty and wharfage facilities in the River Thames to allow delivery of materials and removal of excavated material by river. However, barge movements are restrictive in this area of the River Thames.

G.3.34 **Planning:** Assessed the site as suitable for a main tunnel reception/intermediate site and a single main tunnel drive site. There are a series of planning designations that are applicable to the site. Taking on board all the potential constraints, and balanced against the potential for mitigation against potential impacts or conflicts with policy, this site is suitable for use. This recommendation is subject to successful mitigation of the constraints identified. There may be additional disruption to recreational river users and to the residential receptors to the south for a single drive site. However, use of the site in this way would result in more effective and efficient use of land, and the need for only one site for both construction and interception works instead of two.

G.3.35 The site is considered less suitable for use as double drive main tunnel site. Increased traffic movement associated with spoil removal for a double drive and the resulting impacts on the amenity of the surrounding area are a particular concern, as well as potential visual impacts resulting from the triple stacking of office/welfare facilities.

G.3.36 **Environment:** Overall, the site is considered to be suitable as a reception/intermediate, single or double main tunnel site. However, mitigation would be required to enable the site to be used.

G.3.37 Based on current information, the site is considered suitable from the perspective of transport, hydrogeology, built heritage, townscape, noise, air quality (for access options 1 and 2) and land quality.

G.3.38 The site is considered less suitable from the perspective of archaeology, ecology, surface water, flood risk and air quality (for access option 3).

G.3.39 Overall, the site is considered suitable with access from Rocks Lane, subject to further investigation of whether archaeology, ecology, surface water, flood risk and air quality impacts can all be adequately mitigated.

G.3.40 **Socio-economic and community:** Assessed the site as suitable for a main tunnel reception/intermediate site, but less suitable as a main tunnel single or double drive site. The main tunnel drive site options would
require increased levels of works activity and larger site size. There would be a temporary loss of sports fields, disruption to the operation and users of the Boat House and Sailing Club, Thames Path and recreational river users.

G.3.41 In general, this site is likely to have an important amenity value to neighbouring residential users and a value to the local community as a sports facility and area of open space. The river in the area is recognised to have a high value to recreational users. The current ambient noise level is generally low, except during the core flight times to Heathrow airport, so residential areas near the site and across the river as well as Barnes Wetlands Centre would experience increased noise from the works, especially in regard to site set-up and tunnelling activities.

G.3.42 Access Option 1 (Rocks Lane) appears likely to have the least impact on the local community, although efforts will need to be made to minimise the impact of additional traffic past the residential properties on this road and the impact the new access route has on the sports fields and users.

G.3.43 **Property:** Assessed the site as **less suitable** for a single and double main tunnel drive site. While the site is undeveloped, the provision of replacement land is likely to result in high acquisition costs and is likely to be extremely difficult. Therefore, a special parliamentary procedure may be required which could cause delays to the project. There has been significant public and political opposition to the use of the site as a main tunnel site which is likely to increase the acquisition risk. Furthermore, the boat house buildings will need to be demolished and reinstated which may disrupt these operations. There will also be considerable potential for discretionary purchase costs.

G.3.44 The site is **suitable** for a main tunnel reception/intermediate site. Acquisition costs for the small site layout are likely to be acceptable and the acquisition of the boat house and sailing club buildings is not required.

**S87HF: Carnwath Road Riverside**

G.3.45 Site S87HF is located adjacent to the River Thames within the London Borough of Hammersmith and Fulham. The site incorporates Hurlingham Wharf as well as Whiffin Wharf to the west and the Carnwath Road Industrial Estate to the east, which contains of a number of two-storey industrial, warehouse and retail units.

G.3.46 The surrounding area is characterised by a mix of land uses. Immediately to the north of the site along Carnwath Road is the Piper Building, a large, mixed-use building with high-density residential properties, including car parking provision on the corner with Peterborough Road. Also, to the north of the site are residential properties within Philpot Square. A four-storey residential block and a Currys superstore are located immediately adjacent to the site to the east. Situated to the west of the site are three- to four-storey high residential properties overlooking the site and the River Thames.

G.3.47 The site was assessed for use as a main tunnel drive site and main tunnel reception/intermediate site.
G.3.48 **Engineering:** Assessed the site as **suitable** as a main tunnel drive and reception/intermediate site. The site is of suitable size with sufficient proportions to enable efficient working. It is level and predominately clear, with minimal enabling works required for the demolition of the light industrial units.

G.3.49 **Planning:** This site is considered to be **suitable** as an intermediate/reception site and a main tunnel drive site. Hurlingham Wharf is designated as a safeguarded wharf and is currently vacant. Temporary use of this site, including its use for the waterborne transport of construction materials (for the main drive site), is consistent with extant local policy and regional planning guidance. The Carnwath Road Riverside sites are subject of a number of planning policy designations and the shaft location and layout of the permanent structures will need particular consideration, especially with regards to the wider conservation area and regeneration area. However, none of these designations are deemed significant to preclude the use of the site. Of most concern is the potential adverse impact on residential amenity, particularly to the adjacent residential properties to the west and east, but it is considered these impacts can be reduced with appropriate mitigation measures.

G.3.50 **Environment:** Overall, the site was assessed as **suitable** for use as a main tunnel drive and reception/intermediate site. The site was considered likely to be **suitable** from the perspective of transport, built heritage, townscape, water resources (hydrogeology) and ecology. In the case of the reception/intermediate option, it is also **suitable** from the perspective of water resources (surface water) and flood risk. However, the site is **less suitable** from the perspective of archaeology, air quality, noise and land quality. In the case of the single drive option, it is also less suitable from the perspective of water resources (surface water) and flood risk.

G.3.51 **Socio-economic and community:** Assessed the site as **less suitable** for use as a main tunnel drive and reception/intermediate site. This is due to the potentially adverse impact on the businesses operating out of premises located on the eastern section of the site and the residential properties located to the west, north and east of the site and surrounding vicinity. While these impacts are likely to be lower for a reception/intermediate site, this is likely to be partially offset by the increased road transport impacts from not utilising river transport.

G.3.52 **Property:** Assessed the site as **less suitable** for use as a main tunnel drive and reception/intermediate site. The site is partially vacant, however there will be likely to be large acquisition costs and a requirement for relocation or extinguishment of businesses in Carnwath Road Industrial Estate.

G.4 **Preferred site recommendation**

G.4.1 Following the completion of the back-check process, a multidisciplinary workshop was held to select the most suitable main tunnel site out of the shortlisted sites within each zone, and then consider the drive options to determine the preferred site. This workshop took into account the SSR
findings, feedback received during the phase one consultation and interim engagement.

G.4.2 No shortlisted sites were identified within zones S1 and S4. The workshop agreed that S17RD: Barn Elms was the most suitable main tunnel site in Zone S2. The workshop also agreed that S87HF: Carnwath Road Riverside was the most suitable main tunnel drive site in Zone S3. (While S18WH: Feathers Wharf was identified as potentially the most suitable main tunnel reception site in Zone S3, for the reasons explained below in paragraph G.4.3, ultimately a drive site was required in Zone S3).

G.4.3 As S01EG/C01YC: Acton Storm Tanks, the preferred site in Zone S0, was found to be suitable only for use as a main tunnel reception shaft (see Appendix A), a main tunnel drive site had to be identified in zones S1 – S4 to construct the western sections of the main tunnel. This means that a main tunnel drive site is required from either Zone S2 or Zone S3.

G.4.4 Figure G.3 below shows the location of the preferred sites and tunnelling strategy for the construction of the western section of the main tunnel that will be published at phase two consultation.

**Figure G.3 Location of main tunnel preferred and shortlisted main tunnel sites**

G.4.5 These two options were compared at a workshop which took into account the SSR findings and the feedback received during the phase one consultation. On the basis of the assessments described above and professional judgement, it was agreed by all disciplines that **S87HF: Carnwath Road Riverside should become the recommended phase two preferred main tunnel drive site**. This meant that we believed this to be the most appropriate site, subject to further engagement with
stakeholders and further design development to verify this conclusion prior to phase two consultation.

G.4.6 In summary, S87HF: Carnwath Road Riverside was identified as the most suitable site because:

- Carnwath Road Riverside is a brownfield site while Barn Elms is a greenfield site
- the site has better river access via the existing safeguarded wharf than is available at Barn Elms. This allows much larger barges (800t – 1000t rather than 350t) to be used to remove excavated materials and deliver construction materials to site. Use of larger barges also has associated cost and environmental benefits
- there would be much less conflict with the recreational users of the River Thames than at Barn Elms
- Carnwath Road Riverside has better existing road access and links to the strategic road network. In contrast, at Barn Elms there would be a need to construct a lengthy temporary access roads across the Barn Elms playing fields to local roads that are congested at peak times
- use of Carnwath Road Riverside avoids disruption of Thames Path at Barn Elms. The Thames Path is already diverted around the site at Carnwath Road Riverside
- use of this site will have less impact on the natural and built environment in terms of planning policies and designations than is likely to be the case at Barn Elms
- use of this site presents less programme risk and is likely to have lower construction costs. Enabling works can also be progressed more easily, especially as there is an existing energy supply on site
- this site has a higher resale land value, while the Barn Elms site has higher site set-up cost and no resale value.

G.4.7 Use of Carnwath Road Riverside means, however, that a small CSO shaft site will still be required at Barn Elms to intercept the West Putney Storm Relief Sewer and connect it to the main tunnel (see Appendix C – Barn Elms).

G.4.8 The Carnwath Road Riverside site is also closer to residential properties than the proposed phase one site at Barn Elms, so additional mitigation will be required to reduce potential impacts of construction activities.

G.4.9 As detailed above, the back-check process also identified a main tunnel reception site at Acton Storm Tanks (see Appendix A – Acton Storm Tanks). This site’s suitability was reviewed at the same multidisciplinary workshop as the Carnwath Road Riverside site and the site was subsequently confirmed as the phase two preferred site for the interception of the Acton Storm Tanks CSO and to receive the main tunnel driven from the Carnwath Road Riverside site.

G.4.10 In addition, the preferred main tunnel shaft site identified at phase one consultation in Zone S5 (S79WH with S80WH: Tideway Walk) became
unavailable, so a further back-check was undertaken to identify potential alternative sites in this zone. This process identified S72WH/S93WH: Kirtling Street (with Cringle Street) as our phase two preferred site for a main tunnel shaft in Zone S5 (see Appendix L – Kirtling Street for full details of the selection of this site). In reviewing the drive options, it was agreed by all disciplines to drive the main tunnel from S72WH/S93WH: Kirtling Street (with Cringle Street) to S87HF: Carnwath Road Riverside.

G.5 Site development

G.5.1 Following the selection of Carnwath Road Riverside as the recommended preferred site, further feedback from stakeholders and ongoing scheme development work have contributed to a number of further site changes.

Engagement with stakeholders

G.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.

G.5.3 We have engaged with community and interest groups through ongoing meetings and correspondence. Furthermore, we have had regular meetings and workshops with officers from the London Borough of Hammersmith and Fulham, Port of London Authority (PLA), 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 reviews for Carnwath Road Riverside were attended by the London Borough of Hammersmith and Fulham and our pan-London stakeholders.

G.5.4 We have also undertaken a series of drop-in sessions to present and discuss the potential suitability of Carnwath Road Riverside as an alternative preferred site. These comments have been considered and details are provided in the Interim engagement report.

Construction layout

G.5.5 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. Particular factors at this site that have influenced the layout are as follows:

- The site layout would capitalise on existing river infrastructure through the use of the safeguarded wharf during construction to remove excavated material.
- Site access has been arranged so it is not directly opposite residential units.
• While continuous tunnelling is taking place, the working area would be enclosed in a temporary structure which would significantly reduce noise levels.

G.5.6 Further information on the construction logistics and the site layouts for the construction and operational phases can be found in the Carnwath Road Riverside site information paper.

**Design**

G.5.7 The design of the permanent use and appearance of the structures at Carnwath Road Riverside follows our scheme-wide principles and has taken into account comments raised during ongoing engagement with the London Borough of Hammersmith and Fulham and other technical consultees.

G.5.8 Full details of design development for the Carnwath Road Riverside site are provided in the Design development report.

**G.6 Phase two consultation**

G.6.1 A final preferred site 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 Carnwath Road Riverside should become the phase two consultation preferred site for a main tunnel drive site to construct the western section of the main tunnel.

G.6.2 Site S01EG/C01YC: Acton Storm Tanks was also confirmed as a main tunnel reception site and S72WH/S93WH: Kirtling Street (with Cringle Street) was confirmed as the main tunnel site which would be used to drive the main tunnel to Carnwath Road Riverside and to Chambers Wharf.

G.6.3 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.