Thames Tideway Tunnel
Thames Water Utilities Limited

Application for Development Consent

Application Reference Number: WWO10001

Planning Statement

Doc Ref: **7.01**

Appendix C

APFP Regulations 2009: Regulation **5(2)(q)**

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Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

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C.1 Introduction

C.1.1 Catchment modelling[1] indicates that in an average year, the West Putney Storm Relief combined sewer overflow (CSO) spills approximately 30 times and discharges 35,000m^3 of untreated sewage into the River Thames in the London Borough of Richmond upon Thames. On the basis that litter tonnages are proportional to discharge volumes, approximately 9 tonnes of sewage derived litter is also discharged from this CSO in an average year (*Environmental Statement* Vol 6, Section 14.4). A worksite is required to connect the West Putney Storm Relief CSO to the main tunnel. The proposed development site is known as Barn Elms, which is located in the London Borough of Richmond upon Thames near the London Borough of Wandsworth.

C.1.2 The Environment Agency identified the West Putney Storm Relief CSO as a CSO that needs to be controlled, and Thames Water's[2] solution is for full interception. The CSO discharges have multiple impacts on water quality at the outfall location. This includes a localised effect of rapidly dropping dissolved oxygen levels, the release of pollutants and the discharge of sewage litter and effluent.

C.1.3 Catchment modelling suggests that if the project is constructed as proposed, the annual discharge of untreated sewage into the Thames would be reduced to 1,500m^3, and that the number of CSO spills would be reduced to one spill event per year. The sewage derived litter from the CSO can be expected to reduce by approximately 96 per cent to less than one tonne (*Environmental Statement* Vol 6, Section 14.6).

C.1.4 The location of the site is identified in the Site location plan in Annex C.

C.1.5 This assessment is structured as follows:

a. Section C.2 provides a brief description of the Barn Elms site.

b. Section C.3 sets out the planning context for works in this location.

c. Section C.4 describes the site-specific development for which consent is sought and how the proposals evolved in response to consultation.

d. Section C.5 analyses the principal site-specific planning considerations and how the proposals comply with relevant planning policy.

e. Section C.6 provides an overall conclusion of the site-specific assessment.

[1] The assessment of the beneficial effect of a reduction in sewage derived litter discharged to the Tidal Thames was inferred from catchment modelling results of the reduction in discharge volume, frequency and duration and was not directly modelled. For further details on catchment modelling refer to *Environmental Statement* Vol 3, Section 11.

[2] Thames Water Utilities Ltd (TWUL). The Draft Development Consent Order (DCO) contains an ability for TWUL to transfer powers to an Infrastructure Provider (as defined in article 2(1) of the DCO) and/or, with the consent of the Secretary of State, another body.

C.2 Site description

C.2.1 The site itself comprises a band of greenfield land along the northern, eastern and southern borders of the Barn Elms Schools Sports Centre (the 'BESSC') covering an area of approximately 3.1ha. The playing fields area of the BESSC measures approximately 23ha and is owned and operated by the London Borough of Wandsworth. The BESSC is a separate facility to the adjacent Barn Elms Playing Fields to the west and is owned and operated by the London Borough of Richmond upon Thames. Therefore, in terms of size, the application site only represents a very small proportion of the BESSC.

Figure C.1 Aerial photograph of Barn Elms

C.2.2 The site is bounded to the north by the pedestrian section of Queen Elizabeth Walk, to the east by a line of mature trees and the Thames Path, to the southeast and south by the Beverley Brook footpath and to the west by the BESSC. The Thames Path and the Beverley Brook footpath are both Public Rights of Way.

C.2.3 Two changing room facilities and associated car park hardstanding and several track and field facilities are located towards the north of the BESSC playing fields.

C.2.4 The key features of the site are illustrated in the Existing site features plan in Annex C.

C.2.5 The surrounding area comprises a combination of open space and residential and community facilities. The London Wetland Centre Site of Special Scientific Interest lies to the north of the site.

C.2.6 Barn Elms Boat House, an existing council-run rowing club, sits on the eastern boundary of the site. The access route to the boat house runs from the BESSC car park eastwards across the BESSC playing fields along a path lined with Lime trees.

C.2.7 The site lies approximately 35m from the River Thames and the River Thames and Tidal Tributaries Site of Importance for Nature Conservation. On the opposite bank of the river are residential properties, the Fulham Football Club and Bishop's Park.

C.2.8 To the southeast lie an existing scout hut, a Learning Disability Centre, and the confluence of the River Thames and Beverley Brook. On the far side of the confluence are the Wandsworth Sea Cadet Corps building and Leader's Gardens. Leader's Gardens is a small public park adjacent to Putney Embankment, which features open grassland, scattered mature trees and play equipment.

C.2.9 The Ashlone Wharf Tidal Barrier is also located to the southeast of the site. In late 2011 to spring 2012, the Environment Agency undertook repair works to the flood defence barrier. In order to undertake these works, a compound was set up next to the BESSC and an access track created along the edge of the playing fields parallel to the River Thames. This access track was reinstated as grassland on completion of the works. The Environment Agency was able to undertake these works without the need for planning permission and has a right of access to the site through the playing fields.

C.2.10 The Beverley Brook watercourse runs along the southern perimeter of the BESSC and the Barn Elms Playing Fields and is approximately 15m to the south of the site. The nearest residential properties are five and six storey blocks of flats located beyond the Beverley Brook on Horne Way, including Pearson House, Huntingford House, Lancaster House and Jay House which are between 35m to 55m from the site boundary and fall within the London Borough of Wandsworth. These properties are separated from the southern boundary of the site by the Beverley Brook, the Beverley Brook footpath and a narrow area of woodland which provides intermittent visual screening. There are also residential properties at Stockhurst Close, approximately 60m from the site boundary.

C.2.11 Barn Elms Playing Fields to the west of the BESSC forms the Barn Elms Playing Fields Site of Importance for Nature Conservation. The playing fields feature numerous corridors of mature trees. The facilities include marked sports pitches, an athletics track, a fishing lake and a number of tennis courts. The tennis courts are located to the west of the changing room facilities.

C.2.12 There are also three residential properties directly to the north of the tennis courts on Queen Elizabeth Walk.

C.2.13 Access to the BESSC is taken from Queen Elizabeth Walk, which then joins the A307 (Rocks Lane).

C.3 Planning context

C.3.1 In developing the proposals and mitigation measures for the development at Barn Elms Thames Water had regard to the policies set out in the National Policy Statement for Waste Water (the 'NPS'), and to local development plan designations where these are relevant to the application.

C.3.2 In this case, the local development plan comprises:

a. the *London Plan* (2011)

b. the London Borough of Richmond upon Thames's *Core Strategy (*April 2009)

c. the council's *Development Management Plan (*November 2011)

d. Saved policies from the council's *Unitary Development Plan* (March 2005).

C.3.3 The combined area of the BESSC and the Barn Elms Playing Fields is identified as site B5 – Barn Elms Sports Ground in the saved London Borough of Richmond upon Thames *Unitary Development Plan*, which is allocated for the rationalisation of sports use, including providing a public indoor sports hall, upgrading sports pitches and enhancing the landscape. A planning application for the redevelopment of Barn Elms Playing Fields, including the demolition of replacement of the main pavilion, new car parking, refurbishment of the tennis courts, pitch improvements and the widening of the existing vehicular site entrance (ref: 10/1729/FUL) was granted planning permission in December 2010. These works are now complete and therefore will not have any impact on the project, nor would the project affect the works.

C.3.4 As defined in the *Core Strategy* and *Development Management Plan*, the site is located within Metropolitan Open Land.

C.3.5 The site lies within the wider Thames Policy Area and is, therefore, subject to the provisions of Policy ENV26 (Thames Policy Area). This requires all new development to have an association with the river, to contain a mix of uses, be of high quality of design and supported by a design brief and statement, assessing the effects of new development on any existing river-dependent uses.

C.3.6 The majority of the site lies within the locally designated Barnes Common archaeological priority area, which includes the alluvial floodplain and foreshore of the River Thames to the east of the site.

C.3.7 The site is adjacent to the Putney Embankment Conservation Area. There are no listed buildings within or adjacent to the site.

C.3.8 The London Wetland Centre Site of Special Scientific Interest lies to the north of the site. Barnes Common Local Nature Reserve is located to the southwest of the site. There are four Sites of Importance for Nature Conservation in the vicinity of the site: Barn Elms Playing Fields, Putney Lower Common, the River Thames and tidal tributaries, and Beverley Brook.

C.3.9 No relevant extant planning permissions or pending applications within the site boundary or its immediate vicinity were identified as a result of on-going application monitoring.

C.4 Description of development

Overview

C.4.1 The proposed development at Barn Elms would intercept the West Putney Storm Relief CSO. The works would convey the flows from the existing pipework beneath the BESSC to the main tunnel.

C.4.2 The work would require the construction of a CSO interception chamber, hydraulic structures (including chambers, culverts and pipes), ventilation structures and an electrical and control kiosk. Flows would be transferred from the relatively shallow depth of the existing pipework to the deeper level of the main tunnel via a CSO drop shaft and associated connection tunnel. The CSO shaft would be approximately 34m deep.

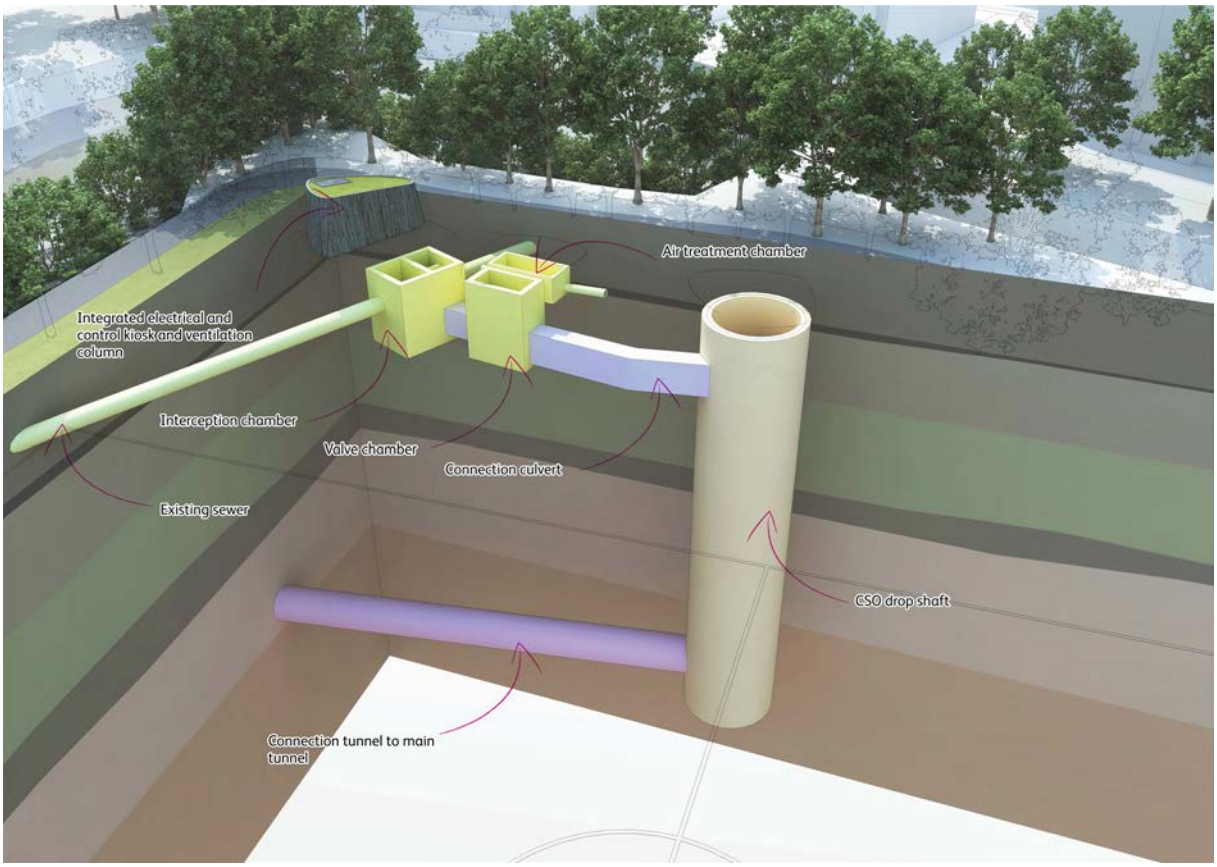
C.4.3 The ventilation structure and electrical control kiosk would be integrated into a single above-ground structure, surrounded by a habitat enclosure.

C.4.4 All permanent works would be surrounded by an operational maintenance area to facilitate vehicle access during maintenance activities. This area would be finished approximately 700mm above the existing ground level for hydraulic reasons and to reduce the likelihood of the area becoming flooded during heavy rain. The area would be landscaped upon completion.

C.4.5 Operational vehicle access would be off Queen Elizabeth Walk, via the BESSC car park. A new permanent access road would be constructed along the northern and eastern perimeters of the sports centre playing fields. It is proposed that this road would be finished in reinforced grass. The alignment of the access road would require the demolition of an existing changing room facility and the relocation of a number of track and field sports facilities.

C.4.6 All works would be contained within the relevant zones as indicated on the Site works parameter plans.

Figure C.2 Functional components diagram



Application for development consent

C.4.7 The geographic extent of the proposals for which the development consent is sought is defined by the limits of land to be acquired or used in the drawings listed in Table C.1

Table C.1 Barn Elms: Drawings that define the proposed development

Drawing title	Status	Location
Proposed schedule of works	For approval	Schedule 1 to the *Draft Thames Water Utilities Limited (Thames Tideway Tunnel) Development Consent Order*
Access plan	For approval	*Book of Plans*, Section 7
Demolition and site clearance plans (various)	For approval	*Book of Plans*, Section 7
Site works parameter plan	For approval	*Book of Plans*, Section 7
Permanent works layout (various)	Illustrative	*Book of Plans*, Section 7
Proposed landscape plan	Indicative except the above-ground structures, which is	*Book of Plans*, Section 7

Drawing title	Status	Location
	illustrative	
Section AA	Illustrative	*Book of Plans*, Section 7
As existing and proposed elevation (various)	Illustrative	*Book of Plans*, Section 7
Kiosk and ventilation column design intent	Indicative	*Book of Plans*, Section 7
Construction phases plans	Illustrative	*Book of Plans*, Section 7
Highway layout during construction (various)	Illustrative	7.10.3 Transport Assessment, Barn Elms Figures

C.4.8 The Nationally Significant Infrastructure Project works (Work No. 4a) comprise the construction of a CSO drop shaft with an internal diameter of approximately 6m and a depth of 34m. Associated development (Work no. 4b) comprises the construction of the West Putney connection tunnel between the Barn Elms CSO drop shaft and the main tunnel (west) (Work No.1a). Associated development (Work no. 4c) comprises the works to intercept and divert flow from the West Putney Storm Relief CSO to the Barn Elms CSO drop shaft (Work No. 4a) and into the Barn Elms connection tunnel (Work No. 4b) including the demolition and replacement of the existing changing rooms, the formation of a new permanent construction vehicle road to Queen Elizabeth Walk, construction of an interception chamber, CSO overflow structures, hydraulic structures, structures for air management plant and equipment and other structures to manage and intercept flow. The full description of the proposed development can be found in Schedule 1 to the *Draft DCO*, and further details of the temporary construction works and permanent operational structures are contained below.

C.4.9 At this site, approval is sought for the works shown on the Works plan showing Work Nos. 4a and 4b, and the Site works parameter plan which shows the relevant zones and limits of land to be acquired or used in which the associated development works would be undertaken (Work No. 4c), Access plans, and Demolition and site clearance plans. The plans for approval are contained in the *Book of Plans* along with other plans showing the construction phasing and permanent works plans relevant to this site. These other plans are marked either for approval, for information, indicative or illustrative depending on the level of detail they provide. Section 2 of the *Planning Statement* explains in more detail the overall approach to the level of detail and how the plans for approval developed. The Good design subsection of this appendix explains the level of detail with regard to the proposed above-ground structures at this site and the need to obtain further approvals.

Construction

C.4.10 The construction is programmed to take approximately two and a half years and would involve the following main activities:

a. Site Year 1: site preparation (approximately three months)

b. Site Year 1: shaft construction (approximately three months)

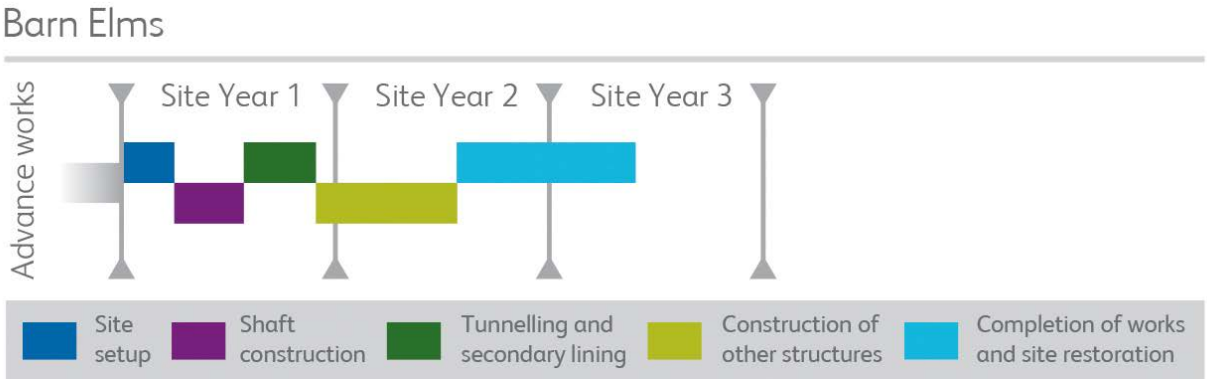
c. Site Year 1: tunnelling and secondary lining (approximately five months)

d. Site Years 1 to 2: construction of other structures (approximately eight months)

e. Site Years 2 to 3: completion of works and site restoration (approximately nine months).

C.4.11 The construction timeline is presented graphically in Figure C.3 below.

Figure C.3 Construction timeline



C.4.12 Additional construction works would be required for the provision of alternative changing room facilities and would be conducted in advance of the main activities listed above.

C.4.13 The majority of construction would occur from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. Construction activities may occasionally be required outside of these hours during key construction activities. Where practical, heavy goods vehicle (HGV) movement would avoid accessing the site between 7am and 9am Monday to Friday and over the weekend to minimise local congestion.

C.4.14 A period of 24-hour working would be required during the construction of the connection tunnel and secondary lining. During this period of continuous working, activities would be predominately below ground, with support activities occurring at ground level. However, HGV movements would be limited to weekday daytime hours. Works during standard hours on a Saturday shall consider avoiding periods of high recreational activity. This includes no HGV access.

C.4.15 Construction vehicles would access the site via the Upper Richmond Road (A205), travelling along Rocks Lane (A306) and turning right into Queen Elizabeth Walk. Construction vehicles would leave the site following the

same route. Some minor modifications would be required to the road markings at the junction of Rocks Lane and Queen Elizabeth Walk.

C.4.16 A temporary construction access road would be required to serve the site. The route would be off Queen Elizabeth Walk, along a short length of private road and across the northern and eastern perimeters of the BESSC. Vehicle management would be employed to avoid vehicle conflict with other users of the road. An illustration of the construction access route is shown on the Construction phase plans, which are in Annex C.

C.4.17 It is anticipated that an average of six HGVs would access the site per day for the majority of the construction period. This would rise to approximately 22 HGVs per day over an estimated one month period during the demolition of the existing changing room facility and the building of the construction access road. There may be additional periods during key construction activities when these HGV numbers would need to be exceeded.

C.4.18 Potential layouts of the construction site are shown on the Construction phase plans. It should be noted that these layouts are for guidance only. The contractor may arrange the site in a different way, depending on the chosen construction method, provided that any environmental effects are appropriately managed and that main construction activities are contained within the appropriate zones.

Site preparation

C.4.19 Alternative changing rooms and track and field facilities would be provided prior to the commencement of any works. The exact location and specification of these facilities is subject to agreement with the landowners, the London Borough of Wandsworth.

C.4.20 The site boundary along the temporary construction access road and site area would be established and welfare and office facilities provided. Suitable fencing and hoarding would be used to segregate the construction access road and site from the adjacent playing fields. It is anticipated that the hoarding enclosing the construction site would be up to 3.6m in height, whilst the weld mesh fencing surround the construction access route would be up to approximately 2.2m in height.

C.4.21 The enclosed area would then be cleared, with areas of top soil being stripped and stock piled. The construction access and site working area would then be formed. A protective concrete slab would be laid over the high pressure gas main which exists beneath the sports centre to enable vehicles to pass across it safely.

Shaft construction

C.4.22 The 6m internal diameter CSO drop shaft would then be constructed.

C.4.23 This would comprise excavating in approximately 1m increments and then using a sprayed concrete lining to form the shaft walls. This process would be repeated until the required depth of shaft is reached.

C.4.24 Excavated material from the shaft would be lifted to ground level using a mobile crane prior to being deposited in a material handling area within the

site. Excavated material would then be removed from site by HGVs utilising the construction access road. The concrete required on the site may either be batched on site, or delivered ready mixed as required.

Tunnelling

C.4.25 The connection tunnel between the CSO drop shaft and the main tunnel would then be constructed. This would be approximately 2.2m internal diameter.

C.4.26 The connection tunnel would be excavated in 1m increments before a sprayed concrete lining is applied to form the tunnel walls. Excavated material from the tunnel would be removed via the drop shaft and again be lifted to surface level using a mobile crane.

C.4.27 The excavated material would be transferred within the site in the same manner as that from the drop shaft before being transported off site by HGVs using the construction access road.

Secondary lining of connection tunnel and shaft

C.4.28 A secondary concrete lining would then be applied to the drop shaft and connection tunnel. This is required to improve the durability, water tightness and structural integrity of the shaft and tunnel.

C.4.29 The process would involve casting an *in situ* concrete lining using a curved mould, or shutter, to form the internal face of the tunnel and the drop shaft. The secondary lining would be progressed by continuously pouring concrete to the shutter as it is advanced either horizontally along the length of the tunnel or vertically up the wall of the shaft.

C.4.30 The concrete for the secondary lining may either be batched on site, or delivered ready mixed to site. It would be pumped from surface level to the connection tunnel or drop shaft.

Construction of other structures

C.4.31 The internal layout of the CSO drop shaft, including concrete access platforms and the concrete vortex generator would then be constructed.

C.4.32 Other below-ground hydraulic structures, including the interception chamber and valve chamber would also be constructed. These chambers would be constructed from *in situ* concrete poured into shuttered excavations to provide the structure's shape.

C.4.33 The integrated above ground ventilation structure and electrical and control kiosk would then be built. A prefabricated external frame and cladding would then be assembled to form the habitat enclosure. Voids within the cladding would be filled with a variety of both natural and non-natural media to provide suitable habitat for different species. A planted brown roof would enclose the structure to promote local biodiversity. The structure would be between 4m and 6m in height.

Completion of works and site restoration

C.4.34 On completion of the permanent structures, the site area would be landscaped and the operational maintenance hardstanding area formed.

C.4.35 The area immediately adjacent to the below ground structures would be finished in a hard landscape material with the remainder of the operational hardstanding area being reinforced grass. This would facilitate safe operational access, whilst retaining a natural appearance.

C.4.36 The 700mm level difference between the existing sports fields and the elevated operational hardstanding area would be achieved by a slope planted with natural grass species.

C.4.37 The temporary construction access road would then be removed and replaced with the permanent access road, finished with reinforced grass. The width would be reduced from approximately 5m during construction to approximately 3m for the permanent access.

C.4.38 As the landscaping is progressed, the hoarding around the construction site and the fencing along the access road would gradually be removed. Temporary weld mesh fencing would be used to surround any final landscaping works to maintain separation from the users of the sports centre.

C.4.39 Once all work is finished, any temporary fencing, vehicles and equipment would be removed from the site and any final landscaping requirements completed. The system would then be commissioned.

Operation and maintenance

CSO drop shaft

C.4.40 The Barn Elms CSO drop shaft would have an approximate internal diameter of 6m and an approximate depth of 34m. It would be finished to approximately 0.7m above the existing ground level.

Electrical and control kiosk

C.4.41 An integrated electrical control kiosk and ventilation column would be located within the southeast of the site, surrounded by a habitat enclosure which would measure 5m wide x 8m long x 4m minimum to 6m maximum high. The habitat enclosure would be situated on a new raised permanent area of hardstanding.

C.4.42 A planted brown roof and habitat wall are proposed on the enclosure to promote local biodiversity. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brown field plants of particular value to insects and birds, would be promoted. The use of suitable materials on the walls would similarly attract different animals and insects.

Air management structures

C.4.43 Two ventilation columns are proposed within the habitat enclosure. One column measures 0.6m internal diameter and the other 0.225m internal diameter. Both columns would be enclosed within a 2.5m x 1.5m structure of 4m minimum to 6m maximum in height.

C.4.44 An interception chamber ventilation column would be incorporated within the same ventilation structure.

Permanent restoration and landscaping

C.4.45 The indicative landscaping at this site is presented in the Proposed landscape plan. The layout of the above-ground structures is illustrative and is not assessed. The final landscape and restoration proposals would be subject to both the generic and site-specific design principles.

C.4.46 An area of hardstanding would be formed around the drop shaft, chambers and integrated electrical control kiosk and ventilation columns. This would facilitate operational maintenance, including crane and vehicular access. This hardstanding would be accessible to users of the playing fields but Thames Water would retain a right of access over it and would install temporary security fencing when the area is used for shaft access.

C.4.47 Operational access would be via a new permanent access road from the existing changing room area at the end of Queen Elizabeth Walk, to the CSO drop shaft site. The surface of this route would be of reinforced grass capable of supporting maintenance vehicles.

Typical maintenance regime

C.4.48 Once the project is operational, it is anticipated that Thames Water personnel would visit the site approximately every three to six months to inspect and carry out maintenance of the electrical and control, ventilation and below-ground equipment. This would likely involve a visit by personnel in a small van during normal working hours and may take several hours.

C.4.49 It is anticipated that a major internal inspection of the tunnel system and underground structures would be required once every ten years. This process would likely involve a small team of inspection staff and support crew and two mobile cranes to lower the team into the CSO drop shaft. The inspection would be carried out during normal working hours and would likely take several weeks.

C.4.50 Thames Water may also need to visit the site for unplanned maintenance or repairs, for example, in the event of a blockage or an equipment failure. Such a visit may require the use of mobile cranes and vans.

Scheme development

C.4.51 The proposed development of the Barn Elms site was subject to over two years of extensive pre-application consultation and engagement. The site featured as a preferred site in two full rounds of public consultation however, the proposed use of the site changed over time. Barn Elms was presented as a main tunnel double drive site at phase one consultation, and as a result of the feedback received was subsequently presented as a CSO only site at phase two consultation with Carnwath Road Riverside proposed as the main drive site instead. Barn Elms was also subject to a phase of interim engagement, a round of targeted public consultation and a period of pre-application publicity. Throughout this period, the scheme evolved in response to consultation, through engagement with key stakeholders, and through on-going design development.

The *Consultation Report* contains detailed information on the consultation process.

C.4.52 At phase one consultation, which ran from September 2010 to January 2011, Barn Elms was the preferred site to sequentially drive the main tunnel firstly to Tideway Walk and secondly to Hammersmith Pumping Station, and also to intercept the West Putney CSO. Three sites were originally shortlisted as potential alternative CSO sites: Foreshore adjacent to Barn Elms, Boat Repair Yard and Leaders Gardens. Besides Barn Elms, the only alternative site for the main tunnel drive site in the area was St Paul's Playing Field, and no other sites at this stage were considered suitable between Barn Elms and Battersea.

C.4.53 A significant level of concern was raised by members of the public and key stakeholders at phase one consultation regarding the proposed use of Barn Elms as a main tunnel drive site; the potential disruption it would cause, loss of green space, effect on river users' safety and the negative impact on the environment and tranquillity of the area. Many respondents required further justification to be provided about why this site was selected, including why brownfield alternatives and solutions had not been explored, including splitting the drive site and CSO site.

C.4.54 The London Borough of Richmond upon Thames objected to the location of the main drive site at Barn Elms, noting the consequences if this were to proceed as set out in the phase one proposal. Likewise the London Borough of Wandsworth stated that the main site was *"unacceptable"* and requested that Thames Water identified an *"acceptable alternative to the main shaft site"* proposed at Barn Elms.

C.4.55 In response to this feedback, further work to test the suitability of the site and a review of potential alternative sites was undertaken. The main tunnel sites and tunnelling strategy for the main tunnel was also re-assessed. Carnwath Road Riverside was subsequently proposed as a more suitable main tunnel drive site. This site was not previously presented at phase one consultation. Refer to the Scheme development subsection within Appendix G Carnwath Road Riverside for further details.

C.4.56 Following extensive analysis and design development, Barn Elms remained the preferred site for connecting the West Putney CSO to the main tunnel (via a short connection tunnel) at phase two consultation which ran from November 2011 to February 2012, and Carnwath Road Riverside was the preferred main tunnel drive site.

C.4.57 The change in use from a main tunnel drive site to a CSO interception site significantly reduced the potential impact and disruption at Barn Elms, and addressed the concerns raised at phase one consultation, listed in para. C.4.53 as follows:

a. The size of the operational Barn Elms site was reduced from approximately 15ha[3] to approximately 3.1ha with fewer proposed

[3] This figure is based on an approximate site area required for a main tunnel drive site published in the *Site Selection Methodology Paper* (Summer 2011).

permanent structures, therefore reducing the potential effect on Metropolitan Open Land.

b. The site would be located close to the existing CSO at its interception point in the southern corner of BESSC which avoids the permanent loss of any sports pitches. The potential temporary loss of sports pitches was reduced from four winter pitches and between four and six summer pitches to only one pitch.

c. There is no need to divert the Thames Path around the site and therefore no amenity disruption to Thames Path users.

d. There is no need for access and construction on the foreshore of the River Thames, which eliminates the potential effect on river navigation and river users, and avoids the need to relocate the Scout Hut.

e. No disruption would be caused to the major international events including the Head of the River Race and the University Boat Race.

f. The construction period was reduced from approximately seven years to approximately two and a half years, and the size of the construction site would also be significantly reduced.

C.4.58 The London Borough of Richmond upon Thames, the London Borough of Wandsworth and the Greater London Authority were supportive of the change in use from the main tunnel drive site to a CSO interception site. They recognised that this was a significant improvement to the scheme. The Environment Agency supported the change in use of the preferred site because of the reduced impacts on the Thames environment.

C.4.59 The proposed site was identified and then assessed through a robust, qualitative, and iterative site selection process, and was subject to over two years of extensive consultation and engagement. The site selection methodology used to select the site was subject to consultation with local authorities and key stakeholders. The use of the site to intercept the West Putney Storm Relief CSO was supported by the London Borough of Richmond upon Thames, the London Borough of Wandsworth and key stakeholders. For further details refer to the *Final Report on Site Selection Process*, which accompanies the application.

C.4.60 No feasible or preferable alternative sites, including the shortlisted sites, were put forward by stakeholders and the extensive site selection process did not identify any alternative sites that would be suitable for the works that are required. The Environment Agency suggested a potential site on land towards the northwest of the Beverley Brook inlet, on the Tideway side of the gates. This site was subsequently considered but did not progress beyond the draft shortlist stage of the site selection process because it is too small, has poor access and is not viable for connection to the sewer.

C.4.61 The key design developments presented at this stage included the reduction in the size of the drop shaft from 26m internal diameter to 6m internal diameter as a result of the proposed change in the use of the site and new tunnelling strategy. Further design developments included the

removal of the need for ventilation buildings due to modified project-wide air management proposals and a change in its use to a CSO site only.

C.4.62 The principal issues that arose from phase two consultation and Section 48 publicity for Barn Elms are identified below. These are subsequently addressed in the respective planning assessment subsections as follows.

a. Impact on the loss of green space, playing pitches and on the openness of Metropolitan Open Land: This issue is addressed in the Good design and Land use including open space, green infrastructure and green belt subsections below.

b. Scale and design of permanent structures, including provision of habitat walls: This issue is addressed in the Good design subsection below.

c. Impact on the environment, the area's tranquillity, biodiversity and wildlife: This issue is addressed in Biodiversity and geological conservation and the Noise and vibration subsections below.

d. Construction and operational site access road: This issue is addressed in the Good design subsection below.

   The routing access along the northern edge of the site could involve the loss of mature conifers: The access road at this point was very slightly realigned to ensure there would be no detrimental effect to the conifers therefore this issue is addressed.

e. Maintain access to the existing car park facilities, changing rooms and track and field facilities throughout the construction period: This issue is addressed in the Land use subsection and Section 5 of *CoCP* Part B which ensures access is maintained to the above facilities during construction.

f. Footpath access, including the Thames Path and Beverley Brook footpath, should not be disrupted: This issue is addressed in Section 4 of *CoCP* Part B which ensures that operating plant and equipment would be set back from the bank of the Beverley Brook to leave an 8m buffer zone, unless agreed otherwise. The Thames Path would not be disrupted, which is a result of the change in use from a main tunnel drive site to a CSO only site.

C.4.63 There was significant level of concern raised at phase two consultation regarding the proposed access arrangements, including objections by the London Borough of Richmond upon Thames and London Borough of Wandsworth. In response to comments Thames Water decided to carry out targeted consultation on a revised access route, which ran from June 2012 to July 2012. The revised vehicle access route would be constructed along the northern and eastern perimeters of the BESSC, and the alignment of the new route would be used for both the temporary construction access and the permanent operational access. Construction traffic would access the site from Upper Richmond Road, travel along Rocks Lane before turning right into Queen Elizabeth Walk. The proposed

works at Barn Elms continued to evolve in response to consultation responses received and on-going engagement.

C.4.64 Following further design improvements and the identification of mitigation measures the Barn Elms site was the most appropriate site to intercept the West Putney Storm Relief CSO and connect to the main tunnel. It was therefore publicised as Thames Water's proposed site at Section 48 publicity, which ran from July 2012 to October 2012.

C.5 Site-specific planning considerations

C.5.1 This section provides an analysis of the key planning considerations associated with the proposed works at Barn Elms. It considers the issues and factors identified in the NPS and other issues relevant to the site, as set out in para. C.4.62.

Meeting the need

C.5.2 The proposed works at Barn Elms would be successful in meeting the specific need to intercept the West Putney Storm Relief CSO and would make an important contribution to meeting the wider need for the project identified in the NPS.

C.5.3 Currently, in an average year, the West Putney Storm Relief CSO discharges approximately 35,000m^3 of untreated sewage into the River Thames adjacent to the Ashlone Wharf Tidal Barrier. The CSO discharges approximately 30 times a year, and releases 9 tonnes of sewage derived litter. The CSO was identified by the Environment Agency as a CSO that needs to be controlled. The proposed solution to control the CSO is for full interception. The CSO discharges have multiple impacts on water quality in this location, including a localised effect of rapidly dropping dissolved oxygen levels, the release of pollutants and the discharge of sewage derived litter and effluent.

C.5.4 Each discharge increases the risk of exposure to harmful microscopic organisms within the untreated sewage for river users who come into contact with water. An assessment of health impacts upon recreational users of the River Thames concluded that the risk of infection can remain for two to four days following a spill as the water containing the sewage moves backward and forward with the tide.

C.5.5 Assuming the average 30 spills per annum from the West Putney Storm Relief CSO occur on separate days, there could be up to a maximum of 120 days per year when recreational users are at risk of exposure to untreated sewage in the vicinity of the outfall as a result of the West Putney Storm Relief CSO spills alone.

C.5.6 It is predicted that the CSO discharges will continue to worsen both in terms of volume, frequency and content. By the time the proposed works at Barn Elms are ready to become operational and with the Lee Tunnel and Sewage Treatment Works in place, the CSO is predicted to discharge, in an average year, approximately 37,000m^3 of untreated sewage, discharging approximately 31 times a year, and would continue to releasing 9 tonnes of sewage derived litter.

C.5.7 Modelling suggests with the project in operation the discharges of untreated sewage in a typical year would be reduced to 1,500m^3, to a predicted level of one spill per year, with less than one tonne of sewage derived litter. This is a reduction of approximately 96 per cent and would have a beneficial effect on river water quality. As a result of the improved water quality, there would significant beneficial impact for the recreational users of this highly used stretch of the River Thames adjacent to the Barn Elms

C.5.8 Overall the works proposed at Barn Elms would meet the specific need at this site through the interception of the West Putney Storm Relief CSO.

Good design

C.5.9 The amount, layout and scale of the proposed development is primarily dictated by the function it needs to perform in transferring flows from the West Putney Storm Relief CSO and directing flows into the main tunnel, and the site's location within the BESSC. In particular, the site is constrained by the location of the West Putney Storm Relief CSO which is to be intercepted, the need to protect existing sports pitches and facilities, and the need to avoid disturbance of the high pressure gas main to the north of the site.

C.5.10 Early site analysis and subsequent engagement identified that it was important for the design to respond to a number of opportunities and constraints.

C.5.11 The site-specific design opportunities included the potential to:

a. protect and improve the open character of the Metropolitan Open Land through a high standard of design and improved access and facilities

b. provide a replacement changing room facility

c. incorporate sustainable elements into the design of the permanent structure to preserve and enhance biodiversity and habitats, and accommodate Sustainable Drainage Systems for site drainage.

C.5.12 The site-specific design constraints included:

a. The site is designated Metropolitan Open Land.

b. The site is surrounded by playing fields used for sports and recreation. Both the construction phase and the operational design must minimise any loss of land from the playing fields.

c. The site is in close proximity to sensitive receptors, notably the flats on Horne Way.

d. A major high pressure gas main is located in close proximity to the north of the area in which the permanent works would be located.

e. The site is in close proximity to ecological resources, including Beverley Brook.

f. Access to the Barn Elms Boat House and other facilities in the BESSC must be maintained.

g. The site is prone to flooding.

C.5.13 In order to address constraints a. and d. above, the permanent works would be located as close as possible to the southern perimeter of the site to reduce the permanent land take and to allow for flexibility in any subsequent reconfiguration and relocation of the playing fields without compromising the project's access and maintenance arrangements. To ensure this, design principle BAREL.02 is in place to allow an 8m buffer from the embankment to the Beverley Brook. This location also ensures that no damage is caused to the high pressure gas main which lies directly north of the site. This proposed location of the permanent works complies with NPS para. 3.5.3, which states that good design can be demonstrated in terms of siting, relative to existing and currently planned landscape character.

C.5.14 The Design Council CABE suggested that *"planting around the structure should require little maintenance and encourage biodiversity to allow it to tie in with the landscape and the brook".* The London Borough of Wandsworth also encouraged any opportunities to enhance biodiversity in the area to be explored. Design principle BAREL.10 was developed to ensure that landscaping would include semi-improved acid to neutral grassland to promote biodiversity around operational structures and along the operational access road without impinging on the use of the playing fields. A maintenance schedule would be produced and implemented in such areas. As specified in a site-specific Requirement, details of the permanent landscaping works for the site would be subsequently submitted to the local planning authority for approval, and would be in accordance with the indicative Proposed landscape plan and the design principles.

C.5.15 Following phase one consultation and the subsequent change in use of the site, the design of the scheme evolved through two further rounds of formal consultation and continued engagement (including two design reviews) with key stakeholders such as the Design Council CABE, the London Borough of Richmond upon Thames and the London Borough of Wandsworth, and Thames Water's pan-London strategic stakeholders. Details of the consultation process for this site are reported in the *Consultation Report* and the evolution of the design is explained in further detail in the *Design and Access Statement.* Based on the analysis of opportunities and constraints, and the feedback from stakeholder consultations, the principal objectives that influenced the design include:

a. achieving a high quality design and appropriate scale of the above-ground structures
b. suitably siting the construction and operational access
c. providing replacement changing rooms
d. managing construction impacts.

Figure C.4 Illustrative aerial view of the completed site

Achieving a high quality design and appropriate scale of the above-ground structure

C.5.16 The scheme proposes a single permanent above-ground structure, enclosed by a 'habitat enclosure' which would be used to locate and conceal the integrated electrical and control kiosk and ventilation columns. The height of the habitat enclosure is fixed between 4m and 6m high. This is shown on the Site parameter plan which is for approval. The final detailed design would be guided by the potential solution illustrated in the *Design and Access Statement,* which accompanies this application and the indicative Kiosk and ventilation column design intent plan. The final design would be consistent with the generic and site-specific design principles which would be secured by a Requirement or Section 106 agreement. The details of the external appearance and materials of the habitat enclosure would be submitted the council for subsequent approval under a site-specific Requirement, so this would ensure there is local input to the final solution.

C.5.17 At phase two consultation, two permanent above-ground structures were proposed to be enclosed by 'habitat walls' and to house all the permanent infrastructure: one for the CSO drop shaft, and the other for the electrical, control and ventilation equipment and associated hydraulic chambers. Key stakeholders including the London Borough of Wandsworth raised concern with regard to these structures and their visual impact. The London Borough of Wandsworth stated in their phase two consultation response

that: *"the design of the structures [which] are considered to be intrusive to the character of the open grassed playing fields. Rather than offer the two structures as 'showpieces' the structures should be designed to fit in with the surrounding area. The Council would prefer a design which takes the form of grass covered mounds".* The Design Council CABE noted in it response that the *"scale of the structures required on this site makes it a challenge to integrate the proposals with this open landscape...However, the ideas presented are intriguing and give us the confidence that the scheme is moving in the right direction".*

C.5.18 Following phase two consultation, Thames Water continued to liaise with representatives of the London boroughs of Wandsworth, Richmond upon Thames and Design Council CABE to develop the design and design principles for the site to accommodate their aspirations for the area. The scheme now proposed as part of this application for development consent (and previously publicised at Section 48 publicity) comprises a single permanent above-ground structure. Thames Water commits to a combined structure in design principle BAREL.08

C.5.19 The CSO drop shaft would be covered with hardstanding rather than concealed within a separate structure. Design principle BAREL.07 was developed to ensure that the design would accommodate the raised level required for the shaft and other hydraulic structures in a grass covered mound capable of handling heavy plant, which is in accordance with the guidance provided by the London Borough of Wandsworth.

C.5.20 In response to phase two consultation feedback, the scale and design of the habitat enclosure was reduced as much as possible in order to retain the openness of the Metropolitan Open Land together with views across the site from both within the playing fields and from the Beverley Brook footpath. The height of the habitat enclosure would be between 4m and 6m high above the permanent hardstanding area in order to conceal the electrical and control kiosk and ventilation structures from view. Land to the south of the permanent works, along the Beverley Brook footpath, would be elevated above that of the playing fields and therefore is necessary to erect the walls of the habitat enclosure to a height which would conceal the permanent equipment from local viewpoints. Design principle BAREL.04 would ensure that the above-ground structures are positioned in a planting and landform scheme sympathetic to the surrounding character.

C.5.21 In response to the London Borough of Wandsworth suggestion to deliver environmental enhancements through permanent design, design principle BAREL.08 ensures that a brown roof would be incorporated on the combined kiosk and ventilation structure and that the vertical surfaces would be finished to promote biodiversity. For further details on proposed biodiversity measures refer to the Biodiversity and geological conservation subsection.

Suitably sited construction and operational access

C.5.22 The proposed construction and operational access route would be constructed along the northern and eastern perimeters of the BESSC. One existing changing room and various track and field facilities in the north of

the site would need to be relocated. Vehicles would access the site from Upper Richmond Road, travel along Rocks Lane before turning right into Queen Elizabeth Walk and passing through a narrow section of private road that currently serves the BESSC playing fields and three houses.

C.5.23 At phase two consultation, the operational access was proposed via a new permanent access route between Queen Elizabeth Walk and the existing Barn Elms Boat House access road which is lined with an avenue of Lime trees. The construction access road was proposed to run along the southern perimeter of the Barn Elms sports ground playing fields and connect to Rocks Lane. The London Borough of Wandsworth and the London Borough of Richmond upon Thames raised concern regarding the construction route. It suggested a new route, similar to the proposed operational route and to the route used by the Environment Agency for recent works. The council's preferred route would *"avoid the use of the avenue of Lime trees [...] and run parallel with the River Thames and then turn 90 degrees to connect with Queen Elizabeth Walk. This approach would require the redevelopment of the changing rooms and plant room, which should be funded by Thames Water".* This view was also supported by the London Borough of Richmond upon Thames in its phase two consultation comments.

C.5.24 Following phase two consultation, Thames Water decided to carry out targeted consultation on an amended construction and operational access route. The construction route was amended in accordance with both councils' suggested preferred route. The newly proposed operational access route, as described in para. C.5.22, would avoid the use of the existing Barn Elms Boat House access.

C.5.25 The construction route is now significantly shorter in overall length compared with the route proposed at phase two consultation, and also avoids potential adverse ecological impacts on the Beverley Brook watercourse. The London Borough of Wandsworth stated in its Section 48 comments that: *"The revised proposals for routing access to the work site around the north and east perimeter of the Barn Elms sports and recreational facilities is considered an improvement on the previous proposal which used the existing roadway through the centre of the site, or created a new access along the edge of Beverley Brook (from Rocks Lane)".* The London Borough of Richmond upon Thames did not raise any concern with regard to the proposed access in its Section 48 publicity comments.

Providing replacement changing rooms

C.5.26 As the proposed site access road would run through the BESSC car park, one of the existing BESSC changing room facilities would need to be demolished. After discussions with the London Borough of Wandsworth, the owner of the facility, and with the London Borough of Richmond upon Thames, the local planning authority for the area, Thames Water agreed to provide a new replacement changing room facility, prior to demolition of the existing facility.

C.5.27 The existing facility is well used and could benefit from modernisation. See Figure C.5 below.

Figure C.5 Existing Barn Elms Schools Sports Centre changing rooms

C.5.28 The alternative changing room facility would be of equal capacity to the facility scheduled for demolition and, as required by design principle BAREL.01, would be located in close proximity to the existing changing room. The exact specification and location of the alternative facilities would be agreed in advance with the site owners. If this application for development consent is approved, then design details of the replacement changing rooms would be subsequently approved by the London Borough of Richmond upon Thames under a site-specific Requirement.

C.5.29 The erection of the replacement changing room facility would be the first works to commence on the site and would be secured by legal agreement. It would be provided before the demolition of the existing facilities and before the two and a half year construction period. This is also confirmed a site-specific Requirement.

Managing construction impacts

C.5.30 Throughout the consultation period and through numerous design developments, Thames Water sought to limit potential construction impacts. Key measures include:

a. The main site compound is to be fully hoarded. Section 4 of *CoCP* Part B states that buried fencing/steel mesh netting would extend at least 500mm below the hoarding to prevent badgers etc. from accessing the worksite.

b. The access route would have green-painted steel open mesh fencing suitably supported for weather conditions or similar and would be designed to allow badgers, etc, access across the road at night (Section 4 of the *CoCP* Part B).

c. For safety purposes, high pole suspended vertical netting of sufficient height would be erected above the hoarding where required to prevent balls from entering the hoarded construction works from the playing field (Section 4 of the *CoCP* Part B).

d. Access to the existing car park and sports facilities would be maintained. Environment Agency access to the Ashlone Wharf tidal barrier would be retained. Access to the playing fields and Barn Elms Boat House would be maintained during the construction period.

e. Unless otherwise agreed in writing with the local planning authority, no HGVs shall enter or leave the construction site during the hours of 8am to 9am Monday to Friday excluding bank holidays, and 8am to 1pm Saturday to avoid local congestion. Works during standard hours on a Saturday would consider avoiding periods of high recreational activity. Further details on the measures incorporated to manage access and highway impacts at this site are in the Traffic and transport subsection.

f. A range of measures to protect ecology are in the Biodiversity and geological conservation subsection.

C.5.31 The proposed construction layout at Barn Elms is illustrated in the Construction layout plan in Annex C.

Conclusion

C.5.32 In conclusion, the proposals for Barn Elms were carefully developed through a collaborative process of design review and extensive consultation. The key functional requirements at this site relate to the need to intercept the West Putney Storm Relief CSO. The aesthetic components relate to the creation of a high quality landscaped site and the design of the habitat enclosure as a local landmark. The functional and aesthetic elements were combined to create an attractive and adaptable space. Through a careful and considered site layout and appropriate landscaping, the proposal responds sensitively to the characteristics of the site and is successfully integrated into the BESSC without compromising its future use. In addition to this, a new modern changing room facility is proposed which would be an improvement over the existing facility and would offer significant benefits to users of the BESSC and existing and future communities.

C.5.33 The design life of the major civil engineering components of the project is 120 years, including buildings. The details of the external finishes of the above-ground structure are not specified in the application, but are to be submitted for the subsequent approval of the local planning authority. These details must be in accordance with the design principles, which require materials to be high quality and long lasting. The project was therefore designed to be durable and resilient to change.

C.5.34 The proposals at this site achieve good design, in accordance with NPS paras. 3.5.1 to 3.5.4.

Water resources and flood risk

C.5.35 There are no licensed or known unlicensed abstraction sources from the upper or lower aquifers located within a radius of 1km around the site. The nearest defined Source Protection Zone for a chalk source is located approximately 5.2km to the east of the Barn Elms site. There are no environmental designations relevant to groundwater in the vicinity of the site.

C.5.36 The Barn Elms site is located in Flood Zone 3. A Flood Risk Assessment including the sequential and exception test undertaken in accordance with NPS Section 4.4 is included in the *Environmental Statement* (Vol 3, Section 16 and Vol 6, Section 15). This shows that the proposed development would be appropriate for the area as flood risk to the development would remain unchanged. Flood risk would be managed through appropriate design measures and the development would not lead to an increase in flood risk in the surrounding areas. Therefore, no significant flood risk effects are likely.

C.5.37 In accordance with the *CoCP* (Section 8) all site drainage during construction would be drained and discharged to mains foul or combined sewers. Where this is not practicable, the site would be drained such that accumulating surface water would be directed to holding or settling tanks, separators and other measures prior to discharge to the combined or surface water drains. Foul drainage from the site welfare facilities would be connected to the mains foul or combined sewer. This design measure would help manage the risk from this source during construction but would not reduce the level of risk associated with this flood source. Section 8 of the *CoCP* Part B would ensure that the temporary access route would have suitable temporary drainage and would prevent any local flooding of adjacent playing field areas. Furthermore, all other temporary hardstanding would incorporate permeable surfacing.

C.5.38 The development is at residual risk of tidal flooding in the event of a breach in the local flood defence wall along the edge of the tidal Thames or overtopping of the defence wall as a result of a failure of the Thames Barrier. The consequence of a breach or failure of flood defences would not compromise the long term operational function of the main tunnel and therefore no additional measures above those outlined in the *CoCP* are proposed.

C.5.39 Flood risk from all sources has been managed as far as possible through design and the measures incorporated in the *CoCP*, so the criteria in NPS para. 4.10 would be satisfied. No significant flood effects are likely from the proposed development.

C.5.40 Measures to protect water quality and resources during construction are detailed in Section 8 of the *CoCP* Part A and referred to in Section 8 of the *Planning Statement*. The *CoCP* covers activities that are subject to pollution control and makes references to good practice as suggested in the NPS.

C.5.41 Thames Water considered design approaches and measures to ensure surface water is positively drained from this site when operational. The permanent design would comply with the design principles, including generic site drainage design principle SDRN.03, which requires site drainage to be designed to ensure that post-development surface water run-off rates do not exceed existing rates. Pursuant to a Requirement, the specific drainage details would be submitted and approved in writing by the local authority.

C.5.42 Design Principle BAREL.05 would ensure that the extent of hardstanding is reduced as far as practicable to maintain the character of the playing fields and reduce surface water run-off. The final detailed surface water drainage proposals would in due course be submitted for approval by the London Borough of Richmond upon Thames (pursuant to a site-specific Requirement).

C.5.43 The site therefore meets the decision making principles set out in the NPS, because no adverse effects are expected on water resources or flood risk. The Environment Agency has no outstanding concerns.

Air quality, emissions, dust and odour

C.5.44 The site is located within the Thames Air Quality Management Area. Local monitoring data indicates that there are currently exceedences of the air quality objectives at roadside locations in the vicinity of the site.

C.5.45 The closest sensitive receptors to the development are users of the playing fields, BESSC and local clubs (for example, Barn Elms Boathouse and Sea Cadets Corps) and occupiers of nearby residential dwellings on Horne Way, at 3, 5 and 7 Queen Elizabeth Walk and at the junction of Rocks Lane and Queen Elizabeth Walk. The London Wetland Centre (which is a Site of Special Scientific Interest) is also considered in this assessment.

C.5.46 An assessment of the air quality impacts of the proposed development during construction and operation is provided in the *Environmental Statement* (Vol 6, Section 4) and includes impacts arising from emissions and dust. In accordance with the measures incorporated into Section 7 of *CoCP* Part A, all reasonable steps would be taken to minimise detrimental impacts on air quality or amenity resulting from emissions and dust. With the implementation of the *CoCP* measures, the overall effect on local air quality from construction (i.e. effects from construction road traffic and construction plant would not be significant at any of the closest sensitive receptors.

C.5.47 The consideration of operational air quality impacts including odour are set out in Section 8 of the *Planning Statement*. The project-wide *Air Management Plan*, which accompanies the application, is designed to ensure that the air in the tunnels is kept fresh, that a low pressure is maintained within the tunnels to prevent unwanted releases and that when air is released it is treated. This would be achieved by a combination of forced or active ventilation and treatment and passive air treatment. In addition, at all sites there are to be ventilation structures which would allow air to enter and leave the tunnel system.

C.5.48 When the tunnels are empty, clean air would be drawn into the tunnels at specific sites by the extraction of air at other specific sites so as to keep the air in the tunnels fresh. This means that odours would not build up while the tunnels are empty. As the tunnels fill, air displaced from the tunnels would initially be extracted and treated at the active ventilation sites before being released and later, depending of the level of filling, would pass through the passive carbon filters. These filters clean the air and remove any odours before it is released.

C.5.49 At passive ventilation sites a passive carbon filter would be installed within a below ground chamber. During a typical year this treats all the air displaced from the particular shaft which would occur only when the shaft is drowned by the rising wastewater in the tunnel. During infrequent, extreme storm events (about once in 15 years), the air that is pushed out of the shaft could exceed the capacity of the passive filter and would be released untreated through a pressure relief structure to prevent damage to the passive filter. For 100 per cent of the time during a typical year, all air released would be treated, which means that all regulatory requirements would be met and there would be no nuisance odours or loss of amenity due to odours.

C.5.50 The construction and operational effects with regard to air quality and odour would be consistent with the NPS policy objectives to minimise detrimental impacts on amenity and the likelihood of nuisance (paras. 4.12.3, 4.11.4 and 4.11.5) at Barn Elms. Appropriate measures are proposed to ensure that proposals would not lead to any substantial changes in air quality, emissions, dust or odour or a significant loss of amenity during construction or operation.

Biodiversity and geological conservation

C.5.51 The site is not designated for its geology or geomorphological importance, and there are no internationally (Special Protection Areas, Ramsar sites) or nationally designated ecological sites (Sites of Special Scientific Interest, Marine Conservation Zones) in the vicinity of the site. The Wetland Centre SSSI is located approximately 300m from the main worksite, although approximately 110m from the proposed construction and operational access at Queen Elizabeth Walk. The River Thames is designated as a Site of Metropolitan Importance (SMI).

C.5.52 There would be no significant negative effects on any designated sites, aquatic habitats or species as a result of the proposal at Barn Elms.

C.5.53 By intercepting the CSO, the project would reduce the occurrence of dissolved oxygen related fish mortalities and improve the quality of the foraging habitat for fish. This constitutes a significant beneficial effect.

C.5.54 In terms of potential terrestrial ecology, the site includes amenity grassland and mature trees. There would be no significant change in the tree resource on site as replacement planting would be provided. The loss of amenity grassland and reinstatement with semi-improved acid grassland would result an improvement to the quality of the local habitat resource.

C.5.55 The *CoCP* requires an Ecological Management Plan to be prepared for the site, and details the approach to managing effects on ecological receptors.

C.5.56 There are a number of site-specific measures set out in *CoCP* Part B to protect and improve terrestrial ecology during construction. The use of permeable open fencing along the access road would allow badgers to access through the landscape around the construction access road. The use of buried fencing/hoardings around work site would prevent badgers access working site, with planting around site to encourage movement. Tree protection measures would be implemented to protect trees and scrub along the southern boundary of the site and along the eastern side of the site and access road. The trees and scrub adjacent to the site provide important foraging areas for bats and nesting habitat for birds. Therefore, lighting would be directed away from this habitat and light spill would be minimised through the use of cowling.

C.5.57 Design principle BAREL.08 includes the incorporation of a brown roof on the combined kiosk and ventilation structure and the vertical surfaces would be finished to promote biodiversity e.g. through the provision of a habitat wall. By covering the roof with materials such as low nutrient rubble and gravels, natural colonisation of brownfield plants of particular value to insects and birds, would be promoted. A habitat wall would attract different species of animals and invertebrates. Design principle BAREL.10 ensures that landscaping would include semi-improved acid to neutral grassland to promote biodiversity around operational structures and along the operational access road without impinging on the use of the playing fields. A maintenance schedule is to be produced and implemented in such areas. As required by design principles BAREL.11 and BAREL.12 bat and bird boxes shall be installed in existing and re-provided existing trees in order to promote biodiversity. A maintenance schedule for bird boxes and shrub planting would be produced and implemented.

C.5.58 The *Environmental Statement* (Vol 6, Section 6) concludes that there would be a likely significant improvement in the populations of various bat species as a result of the provision of bat boxes on and adjacent to the site, and an increase in the number of nationally and locally notable invertebrate species present on site.

C.5.59 In accordance with NPS policy, the proposed development and mitigation measures would avoid significant harm to biodiversity and geological conservation interests. Thames Water also sought to take advantage of the opportunities to conserve and enhance biodiversity and the works proposed would significantly improve the quality of the site. These measures would be addressed through final landscape designs to be discussed with and approved by the London Borough of Richmond upon Thames, and would allow for the maximisation of opportunities for building in beneficial biodiversity features as part of good design (NPS para. 4.5.14).

C.5.60 As required by the NPS (para. 4.5.17), the footprint of the proposal is not greater than it needs to be. Thames Water sought to take advantage of opportunities to conserve and enhance biodiversity and the works

proposed in this location would result in significant benefits in respect of both aquatic and terrestrial ecology at this site.

Landscape and visual Impacts

C.5.61 The site does not lie within or in close proximity to any nationally designated landscapes. The local townscape shaped the design development and evolution of the proposed works in this location.

C.5.62 The London Borough of Richmond upon Thames *Core Strategy* and *Barnes Common Conservation Area Statement,* and the London Borough of Wandsworth *Core Strategy* and *Putney Lower Common and Putney Embankment Conservation Area Appraisal and Management Strategies*, were taken into account in this assessment, in accordance with NPS para. 4.7.2.

C.5.63 The existing landscape and visual quality of the site is generally good, although the existing changing facilities would benefit from some refurbishment.

C.5.64 The intensity of construction activity (and related visual and townscape impacts) would vary throughout the construction phases. The Barn Elms townscape and visual assessment (*Environmental Statement* Vol 6, Section 11) identifies residencies along Horne Way where the impact of the construction activity at the Barn Elms site might be most visible, particularly because of their proximity. Views of the site from these residencies would only be intermittently visible due to the existing dense belt of mature trees along the Beverley Brook corridor which would dilute the temporary visual impact of construction; however the trees would be less effective in winter months. From the lower storeys of these properties only the site hoardings would be intermittently visible in the foreground of the view. From upper storeys, construction activity (including site hoardings, welfare facilities, cranes and construction plant) and road transport within the site would be intermittently visible beyond the tree line. However, views from these properties are generally well contained and the nature of the construction activity is such that it would be temporary and well controlled.

C.5.65 The site is located in the southeastern corner of the BESSC and according to the *Environmental Statement* (Vol 6, Section 10.4) does not appear to be intensively used. The introduction of site hoardings and construction activity into this area would substantially alter the landscape in the locality of the works, but only on a temporary basis. Furthermore, the level of construction activity would vary in intensity throughout the two and a half year construction period. The main construction site and temporary access route would be visible from most viewpoints within the BESSC playing fields. There would be intermittent construction traffic along the northern and eastern edges of the playing fields. However, the construction layout and design was refined to minimise the visibly of the works. Section 4 of the *CoCP* Part B requires the installation of high quality hoardings around the main construction site that would incorporate climbing plants. This would preserve the green open character of the playing fields and screen construction activities below the height of the hoarding. The site cabins

and welfare facilities would be a dark green colour to tie in with the planted hoardings. The use of green painted open steel mesh fencing along the access road would further minimise alteration to the setting of the area.

C.5.66 There would be no significant operational landscape or visual effects as a result of the proposed development at this site particularly given the majority of proposals are underground and the limited nature of the above ground plant. There would be a minor change in the open character of the area due to the introduction of an above-ground structure and a raised area with small areas of hardstanding. However, the impact is very limited due to its chosen location in a discrete corner of the BESSC playing fields, which makes it less prominent and in a location which does not interrupt views across the playing fields. The scale of the habitat enclosure was reduced as much as practically possible as a result of consultation feedback. Furthermore, the majority of the area is being returned to playing fields with no permanent loss, and the use of planting and reinforced grass would minimise hardstanding and reduce the effect of the proposed development on the surrounding landscape. The provision of replacement changing room facilities and track and field facilities would also offer a visual improvement to the area to the north of the site.

C.5.67 The design parameters and principles for the habitat enclosure, the only above-ground structure, were carefully chosen to ensure it is sensitive to the open character of the BESSC playing fields and is as visually attractive as possible. For example, design principle BAREL.04 requires the above-ground permanent structures to be positioned in a planting and landform scheme sympathetic to the character of a tree-dominated backdrop and amenity grass (playing field) foreground, when viewed from within the playing fields, as illustrated on the indicative Proposed landscape plan.

C.5.68 In conclusion, the measures in place in the *CoCP* and the *Design Principles* help to mitigate visual impacts from sensitive locations and receptors, and reduce impacts on the landscape character to an acceptable level. The landscape proposals would benefit landscape and visual amenity. The new replacement changing room facility would bring about significant longer term benefits in terms of the visual improvement compared with the existing changing room facility.

Land use including open space, green infrastructure and green belt

C.5.69 The site comprises greenfield land within the BESSC. As described in paras. C.3.3 to C.3.5, there are a number of planning policy designations of relevance to this site. The site is located within Metropolitan Open Land and Open Space. Refer to the Land use plan in Annex C.

C.5.70 The *Open Space Assessment,* which accompanies this application, reviewed the quality and value of this area and assessed the potential impact of the project upon it. It concludes that there is no deficiency of open space provision in the area. The assessment states in Section 4.3 that *"this high level provision is due to the large size of two Royal Parks situated in the west of the Borough: Richmond Park (973ha); and Bushy Park (417ha)"*. The assessment also identifies that there is an under-

utilisation of the existing sports pitches. The assessment also states that there *"may be scope for the intensification of remaining pitches, to absorb any lost capacity due to the temporary loss of pitches during the construction phase"*.

C.5.71 The construction works would result in loss of access to approximately 3.1ha of the BESSC for the main construction site, which includes a temporary reduction of playing field capacity equivalent to a maximum of one playing pitch, plus the land required for the proposed temporary access road. The temporary access road would be planted with a reinforced grass system and would measure approximately 5m in width. The loss of land for the main construction site (3.1ha) represents only a small proportion (approximately 13 per cent) of the overall BESSC playing fields (approximately 23ha) and is located on the periphery of the playing fields. The land affected by the proposed temporary access road could possibly be off-set by a reconfiguration of the remaining pitches.

C.5.72 The construction site and access route would result in the demolition and provision of a new replacement changing room facility and the relocation of track and field facilities. As set out in Section 5 of the *CoCP*, access to the existing car park facilities, changing rooms and track and field facilities would be maintained throughout the construction period. As required by a site-specific Requirement, the replacement changing room facility would be provided before the demolition of the existing facilities and before the beginning of the two and a half year construction period. The changing room facilities would be of equal capacity to the existing, but would offer a significant improvement in quality because of its new construction.

C.5.73 All facilities would be reinstated to their existing use after the construction stage. The grass covered hardstanding area for the operational site would result in a loss of approximately 0.11ha of land, which includes the footprint of the above-ground structure (approximately 0.003 ha). The *grass covered access route around part of the perimeter of the site* would result in the loss of a strip of land approximately 3m in width. Refer to para. C.4.63 for further details regarding the access route.

C.5.74 Although the land required for the operational facilities is only 0.11ha the proposed permanent land take is equivalent to one sports pitch, and Thames Water proposes to hand back the balance of the site which is not required for operational purposes to the London Borough of Wandsworth. There is a draft land agreement to this effect. This would ensure that there would be no permanent loss of any sports pitches, or any reduction of playing field capacity or functionality and as such there would be no significant permanent land use impact at Barn Elms. The loss of one BESSC playing field would be only temporary in nature and there would be no reduction in the ability to beneficially use the remainder of the BESCC and its playing fields during the construction phase. The *Open Space Assessment* acknowledges that the proposals only impact one sports pitch and states that *"that there is sufficient capacity within the site to support demand*".

C.5.75 The provision of a new replacement changing room facility would provide significant benefits at this site. The loss of a small area of playing field

space is unavoidable and would be temporary in nature. This loss would be reversed within a reasonable timescale and the long term impacts on the open space from the permanent works would be minor. This would accord with NPS paras. 4.8.13 to 4.8.14.

C.5.76 The proposed works would not prevent the beneficial use of surrounding land uses, either during construction or operation. Similarly, no extant planning permissions, committed developments, or policy allocations for future development within the surrounding area would be adversely impacted as a result of the works.

Noise and vibration

C.5.77 The nearest receptors are Pearson House, Huntingford House, Lancaster House and Jay House. These are six storey residential buildings located on Horne Way.

C.5.78 The NPS recognises that Nationally Significant Infrastructure Projects are likely to take place in mature urban environments, and in the short term, to lead to noise disturbance during construction.

C.5.79 Lancaster House contains 24 residential units and is approximately 35m from the site boundary. The upper floors of this building, from its third floors and above, would be at least partially exposed to works within the site. The *Environmental Statement* (Vol 6, Section 9) identifies that temporary significant noise effects arising from construction activities during the day are likely to affect the dwellings within Lancaster House for approximately seven months as a result of the site establishment works before the hoarding is completed and initial shaft works. At night-time, there would also be temporary adverse noise effects for approximately three months as a result of the construction of the connection tunnel. The activities which result in a potential significant effect do not occur concurrently.

C.5.80 In accordance with NPS policy, a series of measures are embedded within the project design within Section 6 of *CoCP* Part A. This includes operating in accordance with best practice, selection of the quietest cost effective plant available, and optimisation of plant layout to minimise noise emissions. The *CoCP* also contains, in Part B (Section 6) a number of additional site-specific mitigation measures to address noise and vibration effects during construction, which include hoarding height of 3.6m. Furthermore, during connection tunnel works outside of standard working hours the use of surface cranes would be minimised. This would involve stockpiling materials/equipment at the bottom of the shaft for use during the evening and night for removal during standard working hours. In addition, the work would utilise measures to reduce noise including the use of electric gantry cranes, gas/electric fork lift and measures to reduce noise from skip movements and unloading. Screened on-site batchers or screened static concrete re-mixer plant would be used for tunnel works outside standard hours.

C.5.81 There would be no adverse impacts from noise as a result of the operation of the site. There would be no significant vibration effects at Barn Elms during construction or operation.

C.5.82 The NPS advises that in situations where other forms of noise mitigation have been exhausted, noise insulation to dwellings or, in extreme cases, compulsory purchase of affected properties may be considered in order to gain consent for what might otherwise be an unacceptable development. In the case of the project, no extreme cases were identified at the date of submission of the application that would necessitate the compulsory acquisition of properties due to significant adverse effects. The Thames Tideway Tunnel noise insulation and temporary re-housing policy and the Thames Tideway Tunnel project compensation programme (included within Schedule 2 to the *Statement of Reasons*, which accompanies the application) were developed to offset the effects arising from construction related disturbance. The noise insulation and temporary re-housing policy would be implemented where predicted or measured construction noise levels exceed published trigger levels. The compensation programme was established to address claims of exceptional hardship or disturbance. In relation to construction, eligible works would be directed towards mitigation or other required actions to reasonably reduce disturbance from noise or construction activities.

C.5.83 The noise levels at the residential properties within Lancaster House do not exceed the thresholds for noise insulation provided by the Thames Tideway Tunnel noise insulation and temporary re-housing policy and as such these properties would not be eligible for noise insulation under this policy. However, residents of the properties within Lancaster House may be eligible for compensation under the Thames Tideway Tunnel project compensation programme.

C.5.84 Thames Water has employed all possible measures to mitigate the effects of noise at the site. The project demonstrates good design and mitigates and minimises adverse impacts on health and quality of life in accordance with NPS paras. 4.9.8 and 4.9.9. Some residual noise effects still remain. However these would be temporary only, during the most intense periods of construction activity, and would be dealt with through the Thames Tideway Tunnel project compensation programme.

Historic environment

C.5.85 This site does not contain any significant (statutorily protected or otherwise important) heritage assets, nor are there any in the immediate vicinity.

C.5.86 The site is not located within any conservation areas, although the very southern tip of Castelnau Conservation Area, which stretches along the Upper Bridge Street (formerly Castelnau Road), is approximately 65m from the access point at the junction of Queen Elizabeth Walk and Rocks Lane. This junction also falls within the very eastern extent of the Barnes Green Conservation Area. However, the highway works here do not involve any physical works but only minor alterations to the traffic signage. No significant effects on the historic environment are likely from the site's proposals during construction.

C.5.87 The eastern part of the site lies within the locally designated Barnes Common Archaeological Priority Area, and the main potential in terms of buried heritage is for evidence of prehistoric settlement, with moderate

potential for prehistoric structures or timber track ways. There is high potential for later medieval remains associated with the Barn Elms manor house, including outbuildings and landscaping; evidence of land reclamation and water management.

C.5.88 These effects are unavoidable and a consequence of the other constraints on site selection. Measures have been taken to minimise the land take at the site. An approach to recording evidence was developed and agreed with English Heritage.

C.5.89 The operational phase would not involve any activities that would affect buried or above-ground heritage assets.

C.5.90 The proposal accords with the decision making principles in the NPS.

Light

C.5.91 The *Daylight/Sunlight Assessment*, which accompanies the application, established that the temporary and permanent works at Barn Elms would have no material impact on sunlight/daylight to surrounding residential properties. This issue was scoped out of the detailed assessment.

C.5.92 For practicality and safety reasons tunnel construction needs to take place over extended periods of time, including working on a 24-hour, seven days a week basis. A short period of 24-hour working would be required at this site. During this period, the working would mainly take place below ground but artificial lighting would be required for the supporting activity at ground level for extended periods during the tunnelling phase. Measures are included within the *CoCP* Part A to ensure that all reasonable steps would be taken to minimise detrimental impact on amenity resulting from artificial light. For example, site lighting during construction would be capped and directional to ensure minimal light spill and lighting is only used when necessary and as such there would be no unreasonable effects on residential properties during the construction period. *CoCP* Part B (Section 11) ensures that lighting would be directed away from an adjacent habitat and light spill would be minimised through the use of cowling.

C.5.93 Design principle BAREL.09 would ensure that no lighting shall be provided except a low level light to the kiosk doors to allow access for maintenance purposes in the hours of darkness. This light shall only be activated by a directional motion control switch, linked to the door opening. This was developed in consultation with the London Borough of Richmond upon Thames.

C.5.94 In conclusion, all reasonable steps would be taken to minimise any detrimental effects arising from the use of artificial lighting at the site in accordance with NPS para. 4.12.7. As a result, there would be no significant artificial light effects on amenity during the construction or operational phases.

Traffic and transport

C.5.95 Barn Elms has a poor rating for public transport accessibility because there are no London Underground stations in the vicinity of the site and the closest station is Hammersmith station which is approximately 2.5km

to the northeast of the site. The site is located in close proximity to a number of local bus services which provide a link between the site and Hammersmith Station. Barnes National Rail station is approximately 1.8km to the south of the site.

C.5.96 The *Transport Assessment* assumes based on a robust assessment that it is unlikely that any workers would travel to or from the site by car as there would be no parking provided within the site boundary for workers. Parking on surrounding streets is also restricted. A range of measures to reduce car use would be incorporated into a site-specific travel plan, which would be subject to a site-specific Requirement to submit to the local authority for approval. The requirements for the site-specific travel plans are set out in the *Draft Project Framework Travel Plan*, which accompanies the application.

C.5.97 During the construction phase, access to the site would be via Queen Elizabeth Walk before passing through a narrow section of private road which currently serves the sports centre and adjacent residential properties. A new access road would be constructed across the northern and eastern regions of the BESSC to serve the construction site. The alignment of the proposed access road would pass through the existing location of the northernmost BESSC changing rooms. The primary access route to the site would be from the southwest on Rocks Lane. This would be accessed from the western section of Upper Richmond Road. Construction vehicles would both arrive and depart the site using this route.

C.5.98 The access road proposed in this application for development consent was subject to three rounds of formal consultation and is a result of discussion and agreement with the London Borough of Richmond upon Thames and the London Borough of Wandsworth. The proposed access road would not involve the use of the existing tree lined access road (to the boat house facilities) which could possibly be reinstated to grassland. At the Rocks Lane/Queen Elizabeth Walk junction, the northbound stop line would be relocated approximately 500m further south on Rocks Lane.

C.5.99 The primary access route would require construction vehicles to travel across the Barnes Railway Bridge on Rocks Lane (A306). This bridge is currently in poor condition and may be subject to weight restrictions in the future which could potentially limit the size of construction vehicles that can be used at this site. No weight limit is currently imposed upon the bridge. However, initial discussions with Network Rail indicated that the bridge is scheduled for improvement works in approximately 2015/2015. It is anticipated that these improvement works will be complete before Thames Water would need to utilise the bridge during its construction phase.

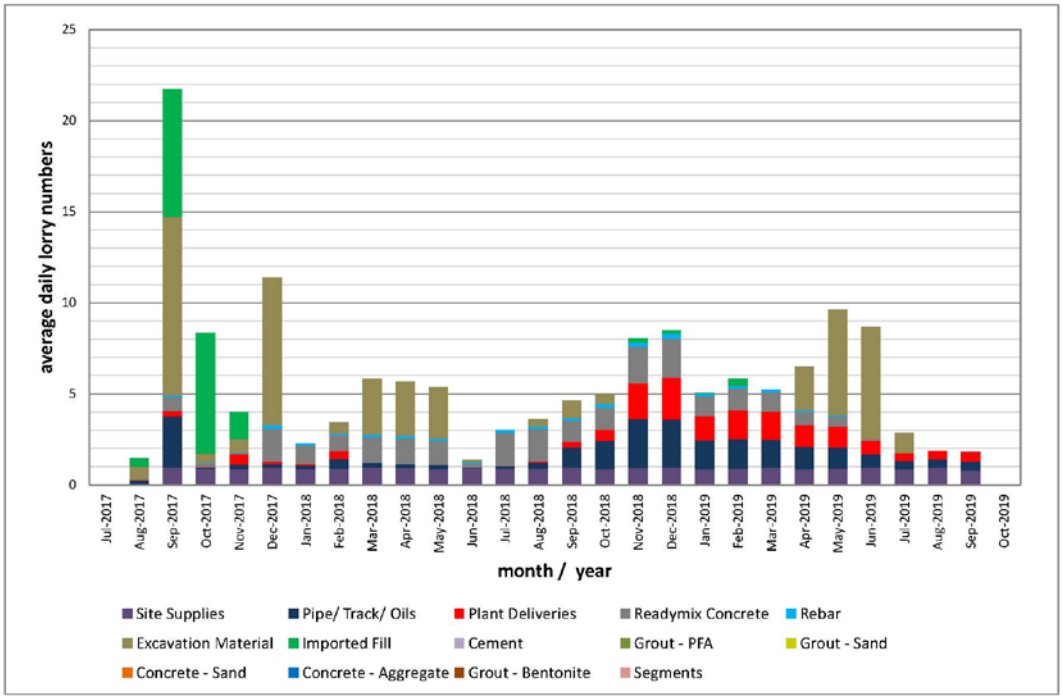
C.5.100 All materials would be transported by road to the Barn Elms site. There are no river services in the vicinity of the Barn Elms site and it is not proposed to use the river to transport materials at this site.

C.5.101 During construction typically vehicle movements would take place on weekdays between 8am to 6pm and on Saturdays from 8am to 1pm with up to one hour before and after these hours of mobilisation and

demobilisation of staff. In exceptional circumstances HGV and abnormal load movements could occur up to 10pm for large concrete pours and later at night on agreement with the local authority. Continuous working hours would be required for a short period of time during the construction of the tunnel.

C.5.102 As stated in the *Transport Assessment*, it is anticipated that an average of six HGVs would access the site for the majority of the two and a half year construction period. However, in the initial month during the demolition of an existing sports changing room facility and during the construction of the temporary access route it is anticipated that there would be 22 HGVs per day. The histogram in Figure C.6 shows the construction vehicle profiling during construction.

Figure C.6 Estimated construction lorry profile



C.5.103 During construction there would be no changes to on-street parking in the vicinity of the Barn Elms site. A number of parking spaces within the Sports Centre car park would need to be suspended throughout the construction period. However, there is likely to be scope to rearrange the existing parking layout to relocate at least some of the suspended spaces.

C.5.104 Measures to further reduce transport impacts are detailed in the *CoCP.* These include HGV management and control measures such as designated vehicle routes to sites for construction vehicles. There is also a provision for management plans, for construction worker journeys to and from the site. In addition to the general measures in the *CoCP* Part A, the following traffic and vehicle control measures are incorporated into the *CoCP* Part B:

a. Unless otherwise agreed in writing with the local planning authority, no HGVs shall enter or leave the construction site during the hours of

8am to 9am Monday to Friday excluding bank holidays, and 8am to 1pm Saturday to avoid local congestion.

b. Works during standard hours on a Saturday would consider avoiding periods of high recreational activity.

c. Access to the boathouse would be maintained for vehicles and pedestrians, unless otherwise agreed.

d. Parking changes within the Sports Centre car park required to facilitate the construction site access road, would include temporary relocation/ re-provision of car parking spaces for the duration of the works (note: land may be available from the London Borough of Richmond upon Thames for the re-provision).

e. Any HGV movements along Rocks Lane between 9pm and 7am Monday to Friday, 1pm to midnight Saturday and all day on Sunday would need to be agreed with the local authority.

f. Traffic marshals would be required at locations along Queen Elizabeth Walk and at the BESSC car park access where the width of the carriageway does not permit two-way vehicle flow for HGVs.

C.5.105 In conclusion, construction works in this location are not likely to result in any significant transport effects on road operation or delays. This is supported in the *Environmental Statement* (Vol 6, Section 12). A range of measures are in place in the *CoCP* and Travel Plan which would mitigate any potential significant impacts. In accordance with NPS para. 4.13.7, appropriate requirements are proposed to minimise impacts at this site. HGV traffic at this site would not be substantial. In addition, there would be no significant effects regarding pedestrian and cyclist amenity, safety or local public transport services.

C.5.106 During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities therefore there would be no significant traffic impacts.

Waste management

C.5.107 The project-wide Waste Strategy was developed to provide a framework for the management of materials and waste that would be produced throughout the construction and operation of the project. This ensures that the requirements set out in NPS para. 4.14.6 would be satisfied, and the Waste Strategy would be secured via an obligation in accordance with NPS para. 4.14.7.

C.5.108 Section 10 of the *CoCP* Part B would ensure that any topsoil to be removed would be retained on site for future use where required as part of the project works.

C.5.109 No particular site-specific waste issues arise at this site.

Socio-economic

C.5.110 The project-wide socio-economic issues and benefits of the project both during construction and operation are detailed in Section 8 of the *Planning Statement*.

C.5.111 Within the immediate area (within 250m), the predominant land uses are residential and Metropolitan Open Land and other public open spaces. The residential areas generally comprise low rise suburban development, except for the six-storey apartment blocks at Horne Way, south of the main worksite. The open land and open spaces includes Putney Lower Common, the River Thames and restricted access open spaces such as the BESSC and the London Wetland Centre. The Barn Elms Boathouse, a Scouts Hut, the towpath forming the Thames Path and national cycle route, and the Beverley Brook footpath are all located in the vicinity of the site.

C.5.112 The community profile suggests that the local community is made up of residents who are predominantly White, who generally experience good health and have high life expectancy and experience effectively no measureable deprivation.

C.5.113 The *Equalities Impact Assessment* identifies a differential negative impact on the children equalities group as a result of the temporary removal of land and construction in the playing fields, and from the movement of HGVs. A range of design measures in the *CoCP* seek to provide safety and security, and reduce the disruptive impact of traffic in the vicinity of the site. Furthermore, information on land take requirements and construction activities would be advertised in advance of any construction to provide users with advanced warning of the need to alter their current use of these spaces. In addition, due to the number of school children using this facility, a programme of education for local children on health and safety issues associated with construction sites would be undertaken in local schools. Therefore, the direct impact of the project would only be temporary in nature.

C.5.114 Construction is expected to require a maximum workforce of approximately 40 workers at any one time. This would not significantly alter the demand for services in the surrounding area. These jobs and training opportunities would provide a stimulus to the local economy.

C.5.115 There would be no significant socio-economic impacts on any nearby sensitive receptors including users of the BESSC, and there would be no adverse impacts on the functionality of the playing fields during construction or operation.

C.5.116 Whilst the proposed works would cause short term inconvenience for some local residents, these would be limited in time and mitigated as far as practical. Once the project is operational there would be a substantial reduction in discharges from the West Putney Storm Relief CSO. As a result, there would be a significant beneficial impact for the recreational users of the highly used stretch of the Thames and foreshore adjacent to the Barn Elms site (*Environmental Statement* Vol 3, Section 8). The users of the BESSC facilities would benefit from a new changing room facility which is a significant improvement over the existing facility.

C.6 Overall conclusions

C.6.1 There is a need to intercept the West Putney Storm Relief CSO. In an average year, the CSO discharges approximately 30 times and discharges approximately 35,000m^3 of untreated sewage into the tidal Thames. The Environment Agency identified the West Putney Storm Relief CSO as a CSO that needs to be controlled.

C.6.2 The reduction of discharges from the West Putney Storm Relief CSO would significantly improve the water quality in the Thames with consequent benefits to water quality, ecology, recreation and amenity. It would also help to reduce sewage derived litter and the health risks to users.

C.6.3 Barn Elms was selected after extensive consideration and engagement as the appropriate site on which to meet the need. The site is suitable and the application proposals would meet the identified need through full interception.

C.6.4 Given the site's location, in greenfield land of the BESSC, it is inevitable there would be some disturbance during the construction period. While Thames Water sought to minimise any disturbance that would be experienced through sensitive design and mitigation, a temporary adverse noise impact at residential properties at Lancaster House is likely to remain.

C.6.5 The assessment above explained that the proposals incorporate measures to limit the effect of this impact. The project design was refined and all practicable mitigation identified and committed to, in accordance with the advice in the NPS. The residual temporary impact is an unavoidable consequence of intercepting the CSO which runs beneath a small section of the south-eastern corner of the BESSC playing fields.

C.6.6 The proposals at Barn Elms would give rise to a number of significant beneficial effects for:

a. fish populations and the recreational users of the river as a result of improved water quality

b. users of the BESSC and existing and future communities from the provision of a new replacement changing room facility and replacement track and field facilities; the new permanent access route would also improve access to the Barn Elms Boat House and other facilities, and enables the existing Barn Elms Boat House access road to be removed (by others)

c. invertebrate populations as a result of the creation of a habitat wall and semi-improved acid grassland

d. bat populations due to the provision of bat boxes.

C.6.7 The proposed works at the Barn Elms site and the mitigation measures developed and advanced as part of the application for development consent directly accord with the approach required by the NPS. Adverse effects have been minimised as far as possible and opportunities have

been taken to enhance the local environment and to leave a positive legacy.

C.6.8 Sections 8 and 9 of the *Planning Statement* considers the implications of the local effects of the works at Barn Elms and the other sites, and describes the overall balance between impacts and benefits associated with the project as a whole, against the guidance in the NPS. It concludes that the works at Barn Elms, and the project as a whole, are compliant with the NPS and that development consent should be granted.

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Annex C: Drawings for Barn Elms

List of drawings

Barn Elms: Location plan

Barn Elms: As existing site features plan

Barn Elms: Construction phases plans

Barn Elms: Land use plan

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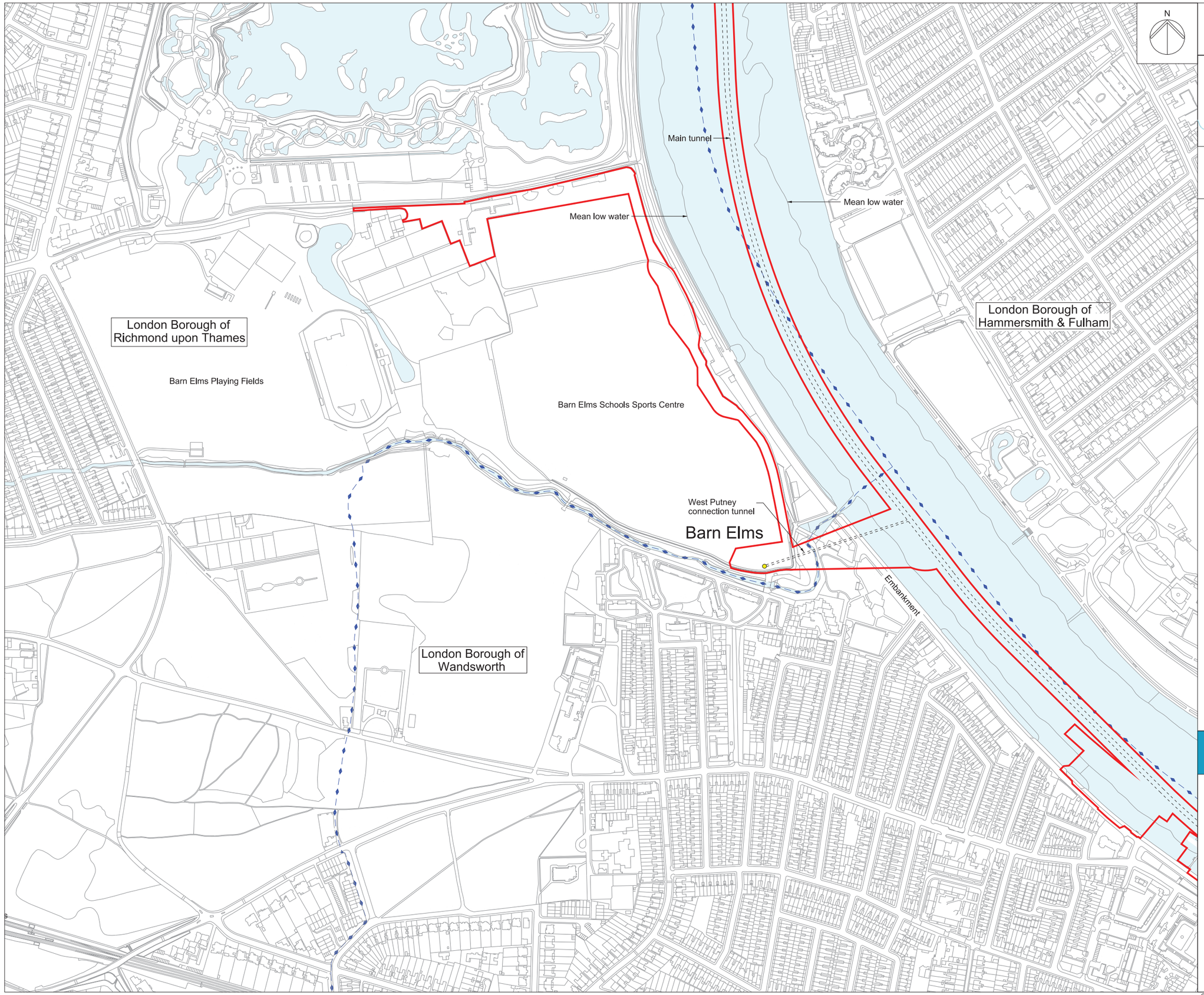


N

Keyplan:

Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key:

- Local authority boundary
- Order limits
- Tunnel
- Shaft

Notes:

1. The alignment of the tunnels are illustrative within limits of deviation.

100m 0 100m

Scale 1:2500 at A1
1:5000 if reproduced at A3

FOR INFORMATION

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

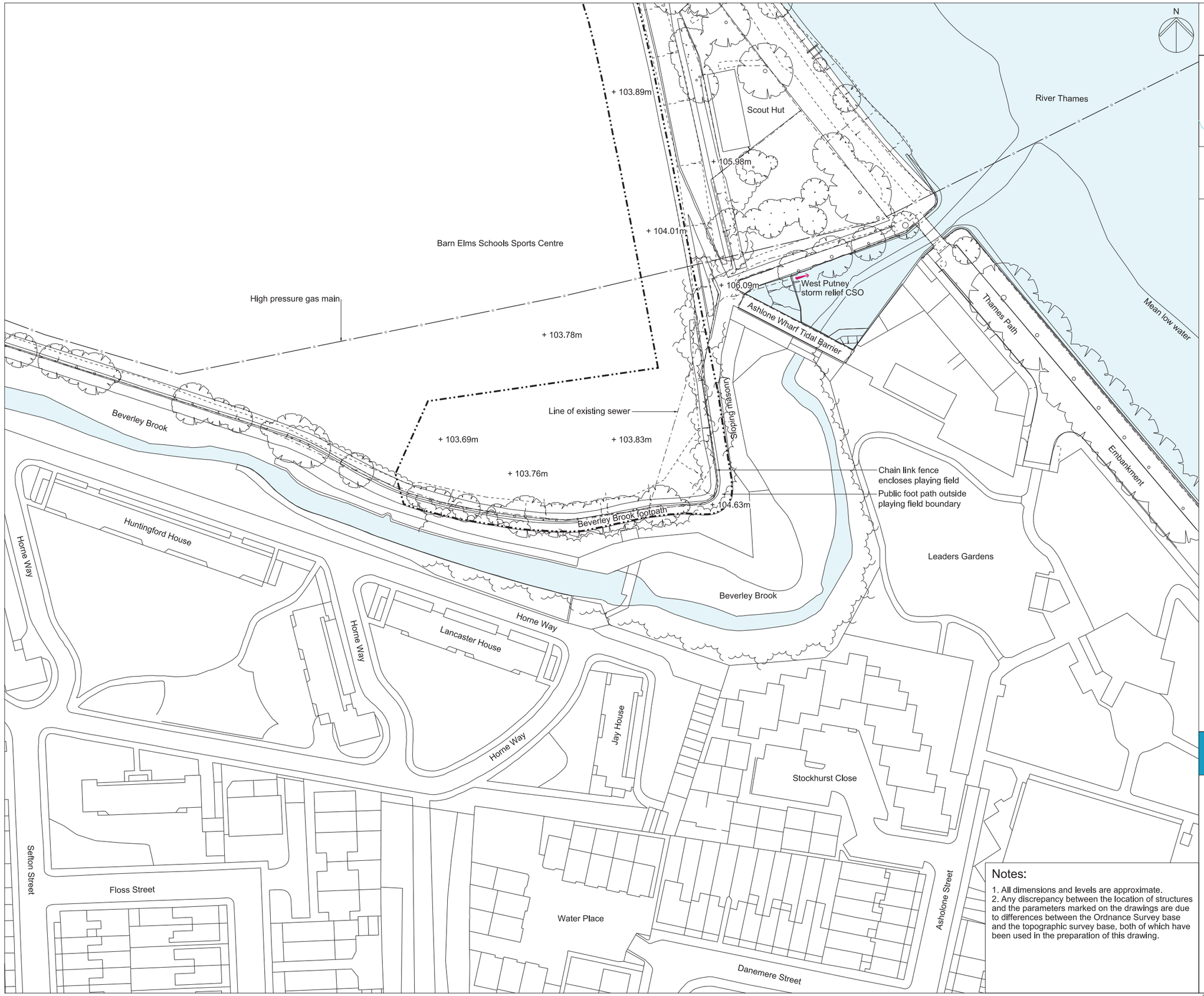
Location plan

Book of plans - section 7

DCO-PP-04X-BAREL-070001
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key:

- Limits of land to be acquired or used (LLAU)
- + 105.40m — Existing levels (shown in metres above tunnel datum)
- Existing trees within surveyed area (trunk sizes vary)
- Approximate position of CSO outlet

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

FOR INFORMATION

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

Application for Development Consent

As existing
Site features plan
Book of plans - section 7

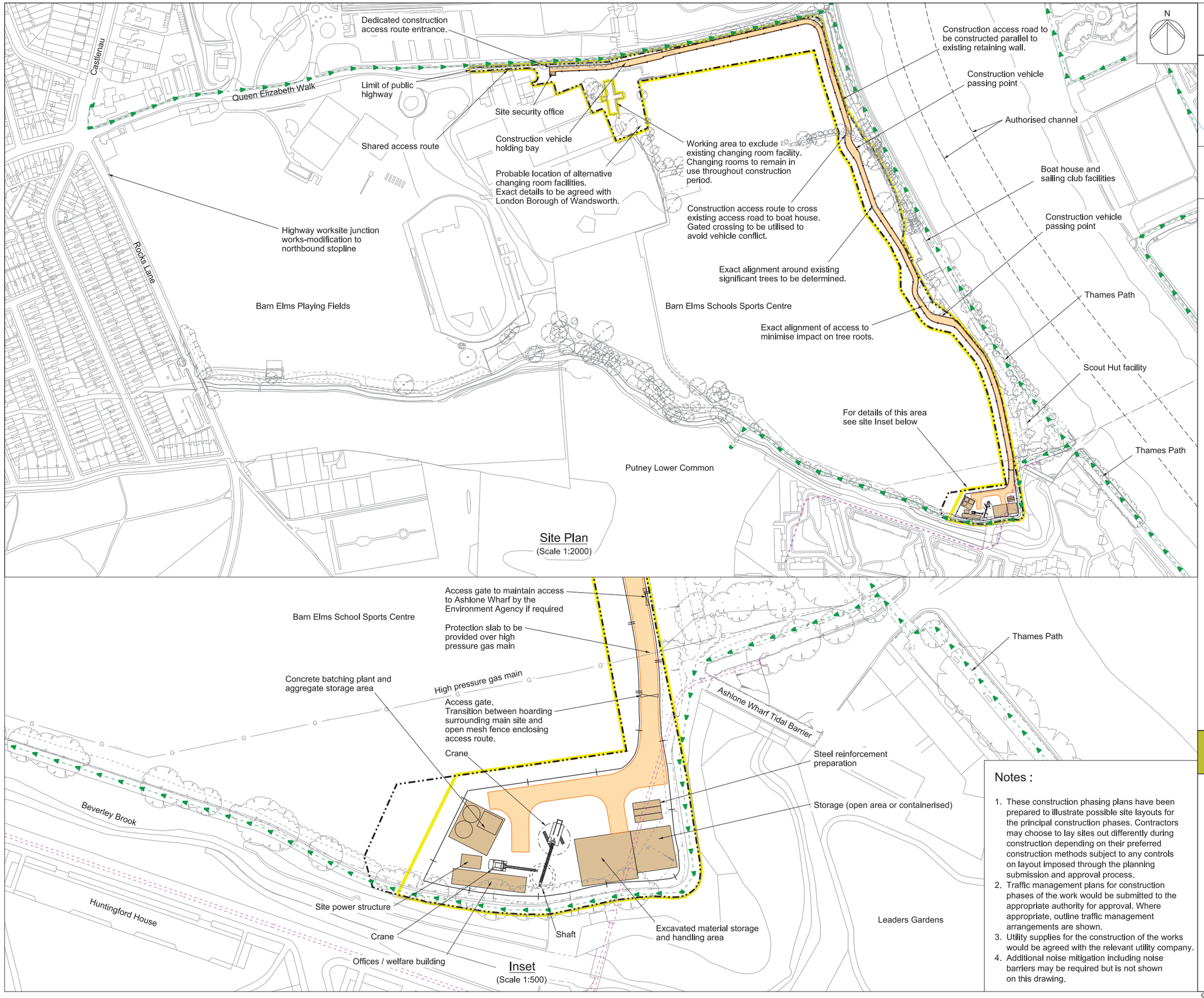
DCO-PP-04X-BAREL-070002
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water

Notes:

1. All dimensions and levels are approximate.
2. Any discrepancy between the location of structures and the parameters marked on the drawings are due to differences between the Ordnance Survey base and the topographic survey base, both of which have been used in the preparation of this drawing.



N

Keyplan:

Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key:

- Limits of land to be acquired or used (LLAU)
- Existing public right of way
- Hoarding
- Open mesh fencing
- Maximum extent of working area
- Access / haul route
- Existing sewers

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

100m 0 100m

Scale 1:2000 at A1
1:4000 if reproduced at A3

Notes :

1. These construction phasing plans have been prepared to illustrate possible site layouts for the principal construction phases. Contractors may choose to lay sites out differently during construction depending on their preferred construction methods subject to any controls on layout imposed through the planning submission and approval process.
2. Traffic management plans for construction phases of the work would be submitted to the appropriate authority for approval. Where appropriate, outline traffic management arrangements are shown.
3. Utility supplies for the construction of the works would be agreed with the relevant utility company.
4. Additional noise mitigation including noise barriers may be required but is not shown on this drawing.

ILLUSTRATIVE

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

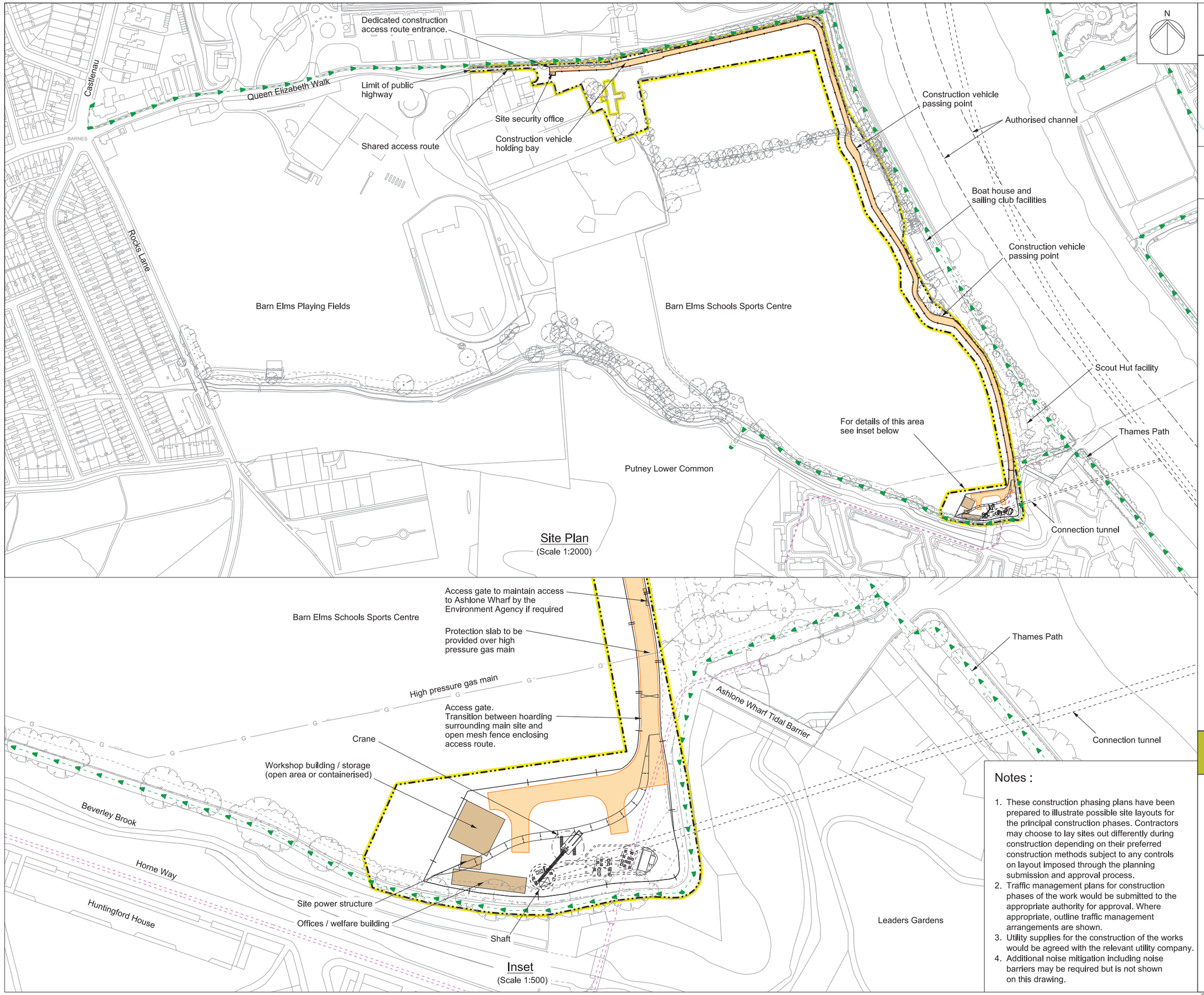
Application for Development Consent

Construction phases - phase 1
Site setup , shaft construction & tunnelling
Book of plans - section 7

DCO-PP-04X-BAREL-070018
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



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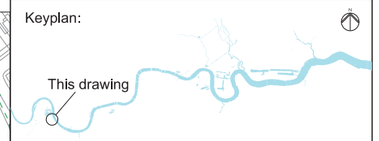
Keyplan:



Coordinates are to be Ordance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

Key:

- Limits of land to be acquired or used (LLAU)
- Existing public right of way
- Hoarding
- Open mesh fencing
- Maximum extent of working area
- Access / haul route
- Existing sewers

10m 0 40m

Scale 1:500 at A1
1:1000 if reproduced at A3

100m 0 100m

Scale 1:2000 at A1
1:4000 if reproduced at A3

ILLUSTRATIVE

Notes :

1. These construction phasing plans have been prepared to illustrate possible site layouts for the principal construction phases. Contractors may choose to lay sites out differently during construction depending on their preferred construction methods subject to any controls on layout imposed through the planning submission and approval process.
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3. Utility supplies for the construction of the works would be agreed with the relevant utility company.
4. Additional noise mitigation including noise barriers may be required but is not shown on this drawing.

Location

Barn Elms
London Borough of Richmond Upon Thames

Document Information

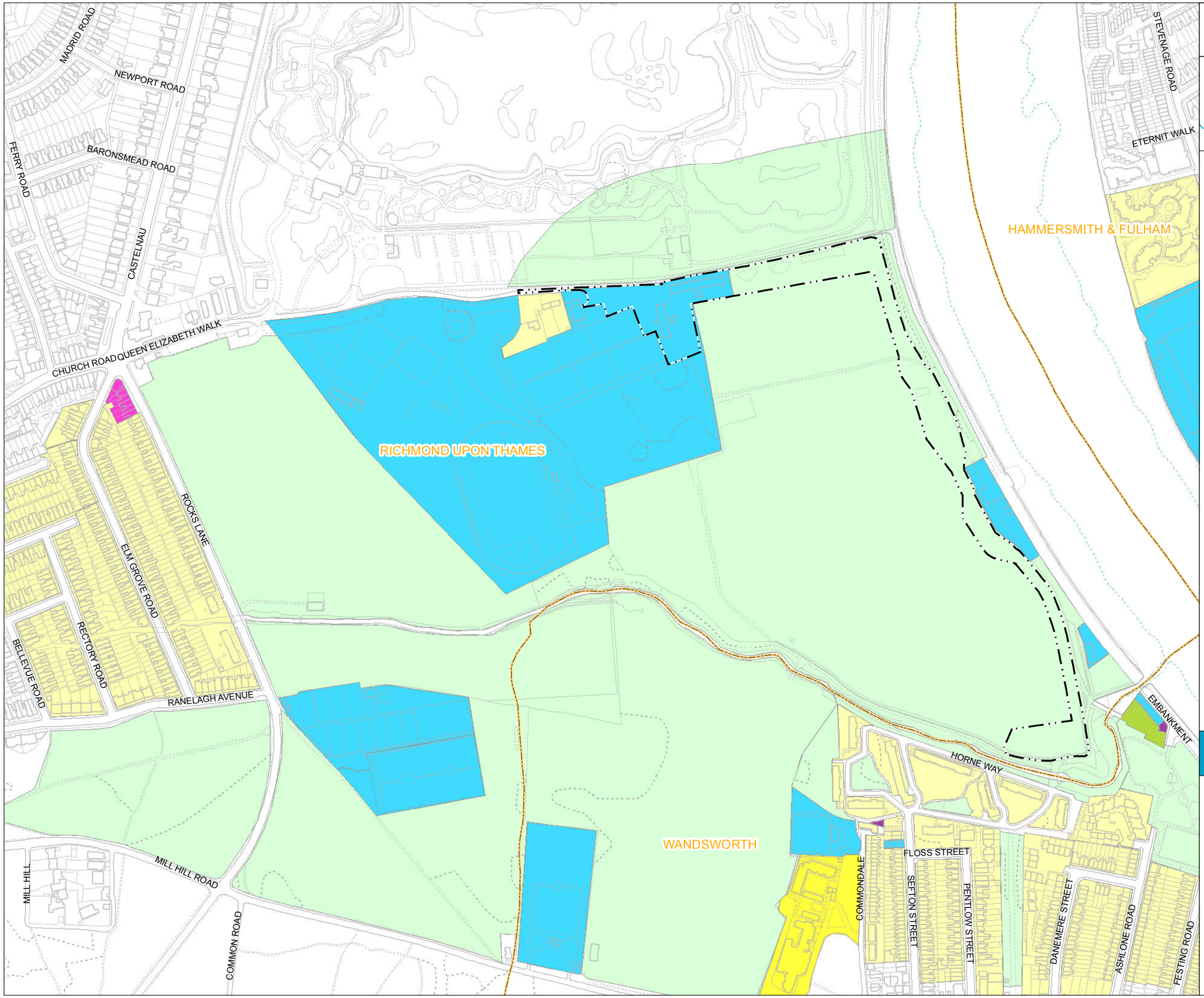
Application for Development Consent

Construction phases - phase 2
Construction of other structures
Book of plans - section 7

DCO-PP-04X-BAREL-070019
January 2013

Thames Tideway Tunnel
Creating a cleaner, healthier River Thames

Thames Water



Keyplan:

Key

- Limits of Land to be Acquired or Used
- Local Authority Boundary

Land Use

- Class B1 (Business (Offices except A2) Research and Development, Light Industry)
- Class C2-C2A (Residential Institutions)
- Class C3-C4 (Dwelling Houses)
- Class D1-D2 (Non Residential Institutions (Community Facilities) and Assembly and Leisure)
- Mixed Use
- Other
- Open Space

50 25 0 50 m

Scale 1 : 4,000 at A3

FOR INFORMATION

Location

Barn Elms

London Borough of Richmond upon Thames

Document Information

Planning Statement

Land use

1PL03-MG-00831

January 2013

Thames Tideway Tunnel

Creating a cleaner, healthier River Thames

Thames Water

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Thames Water Utilities Limited
Clearwater Court, Vastern Road, Reading RG1 8DB

DCO-DT-000-ZZZZZ-070100