

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

Carnwath Road Riverside

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 12

Carnwath Road Riverside

12.1 Introduction

12.1.1 A worksite is required to drive the main tunnel west to Acton Storm Tanks, to receive the main tunnel drive from Kirtling Street, and to receive the Frogmore connection tunnel drive from Dormay Street. The proposed development site is known as Carnwath Road Riverside, which is located in the London Borough of Hammersmith and Fulham. The London Borough of Wandsworth lies on the opposite side of the river.

12.1.2 Above ground elements of the detailed design proposals would be designed at a later stage. The detailed designs would be submitted to the local authority for approval in the form of a DCO requirement.



Figure 12.1: Aerial photograph of the existing Carnwath Road Riverside with LLAU indicated

12.2 Existing site context

12.2.1 The site itself comprises three adjacent parcels of land: Whiffin Wharf and the safeguarded Hurlingham Wharf, which are both largely vacant areas of hardstanding with some existing unauthorised uses, and Carnwath Road Industrial Estate, which contains two-storey industrial, warehouse and retail units. The site also includes an area of the foreshore of the River Thames in front of all three land parcels.

12.2.2 London Plan policy advises that safeguarded wharves such as Hurlingham Wharf should only be used for waterborne freight-handling use or temporary uses that do not preclude re-use for cargo-handling.

12.2.3 The foreshore area falls within the River Thames and Tidal Tributaries Site of Importance for Nature Conservation (Metropolitan Importance). There is potential for archaeological remains in the foreshore, most probably from the late 19th century onwards, but none are anticipated to be significant.

12.2.4 The site is located within the South Fulham Riverside Regeneration Area and the Sands End Conservation Area, which was designated to ensure that future development respects the riverside location and views from the locally listed Wandsworth Bridge (170m to the east). The conservation area status principally seeks to protect the future development of the riverside rather than to retain the existing character of the townscape. The River Thames itself, the river bank, waterborne uses and views across and along the River Thames, are noted as the principal elements that define the character of the conservation area.

12.2.5 The site is subject to a comprehensive redevelopment proposal. Three separate planning applications have been submitted for a mixed-use redevelopment scheme across the three sites that would provide a total of 474 dwellings, retail uses, restaurants/café, office floorspace and basement car parking and cycle parking. The proposals include provision for a new Thames Path, hard and soft landscaping, public and private open space and new areas of public realm. Decisions on these applications were still pending at the time of writing.

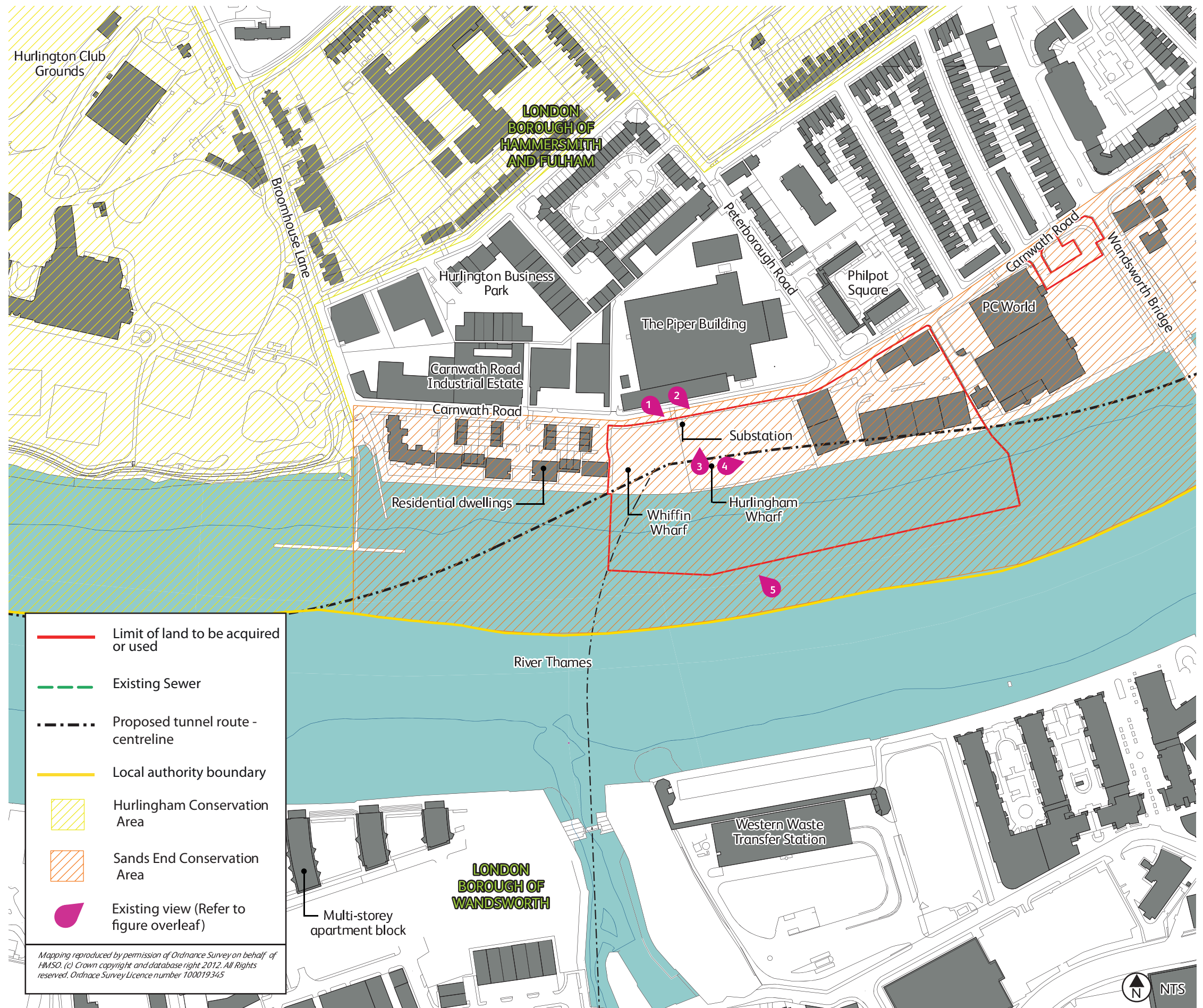


Figure 12.2: Existing site plan



Figure 12.3: Substation on Hurlingham Wharf



Figure 12.6: River wall at Hurlingham Wharf

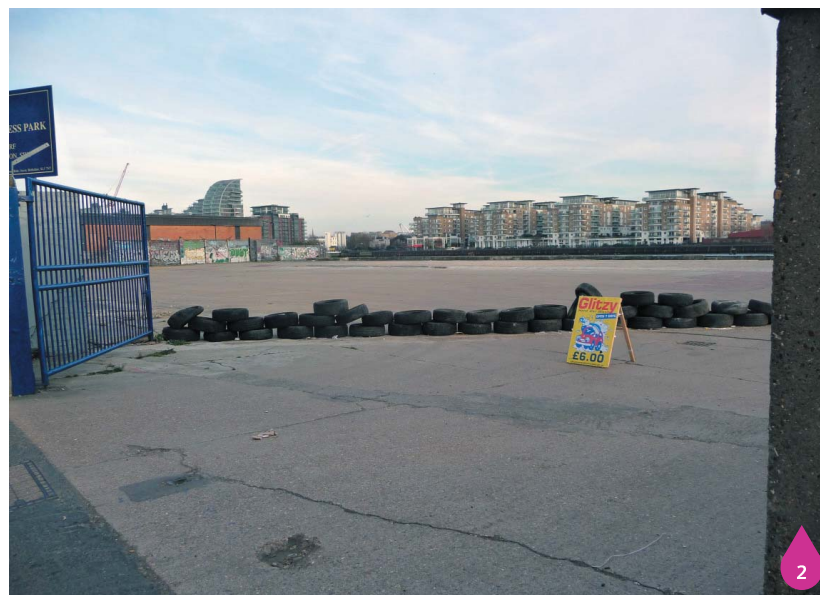


Figure 12.4: Hurlingham Wharf from Carnwath Road



Figure 12.5: Piper Building from Hurlingham Wharf



Figure 12.7: Whiffin Wharf and Hurlingham Wharf from the River Thames

12.2.6 However, a Safeguarding Direction for the whole site was issued by the Secretary of State for the Department of Communities and Local Government under Section 74(1)(a) of the Town and Country Planning Act 1990 on 24 April 2012. The Direction prevents the local planning authority from granting planning consent to applications in respect of any land to which the Direction relates, without specific authorisation from that Department.

12.2.7 The site is bounded to the north by Carnwath Road, to the east by a four-storey residential block and a PC World superstore, to the south by the River Thames, and to the west by three to four-storey residential dwellings that overlook the site and the River Thames.

12.2.8 The Thames Path diverts from the riverside at the edge of the Carnwath Road Industrial Estate and bisects the site along the boundary with Hurlingham Wharf. It runs along the northern boundary of the site (the width of Hurlingham Wharf and Whiffin Wharf), turns back to the riverside along the eastern boundary of Whiffin Wharf and continues towards the west.

12.2.9 The surrounding area is characterised by a mix of land uses. Immediately to the north of the site on Carnwath Road lie the Piper Centre and the Piper Building, which features locally listed modernist murals. The Piper Building is a large mixed-use building that comprises residential properties, a health club and a car park. The four-storey residential blocks of Philpot Square lie on either side of the junction of Carnwath Road and Peterborough Road. The Hurlingham Conservation Area lies approximately 200m to the north of the site.

12.2.10 To the south of the site, on the opposite side of the River Thames, are multi-storey residential apartment blocks with commercial units at ground floor level, and the Western Riverside Waste Transfer Station. To the west beyond the adjacent residential properties lies Hurlingham Park, which contains The Hurlingham Club for private members. An Area of Archaeological Importance lies 50m to the west of the site, which covers the former settlement along Broomhouse Lane. To the northwest lie purpose-built industrial units, including a timber merchant, and other commercial and industrial uses in the Hurlingham Business Park.

Existing site access and movement

12.2.11 The site is accessed directly from Carnwath Road. At present, this access is used for activities associated with the temporary use on Hurlingham Wharf and the operation of the units in the Carnwath Road Industrial Estate.

Highways

12.2.12 Carnwath Road is a single carriageway that features traffic-calming speed cushions. Carnwath Road intersects Broomhouse Lane to the west of the site and forms a signalised junction with Wandsworth Bridge Road (A217) and Townmead Road to the east. Wandsworth Bridge Road forms part of the Strategic Road Network and connects to Fulham and Chelsea to the north and to Wandsworth Common to the south.

Car parking

12.2.13 Carnwath Road falls within a Controlled Parking Zone. On-street parking is permitted and there are dedicated shared-use parking bays along either side of Carnwath Road. Approximately 400 cars can be accommodated in the on-street parking bays in the vicinity of the site between Sullivan and Hugon Road to the north, Wandsworth Bridge Road to the east, Carnwath Road to the south, and Broomhouse Lane to the west.

Public transport

12.2.14 Putney Bridge Underground Station is situated approximately 1.1km to the west and Imperial Wharf Railway Station approximately 1.3km to the east. Wandsworth Town is the closest National Rail Station (approximately 1.1km to the south), which services Waterloo Station to the northeast and Staines to the west.

12.2.15 Five daytime buses and two night bus routes operate within 640m of the site. Route 424 (Putney Heath to Fulham Football Club) operates as a hail-and-ride service along Carnwath Road.

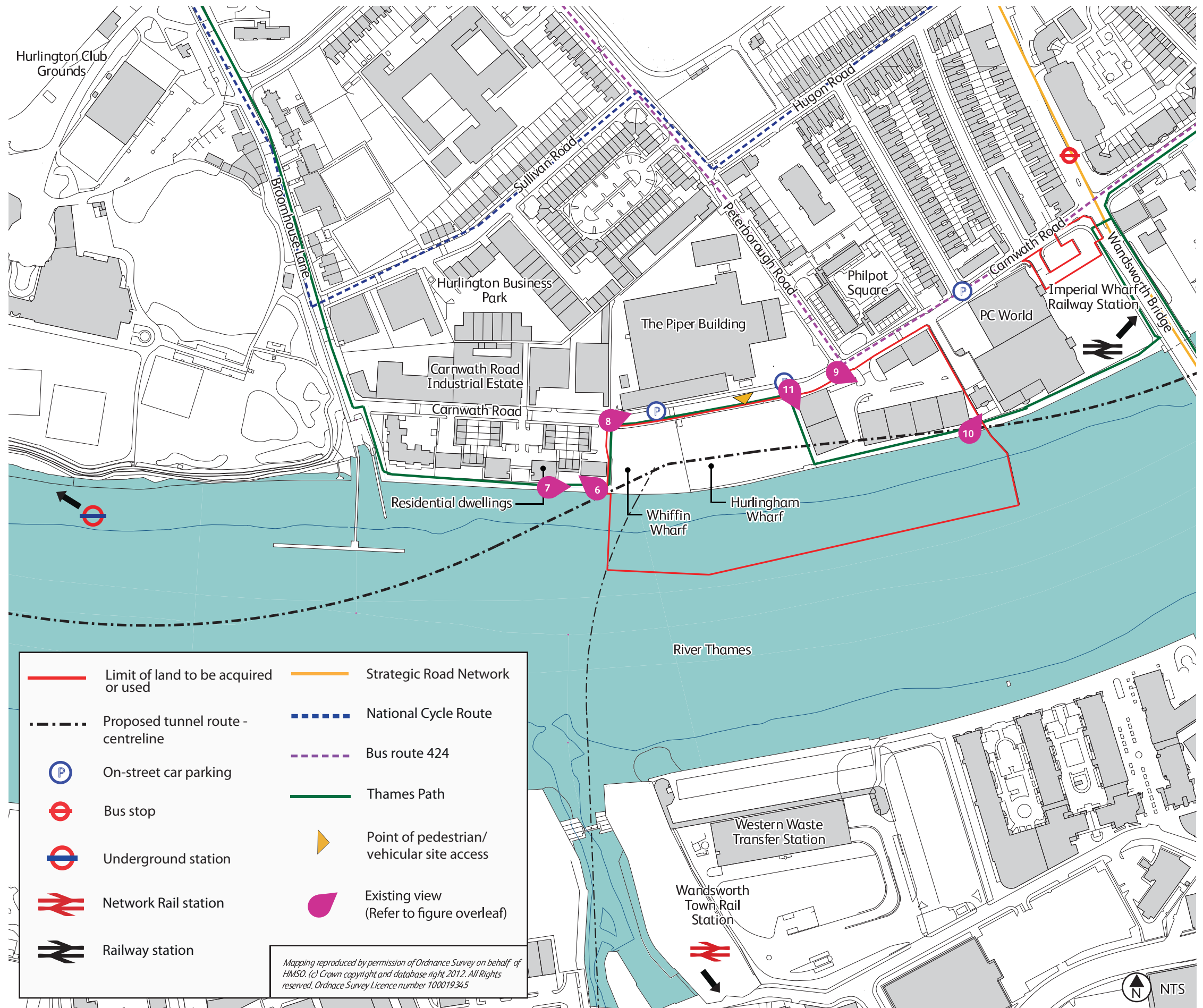


Figure 12.8: Existing site analysis plan



Figure 12.9: Thames path looking west



Figure 12.12: Carnwath Road industrial estate



Figure 12.10: Thames Path looking east



Figure 12.13: Housing beside PC World



Figure 12.11: Carnwath Road beside Piper building



Figure 12.14 Thames Path and Hurlingham Wharf site boundary

Cycle routes

12.2.16 There are no strategic cycle routes along Carnwath Road. Cycling is permitted along the Thames Path, which runs around and through the site.

12.2.17 The main cycle route in the area is National Cycle Network Route 4, which runs across Putney Bridge, around the northern side of Hurlingham Park and along Broomhouse Lane, Sullivan Road, Hugon Road and Stephendale Road. An off-carriageway cycle lane is provided in both directions across Wandsworth Bridge.

12.2.18 The closest Barclays Cycle Hire docking station is located on Grosvenor Road (A3212), 200m to the east of the site.

Pedestrian routes

12.2.19 Carnwath Road provides an east-west link near the bank of the River Thames between Wandsworth Bridge and Hurlingham Park. Footfall is generally highest along Carnwath Road and Hugon Road.

12.2.20 The Thames Path route features signage to direct pedestrians and cyclists.

Historical context

12.2.21 The site was once located within the historic Manor of Fulham, on the River Thames and opposite the delta of the River Wandle. In the early medieval period, the area around the site was occupied by water meadows. The meadows to the north of the present-day Carnwath Road were drained and used for agriculture in the later medieval period. The riverside meadows remained undeveloped until the 1890s, by which time London had expanded to the area.

12.2.22 The Ordnance Survey of 1896 reveals that there was a wharf on the eastern part of the site used by the Metropolitan Asylum Board's river ambulance. The western part was developed soon after with several industrial buildings. The wider riverside was developed for industry from the later 19th century, and some areas were redeveloped with flats or commercial units.

12.2.23 The buildings to the east and west of the site were built in the late 20th century. The buildings along Carnwath Road consist of an inter-war council housing block and post-war industrial buildings, one of which has been converted into flats.

12.2.24 In 1932, the river ambulance service from the wharf stopped and until 1995 the wharves were used for industry, including Blue Circle Cement. Since 1995 the western part of the site has been vacant, except for various temporary unauthorised uses; all the buildings were cleared away and only the piled river wall remained. The Carnwath Road Industrial Estate comprises modern industrial sheds.

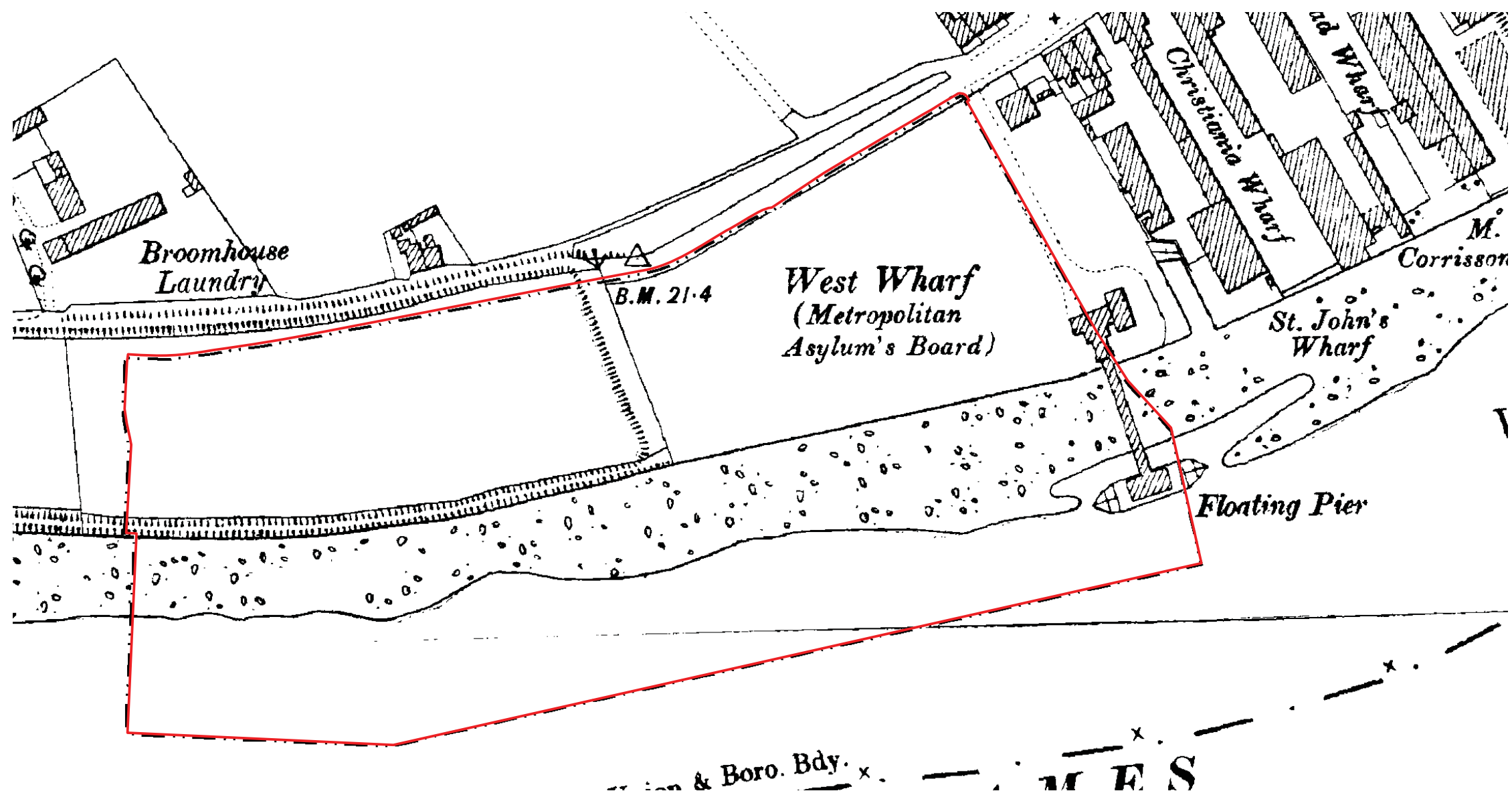


Figure 12.15: Historic map showing existing Carnwath Road Riverside site (1896-1898)

Site analysis: Opportunities and constraints

The site-specific design opportunities included:

- Enhance riverside access and extend the riverside walkway.
- Create a new area of open space next to the river.
- Make use of the south-facing aspect and riverside location.
- Create a new feature in an area that has no overriding architectural style.
- Maintain and enhance the safeguarded wharf.
- Position works on the boundary of Whiffin Wharf and the safeguarded Hurlingham Wharf in order to create a buffer between two potential development sites.

The site-specific design constraints included:

- The permanent works must maximise the area available for future mixed-use residential-led development in line with local planning policy.
- The permanent works should not preclude the future use of the safeguarded Hurlingham Wharf, which is protected for waterborne freight-handling use under *London Plan* Policy 7.26.
- The shaft must be of sufficient size to facilitate the tunnelling operation. It will allow the construction of the main tunnel towards Acton Storm Tanks site and will also receive the tunnel boring machines from both the Kirtling Street site and the Frogmore Connection Tunnel.

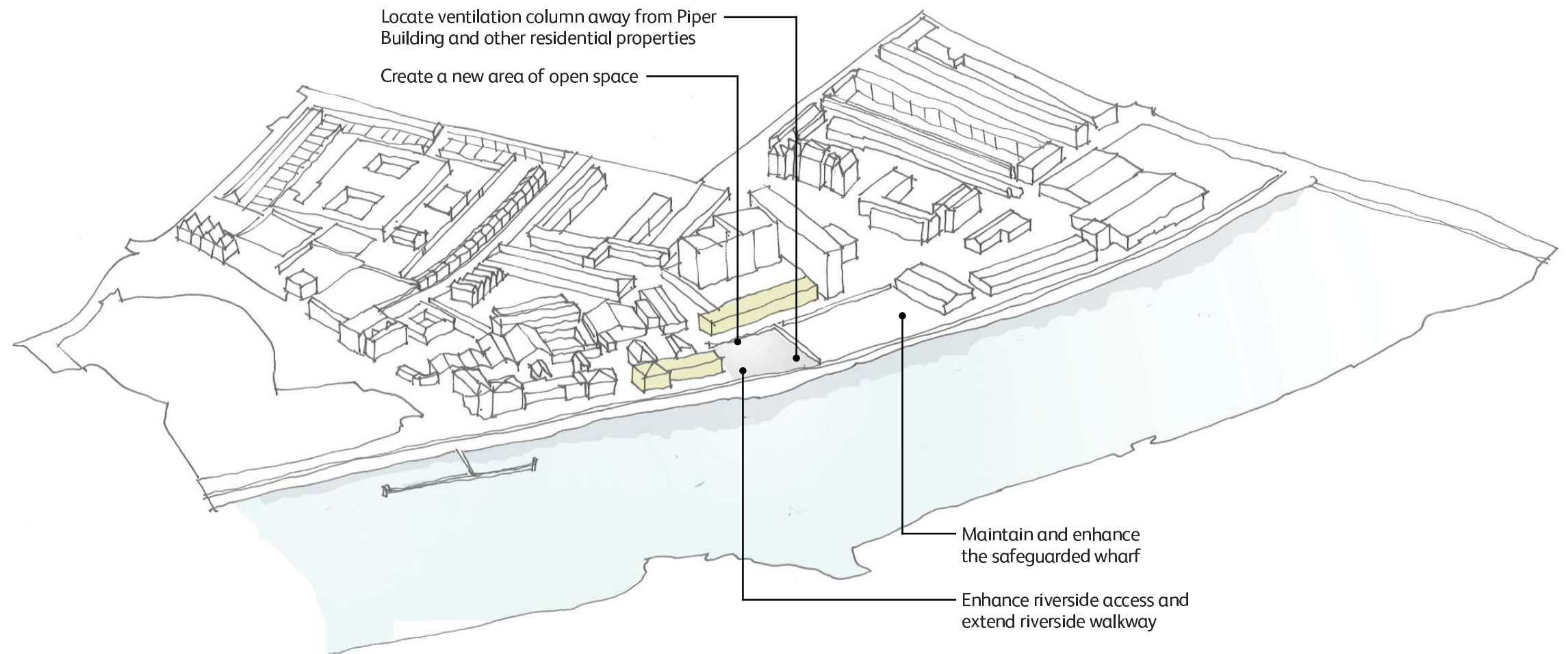


Figure 12.16: Existing site opportunities and constraints sketch

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12.3 Design evolution and alternatives

12.3.1 As the majority 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 Carnwath Road Riverside was to successfully minimise the above-ground structures to enable future redevelopment of the Whiffin Wharf site, and to preserve Hurlingham Wharf for use as a safeguarded wharf.

12.3.2 The design of our proposals at Carnwath Road Riverside was also 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 CABE. We also held various pre-application meetings with the London Borough Hammersmith and Fulham (until August 2011) and other strategic stakeholders. More information on our public consultation process is provided in the *Consultation Report*, which accompanies the application.

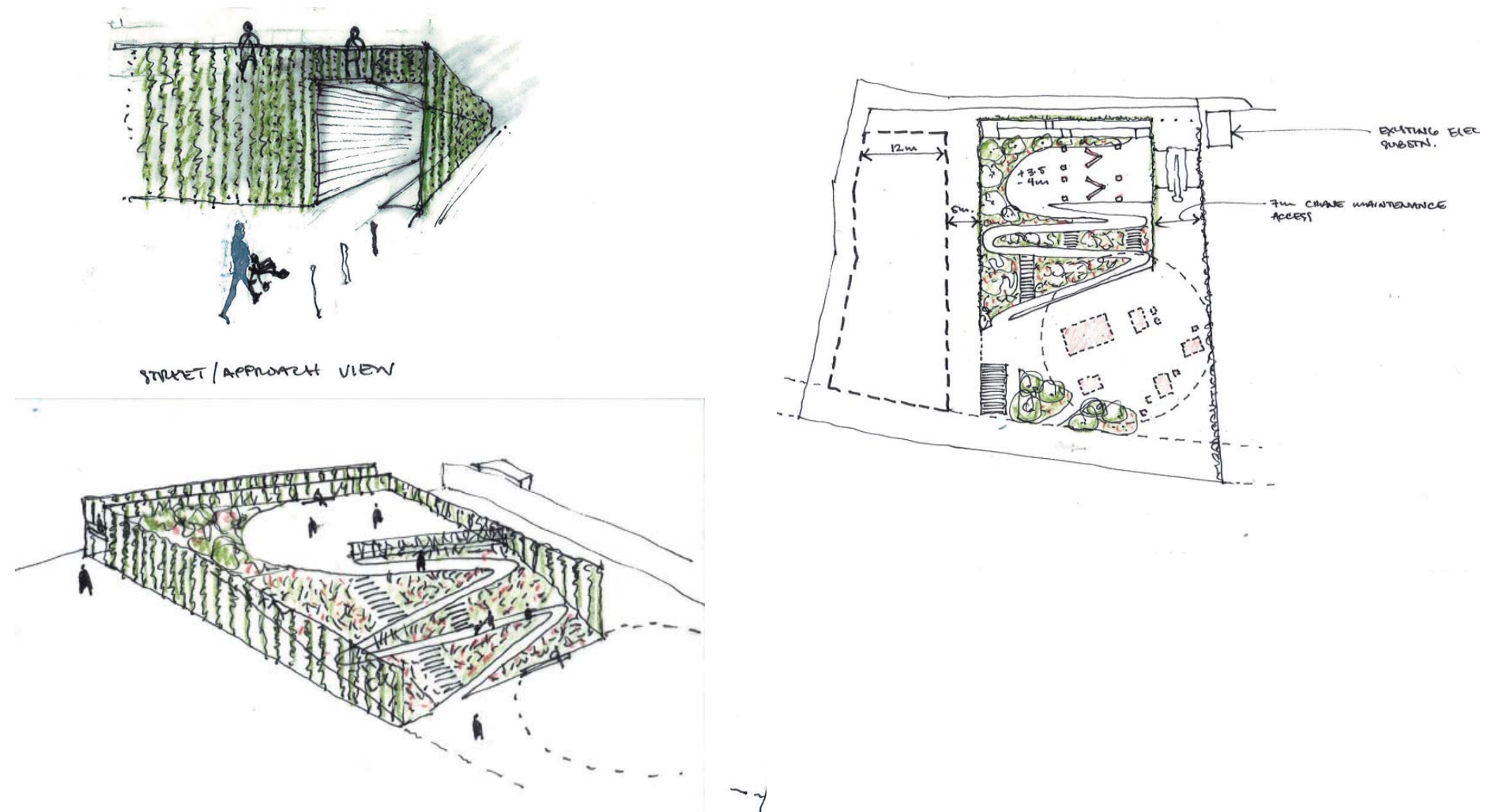


Figure 12.17: Sketches during design development

October 2010

Phase one consultation

12.3.3 Carnwath Road Riverside was not presented as a shortlisted site until phase two consultation. At this stage, our preferred site to construct the western section of the main tunnel was Barn Elms, London Borough of Richmond.

12.3.4 Following phase one consultation, we reviewed the feedback received and considered on-going engineering design developments. Consequently, we undertook a site selection back-check (see the *Final Report on Site Selection Process*, Volume 5, which accompanies the application, for details). We determined that Carnwath Road Riverside should be our preferred site for phase two consultation. Our reasons for this decision at this Stage two consultation included the following:

- a. The site is brownfield land and largely vacant.
- b. The site is in a mixed industrial and residential area. Large-scale redevelopment is proposed within the South Fulham Riverside Regeneration Area.
- c. The site has direct river access and would support the use of an existing safeguarded wharf.
- d. The width of the river at this point would enable the use of large barges and reduce potential conflict with recreational river users compared to other sites further upstream.
- e. The main tunnel shaft could be located adjacent to the river, which would optimise the alignment of the main tunnel, reduce the need to pass under any significant buildings and reduce potential impacts on Wandsworth Bridge.



Figure 12.18: Proposed view of Barn Elms from phase one consultation

12.3.5 We held drop-in sessions on 6 and 7 April 2011 at Hurlingham and Chelsea Secondary School on Peterborough Road to inform the local community of the potential use of the site. We also gathered views on local issues that we should take account of in developing our proposals.

12.3.6 The key issues raised in relation to design included concerns regarding:

- a. the impact on the regeneration proposals for the site and the wider South Fulham Regeneration Area
- b. the design and visual impact of the permanent structures.



Figure 12.19: Precedent images used to explore 'look and feel' of proposals

May 2011

CABE sketch review

12.3.7 We held a sketch review based on an initial site assessment and sketched ideas for the site with the Design Council CABE in May 2011.

12.3.8 The Design Council CABE panel stated that the proposals responded appropriately to the challenges of the site and presented an opportunity for a new public riverside space. The panel welcomed the effort to demonstrate that the proposals would not preclude the future regeneration of the wider site.

12.3.9 The panel's detailed comments included:

- a. Siting the ventilation structure and column at the northern end of a landscaped space and between future blocks of development could create a genuine public asset on the riverside.
- b. The ventilation column should be well-designed and mark the riverside space around it.
- c. The landscape design of the public space should make the river more accessible to local residents.
- d. The ventilation building should be a considered piece of engineering architecture, designed to support the public space around it, and the façades should be detailed in an interesting way.
- e. Revealing the circle of the drive shaft could inform people about the project.

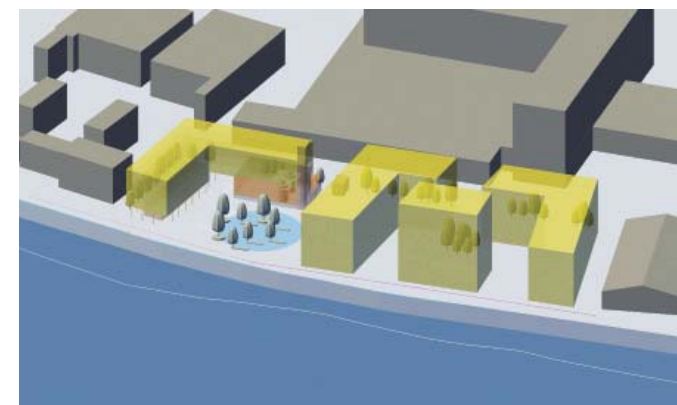


Figure 12.20: Massing studies for development around the shaft site in line with local policy from Design Council CABE sketch review

June 2011

CABE scheme review

12.3.10 We revised the proposals in response to the sketch review, and presented visualisations of the permanent structures, including proposed sections and elevations, examples of materials and a landscaping plan to the Design Council CABE panel on 17 June 2011.

12.3.11 The panel reiterated points a. to d. from the sketch review and made the following new comments:

- a. A chain-linked portion of space could be included to the west for community use.
- b. The landscape design and planting should enable users to cross the space diagonally.
- c. The ventilation column should be positioned to mark the road-side entrance if possible.
- d. The use of timber on the ventilation building should be expressed in a monumental way to help generate the sense of an event on the riverside.

12.3.12 As a result of further design development, we separated the ventilation column from the ventilation building and moved it closer to the river frontage where it could act as a local landmark and optimise air dispersion. The new position also increased its distance from the Piper Building.



Figure 12.21: Proposed view from Design Council CABE scheme review

February 2012

Phase two consultation

12.3.13 At phase two consultation, Carnwath Road Riverside was presented as our preferred site. We received objections to the site selection process, the choice of site, and the potential effects of the construction works. Concerns were also raised regarding the illustrative design, including:

- a. the scale and design of the proposed structures
- b. the visual effect of the permanent buildings and structures
- c. the effect on the future regeneration of the wider area.

12.3.14 We also received supportive comments regarding the illustrative design, to the effect that the proposals would improve the image and character of the area.

12.3.15 The London Borough of Hammersmith and Fulham’s key design-related concerns at phase two consultation included:

- a. the impact on the potential regeneration of the area and the provision of new housing
- b. the impact on the local economy and loss of jobs
- c. the proximity to residential properties and nearby schools and associated construction impacts (including blight)
- d. the impact of the size of the ventilation column and odour from the tunnel system
- e. the unrealistic reinstatement of the cargo-handling use on Hurlingham Wharf
- f. the temporary diversion of the Thames Path.

12.3.16 In its phase two consultation response, the London Borough of Hammersmith and Fulham commented on its existing design aspirations and plans for the regeneration of the site and the surrounding area, which the council has developed in consultation with the Prince’s Trust. In summary, the council is seeking to:

- a. enable residential mixed-use development across the site
- b. provide a new public square in the area
- c. open up the riverfront and connect it to the surrounding area

- d. seek river-related uses
- e. improve and extend this stretch of the Thames Path
- f. improve the junction at Carnwath Road/Wandsworth Bridge Road.

12.3.17 We had regard to these aspirations in developing our proposals for this site and incorporated all of these elements into the design.

12.3.18 The Design Council CABE panel responded positively to our design at phase two consultation, stating that it responded to the challenges of the site in a considered way and that the community could enjoy the new riverside space in future. The panel supported the proposed detached ventilation column, which would be visible from the river, with the ventilation building situated behind it. It also welcomed the fact that the proposals would not preclude the regeneration of the wider site.

12.3.19 Following phase two consultation, we continued to liaise with stakeholders to develop design principles for the site and to accommodate aspirations for the South Fulham Riverside Regeneration Area.



Figure 12.22: Proposed view from phase two consultation

Design development

12.3.20 Following phase two consultation, we developed the engineering design and explored the possibility of locating some of the ventilation equipment below ground. This would result in a much smaller, single storey building. We carried out several studies on the potential location of this building and how to integrate it into the landscape. For example, we considered making the roof accessible with a terraced park leading up to it. However, we decided to pursue a much simpler scheme, which is reflected in the current design.

12.3.21 We also explored a number of ways in which to configure the ventilation column, including breaking the mass up into multiple, more slender columns. However, we considered that distributing the various components of the ventilation column around the site increased the structure’s dominance of the public space. Therefore, the proposed design incorporates all the components into a discreet and elegant column.

12.3.22 There were no further significant design developments at this site following this stage.

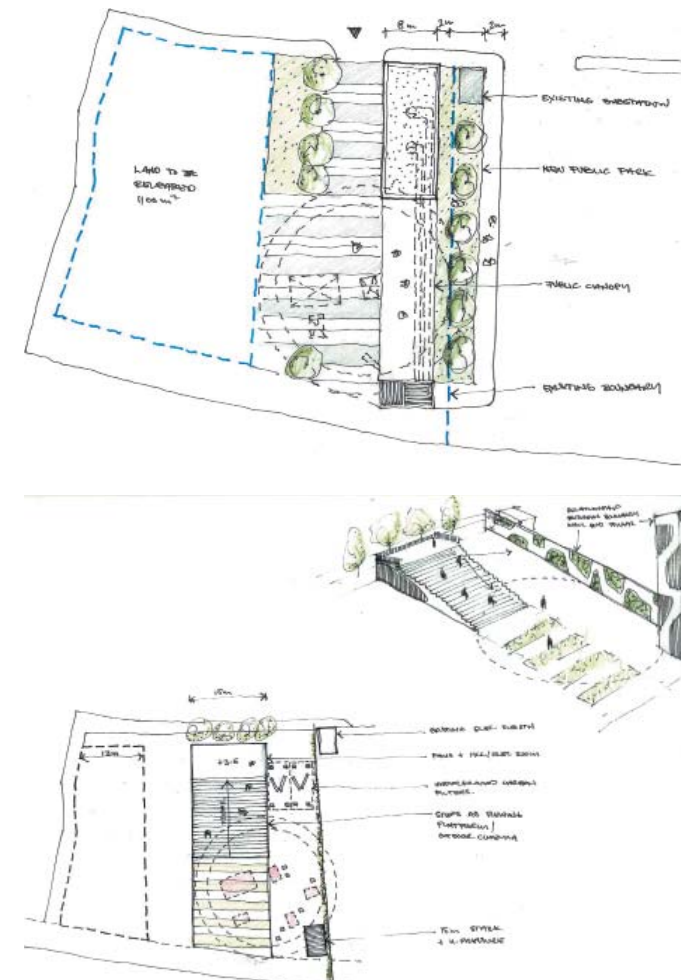


Figure 12.23: Design development sketches

July 2012

Section 48 Publicity



Figure 12.24: Proposed view from Section 48 publicity

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12.4 Proposed design

12.4.1 This section describes the 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

12.4.2 The Site works parameter plan defines the zones in which the proposed works would take place. The plan indicates the general location of the main tunnel shaft, ventilation building and ventilation column.

12.4.3 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.

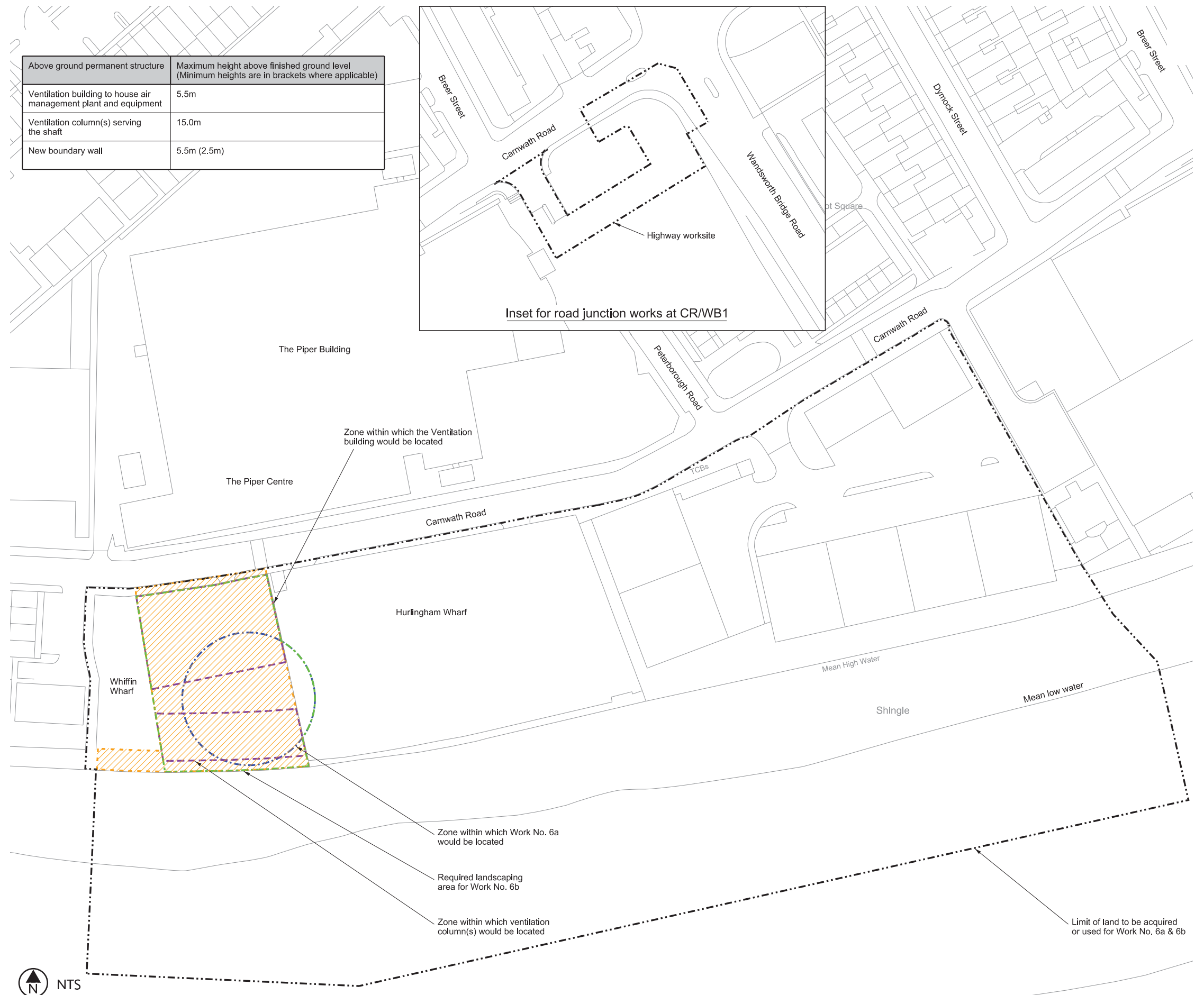


Figure 12.25: Site works parameter plan - refer to Site works parameter plan in the *Book of Plans*

Design objectives

12.4.4 The principle elements that define the character of the Sands End Conservation Area are “the river, the river bank, water-borne uses and views across and along the Thames”. Our design aims to respect, enhance and make use of these elements by creating a new high quality, elegant and contemporary riverside open space with views over and along the River Thames. We had regard to the London Borough of Hammersmith and Fulham’s *Unitary Development Plan Policy EN2*, which seeks to ensure that development preserves or enhances the character and appearance of the Sands End Conservation Area. We also had regard to the London Borough of Hammersmith and Fulham’s Core Strategy Policy BE1, which emphasises the need for new development to create high quality urban environments and *Unitary Development Plan Policy EN21*, which seeks to minimise impacts on residential amenity.

12.4.5 The new riverside open space would:

- a. provide a transition between the different uses that currently border the space on all four sides
- b. provide opportunities for informal recreation, sitting and relaxing, integrated play and interpretation of the surroundings
- c. incorporate as much soft landscaping as possible, including semi-mature trees, shrubs, ornamental grasses and perennial planting to provide a range of seasonal variation and a range of textures, colours and scents
- d. be flexible enough to respond to the re-development of the area and maximise the space available for future re-development
- e. be usable, safe, attractive and suitably scaled and composed
- f. be robust, simple and clutter-free and feature high quality materials and finishes.

12.4.6 The permanent structures would:

- a. complement and form a backdrop to the new riverside open space in a low-key, elegant manner
- b. act as a buffer between the potential residential development on the western edge of Whiffin Wharf and future activities associated with the safeguarded Hurlingham Wharf
- c. meet the functional size requirements using the height of the ventilation column to add character to the space and create a local landmark when viewed from the river
- d. be constructed in a high quality palette of durable and attractive materials to stand the test of time.

12.4.7 Given the south-facing aspect of the site to the River Thames, we anticipate that a riverside open space here would be well used. It would also be self-policing and foster natural surveillance. It would be highly accessible and provide pleasant riverfront access all year round.

12.4.8 The main character areas of the landscape design include a riverside walkway, a riverside open space, the edge with Carnwath Road and the ‘built’ buffer to Hurlingham Wharf, which would incorporate the ventilation building and ventilation column.

12.4.9 The character of the design as a whole is drawn together by the project wide ‘flowing bands’ motif. The motif is a visual reference to the way in which the currents in the river bend and direct reeds, and to the way in which the river’s movement forms geological strata over the millennia. At this site we propose to incorporate the bands into the surface of the paving materials, the shape of the ventilation building and the finish of the boundary wall to encourage circulation between the road and the river.



Figure 12.26: Proposed aerial view

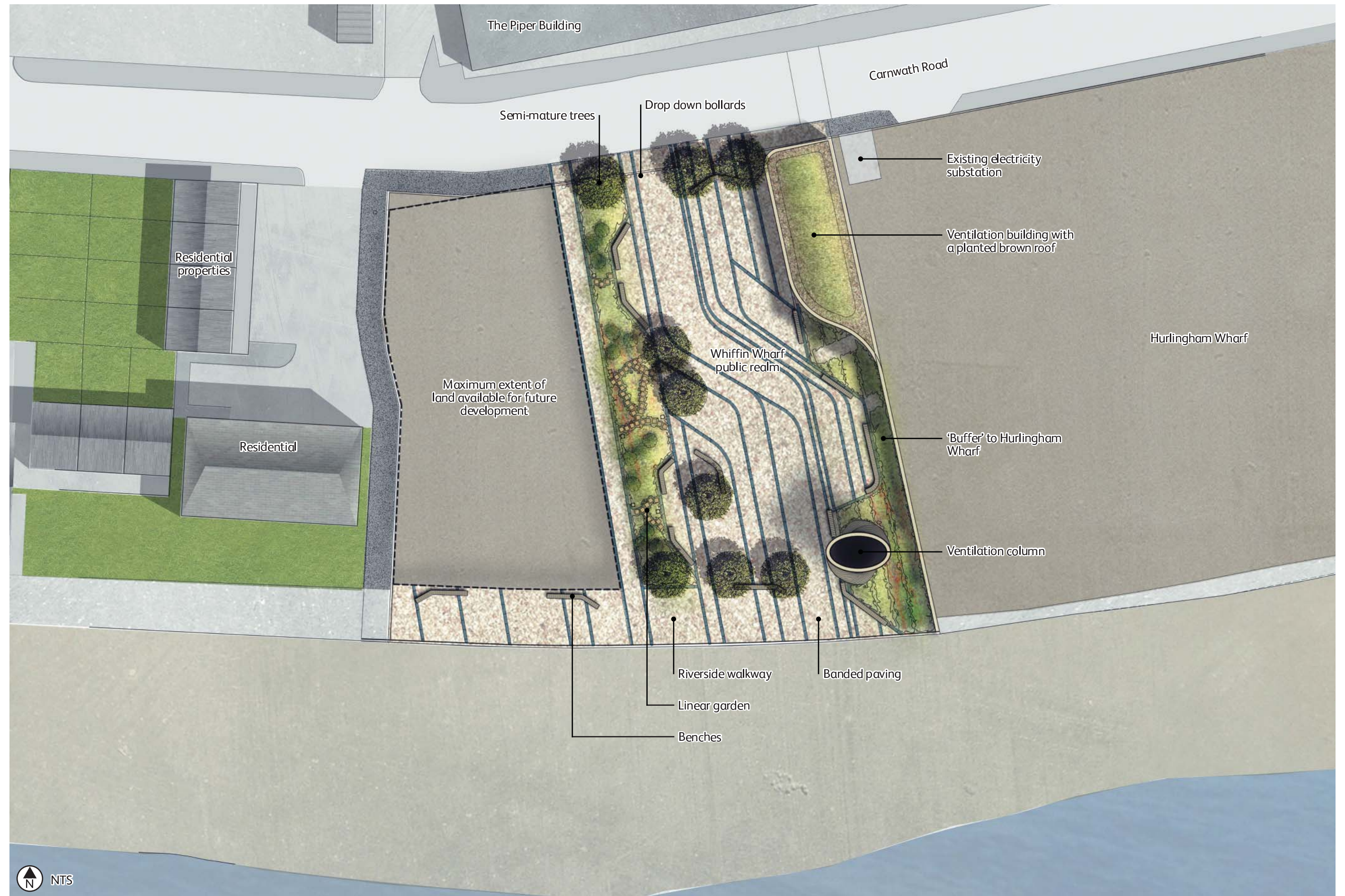


Figure 12.27: Proposed landscape plan

Riverside walkway

12.4.10 The riverside walkway would form a promenade along the river, which would both visually and physically link the river to the riverside open space. The path would be 6m wide, in line with regional guidance for the Thames Path. The eastern end of the walkway would terminate with the ventilation column. However, the column would be set back from the river's edge to facilitate continuation of the walkway along the frontage of Hurlingham Wharf (should this prove possible in the future).

12.4.11 Incidental seating would be positioned along the walkway to provide opportunities to sit by the river.

12.4.12 The walkway would be a simple, und cluttered space featuring consistent surface materials. A high quality balustrade with a timber handrail would provide a comfortable edge to lean on. The balustrade would be as open and transparent as possible to enable views of the river when seated.

Riverside open space

12.4.13 The riverside open space was designed to be flexible and to adapt to additional uses over time. We anticipate that it would be a well-used route between Carnwath Road and the riverside walkway. A hardwearing surface is required in order to accommodate various possible uses and Thames Water's operational access requirements. The open nature of the design would enable views into and out of the space, which would enhance the security of users and provide a sense of safety.

12.4.14 Semi-mature trees would be planted along the northern and southern boundaries and scattered throughout the space to shade seating areas. The trees would have wide canopies and a clear stem at least 3m high to provide psychological separation from the river and road without impeding views across the space.

12.4.15 There would be an area of planting concentrated in a linear garden in the western section. The garden would feature small, multi-stemmed species to create a series of 'garden rooms'. Routes of stepping stones and other



Figure 12.28: Proposed view from the River Thames



Figure 12.29: Proposed view of the design from Carnwath Road

spaces would be carved out of the planting to provide informal opportunities for play. Rich areas of planting would also be provided to create habitat for birds and insects.

'Built' Carnwath Road edge

12.4.16 The transition from Carnwath Road into the riverside open space was designed to balance visibility with a sense of enclosure. Both the ventilation building and the linear garden would reach the northern edge of the open space to frame the main pedestrian entrance. Semi-mature trees would be planted along the boundary to separate the open space from the road, while preserving views across to the river.

Buffer to Hurlingham Wharf

12.4.17 We sought to locate our functional above-ground structures and other planting on the boundary of Hurlingham Wharf and Whiffin Wharf to create a buffer between the safeguarded wharf and the land that would remain available for re-development on the western side of Whiffin Wharf.

12.4.18 The ventilation building and ventilation column would form a backdrop to the space. The challenge was to make the structures low-key yet elegant.

12.4.19 The planting would complement the architecture of the ventilation building, the associated wall and the ventilation column. It would be arranged in a formal layout to emphasise the natural stone banding elements in the design. The scale of the planting would be graded from low-level ground covers at the front to medium-sized shrubs towards the back using a limited range of species that provide high-impact seasonal variety.

12.4.20 The Hurlingham Wharf and Carnwath Road Industrial Estate plots would be cleared and secured with hoardings during construction. They would then be returned to the current landowners or sold. The western side of Whiffin Wharf would also be hoarded off following construction. It is likely that it will be redeveloped with residential-led mixed-use developments in line with local planning policy.

Lighting design

12.4.21 There would be no fences around the riverside open space and it would remain open at night. The scheme is based on the project-wide lighting principles and was developed to reinforce the site specific design objectives.

12.4.22 The main aim was to provide a safe and secure environment that would feel safe to use during the day and to pass through at night. Lux levels would meet best-practice standards, while respecting the sensitive riverside location. A selection of column lights would provide adequate lighting for pedestrians and the main seating areas. Uplighters would also be used to illuminate the canopies of the semi-mature trees.

12.4.23 In-ground strip luminaries would be used to reinforce the main pedestrian routes through the open space. The luminaries would be aligned to the natural stone bands. On-ground luminaries would provide subtle lighting for way-finding along the river's edge while limiting light pollution.



Figure 12.30: Uplighting



Figure 12.31: Night lighting concept



Figure 12.32: Night lighting concept

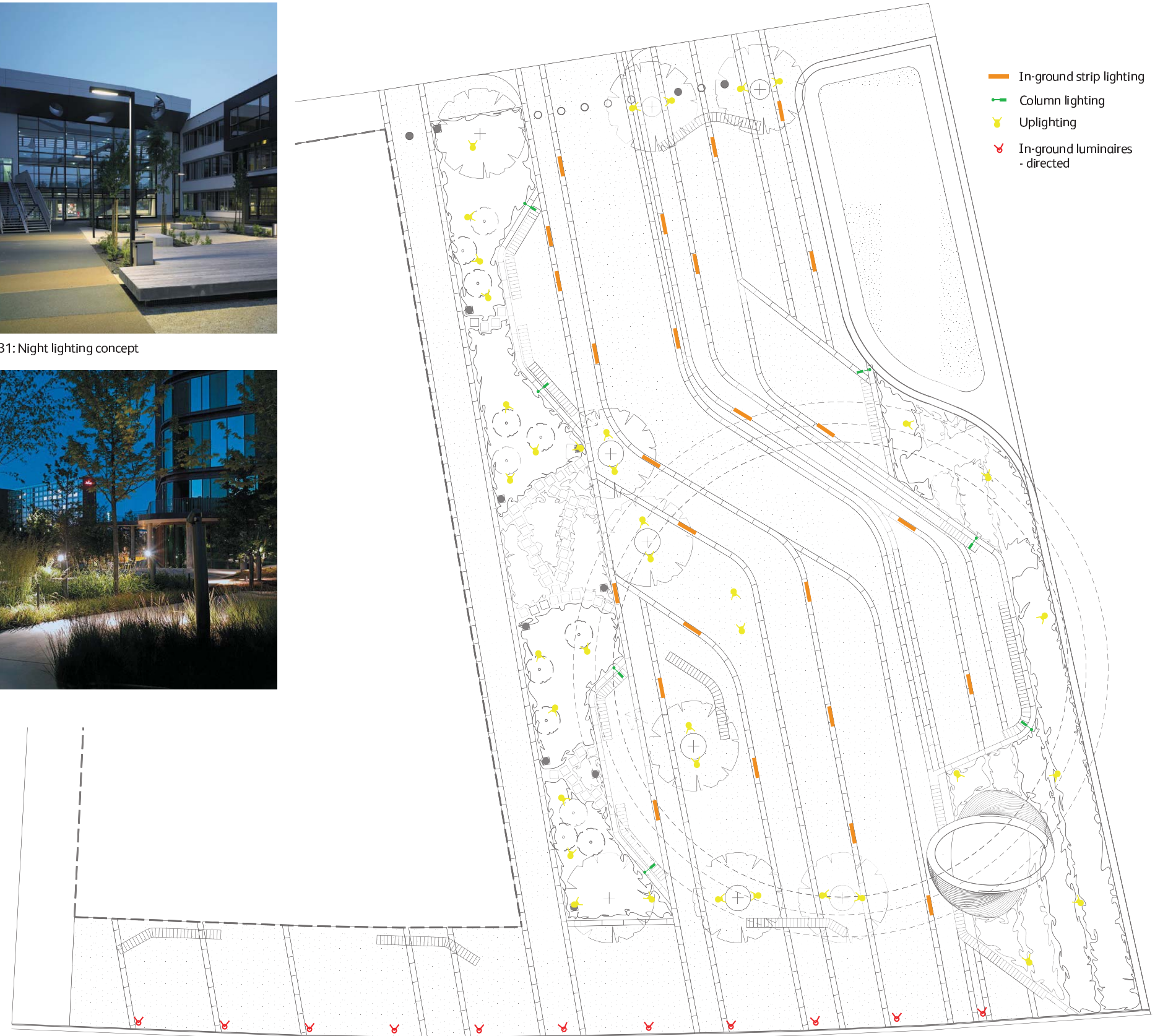


Figure 12.33: Illustrative lighting scheme



Figure 12.34: Example of in-ground strip luminaires



Figure 12.35: Example of in-ground luminaires



Figure 12.36: Example of uplighter

Integration of the functional components

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

- a. a main tunnel shaft
- b. two air treatment chambers
- c. acoustic attenuation chambers
- d. associated ducts.

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

- a. a ventilation building
- b. a ventilation column
- c. a new boundary wall.

Main tunnel shaft and associated structures

12.4.26 The main tunnel shaft would be approximately 25m internal diameter. It would also serve to connect the Frogmore connection tunnel to the main tunnel. It would lie beneath the majority of the site. The associated below-ground chambers would sit beneath the northern section of the site. We sought to accommodate as much equipment as possible below ground.

Ventilation building and boundary wall

12.4.27 The ventilation building would stand a maximum of 5.5m high. It would accommodate equipment that cannot be positioned below ground within a single structure in order to minimise land take and the footprint of the permanent works.

12.4.28 The building would be located on the northeastern corner of the site adjacent to the substation building on Hurlingham Wharf. It would be integrated into the new boundary wall between Whiffin and Hurlingham wharfs (2.5m to 5.5m high) to form simple backdrop to the riverside open space. The doors would be concealed so as not to detract from this

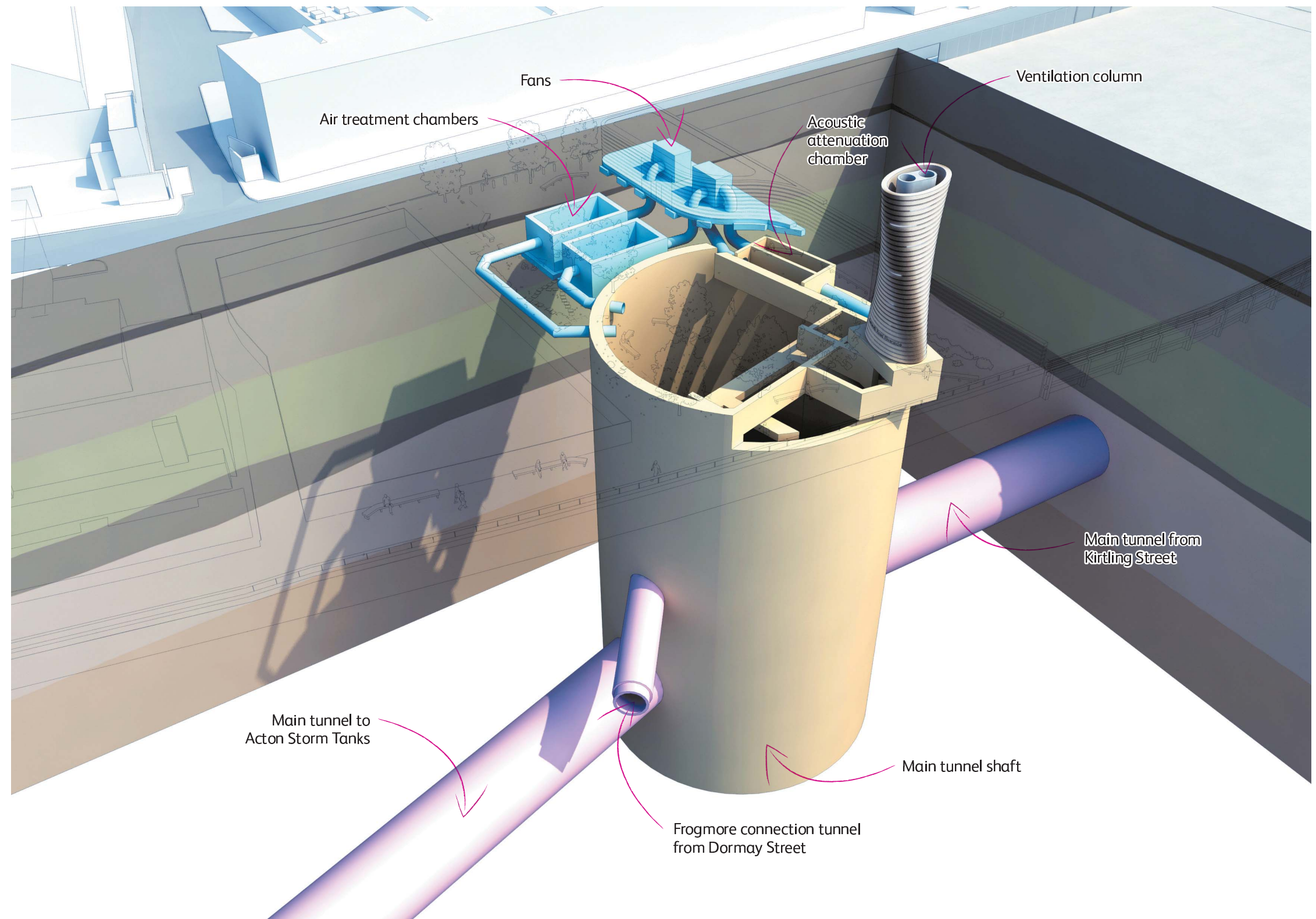


Figure 12.37: Proposed functional components diagram: below ground view



Figure 12.38: Proposed functional components diagram: above ground view

effect. The profile of the structure was kept as low as practicable (while meeting the maintenance requirements) to fit the profile of the boundary wall, which gradually steps down in height from the ventilation building to the river.

12.4.29 Both the ventilation building and the wall would feature the same banded motif as the paving and ventilation column treatment. The structure would be naturally ventilated. The joints between the bands would be wider higher up the building to enable air movement. Lower down the joints would be narrower in order to discourage climbing. The structure would be finished in the same material as the ventilation column – a high quality reconstituted stone in precast units chosen for its robust finish.

12.4.30 The ventilation building would feature a planted brown roof to enhance biodiversity and improve storm water attenuation.

Ventilation column

12.4.31 The ventilation column would be located in the southeastern corner of the site, as far from the existing and proposed areas of residential development as possible. It would be positioned close to the river where the speed of the wind would disperse air most effectively. It would also create a new landmark on the river edge.

12.4.32 The scale of the column is determined by the functional requirements of the air treatment system. At this site, the column should be 15m high (maximum). The combined internal area of the three components of the ventilation system determined the size of the column's footprint.

12.4.33 The appearance of the column was refined to a more oval shape. The column also appears to 'twist' around its vertical axis and therefore looks different when viewed from different angles on land or from the river. The twist effect evokes the project's 'signature' ventilation column design in order to create a visual link with other foreshore sites along the river.

Access covers and hardstanding

12.4.35 Areas of hardstanding would be included to facilitate maintenance vehicle access and incorporate ground-level access covers to the below-ground infrastructure. The position of the areas of hardstanding is constrained by the position of the proposed and existing below-ground works.

12.4.36 Access to the below-ground equipment would be required at various intervals. Some access covers used to remove or replace equipment would be accessed infrequently and may be buried. Covers used to inspect equipment would be required more frequently and must be easily accessible.

12.4.37 We expect that the riverside open space would predominantly be paved with self-binding gravel between bands of natural stone. The majority of the access covers would be located in this surface. Furniture and planting would be carefully located around the anticipated areas required for operational access. It is also possible to position a limited number of covers in the planted buffer zone on the eastern edge of Whiffin Wharf. These covers would be accessed infrequently and screened by surrounding greenery.

River walls and features

12.4.38 Subject to the outcome of a detailed structural survey, the flood defence walls of Whiffin and Hurlingham wharfs and Carnwath Road Industrial Estate may need to be strengthened or reconstructed. If this proves necessary, the works to the walls would comply with the design principles for in-river structures.

12.4.39 The ground level of the site is between 105.11m and 105.43m above Tunnel Datum. The existing flood defence level for this area is 105.41m above Tunnel Datum, which is achieved by a small upstand that runs along the river edge. We would use the same approach for any new walls, and incorporate a small, solid upstand to meet flood defence levels and mount an open balustrade above it to maximise views out to the river.

12.4.40 It is anticipated that the flood defences in London will need to be raised in response to climate change. The Environment Agency's Thames Estuary 2100 study predicted that the flood defences at Carnwath Road Riverside would need to be raised by approximately 1m in the future. This would be achieved by replacing the open balustrade with a parapet wall to avoid the need to raise ground levels. Any new sections of river wall would be designed to support a parapet wall.



Figure 12.39: River wall at existing Carnwath site



Figure 12.40: River wall at existing Carnwath site



Figure 12.41: River wall at existing Carnwath site



Figure 12.42: Riverwall at existing Carnwath site

Landscaping and appearance

Hard landscape palette

12.4.41 The proposed hard landscaping materials and furniture palette comprises good quality contemporary fittings that would stand the test of time. Street lights, bins and furniture would be robust and non-bespoke to facilitate management and maintenance. Hard surface materials would be robust, fit-for-purpose and appropriate to the setting in order to maintain long-term quality.

12.4.42 The hard landscaping materials and furniture palette includes:

- a. light silver grey self-binding gravel, which could be used in the main hard landscaped areas; it is a free-draining material that is easy to maintain and ‘top up’ as necessary
- b. natural stone banding, which could be used in the main hard landscaped areas to provide a visual and physical connection between Carnwath Road and the River Thames. A black basalt or dark grey granite, with a flamed finish, could be used.
- c. seating, benches and loungers, which could be used in the riverside open space and along the riverside walkway; they could be manufactured and finished in galvanised steel, brushed stainless steel and Forest Stewardship Council-certified hard wood

- d. reconstituted stone cladding, which could feature an acid-etched finish to create softness and expose the natural stone aggregate; it could be matched to the warm landscape colour pallet
- e. balustrading could be used along the edge walk, which could be manufactured and finished in brushed stainless steel and sustainable hard wood and incorporate stainless steel tensioning wires
- f. paths and stepping stones, which could be used to provide routes through the linear garden and opportunities for informal play; they could be made from natural stone
- g. bollards, cycle racks and bins, which could be finished in brushed stainless steel
- h. tree grills/surrounds, which could be used to protect tree planting and tree pits in hard landscaped area
- i. lighting, which could be utilised in the riverside open space; the fixtures and fittings of the various lighting units could be finished in silver-grey.



Figure 12.45: Example of handrail



Figure 12.46: Example of timber bench

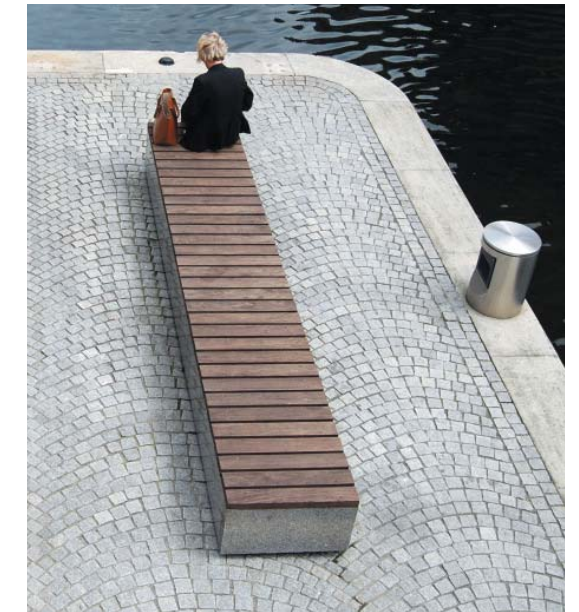


Figure 12.47: Example of Timber benches



Figure 12.43: Example of self-binding gravel



Figure 12.44: Example of setts and tree well treatment

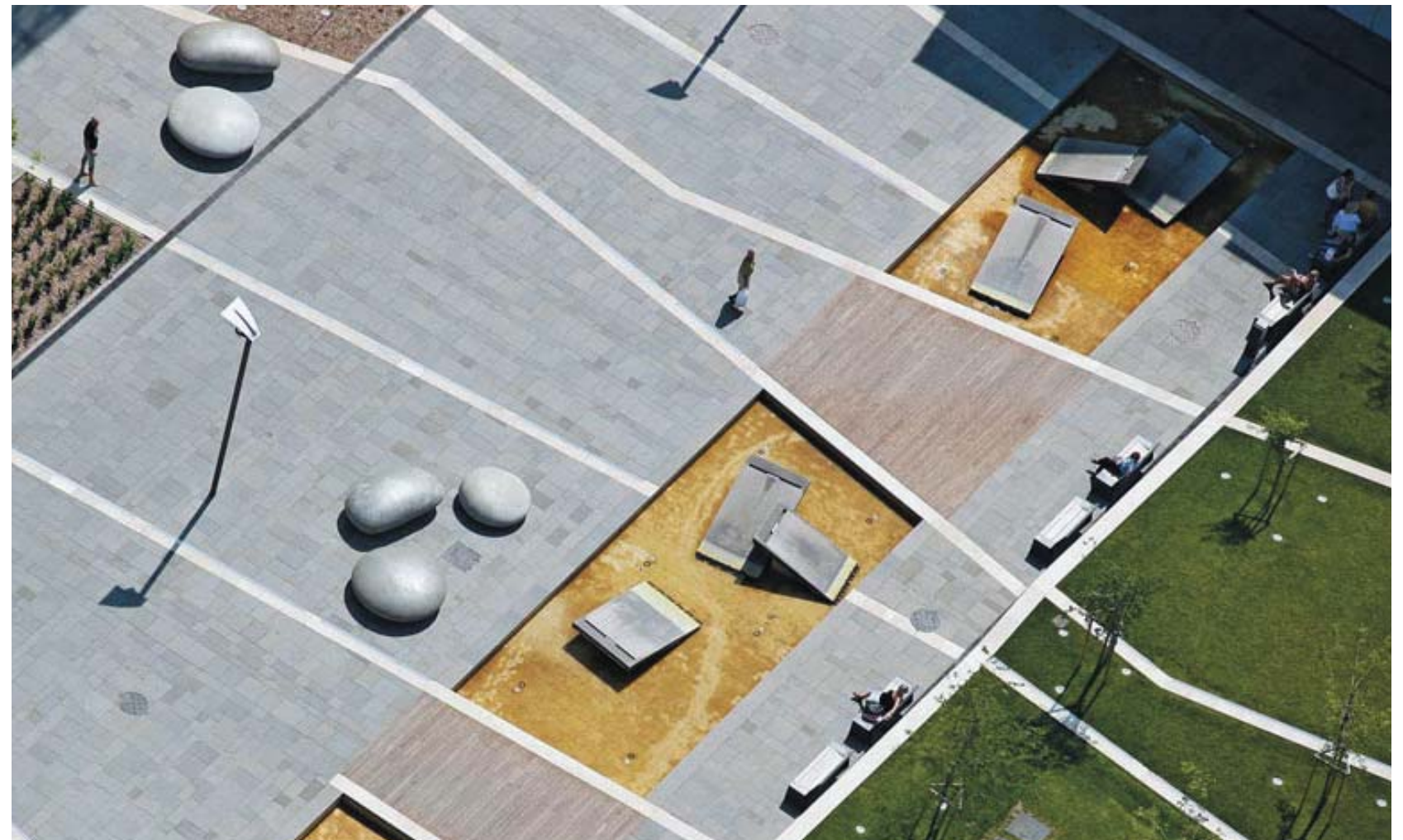


Figure 12.48: Example of hard and soft landscape elements

Soft landscape palette

12.4.43 The soft landscaping palette was designed to promote biodiversity and provide habitat for birds and insects. It would also provide visual interest. Elements of the palette include:

- a. semi-mature and multi-stem deciduous trees
- b. wetland plants and trees
- c. planted brown roof
- d. native and non-native shrub, perennial and grass species.



Figure 12.49: Example of Brown roof



Figure 12.50: Wetland plants



Figure 12.51: Wetland plants



Figure 12.52: Example of deciduous trees



Figure 12.53: Example of native and non-native shrub, perennial and grass species

12.5 Access and movement

12.5.1 The design of the riverside open space aims to enhance accessibility and movement. The Thames Path would be reinstated and a new riverside walk extended along the frontage of Whiffin Wharf, in agreement with the relevant landowners. New signage would also be provided. It is unlikely that the path would be extended any further along the riverfront due to the nature and potential uses of the safeguarded Hurlingham Wharf. The Thames Path would therefore follow the existing route around Whiffin and Hurlingham Wharfs, along Carnwath Road, and turn back to the riverfront along the boundary of Hurlington Wharf.

12.5.2 If the open space is used as a market or for community events, vehicle access would be from Carnwath Road.

12.5.3 Any car parking along Carnwath Road suspended during the construction phase would be reinstated.

12.5.4 The site is broadly flat and there are few constraints on designing a space that is accessible to all. In line with project-wide aspirations and good practice, landscaping treatments and materials would ensure that pedestrian routes meet the best standards of accessibility.

Thames Water access requirements

12.5.5 A permanent access point to the main tunnel shaft, access covers, ventilation structures and other electrical and control equipment would be created from Carnwath Road. The access point would feature a dropped kerb for ease of entry; however, lockable drop-down bollards would prevent unauthorised access.

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

12.5.7 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 main tunnel shaft. The inspection would be carried out during normal working hours and would likely take several weeks.

12.5.8 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.

12.5.9 The riverside open space would likely be closed during maintenance visits. Therefore, the Thames Path along the western edge of Whiffin Wharf would need to be retained.

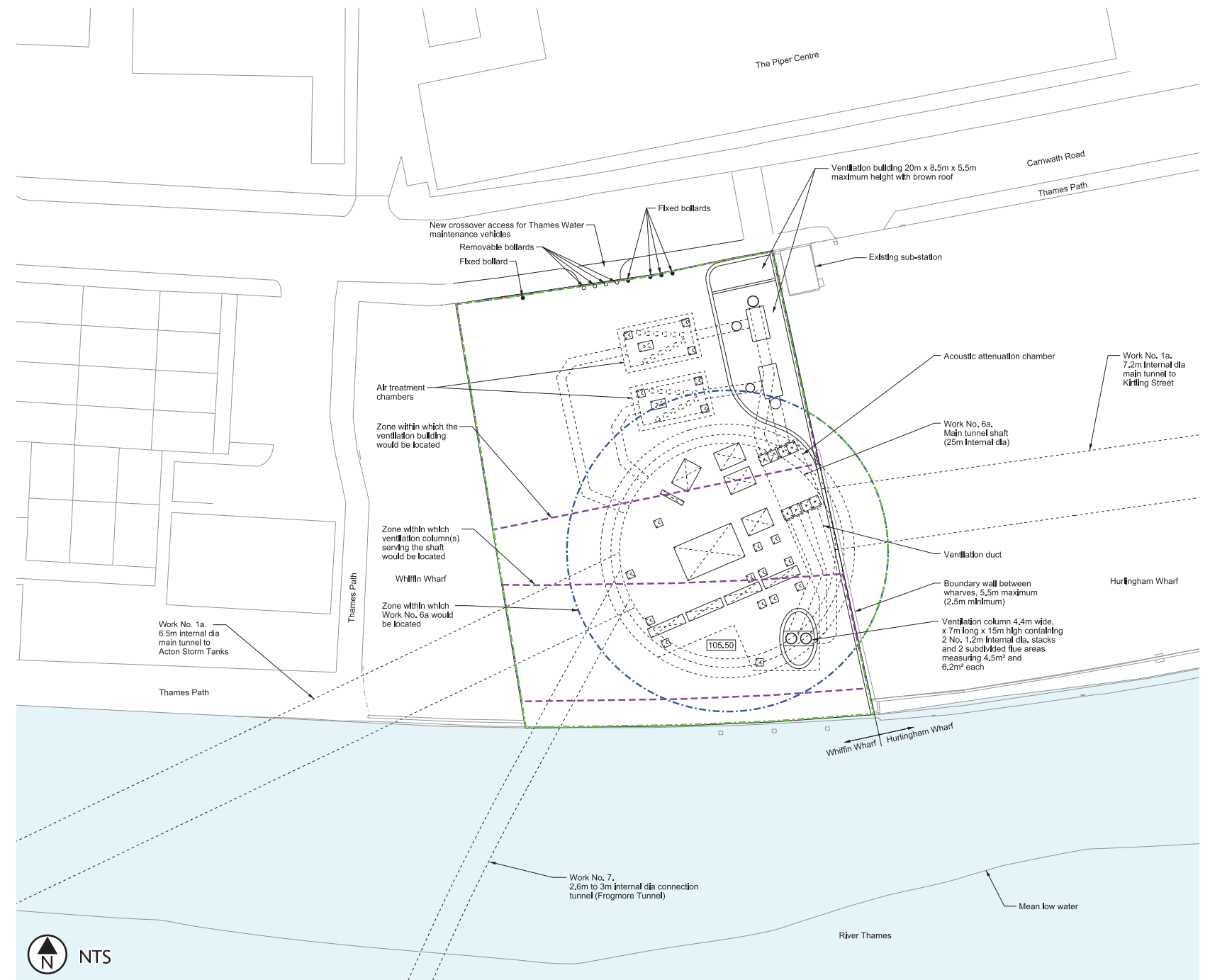


Figure 12.54: Permanent works layout plan - refer to Permanent works layout in the *Book of Plans*

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