

Thames Tideway Tunnel
Thames Water Utilities Limited



Application for Development Consent

Application Reference Number: WWO10001

Planning Statement

Doc Ref: **7.01**

Appendix N

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

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January 2013

**Thames
Tideway Tunnel**



Creating a cleaner, healthier River Thames

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Thames Tideway Tunnel

Planning Statement

Appendix N: Albert Embankment Foreshore

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Appendix N: Albert Embankment Foreshore

N.1 Introduction

- N.1.1 Catchment modelling¹ indicates that in an average year, the Clapham Storm Relief Combined Sewer Overflow (CSO) and Brixton Storm Relief CSO discharge a total of 278,000m³ of untreated sewage into the River Thames at Albert Embankment, beside Vauxhall Bridge in the London Borough of Lambeth. 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.
- N.1.2 A worksite is required to receive the proposed main tunnel driven between Earl Pumping Station and Chambers Wharf and to connect the existing Clapham Storm Relief CSO and Brixton Storm Relief CSO to this main tunnel. The proposed development site is known as Albert Embankment Foreshore, which is located in the London Borough of Lambeth. It lies on the opposite side of the River Thames to the City of Westminster.
- N.1.3 The Environment Agency identified that the Clapham and Brixton Storm Relief CSOs need to be controlled. The CSO discharges have multiple impacts on water quality at the outfall location. This includes a localised effect of rapidly dropping dissolved oxygen levels, the release of pollutants and the discharge of sewage litter and effluent.
- N.1.4 Catchment modelling suggests that if the project is constructed as proposed, in a typical year, the CSOs would not spill into the tidal Thames.
- N.1.5 Albert Embankment Foreshore was selected as a suitable site to intercept the two CSOs, transfer flows into the main tunnel and enclose the required permanent structures. The location of the site is identified in the Location plan (Annex N).
- N.1.6 This section is structured as follows:
- a. Section N.2 provides a brief description of the Albert Embankment Foreshore site.
 - b. Section N.3 sets out the planning context for works in this location.
 - c. Section N.4 describes the site-specific development for which consent is sought and how the proposals evolved in response to consultation.
 - d. Section N.5 provides an analysis of the principle site-specific planning considerations and the proposals comply with relevant planning policy.
 - e. Section N.6 provides an overall conclusion of the site-specific assessment for the proposed works at this site.

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

N.2 Site description

- N.2.1 The site itself comprises an area of the foreshore of the River Thames parallel to Albert Embankment between Tintagel House and St George Wharf. It also comprises Lack’s Dock, a small section of land associated with Camelford House, a section of the Thames Path, and potentially an area of land between Tintagel House and Camelford House (associated with a possible access option). Above ground, the site is split into two sections: the northern section (to contain the drop shaft structure) lies in the foreshore to the north of Lack’s Dock and the southern section (to contain the interception structure) lies in the foreshore beneath and on either side of the Grade II* listed Vauxhall Bridge.
- N.2.2 An aerial photo of Albert Embankment Foreshore is provided in Figure N.1 below.

Figure N.1 Aerial photograph of Albert Embankment Foreshore



- N.2.3 The River Thames surrounds the site to the north, south and west. The site is bounded to the east by property boundaries of Tintagel House, Camelford House, Vauxhall Cross and St George Wharf. The eastern property boundary also interfaces with Albert Embankment (A3036) at the construction access points; and passes under Vauxhall Bridge (A202). The As existing site features plan is provided in Annex N.
- N.2.4 The residential building Peninsula Heights lies to the northeast of the site. The adjacent section of the river wall is Grade II listed and, along with the

nearby Albert Embankment Gardens, was designed by Sir Joseph Bazalgette in 1869 as a part of London's original sewer network.

- N.2.5 Tintagel House, Camelford House and Vauxhall Cross are commercial buildings while St George Wharf is a high-density, modern development of 12 interconnected waterfront buildings up to 22 storeys high, predominantly in residential uses but also comprising offices and retail space.
- N.2.6 Vauxhall Bridge crosses over the southern section of the site. The London Underground Victoria Line runs under the River Thames immediately to the south of Vauxhall Bridge.

N.3 Planning context

- N.3.1 In developing proposals and mitigation measures for the development at Albert Embankment Foreshore Thames Water² had regard to the policies set out in the NPS, and to local development plan designations where these are relevant to the application. In this case, the local development plan comprises:
- a. the *London Plan* (2011)
 - b. the London Borough of Lambeth's *Core Strategy* (January 2011)
 - c. the London Borough of Lambeth's saved *Unitary Development Plan* (2007), which is expected to be fully replaced in 2013 by the emerging *Development Management Plan Document*.
- N.3.2 The site falls within the Albert Embankment Conservation Area (CA57). It also forms part of the *Vauxhall Nine Elms Battersea Opportunity Area Planning Framework*, adopted by the Mayor of London in March 2012, which relates to the substantial regeneration and redevelopment envisioned for the area.
- N.3.3 The foreshore of the River Thames is classified as a River Thames and Tidal Tributaries Site of Importance for Nature Conservation. At this location Albert Embankment Foreshore is also designated as an Archaeological Priority Area.
- N.3.4 Tintagel House and Camelford House on the eastern boundary of the site are classified as a Major Development Opportunity Site and are referenced as Site 64 in the *Core Strategy* changes to the Proposals Map (adopted January 2011).
- N.3.5 The site is designated in the *London Plan* as part of the Thames Policy Area.
- N.3.6 Albert Embankment Foreshore is located in the tidal Thames foreshore (designated a Flood Risk Zone in the local development plan) hence it is considered to be a functional flood plain (Environment Agency Flood Zone 3b).

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

- N.3.7 Albert Embankment and Vauxhall Bridge are designated part of the Transport for London Road Network (TLRN). Vauxhall Bridge is also a heritage Grade II* Listed building.
- N.3.8 There is only one extant planning permission on the site as defined by the limits of land to be acquired or used (LLAU), planning permission 11/03331/LB was issued on 23rd September 2011 for 'Replacement of existing 1.4m high fence with a 4.1m high fence clamped to Vauxhall Bridge'. The planning context of land in the surrounding area is explained more in the Site-specific planning considerations subsection of this report (N.5).

N.4 Description of development

Overview

- N.4.1 The proposed development at Albert Embankment Foreshore would intercept the Clapham and Brixton Storm Relief CSOs. The works would convey the flows from the existing CSOs, which discharge through the existing river walls on either side of the abutment to Vauxhall Bridge, to the main.

Application for development consent

- N.4.2 The geographic extent of the proposals for which development consent is sought is defined by the LLAU as shown in the below ground works above.
- N.4.3 A series of documents define the proposed development and are listed in Table N.1.

Table N.1 Albert Embankment Foreshore: Drawings that define the proposed development

Drawing title	Status	Location
Location plan	For information	<i>Book of Plans, Section 17</i>
As existing site features and landscape plans	For information	<i>Book of Plans, Section 17</i>
Access plan	For approval	<i>Book of Plans, Section 17</i>
Demolition and site clearance	For approval	<i>Book of Plans, Section 17</i>
Site works parameter plan	For approval	<i>Book of Plans, Section 17</i>
Permanent works layout	Illustrative	<i>Book of Plans, Section 17</i>
Proposed site features plan	Indicative save for layout of the above-ground structures, which is illustrative	<i>Book of Plans, Section 17</i>
Proposed landscape plan (various)	Indicative save for layout of above-ground structures, which is illustrative	<i>Book of Plans, Section 17</i>
As existing and proposed elevations	Illustrative	<i>Book of Plans, Section 17</i>

Drawing title	Status	Location
(various)		
Kiosk design intent	Indicative	<i>Book of Plans, Section 17</i>
Typical river wall design intent	Indicative	<i>Book of Plans, Section 17</i>
Proposed listed structure interface: Interception structure	Indicative	<i>Book of Plans, Section 17</i>
Construction phases (various)	Illustrative	<i>Book of Plans, Section 17</i>
Existing utilities plan	For information	<i>Utilities Statement</i>
River foreshore zones of working	For information	<i>Navigational Issues and Preliminary Risk Assessment</i>
Highway layout during construction (various)	Illustrative	<i>Transport Assessment</i>
Permanent highway layout (various)	Illustrative	<i>Transport Assessment</i>

N.4.4 The proposed Nationally Significant Infrastructure Project (NSIP) works at Albert Embankment Foreshore comprises ‘Work No. 15a: Albert Embankment Foreshore CSO drop shaft – A shaft with an internal diameter of 16 metres and a depth (to invert level) of 47 metres’; and ‘Work No. 15b: Clapham / Brixton connection tunnel – A tunnel between Albert embankment Foreshore CSO drop shaft (Work No. 15a) and the main tunnel (east central) (Work No. 1c)’.

N.4.5 The associated development comprises Work No. 15c: to intercept and divert flow from the Brixton Storm Relief CSO and the Clapham Storm Relief CSO to the Albert Embankment Foreshore CSO drop shaft (Work No. 15a) and into the Clapham/Brixton connection tunnel (Work No. 15b) including above and below-ground works such as construction of an interception chamber with access covers and other structures including culverts, pipes and ducts to modify, connect, control, ventilate, de-aerate, and intercept flows. The full description of the proposed development can be found in Schedule 1 to the development consent order, and further details of temporary construction works and permanent operational structures are contained below.

N.4.6 All works would be contained within the relevant zones as indicated on the Site works parameter plan contained in Annex N of this report.

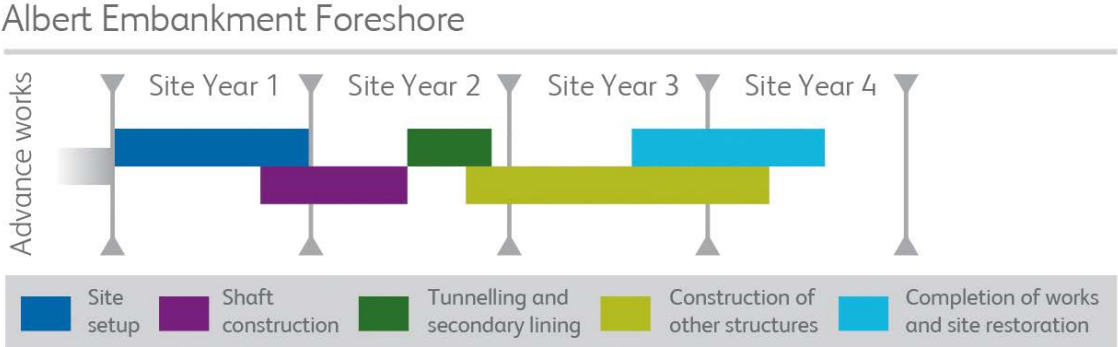
Construction

N.4.7 The construction is programmed to take approximately four and a half years and would involve the following main works:

- a. cofferdam construction and site setup (approximately 12 months)
- b. shaft construction (approximately ten months)
- c. tunnelling and secondary lining (approximately three months)
- d. construction of other structures (approximately 18 months)
- e. completion of works and site restoration (approximately ten months).

N.4.8 The estimated construction programme is represented graphically below.

Figure N.2 Construction timeline



N.4.9 Connection of utilities and diversion of minor utilities may be conducted in advance of the main activities listed above.

N.4.10 The process of site construction is illustrated on the Construction phase plans in the annex attached to this section.

N.4.11 The majority of construction would occur during standard working hours from 8am to 6pm Monday to Friday and 8am to 1pm Saturdays. Construction activities may occasionally be required outside of these hours during key construction activities subject to agreement with the local authority.

N.4.12 Heavy goods vehicle (HGV) movements would be limited to standard working hours. In exceptional circumstances HGV and abnormal load movements could occur up to 10pm on weekdays for large concrete pours and later at night on agreement with the local authority.

N.4.13 A short period of 24-hour working would be required for the connection tunnel and secondary lining. During this period of continuous working, activities would be predominantly below ground, with support activities occurring at ground level. However, HGV movements would be limited to weekday daytime hours.

N.4.14 Barge loading and transport away from the site would take place on a continuous 24-hour, seven days a week basis as barge movements are linked to high tides. Barges of 350 tonnes in size would operate at a peak average of four per day (a total of eight barge movements), transporting excavated material and imported cofferdam fill by river rather than road.

N.4.15 Further information about working hours and site-specific restrictions are contained within the *Code of Construction Practice (CoCP) Parts A and B*.

N.4.16 As explained in access and movement below, there are two options for construction vehicles to access the site, both of which use Albert Embankment (A3036) to arrive at the site.

- a. Option A: construction vehicles would turn left from Albert Embankment into a construction access road at Lack’s Dock which would be used to access the CSO drop shaft and occasionally the foreshore.

- b. Option B: construction vehicles would turn left from Albert Embankment into a new construction access road between Camelford House and Tintagel House that would then cross the existing underground car park access to Camelford House before passing through the existing river wall parapet and onto the CSO drop shaft site. Occasional access for plant/machinery to the foreshore would still be required from Lack's Dock.
- N.4.17 For both options, materials needed for the interception chamber site would be delivered to the CSO drop shaft site and transferred to the interception site by tracked vehicle across the foreshore at low tide.
- N.4.18 Construction vehicles would access the site via Albert Embankment turning left into the site and leave the site turning left out of the site.
- N.4.19 An average peak flow of 46 vehicle movements a day (23 two-way vehicle trips) is expected during the months of greatest activity during Site Year 1 of construction at the Albert Embankment Foreshore site. At other times in the construction period vehicle flows would be lower than this average peak figure.
- N.4.20 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 heavy goods vehicles accessing the site per day is contained within the Transport Assessment.
- N.4.21 Potential layouts of the construction site are shown on the Construction phasing plans contained within 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 and that the cofferdam does not exceed the maximum extent of temporary works platform shown on the Site works parameter plan.

Access and movement

- N.4.22 Vehicle access to the site is currently via the entrance to Lack's Dock off Albert Embankment (A3036), in between Vauxhall Cross and Camelford House. The access-way continues down to the River Thames via a privately-owned slipway used by London Duck Tours (LDT).
- N.4.23 Construction vehicle access is shown on the construction phasing plans for this site (see the *Book of Plans*) and further detailed information on traffic and access can be found in the *Transport Assessment*.
- N.4.24 Two alternative options for construction site access are included in the application for development consent. Both options would use the existing entrance to Lack's Dock off Albert Embankment for operational purposes. The Secretary of State will be asked to decide which construction access option should be provided in any decision to grant development consent for the project.
- N.4.25 For access Option A the site access point would be from the existing Lack's Dock access road. Due to the proximity to Vauxhall Cross, an off-site security screening area would be required to search construction

vehicles prior to arrival at site. This would need to be identified by the contractor, at a later stage.

- N.4.26 For access Option B the main site access point would be from a temporary access road constructed between Camelford House and Tintagel House. Occasional access to the interception structure would still be required along Lack's Dock. Given the infrequent nature of vehicles using Lack's Dock, an off-site security screening area is not required; however security measures for staff and vehicles entering the site would still be required.
- N.4.27 During operation, maintenance vehicles would access the site using the existing entrance to Lack's Dock off Albert Embankment. Vehicles accessing the CSO drop shaft on the northern section of the site would turn right from Lack's Dock through removable bollards and along a widened section of the Thames Path. Vehicles accessing the southern site would travel in front of Vauxhall Cross along the Thames Path.

Site set-up

- N.4.28 The hoarded site boundary and site access from Albert Embankment would be established. For site access Option A (access from Albert Embankment along Lack's Dock), the existing vehicle crossover would be widened, minor structures and shrubs would be removed and the proposed access road (currently a footpath) would be strengthened.
- N.4.29 For site access Option B (access from Albert Embankment along a new temporary access route between Camelford House and Tintagel House) minor structures and trees would be removed, and a new vehicle crossover would be constructed onto Albert Embankment. The ramp into Camelford House's basement car park would be modified to provide one-way access into the car park under signal control and the site access would be constructed over part of the ramp and through the river wall. The parapet of the river wall would not be removed until the cofferdam is in place so that the flood defence is maintained at all times.
- N.4.30 Other site works would include diversion of the Thames Path and temporary services and utility diversions. Two temporary works cofferdams would extend out from the land from the existing river wall to create two working platforms during construction. The piles used to form the temporary cofferdam would be driven into the impermeable clays from a jack-up barge. The top level of the outer wall of the cofferdam would be set to existing flood defence level to maintain the level of defence during construction.
- N.4.31 A concrete campshed would be constructed along the western face of the temporary cofferdam for the shaft structure for barges to sit safely on the river bed. It is assumed that no dredging would be required at this site, although it is likely that there would be some disturbance to the riverbed during construction of the cofferdam and campshed.
- N.4.32 For the purpose of this assessment it is assumed that the piles would be driven using vibration piling techniques although the intention would be to seek to maximise the use of silent piling techniques where reasonably practicable.

- N.4.33 Following removal and replacement of any soft material within the cofferdam, fill material would be placed onto the foreshore on top of a geotextile layer.
- N.4.34 Potential scour would be monitored during the construction works. Any need for scour protection to the cofferdam would be identified using the approach set out in the scour and accretion monitoring and mitigation strategy plan for temporary works in the foreshore in the *Environmental Statement*.
- N.4.35 Internal site roads, plant and material storage areas, offices, welfare and workshops would be established on the cofferdam.

Shaft construction

- N.4.36 The shaft would be constructed with a diaphragm wall primary lining and have a cast *in situ* secondary lining. The first stage in the construction of each section of diaphragm wall would be the excavation and setting of inner and outer guide walls. These guide walls would retain the ground and allow excavation for the diaphragm walls between them. During diaphragm wall excavation, the trench would be filled with bentonite for ground support; on completion of excavation of each wall panel, steel bar reinforcement cages would be lowered in and concrete would be pumped into the trench in order to displace the bentonite and form a solid wall panel. This process is repeated for each diaphragm wall panel in order to create the full circle of the shaft.
- N.4.37 The size of the diaphragm wall panels would require an extended working day for each panel to enable the concrete pour to be completed. The diaphragm wall would be taken to a depth suitable to reduce the flow of water into the shaft. Grouting at the toe of the diaphragm wall and base would also be required to reduce the inflow of water. Dewatering would need to be undertaken as described below.
- N.4.38 The shaft excavation would commence after the diaphragm walls are complete. The guide walls would be broken out, and the soil within the diaphragm walls excavated to expose the walls. The excavator within the shaft would load shaft skips, hoisted by crawler crane, depositing the spoil within the excavated material handling area. After any required treatment, the material would be loaded onto a barge for transport off site. Once the excavation is complete, a steel reinforced concrete base plug would be formed at the base of the shaft.
- N.4.39 It is anticipated that dewatering would be required. Dewatering wells would be drilled from the surface from within the shaft (a process known as 'internal dewatering') and groundwater extracted via pumps. These pumps would be operational during shaft excavation. It is assumed that extracted ground water would be discharged directly into the River Thames after being treated through a settlement system. Extracted water would be sampled on a regular basis to check water quality.

Tunnel works

- N.4.40 To connect the CSO drop shaft to the main tunnel, a 3.2m internal diameter connection tunnel would be driven approximately 24m from the

CSO drop shaft to connect with the main tunnel at a reception chamber. This chamber would be enlarged to approximately 9m in diameter. It would be constructed using sprayed concrete lining techniques.

- N.4.41 The excavated material would be removed from the tunnel to a temporary stockpile on the surface prior to loading to barge for onward disposal.
- N.4.42 Tunnel portals, to reinforce the connection between the shaft and connection tunnel, would be constructed in the shaft lining. The portals would consist of cast *in situ* concrete, with a sealing arrangement as required, tied to the shaft lining. Dewatering and ground treatment would be required for the connection tunnel to main tunnel.

Secondary lining of main tunnel and shaft

- N.4.43 Secondary lining is an additional layer of concrete placed against the inside of a tunnel's primary concrete segmental lining to ensure it is water tight and to improve the overall structural durability.
- N.4.44 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.
- N.4.45 It is assumed that the lining of the CSO 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.
- N.4.46 When the secondary lining is complete the internal structures including the vortex and drop tube would be shuttered and concreted.

Construction of other structures

- N.4.47 The existing storm relief sewers that discharge to the River Thames either side of Vauxhall Bridge would be extended through or around the temporary cofferdam, maintaining flows during the works. These would be fully enclosed with flap valves fitted to prevent tidal surcharge.
- N.4.48 In order to access the interception structure site, a temporary ramp from foreshore level up to the cofferdam would be constructed. This would be removed on completion of the works.
- N.4.49 Sheet pile or secant pile walls would be used to provide support within which the underground chambers would be constructed. Walls would be constructed to a depth to minimise ground water ingress into the excavation, but small pumps would be utilised to manage any ground water that does seep through. The pumps would discharge to the River Thames after being treated through a settlement system.
- N.4.50 The walls of the interception chamber would be formed by in situ concrete techniques. Concrete would be delivered to site and either pumped or skipped to the chamber.

- N.4.51 A culvert would be constructed to intercept the Brixton Storm Relief Sewer CSO outfall at the north of the bridge. A pipe would be laid to intercept the Clapham Storm Relief Sewer CSO outfall at the south of the bridge and transfer flows beneath the bridge to the interception structure at the north of the bridge. Both the pipe and culvert would be constructed through the existing foreshore within a retained excavation.
- N.4.52 The connection culvert between the interception chamber and the drop shaft would be constructed, using sprayed concrete lining techniques similar to those described for the connection tunnel.
- N.4.53 The new river walls around both sites would be built within the temporary cofferdams. It is assumed that the new river wall around the shaft site would be constructed as a piled wall which incorporates both driven tubular and steel sheet piles and a reinforced concrete structure. It is assumed that the new river wall around the interception structure site would be constructed as a terraced wall comprising cast in situ concrete terraces which would be backfilled with substrates suitable for growing intertidal habitat.
- N.4.54 Once the walls are in place, the reinforced concrete would be completed either *in situ* or using precast components, incorporating the required architectural finishes.
- N.4.55 A new outfall would be constructed on the front of the new river wall to cater for the event that the main tunnel cannot accept any more flow. Flap valves would be fitted to prevent tidal flow entering the system.
- N.4.56 Air management structures comprising an underground air treatment chamber, ventilation columns and underground louvre chambers for ventilation control, electrical and control kiosks and local control pillars would also be built and commissioned.

Completion of works and site restoration

- N.4.57 On completion of the main construction (outlined above) the new river walls would be finished prior to removal of the temporary cofferdams to ensure flood protection.
- N.4.58 Once the cofferdam fill is removed, the geotextile layer would be removed and permanent scour protection would be placed around the structure.
- N.4.59 Once the main elements of construction are completed, the final landscaping works would be undertaken including final treatments and surfaces, planting and installation of street furniture. The site accesses would be reinstated to their existing condition.

Operation

CSO drop shaft

- N.4.60 The drop shaft would have an approximate internal diameter of 16m and be approximately 47m deep, this would take combined sewage flows diverted from the Clapham CSO and Brixton CSO via a connection culvert then link with the main tunnel via a connection tunnel.

N.4.61 Ground level access covers would be incorporated on the top of the shaft for inspection and maintenance purposes.

Overflow weir chamber and culvert

N.4.62 The overflow weir chamber and valve chambers would sit below ground, within a new extension to Albert Embankment. Covers on top of the chambers would enable access and inspection.

River wall

N.4.63 River wall parapets would be provided around the foreshore structure at current flood defence levels. The new public space on top of the structure would be at the same height as the flood defences.

Ventilation structures

N.4.64 The two ventilation columns serving the drop shaft would have an approximate internal diameter of 0.9m and be approximately 4m minimum to 8m maximum high. These ventilation columns would be of the project's 'signature' design.

N.4.65 The two ventilation columns serving the interception chamber would also have an internal diameter of approximately 0.3m and be a maximum 6m high.

N.4.66 The height of the smaller diameter ventilation columns is consistent with Thames Water standards. The ventilation column serving the Clapham Storm Relief CSO would have an internal diameter of approximately 0.3m and be a maximum 6m high.

Electrical and control kiosk

N.4.67 The size of the electrical and control kiosks is determined by the electrical and control equipment they would house. Two kiosks are required because one controls equipment located within the interception structure located near the south abutment of Vauxhall Bridge and the other controls equipment within the drop shaft structure to the north of Lack's Dock.

Permanent restoration and landscaping

N.4.68 Following close engagement with stakeholders including the London Borough of Lambeth, English Heritage and the Design Council CABE throughout the pre-application engagement, a design was developed that is supported to an indicative level of detail at this site. Final details would be agreed at a later stage through the proposed requirements, in compliance with the design principles and indicative Landscape plan agreed for this site.

N.4.69 The foreshore structure would be surrounded by a new section of river wall to protect most sections of the new paved surface, which would form new public realm and an extension to the Thames Path. The only part of the new structure not accessible at ground level is a small, landscaped area immediately in front of the Vauxhall Cross building that would be gated in response to security concerns of the adjoining building occupiers.

N.4.70 The foreshore structure would also occasionally enable operational access for cranes and maintenance vehicles.

Typical maintenance regime

- N.4.71 With the project in place and operational, the flows from the CSOs would be reduced to an average of approximately one 13,600m³ discharge in a typical year, a 95.11 per cent decrease from current sewage discharge levels.
- N.4.72 Vehicles and plant accessing the area of hardstanding above the CSO drop shaft on the northern section of the site would turn right from Lack's Dock through removable bollards and along a widened section of the Thames Path. Cranes and other plant would sit on the area of hardstanding. Vehicles and plant accessing the area of hardstanding above the southern site would travel in front of Vauxhall Cross along the Thames Path. Cranes and other plant would sit on the area of hardstanding and on the section of the Thames Path adjacent to the chamber. Occasionally cranes may service the southern site from the foreshore, accessed from Lack's Dock.
- N.4.73 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 ventilation and below-ground equipment. This would likely involve a visit by personnel in a small van and may take several hours.
- N.4.74 Once every ten years, it is anticipated that a major internal inspection of the tunnel and underground structures would be required. This process would likely require a small team of inspection staff and support crew and two mobile cranes to lower the team into the shaft. The inspection would likely take several days.
- N.4.75 The Thames Path may be temporarily diverted during maintenance activities. Visits to the site for unplanned maintenance or repairs may also be required, for example in the unlikely case of a blockage or equipment failure.

Scheme development

- N.4.76 Selecting an appropriate site to intercept the Clapham and Brixton CSOs, and making sure that site delivers positive technical and urban design outcomes involved an iterative process of site assessment, design response and consultation with stakeholders.
- N.4.77 Initially four locations were considered in selecting a site to intercept the Clapham and Brixton CSOs, namely:
- a. The foreshore adjacent to St George Wharf and Vauxhall Bridge: The London Underground Victoria Line tunnels under this location would mean that the deep CSO drop shaft would need to be built at the south of the site, where a new passenger service pier (St Georges Wharf pier) is located. Furthermore, the site immediately adjacent to St George Wharf and Vauxhall Bridge was considered to be less suitable than the other foreshore sites in respect of built heritage, groundwater, townscape, surface water, ecology, flood risk and land quality.

- b. Foreshore, adjacent to Vauxhall Cross Building and Vauxhall Bridge: This potential location would necessitate construction vehicle access that would close Lack's Dock to the LDT operations. Furthermore, this site is immediately adjacent to the Vauxhall Cross Building, the occupants of which raised concerns regarding national security.
- c. Open Space, Claylands Road: The open space at Claylands Road is a constrained site and its use, in comparison to the other shortlisted sites, would result in substantial impacts on adjacent residential properties, including noise, vibration, dust and traffic movements. Furthermore, there would be a temporary loss of public open space and residents' parking, and a 700m long connection tunnel would be required to connect the site to the main tunnel.
- d. Albert Embankment Foreshore: The site is adjacent to a large, older commercial office in multiple occupancy. The river wall is set back further at this site than it is in front of St George Wharf and Vauxhall Cross meaning that a new permanent structure in the foreshore would be less prominent. Furthermore, in this set back location, the permanent structures are also further from the authorised navigation channel. The site is also further away from the Grade II* listed Vauxhall Bridge than the other foreshore sites. In this location the interception structures required below the bridge can also be smaller in scale than the shaft structure and can be profiled to minimise the potential impact on the bridge and its setting.

N.4.78 Having carefully reviewed the relative advantages and disadvantages of the three shortlisted sites, Thames Water concluded that Albert Embankment Foreshore was the most suitable site for the following reasons (not in order of importance):

- a. There is direct access from Albert Embankment (A3036), which forms part of the TLRN.
- b. Use of this site minimises the potential impact on the Victoria line tunnels.
- c. There are fewer national security concerns in relation to the proximity to Vauxhall Cross compared to the alternative sites.
- d. The site allows for segregation of construction vehicle access from the LDT slipway access (Lack's Dock), which means that LDT can continue to operate.
- e. The site allows both CSOs to be intercepted in one location.
- f. Out of the foreshore sites, it would have the least impact on the listed Vauxhall Bridge and its setting.
- g. It would have the least impact on fluvial flows and is furthest from the authorised navigation channel.
- h. It would have less impact on local residential properties as the site of the main shaft would be located further away from these receptors.
- i. The proposed structure could incorporate new habitat to offset, in part, habitat that would be lost.

The process by which potential sites were identified and appraised can be found in the *Final Report on Site Selection Process*, which accompanies the application.

The proposals for Albert Embankment Foreshore were developed through regular meetings with stakeholders such as the London Borough of Lambeth and in response to formal and consultation with stakeholders. The evolution of the design is described in the Good design subsection below.

N.4.79 The principal issues arose through pre-application consultation and Section 48 publicity for Albert Embankment Foreshore are summarised below. These are subsequently addressed in the planning assessment in N.5 which follows:

- a. national security concerns from the occupiers of Vauxhall Cross: this is addressed under the 'security considerations' section.
- b. construction effects on Camelford House including noise, vibration and dust and potential structural damage to property: these matters are addressed in the Noise and vibration, Air quality emissions, dust and odour and Land use and Open space subsections respectively.
- c. navigational safety relating to the use of Lack's Dock by LDT: this is discussed in the land use and open space section of this Appendix.
- d. effect on archaeological assets in the foreshore, plus the effect on setting of the Grade II* listed Vauxhall Bridge and views along the river: these matters are discussed in the Historic environment subsection.
- e. loss of foreshore habitat these matters are addressed within the Biodiversity and geological conservation subsection.

N.5 Site-specific planning considerations

N.5.1 This section provides an analysis of the key planning considerations associated with the proposed works at Albert Embankment Foreshore. It considers the issues and factors identified in the NPS and other issues relevant to the site. The design response to each of these issues was informed by extensive consultation with stakeholders, as set out in the *Consultation Report*, which accompanies the application, and the Good design subsection below.

Meeting the need

N.5.2 The proposed works at Albert Embankment Foreshore would be successful in meeting the need to intercept the Clapham and Brixton CSOs, and would make an important contribution to meeting the wider need for the project identified in the NPS.

N.5.3 Currently, in an average year, the Clapham CSO discharges approximately 13,000m³ and the Brixton CSO 265,000m³ of untreated sewage into the River Thames besides Vauxhall Bridge in the London Borough of Lambeth. The Clapham CSO discharges approximately six

times a year, and the Brixton CSO discharges 29 times a year, further details can be found in the *Environmental Statement*.

- N.5.4 The Environment Agency identified that the Clapham and Brixton Storm Relief CSOs need to be controlled. 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.
- N.5.5 It is predicted that the CSO discharges will continue to worsen both in terms of volume, frequency and content. By the time the proposed works at Albert Embankment Foreshore are ready to become operational the CSO is predicted to discharge, in an average year a total of approximately 293,000 m³ of untreated sewage, discharging approximately 37 times a year.
- N.5.6 Modelling suggests with the project in operation the discharges of untreated sewage in an average year would be reduced to a total of 13,600m³, a predicted level of two spills per year. This reduction would have a beneficial effect on water quality.
- N.5.7 A key reason the Albert Embankment Foreshore site was considered the most appropriate of the four potential sites near this location, was that it offered the benefit of intercepting both of these CSOs with a single development.

Good design

- N.5.8 The amount, layout and scale of the proposed structures are primarily dictated by the function they need to perform. At this site, the key functional consideration is the need to transfer flows from the Clapham and Brixton Storm Relief CSOs and direct them into the main tunnel.
- N.5.9 Early site analysis and subsequent engagement identified that it was important for the design to respond to the following key opportunities and constraints.
- N.5.10 The site-specific design opportunities included:
- Improve the Thames Path riverside walkway.
 - Create a new, high quality public space.
 - Provide an area to enjoy views of Vauxhall Bridge, the Palace of Westminster World Heritage Site, and the Tate Britain Gallery.
 - Provide information on the local area and the historic environment.
 - Replace sections of the existing river walls that are in poor condition and feature high, visually intrusive railings.
 - Reference the alignment and end point of the Victorian Albert Embankment.
 - Enhance the notable characteristics of the site, which include a large accessible area of foreshore and a working dock.
 - Improve potential habitat for aquatic ecology.
- N.5.11 The site-specific design constraints included:

- a. The site forms the setting of the Grade II* listed Vauxhall Bridge and the surrounding townscape.
- b. The aspect of the site is generally to the northwest but it is overshadowed by Vauxhall Bridge and Camelford House and receives little sun.
- c. The site is in close proximity to the Camelford House office building.
- d. The site lies in close proximity to government offices in Vauxhall Cross.
- e. The shaft cannot be located in front of Vauxhall Cross due to security concerns.
- f. The London Underground Victoria Line runs near the boundary of the site.
- g. The slipway at Lack's Dock is in on-going commercial use.
- h. Environment Agency policy seeks to minimise encroachment into the river. The project structures must minimise any impact on river flows and reduce the potential for scour. The project structures must also be protected from vessel impacts.

N.5.12 The proposals for Albert Embankment Foreshore were carefully developed through a collaborative process of design review and extensive consultations with stakeholders including London Borough of Lambeth, English Heritage and the Design Council CABI. The principal objectives that influenced the design at Albert Embankment Foreshore arising from the analysis of site opportunities and constraints, and based on feedback from stakeholder consultations, are:

- a. security concerns from the occupiers of Vauxhall Cross regarding the use of the interception structure by the public
- b. navigational safety relating to the use of Lack's Dock by LDT
- c. the effect on the setting of the Grade II* listed Vauxhall Bridge and views along the river
- d. the need to limit the impacts from construction.

These design objectives presented a significant challenge to balance potentially conflicting constraints and stakeholder concerns. Thames Water recognised these tensions, and sought to achieve an appropriate balance between the design objectives, and the development for which consent is sought reflects this. Subsequent agreement of final details such as materials and planting would be achieved through the proposed requirements and in compliance with the design principles agreed for this site in the *Design Principles* document, which accompanies the application.

Security considerations

N.5.13 Feedback was received from the occupants of Vauxhall Cross, the details of which cannot be made public because they encompass security issues. However, these issues mainly relate to the means of achieving the construction rather than the fundamental content of the construction works

itself. The objection is in two parts; an objection to the use of Lack's Dock for construction vehicle access and an objection to the use of the top of the interception structure by members of the public.

- N.5.14 Vauxhall Cross is a square plot located between two major highways the Albert Embankment (A3036) and Vauxhall Bridge (A202), both of which are TLRN routes. The Thames Path runs in front of the Vauxhall Cross building and Lack's Dock along the northern boundary. Thames Water engaged in discussions with the occupiers of Vauxhall Cross on several occasions with respect to the use of Lack's Dock, suggesting possible mitigation measures to address their concerns. None of the measures proposed were considered sufficient. Alternative access options were considered but these also raised substantive concerns from other stakeholders, so two alternative construction access options are included in the application for development consent. This allows the issue to be considered and determined as part of the examination of the application.
- N.5.15 Thames Water responded to concerns raised by the occupiers of Vauxhall Cross regarding public access to the new land created above the interception structure by incorporating a gate on the alignment of the existing river wall to restrict access to Thames Water maintenance workers only. The London Borough of Lambeth expressed its strong preference for the new embankment space to be accessible to the public. The design principles allow for the structure to be built without a gate in the event the objection on security grounds can be overcome.
- N.5.16 One key aspect of the design that has changed is the proposed temporary construction vehicle access. Although in all cases permanent access maintenance is proposed via Lack's Dock, three different construction access options were presented at different stages of consultation.
- N.5.17 At Phase one Thames Water proposed that vehicles enter and leave the site via a temporary road through Albert Embankment Gardens and along the foreshore. This route was objected to by London Borough of Lambeth, GLA, Environment Agency and residents because of the effect on ecology of the river, loss of open space and effect on residents (Peninsula Heights). A number of responses suggested the use of Lack's Dock to enable access.
- N.5.18 Following Phase one Thames Water reviewed construction access options and concluded that it was technically feasible to use a segregated access along Lack's Dock which would allow continued use by LDT and which would address the issues raised during Phase one consultation. This option was therefore put forward for Phase two consultation but it elicited an objection from the occupants of Vauxhall Cross.
- N.5.19 Various methods of addressing the security concerns were considered, including an off-site security screening area for incoming vehicles. However full information was not provided to Thames Water on the specific security concerns at this site, so the objection from the occupiers of Vauxhall Cross could not be resolved. The next step was therefore to explore whether there were any alternative feasible access options. The phase one access option was discounted because of the issues which this had raised during earlier consultations. A new option was explored which

was located between Camelford House and Tintagel House. For this option it would be necessary to remove a small section of pavement, a wall and a tree on Albert Embankment to create the new access. This access route would then need to be segregated from the car parks of Camelford and Tintagel House and a signalled controlled access to the basement car park would be required.

- N.5.20 Targeted consultation was undertaken in order to explore issues associated with this third access option. This subsequently raised objections from the London Borough of Lambeth, and the leaseholders of Camelford House. This presented Thames Water with an exceptional combination of circumstances which it was unable to resolve. Therefore two alternative options for construction site access (Option A Lack's Dock and Option B between Camelford House and Tintagel House) are included in the application for development consent. This allows the issue to be considered and determined as part of the examination of the application.

Navigational safety

- N.5.21 There is no discernible difference between access Options A and B with respect to this topic.
- N.5.22 The *Navigational Issues and Preliminary Risk Assessment*, which accompanies the application, discusses particular issues faced at potential project development sites in foreshore locations.
- N.5.23 LDT and the Port of London Authority (PLA) raised concerns as to the scale of the proposals and its encroachment into the navigational channel and how this would affect navigation in the river and the use of Lack's Dock.
- N.5.24 In its response to Section 48 publicity dated 5 October 2012, the PLA said: *"the scale and extent of the LLAU at this site is considered excessive – extending into the authorised channel – and must be withdrawn south to a line not closer than five metres to the channel. The intertidal terracing is unacceptable unless adequate provision is included within it to prevent London Duck Tours and other craft from impacting it; the steel mono piles currently shown in the construction phasing drawings at the downstream end of the structure are considered to be insufficient to prevent contact and potential capsizing"*.
- N.5.25 LDT responded to the Section 48 publicity on 5 October 2012, with comments including: *"The change in the site boundaries which was released in June 2012 as part of this third consultation is now significantly greater than previously disclosed particularly in respect of encroachment into the River Thames. This new site plan would preclude LDT from operating, as entering and exiting from Lack's Dock would now be forced to take place in the main channel. This would be for significant periods of time i.e. two years of the four year construction programme. This new proposal creates an unexpected and wholly unacceptable marine risk. For those not familiar with marine operations of DUKWS on the River Thames LDT would liken it to trying to enter and exit a motorway by crossing from the outside lane of one side to the hard shoulder of the other, without any ability to control the moving traffic within the other lanes"*.

N.5.26 After Phase two a minor alteration to the shape of the CSO drop shaft structure was made to provide a better line of sight for users of Lack's Dock, which included a line of piles in front of the interception structure to prevent vessels from grounding. In addition Thames Water discussed these proposals with the PLA and LDT. Thames Water will continue to discuss the proposed works in the river with the PLA (in consultation with LDT) and provided a Navigational Issues and Preliminary Risk Assessment report with the application which includes an assessment of navigational issues, risk and mitigation measures. If the works proceed contractors would be required to provide detailed method statements and navigational risk assessments to be agreed with the PLA prior to commencement of the works.

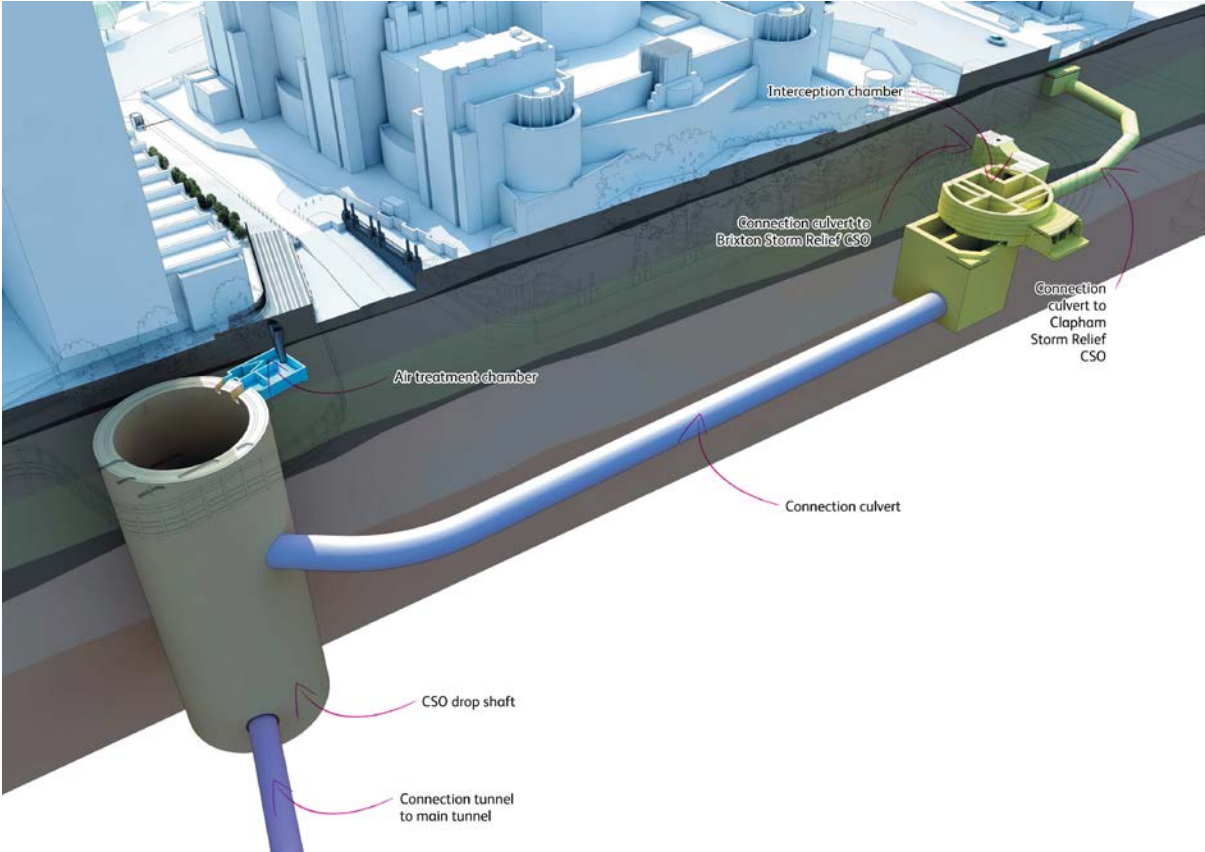
Historic setting and views along the river

N.5.27 The proposed development at Albert Embankment Foreshore is a carefully considered design response to the need for functional utility infrastructure to be retrofitted into a complex urban environment, while achieving a high quality design outcome.

N.5.28 The Design Council CABE, English Heritage and the London Borough of Lambeth insisted that the historic character of the area was respected. Following phase one consultation, attention was therefore focused particularly on resolving the relationship of the CSO interception structures with Vauxhall Bridge and the foreshore. Studies were undertaken of the style and massing of the structures which sought to complement the adjacent built environment. At one stage an option was considered which linked the two structures underneath Vauxhall Bridge via a pedestrian bridge (similar to the arrangement beneath Chelsea Bridge). However, this produced bulky structures on either side of the listed bridge abutment.

N.5.29 To refine the appearance of the structures besides Vauxhall Bridge the proposed Clapham and Brixton Storm Relief CSO interception chambers were combined into one CSO interception structure positioned on the northern side of the bridge. The Clapham Storm Relief CSO is connected to the interception chamber via a culvert along the foreshore, as shown in the Functional components diagram overleaf.

Figure N.3 Functional components diagram



- N.5.30 In parallel, physical modelling of the function of the CSO drop shaft led its diameter to be increased from approximately 10m to 16m in order to meet the hydraulic requirements. Following modifications to the project-wide air management strategy, more ventilation columns of a smaller size than initially proposed were also introduced.
- N.5.31 In April 2011 a review session was held with the Design Council CABE, this set out the use of the site, the layout of the below-ground infrastructure, vehicular access and egress points, plans for the Thames Path and possible materials. Early concept sketches for a terraced structure around the CSO interception structure were also provided and although the concept was not completely resolved, it demonstrated Thames Water’s intention to design a contoured structure that would complement the foreshore environment.
- N.5.32 In a letter dated 13 April 2011 the Design Council CABE panel said that the scheme responded appropriately to the functional context. In relation to the CSO drop shaft structure to the north of Lack’s Dock, the panel supported *“the decision to mark the termination of the embankment at this point with an extended river wall and area of hardstanding accessible to the public”, and encouraged “further enhancing the pedestrian experience”*. However, the panel recommended that the *“designs should demonstrate a fuller appreciation of how they will affect both the visual integrity of the [Vauxhall] bridge as it meets the embankment and the relationship of the proposals to the springing point of the bridge”*.

- N.5.33 Thames Water continued to progress the functional and aesthetic design and in June 2011 held a second review session with the Design Council CABE. The concentric circular geometry of the upper levels of the structure was designed to reference the architecture of Vauxhall Cross. The new design incorporated areas of intertidal habitat in the form of terraces stepping down from the level of the existing flood defences. In a letter dated 30 June 2011 the Design Council CABE commented on the revised proposals saying: *“As one of the most important sites of the Thames Tunnel³ project, it is critical that the proposals for the Albert Embankment Foreshore both respect and enhance this sensitive riverside setting. While we welcome the way in which the proposals terminate the embankment, we think the design and positioning of the foreshore structure beside the bridge would benefit from further thought”*.
- N.5.34 Thames Water considered the comments of the Design Council CABE panel and in response moved the top terrace of the CSO interception structure further away from Vauxhall Bridge, increased the distance from the river wall and made the circular geometry of the terraces less formal. This design was then presented at phase two consultation.
- N.5.35 Following phase two consultation, minor amendments were made to the proposed plans, including the introduction of an access gate to prevent public access to the CSO interception structure, a request of the occupiers of Vauxhall Cross. In addition, a minor alteration to the shape of the CSO drop shaft structure was made to provide a better line of sight for users of Lack’s Dock.
- N.5.36 In a letter dated 3 July 2012 the London Borough of Lambeth said in relation to the amended permanent design: *“The proposals incorporate into the design a functional and welcome addition to the public realm that allows safe access to the inspection chamber and the space to be enjoyed, enhancing the views of Lambeth bridge and the Houses of Parliament. There are concerns that to restrict access to this area would be detrimental in both appearance and perception of safety, and in addition, create unnecessary added maintenance costs and create a space [that] could lead to anti-social behaviour or a convenient hiding place”*. Given that the access to the interception structure is objected to on security designs, the proposals to gate the structure were retained but developed a design principle to make the area public realm in future if security concerns are resolved.
- N.5.37 An aerial view of the proposed structure and landscaping is shown overleaf.

³ The project changed its name from the Thames Tunnel project to the Thames Tideway Tunnel project in July 2012.

Figure N.4 Aerial visualisation of the completed site



Limiting the impacts from construction

- N.5.38 In order to limit the impacts of construction, a number of measures were developed to mitigate site-specific issues at Albert Embankment Foreshore including:
- a. The height of hoardings was increased.
 - b. The foreshore would be protected from vehicular traffic.
 - c. The area of foreshore between the worksites would be monitored for spillage of oils, fuels and other materials during use. The use of low vibration piling such as hydraulic jacking/hydraulic press methods where possible for construction of the cofferdam
 - d. A traffic marshal would manage potential conflicts between Thames Water and LDT vehicles.
 - e. The Thames Path diversion would be clearly signposted.

Conclusion

- N.5.39 The proposals for Albert Embankment were carefully developed through a collaborative process of design review and extensive consultations. The key functional requirements at this site relate to the need to receive the proposed main tunnel driven between Earl Pumping Station and Chambers Wharf and to connect the existing Clapham Storm Relief CSO

and Brixton Storm Relief CSO to this main tunnel. The proposals demonstrate that this can be achieved in an efficient and effective manner.

- N.5.40 The design life of the major civil engineering components of the project is 120 years, including buildings. The details of the external finishes of the ventilation columns and kiosks are not specified in the application, but are to be submitted for the subsequent approval of the local planning authority. These details must be in accordance with the design principles, which require materials to be high quality and long lasting. The project was designed to be durable and resilient to change. The Environment Agency established the Thames Estuary 2100 project to develop a long-term flood risk management plan for London and the tidal Thames. The plan suggests that the height of the tidal Thames flood defences could be raised in the future. This was taken into account and the ability to raise river walls at a later date was incorporated into the designs.
- N.5.41 The aesthetic components relate to the creation of a new, high quality landscaped space, which could be publicly accessible, and through careful design of the foreshore and above-ground structures. Through a careful and considered site layout and appropriate landscaping the proposals respond sensitively to the characteristics of the site of its neighbours. The final detailed design would contribute positively to the character of the area and create an attractive and adaptable space.

Water quality, water resources and flood risk

- N.5.42 There is no discernible difference between access Options A and B with respect to this topic.

Water quality and resources

- N.5.43 There are seven licensed groundwater abstractions from the lower aquifer located within 1km of the Albert Embankment Foreshore site; with three to the southwest, one to the west and east and two to the north. These abstraction sources are used for drinking water supply and for ground source heat pump purposes. The nearest licensed groundwater abstraction from the River Terrace Deposits or upper aquifer is located further than 1km from the site and therefore is unlikely to be impacted. There are no known unlicensed groundwater abstractions from either the upper or lower aquifers locally.
- N.5.44 Measures to protect water quality and resources during construction are detailed in Section 8 of the *CoCP* Part A, and referred to in Sections 5 and 7 of the *Planning Statement*. The *CoCP* also covers activities that are subject to pollution control and makes reference to good practice.
- N.5.45 After taking into account the measures incorporated into the design and *CoCP*, including adherence to good pollution prevention practice, there would be no adverse impacts on surface water resources, river flows and groundwater resources.
- N.5.46 Once operational, the scheme would reduce the number of discharges significantly from 35 to one. Therefore the project would have a beneficial effect on water quality in the tidal Thames and contribute to the protection and enhancement of biodiversity of the Blue Ribbon Network.

N.5.47 The site therefore meets the decision making criteria set out in the NPS as no adverse effects are expected on water quality or resources and the Environment Agency has no outstanding concerns.

Flood risk

N.5.48 The main flood risk to the site during construction and operation is the tidal Thames. The majority of the site is situated within the foreshore, which is a functional floodplain and is classified as Flood Zone 3b (land where water flows or is stored during flooding). The inland section of the site falls within the 'high probability' flood zone (Flood Zone 3a). A Flood Risk Assessment including the sequential and exception test undertaken in accordance with Section 4.4 of the NPS is provided within the *Environmental Statement* (Vol 3, Section 15)).

N.5.49 Flood defence levels along the River Thames frontage would be maintained during the temporary works. This would be achieved by constructing a temporary works platform in the river (including cofferdam) to the same height as the existing flood defence level. This temporary structure would tie into the existing flood defences on either side of the site.

N.5.50 The permanent operational area would be protected from flooding through the provision of flood defences which would provide the same level of protection as existing defences. This would be secured via a project-wide riparian design principle (IRVR.02). In addition, to accommodate climate change the proposed new structure at Albert Embankment Foreshore was designed so that the river walls can be raised to TE2100 levels in the future.

N.5.51 The new flood defences would be located along the periphery of the operational area and would tie into existing flood defences, providing a continuous defence line along the embankment at all times. However, as at present, the site would be at residual risk of tidal flooding in the event of a breach in the new flood defence wall or overtopping of the defence wall as a result of a failure of the Thames Barrier. The consequence of a breach or failure of flood defences would not compromise the long term operational function of the tunnel and therefore no additional measures in addition to those outlined above are proposed.

N.5.52 Part B of the *CoCP* includes site-specific measures for temporary drainage of the construction access route and permeable surfacing of temporary areas of hardstanding.

N.5.53 Operational surface water drainage at this site is addressed in the design principles, which require on-site drainage to be designed in accordance with relevant National Standards and in accordance with the Water Management Act 2010. Site-specific design approaches and measures were developed to ensure surface water is positively drained once operational. In the event of a storm coinciding with a high tide event, surface water drainage from the site may be restricted by tide-locking of the surface water outfall, similar to existing riverside areas. Although water would potentially pool on the surface of the public realm, given the rare

concurrence of such events, on-site storage at or below the surface would be provided in accordance with design principle SDRN.02.

N.5.54 The *Draft DCO* includes a requirement for the permanent drainage details to be submitted and approved in writing by the local authority in accordance with the design principles.

N.5.55 The Flood Risk Assessment shows that the proposed development would be appropriate for the area as flood risk to the development would remain unchanged and the development would not lead to an increase in flood risk in the surrounding area. The presence of permanent structures within the foreshore has the potential to reduce the availability of flood storage within the tidal foreshore of the River Thames. The effect of removal of flood storage on flood levels is propagated throughout the hydrological unit of the Thames reach and was considered on a cumulative basis. This is discussed further in the project-wide assessment.

N.5.56 The project would have a direct beneficial effect on water quality in the River Thames at this location and contribute to the protection and enhancement of biodiversity of the Blue Ribbon Network and the River Thames Site of Nature Conservation Importance.

N.5.57 Following the construction of the proposed development, the risk of flooding would remain unchanged. Therefore, the proposed development satisfies the decision making requirements of the NPS as set out in para. 4.4.10.

Air quality, emissions, dust and odour

N.5.58 There is no discernible difference between access Options A and B with respect to this topic.

N.5.59 The project-wide air management plan is designed to keep the air in the tunnel system fresh, avoid any build-up of pressure in the system, and to treat the air released. This would be achieved by a combination of forced or active ventilation treatment and passive air treatment. In addition, ventilation structures would be required at most sites to allow air to enter and leave the system.

N.5.60 When the tunnel system is empty, clean air would be drawn inside to keep the air fresh and avoid odour. As the tunnels fill, any air would pass through carbon filters to clean it and remove any odours before it is released.

N.5.61 The northern part of the London Borough of Lambeth, which includes the Albert Embankment Foreshore site, has been designated as Air Quality Management Area for NO₂. The Albert Embankment Foreshore site is also close to the boundaries of the City of Westminster and the London Borough of Wandsworth, both of which have declared Air Quality Management Areas for NO₂ and PM₁₀ for their respective boroughs.

N.5.62 In addition to local authority monitoring by the London Borough of Lambeth, diffusion tube monitoring was undertaken as part of the Environment Impact Assessment to monitor NO₂ concentrations in the vicinity of the site. All of the six monitoring sites showed measured concentrations above the NO₂ annual mean objective/limit value. These

concentrations are in line with the local authority monitoring at roadside sites and are typical of the high levels in central London.

- N.5.63 The closest sensitive receptors to the development are residential and office occupiers of adjoining properties.
- N.5.64 The long leaseholders of Camelford House (CGIS Ltd) have through their legal and property representatives objected to the proposal on several grounds including dust and amenity impacts potentially associated with construction.
- N.5.65 Through the measures included in the *CoCP*, all reasonable steps would be taken to minimise detrimental impacts on air quality or amenity resulting from emissions and dust, as required by guidance in the *NPS*. With the implementation of the *CoCP* measures, the overall effect on local air quality from construction (ie, effects from construction road traffic, tugs for river barges and construction plant), would not be significant at any of the closest sensitive receptors.
- N.5.66 Appropriate measures are proposed to ensure that the proposals would not lead to any or substantial changes in, air quality, emissions, dust or odour or a significant loss of amenity during construction or operation.

Biodiversity and geological conservation

- N.5.67 There is no discernible difference between access Options A and B with respect to this topic.
- N.5.68 The site was designated by the Environment Agency as being within a hydrological Source Protection Zone 2. There are no internationally designated (Special Protection Areas, Ramsar sites) or nationally designated ecological sites (Sites of Special Scientific Interest, Marine Conservation Zones) in the vicinity of the site. The site is locally designated as a 'River Thames and Tidal Tributaries Site of Importance for Nature Conservation'.
- N.5.69 In its letter dated 2 October 2012, the Environment Agency stated: "*We were pleased that from the beginning of the Thames Tideway Tunnel project, the project team agreed to use the balance sheet approach to biodiversity mitigation and compensation as this is a transparent way to show impacts, mitigation and compensation across the project. This will be supported by the application of the agreed decision hierarchy of: avoid impact, minimise impact, mitigate and compensate*".
- N.5.70 Specifically with regards to the Albert Embankment Foreshore site, the Environment Agency also stated that: "*the foreshore in this area is a large shoal area of gravel/shingle. It is rare in the local context and therefore it will need to be reinstated fully once the coffer dam and campsheds are removed*".
- N.5.71 During construction, effects would be managed in accordance with measures outlined in Part A of the *CoCP*. Part B provides additional site-specific detail including a requirement to monitor the area of foreshore between working sites for spillage of oils, fuels and other materials. A membrane would also be installed between the river bed and the temporary fill material of the cofferdam to prevent contamination of

juvenile fish habitats. As far as practicable the structure would, therefore, reinstate the shingle habitat of the existing foreshore. The contractors environmental management plan would include an ecology and landscape management plan which would detail the approach to management of effects on ecological receptors to ensure compliance with the *CoCP*.

- N.5.72 The design of the structure at Albert Embankment Foreshore incorporates habitats for aquatic ecology, whereby the concrete finish on each terrace roughens and becomes more shingle-like as it gets closer to the river bed. The very base of the structure would be tied into the foreshore with boulders. This would provide an opportunity for a variety of fish habitats.
- N.5.73 All of the terraces would be above mean low water springs (ie, all would be in the intertidal zone). The outer 'walls' of the two lowest terraces would be made of boulders (maximum size approx. 500mm diameter) rather than cast concrete, to provide a more diverse habitat for fish. The third terrace would be planted with common reed *Phragmites Australis* as this species is more likely to be more resilient to constant inundation and wave action. The upper terraces would be inundated less frequently. These are therefore more appropriate for saltmarsh creation. The highest terrace would only be inundated on a roughly two-week cycle and would essentially consist of a standing brackish pool which would be tidally flushed every two weeks.
- N.5.74 By intercepting the CSO, the project would result in the reduction in the occurrence of dissolved oxygen related fish mortalities and would improve the quality of the foraging habitat for fish, constituting a significant beneficial effect.
- N.5.75 In accordance with NPS guidance, Thames Water sought to minimise impacts on biodiversity and to take advantage of opportunities to conserve and enhance biodiversity as part of the proposals in this location.

Landscape and visual effects

- N.5.76 There is no significant difference between access Options A and B with respect to this topic.
- N.5.77 During construction, the scale and intensity of activity would result in temporary effects on the townscape and views in the immediate surrounding area comprising the office and residential buildings along Albert Embankment, the River Thames (Vauxhall and Pimlico reach) and St George Wharf. The visibility of construction is an unavoidable consequence of the scale of works required to construct the drop shaft and main tunnel. The NPS recognises in para. 1.4.4 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. The type and scale of the temporary construction activities proposed is not uncharacteristic of other major construction projects undertaken throughout central London, such as Crossrail, or the scale of regeneration development which is forecast over the next 20 years within the wider Vauxhall, Nine Elms and Battersea Framework Plan Area. Large scale

construction works at Albert Embankment Foreshore should be viewed in this context and would be experienced against the background of the planned residential development/major redevelopment of the site and surrounding area.

- N.5.78 The design of the permanent works took considerable care to integrate the proposals into the existing townscape. The size and location of the interception structure to the north of Lack's Dock was designed in order to reduce the extent to which the new structure would project into the river and minimise the effect on the setting of Vauxhall Bridge. The shaft structure would sit in the recess behind the line of the river walls formed by Albert Embankment and Vauxhall Cross. The shape of the structure was designed to reference this line and mark the termination of the embankment river wall at Lack's Dock more strongly. The link between the site and the embankment would be further strengthened by planting three London Plane trees, a standard feature of the Victorian embankments, towards the back of the site.
- N.5.79 Thames Water took into account the Albert Embankment Conservation Area designation by the London Borough of Lambeth, and received positive comments on the design from the Design Council CABE, the London Borough of Lambeth, and English Heritage. In its letter dated 10 February 2012 responding to phase two consultation, English Heritage said "*We consider the proposed design for the operational infrastructure is effective and welcome the way the infrastructure around the bridge has stayed clear of the bridge's springing point; a feature we consider essential.*"
- N.5.80 There would be temporary effects on the townscape during construction but, during the operational phase there would be significant beneficial effects as a result of the development creating a new high quality space which could be available to the public.

Land use and open space

- N.5.81 The area within the LLAU comprises foreshore of the tidal Thames, part of the Thames Path and a small section of land associated with Camelford House, a commercial office building. Immediately adjoining the site there are two further office land uses at Tintagel House and Vauxhall Cross. Residential land uses are found at Peninsula Heights to the north of the site and St George Wharf on the southern side of Vauxhall Bridge (which also incorporates some retail and office uses). Land uses in the wider area include more residential, retail and commercial uses, a bus and train interchange, wholesale market, museum and warehouses.

Camelford House

- N.5.82 Camelford House is in close proximity to the site. CGIS Ltd has through its legal and property representatives objected to the proposal, primarily on the basis that the construction would impede its 'quiet enjoyment' of Camelford House as promised in their lease with freeholder the Duchy of Cornwall. Camelford House is presently fully occupied by 25 sub-leaseholders who CGIS Ltd fears would utilise break clauses should the convenience and amenity of their premises be harmed by the proposals.

- N.5.83 The Duchy of Cornwall (freehold owners of Tintagel House and Camelford House) are generally supportive of the project but are concerned about construction effects on the lessees and tenants of the buildings (this is discussed further below under the Noise and vibration subsection).
- N.5.84 Camelford House and Tintagel House are designated on the Proposals Map as Major Development Opportunity Site 64 and situated within the Vauxhall, Nine Elms, Battersea Opportunity Area Planning Framework area. The site itself may be redeveloped and the wider area would experience substantial construction effects in any event. The temporary construction effects from the works at Albert Embankment foreshore need to be seen in this context.
- N.5.85 The proposed development would not sterilise the redevelopment of the Major Development Opportunity Site, although it is noted that should it be redeveloped, construction access Option B may cause severance and discourage proposals being brought forward during the construction works.
- N.5.86 There is no evidence to suggest that the proposed development would render the existing use of the building non-viable in planning terms. Any impacts on Camelford House would be temporary and not untypical of those associated with close proximity to any major construction site in central London.
- N.5.87 The scheme supports the objectives of the Vauxhall, Nine Elms, Battersea Opportunity Area Planning Framework, by providing an increase in the amount and quality of public realm available in the area.
- N.5.88 Vauxhall Bridge and Albert Embankment are part of the Transport for London Road Network. Aside from an increase in traffic associated with the scheme during construction; and possibly an additional vehicle crossover on Albert Embankment for access Option B, the proposed development would not result in any changes to the surrounding road network.

Foreshore

- N.5.89 Albert Embankment Foreshore is only visible and publicly accessible during low tide. The space has some limited visual amenity and environmental value as part of the wider River Thames but no formal recreational value. The proposals would require a temporary land take and would affect the function of the foreshore during construction works when it would be enclosed by the cofferdam and site hoarding. The permanent works would comprise a permanent loss of foreshore, but the size of the structures have been minimised as far as possible and are an unavoidable consequence of the need to intercept the CSOs in this location. Following construction, the accessible foreshore would be replaced by a new embankment structure at ground level that is largely publicly accessible.
- N.5.90 The Thames Path to the east of Vauxhall Bridge accommodates facilities for sitting out, public art and educational information on wildlife in the Thames. The space also forms part of the Thames Path and therefore has a recreational role. The construction works would require temporary

closure and diversion of the Thames Path. The space would not be open for sitting out and construction and visual impacts are likely to make sitting out less attractive. However, these effects would be temporary and on completion the Thames Path would be widened to allow pedestrians to be diverted in front of (rather than underneath) Camelford House. The undercroft area no longer required for circulation would be screened off with high quality architectural fencing and returned to the landowner. Once complete a new landscaped space of approximately 3,000m³ would have been created, a substantial contribution to the London Borough of Lambeth both in scale and quality of open space.

- N.5.91 In summary, although the proposed development would result in temporary noise, dust and general disturbance to adjoining properties, particularly Camelford House, the eventual land use and indicative design is compatible with the existing land use designations for the site and surrounds. There would be a permanent loss of foreshore, but this has been minimised as far as possible and would be replaced by a high quality public realm. Moreover, it is not considered that any extant planning permissions, committed developments, or policy allocations for future development within the surrounding area would be adversely impacted as a result of the works in this location or through adverse cumulative effects.

Noise and vibration

- N.5.92 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.
- N.5.93 The noise environment in the vicinity of the site is dominated by road traffic noise from Albert Embankment and Vauxhall Bridge. The nearest residence to the site is 1 to 146 Bridge House to the southeast of the site. Peninsula Heights to the north of the site was also assessed. Both receptors are in the London Borough of Lambeth. On the north bank of the Thames are the residential developments on Milbank and Grosvenor Road which are within the City of Westminster. The non-residential noise sensitive receptors selected for assessment are Vauxhall Cross, Camelford House and Tintagel House which are office buildings on the south bank in the London Borough of Lambeth.
- N.5.94 Through its legal and property representatives, CGIS Ltd objected to the proposal, primarily on the basis that the construction would impede its 'quiet enjoyment' of the property as promised in its lease with freeholder the Duchy of Cornwall. Camelford House is presently fully occupied by 25 sub-leaseholders who CGIS Ltd fears would utilise break clauses should the convenience and amenity of their premises be harmed by the proposals. In anticipation of perceived damage to their business, CGIS Ltd claimed they would sue the Duchy of Cornwall for loss of income.
- N.5.95 As the project environmental assessment team was not able to access the interior of Camelford House to undertake baseline noise assessment or determine if it is eligible for noise insulation, a worst case scenario of significant noise impacts was assumed. Construction noise impacts at Camelford House are therefore considered potentially significant. The

- increase in average noise levels inside the building could exceed guideline noise levels for general office use based on typical noise insulation designed for a façade of this type.
- N.5.96 The noise generated by construction traffic is relatively small compared to other activities and therefore it is unlikely occupants of Camelford House would notice a difference in noise volumes between Options A or B.
- N.5.97 Where barges are used to transport materials by river, a change of less than 3dB is predicted and therefore the noise impact from river-based construction traffic is not considered to be substantial.
- N.5.98 Noise impacts at Vauxhall Cross and Tintagel House are also expected to be significant although the extent of insulation for these buildings is also not known.
- N.5.99 The Albert Embankment Foreshore CoCP Part B sets out a number of additional mitigation measures to address noise effects such as increased hoarding height.
- N.5.100 The *Environmental Statement* identified that there are no operational noise impacts as a result of the proposals.
- N.5.101 In addition to the construction noise impacts on amenity, the CGIS are concerned that vibration from construction vehicles and processes might damage their building. In a letter from their property consultants Jones Lang LaSalle dated 4 July 2012 CGIS said in relation to access Option B: *“the access between the two buildings is extremely narrow and was not designed to carry the heavy duty traffic at the frequencies and for the periods envisioned in the proposals. In particular, the access is within a distance of less than one metre from the retaining walls supporting the north elevation of our clients’ building and their basement car park. The heavy duty vehicles travelling to and from the construction site would impose significant surcharges on these retaining walls. The proposal is unacceptable because the proposed user of the access might cause severe damage to these retaining walls and thereby loosen the stone and brick cladding and cause shelling of the panels”*.
- N.5.102 The CoCP Part A seeks to ensure that piling methods which limit noise and vibration are selected where possible. If ground conditions at the Albert Embankment Foreshore site are such that these methods could be implemented, effects would not be significant. However, as the specific ground conditions encountered would not be known until piling is underway, it cannot be guaranteed that these measures can be implemented. Therefore, in the worst-case, significant effects would arise from piling at Bridge House, Vauxhall Cross and Camelford House (as identified above). However these are below the threshold of potential cosmetic damage to buildings.
- N.5.103 Measures to manage ground movement effects arising from construction are described in the *Settlement Information Paper*, which accompanies the application.
- N.5.104 The NPS advises that in situations where other forms of noise mitigation have been exhausted, noise insulation to dwellings or, in extreme cases,

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

Historic environment

- N.5.105 There is no discernible difference between access Options A and B with respect to this topic.
- N.5.106 The *Heritage Statement* which accompanies the application explains the archaeological, heritage and conservation area attributes of the site more fully.
- N.5.107 The NPS recognises that NSIPs are likely to take place in mature urban environments and to have adverse effects on archaeology and cultural heritage.

Archaeological assets

- N.5.108 The site is located within an Archaeological Priority Area; this pertains partly to a prehistoric pile structure of possible Mesolithic date (10,000 to 4,000 BC) that is located within the site. This is visible within the foreshore area of the site at low tide. Past human activity and the scouring action of the river mean that the potential for evidence surviving from the Roman to early modern periods is relatively low. Continued river action is also likely to destroy the (potentially) Mesolithic piers structures, therefore these are being carefully removed for study and preservation.
- N.5.109 English Heritage identified this location as being the most significant site for archaeology along the route of the tunnel and although not formally designated, the Prehistoric pile structure on the foreshore is potentially of national importance.
- N.5.110 Further evaluation and mitigation would be carried out in accordance with a scope of works (*Site-specific Archaeological Written Scheme of Investigation*), based on the principles in the *Overarching Archaeological Written Scheme of Investigation*, which accompanies the application, to ensure that the scope and method of fieldwork are appropriate. The site-specific scheme would be submitted in accordance with the DCO Requirement.

N.5.111 There is no realistic alternative to the loss of this important heritage asset, but the measures proposed would record and advance understanding of its significance before it is lost.

Effect on the setting of the conservation area

N.5.112 Albert Embankment Conservation Area was proposed by London Borough of Lambeth in 2001. The designation of the Albert Embankment Conservation Area (CA57) states (26 November 2001, p. 2): *“The designation recognises the historic significance of one of London’s most ambitious engineering achievements of the Nineteenth Century – the construction of the Albert Embankment itself, planned by the famous Victorian engineer Sir Joseph Bazalgette in 1869 (including the dolphin / sturgeon lamps and benches) and the surviving small docks associated with it. The Conservation Area status also recognises the architectural significance of the two major landmark buildings on the Embankment – the monumental post-modern Vauxhall Cross building at Vauxhall Bridge and the art deco modern London Fire Brigade Headquarters, along with what survives of the C19th Century heritage of the area including Vauxhall Bridge, two mid C19th public houses – the Crown and the Windmill, and a Victorian warehouse. Finally the Conservation Area will further protect the important strategic views from the Albert Embankment and Vauxhall Bridge of the Palace of Westminster and the Tate Gallery”.*

N.5.113 During construction, the scale and intensity of activity would result in temporary visual effects on the Conservation Area. The CoCP identifies mitigation in the form of high specification hoardings on the land facing parts of the site. It should be noted however that construction is an unavoidable consequence of the scale of works required to construct the drop shaft and main tunnel. The type and scale of the temporary construction activities proposed is not uncharacteristic of other major construction projects undertaken throughout central London, such as Crossrail, or the scale of regeneration development which is forecast over the next 20 years within the wider Vauxhall, Nine Elms and Battersea Framework Plan Area.

N.5.114 The proposed use has particular reference to the context of the Albert Embankment, being an upgrade to the Bazalgette sewer system which is the reason the Albert Embankment was built. An indicative level of design was agreed with the London Borough Lambeth and English Heritage and final details would be discussed with these and other stakeholders in line with the Requirements of the development consent and the design principles.

N.5.115 The works would provide an improved Thames Path and a high quality area of public realm from where views across the Conservation Area towards the Tate Britain and Palace of Westminster can be enjoyed. In the long term this would enhance the conservation area and these operational benefits are considered to outweigh the temporary construction effects.

Effect on the Grade II* listed Vauxhall Bridge

- N.5.116 The heritage effect of the proposals on the Grade II* listed Vauxhall Bridge generally would be minimised by: the small size and low height of the interception structure, breaking up its appearance through its terraced and curving shape; butting the structure up to the listed abutment and making the fewest physical connections between the two; and ensuring that the important view of the whole eastern arch is maintained through keeping the proposed structure beneath the springing level. This would result in a modest, acceptable impact on the fabric and the setting of the bridge.
- N.5.117 The Grade II* listed Vauxhall Bridge would be slightly affected by ground movement during construction. The bridge would experience an approximate maximum vertical settlement of 8mm at pier three and 10mm at pier four, with the possibility of hairline cracking to a maximum of 0.1mm. No structural instability would result from the ground movement, a negligible magnitude of change to the bridge with only a minor adverse effect. A membrane around the footing of Vauxhall Bridge (east) would further protect the bridge during construction, protecting the fabric of the listed structure.
- N.5.118 The London Borough of Lambeth and English Heritage supported the proposals at this site. Subsequent agreement of final details such as materials and planting would be achieved through the proposed Requirements, in compliance with the agreed design principles.

Light

- N.5.119 The NPS requires the decision maker to be satisfied that all reasonable steps have been undertaken to minimise detrimental impact on amenity from artificial light. Additionally, Thames Water prepared a *Daylight/Sunlight Assessment*, which accompanies the application. Although there are both residential and commercial properties surrounding this site the screening assessment concluded that neither the temporary nor the permanent works would have a material impact.
- N.5.120 With regards to artificial lighting during construction, no assessment of effects on night time character is made for this site during construction on the basis that:
- a. The site would generally only be lit in the early evening during winter.
 - b. All site lighting would have minimal spill into the wider area due to the measures set out in the draft CoCP.
 - c. The surrounding area is lit in the early evening by street lighting and by light spill from surrounding buildings.
 - d. Visual receptors have limited sensitivity to additional lighting in the early evening.
- N.5.121 For practicality and safety reasons tunnel construction needs to take place over extended periods of time, including working on a 24-hour, seven days a week basis. A short period (approximately three months) of below ground 24-hour working would be required at Albert Embankment Foreshore. During this period, the working would mainly take place below

ground but artificial lighting would be required for the supporting activity at ground level for extended periods during the tunnel construction and secondary lining phases. Measures are included within the *CoCP* to ensure that all reasonable steps would be taken to minimise any detrimental impact on amenity. For example, site lighting during construction would be capped and directional to ensure minimal light spill and lighting would only be used when necessary. Therefore there would be no unreasonable effect on residential properties during construction.

- N.5.122 An assessment of the landscape and visual effects of lighting during operational phase found that at night, lighting (including public realm lighting and illumination of the ventilation columns), would be barely perceptible in the background of the view.
- N.5.123 Through the measures included within the *CoCP* all reasonable steps have been taken, and would be taken, to minimise detrimental impact on amenity resulting from artificial light as identified in the NPS.

Traffic and transport

- N.5.124 Albert Embankment and Vauxhall Bridge are designated part of the TLRN, meaning Transport for London (TfL) is the relevant responsible authority for any changes proposed to the roads, discussed further in the traffic and transport section of this report.
- N.5.125 As explained, two options for construction site access are included in the application for development consent. This allows the issue to be considered and determined as part of the examination of the application.
- N.5.126 For access Option A the site access point would be from the existing Lack's Dock access road which is currently used by the tour operator. Due to the proximity to Vauxhall Cross, an off-site security screening area would additionally be required to search construction vehicles prior to arrival at site. Option A is the less obtrusive of the two access routes as it utilises an existing entrance from Albert Embankment (A3036), one of two TLRN roads bordering Vauxhall Cross.
- N.5.127 For access Option B it would be necessary to remove a section of pavement, wall and a tree on Albert Embankment to create a new access point to direct traffic between Tintagel House and Camelford House then along the foreshore to the construction site.
- N.5.128 Option B attracted objection from several parties including CGIS who were concerned about the frequency and type of vehicles intended to use the space immediately to the north of their building, Camelford House.
- N.5.129 In a letter dated 3 July 2012 the London Borough of Lambeth stated in relation to construction access Option B:
- “Although the public highway is the responsibility of transport for London, Lambeth is concerned about the introduction of a separate access and egress point between Camelford Houses given there is a suitable existing access at Lack's Dock. As this access is used on a daily basis by Duck Tours it is difficult to understand the security issue of Thames Water's vetted construction vehicles using this access especially as they still propose some occasional use. In addition we have concerns that an extra*

entrance for HGVs on Albert Embankment would further negatively impact on pedestrians and cyclists already diverted from the closed section of the Thames Path”.

N.5.130 Further to the above, in response to Section 48 consultation on 5 October 2012 the London Borough of Lambeth wrote a further letter reiterating its concerns regarding proposed construction access Option B.

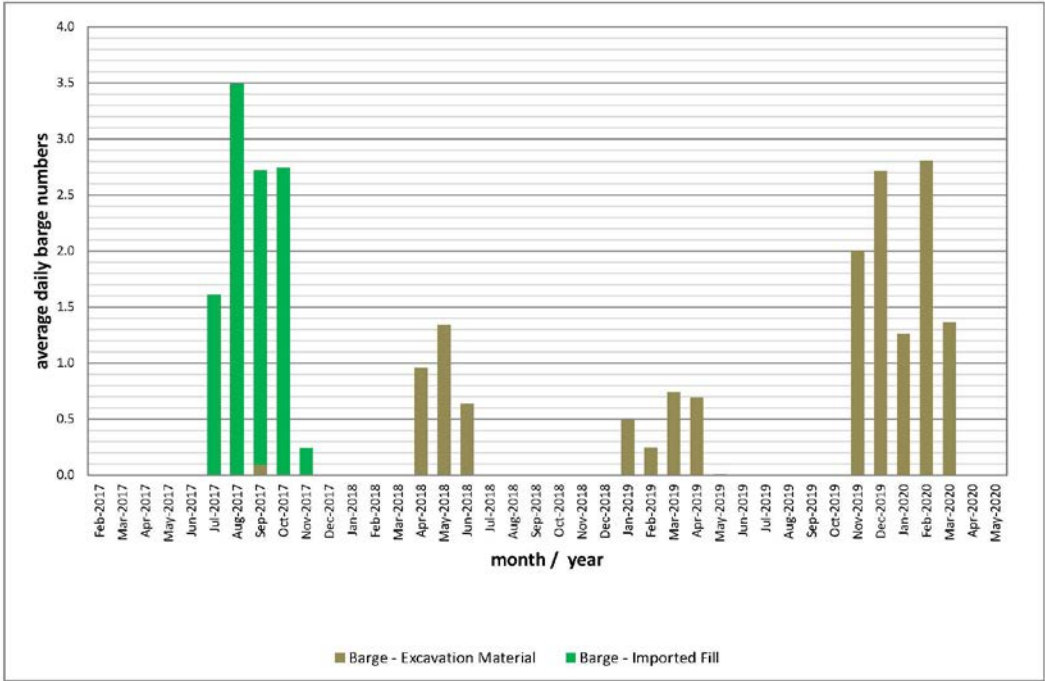
N.5.131 In its letter dated 4 July 2012, TfL did not object to the proposed construction access Option B. It stated that:

“The scheme promoter has identified that inbound vehicles may first need to be held in a nearby holding area and if this is the case the location of this holding area needs to be identified and included within any TA for the site so as to satisfy TfL as there are concerns over the proposed design of the site access from the A3036 Albert Embankment and the potential impact of vehicles turned away”.

N.5.132 During construction vehicle movements typically would take place on weekdays between 8am to 6pm and on Saturdays from 8am to 1pm with up to one hour before and after these hours for mobilisation and demobilisation of staff. Mobilisation may include: loading; unloading; and arrival and departure of workforce and staff at site and movement to and from the place of work. In exceptional circumstances HGV and abnormal load movements could occur up to 10pm for large concrete pours and later at night on agreement with the local authority. Further details can be found in the CoCP which accompanies the application.

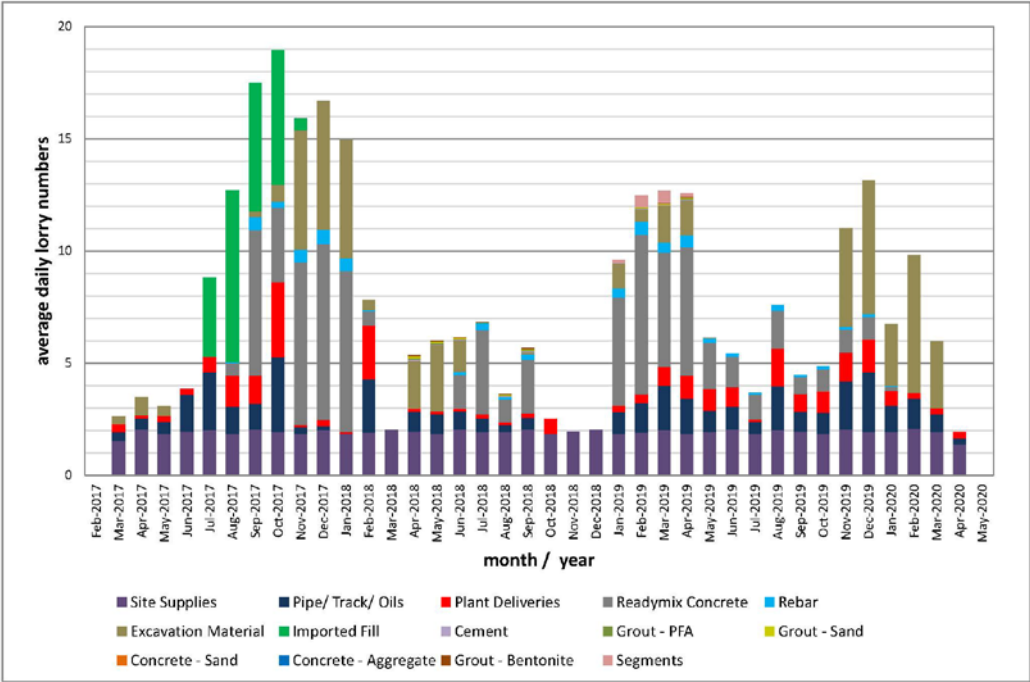
N.5.133 River transport would be used at this location to export shaft excavated materials and other materials, and to import and export cofferdam fill material. Approximately 90 per cent of all materials would be moved by river, which would significantly reduce the number of HGV trips required.

Figure N.5 Albert Embankment Foreshore: Average daily barge numbers



N.5.134 It is anticipated that along Albert Embankment there would be five more two-way HGV movements during the peak hour, and an average of one two-way HGV movements during the peak hour associated with other project sites during site year 1 of construction. The estimated number of movements in the *Transport Assessment* is not considered significant in terms of the capacity or usage of the surrounding road network.

Figure N.6 Albert Embankment Foreshore: Average daily lorry numbers



N.5.135 The Thames Path would be temporarily diverted during construction. During the operational stage, the location of the permanent works and access would facilitate the widening of the existing Thames Path and enhance the quality of this existing pedestrian route.

N.5.136 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 on the surrounding transport networks. No mitigation is required for the operational phase.

N.5.137 The NPS recognises that new nationally significant infrastructure may give rise to substantial impacts on traffic and transport particularly during construction, however, provided that the applicant is willing to mitigate adverse impacts, including by entering into development consent obligations, then development consent should not be withheld. Furthermore, limited weight should be applied to residual effects on the surrounding transport infrastructure’ (NPS para. 4.13.7).

Waste management

N.5.138 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 an obligation in accordance with para. 4.14.7 of the NPS.

N.5.139 No particular site-specific waste issues arise at this site.

Socio-economic

N.5.140 The site-specific socio-economic assessment is reported in the *Environmental Statement*, along with the outcomes of the *Equalities Impact Assessment*, which accompanies the application.

N.5.141 Temporary diversion of the Thames Path plus noise and vibration during construction, are the primary impacts on the surrounding residential and business community. Potential construction impacts on existing site users LDT and Camelford House are explained in the Land use and open space subsection above; and it is not anticipated these would result in any adverse socio-economic effects such a loss of employment.

N.5.142 Construction of the project at Albert Embankment Foreshore is expected to require a maximum workforce of approximately 65 workers at any one time, creating a new source of temporary local employment.

N.6 Overall conclusions

N.6.1 A specific need was identified to intercept the Clapham and Brixton CSOs and to find a suitable site to receive the main tunnel. In an average year, the Clapham and Brixton Storm Relief Sewer CSOs discharge approximately 278,000m³ of untreated sewage into the River Thames at Vauxhall Bridge in London Borough of Lambeth. The Environment Agency identified the Clapham and Brixton Storm Relief CSOs as requiring interception. The capture of these CSO discharges would substantially reduce flows of untreated sewage into the River Thames in this location and lead to a significant improvement in water quality.

N.6.2 Given the site's location, on the river front of the tidal Thames and within an urban area, it is inevitable there would be some disturbance during the construction period. Whilst Thames Water has sought to minimise any disturbance that would be experienced through sensitive design and mitigation, some negative effects are likely to remain. These comprise:

- a. loss of foreshore
- b. townscape and visual effects during the temporary construction period
- c. construction noise effects at Camelford House, Vauxhall Cross and Tintagel House
- d. vibration effects from piling at Bridge House, Vauxhall Cross and Camelford House.

N.6.3 For each of these effects, the project design was refined and all practicable mitigation applied and it is considered that the remaining adverse impacts are an unavoidable consequence of the works necessary at this site to facilitate construction of the project.

N.6.4 The operational benefits of the proposed works in this location are substantial. The reduction of discharges from the Clapham and Brixton

CSOs would improve the water quality in the tidal Thames with associated benefits to water quality, ecology, and amenity. This would also help reduce the health risks to river users and reduce sewage derived litter.

- N.6.5 The design of the permanent works has the support of London Borough of Lambeth, English Heritage and the Design Council CABI who responded positively to the design and this is reflected in the agreement to submit an indicative level of detail in the development consent application. There would be a permanent loss of foreshore but the design would provide an attractive new area of public realm and Thames Path with views across the Thames and provide replacement habitat in the form of inter tidal terraces. The design has also minimised the effect on the Grade II* listed Vauxhall Bridge and Albert Embankment Conservation Area.
- N.6.6 The potential loss of archaeology as a result of the works in the foreshore is an unavoidable consequence of the constraints on site selection. Careful investigation and recording of the site would, enable a full understanding of the heritage asset to be gained.
- N.6.7 The proposed works at this site, and the mitigation 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.
- N.6.8 Section 8 of the *Planning Statement* considers the implications of the local effects of the works at Albert Embankment Foreshore 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 Albert Embankment Foreshore, and the project as a whole, are compliant with the NPS and that development consent should be granted.

Annex N: Drawings for Albert Embankment Foreshore

List of drawings

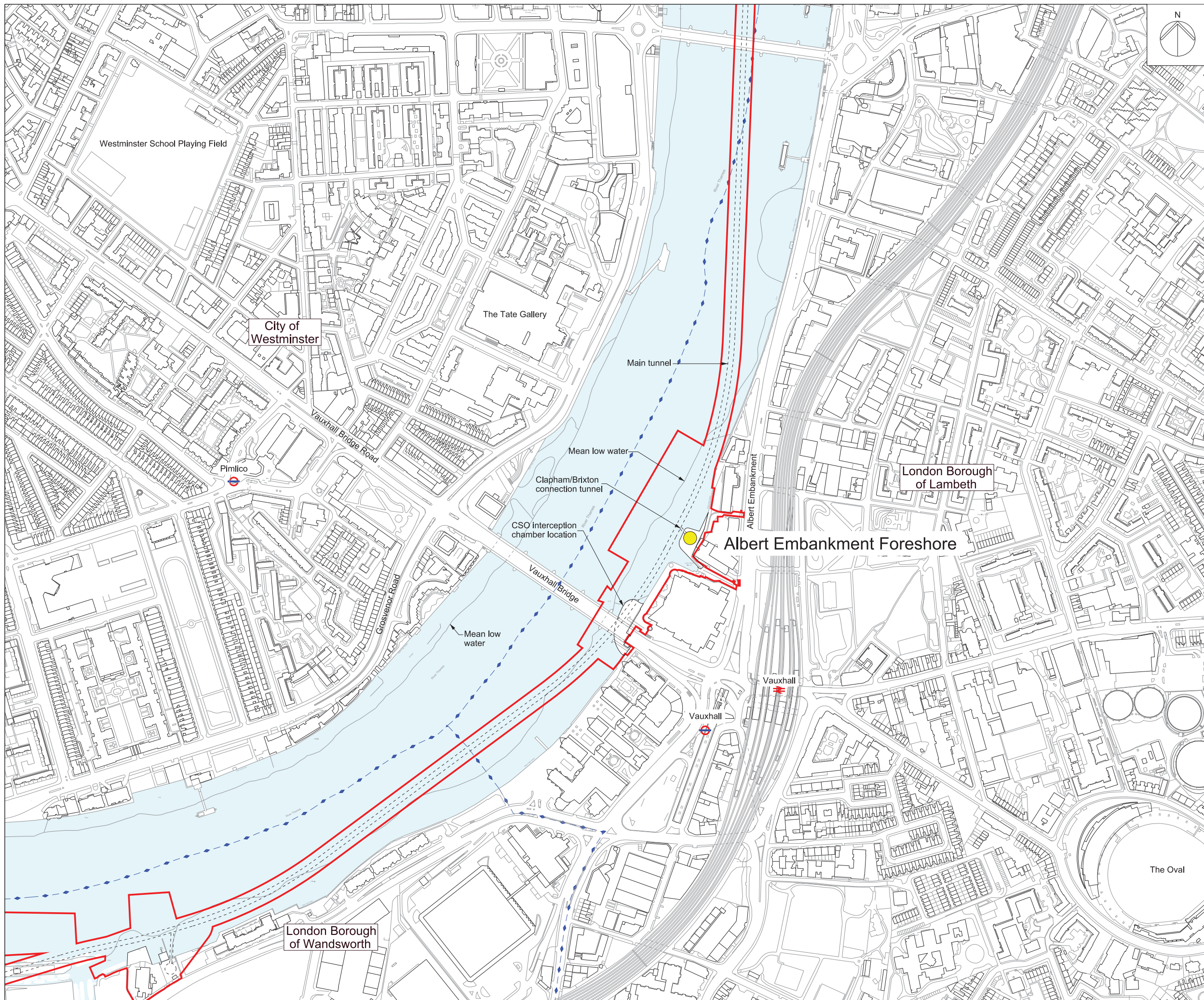
Albert Embankment Foreshore: Location plan

Albert Embankment Foreshore: As existing site features plan

Albert Embankment Foreshore: Construction phases plans

Albert Embankment Foreshore: Land use plan

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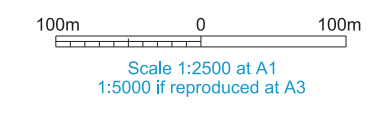


Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

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

Notes:

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



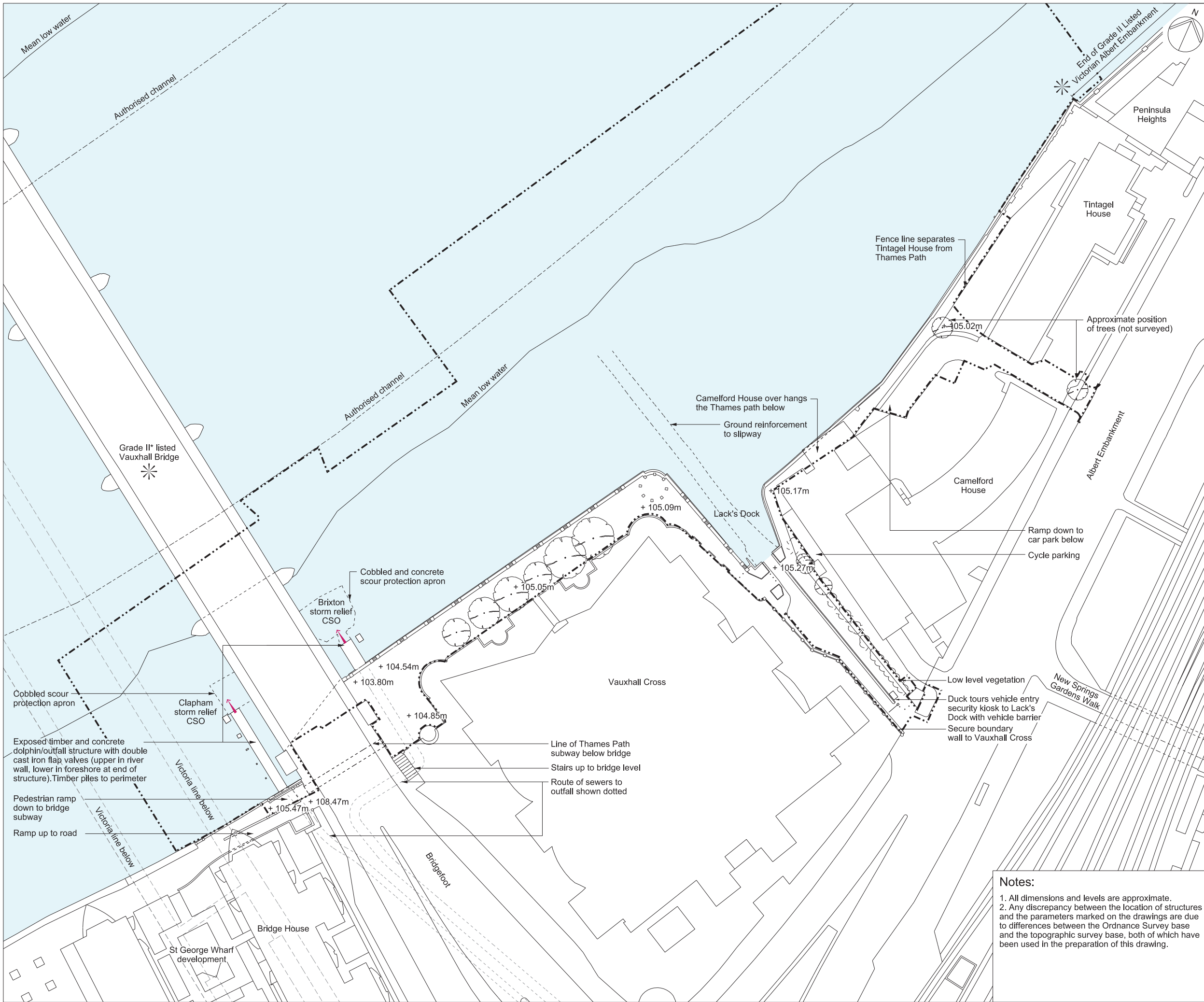
FOR INFORMATION

Location
Albert Embankment Foreshore
 London Borough of Lambeth

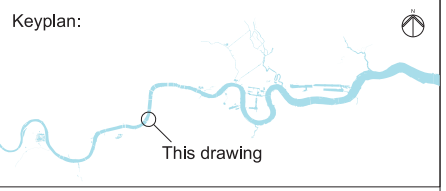
Document Information
Application for Development Consent
 Location plan

Book of plans - section 17
 DCO-PP-15X-ALBEF-170001
 January 2013



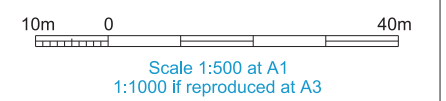


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Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

- Key:**
- Limits of land to be acquired or used (LLAU)
 - - - - - Authorised channel
 - + 105.40m Existing levels (shown in metres above tunnel datum)
 - ✱ Listed buildings/structures
 - Approximate position of CSO outlet
 - ⊙ Existing trees within surveyed area (trunk sizes vary)



FOR INFORMATION

Location
Albert Embankment Foreshore
London Borough of Lambeth

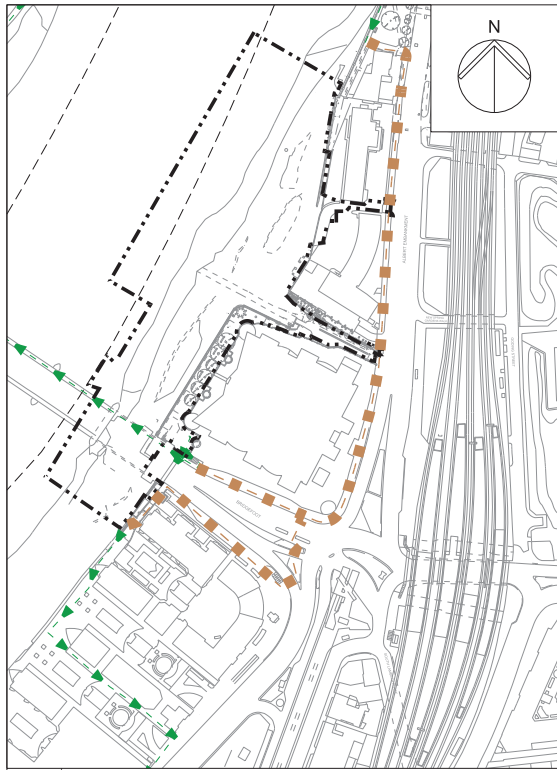
Document Information
Application for Development Consent

As existing
Site features plan
Book of plans - section 17
DCO-PP-15X-ALBEF-170002
January 2013

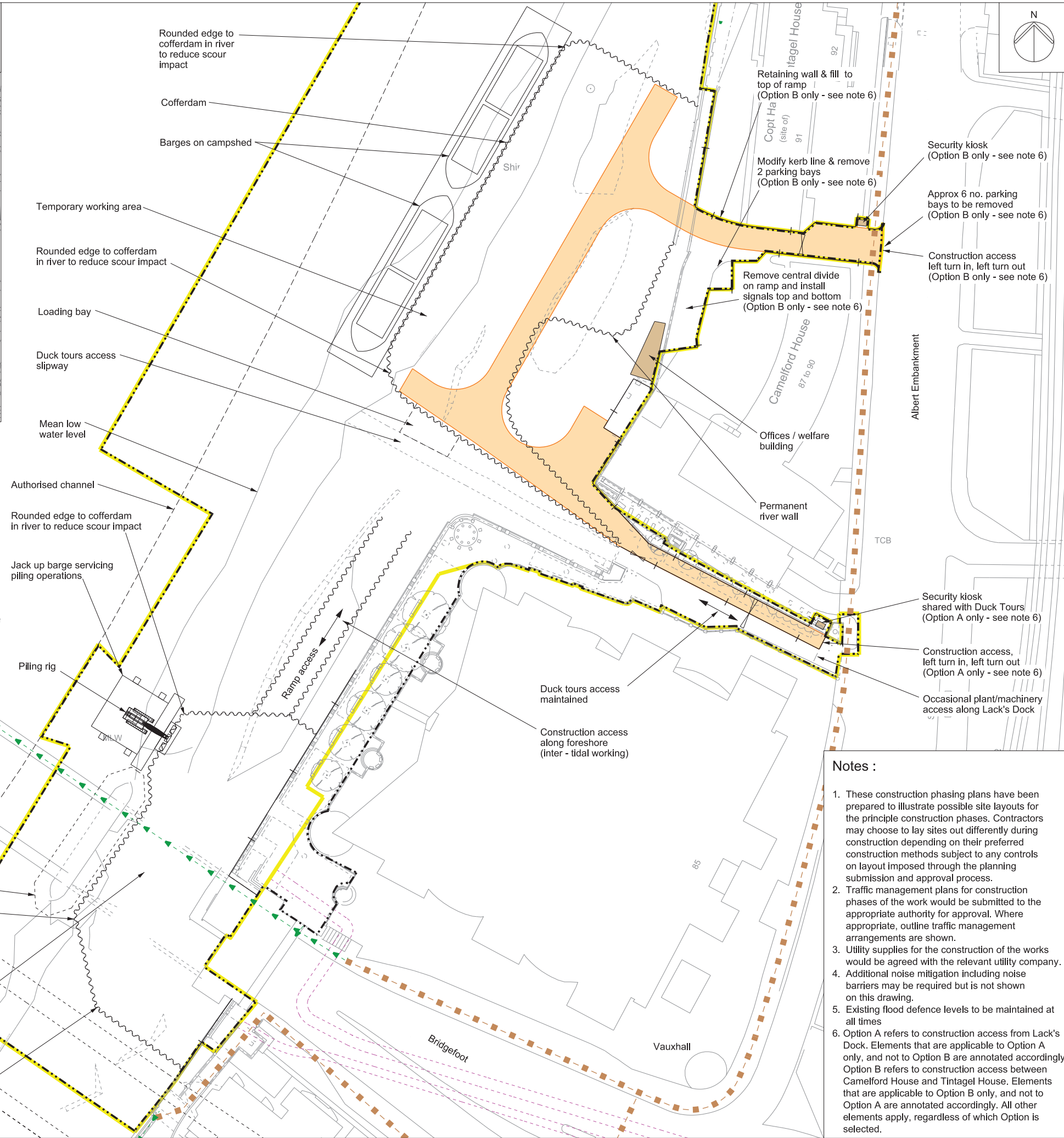
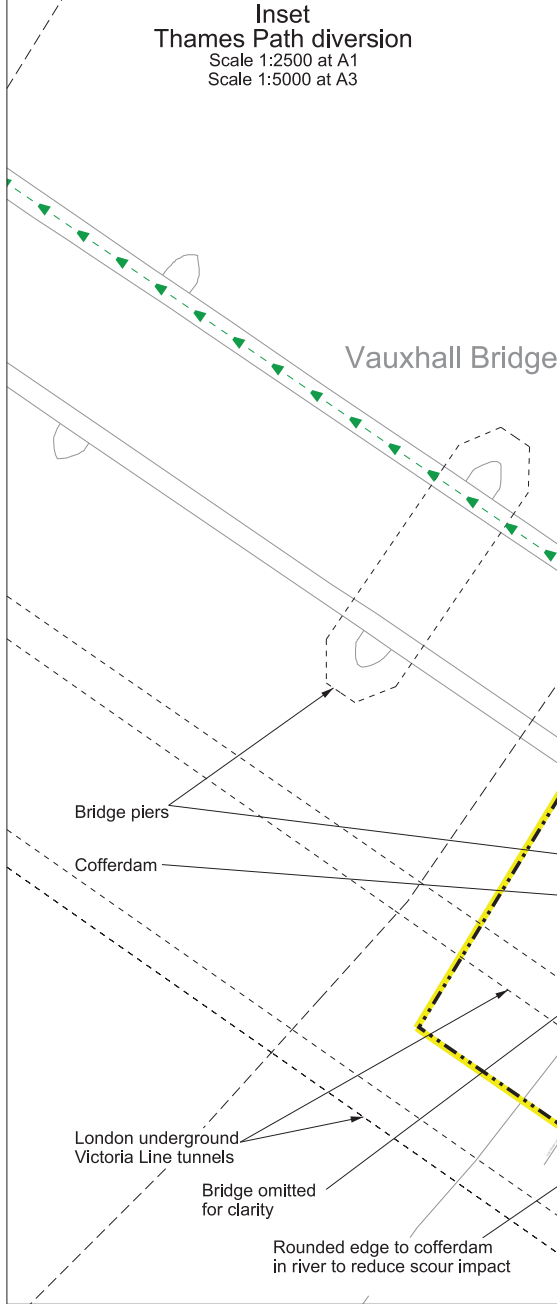


Notes:

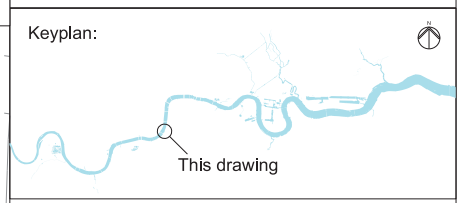
1. All dimensions and levels are approximate.
2. Any discrepancy between the location of structures and the parameters marked on the drawings are due to differences between the Ordnance Survey base and the topographic survey base, both of which have been used in the preparation of this drawing.



Inset Thames Path diversion
 Scale 1:2500 at A1
 Scale 1:5000 at A3

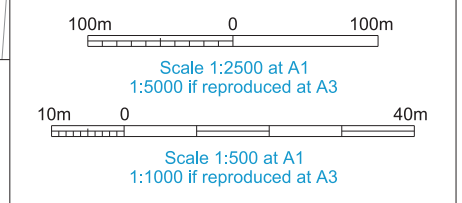


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Coordinates are to be Ordnance Survey Datum OSGB36. All levels are in metres and relate to the Tunnel Datum which is 100 metres below Ordnance Datum Newlyn.

- Key:**
- Limits of land to be acquired or used (LLAU)
 - 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
 - Sheet piles



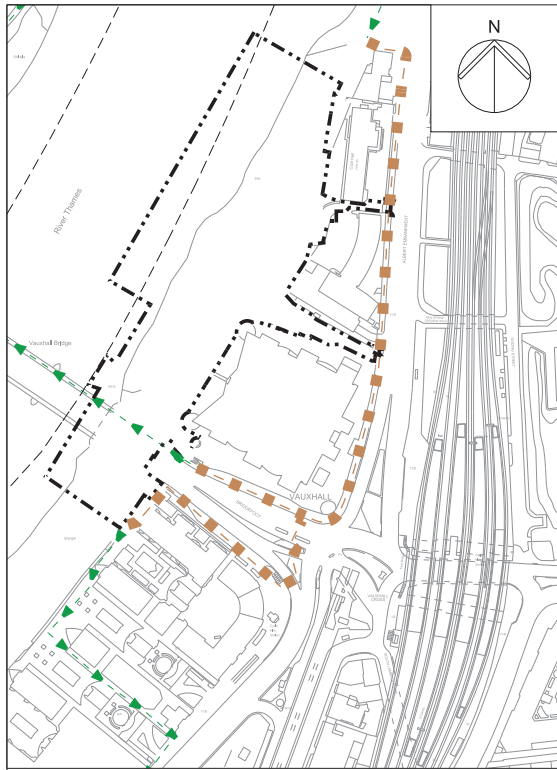
- Notes :**
1. These construction phasing plans have been prepared to illustrate possible site layouts for the principle construction phases. Contractors may choose to lay sites out differently during construction depending on their preferred construction methods subject to any controls on layout imposed 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.
 5. Existing flood defence levels to be maintained at all times
 6. Option A refers to construction access from Lack's Dock. Elements that are applicable to Option A only, and not to Option B are annotated accordingly. Option B refers to construction access between Camelford House and Tintagel House. Elements that are applicable to Option B only, and not to Option A are annotated accordingly. All other elements apply, regardless of which Option is selected.

ILLUSTRATIVE

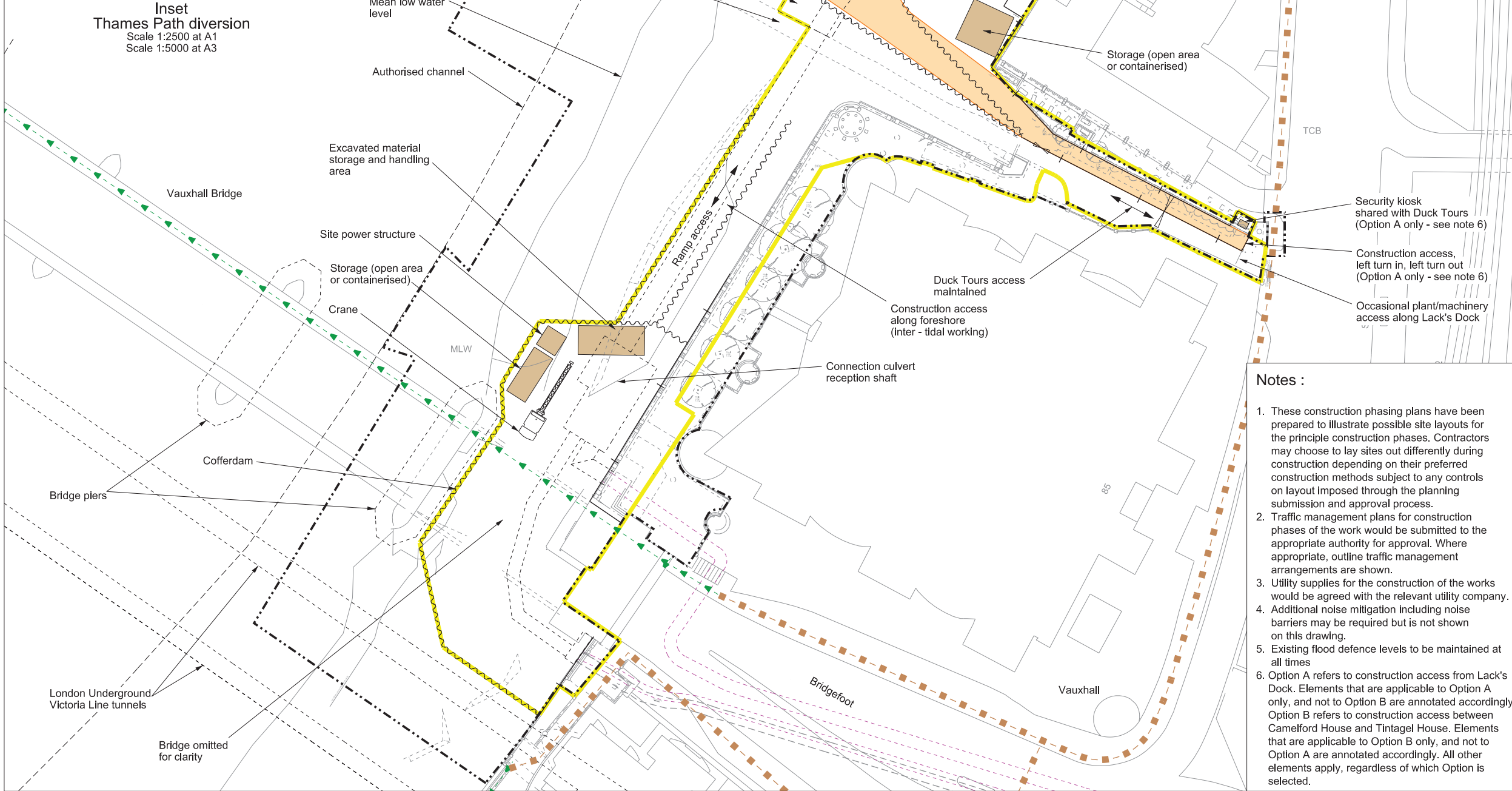
Location
 Albert Embankment Foreshore
 London Borough of Lambeth

Document Information
 Application for Development Consent
 Construction phases - phase 1
 Site set-up
 Book of plans - section 17
 DCO-PP-15X-ALBEF-170030
 January 2013





Inset Thames Path diversion
 Scale 1:2500 at A1
 Scale 1:5000 at A3

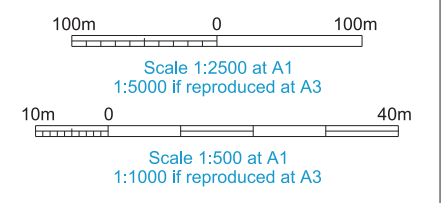


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- Key:**
- Limits of land to be acquired or used (LLAU)
 - Hoarding
 - Maximum extent of working area
 - Existing public right of way
 - - - Route of temporary diversion of right of way
 - Site access
 - Access / haul route
 - - - Existing sewers
 - ~ Sheet piles



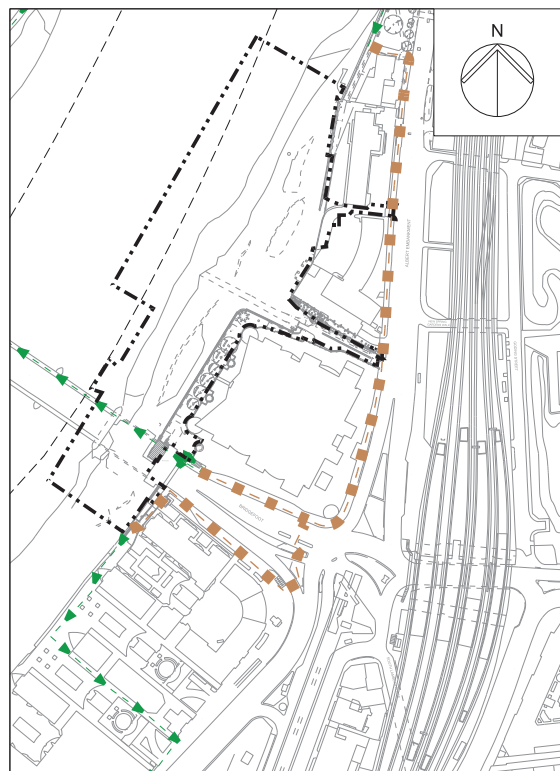
- Notes :**
1. These construction phasing plans have been prepared to illustrate possible site layouts for the principle construction phases. Contractors may choose to lay sites out differently during construction depending on their preferred construction methods subject to any controls on layout imposed 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.
 5. Existing flood defence levels to be maintained at all times
 6. Option A refers to construction access from Lack's Dock. Elements that are applicable to Option A only, and not to Option B are annotated accordingly. Option B refers to construction access between Camelford House and Tintagel House. Elements that are applicable to Option B only, and not to Option A are annotated accordingly. All other elements apply, regardless of which Option is selected.

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Location
 Albert Embankment Foreshore
 London Borough of Lambeth

Document Information
 Application for Development Consent
 Construction phases - phase 2
 Shaft construction and tunnelling
 Book of plans - section 17
 DCO-PP-15X-ALBEF-170031
 January 2013





Inset Thames Path diversion
 Scale 1:2500 at A1
 Scale 1:5000 at A3



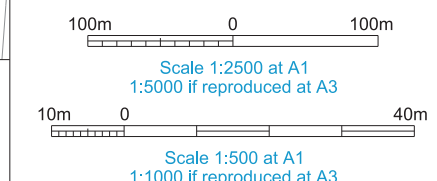
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Key:

	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
	Sheet piles



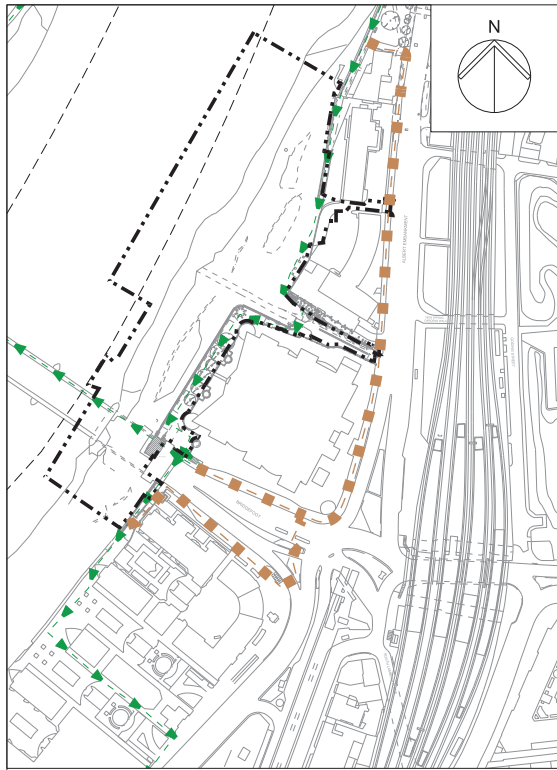
- Notes :**
1. These construction phasing plans have been prepared to illustrate possible site layouts for the principle construction phases. Contractors may choose to lay sites out differently during construction depending on their preferred construction methods subject to any controls on layout imposed 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.
 5. Existing flood defence levels to be maintained at all times
 6. Option A refers to construction access from Lack's Dock. Elements that are applicable to Option A only, and not to Option B are annotated accordingly. Option B refers to construction access between Camelford House and Tintagel House. Elements that are applicable to Option B only, and not to Option A are annotated accordingly. All other elements apply, regardless of which Option is selected.

ILLUSTRATIVE

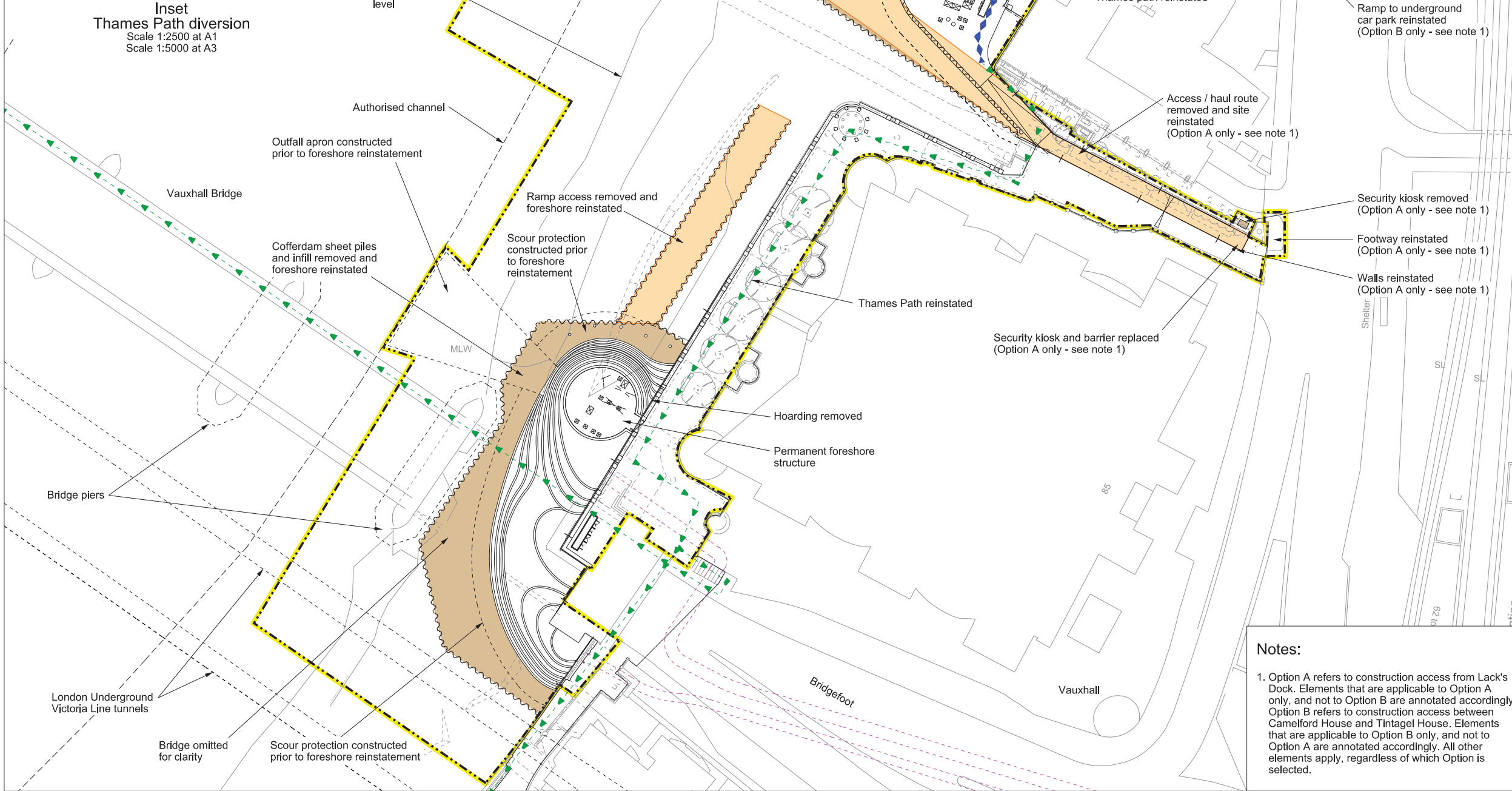
Location
 Albert Embankment Foreshore
 London Borough of Lambeth

Document Information
 Application for Development Consent
 Construction phases - phase 3
 Construction of other structures
 Book of plans - section 17
 DCO-PP-15X-ALBEF-170032
 January 2013

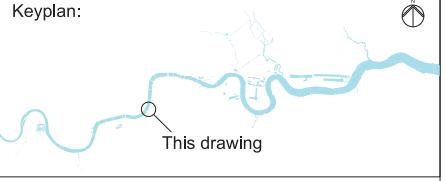




Inset Thames Path diversion
 Scale 1:2500 at A1
 Scale 1:5000 at A3

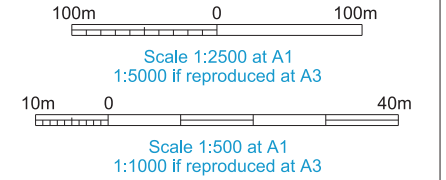


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- Key:**
- Limits of land to be acquired or used (LLAU)
 - Hoarding
 - Maximum extent of working area
 - Existing public right of way
 - Route of temporary diversion of right of way
 - Provision of permanent permissive right of way
 - Site access
 - Access / haul route
 - Existing sewers
 - Sheet piles



ILLUSTRATIVE

Location
 Albert Embankment Foreshore
 London Borough of Lambeth

Document Information
 Application for Development Consent

Construction phases - phase 4
 Site demobilisation
 Book of plans - section 17
 DCO-PP-15X-ALBEF-170033
 January 2013



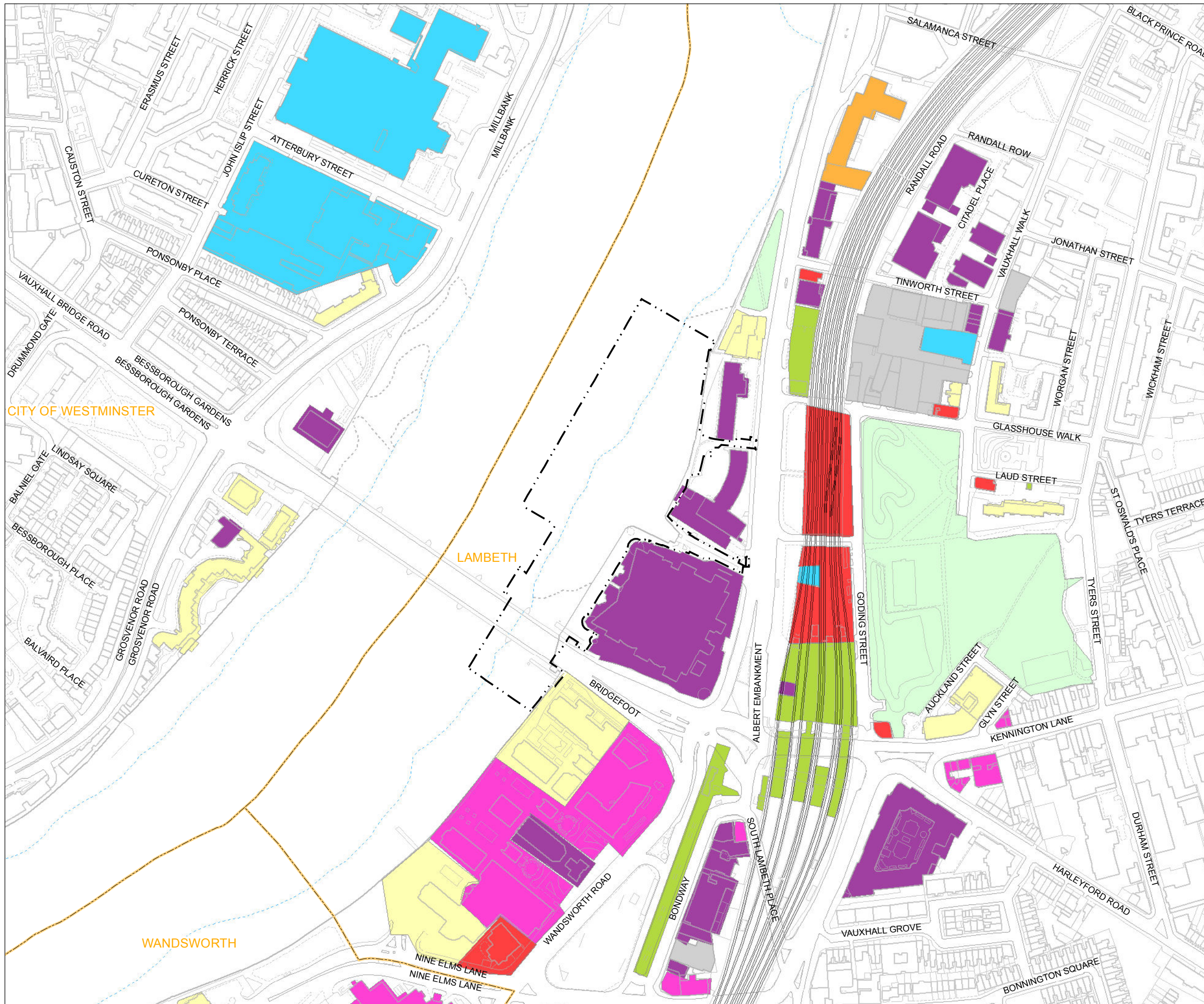
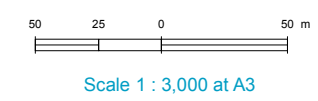
Notes:

1. Option A refers to construction access from Lack's Dock. Elements that are applicable to Option A only, and not to Option B are annotated accordingly. Option B refers to construction access between Camelford House and Tintagel House. Elements that are applicable to Option B only, and not to Option A are annotated accordingly. All other elements apply, regardless of which Option is selected.

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- Key**
- Limits of Land to be Acquired or Used
 - Local Authority Boundary
- Land Use**
- Class A1-A5 (Shops, Financial & Professional Services, Restaurants, Drinking Establishments and Hot Food Takeaways)
 - 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



FOR INFORMATION

Location
Albert Embankment Foreshore
 London Borough of Lambeth

Document Information
Planning Statement
 Land use

1PL03-MG-00809
 January 2013



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Thames Water Utilities Limited

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