

Thames Tideway Tunnel
Thames Water Utilities Limited



Application for Development Consent

Application Reference Number: WWO10001

Planning Statement

Doc Ref: **7.01**

Appendix W

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

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Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Planning Statement

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Appendix W: Greenwich Pumping Station

W.1 Introduction

- W.1.1 In an average year, the Greenwich Pumping Station CSO discharges approximately 8,320,000m³ of untreated sewage, approximately 51 times a year into the tidal Thames. On the basis that litter tonnage is proportional to discharge volumes, approximately 2,100 tonnes of sewage derived litter is also discharged from this CSO in an average year. The CSO has been identified by the Environment Agency as requiring full interception.
- W.1.2 A worksite is required to connect the Greenwich Pumping Station CSO to the Greenwich connection tunnel and drive the connection tunnel to Chambers Wharf, where it would be connected to the main tunnel. The proposed development site is known as Greenwich Pumping Station, which is located in the Royal Borough of Greenwich immediately to the west of the administrative boundary with the London Borough of Lewisham.
- W.1.3 The extent of the project site is shown in the Location plan, contained within Annex W of this report and within the *Book of Plans*, which accompanies the application.
- W.1.4 This section is structured as follows:
- a. Section W.2 provides a brief description of the Greenwich Pumping Station site.
 - b. Section W.3 sets out the planning context for works in this location.
 - c. Section W.4 describes the site-specific development for which consent is sought and the way in which proposals evolved in response to consultation.
 - d. Section W.5 provides an analysis of the principal site-specific planning considerations and how the proposals comply with relevant planning policy.
 - e. Section W.6 provides an overall conclusion of the site-specific assessment for the proposed works at this site.

W.2 Site description

- W.2.1 The site itself comprises Thames Water's existing, operational Greenwich Pumping Station and associated buildings, two railway viaducts that bisect the site and Phoenix Wharf. The two railway viaducts serve Network Rail and the Docklands Light Railway (DLR). The site also includes a shared pedestrian and cycle path, which runs alongside the National Rail lifting bridge from Creekside, enters the site over the Ha'penny pedestrian bridge, continues diagonally across the site under the DLR viaduct and connects to Norman Road.

W.2.2 An aerial photo of Greenwich Pumping Station is provided in Figure W.1 below.

Figure W.1 Aerial photograph of Greenwich Pumping Station



- W.2.3 There are a number of Grade II listed structures on the site including: the 19th century east and west beam engine houses that adjoin the pumping station building; the boiler house that links the two beam engine houses two coal sheds to the southwest of the pumping station; the early 20th century pumping station extension and the Network Rail viaduct.
- W.2.4 The site lies in the flood plain of the River Ravensbourne, the lower part of which is known as Deptford Creek and falls within the tidal Flood Zone 3 of the River Thames and Deptford Creek, which is protected by flood defences.
- W.2.5 The site is bounded by the Brook Marsh Trading Estate, a vehicle repair garage and offices to the north, Norman Road to the east, Greenwich High Road to the south, and Deptford Creek to the west.
- W.2.6 The area to the north of the site across Deptford Creek is predominantly industrial but also includes the Trinity Laban contemporary dance centre. To the northeast of Phoenix Wharf, the land uses are industrial and residential, including the multi-storey residential development on Tarves Way.
- W.2.7 Beyond Greenwich High Road to the south is a mix of residential apartment blocks, terraced housing and retail terraces. The Premier Inn development and multi storey residential development lies adjacent to the south-western boundary of the site facing Greenwich High Road.

- W.2.8 The western banks of Deptford Creek are characterised predominantly by industrial and commercial development, including two and three-storey warehouses ranging from small units to large-scale sheds. The development pattern is typical of industrial estates and there are various small access roads informally arranged between Deptford Creek and the DLR line. There are also a number of cultural uses and residential properties beyond.
- W.2.9 The key features of the site are identified in the site features plan within Annex W of this report and in the *Book of Plans*.

W.3 Planning context

- W.3.1 As set out in Section 7, the proposed works will be assessed against the requirements of the National Policy Statement for Waste Water (the 'NPS'). In developing the proposals and mitigation measures for the development at Greenwich Pumping Station, Thames Water¹ had regard to the local development plan where it is relevant to the application.
- W.3.2 In this case the local development plan comprises the *London Plan* (2011), the Royal Borough of Greenwich's *Unitary Development Plan* (*UDP*) (2006) (saved policies) and policies and emerging policies in the Borough's draft *Core Strategy with Development Management Policies*, which is expected to be adopted in 2013. Once adopted, the *Core Strategy* will replace many of the Royal Borough's saved *UDP* policies.
- W.3.3 Deptford Creek is designated as a Site of Importance for Nature Conservation at metropolitan and borough level in the London Borough of Greenwich's *UDP*. The creek and the site fall within a Royal Borough of Greenwich designated Area of Archaeological Potential also designated in the *UDP*.
- W.3.4 The Ashburnham Triangle Conservation Area lies to the south of the site beyond Greenwich High Road. The London Borough of Lewisham has recently designated a conservation area at Creekside opposite the site to the west of Deptford Creek.
- W.3.5 There are three Local Nature Reserves near the site, including Sue Godfrey Nature Reserve (also designated as a Site of Importance for Nature Conservation) (within 400m), Brookmill Road (within 1km) and Mudchute Park Farm (within 2km).
- W.3.6 Phoenix Wharf which comprises the land north of the Network Rail viaduct is allocated for mixed use development (J7 Jobs and local economy) as defined in the *UDP*.
- W.3.7 There are three Grade II listed buildings on site; two listed coal sheds and a listed pumping station comprising two beam engine houses flanking a boiler house. The railway viaduct that crosses the site is also Grade II listed.

¹ 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

- W.3.8 Under the Town and Country Planning Act 1990, Greenwich Pumping Station (excluding the land to the north of the railway viaduct) constitutes operational land that is specifically used or held for the purposes of carrying out Thames Water's statutory undertakings. The development is proposed on and under land owned by Thames Water. Phoenix Wharf is not currently in Thames Water's ownership, however this part of the site would be used to process and store excavated material only and the permanent structures would be located exclusively on Thames Water's operational land.
- W.3.9 There are no extant planning permissions or pending applications within the site boundary.
- W.3.10 Beyond Norman Road to the east of the site lies Greenwich Industrial Estate where an extant planning permission for a mixed use development is currently being implemented. The redevelopment scheme includes 181 residential units, 358 student residential units, education/office floor space, hotel use and associated restaurant, a mix of community uses and public realm improvements. An application is also being considered by the Royal Borough for the change of use of floor space on part ground, part first and the entirety of the second and third floors of Block E 43 to 81 Greenwich High Road from office to hotel use. A further application has recently been submitted to the London Borough of Lewisham for the redevelopment of the Faircharm Estate opposite the Greenwich Pumping Station site on Deptford Creek. The redevelopment scheme includes repair, restoration and conversion of two existing buildings (A and C) to provide commercial uses. The scheme also includes demolition of building B and construction of new buildings ranging from six to 12 storeys to provide residential and commercial uses, new open space, landscaping and car parking.
- W.3.11 A Safeguarding Direction has been secured for Phoenix Wharf, which forms the northern part of the Greenwich Pumping Station site and is not currently in Thames Water's ownership. The Direction was served by the Department for Communities and Local Government and prevents the Royal Borough of Greenwich granting planning permission on any application in respect to the safeguarded land without specific authorisation from the Department. The Direction came into force on 5 October 2012 and will remain in force until 31 March 2013 and was applied for by Thames Water in light of discussions with the Royal Borough and the land owners which suggested a planning application for the redevelopment of the site was imminent. The Safeguarding Direction states: "*Whilst it is clear that the delivery of this nationally significant project is extremely important, the Secretary of State is very conscious that there are on-going conversations between your authority and potential developers to plan the housing and other development. For this reason the Secretary of State [...] has opted to issue a safeguarding Direction*".

W.4 Description of development

Overview

- W.4.1 The proposed development at Greenwich Pumping Station would intercept the Greenwich Storm Relief CSO. The Greenwich connection tunnel would also be driven from this site to Chambers Wharf. A drop shaft would be constructed into which a tunnel boring machine would be inserted and driven northwards via the sites at Deptford Church Street and Earl Pumping Station towards Chambers Wharf where the Greenwich connection tunnel would meet the main tunnel.
- W.4.2 Works at Greenwich Pumping Station would also include a CSO interception chamber, hydraulic structures/chambers with access cover(s), and culverts to modify, connect, control, ventilate, access and intercept flows from the existing Greenwich Pumping Station CSO and divert them into the Greenwich connection tunnel.
- W.4.3 The broad locations (within parameters) and size thresholds of the shaft, structures for air management, electrical and control kiosk and other underground chambers, culverts, pipes and ducts to connect, control and intercept flow are all submitted for approval as part of the application. These works would be contained within the relevant zones as indicated on the site works parameter plan contained in the *Book of Plans*.
- W.4.4 Illustrative landscaping plans and designs accompany the application to show how the site could look once construction works are complete, but are not submitted for approval. Those elements to be submitted for detailed approval by the Royal Borough of Greenwich must be consistent with the general and site-specific design principles which are set out in the *Design Principles* document, which accompanies the application.

Figure W.2 Visualisation of Greenwich Pumping Station



Application for development consent

W.4.5 The geographic extent of the proposals for which development consent is sought is defined by the limits of land to be acquired or used.

W.4.6 Table W.1 below lists the application drawings relevant to this site and their status.

Table W.1 Greenwich Pumping Station: Drawings that define the proposed development

Drawing title	Status	Location
Proposed schedule of works	For approval	Schedule 1 to the <i>Draft Thames Water Utilities Limited (Thames Tideway Tunnel) Development Consent Order</i> (the 'Draft DCO' (and extracts below)
Access plan	For approval	<i>Book of Plans</i> , Section 24
Demolition and site clearance plan	For approval	<i>Book of Plans</i> , Section 24
Site works parameter plan	For approval	<i>Book of Plans</i> , Section 24
Permanent works layout	Illustrative	<i>Book of Plans</i> , Section 24
Proposed site features plan	Illustrative except the above-ground structures which is indicative	<i>Book of Plans</i> , Section 24
Existing floor plan with extent of loss	For information except for maximum extent of loss of listed structures which is for approval	<i>Book of Plans</i> , Section 24
Proposed floor plan	Indicative	<i>Book of Plans</i> , Section 24
Section AA	Illustrative	<i>Book of Plans</i> , Section 24
Section BB	Indicative	<i>Book of Plans</i> , Section 24
Section CC	Indicative	<i>Book of Plans</i> , Section 24
As existing and proposed elevation (various)	Illustrative	<i>Book of Plans</i> , Section 24
As existing beam engine house north elevation	For information	<i>Book of Plans</i> , Section 24
Proposed beam engine house elevation (various)	Indicative	<i>Book of Plans</i> , Section 24
As existing beam engine house south elevation with extent of loss	For information except for maximum extent of loss of listed structures which is for approval	<i>Book of Plans</i> , Section 24
Existing beam engine house east elevation	For information	<i>Book of Plans</i> , Section 24

Drawing title	Status	Location
Listed building internal elevations with extent of loss	For information except for maximum extent of loss of listed structures which is for approval	<i>Book of Plans</i> , Section 24
Listed structure interface (various)	Indicative	<i>Book of Plans</i> , Section 24
Construction phases	Illustrative	<i>Book of Plans</i> , Section 24
Highway layout during construction	Illustrative	<i>Transport Assessment</i> Greenwich Pumping Station Figures
Permanent highway layout	Illustrative	<i>Transport Assessment</i> Greenwich Pumping Station Figures

W.4.7 The Nationally Significant Infrastructure Project (NSIP) works (Work Nos. 23a) comprise the construction of a CSO drop shaft with an internal diameter of approximately 17m and depth of 46m and a short connection tunnel to the main tunnel. Associated development (Work no. 23c) comprises the works to intercept and divert flow from the Greenwich Pumping Station CSO to the drop shaft including construction of an interception chamber, CSO overflow structures, hydraulic structures, chambers with access covers, 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*. Further details of temporary construction works and permanent operational structures are contained below and an extended description can also be found in the *Environmental Statement* (Vol 24), which accompanies the application.

W.4.8 At this site, approval is sought for the works shown on the Works plan showing the Greenwich connection tunnel (Work no. 20), Greenwich Pumping Station CSO drop shaft (Work No. 23a) 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. 23c) 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 are providing. Section 5 of this document explains in more detail the overall approach to the level of detail and how the plans for approval were developed.

Construction

W.4.9 Construction at Greenwich Pumping Station is anticipated to take approximately five and a half years and would involve the phases detailed below and presented graphically in Figure W.3 overleaf.

- a. site set-up (approximately eight months)
- b. shaft construction (approximately 12 months)
- c. tunnelling (approximately 20 months)
- d. secondary lining (approximately seven months)
- e. construction of other structures (approximately 18 months)
- f. completion of works and site restoration (approximately eight months).
- g. connection of utilities and diversion of utilities may be conducted in advance of the main activities listed above.

Figure W.3 Construction timeline



- W.4.10 This site would operate to the standard, extended and continuous working hours for various phases and activities as set out in the *Code of Construction Practice (CoCP) Part A and B (Section 4)*. Standard working hours would be applied to all of the above phases of construction work apart from elements of shaft construction, tunnelling and secondary lining as described below.
- W.4.11 Extended working hours are required at this site to allow for major concrete pours for shaft construction including diaphragm wall panels, base slab, roof slab and other large elements. It is assumed that extended hours would be required approximately twice a week during diaphragm walling for a total duration of approximately four months, and once a month during other major concrete pours.
- W.4.12 It was also assumed that continuous hours would be required for below ground and tunnelling works for a total duration of approximately 20 months, and during secondary lining for approximately seven months. The exact timing of any extended hours of working would be consulted on, and notified to the Royal Borough of Greenwich. During these periods only those activities directly connected with the task would be permitted within the varied hours.
- W.4.13 Construction traffic would access the site from Blackheath Road (A2), along Greenwich High Road (A206) and Norman Road. There would be several site access points along Norman Road, most making use of existing entrances. One new entrance would be created from Norman Road. Light vehicles would access the site from the existing entrance on Greenwich High Road (A206). Traffic would leave the site via the same route.

- W.4.14 The existing footpath that runs from Norman Road to the footbridge across Deptford Creek would need to be diverted and occasionally the footpath would need to be closed to allow construction traffic to pass under the railway arches between the Greenwich Pumping Station site and Phoenix Wharf. Parking restrictions would also be required along Norman Road.
- W.4.15 It is anticipated that an average of 25 heavy goods vehicles (HGVs) would access the site per day for the majority of the construction period. This would rise to approximately 77 HGVs per day over an estimated twelve month period during connection tunnel construction. There may be additional periods during key construction activities when these HGV numbers would need to be exceeded. Further details regarding the number and breakdown of anticipated HGVs accessing the site per day is contained within the *Transport Strategy*, which accompanies the application.
- W.4.16 Potential layouts of the construction site are shown on the Construction phases plans contained within Annex W and in the *Book of Plans*. It should be noted that these layouts are illustrative 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.

Site set-up

- W.4.17 Tree clearance and pruning would be required for on-site trees and also trees at the entrance to the site from Norman Road. The approach to any land remediation that might be required cannot be defined at this stage. However it is assumed that any remediation that is required would occur within this earliest phase of construction and that any associated lorry movements would be substantially lower than the subsequent peak during the main construction phases.
- W.4.18 Prior to any works commencing the site boundary would be established and secured. The boundary would be built to the heights specified in the *CoCP*. The existing access gates off Norman Road would be upgraded, and a second, new, entrance off Norman Road into the Thames Water site constructed. Welfare and office facilities would also be set up.
- W.4.19 A light traffic access route and traffic management measures would be set up beneath the railway arches to the Phoenix Wharf section of the site. The main access to the Phoenix Wharf section of the site would be via their existing entrances off Norman Road.
- W.4.20 A new substation would be required on site to supply power for the tunnel drive from the site.
- W.4.21 Any decontamination works required within the existing pumping station site would be undertaken.

Shaft construction

- W.4.22 The 17m internal diameter CSO drop shaft (and connection tunnel drive site) would then be constructed by diaphragm wall techniques.

- W.4.23 During diaphragm wall excavation the trench would be filled with bentonite for ground support; on completion of the excavation cycle, steel bar reinforcement cages would be lowered in before concrete is pumped into the trench in order to displace the bentonite and form a solid wall panel.
- W.4.24 This process would be repeated for each diaphragm wall panel in order to create the full circle of the shaft. Diaphragm wall excavated material would be processed as required and then loaded onto lorries for transport off site.
- W.4.25 The shaft excavation would commence after the diaphragm walls are complete. Excavated material would be put into skips within the shaft working area and hoisted by crawler crane from the shaft and deposited in a suitable storage area. After any required treatment, the material would be loaded onto lorries for transport off site. Once the excavation is complete, a steel reinforced concrete base slab would be formed at the base of the shaft.
- W.4.26 It is anticipated that dewatering would be required. Dewatering wells would be drilled from within the shaft (a process known as 'internal dewatering') and groundwater extracted via pumps.
- W.4.27 It is anticipated that ground treatment would be required within the chalk and fissure grouting to the chalk immediately below the toe of the wall may also be required. In addition, ground treated blocks would be constructed either side of the shaft to facilitate tunnel boring machine (TBM) break out.

Tunnel construction

- W.4.28 A connection tunnel approximately 4.6km long with an internal diameter of approximately 5m would be driven west from Greenwich Pumping Station to the Chambers Wharf site. On completion of the shaft construction described above, the worksite layout would be reconfigured to support the tunnelling works.
- W.4.29 The TBM sections would be delivered to site by road and assembled within the shaft serviced by large mobile or crawler cranes.
- W.4.30 Tunnel portals would be formed in the shaft lining. After TBM assembly but prior to the start of tunnelling works, the enclosure would be installed over the shaft area to mitigate for potential noise effects.
- W.4.31 Once launched the TBM would cut the ground by rotating the cutter head whilst hydraulic shove rams would propel it forward. Precast concrete segmental tunnel linings would be installed as the TBM progresses. The excavated chalk would be transported back along the newly formed tunnel in slurry form through temporary pipework. The slurry would be pumped to the slurry processing plant on the surface where the solids would be separated and the excavated material transported off site. The TBM would move forward and a temporary railway built behind it within the tunnel as the TBM proceeds to bring material to the TBM including precast concrete segments. The cleaned slurry would be re-circulated back to the advancing TBM.

Secondary lining of tunnel and shaft

- W.4.32 Secondary lining is an additional layer of concrete placed against the inside of a tunnel's primary concrete segmental lining for water tightness and to improve the overall structural durability. It was assumed that both the main and long connection tunnels would have reinforced concrete secondary linings.
- W.4.33 It was assumed that on completion of the tunnelling phase, a batching plant would be mobilised to site. The plant would supply the secondary lining of the tunnel. Concrete would be batched on the surface and pumped or skipped to the tunnel. The tunnel enclosure installed over the shaft and gantry crane area during tunnelling would remain in situ during secondary lining.
- W.4.34 The secondary lining of the connection tunnel would be constructed by installing steel reinforcement, erecting a cylindrical shutter within a short length of tunnel and pumping concrete into the gap between the shutter and the primary lining. Once the concrete hardens sufficiently, the shutters would be removed and erected in the next section of tunnel.
- W.4.35 It is assumed that the lining of the shaft would be made of reinforced concrete placed inside the shaft's primary support. The steel reinforcement would be assembled in sections and a shutter would be used to cast the concrete against. The shutter would be assembled at the bottom of the shaft and sections of reinforcement installed and lining cast progressively up the shaft. At ground level an external shutter would be added to allow construction of the shaft to continue above ground level to the proposed roof slab level.
- W.4.36 Any reinforced concrete structures internal to the shaft and the roof slab would be constructed in a similar manner progressively from the shaft bottom.

Construction of other structures

- W.4.37 Sheet pile walls would be used to provide ground support within which the underground chambers would be constructed. Walls would be constructed to a depth to minimise water ingress into the excavation, but small pumps would be utilised to manage any ground water that does seep through.
- W.4.38 The pumps would discharge to the sewer or Deptford Creek after being treated through a settlement system.
- W.4.39 The walls, bases and roofs of the chambers and shallow foundations for above-ground structures would be formed by in situ concrete techniques. Ready mixed concrete would be delivered to site from an external supplier and either pumped or skipped to the chamber.
- W.4.40 For the above-ground structures, the components would be delivered by road and assembled on site using suitable lifting equipment.

Completion of works and site restoration

- W.4.41 On completion of the construction works, the permanent works area would be finished in accordance with the landscaping.

Operation

CSO drop shaft

- W.4.42 The drop shaft would be constructed in the north-eastern corner of the site to the south of the DLR line and north of the pumping station. The shaft would be approximately 17m wide and would be finished approximately 1.5m above ground level. Access covers would be situated on top of the chambers to allow inspection and maintenance of the shaft.

Chambers and culverts

- W.4.43 The interception chamber, culvert and valve chamber would sit below ground to the west of the northern entrance podium to the East Beam Engine House and extend approximately 1m above ground level. Access covers would be incorporated on top of the chambers for inspection and maintenance purposes.

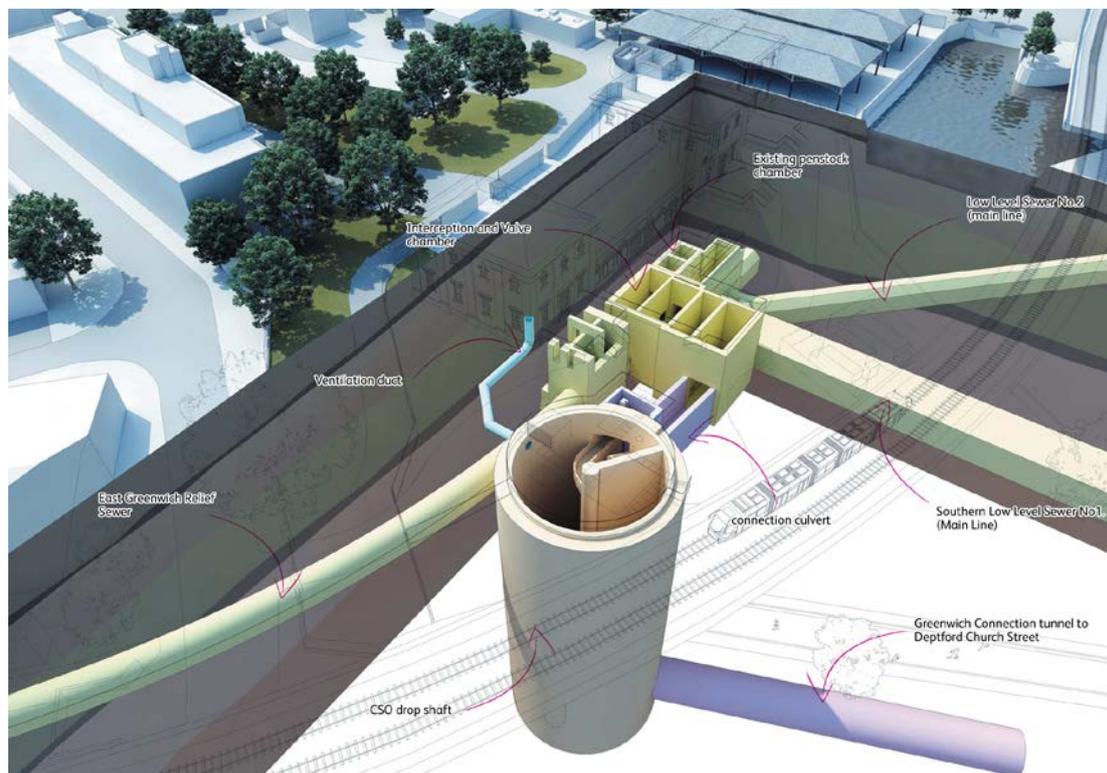
Ventilation structures

- W.4.44 Ventilation plant would be housed in the disused East Beam Engine House on the east side of the Greenwich Pumping Station building. Treated air would be released through existing openings in the building. A high pressure relief ventilation structure approximately 4m in height would be located on the roof of the shaft.

Electrical and control kiosk

- W.4.45 Electrical and control panels would be located in the East Beam Engine House. The functional components diagram below (Figure W.4) provides a graphic illustration of the proposed infrastructure.

Figure W.4 Functional components diagram



Permanent restoration and landscaping

- W.4.46 The proposed landscape plan is presented in a separate volume of figures. The final design of the landscape and restoration proposals would be subject to both the generic and site-specific design principles.
- W.4.47 The areas around the shaft and the interception chamber would be finished with hardstanding to provide operational access for cranes and maintenance vehicles.
- W.4.48 The corner of the Thames Water site northwest of the DLR viaduct would be soft landscaped. Other areas within the pumping station would either be returned to hardstanding to provide continued operational access or landscaped to their existing standard. Areas not required for operational access would be planted with wildflowers and grassland.

Access and movement

- W.4.49 During construction, the site would be serviced via five access points, one off Greenwich High Road and four off Norman Road. The site would operate a two way traffic system for the Greenwich High Road access point and one of the access points at Norman Road.
- W.4.50 During construction the main access/egress to the site would be via the access points on Norman Road. Construction lorries would take the route of minimum impact to the Transport for London Route Network. It is envisaged that construction vehicles would route from the A2 (Blackheath Road) corridor. However, the A200 (Evelyn Street/Creek Road) corridor would also be considered. Locally, vehicles would be routed via the A206 (Greenwich High Road) or the B208 (Norman Road) respectively.
- W.4.51 Once the development is operational the site would be accessed from three entrances, two from Norman Road and from Greenwich High Road. Access to the CSO drop shaft would be via the existing access on Norman Road. Access to the pumping station and East Beam Engine House would be via the existing gate on Greenwich High Road.
- W.4.52 Further detailed information on traffic movements and access is provided in the *Transport Assessment* within the *Environmental Statement* (Vol 24, Section 12).

Typical maintenance regime

- W.4.53 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.
- W.4.54 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.

W.4.55 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

W.4.56 The proposed Greenwich Pumping Station site was subject to over two years of extensive consultation and engagement. The site featured as a preferred site in two full rounds of 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*, which accompanies the application, contains detailed information on the consultation process.

W.4.57 Two sites were originally shortlisted for interception of the Greenwich Pumping Station CSO, Greenwich Pumping Station itself and the foreshore near the Cutty Sark. At phase one consultation which ran from September 2010 to January 2011, the preferred site was Greenwich Pumping Station, as it was already in Thames Water ownership and the proposed works would be consistent with the existing Thames Water operational activities that currently occur on the site.

W.4.58 As detailed in the *Final Report on Site Selection Process*, which accompanies the application, the sites from which the Greenwich connection tunnel could be driven were reviewed including Greenwich Pumping Station. This followed a review of the selection of the site at King's Stairs Gardens from which, during phase one consultation, it was intended to drive the Greenwich connection tunnel to Greenwich Pumping Station. It was recognised that there is not sufficient space within Greenwich Pumping Station to hold and process the excavated material generated from driving the Greenwich connection tunnel and a number of sites nearby were identified as potentially suitable to be used in tandem with Greenwich Pumping Station to process this material. The sites were known as:

- a. Greenwich Pumping Station (CSO interception) + Greenwich industrial Estate, Norman Road (Greenwich connection tunnel drive site)
- b. Greenwich Pumping Station (CSO interception) + Phoenix Wharf (Greenwich connection tunnel drive site).

W.4.59 The use of Greenwich Industrial Estate was not considered suitable due to the grant of planning permission for the redevelopment of the site with a high density mix of residential, education and commercial uses and the subsequent implementation of this permission.

W.4.60 In light of this and following extensive analysis and design development, Greenwich Pumping Station and additional land at Phoenix Wharf was the preferred site at phase two consultation which ran from November 2011 to February 2012.

W.4.61 The proposed works at Greenwich Pumping Station evolved in response to consultation responses received and on-going engagement. Following further improvements and the identification of mitigation measures, the

site, in tandem with Phoenix Wharf was considered the most appropriate site to intercept the Greenwich Pumping Station CSO and drive the Greenwich connection tunnel, and was publicised as Thames Water's proposed site at Section 48 publicity, which ran from July 2012 to October 2012. Greenwich Pumping Station (including Phoenix Wharf) was identified as the selected CSO site for the application for the following reasons (not in order of importance):

- a. The works to both intercept the CSO and drive the connection tunnel can be accommodated on this site, which would create an efficient and effective construction site.
- b. Most of the site is Thames Water operational land.
- c. There are several listed structures on the site but the impact on them would be minimal and can be mitigated. The pumping station is a Grade II listed structure and the proposed location of the works (to the northeast of the pumping station) greatly reduces any potential effect on its setting.
- d. The local road network has capacity to transport excavated materials from this site as a connection tunnel drive site. Thames Water assessed the use of barges from Phoenix Wharf but this was discounted for a number of reasons. Deptford Creek is a narrow tidal creek, it would only support restricted barge sizes and would require dredging before works could commence (see Figure W.5). There are also constraints from the A200 Creek Road lifting bridge, and the location of residential properties at the creek mouth might restrict any night-time barge movements. In addition, there would be significant issues related to the safety and cost-effectiveness of handling and transporting excavated chalk at this site. Thames Water however would not prevent a contractor from using barges if desired.

Figure W.5 View of Deptford Creek



- W.4.62 The principal issues that arose from pre-application consultation and Section 48 publicity for Greenwich Pumping Station are identified below.
- a. The proximity of the drop shaft to the DLR viaduct: This issue is addressed in the Good design subsection.
 - b. Site selection did not properly consider alternative sites: This issue is addressed in this subsection and in the *Final Report on Site Selection Process*, which accompanies the application.
 - c. The loss of businesses as a result of the use of Phoenix Wharf: This issue is addressed in the Socio-economic subsection.
 - d. The scale of effects on the local area and community resulting from the selection of this site is unacceptable: This issue is addressed in the Noise and vibration, Air quality, Light and Socio-economic subsections.
 - e. The effects of design proposals on the setting of the listed buildings: This issue is addressed in the Good design and Historic environment subsections.
 - f. The effects of construction traffic on congestion and amenity: This issue is addressed in the Traffic and transport subsection.

W.5 Site-specific planning considerations

- W.5.1 This section provides an analysis of the key planning considerations associated with the proposed works at Greenwich Pumping Station, considering the issues and factors identified in the NPS and other design and environmental issues relevant to the site.

Meeting the need

- W.5.2 The proposed works at Greenwich Pumping Station would be successful in meeting the need to intercept the Greenwich Pumping Station CSO and drive the Greenwich connection tunnel to Chambers Wharf. It would make an important contribution to meeting the wider need for the project identified in the NPS.
- W.5.3 Currently, in an average year the Greenwich Pumping Station CSO discharges approximately 8,320,000m³ of untreated sewage into the River Thames in the foreshore close to the Cutty Sark at Greenwich. This represents 21 per cent of the total volume discharged to the tidal Thames in a typical year from all CSOs. The CSO discharges approximately 51 times in an average year and releases approximately 2,100 tonnes of sewage derived litter.
- W.5.4 Intercepting this CSO and preventing such a high volume of sewage being discharged into the Thames so close to the Cutty Sark, which in the first three months of re-opening in spring 2012 attracted over 100,000 visitors² can only be beneficial to Greenwich as a major tourism destination.

² <http://www.standard.co.uk/news/london/the-cutty-sark-floats-again11-feet-in-the-air-7647224.html>

- W.5.5 The CSO was identified by the Environment Agency as requiring 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.
- W.5.6 By the time the proposed works at Greenwich Pumping Station are ready to become operational, CSO discharges at Greenwich would have decreased following the expansion to capacity at Crossness Sewerage Treatment Works; however, they would still be significant. The CSO is predicted to discharge, in an average year, approximately 3,940,000m³ of untreated sewage, discharging approximately 28 times a year, releasing 995 tonnes of sewage derived litter.
- W.5.7 Modelling suggests with the project in operation the discharges of untreated sewage in an average year would be reduced to 573,000m³, and a predicted level of five spills per year with 145 tonnes of sewage derived litter. This reduction would have a beneficial effect on water quality.

Good design

- W.5.8 The amount, layout and scale of the proposed development is primarily dictated by the function it needs to perform in directing flows from the Greenwich Pumping Station CSO to the Greenwich connection tunnel where they would then be transferred into the main tunnel at Chambers Wharf. The site is constrained by the existing operational pumping station and the associated infrastructure that would remain on site and in use during and after completion of the proposed works. The infrastructure on this site was adapted and extended since its original construction as part of the wider sewage infrastructure system in London. The proposed works would therefore be the latest phase of the site's historical purpose and use. The proposed design reflects the site's historical function and would be both durable and adaptable in character with the existing infrastructure and buildings. Early site analysis and subsequent engagement identified that it was important for the design to respond to the following key opportunities and constraints:
- W.5.9 The site-specific design opportunities included:
- a. Restore and use the Grade II listed East Beam Engine House to house ventilation equipment and enhance the heritage value of the site.
 - b. Make the site more sustainable by incorporating a brown roof over the CSO drop shaft and enhancing the existing soft landscaping on the site.
 - c. Replace any trees removed during construction with appropriate species to enhance the site's setting and biodiversity potential.
 - d. Reinststate the shared pedestrian and cycle path and potentially improve the surrounding area of public realm.
- W.5.10 The site-specific design constraints included:

- a. the DLR and Network Rail viaducts and associated rights of access
- b. the proximity of sensitive receptors such as residential dwellings to the site
- c. the proximity of development proposals to the east of the site at the former Greenwich Industrial Estate
- d. the layout of the existing operational pumping station and the extensive underground infrastructure on-site
- e. the Grade II listed heritage assets on-site
- f. the shared pedestrian and cycle path on-site.

W.5.11 The design of the proposals for the site evolved through two rounds of consultation and continued engagement with key stakeholders such as the Design Council CABE. Detail of the consultation process for the site is reported in the *Consultation Report* and Section 26 of the *Design and Access Statement*, which accompanies the application. Particularly relevant design objectives arising from the analysis of opportunities and constraints, and from stakeholder consultations included:

- a. Enhance the heritage values of the site through restoration of the Grade II listed East Beam Engine House to accommodate ventilation and electrical and control equipment.
- b. Locate infrastructure to minimise encroachment on the existing Network Rail and DLR viaducts.
- c. Enhance the potential for biodiversity and sustainability enhancement by incorporating a brown roof and improving existing soft landscaping.
- d. Improvements to the public realm by enhancing the shared pedestrian and cycle path.

Enhance the heritage values of the site through restoration of the Grade II listed East Beam Engine House to accommodate ventilation and electrical and control equipment

W.5.12 Proposals show that the active ventilation plant and the electrical and control equipment would be located in the currently disused Grade II listed East Beam Engine House. Such works would be in line with the generic and site-specific heritage design principles (design principles HRTG.07 and HRTG.08). Historic materials would be re-used where practical and appropriate. Where alterations to the original fabric of the East Beam Engine House are required, the re-use potential of the materials would be considered, in accordance with design principle GREPS.04. Should re-use of historic materials not be possible, the project would seek alternative uses. The existing glazing would be repaired or replaced in sections where required and would be sensitive to the significance of the building (design principle GREPS.09).

W.5.13 Proposals at phase one and two consultation showed the two listed coal sheds in the south of the site being dismantled for the duration of works in order to accommodate construction activities on site. This was revised following phase two consultation and proposals at Section 48 publicity showed the sheds remaining on site for the duration of construction works.

It is Thames Water's intention that the setting of all listed structures on site would be enhanced by the proposed works and landscaping proposals.

W.5.14 The Greenwich conservation officer considered that the proposed works were in keeping with the history of the site and saw the project as an "*evolution of the Victorian sewerage system*". The Design Council CABE also supported Thames Water's proposals. In June 2011, during a design review, the Design Council CABE considered the re-use of the East Beam Engine House "*would be a beneficial outcome and was preferable to creating a new, isolated building on the site*".

W.5.15 English Heritage noted in response to Section 48 publicity, that the beneficial impacts on the settings of the listed Beam Engine House, the wider pumping station and the railway viaduct are dependent on landscaping. Thames Water's proposals involves landscaping improvements to the Greenwich Pumping Station site which would enhance the setting of the listed structures on site and provide opportunities for biodiversity benefits.

Locate infrastructure to minimise encroachment on the existing Network Rail and DLR viaducts

W.5.16 The location of the CSO drop shaft in the north-eastern corner of the site is largely dictated by the layout of the existing operational pumping station and the extensive underground infrastructure on site. It is located outside the statutory 5m exclusion zone from the edge of the DLR viaduct. Further information on the locational constraints of the CSO drop shaft can be found in the *Engineering Design Statement*, which accompanies the application.

W.5.17 The shaft location also permits an alignment for the Greenwich connection tunnel that avoids the DLR viaduct column piled foundations and allows on site traffic movements associated with construction activities to be restricted to the northern part of the site and remain isolated from the day to day operation of the pumping station.

Enhance the potential for biodiversity and sustainability by incorporating a brown roof and improving existing soft landscaping

W.5.18 The proposed works at Greenwich Pumping Station provide an opportunity to enhance biodiversity on site. The roof of the shaft structure would be a bio-diverse brown roof with various different gravel mediums to provide a colourful patchwork effect. As access would be required to the hatches on the roof the planting would be housed in discreet trays which can be removed when access is required.

W.5.19 Landscaping proposals for the site include the provision of bird and bat boxes which would improve the potential of the site for biodiversity. Areas within the site compound which are not required for access would also be planted with low maintenance wildflowers and grassland which would further enhance biodiversity potential.

W.5.20 Where trees are removed during construction to improve site access, they would be replaced by native London Plane trees unless agreed otherwise with the local authority (design principle LSCP.02).

Improve the public realm by enhancing the shared pedestrian and cycle path

- W.5.21 During construction it would be necessary to temporarily divert the route of the footpath which crosses the site closer to the Network Rail viaduct and Thames Water's proposals show that it would be returned to its current alignment once construction is complete. Discussions with local stakeholders, however, indicated a preference for the path to remain in its temporary location where it would link with the recently constructed footpath adjacent to Skillions/Merryweather Place. The project remains receptive to emerging regeneration proposals for the area and may be able to facilitate a permanent relocation of the path subject to the relevant security considerations, legal and planning agreements. Since there are no current proposals, agreements or approvals for such a scheme this opportunity does not form part of the works for which permission is sought in the application for development consent.
- W.5.22 Whichever route is decided on, Thames Water intend to improve the footpath through provision of high quality materials and lighting. In addition Thames Water plan to respond to the Design Council CABE's comments made in response to phase two consultation which highlighted the opportunity for Thames Water to present a more 'open face' to local people by making the pumping station more visually accessible through implementation of a high quality treatment to the fencing. The fencing may be created through collaboration with a local artist to inform passers-by of the function and historical importance of the pumping station and the industrial history of the area.

Managing construction impacts

- W.5.23 The *CoCP* submitted as part of the application for development consent sets out how the environmental effects resulting from the construction of the project would be managed. The *Draft DCO* includes requirements that the construction works are carried out in accordance with the *CoCP*.
- W.5.24 Design measures to manage impacts of construction traffic are outlined in *CoCP* Part A, which includes the provision of a site-specific transport management plan to set out how vehicular access to the site would be managed so as to minimise impacts on the local area and a Requirement to communicate this with the Royal Borough of Greenwich and other stakeholders.
- W.5.25 Further specific design measures to minimise temporary construction impacts at this site are outlined in the *CoCP* Part B and include use of site buildings, and temporary stockpiles to provide acoustic screening, hoarding of a height and extent to achieve appropriate visual screening and noise attenuation to incorporate suitable art work at public facing sections to improve appearance.
- W.5.26 During the connection tunnel construction and secondary lining works which require 24-hour working for health and safety reasons, the construction area around the main shaft would be covered by an enclosure/building to provide acoustic screening. A three-sided noise screen with roof would also be provided around the material handling

area. The buildings would have cladding with a specific sound reduction value. This would be mainly for noise attenuation however the structure would hide plant equipment, construction materials and cranes. The buildings openings would be designed to be away from sensitive noise receptors and would be kept closed when not in use at night.

Design alternatives

- W.5.27 The functional and engineering constraints at this site are relatively restrictive and there is limited scope to change the overall layout of the construction and permanent works, due to the existing operational requirements and network of underground infrastructure at Greenwich Pumping Station. At this site, the alternatives considered relate to the location of the ventilation and electrical and control equipment. The two options were:
- a. Construct a new, purpose-built ventilation and electrical and control building adjacent to the East Beam Engine House.
 - b. Integrate the ventilation, and electrical and control equipment within the disused East Beam Engine House, thereby avoiding the need for a new ventilation structure.
- W.5.28 In accordance with the guidance for design in the NPS, the project progressed with proposals to site the ventilation, and electrical and control equipment within the existing listed East Beam Engine House. This option was supported by the Design Council CABE as it would avoid the need for a separate building on site and includes restorative and repair works to elements of the existing building.

Good design conclusions

- W.5.29 In conclusion, the proposals for Greenwich Pumping Station were carefully developed through a collaborative process of design review and extensive consultation. Thames Water took account of both aesthetics and functionality through good design and architecture, as well as appropriate layout and siting, and would respond sensitively to the characteristics and operational constraints of the site. The site-specific design principles and requirements were developed with key stakeholders and would ensure that the details of landscaping and materials would be submitted to the local planning authority for approval and would be visually attractive, sustainable, usable and durable.

Water quality and resources

- W.5.30 There are no licensed water abstractions from the River Terrace Deposits or upper aquifer within a 1km radius around the Greenwich Pumping Station site. The nearest abstraction source is located approximately 700m south of the site, which abstracts from the chalk for public supply purposes. There are no known unlicensed groundwater abstractions within a 1km radius of the site. The site is located within a Source Protection Zone of a Chalk public water supply source. There are no environmental designations relevant to groundwater in the vicinity of the Greenwich Pumping Station site.

- W.5.31 Measures to protect water quality and resources during construction are detailed in Section 8 of the *CoCP* Part A and referred to in the project-wide assessment. In accordance with the approach suggested in the NPS, the *CoCP* covers activities that are subject to pollution control and incorporates good practice.
- W.5.32 In respect of construction impacts, the *Environmental Statement* (Vol 24, Sections 13 and 14) concludes that in view of the measures embedded in the design and contained in the *CoCP*, the proposed works would not impact on surface water or ground water resources.
- W.5.33 The Flood Risk Assessment undertaken as part of the *Environment Impact Assessment* determined that there would be no increase in flood risk as a result of the proposed development therefore no significant flood risk effects are likely.
- W.5.34 The proposals at Greenwich Pumping Station therefore meet the decision making principles set out in the NPS because no adverse effects are expected on water quality or water resources. In addition, the Environment Agency has no outstanding concerns.

Air quality, emissions, dust and odour

- W.5.35 The project-wide air management plan 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.
- W.5.36 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.
- W.5.37 The filters would be within below ground chambers and the fans would be acoustically shrouded within the East Beam Engine House. The fans draw air from the tunnels through the filters, which clean the air before it is released through individual vents in the gable end of the building. Activated carbon would be used in the filters, which is a standard and proven way of treating air from wastewater operations.
- W.5.38 The ventilation plant is sized to cater for all expected storm events during a typical year, but under extremely rare storm events (approximately once every 15 years) untreated air may be released through a pressure relief structure to prevent damage to the odour control equipment. 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.

- W.5.39 The entire Royal Borough of Greenwich is designated an Air Quality Management Area declared for nitrogen dioxide, and therefore the Greenwich Pumping Station site falls wholly within it. Due to the site's proximity to the London Borough of Lewisham boundary, the Lewisham Air Quality Management Area declared for particulate matter and nitrogen dioxide is also relevant to the site. Local monitoring data indicates that there are currently exceedences of the air quality standard for nitrogen dioxide and particulate matter in the vicinity of the site.
- W.5.40 With regard to air quality, the closest sensitive receptors to the site are occupiers of residential developments on Greenwich High Road, Creekside Village East and future residents of the proposed development at Greenwich Industrial Estate. The *Environmental Statement* predicts that nitrogen dioxide concentrations would have an adverse effect on the future residential development at Greenwich Industrial Estate and on residential properties on Greenwich High Road. Project-wide mitigation measures are embedded within the *CoCP* Part A however, given the adverse impacts predicted at these locations further mitigation measures including the enclosure of some construction activities as set out in *CoCP* Part B would also be implemented.
- W.5.41 In respect of particulate matter concentrations, there are no predicted exceedences of the daily criteria and no likely adverse effects associated with construction dust beyond 20m of the site.
- W.5.42 As required by the NPS, appropriate measures are proposed to ensure that the proposals would not lead to any substantial changes in air quality, emissions, dust, odour or a significant loss of amenity during construction or operation.

Biodiversity and geological conservation

- W.5.43 The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance and is also adjacent to Deptford Creek which is a designated Tidal Tributaries Site of Importance for Nature Conservation comprising inter-tidal habitat and river channel.
- W.5.44 In respect of terrestrial ecology, the site currently comprises amenity grassland and scattered trees. Site clearance would result in some loss of vegetation on site but this would not have a significant effect on terrestrial habitats or species. Given the limited extent of the permanent works which would be located within an existing Thames Water operational site, assessment of the operational activities on terrestrial ecology was scoped out of the environmental impact assessment as this is not expected to give rise to any significant impacts.
- W.5.45 No detrimental impacts are predicted on aquatic ecology as a result of the works at this site. Interception of the Greenwich Pumping Station CSO would have a beneficial effect on river water quality in the local area and lead to an increase in the diversity and abundance of invertebrates and the distribution of pollution-sensitive fish and invertebrate species throughout the tidal Thames.
- W.5.46 Thames Water sought to incorporate measures to conserve and enhance biodiversity on the site, such as installation of bat boxes and nest boxes

on trees within the site for breeding birds, and provision of a brown roof as a foraging resource which would provide some local benefit for bat populations and breeding birds. In addition, the *CoCP* includes measures to address adverse effects during construction, such as reinstatement and replacement of trees and planting. The *CoCP* also includes provision for the preparation of an ecological management plan for each site, which would detail the approach to management of effects on ecological receptors with reference to the results of the terrestrial ecology assessment.

- W.5.47 As required by the NPS (para. 4.5.17), the footprint of the proposals is not greater than it needs to be and measures are in place to mitigate any adverse effects and to put into place proposals to enhance the value of long term habitat on site.

Townscape and visual impacts

- W.5.48 The site has limited townscape value due to the lack of open space and the industrial use of the area; however, the Grade II listed buildings, including the coal sheds represent components of the character area that are valued at the borough scale due to their historical importance. The site has a low level of tranquillity due to its industrial use set amongst a wider industrial area close to the DLR, mainline railway and Greenwich High Road.
- W.5.49 The proposed construction works would likely have a temporary adverse impact on townscape arising from construction activities including clearance of trees and vegetation, plant and lighting and the presence of the noise shed, hoardings and welfare facilities.
- W.5.50 In terms of visual amenity and viewpoints, during the construction period there would be temporary negative impacts on the London Panorama 6A.1 (Blackheath Point to St Paul's Cathedral) due to the visibility of a noise shed and cranes on the site. There would also be temporary negative impacts on views from residences close to the site on Greenwich High Road, Creekside East and the proposed residences in the Greenwich Industrial Estate. The *CoCP* Part A details the types of hoardings and proposed fencing for maintaining visual screening during the construction period.
- W.5.51 Operational effects on townscape and visual components were not assessed at Greenwich Pumping Station, on the basis that the limited changes in operation would have no significant effects given the existing use of the site. The utilisation of the currently disused East Beam Engine House for the associated ventilation equipment and high quality, sensitive landscaping proposals would however provide a positive legacy in terms of the visual impact of the site.
- W.5.52 Para. 1.4.4 of the NPS recognises that NSIPs are likely to take place in mature urban environments, with adverse townscape and visual effects within a built up environment, with many possible receptors. Large scale construction works are commonplace in London. The construction effects of the project are unavoidable and temporary and should be considered in this context. The operational effects would help to regenerate and make

continued beneficial use of important historic buildings of townscape character. The overall effects on townscape are likely to be positive and beneficial.

Land use including open space, green infrastructure and green belt

- W.5.53 Phoenix Wharf, which comprises the land north of the Network Rail is currently occupied by the builders' merchant yard and is allocated for mixed use development under saved site proposal J7 (Jobs and local economy) as defined in the *UDP*. There are no future development allocations that apply to the southern section of the site which comprises the pumping station and associated buildings, nor is this area of the site designated for any other land use.
- W.5.54 The key land uses surrounding the site are identified in the land use plan within Annex W of this report.
- W.5.55 The project works at Greenwich Pumping Station would be constructed and operated on land owned by Thames Water that is in operational use. Given the long established use of the site at Greenwich, the proposed works would be consistent with its historic and current land use.
- W.5.56 The use of Phoenix Wharf would be temporary and required during construction for the storage and processing of excavated material. Following construction, the site would be cleared and available for redevelopment in accordance with its designation as a redevelopment site under the *UDP*.
- W.5.57 Land use proposals for sites within the vicinity of Greenwich Pumping Station were taken into consideration in the site selection and design development process. It is noted that the redevelopment proposals at Faircharm Estate were not considered as part of this process as the application was submitted in late November 2012 following completion of the assessment. The following sites were assumed to have developments completed by 2023:
- a. 43 to 81 Greenwich High Road mixed use scheme including commercial and residential uses, and a 102-bed hotel, adjacent to the site
 - b. 83 to 87 Greenwich High Road mixed use scheme including commercial uses at ground floor with residential above, adjacent to the site
 - c. Greenwich Industrial Estate mixed use development including retail, commercial and residential, adjacent to the site
 - d. Hilton's Wharf residential and commercial development on Norman Road close to the site
 - e. Seager Buildings mixed use development incorporating a 26 storey residential tower, 250m southwest of the site
 - f. Creekside Village East (Thanet Wharf) mixed use development to the north of the site, comprising nine to 22 storey blocks.

- W.5.58 The proposed works would not prevent the beneficial, continued and proposed use of surrounding land uses, either during construction or operation. Similarly, no extant planning permissions, known applications (if approved), committed developments, or policy allocations for future development would be adversely impacted as a result of the works in this location.

Noise and vibration

- W.5.59 Noise in the vicinity of the site is generated from a mixture of sources, including train services on the DLR and national rail viaducts to the north of the site, steady road traffic on Greenwich High Road, occasional traffic on Norman Road and noise generated from the surrounding industrial developments. The nearest receptors that are sensitive to noise and vibration are residential dwellings and hotel rooms on Greenwich High Road (south), the proposed mixed use development at Greenwich Industrial Estate on Norman Road (east) and the multi-storey residential development on Tarves Way (north).
- W.5.60 The *Environmental Statement* predicts that during construction and operation, there would be no significant noise or vibration impacts on nearby sensitive receptors. The *CoCP* Part A incorporates noise suppression methods which were embedded in the design and approach to construction at all sites. Project-wide design measures include operating in accordance with best practice, selecting the quietest cost-effective plant available, optimising plant layout to minimise noise emissions and installation of site hoarding. The *CoCP* also incorporates site-specific noise mitigation in Part B. Proposed site-specific measures include enclosing the area around the shaft during construction of the Greenwich connection tunnel and secondary lining works. The enclosed area would have specified sound reduction cladding. Provision of a noise screen around the materials handling area would be provided and site hoarding would be 3.6m high at this site.
- W.5.61 The NPS recognises that NSIPs are likely to take place in mature urban environments and in the short term, to lead to noise disturbance during construction. Proposals at Greenwich Pumping Station were developed, as far, as practicable to minimise adverse noise effects on surrounding sensitive receptors. Mitigation measures are proposed to mitigate and avoid significant adverse impacts from noise, in accordance with NPS paras. 4.9.8 and 4.9.9.

Historic environment

- W.5.62 The Greenwich Pumping Station site contains four Grade II listed heritage assets. Three of the listed assets are associated with the original pumping station, which was built in the early 1860s and was operational by 1865. These comprise the pumping station building itself, with its east and west beam engine houses and two associated and separately listed coal sheds located in the southern half of the site. The Network Rail viaduct that crosses the centre of the site is also a Grade II listed heritage asset.
- W.5.63 The site lies to the north of the Ashburnham Triangle Conservation Area designated by the Royal Borough of Greenwich. The London Borough of

Lewisham has recently designated a conservation area at Creekside opposite the site to the west of Deptford Creek. Greenwich Pumping Station is also situated within an extensive Area of Archaeological Potential as designated by Royal Borough Greenwich.

- W.5.64 Thames Water's proposals include the re-use of the East Beam Engine House to accommodate the ventilation and electrical and control equipment. The proposed works would be compatible with the original use of the building and in keeping with the operational structures which currently form part of the pumping station. Thames Water's proposals do not include any physical alteration works to the listed coal sheds or the Network Rail viaduct.
- W.5.65 The East Beam Engine House has been disused for over half a century and the proposed works would enable its re-use for a role similar to its original intended use, with minimal alteration to the original fabric. This would help ensure its survival and upkeep. The proposed refurbishment works would be undertaken in a sensitive manner, with alterations that are consistent with the original function of the building. Much of the works would involve restoring the original external appearance, particularly windows and other openings to the building visible from the public realm. While there would be some changes required to the building for its re-use to be practical, these would be largely complimentary and consistent with the intention of its original role.
- W.5.66 Repair works to the East Beam Engine House would be undertaken in line with the project-wide and site-specific heritage design principles which are submitted for approval with this application. Restoration works to the listed building including use of materials and construction methods would be carried out in accordance with the design principles guidance and best practice. Measures to protect listed buildings and other elements of the historic environment are detailed in the *CoCP Part A*. Site-specific measures incorporated in the *CoCP Part B* include an archaeological standing structure survey of the East Beam Engine House, including the temporary removal of steps, in order to mitigate the effects of the proposed modifications and provide a record to guide subsequent repairs and reinstatement.
- W.5.67 Ground movement from tunnelling and construction has the potential to affect the Grade II listed East and West Beam Engine Houses, although the effects are not likely to be significant (*Environmental Statement, Vol 3*). The building would likely be subject to ground movement consisting of 15mm to 34mm of settlement in the area of the East and West Beam Engine Houses, dissipating across the remainder of the building to 1mm at the West Beam Engine House. There is potential for moderate adverse effects as a result of settlement. For this building, mitigation measures such as strengthening the building would not be considered to be required or appropriate as they are likely to be more intrusive and damaging to heritage fabric than a carefully managed process of survey and repair of minor defects, if required, using appropriate materials and techniques. The listed building would be monitored during the works, and in the event of damage to its significance caused by ground movement, would be

repaired on conclusion of the works, in accordance with the *CoCP* (Section 12), using standard conservation methods, to produce a like for like repair. The listed London and Greenwich railway viaduct would experience settlement to a maximum of 4mm, with minimal differential ground movement resulting from the proposed works. The proposed works would not impact on the structural integrity of the listed railway viaduct therefore the effect is assessed as negligible.

- W.5.68 The proposed works to the East Beam Engine House are likely to enhance the significance of the Grade II listed building in line with the requirements of the NPS (para. 4.10.12). The proposed landscaping improvements would also make a positive contribution to the setting of the building and to the other listed structures on site.
- W.5.69 The proposals were developed with the benefit of a thorough understanding of the historical significance of the site and the listed structures on it. The NPS recognises that NSIPs are likely to take place in mature urban environments and to have adverse effects on archaeology and cultural heritage. The design at Greenwich Pumping Station was developed to minimise adverse effects on the historic environment and to take opportunities to enhance the long term setting of the listed buildings and structures.

Light

- W.5.70 The surrounding area is lit in the early evening by street lighting and by light spill from surrounding buildings.
- W.5.71 The screening assessment carried out into the daylight/sunlight impacts of the proposed development concluded that the permanent works would have no material impact. During the construction phases, the 7m high massing over the entire site might have an impact on the daylight to the basement of the new building to the southwest of the site; however, it seems unlikely that this floor of the building is residential.
- W.5.72 Greenwich Pumping Station is a short tunnel construction site and 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. The need for extended working hours does mean that artificial lighting would be required for extended periods at this site during the tunnel construction and secondary lining phases (lasting approximately 20 months). Measures are included within the *CoCP* 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 only proposed when necessary. Accordingly, it is considered unlikely that there would be an unreasonable effect on residential properties as a result of artificial lighting during the construction period.
- W.5.73 There would be some effects on night time character as a result of construction lighting at Greenwich Pumping Station with adverse impacts experienced at the recently completed residential development on Greenwich High Road and south from the Creekside Village East development, particularly for upper storeys due to the proximity of the

Greenwich Pumping Station site to the residences. Mitigation measures such as capped and directional lighting would be used to manage these effects during construction and these measures are incorporated in the *CoCP*.

W.5.74 No operational lighting is proposed at the Greenwich Pumping Station site.

W.5.75 Through the measures included within the *CoCP*, all reasonable steps would be taken to minimise any detrimental effects arising from the use of artificial lighting at this site.

Traffic and transport

W.5.76 The site is in close proximity to a number of public transport services and routes. Greenwich Station is located approximately 300m northeast of the site and provides National Rail and DLR services. The site is also in proximity to a number of bus stops which serve the local area. Information regarding the travel arrangements of staff working on the site is included in the travel plan, which encourages the use of public transport by those working on the project.

W.5.77 During construction the site would utilise existing access points on Greenwich High Road and Norman Road with an additional, temporary access provided on Norman Road. There would be no modification required to highway or junction layouts or vehicle parking arrangements as a result of construction activity at the site.

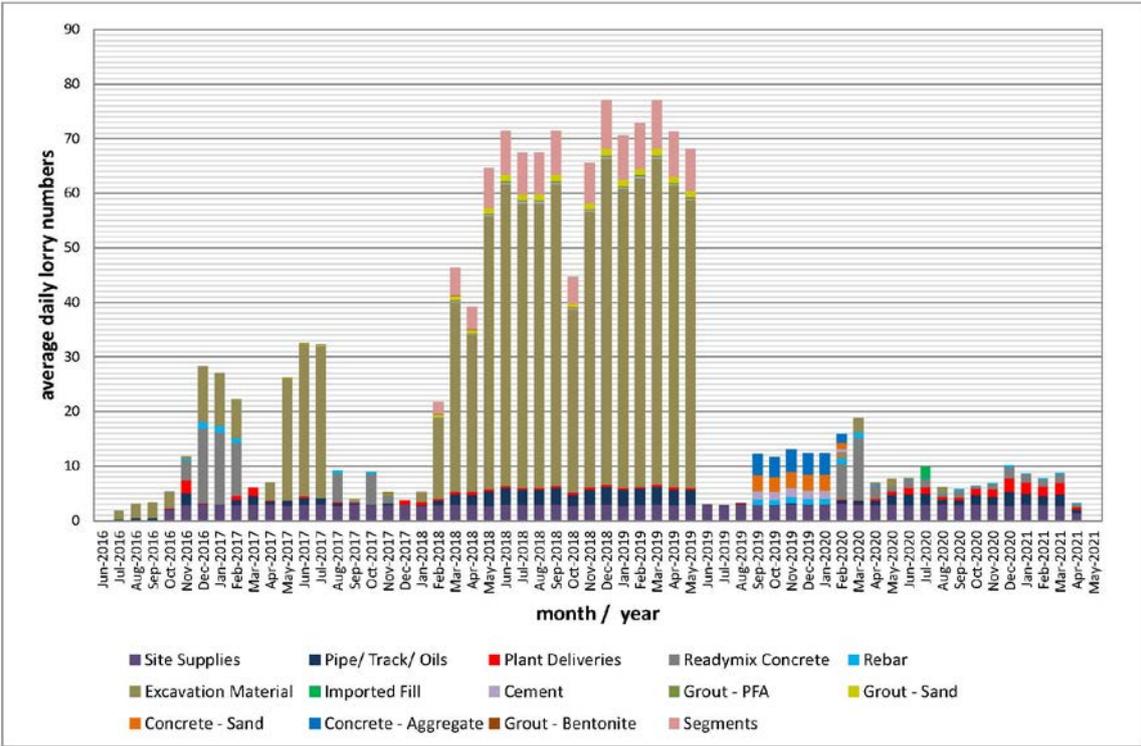
W.5.78 The shared pedestrian and cycle path would be diverted approximately 10m north of its current location, adjacent to the Network Rail viaduct. Current proposals show that following construction the path would be re-established providing linkages with other planned pedestrian routes on Creekside. Reinstatement works would be undertaken in consultation with the Royal Borough of Greenwich and other relevant stakeholders including Network Rail and DLR. Consideration would be given to making the footpath diversion a permanent measure in response to consultation feedback received, however this would be subject to further discussion with the Royal Borough and other relevant stakeholders and does not form part of the application.

W.5.79 Although there would be 24-hour working on this site, in general, vehicle movements on site would take place on weekdays between 8am and 6pm and from 8am to 1pm on Saturdays, with up to one hour before and after these hours for mobilisation and demobilisation processes. Mobilisation may include loading, unloading, the arrival and departure of staff, and movement to and from the site. Vehicle movements on site may be required up to 10pm for large concrete pours during shaft construction and in exceptional circumstances, HGVs and abnormal load movements may occur later at night in agreement with the local authority.

W.5.80 As shown in Figure W.6 overleaf, an average peak of 154 daily HGV movements (77 HGVs) is expected during connection tunnel construction when material would be removed from the site by road. This would occur during Year 3 of the construction period. At other times, vehicle movements are predicted to be considerably less than this. The peak traffic generation is predicted to result in a slight increase in delay on this

part of the network with a maximum increase of eight seconds delay per vehicle on Greenwich High Road (eastbound) during the AM peak hour and 12 seconds per vehicle during the PM peak hour. The additional traffic would also result in a slight reduction in capacity along Greenwich High Road and Norman Road however the junction of the two roads would continue to operate within capacity, resulting in a negligible impact.

Figure W.6 Estimated lorry construction profile



- W.5.81 It is not anticipated that there would be any detrimental impacts on pedestrian and cyclist amenity and safety or on local public transport services.
- W.5.82 Measures to reduce transport impacts included in the *CoCP* include HGV management and control measures such as designated routes to sites for construction vehicles. In addition to the general measures in the *CoCP* Part A, the following measures are incorporated into the *CoCP* Part B in relation to the Greenwich Pumping Station site:
 - a. Adequate security arrangements would be provided at each of the site accesses.
 - b. The site layout would ensure that lorries can turn on site and no reversing onto the adjacent roads would be required. Any exceptions such as abnormal loads would be agreed in advance.
 - c. The existing entrance to the site from Greenwich High Road would be restricted to cars and light goods vehicles only apart from during site set-up and removal.
 - d. Construction traffic would access the site from Greenwich High Road and Norman Road, from the direction of Blackheath Road.

W.5.83 During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities. These would have a negligible effect of the surrounding transport networks. Overall, construction would not result in any significant, detrimental impacts on the highway network. Thames Water sought to minimise and mitigate impacts from construction traffic, in accordance with NPS paras. 4.13.6 to 4.13.10.

Waste management

W.5.84 The Waste Strategy was developed to provide a framework for the management of materials and waste that would be produced throughout the construction and operational phases of the project. This ensures that the requirements set out in para. 4.14.6 of the NPS would be satisfied, and the Waste Strategy would be secured via a Requirement/obligation in accordance with para. 4.14.7 of the NPS.

W.5.85 No particular waste issues arise at this site.

Socio-economic

W.5.86 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*.

W.5.87 The builders' merchant yard to the north of the pumping station would require relocation as a result of the construction works. The builders' merchant yard is part of a wider designation as a mixed use development area (J7) which states that there is scope for more intensive mixed business and residential use on the site as part of the wider redevelopment around Greenwich Station. The site's allocation suggests that it is likely that the site would come forward for redevelopment over the *UDP* plan period so the impact of the project is likely to bring forward the permanent relocation or loss of the current business. The temporary use of this site for construction would not impact on the mixed use allocation or the long-term development aspirations for the site.

W.5.88 Although the construction period is temporary, the displacement and impact on the business is likely to be permanent as once relocated it is unlikely the business would return to its previous site. The effect on the business of relocating would involve costs and expenditure associated with the move including, but not limited to, removal expenses, legal and surveyor fees, taxes, costs of adapting new premises, temporary loss of profits during the period of the move, and any diminution of goodwill following the move (reflected in future profits). Thames Water would compensate for reasonable costs associated with relocating in accordance with the provisions of the statutory compensation code.

W.5.89 An alternative location for the business has not yet been identified. Although overall vacancy rates in the wider region are moderate as part of a larger chain of stores, the company operating the business may choose to consolidate operations within other branches within southeast London.

W.5.90 The construction work at this site is expected to require a maximum workforce of approximately 170 workers. These jobs and training opportunities would provide a stimulus to the local economy.

- W.5.91 In accordance with the NPS, the *Equalities Impact Assessment* provides a description of the demographics of the area surrounding each of the project sites and assesses whether a disproportionate number of equalities groups would be affected by the generic impacts associated with the project, including air emissions, flood risk, noise and vibration etc. The assessment also describes the impact on people who live, work or own businesses in the area that may be displaced as a result of the development.
- W.5.92 The *Equalities Impact Assessment* concluded that no equalities groups would be disproportionately impacted as a result of the proposed works.
- W.5.93 While the proposed works would require the relocation of a business, this is likely to bring forward an event which is likely to occur in any event and would be compensated in line with the Thames Tideway Tunnel compensation programme.

W.6 Overall conclusions

- W.6.1 There is a need to intercept the Greenwich Storm Relief CSO. In an average year the CSO discharges approximately 8,320,000m³ of untreated sewage into the Thames in front of the Cutty Sark at Greenwich.
- W.6.2 Greenwich Pumping Station was selected after extensive engagement as the site on which to meet the need. The site is appropriate and the application proposals would directly meet the identified need. The reduction of discharges from the Greenwich Pumping Station CSO would improve the water quality in the Thames with consequential benefits to water quality, ecology, recreation and amenity. The site would also be used to drive the Greenwich connection tunnel to Chambers Wharf (via Deptford Church Street and Earl Pumping Station) and so would play an important role in facilitating construction of the project as a whole.
- W.6.3 Given the site's location close to residential properties and hotels, 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, some negative effects are likely to remain. These comprise principally:
- a. townscape and visual effects during construction
 - b. impacts on vehicle movements on Greenwich High Road during the construction period.
- W.6.4 The assessment above explained that the proposals incorporate measures to limit the effect of each of these impacts. For each of these effects, the project design was refined and all practical mitigation identified and committed to, in accordance with the advice in the NPS. The residual impacts are an unavoidable consequence of intercepting the CSO in a dense urban environment.
- W.6.5 The proposals at Greenwich Pumping Station would also give rise to a number of significant beneficial effects including:

- a. bringing the currently disused listed East Beam Engine House back into viable use in accordance with its original intended use
- b. landscaping improvements to the Greenwich Pumping Station site to enhance the setting of the listed structures on site and offer biodiversity benefits
- c. enhancing the public realm and improving the pedestrian and cycle path.

W.6.6 The proposed works at the Greenwich Pumping Station 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.

W.6.7 Section 8 of the *Planning Statement* considers the implications of the local effects of the works at Greenwich Pumping Station 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 Greenwich Pumping Station, and the project as a whole, are compliant with the NPS and that development consent should be granted.

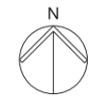
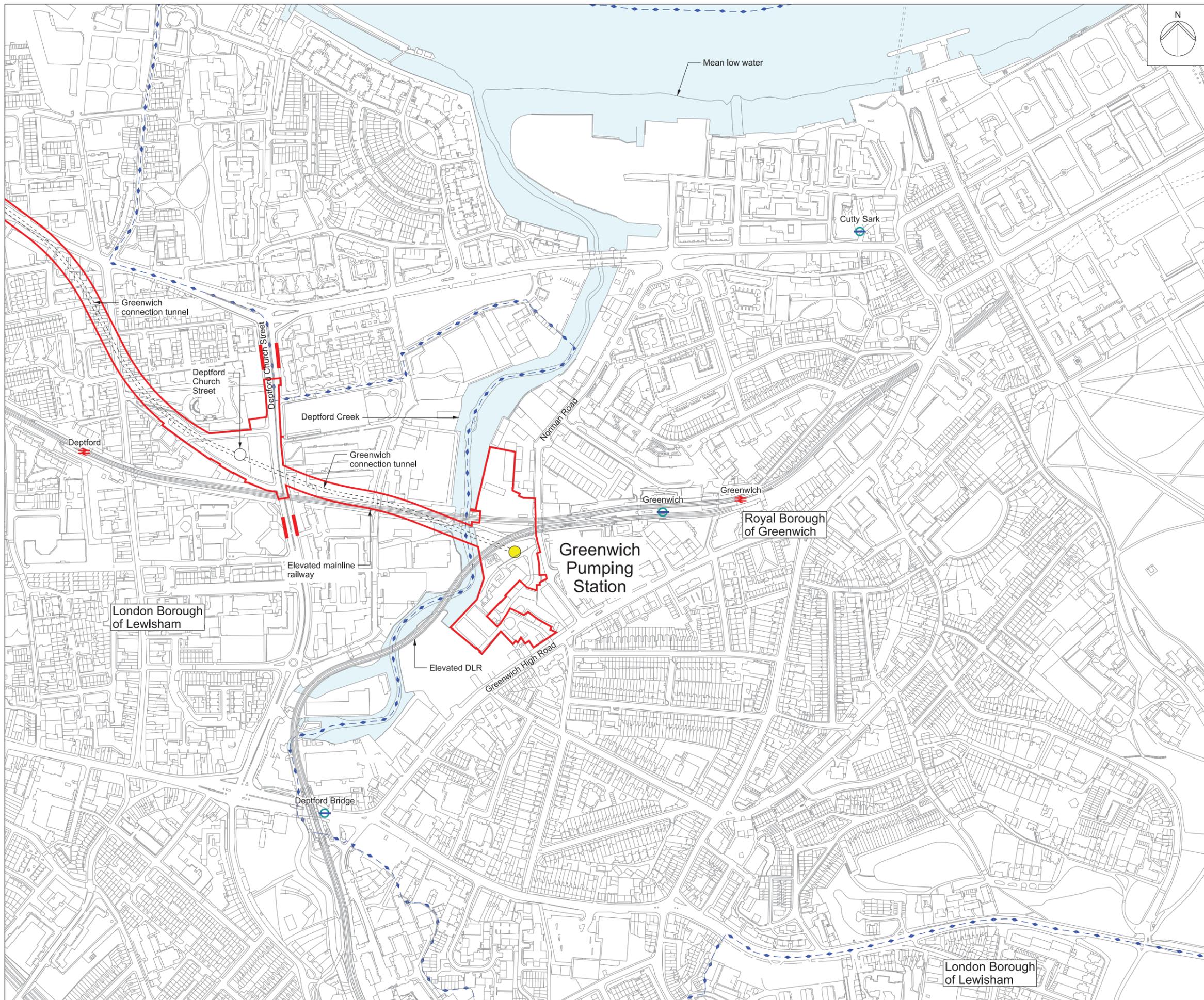
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Annex W: Drawings for Greenwich Pumping Station

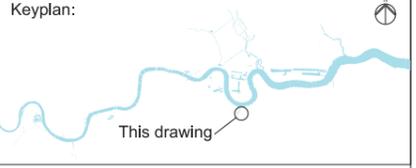
List of drawings

- Greenwich Pumping Station: Location plan
- Greenwich Pumping Station: As existing site features plan
- Greenwich Pumping Station: Construction phasing plans
- Greenwich Pumping Station: Land use plan

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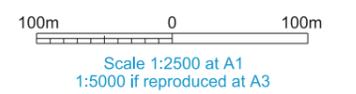


Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

- Key:**
- Local authority boundary
 - Order limits
 - Tunnel
 - Shaft

Notes:

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



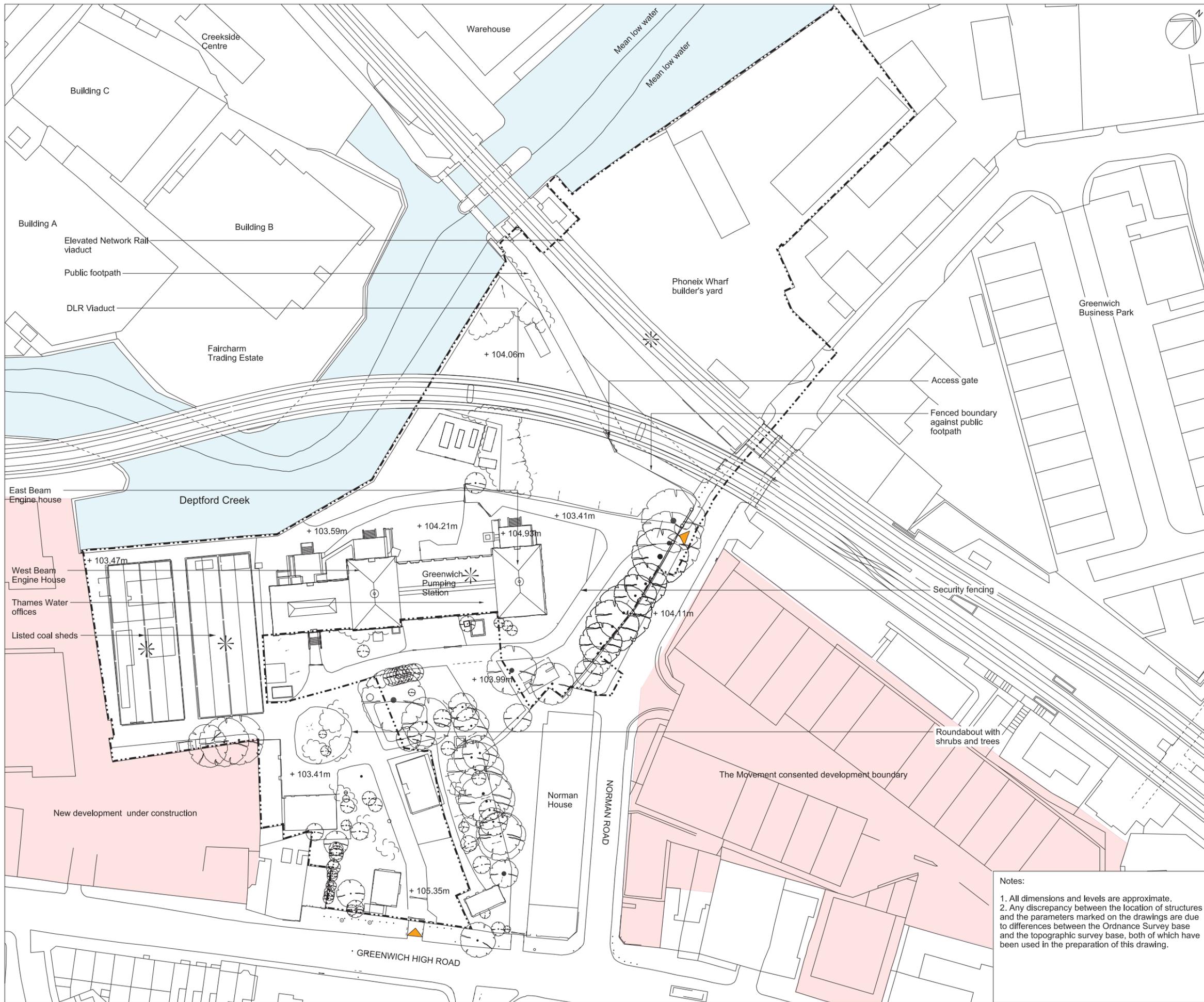
FOR INFORMATION

Location
Greenwich Pumping Station
 Royal Borough of Greenwich

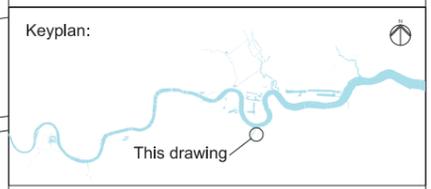
Document Information
Application for Development Consent
 Location plan

Book of plans - section 24
 DCO-PP-23X-GREPS-240001
 January 2013



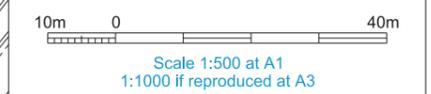


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Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

- Key:**
- Limits of land to be acquired or used (LLAU)
 - - - Zone within which permanent above ground structures would be located
 - - - Zone within which required landscaping would be located
 - Maximum extent of foreshore structure
 - - - Authorised channel
 - + 105.40m Existing levels (shown in metres above tunnel datum)
 - [105.40] Proposed levels (shown in metres above tunnel datum)
 - Consented development footprint (by others)
 - Listed buildings/structures
 - Approximate position of CSO outlet
 - Existing trees within surveyed area (trunk sizes vary)
 - Proposed trees
 - Thames Water access



FOR INFORMATION

Location
Greenwich Pumping Station
Royal Borough of Greenwich

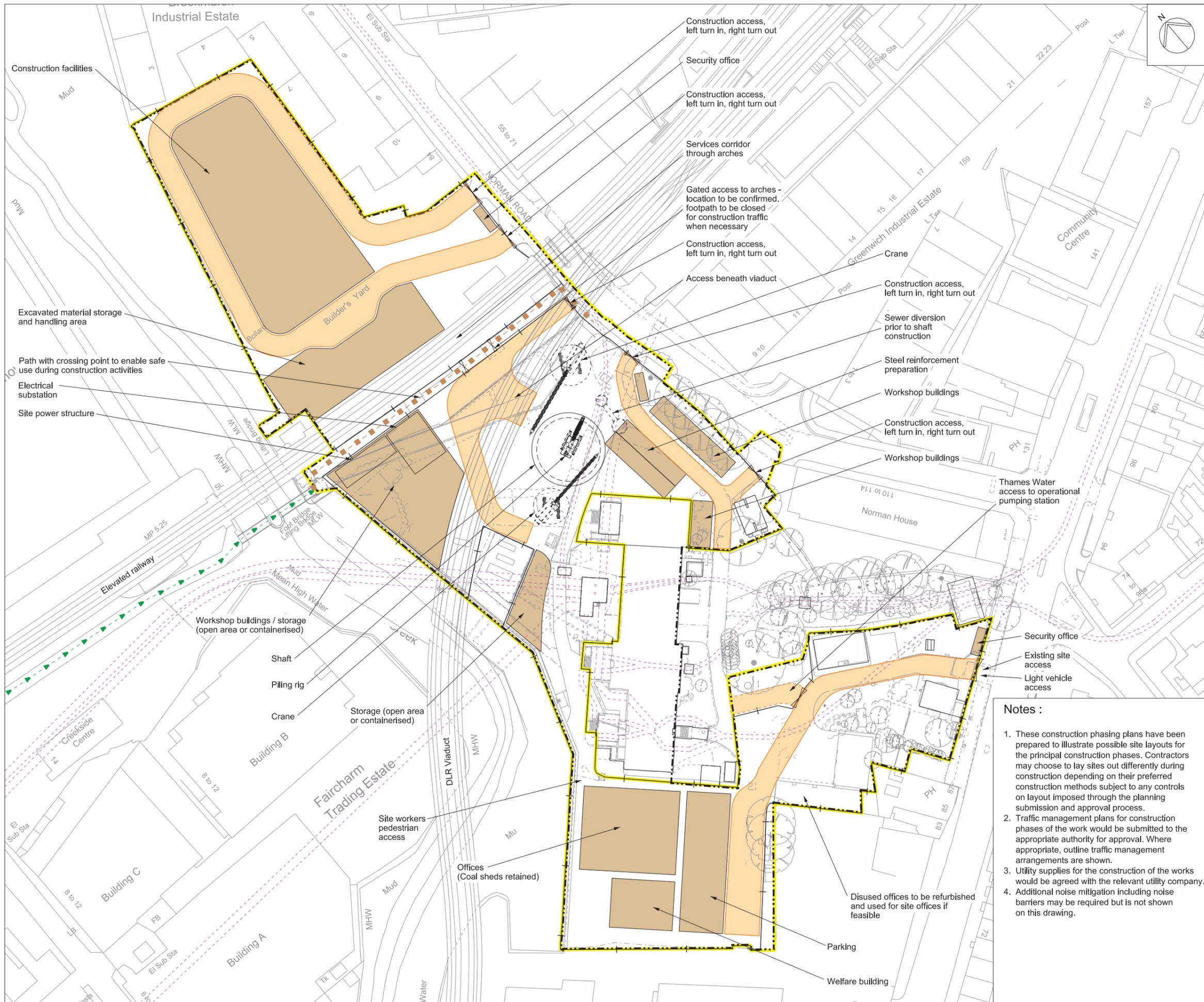
Document Information
Application for Development Consent

As existing
Site features plan
Book of plans - section 24
DCO-PP-23X-GREPS-240002
January 2013

Notes:

- All dimensions and levels are approximate.
- 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.





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Keyplan:

Coordinates are to be Ordnance 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)
 - Hoarding
 - Maximum extent of working area
 - Existing public right of way
 - Route of temporary diversion of right of way
 - Site access
 - Access / haul route
 - Existing sewers

10m 0 40m

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

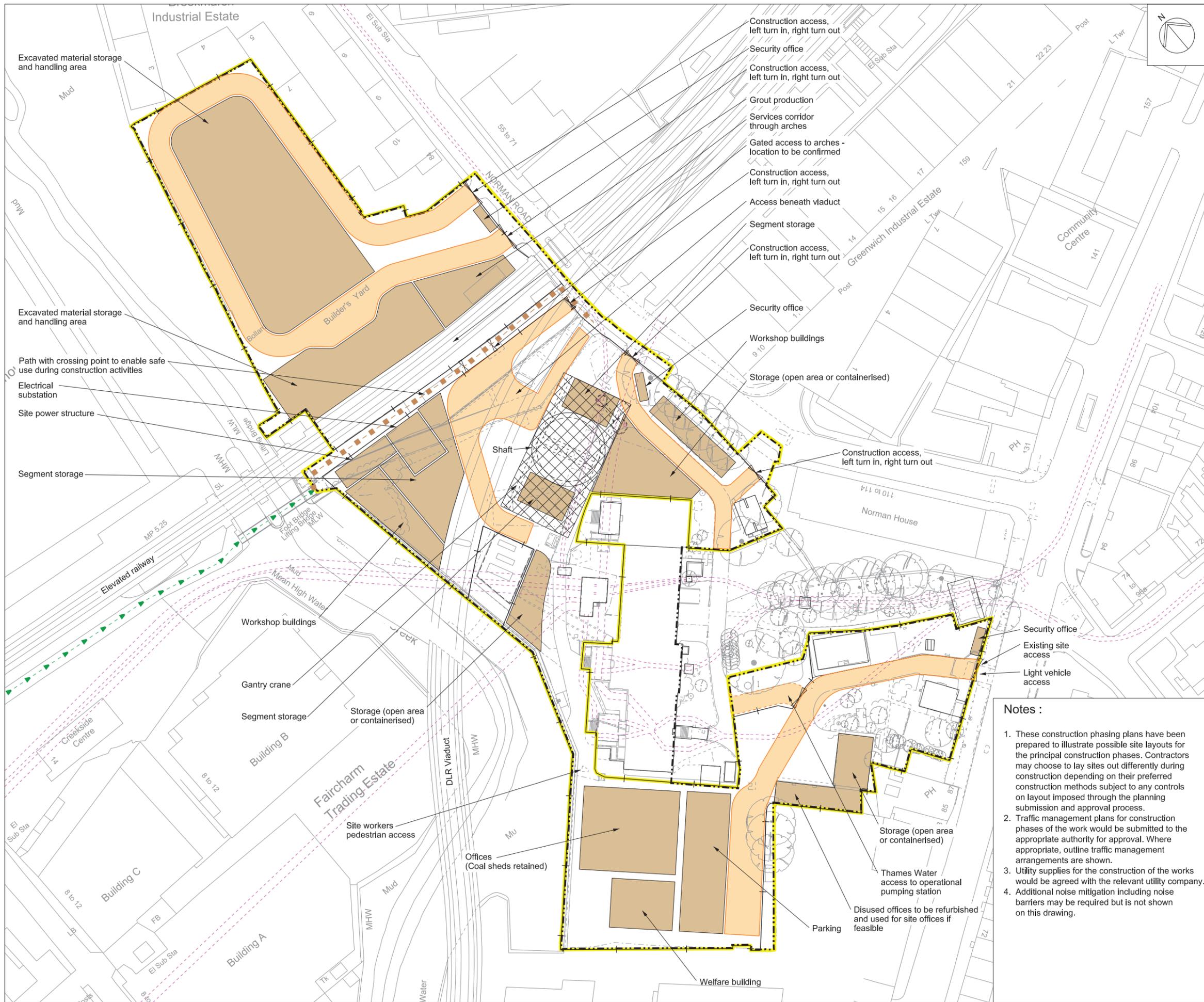
ILLUSTRATIVE

Location
Greenwich Pumping Station
London Borough of Lewisham

Document Information
Application for Development Consent
Construction phases - phase 1
Site setup & shaft construction
Book of plans - section 24
DCO-PP-23X-GREPS-240027
January 2013



- 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.



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Keyplan:

Coordinates are to be Ordnance 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)
 - Hoarding
 - Maximum extent of working area
 - Existing public right of way
 - Route of temporary diversion of right of way
 - Site access
 - Access / haul route
 - Existing sewers
 - Noise enclosure over shaft and gantry crane

10m 0 40m

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

ILLUSTRATIVE

Location
Greenwich Pumping Station
London Borough of Lewisham

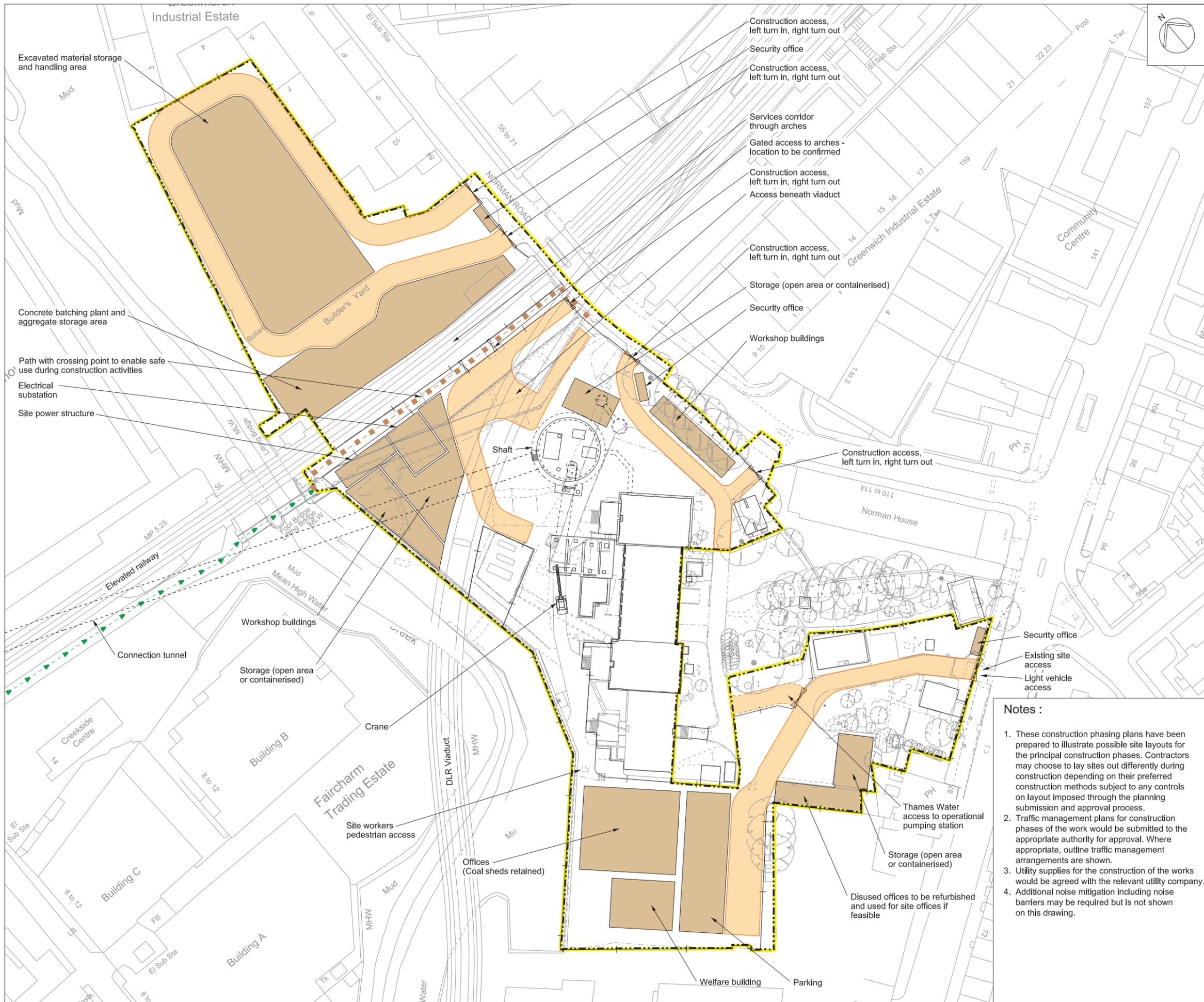
Document Information
Application for Development Consent
Construction phases - phase 2
Tunnelling
Book of plans - section 24
DCO-PP-23X-GREPS-240028
January 2013



- Construction access, left turn in, right turn out
- Security office
- Construction access, left turn in, right turn out
- Grout production
- Services corridor through arches
- Gated access to arches - location to be confirmed
- Construction access, left turn in, right turn out
- Access beneath viaduct
- Segment storage
- Construction access, left turn in, right turn out
- Security office
- Workshop buildings
- Storage (open area or containerised)
- Construction access, left turn in, right turn out
- Security office
- Existing site access
- Light vehicle access
- Storage (open area or containerised)
- Thames Water access to operational pumping station
- Disused offices to be refurbished and used for site offices if feasible
- Parking
- Welfare building

- Excavated material storage and handling area
- Excavated material storage and handling area
- Path with crossing point to enable safe use during construction activities
- Electrical substation
- Site power structure
- Segment storage
- Workshop buildings
- Gantry crane
- Segment storage
- Storage (open area or containerised)
- Site workers pedestrian access
- Offices (Coal sheds retained)

- Notes :**
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 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.
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Keyplan:

Coordinates are to be Ordnance 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)
 - Hoarding
 - Maximum extent of working area
 - Existing public right of way
 - Route of temporary diversion of right of way
 - Site access
 - Access / haul route
 - Existing sewers

10m 0 40m

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

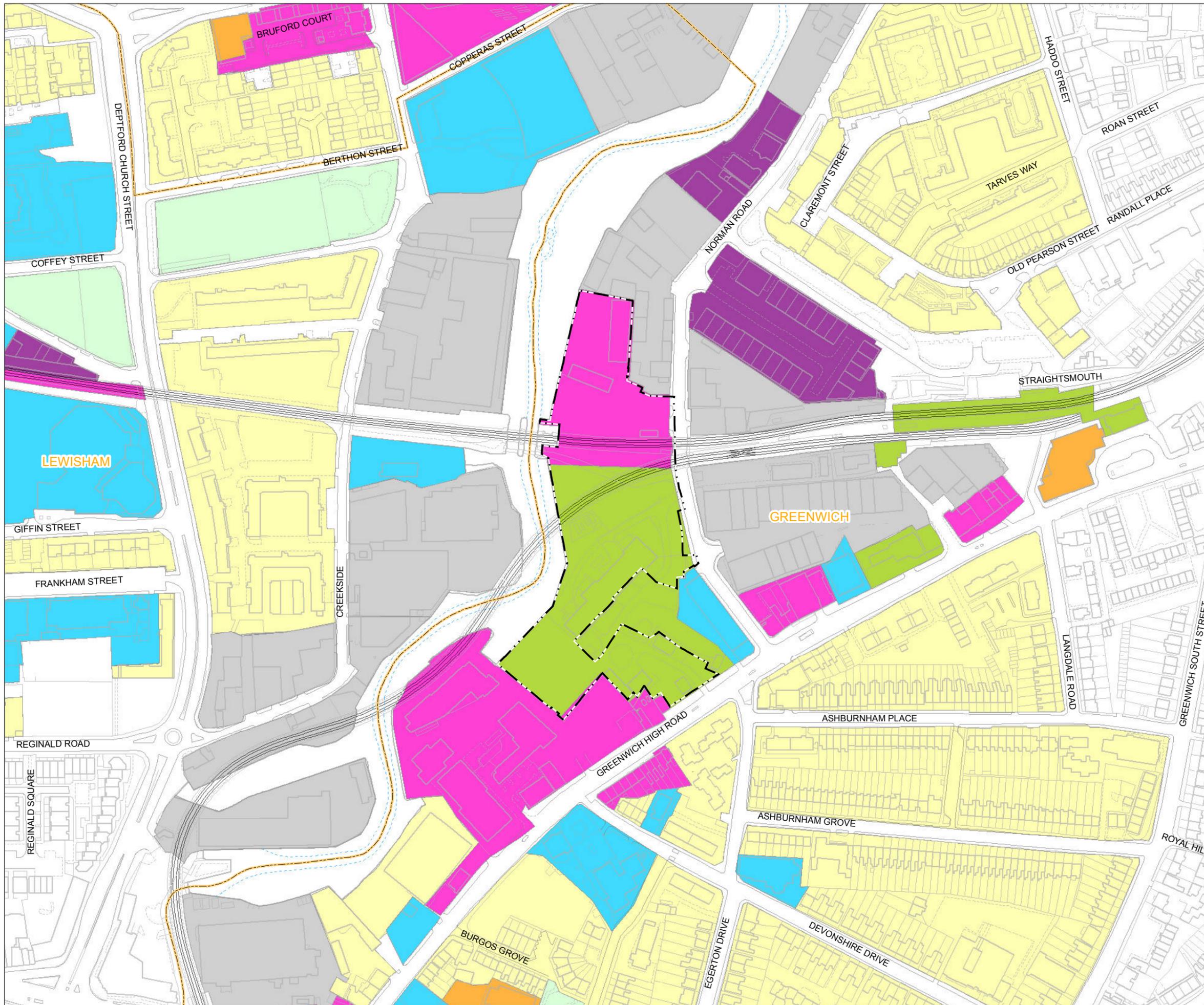
ILLUSTRATIVE

Location
Greenwich Pumping Station
London Borough of Lewisham

Document Information
Application for Development Consent
Construction phases - phase 3
Construction of other structures
Book of plans - section 24
DCO-PP-23X-GREPS-240029
January 2013



- 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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 4. Additional noise mitigation including noise barriers may be required but is not shown on this drawing.



- 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 B2-B8 (General Industrial / Storage or Distribution)
 - Class C1 (Hotels)
 - Class C3-C4 (Dwelling Houses)
 - Class D1-D2 (Non Residential Institutions (Community Facilities) and Assembly and Leisure)
 - Mixed Use
 - Other
 - Open Space



Scale 1 : 2,500 at A3

FOR INFORMATION

Location
Greenwich Pumping Station
 Royal Borough of Greenwich

Document Information
Planning Statement
 Land use

1PL03-MG-00826
 January 2013



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