

Thames Tideway Tunnel
Thames Water Utilities Limited



Application for Development Consent

Application Reference Number: WWO10001

Design and Access Statement

Doc Ref: **7.04**

Part 2

Albert Embankment Foreshore

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

Hard copy available in
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January 2013

Thames
Tideway Tunnel 
Creating a cleaner, healthier River Thames

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Section 18

Albert Embankment Foreshore

18.1 Introduction

18.1.1 A worksite is required to connect the Clapham Storm Relief CSO and the Brixton Storm Relief CSO to the main tunnel. The proposed development site is known as Albert Embankment Foreshore, which is located in the London Borough of Lambeth.

18.1.2 We have agreed with the London Borough of Lambeth that some elements of the detailed design proposals would be drawn up at a later stage. The detailed designs would be submitted to the local authority for approval in the form of a DCO requirement. Therefore, the majority of the images and plans in this section are for illustrative purposes only. The proposed landscape design, however, is indicative.

18.1.3 We have submitted two options for the construction access to the site in the application for Development Consent and the Secretary of State will need to select an option as part of any decision to grant development consent for the project. Option A is via Lack's Dock and Option B is between Tintagel House and Camelford House. In either case, permanent access to the site would be via Lack's Dock.

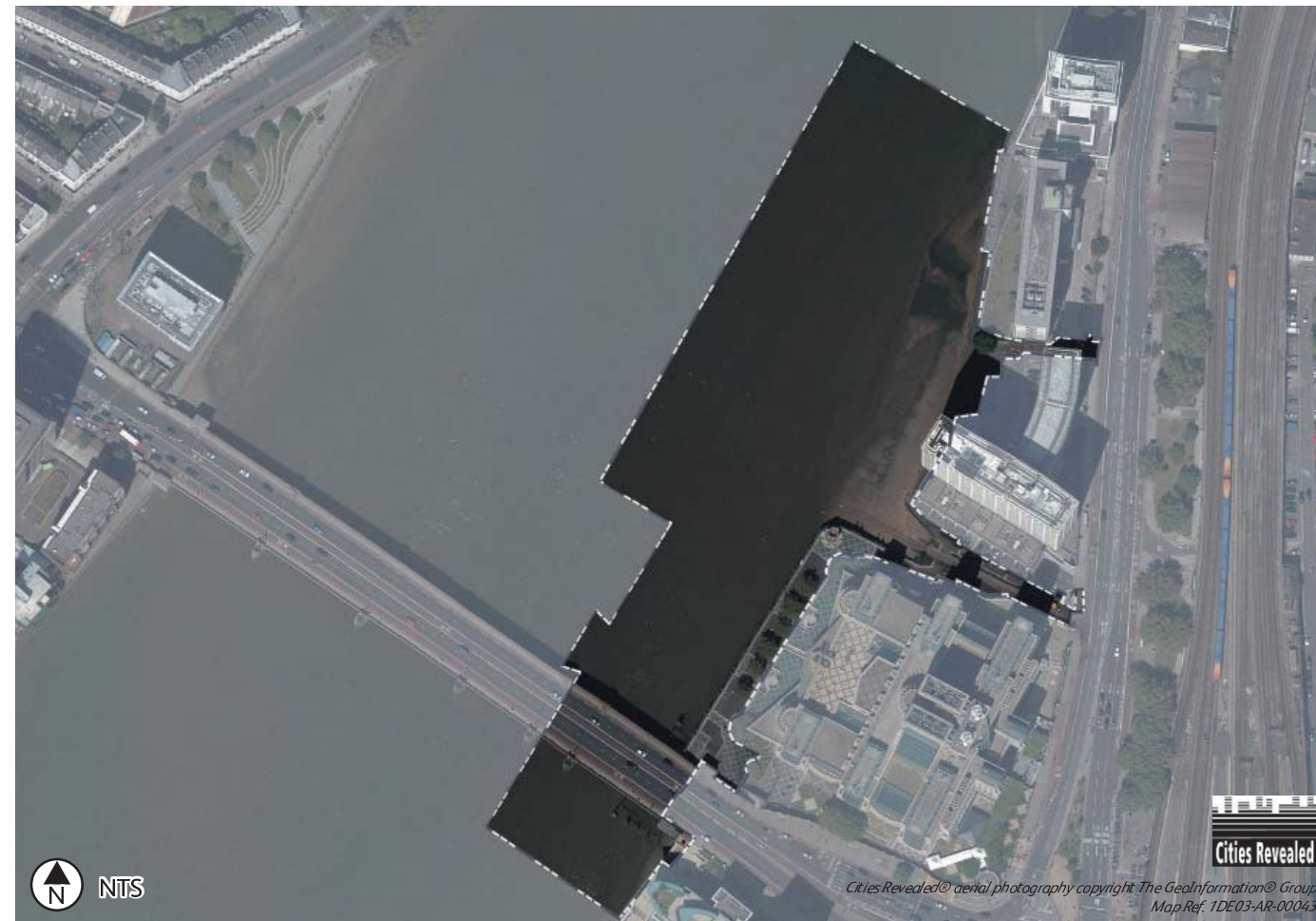


Figure 18.1: Aerial photograph of the existing Albert Embankment Foreshore site with LLAU indicated

18.2 Existing site context

18.2.1 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 section of the Thames Path, and potentially an area of land between Tintagel House and Camelford House (subject to the decision of the Secretary of State on the construction site access). Above ground, the site is split into two sections: the northern section lies in the foreshore to the north of Lack's Dock and the southern section lies in the foreshore beneath and on either side of the Grade II* listed Vauxhall Bridge. Lack's Dock is frequently used by the amphibious vehicles of London Duck Tours.

18.2.2 The site falls within the Albert Embankment Conservation Area (CA57). It also forms part of the Vauxhall Nine Elms Battersea Opportunity Area, for which a *Supplementary Planning Document* is being drawn up in order to direct the substantial regeneration and redevelopment envisioned for the area.

18.2.3 The foreshore of the River Thames is classified as the River Thames and Tidal Tributaries Site of Importance for Nature Conservation. It is also designated as an Archaeological Priority Area in this location.

18.2.4 The River Thames surrounds the site to the north, south and west. The site is bounded to the east by the Thames Path.

18.2.5 The residential building Peninsula Heights lies to the northeast of the site. The section of the river wall adjacent to Peninsula Heights is Grade II listed and, along with the nearby Albert Embankment Gardens, was designed by Sir Joseph Bazalgette in 1869.

18.2.6 Vauxhall Cross and the 1960s office buildings Tintagel House and Camelford House are located along the southeastern boundary of the site. Vauxhall Cross is noted in the Albert Embankment Conservation Area statement for its imposing scale and façade.

18.2.7 Tintagel House and Camelford House are referenced as Site 64 in the London Borough of Lambeth's *Development Plan Document* which states: "Redevelopment encouraged. Widening and improvement of Riverside Walk. Active frontage uses on both flanks as far as viable, should form a

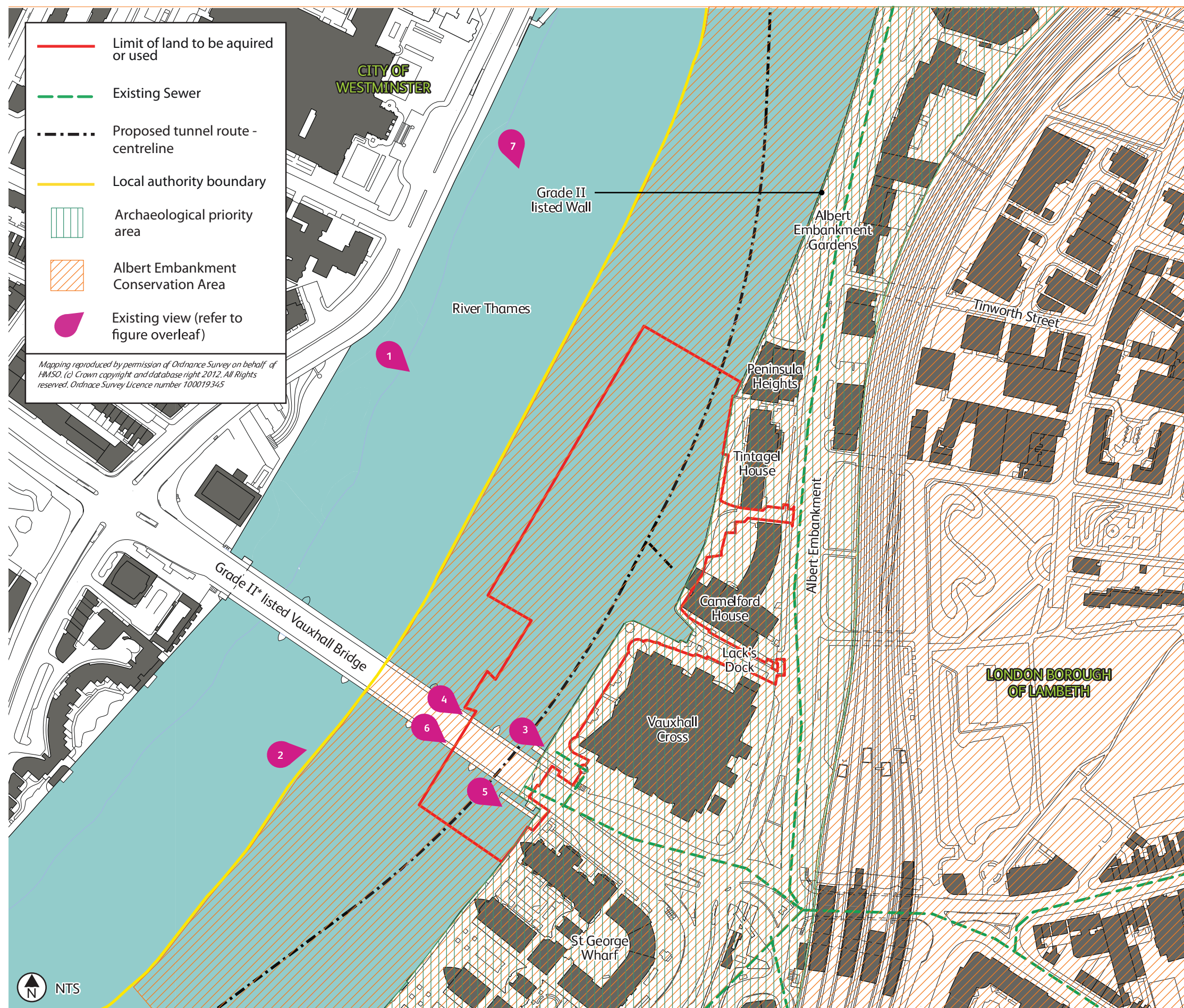


Figure 18.2: Existing site plan



Figure 18.3: Existing site upstream of Vauxhall Bridge



Figure 18.4: Existing site downstream of Vauxhall Bridge



Figure 18.5: Brixton CSO discharging



Figure 18.6: Brixton CSO



Figure 18.7: Claham CSO



Figure 18.8: Clapham CSO

transition in scale and design between Albert Embankment and Vauxhall Cross. Preference for both sites to be developed together to open up riverside”.

18.2.8 To the southeast lies St George Wharf – a high-density, modern development of 12 interconnected waterfront buildings up to 22 storeys high and a 185m high residential building known as ‘The Tower’, which is currently under construction. It is predominantly a residential development that also comprises offices and retail space. The London Underground Victoria Line runs under the River Thames immediately to the south of Vauxhall Bridge.

18.2.9 In this area, the riverside is dominated by the row of multi-storey buildings comprising Peninsula Heights, Tintagel House, Camelford House, Vauxhall Cross and St George Wharf.

Foreshore area

18.2.10 The Albert Embankment Foreshore site features one of the most accessible large areas of exposed foreshore in central London. Its proximity to Lack’s Dock means that people are frequently seen walking along the foreshore. The surface of the riverbed is generally composed of mud and shingle and grades gently down towards the water. The Lack’s Dock slipway is reinforced on the foreshore to provide access to the river for London Duck Tours’ amphibious vehicles.

18.2.11 To the north of Lack’s Dock, the river walls are set back from the line of the Victorian embankment. The walls are generally in poor condition in front of Camelford and Tintagel houses and are

composed of a mixture of brick, concrete and timber. The section closest to Lack’s Dock is also topped with very high railings that impede views over the river.

18.2.12 To the south of Lack’s Dock, the river walls are designed to complement Vauxhall Cross. They are finished with highly modulated, post-modern precast concrete panels, complete with Lion’s Head castings to reference the style of the Victorian embankment. Lamp standards are arranged in pairs along its length. The line of the wall sits further out into the River Thames than to the north of Lack’s Dock. It also sits in front of the abutment of Vauxhall Bridge. The ground level of the public realm ramps down adjacent to the north of the bridge abutment to a securely fenced-off area beneath the arch of Vauxhall Bridge.

18.2.13 The public realm and river wall between Vauxhall Cross and the River Thames are also designed to complement Vauxhall Cross. The space is generally overshadowed and underused except for the Thames Path, which runs across it.

18.2.14 There is a CSO outfall structure on either side of Vauxhall Bridge. Each outfall features flap valves in the river wall and exposed culverts to lower level flap valves further out into the River Thames. The culverts are protected by lines of timber piles and timber dolphins. There is a plaque above the Brixton Storm Relief CSO that indicates that it was once the ‘lost’ River Effra.

18.2.15 To the south of Vauxhall Bridge, the river wall and the Thames Path were designed to complement the St George Wharf development.



Figure 18.9: Existing site from the River Thames

Existing site access and movement

18.2.16 Vehicle access to the site is via the entrance to Lack's Dock off Albert Embankment, 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.

Highways

18.2.17 Albert Embankment (A3036) forms part of the Transport for London Road Network. It carries three lanes of traffic, including a dedicated bus lane, in each direction but merges into a single lane (in addition to the bus lane) in front of Tintagel House.

18.2.18 To the southeast, a gyratory system directs significant traffic flows around a one-way system between the junctions with Vauxhall Bridge, Albert Embankment, Wandsworth Road (A3036), Kennington Lane (A3204), Harleyford Road (A202), Parry Street and South Lambeth Road (A203).

Car parking

18.2.19 There is no public car parking available in the immediate vicinity of the site. Private underground car parking is available at Peninsula Heights, Camelford House and St George Wharf.

Public transport

18.2.20 There are several bus stops within 640m of the site including the Vauxhall Bus Station and bus stops 'P' in front of Camelford House and 'S' on the opposite side of Albert Embankment in front of the Vauxhall rail viaducts.

18.2.21 Vauxhall Train Station lies approximately 200m to the southeast of the site. It is served by National Rail services operated by South West Trains to Waterloo and to southwest London as well as regional destinations such as Reading, Exeter and Portsmouth. Vauxhall Station also serves the London Underground Victoria Line.

18.2.22 St George Wharf Pier is located immediately south of Vauxhall Bridge. The pier was opened in September 2011 and is used by the Thames Clipper service to connect the area with Embankment Pier, Blackfriars

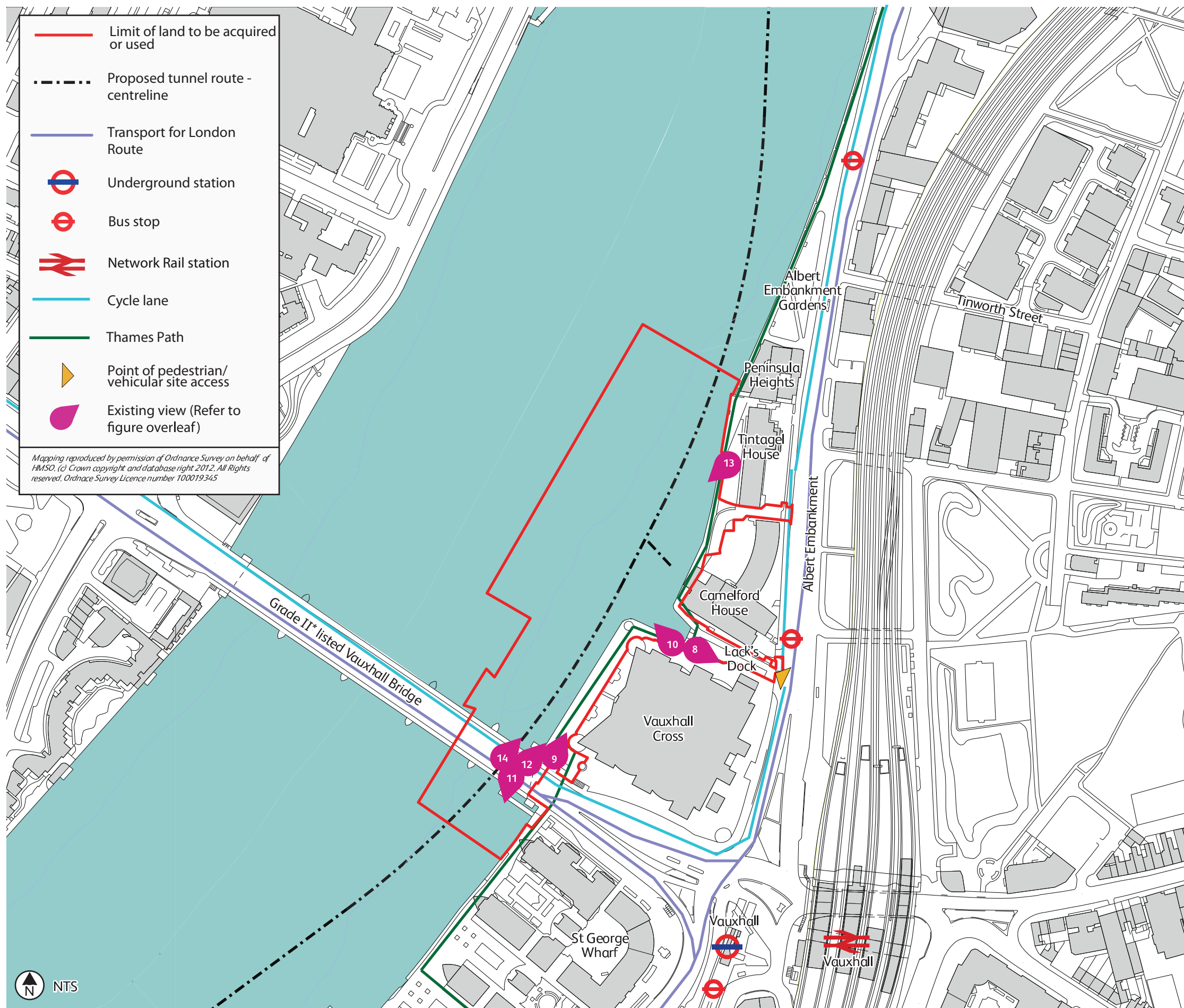


Figure 18.10 Existing site analysis plan



Figure 18.11: Lack's Dock looking towards the security hut and Albert Embankment



Figure 18.12: Thames Path Beside Vauxhall Cross



Figure 18.13: Duck Tours boat emerging from water on to Lack's Dock



Figure 18.14: St George Wharf Pier



Figure 18.15: Existing site from Vauxhall Bridge

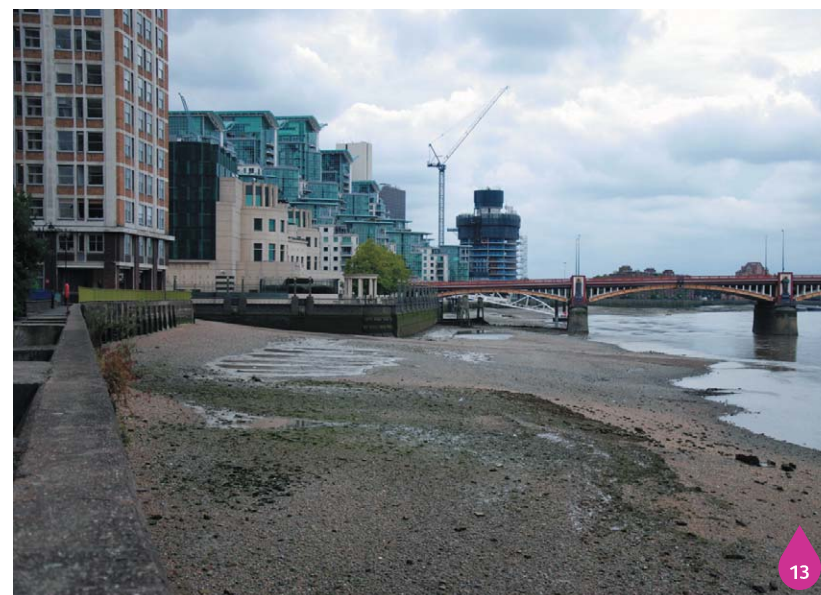


Figure 18.16: Existing site showing the large area of foreshore exposed at low tide

Millennium Pier and Bankside Pier, as well as destinations further east on the Thames such as Canary Wharf. The pier is a floating structure with services every 40 minutes, seven days per week and operates as part of an integrated public transport network, connecting commuters with nearby rail and bus services.

18.2.26 The Vauxhall vehicle gyratory is bisected by overland rail infrastructure, which creates a visual and pedestrian barrier to east-west movement between Albert Embankment and the remainder of Vauxhall and Oval. Intermittent arches in the rail viaduct provide a through access for vehicles and pedestrians.

Cycle routes

18.2.23 The main cycle route in the area is Cycle Superhighway Route 8 (Wandsworth to Westminster) on the opposite side of the River Thames. Cycles are not permitted on the majority of the Thames Path, including the section along Albert Embankment.

18.2.24 The roads surrounding the site are very busy, however cycle lanes are provided on sections of Vauxhall Bridge and Albert Embankment.

Pedestrian routes

18.2.25 Albert Embankment provides an almost continuous east-west pedestrian link between Vauxhall and Waterloo along the southern bank of the River Thames. The quality of the path varies along its length. To the north of Lack's Dock in front of Camelford and Tintagel houses it is generally quite narrow and passes beneath Camelford House. To the south the Thames Path forms part of the public realm treatment of Vauxhall Cross. A pedestrian subway passes under Vauxhall Bridge to the St George Wharf development. Vauxhall Bridge is accessible via steps and ramps.



Figure 18.17: Engraving reference to river Effra above Brixton CSO

Historical context

18.2.27 The site lies at the junction of the River Thames and the River Effra, which is now culverted as the Brixton Storm Relief Sewer and discharges immediately to the north of Vauxhall Bridge. There is evidence of prehistoric occupation along the river banks, including the remains of a possible Mesolithic (10,000 to 4,000 BC) timber structure in the foreshore deposits.

18.2.28 The site itself comprised marshland and marshy fields until after the medieval period, with some evidence of buildings. The riverside location attracted industry, including the well-known local pottery industry and the nearby 17th century glass works.

18.2.29 Map evidence from the mid-18th century indicates that the river bank was set back from the current alignment. There were wharfs, warehouses and associated buildings at the water's edge and the Vauxhall river stairs were already in place.

18.2.30 A horse ferry at Vauxhall was replaced by a bridge from approximately 1809 to 1816. The Millbank Penitentiary, inspired by Jeremy Bentham, was opened on the opposite side of the River Thames just after the bridge was built. It influenced the layout of streets and buildings on the riverbank opposite the site.

18.2.31 By the early 1860s, Lack's Dock had replaced Vauxhall Stairs. A gin distillery, which had been a vinegar factory, lay to the south. By this time the distinctive line of the river wall, which bends at the southern end of what became Albert Embankment and extends south to Lack's Dock, was already in place.

18.2.32 Industrial development in the area intensified and diversified in the second half of the 19th century. The 1896 Ordnance Survey map indicates a draw dock at the northern end of the site. It also indicates that the section of river wall to the south of Lack's Dock was brought forward of the line of the river wall on either side.

18.2.33 The Georgian bridge over the River Thames was replaced by the current Grade II* listed bridge in 1906.

18.2.34 The area suffered some bomb damage during the Second World War. In the second half of the 20th century, the warehousing was cleared, the draw dock was filled in and Camelford House was built.

18.2.35 More recently the areas on either side of Vauxhall Bridge were radically altered with the construction of Vauxhall Cross and the St George Wharf development, parts of which are still under construction. At this point, land was reclaimed from the foreshore to create a new promenade.



Figure 18.18: Historic map (1862-1895)

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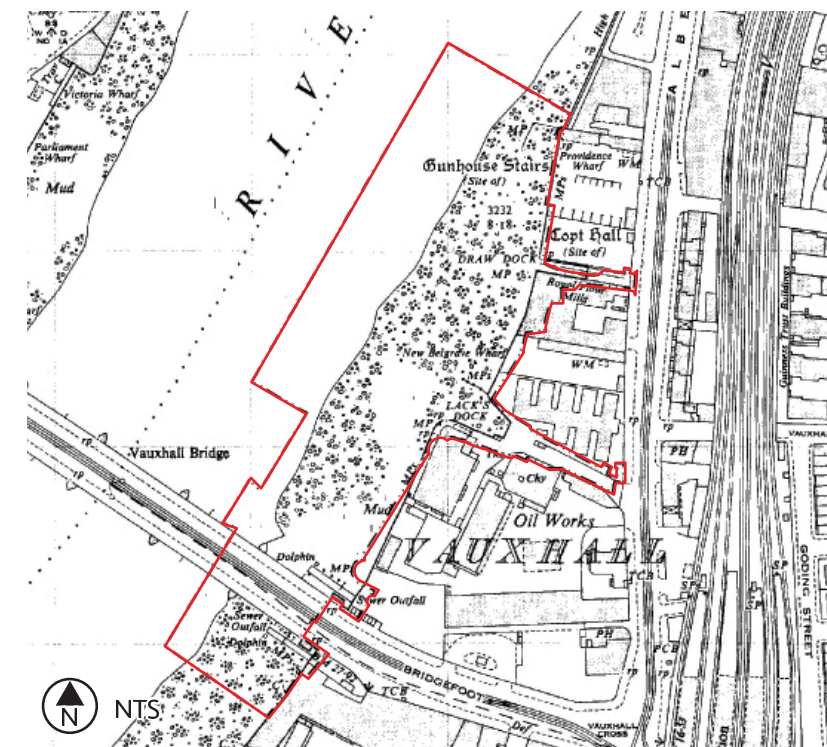


Figure 18.19: Historic map (1947-1972)

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Figure 18.20: 17th century seal from wine bottle found close to the site © Museum of London Archaeology



Figure 18.21: Historical Map of Vauxhall (1681) © Dean and Chapter of Canterbury



Figure 18.22: 17th century wine bottles found close to the site © Museum of London Archaeology

Site analysis: Opportunities and constraints

The site-specific design opportunities included:

- a. Improve the Thames Path riverside walkway.
- b. Create a new, high quality public space.
- c. Provide an area to enjoy views of Vauxhall Bridge, the Palace of Westminster World Heritage Site, and the Tate Britain Gallery.
- d. Provide information on the local area and the historic environment.
- e. Replace sections of the existing river walls that are in poor condition and feature high, visually intrusive railings.
- f. Reference the alignment and end point of the Victorian Albert Embankment.
- g. Enhance the notable characteristics of the site, which include a large accessible area of foreshore and a working dock.
- h. Improve potential habitat for aquatic ecology.

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.

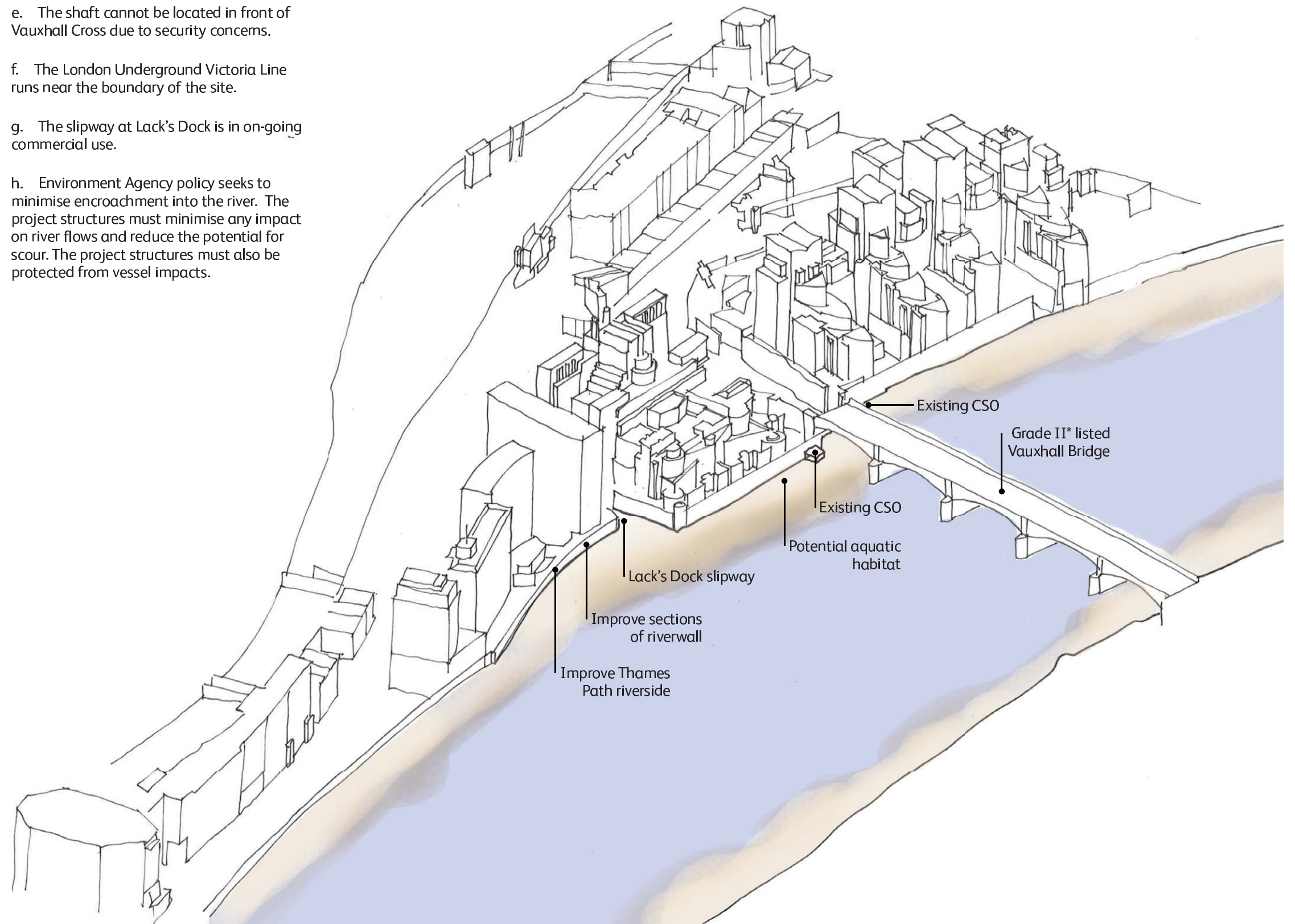


Figure 18.23: Site opportunities and constraints sketch

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16.3 Design evolution and alternatives

18.3.1 As most of the infrastructure for the project would be below ground, the key design objective for the permanent above-ground works was to integrate the functional components into the surroundings. The site-specific design objective at Albert Embankment Foreshore was to take account of the existing below-ground infrastructure and adjacent buildings as well as the future public use of the site.

18.3.2 The design of our proposals at Albert Embankment Foreshore was significantly influenced by an extensive process of stakeholder engagement and design review. In order to ensure design quality, we undertook two rounds of review hosted by the Design Council CABI. We also held various pre-application meetings with the London Borough of Lambeth and other strategic stakeholders, including English Heritage. We continually liaised with the London Borough of Lambeth in particular to develop design principles for the site to accommodate its aspirations for the area. More information on our public consultation process is provided in the *Consultation Report*.



Figure 18.24: Design development visualisation

October 2010

Phase one consultation

18.3.3 At phase one consultation, our preferred site comprised a foreshore structure containing a CSO drop shaft to the north of Lack's Dock and two separate CSO interception structures for the Clapham Storm Relief CSO and Brixton Storm Relief CSO outfalls in the foreshore on either side of Vauxhall Bridge.

18.3.4 The London Borough of Lambeth responded with various concerns in relation to:

- the impact on the conservation areas, nearby listed buildings and structures, and residential amenity
- the design of the permanent structures, including the restoration of the Thames Path.

18.3.5 Following phase one consultation, we focused particularly on resolving the relationship of the CSO interception structures with Vauxhall Bridge and the foreshore. We conducted studies of the style and massing of the structures seeking to complement the adjacent buildings and structures. We also considered linking the two structures underneath Vauxhall Bridge via a pedestrian bridge (similar to the arrangement beneath Chelsea Bridge). However, the studies produced bulky structures on either side of the listed bridge abutment.



Figure 18.25: Proposed view from phase one consultation

Design development

18.3.6 We revised the design in order to reduce the necessary works above the Victoria Line tunnels and to address concerns regarding the impact of the structures on the Grade II* listed Vauxhall Bridge. As a result, we combined the proposed Clapham and Brixton Storm Relief CSO interception chambers into one CSO interception structure positioned on the northern side of the bridge. The Clapham Storm Relief CSO would be connected to the interception chamber via a partially exposed culvert along the foreshore.

18.3.7 We also undertook physical modelling of the function of the CSO drop shaft. As a result, we increased the diameter of the shaft from approximately 10m to 16m in order to meet the hydraulic requirements.

18.3.8 Following modifications to the project-wide air management strategy, we introduced more ventilation columns of a smaller size than initially proposed.



Figure 18.26: Sketch from design development



Figure 18.27: Sketch plan from design development



Figure 18.28: Sketch plan from design development

May 2011

CABE sketch review

18.3.9 We held a sketch review with the Design Council CABE based on an initial site assessment and sketched ideas for the site on 13 April 2011. The concept sketches 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. We also illustrated early concept sketches for a terraced structure around the CSO interception structure. The sketches were as yet unresolved but demonstrated our intention to design a contoured structure that would complement the foreshore environment.

18.3.10 The Design Council CABE panel considered 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" [Letter dated 13 April 2011].

18.3.11 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" [ibid.].

18.3.12 The panel also requested the project to:

- construct minimal (and possibly only floating rather than fixed) projections into the River Thames on account of its national significance
- demonstrate that all alternative locations have been exhausted since the proposed works would be permanent.



Figure 18.29: Proposed view from Design Council CABE sketch review

June 2011

CABE scheme review

18.3.13 We held a scheme review on 30 June 2011 at which we presented more developed proposals for a terraced structure around the CSO interception chamber. 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.

18.3.14 The Design Council CABE panel made the following comments on our revised proposals:

“As one of the most important sites of the Thames Tunnel 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. Our detailed observations are as follows:

a. *“We continue to support the decision to mark the termination of the Albert Embankment with an extended river wall and area of hard standing that is accessible to the public. The overall approach to the public realm designs for this area is also welcome.*



Figure 18.30: Proposed view from Design Council CABE scheme review

b. *“The notion of a foreshore structure that contrasts with the listed bridge is welcomed. While a circular form may well work well in this context, we think its positioning in relation to the bridge and river wall makes it hard to characterise it as either an on-shore or off-shore structure. In our view, introducing more distance between the structure and river wall and bridge would help this.*

c. *“We support the idea of conveying the changing water levels through the architecture of the structure. The ecological benefits of a tiered structure are recognised although the potential for the gradual erosion of its walls could affect the clarity of the form over time. Given its proximity to the bridge this solution could also create corners that trap river refuse. There would be value in testing alternative forms such as a simpler drum structure to be confident that the chosen approach is the right one.*

d. *“The solution adopted should exploit the ever-changing environment of the river so that it appears intentional. For example, advantage could be taken of the changing tide to trap water within its terraces. The design team should also examine whether steps might be incorporated on its perimeter to provide access from the beach when its base is exposed at low tide” [Letter dated 30 June 2011].*



Figure 18.31: Proposed view from Design Council CABE scheme review

November 2011

Phase two consultation

18.3.15 In response to the Design Council CABE’s comments, we moved the top terrace of the CSO interception structure further away from Vauxhall Bridge and made the circular geometry less formal. We then presented this design at phase two consultation.

18.3.16 The main supportive comments received related to specific design features, such as the new open space that would be created and the reduction of the potential effects on Vauxhall Bridge.

18.3.17 However, respondents also raised a number of objections, issues and concerns, including:

- a. suggestions to relocate the proposed shaft and/or alter the proposed foreshore structure
- b. security concerns regarding the creation of the new open space
- c. the effect of the permanent design and layout on river navigation, and on commercial and recreational river users.

18.3.18 Following phase two consultation, we made minor amendments to the proposed plans. In response to comments from the occupants of Vauxhall Cross, we introduced a gate to prevent public access to the CSO interception structure. In addition, we made a minor alteration to the shape of the CSO drop shaft structure to provide a better line of sight for users of Lack’s Dock.



Figure 18.32: Proposed view form phase two consultation

April 2012

Targeted consultation

18.3.19 As a result of feedback received from the occupants of Vauxhall Cross, we undertook targeted consultation on the site access arrangement during construction. We consulted on two options:

- a. Option A was via Lack’s Dock, as presented at phase two consultation.
- b. Option B was between Tintagel House and Camelford House.

18.3.20 In both options the permanent access to the structures would be via Lack’s Dock, as presented at phase two consultation.

18.3.21 The London Borough of Lambeth made the following comment in relation to the permanent design:

“[T]he 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 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” [Letter dated 3 July 2012].

18.3.22 The responses to targeted consultation did not enable us to resolve the matter of the construction access route and for this reason both Option A and Option B are submitted in the application.

18.3.23 There was no further design development at this site following targeted consultation. The design submitted for the application is closely based on the proposals at the phase two consultation.



Figure 18.33: Proposed view from Section 48 publicity



Figure 19.47: Proposed panoramic view from Albert Embankment looking northwest



Figure 19.48: Proposed panoramic view from Vauxhall Bridge looking northeast

18.4 Proposed design

16.4.1 This section describes the amount, layout and scale of the proposed development and how the functional components would be integrated into the existing site. Details of the proposed landscaping and appearance of the site are also embedded in the description where relevant.

Fixed principles

18.4.2 The Site works parameter plan defines the zones in which the proposed works would take place. The plan indicates the general location of the CSO drop shaft, CSO interception structure, ventilation structures and columns, and electrical and control equipment.

18.4.3 The site-specific design principles are included in the *Design Principles* document which accompanies this application. These principles establish the parameters for the above ground structures and landscaping on the site and have, where possible, been developed in consultation with the local authority. The site-specific principles should be read in conjunction with the project-wide design principles.

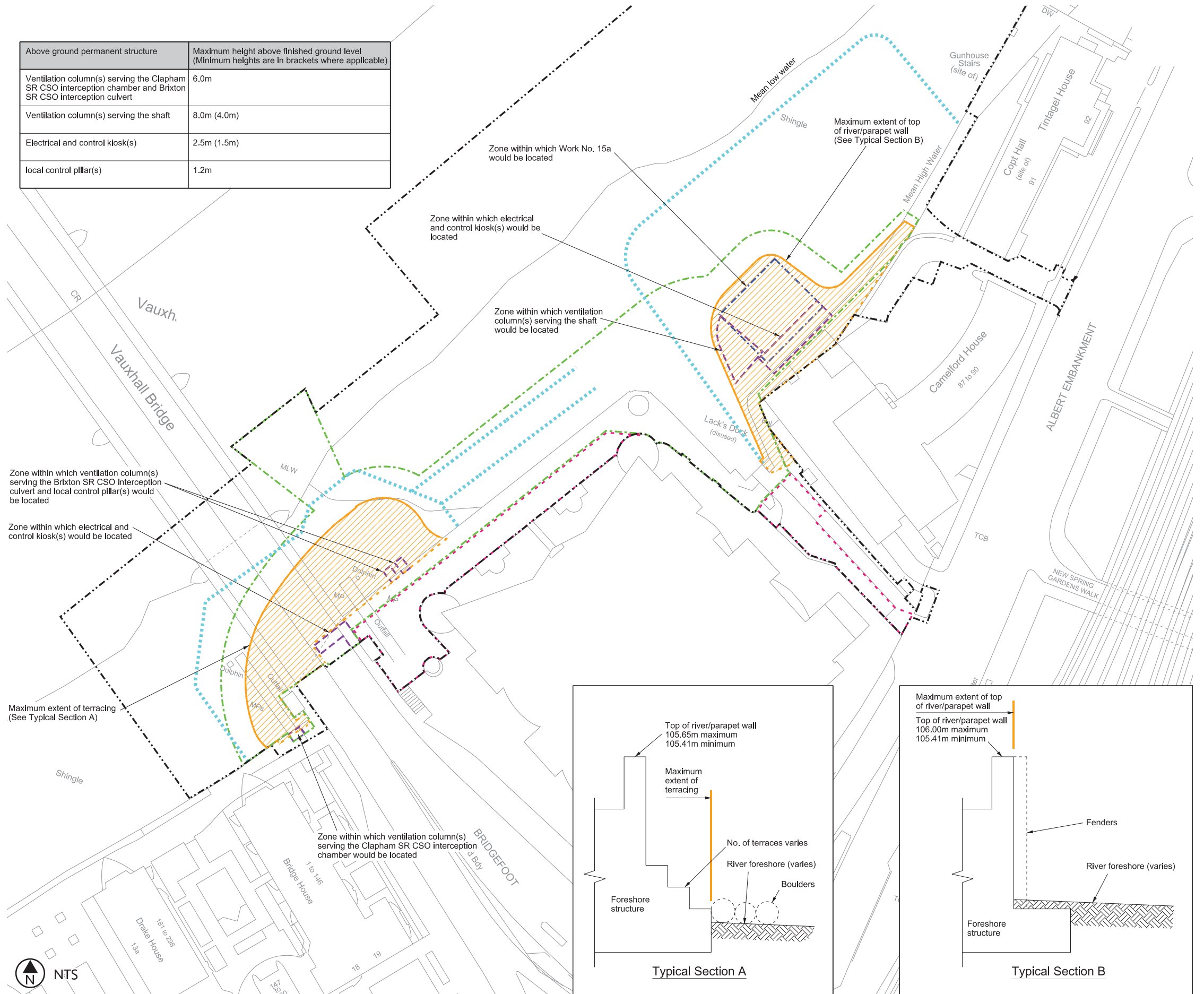


Figure 18.34: Site works parameter plan - refer to Site works parameter plan in the *Book of Plans*

Design objectives

18.4.4 The CSO drop shaft and CSO interception structures would potentially form new areas of public realm. The main driver behind the development of the designs was to explore ways in which the structures could fit in with and contribute positively to their riparian environment. Our main objectives included:

- a. Create a new space next to the River Thames with views towards the Palace of Westminster
- b. Create structures that are attractive when viewed from the river or the shore.
- c. Ensure that the design respects the functional character and history (both prehistoric and more recent industrial) of this stretch of the River Thames.
- d. Visually link the CSO drop shaft structure with the alignment of the Victorian Albert Embankment.
- e. Enhance the unique character of the foreshore near Vauxhall Bridge by promoting aquatic ecology.
- f. Respect the setting of Vauxhall Bridge by breaking up the mass of the CSO interception structure as far as possible, in line with the London Borough of Lambeth's Unitary Development Plan (UDP) Saved Policy 45.
- g. Limit the size of the structures and the encroachment into the foreshore.

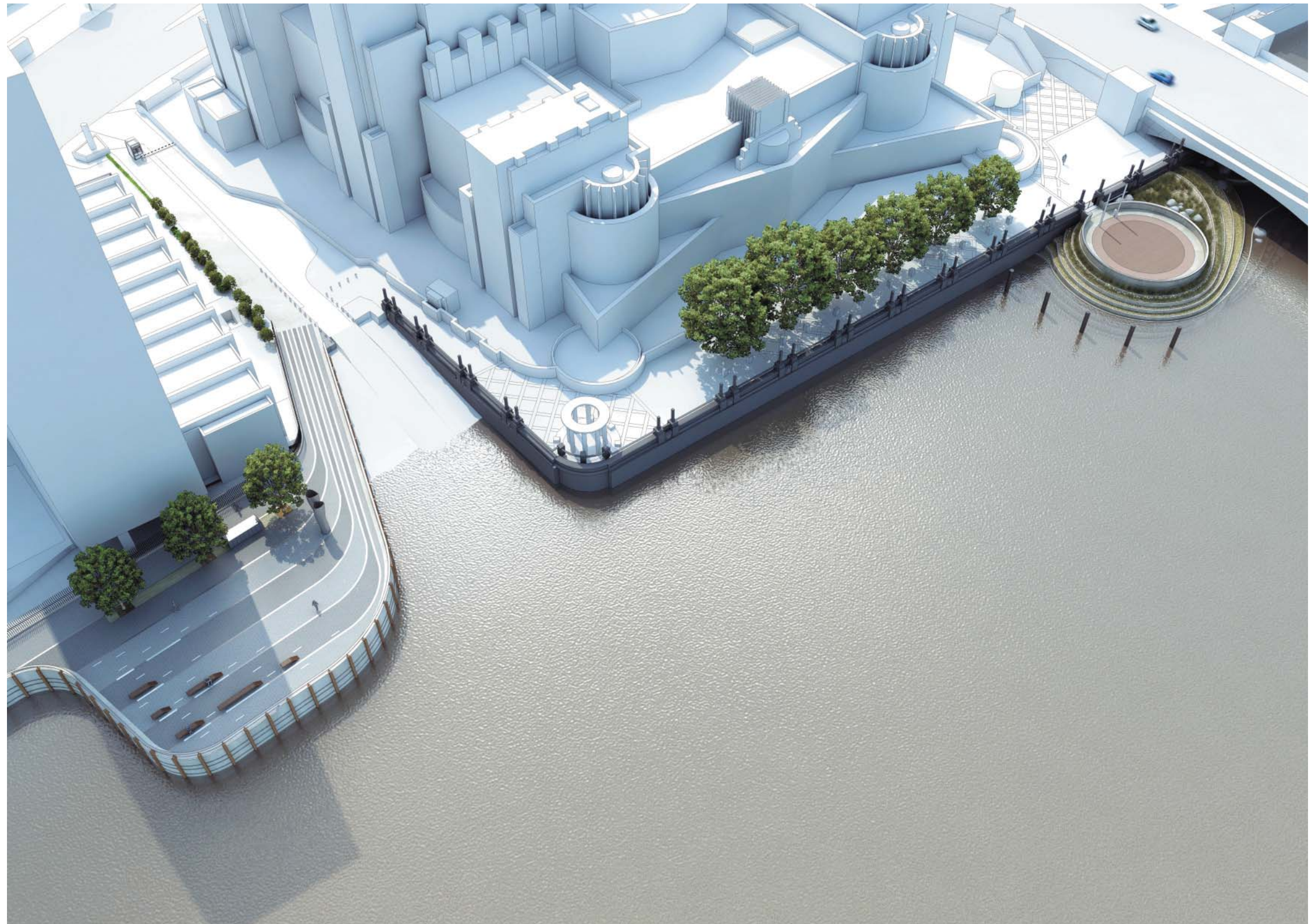


Figure 18.35: Proposed view of design - northern foreshore structure (left) and southern foreshore structure (right)

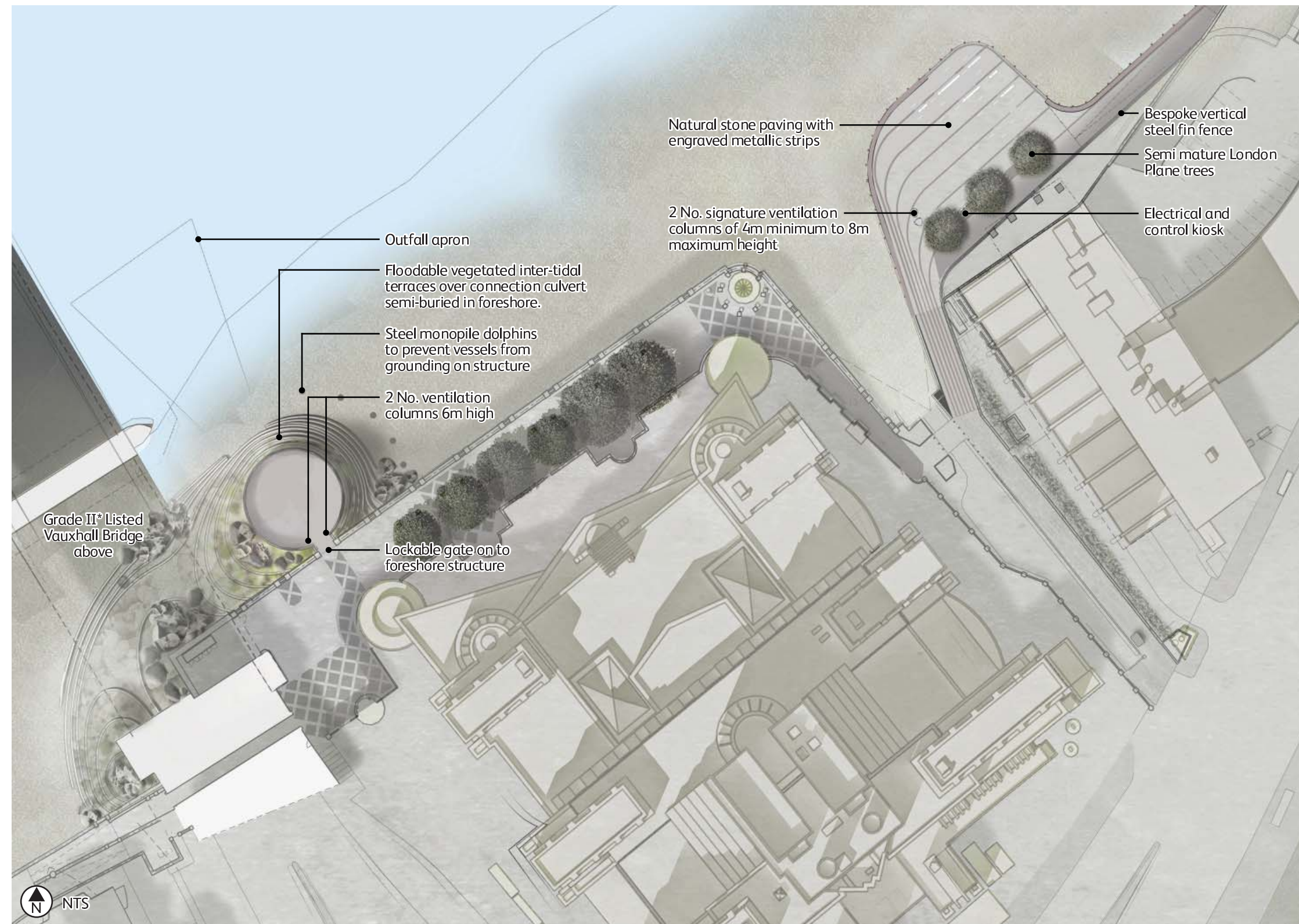


Figure 18.36: Proposed landscape plan

Use and programme

18.4.5 The CSO drop shaft structure would create a new space next to the River Thames, which could potentially be accessible to the public. This would not preclude the aspiration set out in UDP Saved Policy MD01 to redevelop Camelford and Tintagel Houses and would complement the policy by activating and opening up the riverside area.

18.4.6 The space could be used as an incidental viewing and seating space for pedestrians passing along the Thames Path to enjoy views over the River Thames towards the Palace of Westminster and the Tate Britain Gallery. This would comply with the aspirations set out in UDP Saved Policies 43 and 47 to enhance views to and from the conservation area. The proximity of the space to the wide open spaces of the river would make it an attractive place to pause for a moment; however, as it would be broadly north-facing, it is unlikely that people would spend lengthy periods of time there.

18.4.7 We ensured that there would be no convenient hiding places in the space and the open and uncluttered design would be self-policing and foster natural surveillance.

18.4.8 However, in our application we do not propose that the surface of the CSO interception structure would be publically accessible due to security concerns raised by the occupants of Vauxhall Cross. Due to the stepped design of the structure, the majority of it would be accessible from the foreshore; however, the structure (and the foreshore in general) is not intended for use as public realm.

CSO drop shaft structure

18.4.9 We positioned the structure to the north of Lack's Dock in order to reduce the extent to which the new river wall surrounding the structure would project into the river and the resulting impact on the setting of Vauxhall Bridge and the river flow around the bridge pier. The structure would sit in the recess behind the line of the river walls formed by Albert Embankment and Vauxhall Cross.

18.4.10 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.

18.4.11 The proposed London Plane trees and the stone clad electrical and control kiosk would mark the separation between the thoroughfare of the Thames Path and the projecting area of public realm with seating. In order to address the narrowness of the Thames Path, it would be widened through the site allowing pedestrians to pass in front of Camelford House rather than underneath it. The Camelford House undercroft area would then be screened off with high quality architectural fencing, in order to limit opportunities for antisocial behaviour or rough sleeping, and returned to the landowner.

18.4.12 If Option B is selected for the construction access, works would be required to rebuild the wall between the Thames Path and the Camelford House car park. The wall would either be reinstated to match the existing or the architectural fencing treatment around the undercroft would be extended across this section. The access road and temporary highway access created for the route between Tintagel and Camelford Houses would be reinstated as existing.

18.4.13 The paving design for the structure features the project-wide motif of flowing bands. This is a visual reference to the way in which the river current bends and directs reeds and exposes different geological strata over the centuries. At this site, the bands and the arrangement of the seating benches would draw people into the viewing area from Lack's Dock and direct them to the principle views over the river and towards the Palace of Westminster and Tate Britain.

River walls

18.4.14 The new wall around the CSO drop shaft structure would form part of the flood defences. The top would be finished at 106m Above Tunnel Datum (ATD), which is approximately 600mm above the ground level of the foreshore structure. This is higher than the current flood defences and anticipates the requirement to raise flood defence levels in the Environment Agency's Thames Estuary 2100 strategy. The structural design of the wall would be developed so that it could be raised further to meet the requirements by the year 2100. It would be topped with an open balustrade and handrail to facilitate views when seated. There would be no concrete upstanding on the north-facing elevation, which offers the best views.

18.4.15 We selected a simple 'wharf-like' treatment for the wall in this location. The materials would reference the robust and utilitarian local history and character; however, they would be designed, proportioned and arranged to be in keeping with the changing nature of the area. The wall would be finished with high-quality concrete panels cast with horizontal grooves to mark pertinent tide levels. In order to tie in with the design of the interception structure, the treatment would roughen in graduated horizontal bands between the grooves.

18.4.16 Vertical timber fenders would be applied to the whole wall, which would continue above the line of the concrete wall to form part of the handrail design. Above the concrete upstand and between the fenders, the balustrade treatment would be kept as open as possible to enable views over the River Thames when seated. We propose to include a stainless steel handrail in this location in response to maintenance concerns raised by the local authority in relation to the durability of timber. The handrail would be profiled to be comfortable to lean against.

18.4.17 A 'fish entrapment feature' would be incorporated at the base of the wall. This would comprise a timber planter filled with brush, rubble or sediment to provide habitat. The planter would be positioned in the intertidal zone between the timber fenders outside of the area likely to be impacted by vessels. Such planters have previously been installed along the tidal Thames. The final design would be agreed at a later stage.



Figure 18.37: Proposed view of CSO drop shaft structure

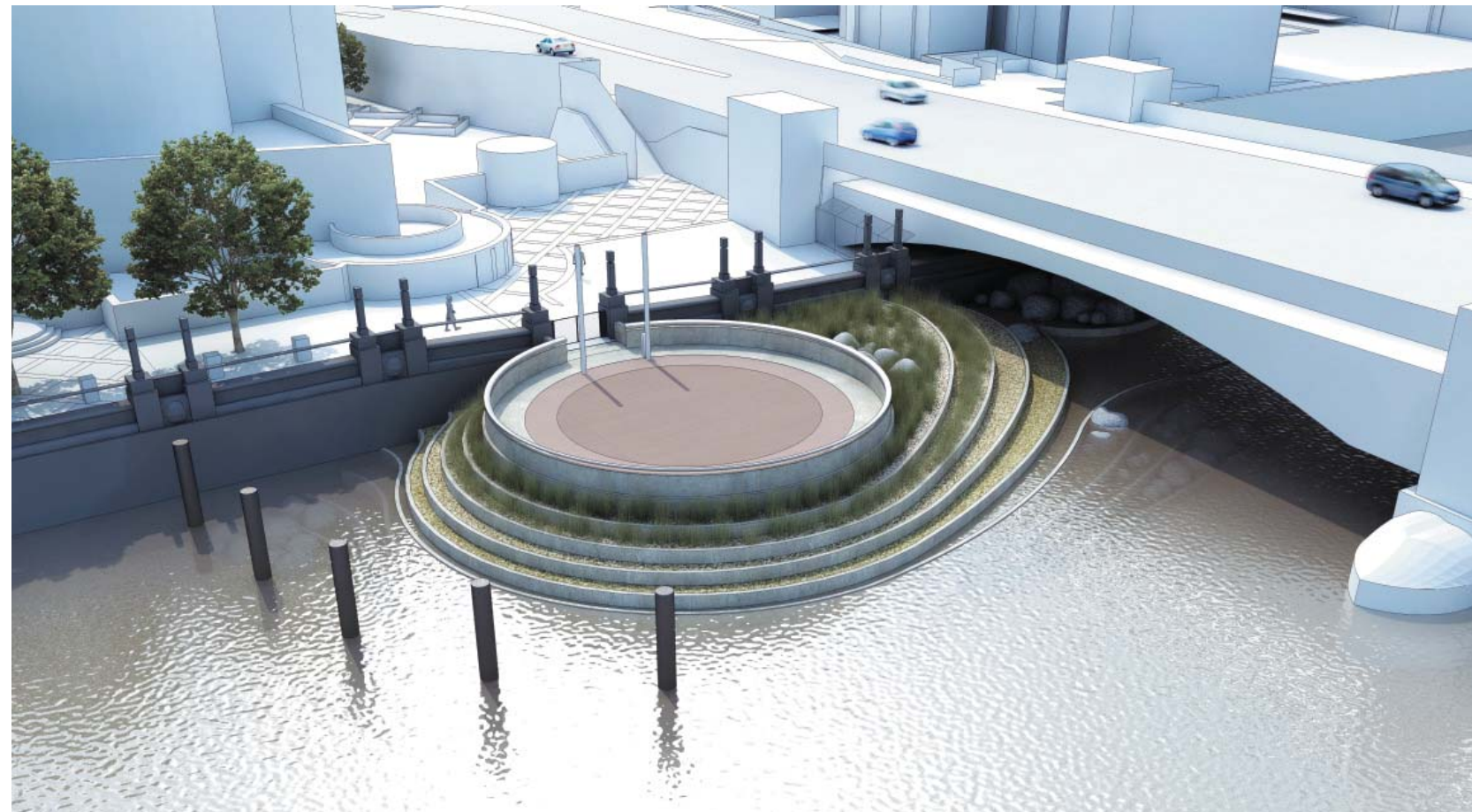


Figure 18.38: Proposed view of CSO interception structure downstream of Vauxhall Bridge



Figure 18.39: Proposed view of CSO interception structure upstream of Vauxhall Bridge

CSO interception structure

18.4.18 The design of the interception structure was developed primarily to break up its massing and bulk in relation to Vauxhall Bridge. Early studies demonstrated that, if we adopted the conventional orthogonal approach of surrounding the proposed infrastructure with vertical river walls, the size of the structure would adversely affect the setting of the bridge and encroach a long way in front of the abutment. The height of the structure is designed to sit below the arch spring of Vauxhall Bridge in order to retain views of the Grade II* listed bridge.

18.4.19 A circular platform of hardstanding is required on top of the structure, which would be positioned away from the listed bridge. It would be accessed via gates from the Thames Path. The space between a pair of lamp standards on the Vauxhall Cross wall would be widened to make a level connection to the platform. The area of hardstanding would not be publically accessible but could be viewed from Vauxhall Bridge and surrounding buildings. Therefore we sought to make the paving treatment attractive and to reference the River Effra.

18.4.20 The culvert from the Brixton and Clapham Storm Relief CSO in the foreshore would be partially exposed and require protection. We developed the terraced approach in order to provide such protection in a consistent and attractive way. We also felt that this approach would make a better contribution to the unique foreshore environment. We sought to maximise this contribution by incorporating planted intertidal basins on the higher levels and shingle and sediment basins lower down that would form small 'rock' pools. The form of the lower terraces was inspired by the contours of the riverbed and the way the river deposits banks of shingle over time.

18.4.21 The interception structure as a whole was designed to transition from the formal Vauxhall Cross building at the level of the Thames Path to the more organic language of the river bed when viewed from the river or the opposite bank. The regular circular geometry of the top level gradually breaks down to more fluid lines further down the structure. The concrete finish on the terraces would gradually become rougher and more shingle-like closer to the river bed. The very base of the structure would be tied into the foreshore with boulders, which would provide an opportunity for a variety of fish habitats and would protect the underground pipes. The terraces would be free-standing and abut the bridge in order to reduce the need for intrusive works to the listed bridge.

Ecological design of the intertidal terraces

18.4.22 Planted intertidal terraces at this scale at a site of this prominence would be unprecedented in central London. We conducted studies to determine the feasibility of the planted terraces and had regard to the fact that both planting and the river can be unpredictable. Therefore, we designed the form and finish of the flowing terraces to be attractive in an un-vegetated state in the event that the planting fails to establish correctly. The detailed design would be agreed at a later stage.

18.4.23 The intertidal terraces were profiled to foster aquatic ecology and to provide habitat for fish and invertebrates. The design consists of self-contained concrete basins arranged around the structure. The terraces would be angled towards the river to enable water to flood into and drain out of each terrace without causing erosion.

18.4.24 The terraces would range from approximately 98.5m ATD to 103.50m ATD and would be exposed to different tidal levels. The lower terraces (98.5m ATD to 101.0m ATD) would be left un-vegetated and contain ecologically valuable sediment habitats. The mid-range terraces (up to 101.5m ATD) would contain saline-tolerant plant habitats, which require regular inundation. The higher terraces (from 102.0m to 103.5m ATD) would be inundated with less water and contain reed bed habitats. Each basin would be filled with sediment substrate, which would be sourced locally prior to construction, including sediment removed from the River Thames at the site of the interception structure.

18.4.25 Coir pallets planted with locally-sourced native reed bed species pre-grown for a minimum of two vegetation seasons would be introduced to the top of the sediment substrate. Pre-planted coir rolls held in place with untreated wooden battens would provide added protection against erosion. In areas susceptible to erosion, additional rock mattresses and rock rolls would be introduced to protect the sediments.

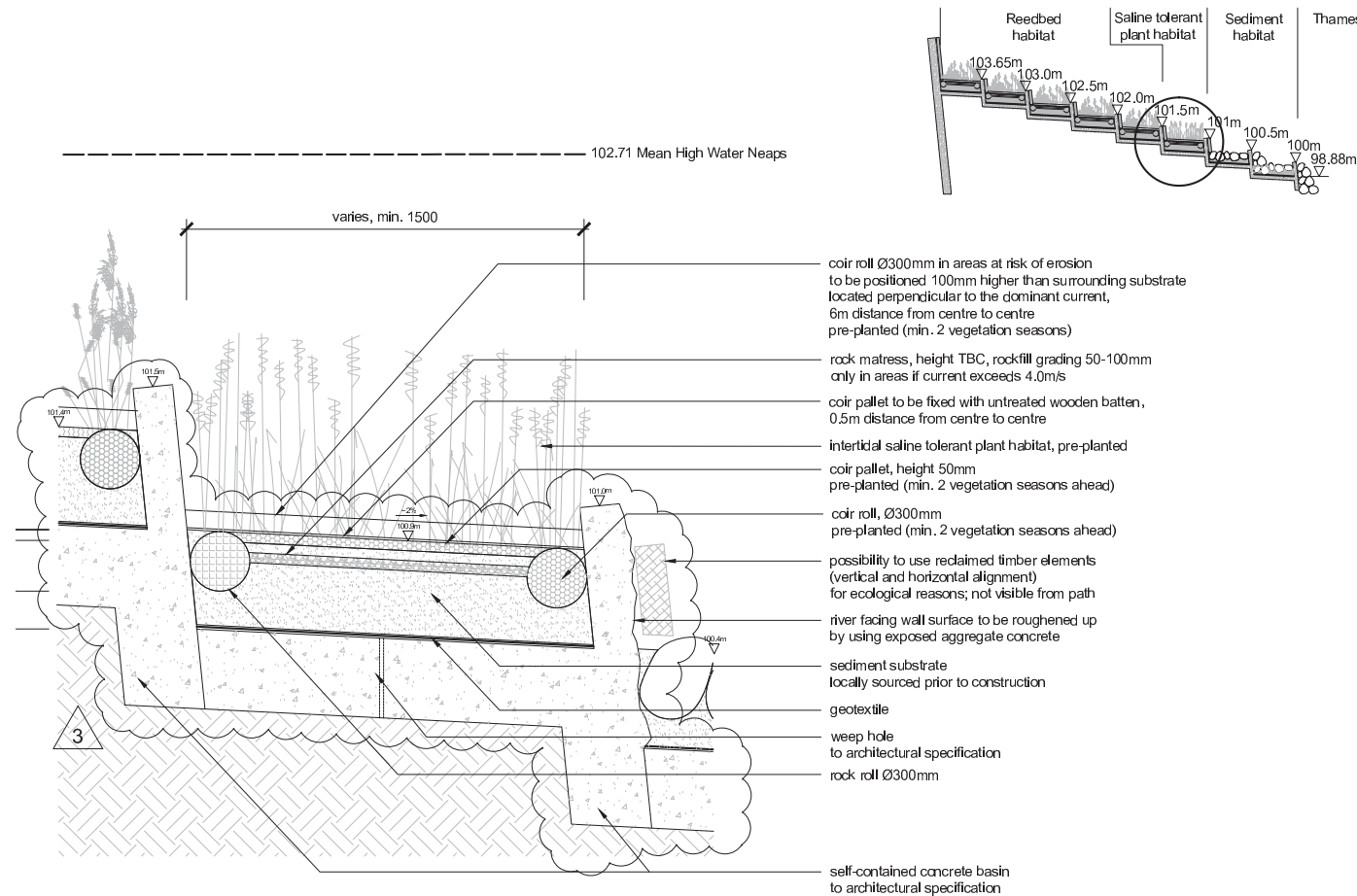


Figure 18.40: Intertidal planting details (not to scale)

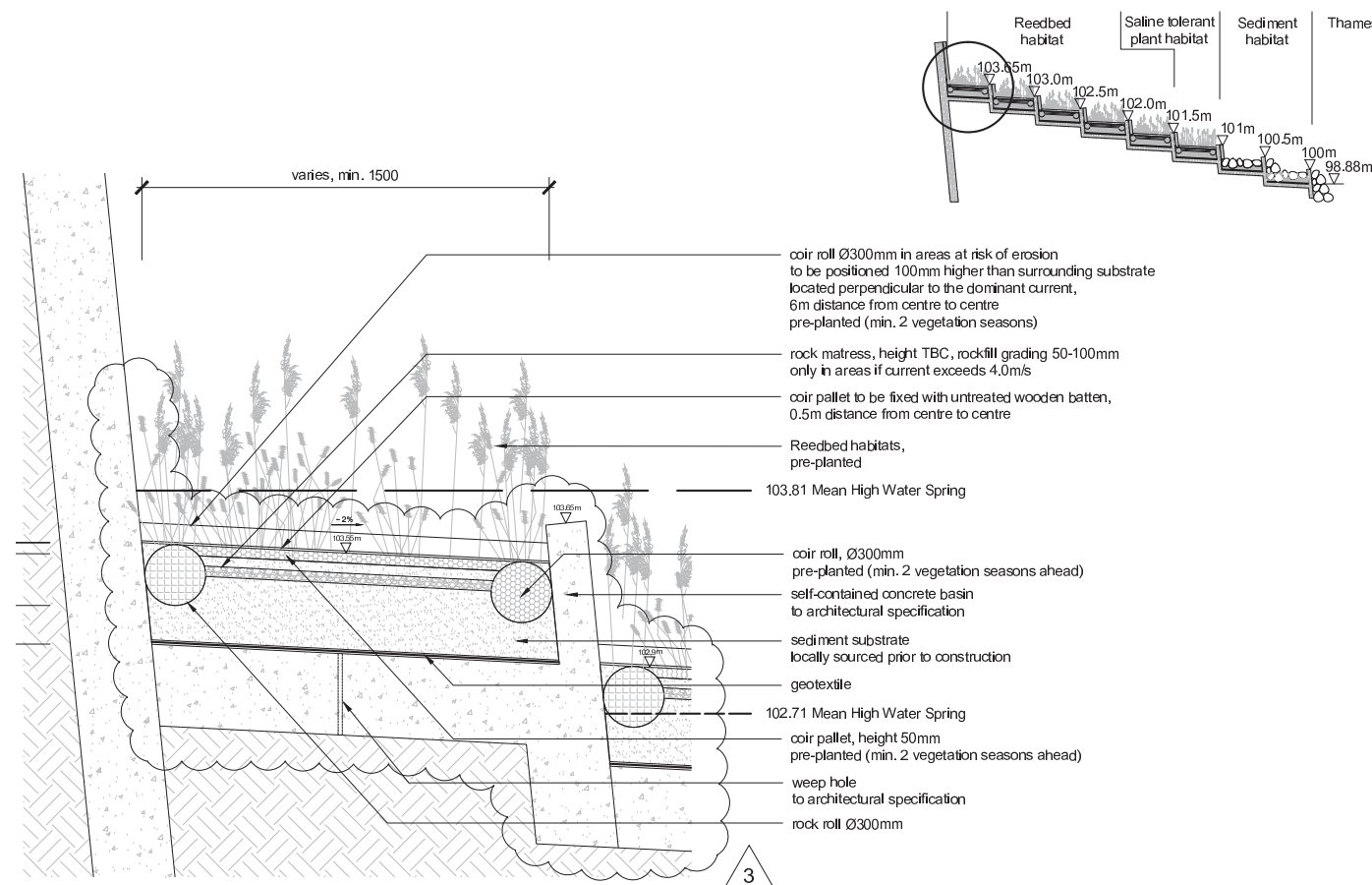


Figure 18.41: Intertidal planting details (not to scale)

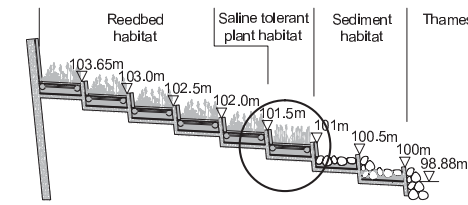


Figure 18.42: Bolboschoenus maritimus



Figure 18.43: Puccinellia distans



Figure 18.44: Juncus maritimus



Figure 18.45: Phragmites australis



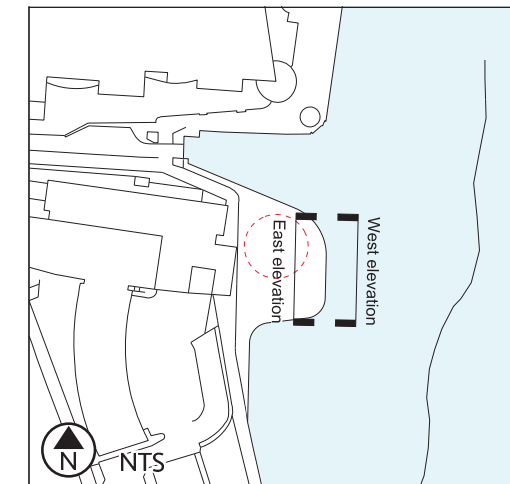
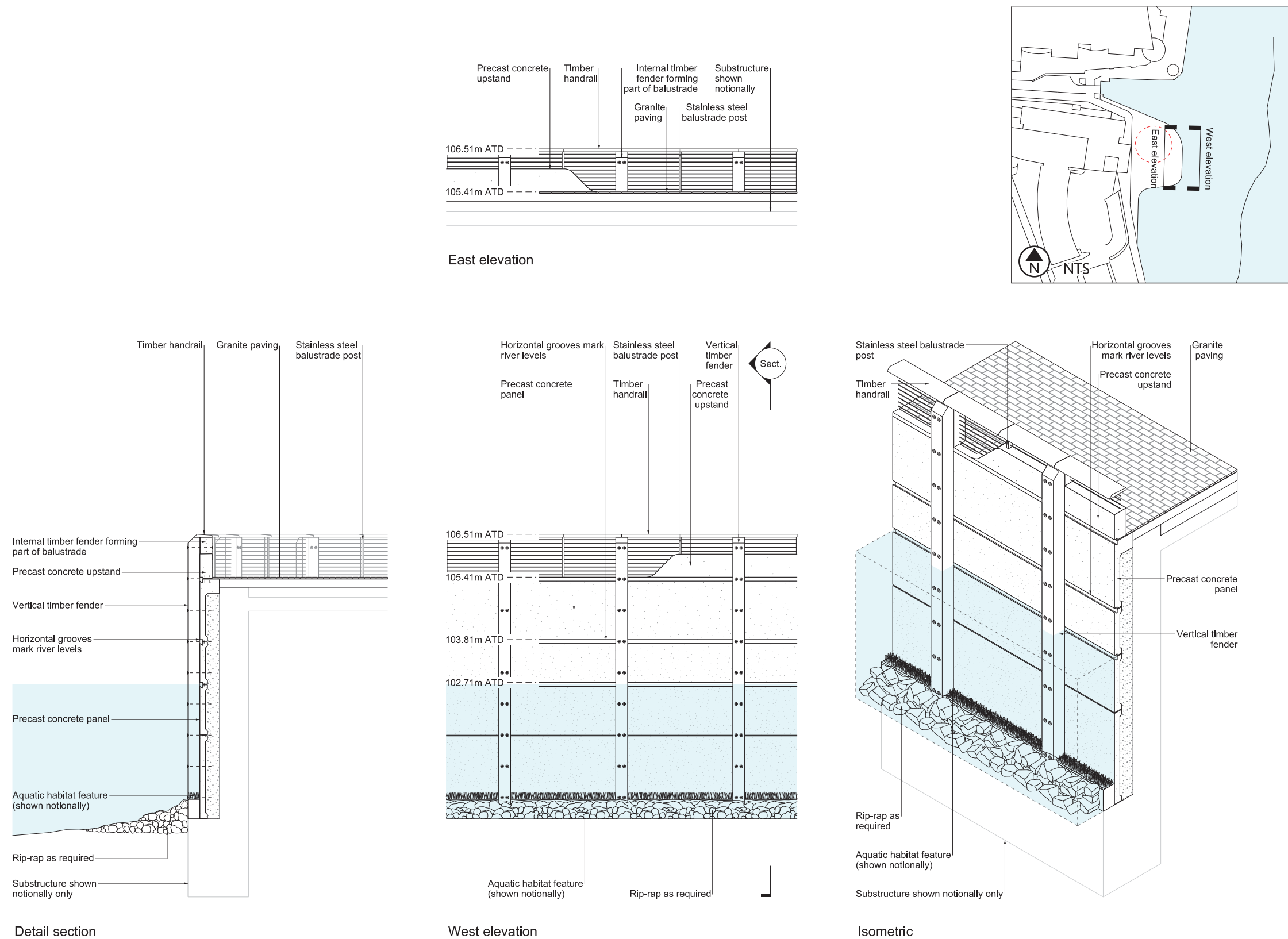
Figure 18.46: Aster tripolium



Figure 18.47: Plantago maritima



Figure 18.48: Example of 'rip rap' scour protection



18.4.26 Regular litter removal would be essential to the establishment and growth of the planting and the visual appearance of the site. Every five to ten years, the vegetation around the inlet pipes would need to be partially cleared back to prevent blockages. Vegetation development would need to be regularly monitored; we anticipate that two site visits per season by an ecologist would be adequate. Some species would need to be controlled by cutting them back at the base of the stem and others replanted. Monitoring would need to continue for at least five years following planting.

CSO

18.4.27 The Clapham and Brixton Storm Relief CSOs would be combined into a single new outfall from the interception structure. The existing culverts and dolphins would be removed. The layout of the intertidal terraces was developed to converge at the CSO to ensure that sufficient height for the outfall is available. The associated metal flap valves would be surface-mounted.

Apron and scour protection

18.4.28 The Clapham and Brixton Storm Relief CSOs' existing scour protection apron would be broken out once the flow is diverted. A new apron would be formed in front of the new CSO using rip-rap beneath a layer of foreshore sediments.

18.4.29 Scour protection may also be required at the base of the river walls and the bridge pier, which would also be created with rip-rap. The maximum extent of this work is defined on the Site works parameter plan as the zone in which all the permanent structures would be located.

Detail section

West elevation

Isometric

Figure 18.49: Proposed river wall (not to scale) - refer to Typical river wall design intent in the *Book of Plans*

Navigational issues

18.4.30 The CSO drop shaft structure would sit approximately 60m outside of the authorised navigation channel in the River Thames and we do not anticipate that it would significantly impact on river navigation for large boats.

18.4.31 The mean low later line lies approximately 40m from the front of the structure and would not impact on river users at low tide. It would have some effect on smaller boats at high tide; however, we do not anticipate that boats would navigate close to structure.

18.4.32 The CSO interception structure would sit 36m outside the authorised navigation channel in the River Thames and we do not anticipate that it would significantly impact on river navigation for large boats.

18.4.33 The interception structure would encroach into Arch 5 of Vauxhall Bridge and reduce the available space between the structure and bridge pier. At present, Arch 5 is only navigable by smaller boats; however, the Port of London Authority has requested that the arch be closed to all river users. Appropriate signage would be required on Vauxhall Bridge to indicate that the arch is closed.

18.4.34 The mean low later line lies approximately 10m from the front of the most projecting terrace of the interception structure. It would therefore not affect river users at low tide, but would have some effect on smaller boats at high tide. However, once Arch 5 is closed, boats would not navigate close to the structure.

18.4.35 The main navigational issue posed by the permanent works is that Lack's Dock is frequently used by London Duck Tours. A number of steel monopile dolphins would be positioned on the northern edge of the CSO interception structure to prevent the amphibious vehicles drifting onto the terraces and becoming 'beached' in the event of an engine failure.

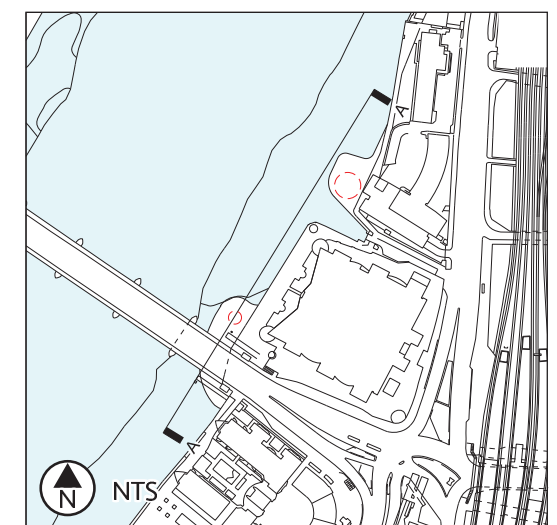
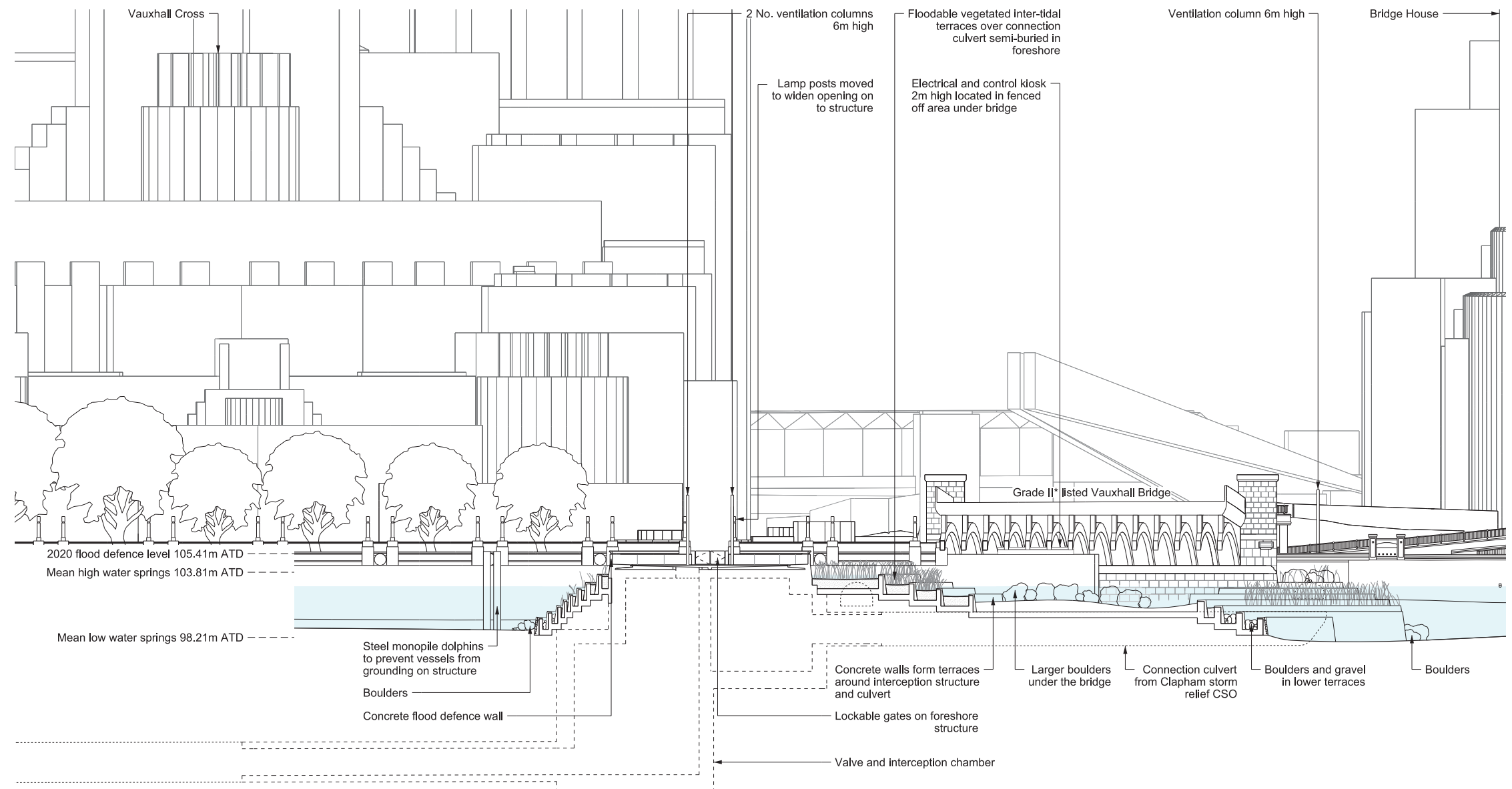


Figure 18.50: Section through Interception Structure (not to scale) - refer to Section A-A sheet 2 of 2 in the *Book of Plans*



Figure 18.51: Example of how metal inlays in paving provide information



Figure 18.52: Example of encription in stone

Historic interpretation

18.4.36 The project intends to develop a full historical interpretation strategy, which would have particular relevance to this site. There is considerable scope to include interpretive material to inform passers-by of the history of the site, the River Thames, the River Effra and significant recent archaeological finds in the area.

18.4.37 The signature ventilation columns on the CSO drop shaft structure were designed to be inscribed with site-specific information. The paving on the surface of the structure was designed to feature historical references etched into ground-level metal strips arranged near the seating area. The strips would align with the flowing paving bands.

18.4.38 Signage similar to the existing plaque over the Brixton Storm Relief CSO outfall could be positioned over the new outfall and the paving on the interception structure could reference the River Effra in an attractive and graphic way.

Integration of the functional components

18.4.39 The majority of the proposed works are below-ground structures, including:

- a. a CSO drop shaft
- b. a connection tunnel
- c. CSO interception chambers on the Clapham Storm Relief and Brixton Storm Relief CSOs
- d. valve chambers
- e. connection culverts
- f. CSO overflow structures and a protective foreshore apron
- g. an air treatment chamber
- h. associated hydraulic structures, culverts, pipes and ducts.

18.4.40 Post construction, the following structures would be visible on the site:

- a. The foreshore structure for the CSO drop shaft surrounded by a new section of river wall including:
 - i two signature ventilation columns
 - ii an electrical and control kiosk.
- b. The foreshore structure for the CSO interception chambers:
 - i reclaimed land with a flood defence wall to the uppermost level of the structure with semi-planted terracing
 - ii two ventilation columns to serve the combined interception chamber
 - iii one ventilation to serve the Clapham Storm Relief CSO
 - iv a local control pillar
 - v steel monopile dolphins.
- c. an electrical and control kiosk underneath Vauxhall Bridge.

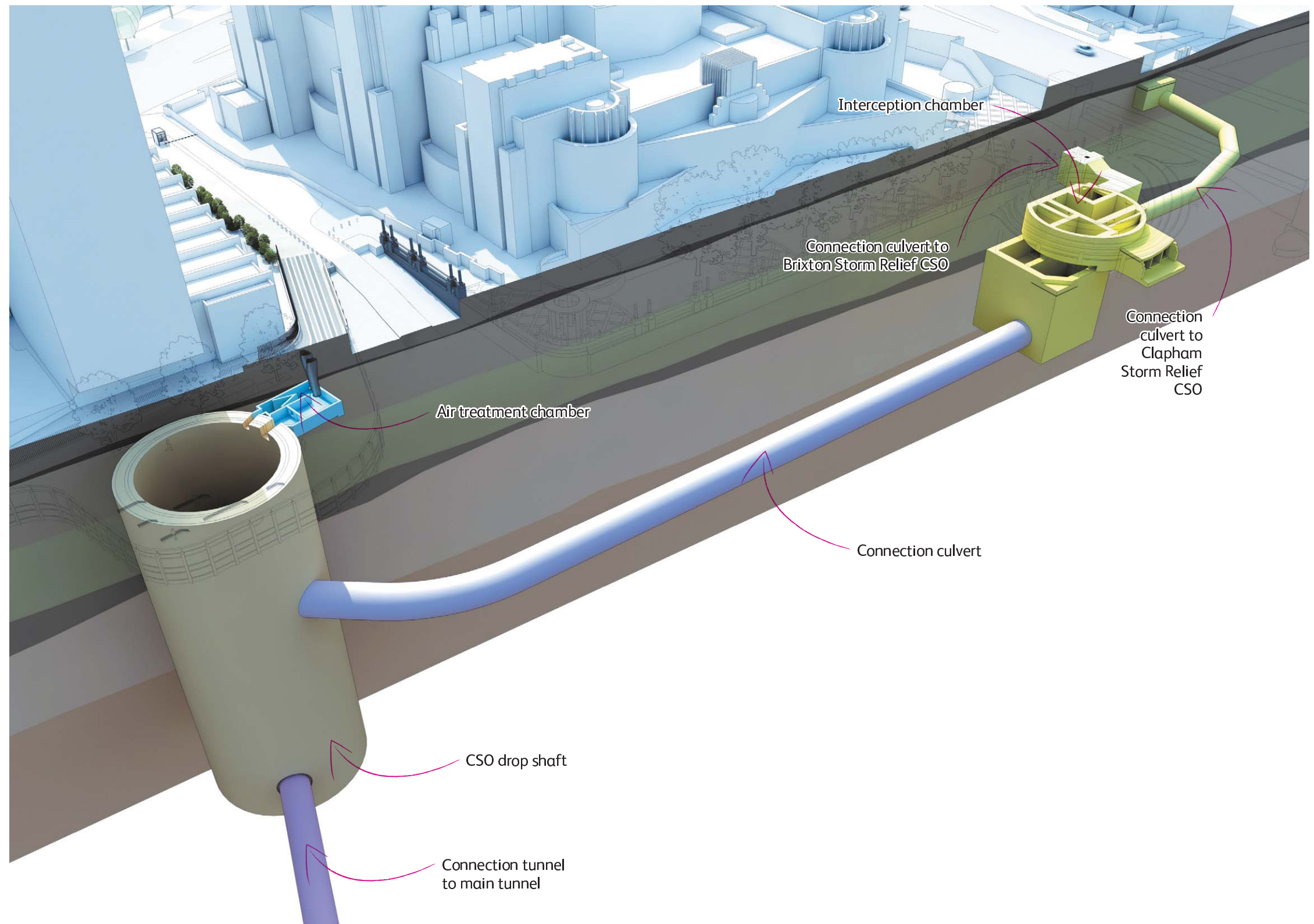


Figure 18.53: Proposed functional components diagram: below ground view

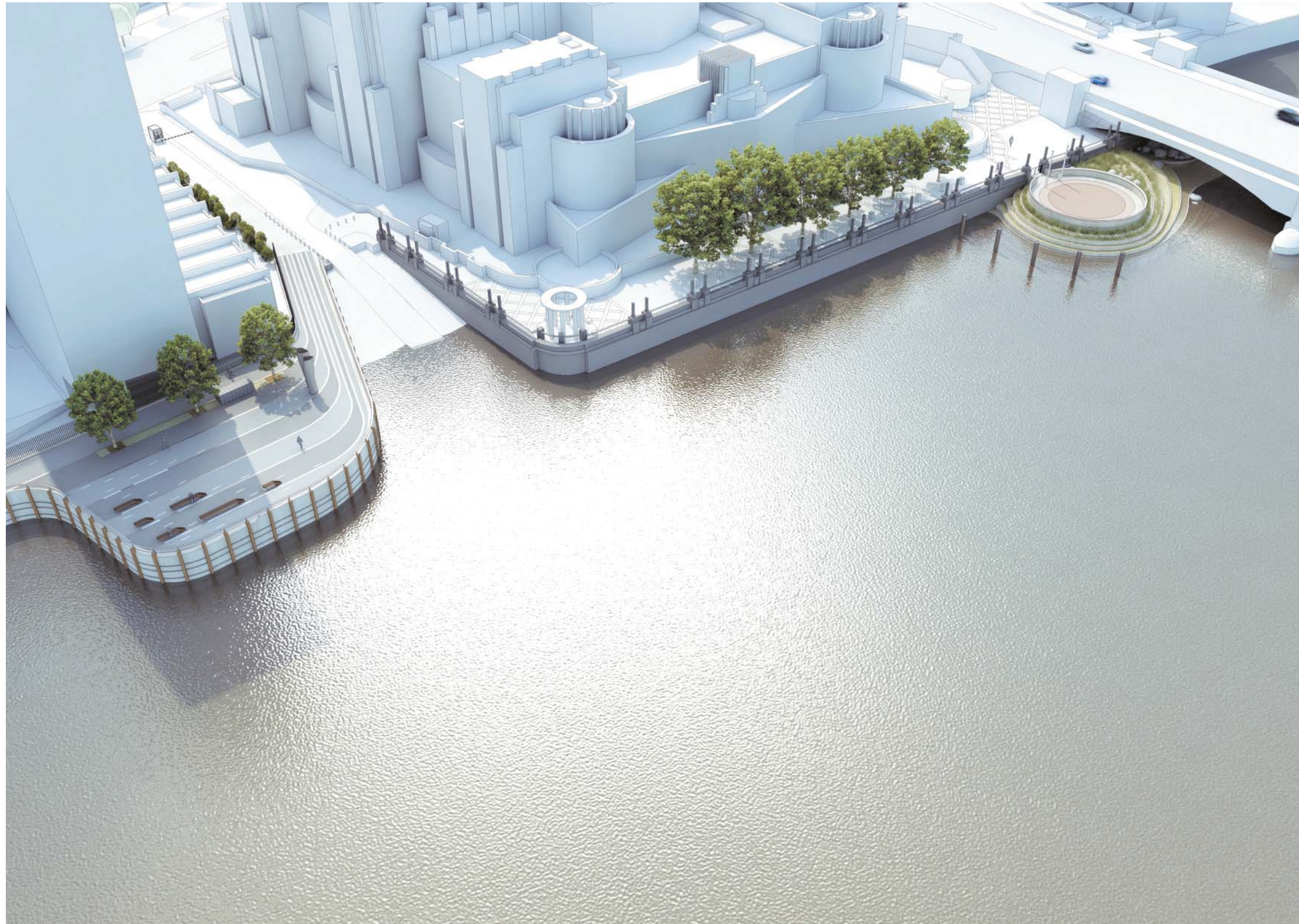


Figure 18.54: Proposed functional components diagram: above ground view

CSO drop shaft and CSO interception structure

18.4.41 The CSO drop shaft would be approximately 16m in internal diameter. It would be connected to the main tunnel via a short connection tunnel. Along with the air treatment chamber, it would be enclosed within the CSO drop shaft structure.

18.4.42 The combined CSO interception chamber and connection culverts to the Brixton and Clapham Storm Relief CSOs would be enclosed within the CSO interception structure to the north of Vauxhall Bridge. The interception chambers were combined in order to reduce the size of the structure and the temporary cofferdam above the Victoria Line tunnels. The underground connection culvert would link the interception structure to the drop shaft structure.

Ventilation columns

18.4.43 The number and size of the ventilation columns are determined by the air treatment requirements at the site. At Albert Embankment Foreshore, we propose to include two signature ventilation columns (between 4m and 8m high) to serve the CSO drop shaft. The final height would be determined by the functional requirements and the proportions would ensure that the visual appearance of the columns is appropriate to the site.

18.4.44 We would also include three 6m high smaller-diameter columns: two to serve the CSO interception chamber located opposite the southwestern corner of Vauxhall Cross by the Brixton Storm Relief CSO; and one to serve the Clapham Storm Relief CSO located opposite the northeastern corner of St George Wharf. These columns would be similar in scale to a lamppost and finished to blend in with the local context. If the necessary ventilation infrastructure for this site were incorporated into a single structure it would be undesirably large.

18.4.45 In order to limit the scale of the permanent works, we separated the infrastructure between the drop shaft and the interception structures to reduce the apparent bulk of the columns.

Electrical and control kiosks

18.4.46 We propose to include two electrical and control kiosks: one on the CSO drop shaft structure and one on existing land beneath Vauxhall Bridge with a 750mm clearance to the arch of the bridge. In this location it would not impede river views or visibility across the site. The existing fence around the area would be fully reinstated following construction to ensure the area was secure.

18.4.47 The kiosks would be clad in a material to reference the area of hardstanding and the materials of local buildings.

18.4.48 The kiosk on the CSO drop shaft structure could further contribute to the public realm by incorporating interpretive material such as an information board to explain the history of the site.

18.4.49 Areas of hardstanding would be included to facilitate maintenance vehicle access and incorporate access covers to the below-ground infrastructure. The hardstanding would also limit the visual impact of the covers.

18.4.50 We positioned as much equipment as possible below ground in order to leave the area of public realm clear. Access to the equipment would be required at various intervals. Some access covers for removing/replacing equipment would be accessed infrequently and may be buried, whereas the secure covers for regularly inspected equipment must be more easily accessible.

Lack's Dock

18.4.51 The Thames Path between the CSO drop shaft structure and Lack's Dock would be widened slightly to allow maintenance vehicles to access the foreshore area. We would also provide retractable or drop-down bollards to ensure that unauthorised vehicles cannot access the drop shaft structure.

18.4.52 The extent of other reinstatement works depends on which construction access point is selected. For Option A, we would need to reinstate the security hut and re-pave and re-plant the access route. For Option B these works would not be required.

Lighting design

18.4.53 Low level lighting would be incorporated within the permanent works in order to limit visual clutter. Circular recessed luminaires would be included in the wall of the parapet on the CSO interception structure, which would highlight the paving pattern at night when viewed from Vauxhall Bridge.

18.4.54 Light would be provided by in-ground luminaires around the edge of the CSO drop shaft structure. A scattering of in-ground strip luminaires would follow and reinforce the banded paving pattern.

18.4.55 The line of new London Plane trees would be subtly highlighted with up-lighting from ground level in the same way as the trees on Albert Embankment. A collar of low level LEDs would wash the lower levels of the signature ventilation columns with a subtle light. The architectural fencing beneath Camelford House would be subtly back-lit.

18.4.56 No lighting would be directed towards Vauxhall Bridge or the River Thames itself in order to avoid any adverse effect on resident and migratory wildlife.



Figure 18.55: Example of recessed wall luminaires

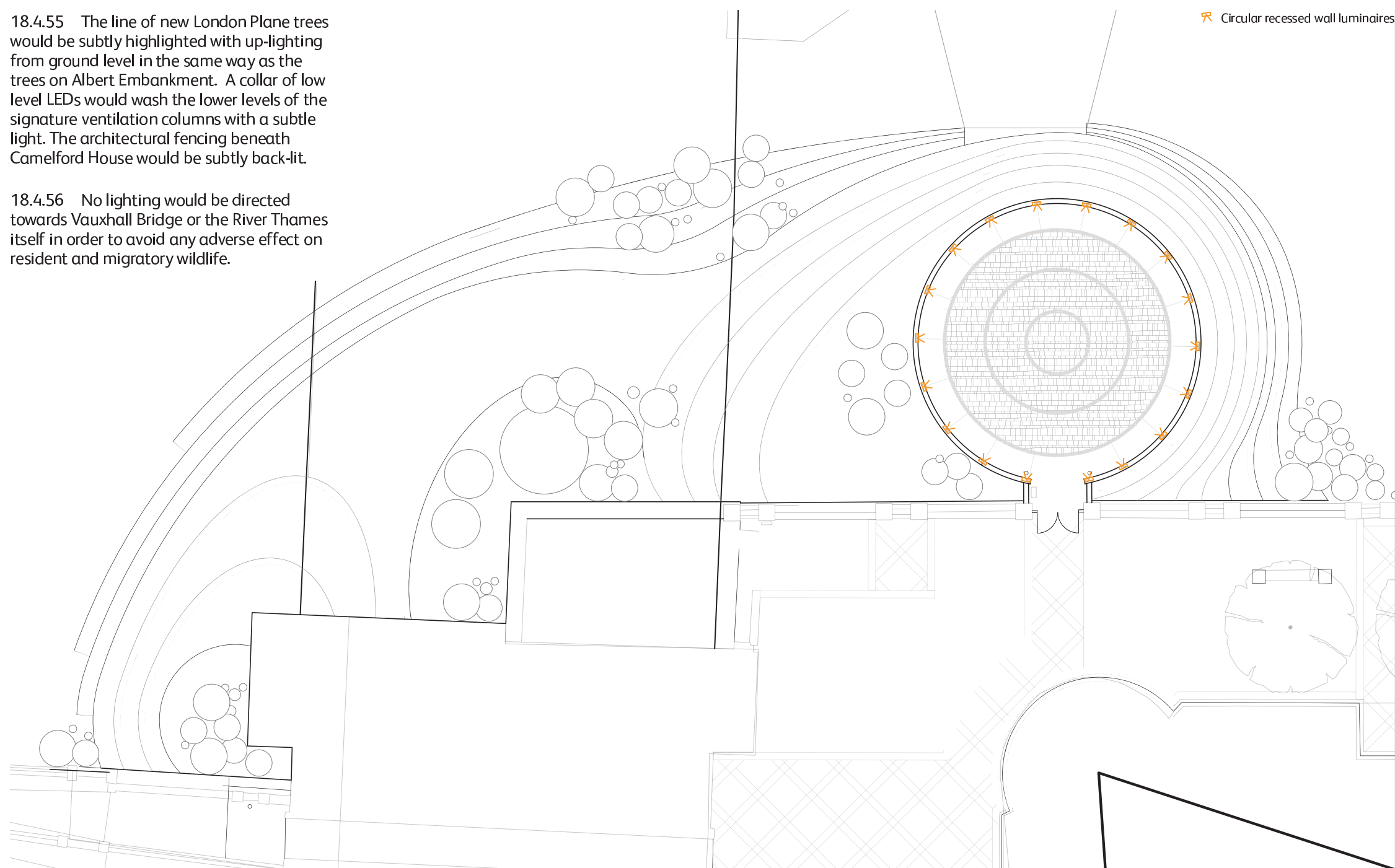


Figure 18.56: Proposed lighting plan for the interception Structure (not to scale)

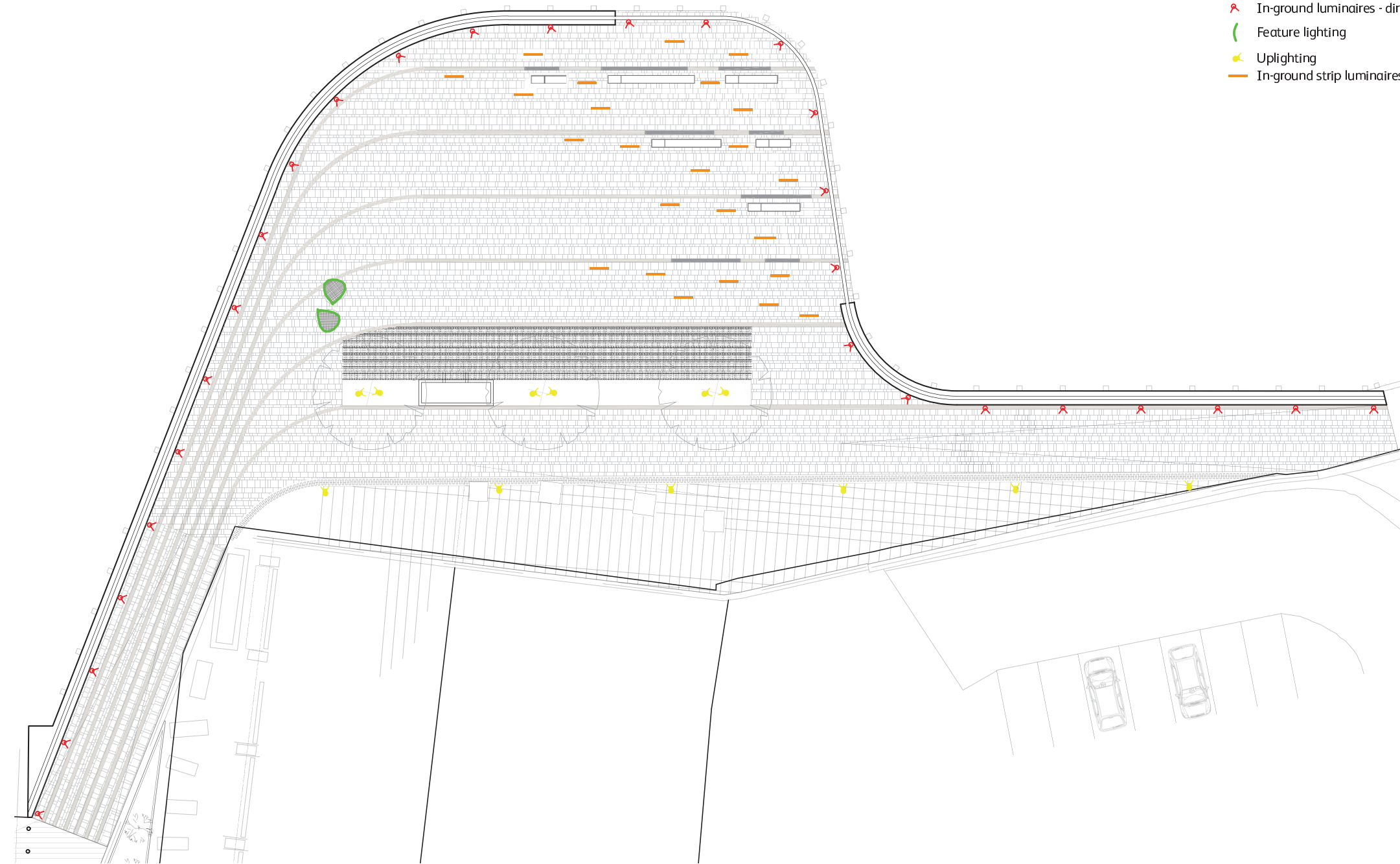


Figure 18.57: Proposed lighting plan for the drop shaft structure (not to scale)

- In-ground luminaires - directed light
- Feature lighting
- Uplighting
- In-ground strip luminaires

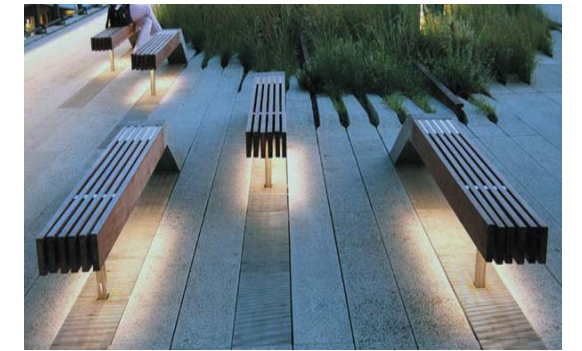


Figure 18.59: Example of illuminated benches



Figure 18.60: Example of in-ground luminaires



Figure 19.58: Proposed panoramic night view from Vauxhall Bridge

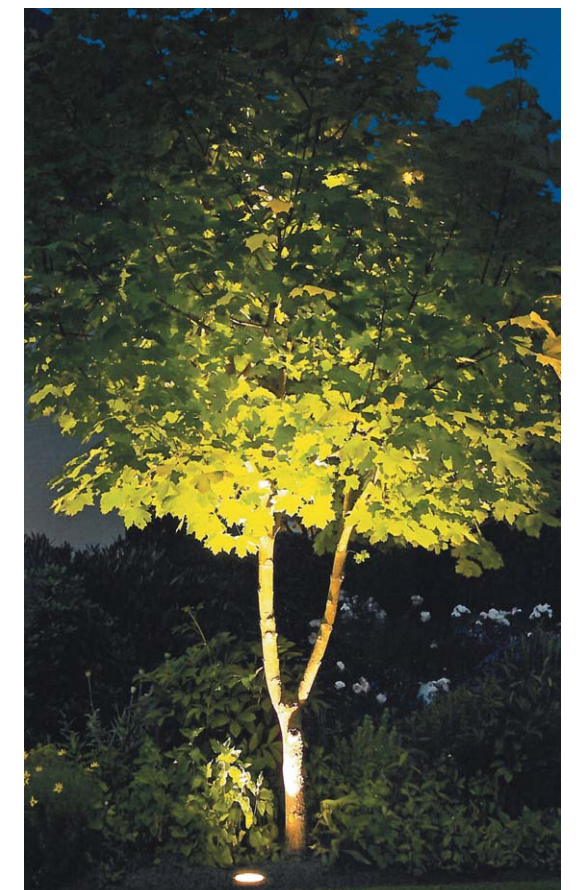


Figure 18.61: Example of uplighting on tree

Landscaping and appearance

Hard landscape palette

18.4.57 The proposed hard landscape materials and furniture palette uses traditional high-quality materials in a contemporary manner. Hard surface materials would be robust, fit-for-purpose and appropriate for the setting in order to ensure long-term quality. The seating would be stone or concrete softened by a timber top.

- concrete for river walls and terraces
- natural stone and concrete for paving surfaces
- timber-topped benching
- etched metal strips
- stainless steel handrail
- metal gates and architectural fencing.

Soft landscape palette

- The existing tree and shrub planting along Lack's Dock would be retained and pruned as necessary.
- Specimen *Alnus Glutinosa* (if permeable paving is incorporated), or *Platanus x hispanica* would be planted on the CSO drop shaft structure.
- Intertidal saline-tolerant plants would include *Aster tripolium*, *Bolboschoenus maritimus*, *Juncus gerardii*, *Juncus maritimus* and *Puccinellia distans*. Possible intertidal reed bed plants would include *Phragmites australis*, *Typha angustifolia*, *Phalaris arundinacea*, *Acorus calamus*, and *Sparganium angustifolium*.



Figure 18.62: Example of natural stone paving



Figure 18.62: Example of natural stone paving



Figure 18.67: Street tree planting



Figure 18.63: Natural stone paving



Figure 18.64: Permeable natural stone paving



Figure 18.65: Example of timber bench

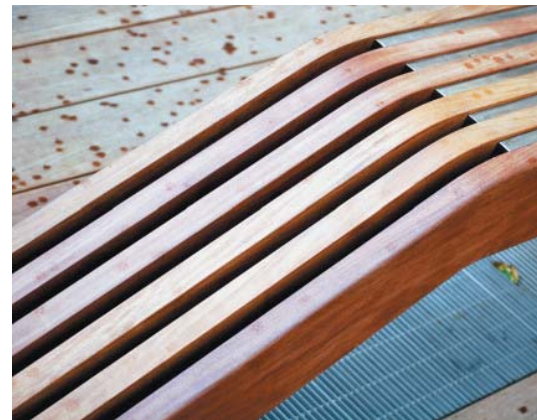


Figure 18.66: Example of timber bench detail

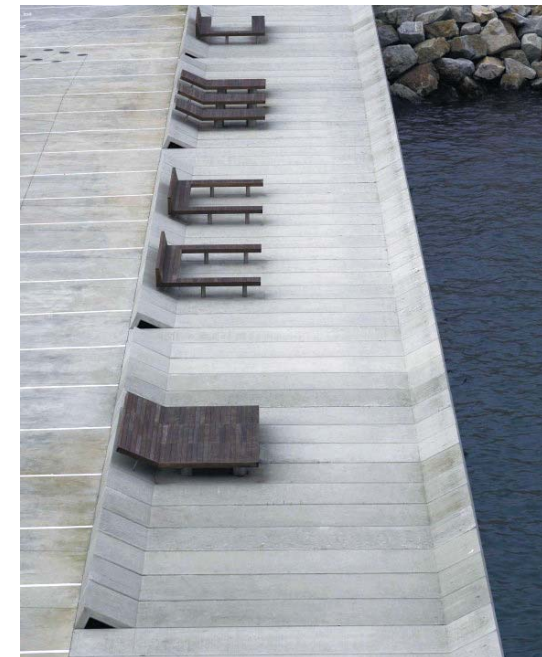


Figure 18.68: Example of timber bench detail

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18.5 Access and movement

18.5.1 Pedestrians would be able to access the CSO drop shaft structure from the adjoining Thames Path. However, due to concerns raised by the occupants of Vauxhall Cross, the CSO interception structure would be closed to the public by a lockable gate.

18.5.2 The CSO drop shaft structure would be generally level except for two gently-sloping pathways, which would link the structure with the adjacent Thames Path. We sought to ensure a clear and inclusive environment that would be safe and suitable for all, including people with disabilities, the elderly, and children in pushchairs. The gradient of the level changes would be no greater than 1:20.

18.5.3 In line with project-wide aspirations and good practice, landscaping treatments and materials would ensure that pedestrian routes meet the best standards of accessibility.

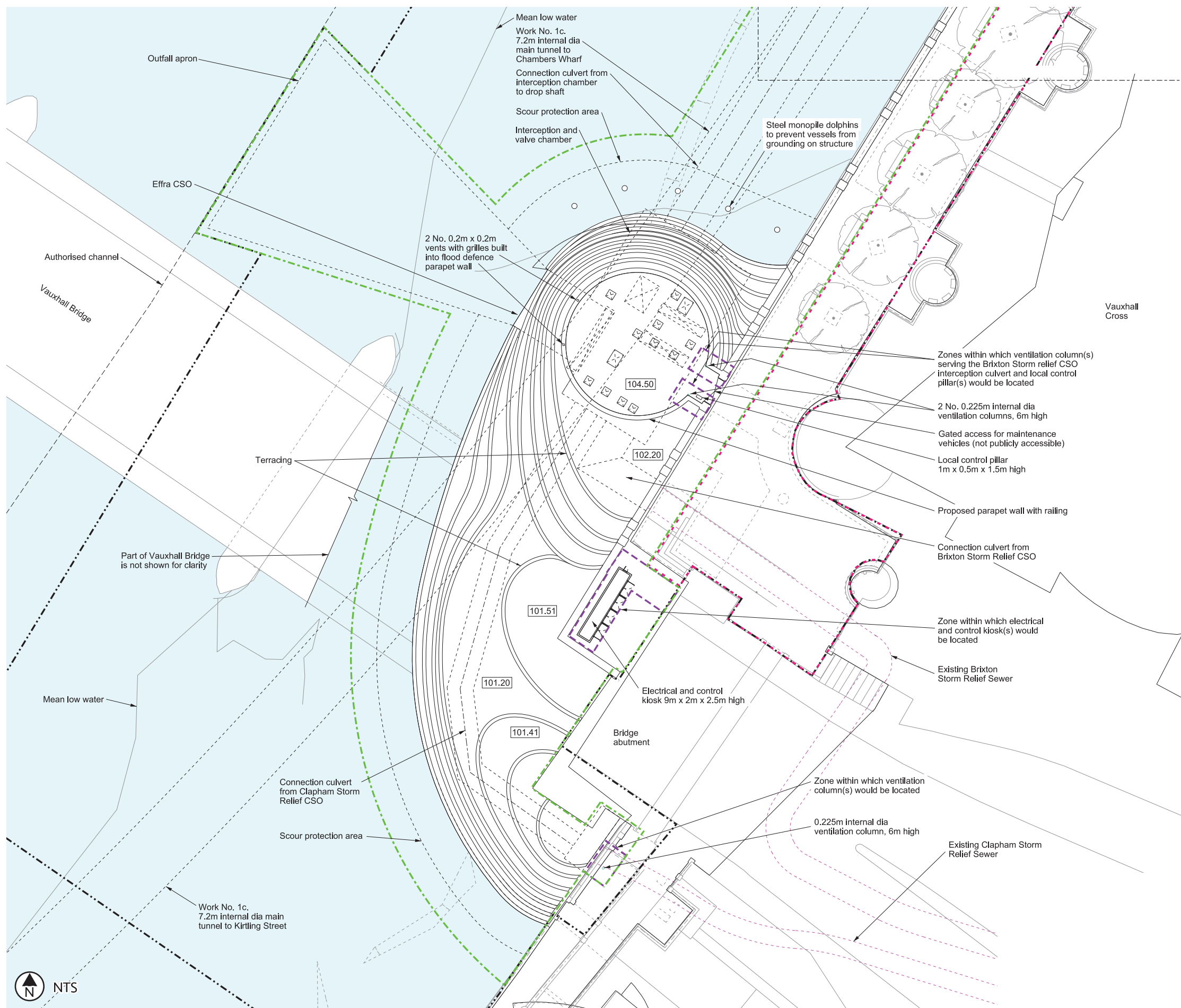
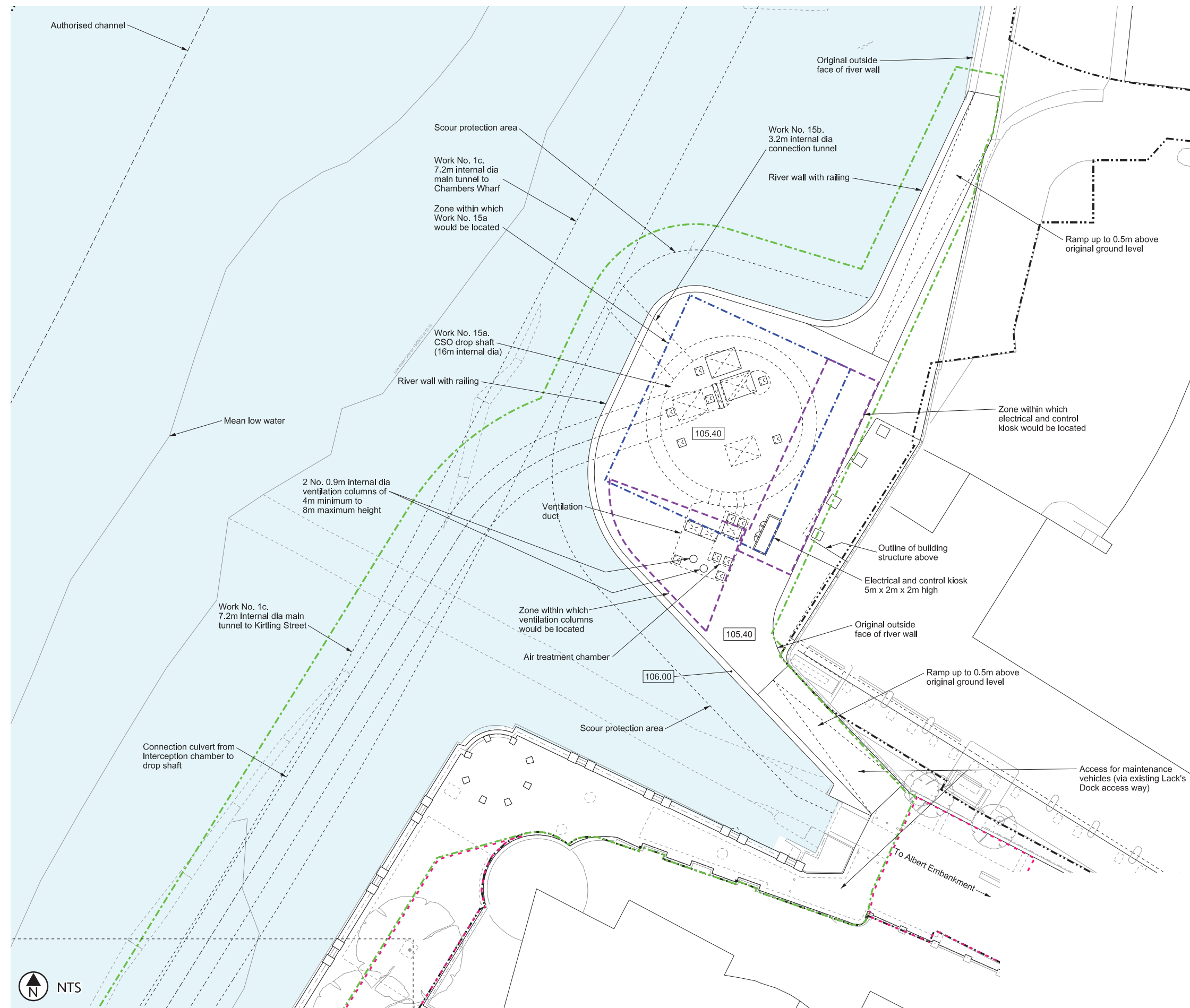


Figure 18.72: Permanent works layout - refer to Permanent works layout in the *Book of Plans*



Thames Water access requirements

18.5.4 Vehicle access to the two foreshore structures would be via the existing entrance from Albert Embankment between Vauxhall Cross and Camelford House and along Lack's Dock.

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

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

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

18.5.8 Maintenance vehicles and plant accessing the area of hardstanding above the CSO drop shaft would turn right from Lack's Dock through removable bollards and along the widened section of the Thames Path. Cranes and other plant would sit on the area of hardstanding.

18.5.9 Maintenance vehicles and plant accessing area of hardstanding above the interception structure would travel along the Thames Path in front of Vauxhall Cross. Cranes and other plant would sit on the area of hardstanding and on the adjacent section of the Thames Path.

18.5.10 The Thames Path may need to be temporarily diverted during maintenance activities.

Figure 18.73: Permanent works layout - refer to Permanent works layout in the *Book of Plans*

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