

Transport for London

Vauxhall Nine Elms Battersea

Public Realm & Highways Modelling Study

Final V.4

December 2010

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1. Introduction

1.1 Scope of Study

The Vauxhall Nine Elms Battersea (VNEB) Public Realm and Highways Modelling Study aims to identify feasible transport and urban realm options to support projected development in the Vauxhall, Nine Elms and Battersea area (VNEB).

Currently, although close to central London, the area has been described as “disconnected and discordant” and lacking any integration. The environment for pedestrians and cyclists is challenging with major roads and other transport infrastructure providing a barrier to ease of movement.

The Mayor’s London Plan identifies this area as an Opportunity Area (OA), one of the city’s “few opportunities for accommodating large scale development to provide substantial numbers of new employment and housing, each typically more than 5,000 jobs and/or 2,500 homes, with a mixed and intensive use of land and assisted by good public transport accessibility.”

The Greater London Authority (GLA) is leading on the preparation of an Opportunity Area Planning Framework (OAPF) for the VNEB area in collaboration with Transport for London (TfL). The OAPF sets out the projected levels of development in ‘Revised Scenario 5’ up to the year 2026. The additional development is expected to generate increased traffic flows and footfall in the opportunity area that will impact on the existing TfL road network and public realm.

This study is required to test the impact of projected levels of development as set out in ‘Revised Scenario 5’ of the OAPF on the TfL road network within the opportunity area, focussing particularly on the Vauxhall gyratory but also including Albert Embankment and Nine Elms Lane and propose the required highways enhancements. The study is also required to assess the feasibility of the public realm strategy set out in the OAPF and propose a series of deliverable public realm schemes to improve pedestrian and cycle movement/experience, taking account of the needs of other road users and the Mayor’s objective to smooth traffic flow in the process. In order to deliver the above, the study follows five steps.

Step 1 - Baseline option modelling for Vauxhall Gyratory; understanding future (2026) traffic and pedestrian flows for Vauxhall and the whole OA.

Step 2 - Building on the public realm strategy within the OAPF and Lambeth’s emerging SPD for Vauxhall,

- Develop high level highways and public realm options for Vauxhall gyratory and Albert Embankment. At least one of the Vauxhall gyratory options should consider the long-term feasibility of removal and reconfiguration of the gyratory, to return the existing gyratory to two way working.
- Develop urban design guidance/principles/options for Nine Elms Lane and riverside walkway.

Step 3 - Test options for Vauxhall and Albert Embankment using the existing VISSIM model - identify a series of pedestrian, cycle and highways schemes for Vauxhall gyratory and Albert Embankment.

Step 4 - Assess the feasibility of the public realm strategy in respect of Nine Elms Lane (TLRN)/riverside walkway.

Step 5 - Reporting – the outcomes of the above four steps are included in work stage Technical Notes 1-4 that form the basis of the final proposals set out in this final report.

The entire process has been informed by consultations undertaken to engage key stakeholders throughout the project. These include Lambeth and Wandsworth Councils, appropriate key landowners and relevant TfL businesses to ensure that TfL’s operational and other interests are protected.

Report Structure

The report is set out in two parts. Part 1 is the main document or final report; part 2 is a compilation of Technical Notes 1 to 4 and the Environmental Appraisal Report.

Additional Work Undertaken

Work additional to that set out in the Project Brief was required in order to successfully complete the study. This included the following:

- Further refinement to the Saturn modeling since Sinclair Knight Merz (SKM) Saturn base models were not calibrated to Design Manual for Roads and Bridges (DMRB) standards and hence the traffic flows in the 2026 model were not “fit for purpose” for use in the Transyt modelling as part of this study.
- Additional base modelling to include ongoing modernisation proposals to a number of traffic signal junctions in the vicinity of Vauxhall Gyratory.
- Due to the lack of accurate 2026 data, option designs had to be initially based on 2008 flows. Further to the completion of the validated 2026 Saturn modelling it was necessary to consider higher flows at the gyratory and along Nine Elms Lane. The models for the three preferred options for the gyratory and the preferred option for Nine Elms Lane needed to be updated to the 2026 flows and some re-design was necessary to ensure that the schemes operate efficiently for the revised flows. Further analysis of the impacts on loss of capacity was also required.
- The agreed requirement to undertake additional traffic modelling and amendments to designs following the 2026 modelling required further urban realm input to bring the highway and urban realm proposals into alignment for the Vauxhall Cross gyratory and Nine Elms Lane.
- Due to the delay in receiving accurate Saturn modeling results, it was decided to remove VISSIM work from the study scope and carry out more detailed Transyt analysis.
- Further detailed pedestrian modelling was carried out as part of the study – this included an assessment of the impact of providing the footbridge across the Thames in the vicinity of the US Embassy.

1.2 Study Objectives

A number of key objectives for the study were set out within the brief as follows:

- Develop a range of public realm design schemes and highway improvement proposals, based on the Public Realm Strategy in the draft OAPF, the London Borough of Lambeth SPD and the London Borough of Wandsworth Core Strategy and Site Specific Allocations document to improve conditions for pedestrians and cyclists while also considering smoothing traffic flow.
- Using the existing TfL VISSIM model for Vauxhall, test the impacts of 2026 predicted growth (Revised S5) on Vauxhall gyratory as existing and indicate the level of traffic reduction required in order to maintain the efficient operation of the TLRN.
- Determine future pedestrian flows, desire lines, origins and destinations generated by RS5 development levels and their impacts on the public realm (such as pavement capacities) for the whole opportunity area.
- Improve pedestrian links to, from, and within the area to cater for forecast future flow levels and desire lines generated by RS5.
- Improve the overall public realm and pedestrian experience within the three main areas of Albert Embankment, Vauxhall and Nine Elms.
- Provide improvements to pedestrian and cycle safety wherever possible.
- Provide enhanced cycle facilities through Vauxhall, to link in with existing and proposed cycle routes (including cycle parking).
- Consider and develop guidance for the interface between future developments and the TLRN roads (particularly along Nine Elms Lane).
- Develop general design principles for the riverside walkway with particular regard to the relationship between the adjacent buildings (existing and proposed) and spaces/links and the riverside, potential materials, scope for planting, furniture and way-finding.

The conclusions of this study provide an illustrative master plan for the area with a range of options for the delivery of significant Urban Realm, pedestrian and cycle improvements to this dynamic opportunity area. However the balance between the area's retail and residential role with that of a significant traffic corridor and public transport hub is delicate. Stake holders will need to work together to develop the feasibility and design of the recommendations set out in section 8 into affordable, phased improvements to support the regeneration of the area as a whole.

1.3 Study Area

The VNEB study area (Figure 1.3.1) is located in southwest central London, bordering on the River Thames between Lambeth Bridge and Chelsea Bridge. It is within the OAPF boundary, which is identified as an opportunity area within the London Plan.

The study area lies within the London Boroughs of Lambeth and Wandsworth and includes the area along Albert Embankment, Vauxhall gyratory, and extends from the river edge to Wandsworth Road in the Nine Elms and Battersea area. It represents the largest remaining industrial area in central London and includes New Covent Garden Market, Battersea Power Station, and the major interchange Vauxhall Cross.

Much of the Albert Embankment and Vauxhall area contains light industry, offices and government buildings as companies and organisations were attracted in the past by the area's central location, the interchange at Vauxhall Cross and comparatively lower rental levels compared to Westminster.

In recent years, Vauxhall's riverside has undergone major redevelopment with the construction of a number of modern residential and office blocks including the distinctive MI6 building and the St Georges Wharf both adjacent to Vauxhall Bridge.

Vauxhall gyratory is an important interchange with the London Underground and National Rail stations located in the centre along with Vauxhall Bus Station. The South West Main Line runs across the gyratory on a viaduct from roughly north to south, whilst the Victoria Line LUL ticket hall is located beneath the bus station as well as the western section of the gyratory. The bus station is one of the busiest in London with constant movements onto the gyratory.

Nine Elms and Battersea are primarily industrial areas, dominated by the Battersea Power Station, the New Covent Garden Vegetable and Flower Markets, a Royal Mail sorting office, other light industry and extensive railway infrastructure. Most of these sites have been earmarked for mixed use development in the near future.



Figure 1.3.1: Study Area (source: VNEB OAPF)

1.4 Historic Development

Roman to Post Medieval

Development within the OA dates back to the Roman times through evidence of Roman occupation in the grounds of Lambeth Palace.

During the medieval ages, Vauxhall developed as a small settlement clustered around the road junction of Kennington Lane, Lambeth High Street/Albert Embankment, Wandsworth Road and South Lambeth Road.

Embankments were built at Battersea and Vauxhall to reclaim marshland behind and the historic Heathwall sewer (Battersea ditch), which dates back to Saxon times drained the area eastward to Heathwall Sluice at Nine Elms. Vauxhall and Nine Elms grew significantly during the post-medieval period and included the establishment of the Vauxhall Gardens (around 1660) which became one of the most important leisure and entertainment venues in London. The Gardens declined with the arrival of the railways in the 19th century and closed in 1859.

During the post-medieval period a substantial hamlet, probably of an industrial character, had developed at Nine Elms. However the Battersea area remained difficult for settlement due to its marshland character. The fertile marshland proved to be ideal for market gardening in the late 16th or early 17th century. By the end of the 18th century, much of eastern Battersea was taken up with market gardens supplying the London market.

Vauxhall became an attractive residential area in the 16th-18th centuries with several large houses, a few of which survive such as Brunswick House at the northern end of Nine Elms Lane, now a grade II* listed building.

Early Industrial Development

With the river as a significant artery of trade and activity, the area flourished in trade and manufacturing with a number of industries being established in Lambeth, Vauxhall and Nine Elms. Main industries in Vauxhall included candle and soap manufacture, a glasshouse manufacturing plate glass, starch-making, sugar-baking, distilling, vinegar making and brewing. Industries in Nine Elms included a brewhouse, a wood-yard, a lime kiln on the river embankment and copper works.

The Coming of the Railways

Development in the area increased rapidly after the construction of the bridges at Westminster (1750) and Vauxhall (1816). The coming of the railways in the late 1830s to the 1860s stimulated further development, but also cut through the unity of the Vauxhall and Lambeth districts, permanently transforming the character of these finely grained areas. A number of well established manufacturing sites were obliterated by the construction of the railway viaduct and other ancillary requirements.

The effect of the railways was quick: a population of 6,000 people in 1840 increased to 168,000 by 1910; and save for the green spaces of Battersea Park, Clapham Common, Wandsworth Common and some smaller isolated pockets, all other farmland was built over, with industrial buildings and vast railway sheds and sidings (many of which remain), housing for workers, especially north of the main east-west railway, and gradually more genteel residential terraced housing further south.



Figure 1.4.1: Nine Elms Station (source: VNEB OAPF)



Figure 1.4.2: Nine Elms 1845 (source: VNEB OAPF)

The Building of Albert Embankment

The stretch of the Thames between Vauxhall and Battersea remained prone to flooding until the 19th century when the Albert Embankment was built by the engineer Sir Joseph Bazalgette for the Metropolitan Board of Works between July 1866 and November 1869.

In common with other Bazalgette works, the original embankment is adorned with Sturgeon Lamp Standards to the designs of George Vulliamy. The southern limit of Bazalgette's embankment was opposite Tinworth Street, where the road moves away from the riverside.

The stretch between the road and the river south of Tinworth Street was occupied by industrial and wharf premises until World War II. These areas have subsequently been redeveloped as offices, with extensions to the embankment being constructed to a more utilitarian design.

Battersea Power Station

A number of gas and water works were established in the Nine Elms, Battersea and Vauxhall area in the nineteenth century. The Southwark and Vauxhall Water Company was established on premises to the east of the railway line at the north-west end of the study area and covered almost 50 acres. The works were closed in the 1920s and the Battersea Power Station was built on the same site for the London Power Company in 1920-35 to the design of Giles Gilbert Scott. In 1983 the Power Station was decommissioned. The structure remains a key heritage asset (grade II*) and one of London's most familiar landmarks.

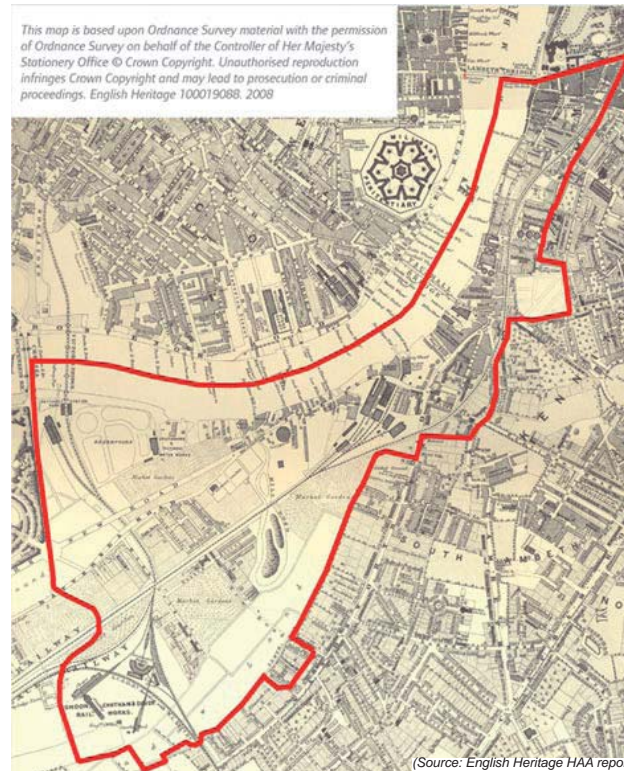


Figure 1.4.3: Stanford 1862 (source: VNEB OAPF)

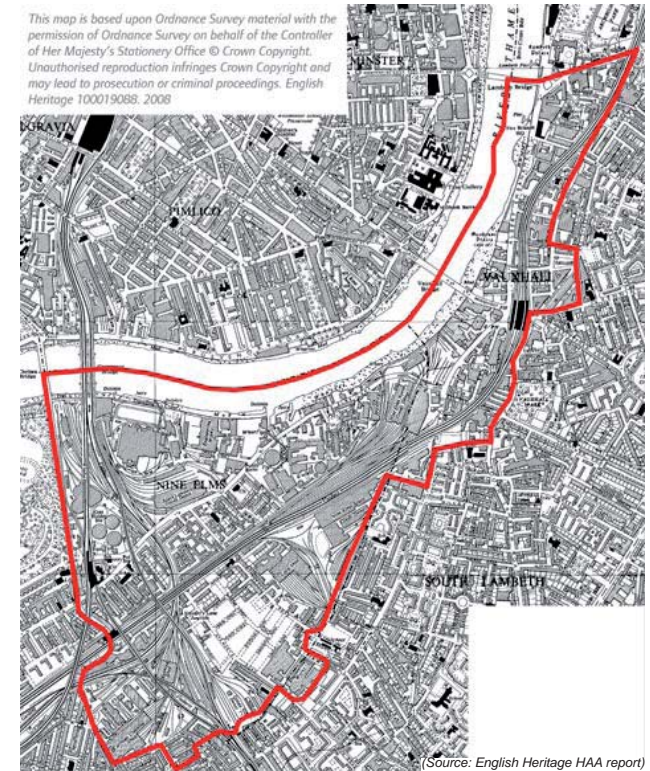


Figure 1.4.4: OS 1955 (source: VNEB OAPF)

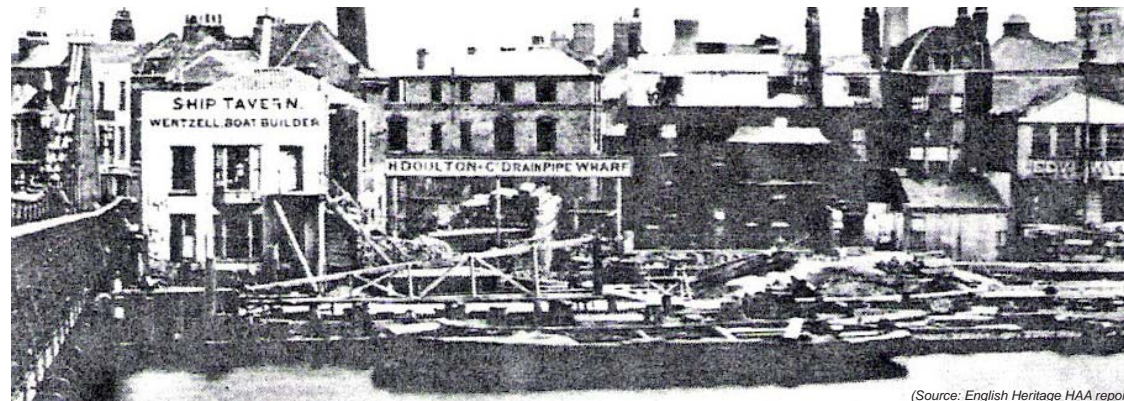


Figure 1.4.5: Lambeth foreshore 1860s (source: VNEB OAPF)

2. The Area Today

2.1 The Overall Area

The river side location, the impact of the railways and the building of the embankment and post war development has greatly influenced the built form of the study area, which is characteristically different to the surrounding areas.

The current built form shows large and individual building footprints surrounded by a significant scale and amount of transport infrastructure, which gives the area its loose fitting urban grain and contributes to an overall lack of legibility in the built form.

The overall land use character is predominantly commercial to the north and industrial to the south, bisected by heavily trafficked routes and elevated rail infrastructure.

The study area in general lacks a consolidated and coherent public realm. The environment for pedestrians and cyclists is challenging with major roads and other transport infrastructure providing a barrier to the ease of movement.

The important TLRN routes include the A3036 (Albert Embankment and Wandsworth Road) and the A3205 (Nine Elms Lane and Battersea Park Road). These link in with the A202 Vauxhall Bridge Road, A3204 Kennington Lane, A202 Harleyford Road and A203 South Lambert Road at the Vauxhall gyratory which is a large one-way system with the main transport hub, the Vauxhall Cross Interchange located in its centre.

The railway viaduct forms a strong physical divide, transecting the site from north to south. This creates severance in the form and character of the area, and contributes to the fragmentation of land uses and character areas.

Based on urban grain character, land uses and type of transport infrastructure, the study area has three distinct character areas – Albert Embankment, Vauxhall Cross and Nine Elms/Battersea (Figure 2.1.2).

Current highways, pedestrian movement and public realm conditions for the three areas have been summarised below followed by a short summary of the assessment of the baseline conditions. For detailed information refer to Technical Notes 1 and 2 and the detailed Environmental Appraisal Report.

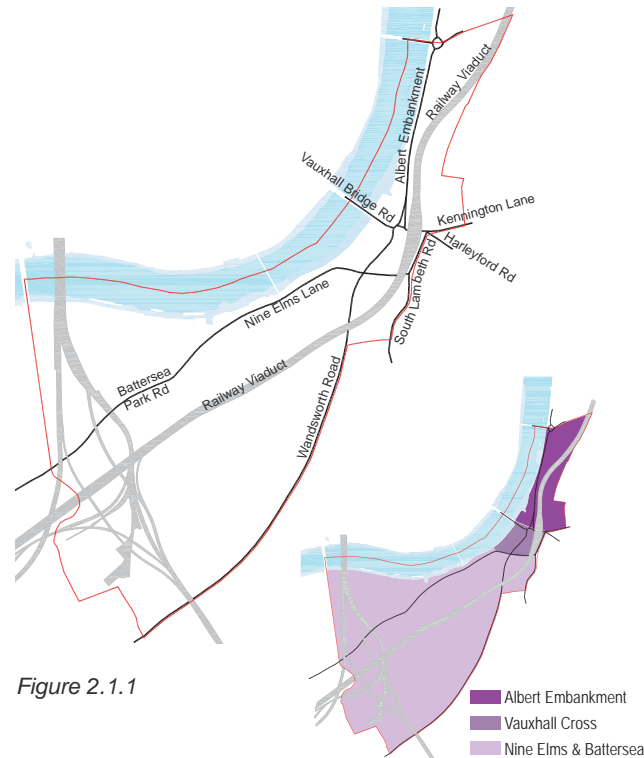


Figure 2.1.1

Figure 2.1.2

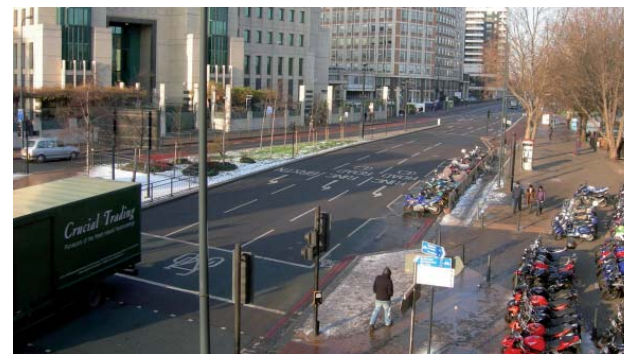


Figure 2.2.2: View towards Albert Embankment from foot-bridge at Vauxhall gyratory

Albert Embankment Area

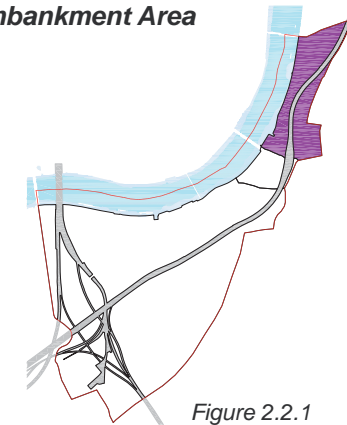


Figure 2.2.1

The Albert Embankment area is characterised by predominantly residential, low/medium-rise development and green public spaces to the east of the railway viaduct, and late 20th century commercial buildings to the west up to the river edge though partly separated from it by the Albert Embankment traffic corridor. A number of east-west streets link the residential hinterland to the riverside though movement towards the riverside is not substantial. There are few areas of active uses that draw pavement activity; those that exist include cafes, restaurants and nightclubs within some railway arches close to Vauxhall gyratory. The distinctive MI6 building at the corner with Vauxhall Bridge provides a landmark within the Albert Embankment area.

Albert Embankment Traffic Corridor

The Albert Embankment traffic corridor has a high quality finish in terms of Yorkstone paving on the footways and granite kerbing. The footways are adequate for current pedestrian flows although some conflicts do occur with cyclists particularly in the area of the coach parking. Approximately 4,100 pedestrians use the footways in both directions on the section of Albert Embankment near Vauxhall Gyratory during the three hour morning peak period. These volumes reduce quite significantly moving away from Vauxhall Gyratory as pedestrians filter into side roads.

From Lambeth Bridge to Albert Embankment Gardens the traffic corridor runs alongside the river walk, allowing for clear

2.2 Albert Embankment Area

views across the river towards Central London. Coach parking in the northbound bus lane blocks the view during certain times of the day adding to the perception of the traffic corridor appearing as a barrier to access to the river walk (Figure 2.2.3).

At the southern end the Albert Embankment traffic corridor moves away from the river edge to be fronted by the MI6 building and three office/residential blocks on the river side and open spaces and the railway viaduct on the eastern side (Figure 2.2.2). Yorkstone paving is replaced by concrete block paving on both footways from the MI6 site towards Vauxhall gyratory.

Pedestrian crossing facilities are provided at key junctions (Black Prince Road and Lambeth Bridge) and near Tinworth Street. There are large gaps between crossings and pedestrians tend to cross informally particularly near bus stops.

In terms of traffic movement, Albert Embankment is a two-way road which forms part of the central London congestion charging zone. Most of the road consists of one general traffic lane and one bus lane in each direction. Currently all the lanes lack consistency in terms of widths.

Approximately 1950 vehicles use Albert Embankment two-way in the morning peak and 1680 in the evening. The corridor operates well with very little delay.

Bus lanes are provided along the majority of Albert Embankment and vary in width from 3.4m to 4.5m. 44 buses per hour use the route generally.

Coach parking is provided within the northbound bus lane during the off peak period (10am- 4pm), the formal limit is 20 minutes.

Albert Embankment does not have dedicated cycle facilities although cyclists have the benefit of the bus lanes during operational hours. Recently a docking station for the London Cycle Hire scheme has been installed along Albert Embankment.

A detailed Collision Analysis was carried out over a thirty-six month period to 31 July 2009. This revealed that there were 28 collisions (32 casualties) on Albert Embankment involving:

- P2Ws – 50% (Average 29.4%)
- Right turn – 39% (Average 1.7%)
- Cyclists – 28.6% (Average 12.8%)
- Fatal and Serious – 21.4% (Average 15.2%)
- Goods vehicles – 21.4% (average 12.7%).

River walk

The river walk is continuous from Lambeth Bridge to Vauxhall Bridge and completely accessible until and including Albert Embankment Gardens. Beyond this point it is separated from the public footway by the MI6 and other buildings. The Duck Tours slipway provides access between the MI6 building and the adjacent office block Peninsular Heights.

Morning peak pedestrian flows (2008) are low on the Albert Embankment with flows across the three hour period observed at around 70 in the centre rising to around 270 close to Vauxhall and Lambeth bridges.

The river walk has high quality treatment in the section from Lambeth Bridge to Albert Embankment Gardens, forming part of the nineteenth century Bazalgette embankment works that extend through most of Central London (Figure 2.2.4).

The section behind Peninsular Heights and Tintagel House is utilitarian in appearance with an exposed concrete embankment (Figure 2.2.5).

The section along the rear of the MI6 building matches the style of that development having been constructed as part of it; however it appears to be in need of refurbishment.

Strategic links

The main links connecting the residential hinterland to the riverside are Black Prince Road, Salamanca Street, Tinworth Street, Glasshouse Walk and New Spring Gardens Walk. These pass through tunnels in the railway viaduct, which were refurbished in 2002 as part of the 'Light at the End of the Tunnel' project. Some of the tunnels require maintenance works to stop water leaks and repair lighting. Most of the links have narrow footways paved in concrete flags or asphalt. Salamanca Place (off Salamanca Street) and Black Prince Road have recently seen some improvements with Salamanca Place being made into a shared surface.



Figure 2.2.3: View towards river from Tinworth Street



Figure 2.2.4: Albert Embankment - historic Bazalgette scheme



Figure 2.2.5: River walk behind Peninsular Heights and Tintagel House.

2.3 Vauxhall Cross Area

Vauxhall Cross Area



Figure 2.3.1

Vauxhall Cross is a significant transport interchange bound by major roads and large junctions that result in a poor built environment, with mostly inactive frontages and uninspiring pedestrian and public realm. The distinctive St George Wharf development on the riverside, the railway viaduct and the steel structure of the bus station dominate the area (Figure 2.3.2).

Within the gyratory area the pedestrian environment is extremely poor in appearance and connectivity. Pavements are narrow, forcing pedestrians to walk through the bus station and causing crowding. The entire central area appears to be a collection of pedestrian refuge islands (Figure 2.3.3).

Pedestrian crossings are provided at all corner junctions of the gyratory with an additional crossing on Parry Street. At present, pedestrians experience long delays due to multiple crossings on approaches.

Currently pedestrian trips are predominantly to/ from (and within) the interchange, with flows in excess of 1,000 during the morning peak period on the eastern footway of Albert Embankment, and on the west side of Wandsworth Road leading to Nine Elms Lane west side footway at the junction with Parry Street.

Pedestrian subways connect the rail/bus stations and the west side of Wandsworth Road to the London Underground ticket hall. A footbridge across Kennington Lane connects the main interchange area with Albert Embankment.

Notwithstanding the presence of the subways for some of the key movements, pedestrian journeys through the area typically involve two to three crossing movements. In some cases these are significantly off the desired route, particularly around the island site where footways are narrow or are not provided at all. Pedestrian journeys to both Vauxhall LUL and the front NR entrance are typically around 8 minutes in length (with a generalised, 'perceived' journey time perhaps 50% longer than this). Journeys to the rear NR entrance are longer on average but involve fewer crossings or grade changes.

The gyratory is characterised by a wide carriageway varying between four and six lanes and long links (up to 250 metres) between junctions, encouraging high speeds and weaving. Traffic signal control is provided at all four corners of the gyratory.

The gyratory experiences high volumes of traffic throughout the day. Highest flows are during the following weekday peak hours:

- AM Peak – 6404 Passenger Car Units (PCU);
- Inter Peak - 5185 PCU;
- PM Peak – 5923 PCU.

Current conditions for traffic are generally good with the gyratory signal timings designed to encourage internal links not to block back with plenty of spare queuing capacity. However, when there is an incident on the network, the gyratory can easily become locked up.

There are some areas of the gyratory where links are approaching full capacity and long queues can often form. These are;

- In the AM Peak: Wandsworth Road approach (96% saturated)
- Circulating carriageway approach to Wandsworth Road (96% saturated)
- In the PM Peak: Circulating carriageway approach to Harleyford Road (88% saturated)
- Nine Elms Lane approach (95% saturated)

Cyclists currently make up 10% of the total vehicles using the gyratory during the AM peak hour (7% PM peak) based on cyclists using the carriageway only. Cycle provision has been installed around much of the periphery of the junction (except Parry Street) in the form of two-way cycle tracks adjacent to the footway and cyclists are permitted through the bus station for certain restricted movements.

Vauxhall gyratory currently provides poor facilities and is complex to navigate for cyclists. The main issue is the wide carriageways where cyclists are often forced to cross five lanes of fast moving and weaving traffic.

Both Vauxhall London Underground and National Rail stations are located in the centre of the gyratory along with Vauxhall Bus Station forming an interchange hub. The South West Mainline runs across the gyratory on a viaduct from roughly north to south, whilst the Victoria Line runs underground from the South East to the North West. The bus station is one of the busiest in London with constant movements onto the gyratory.

175 buses pass through the gyratory and bus station per peak hour. The main bus movements are currently East-West using Vauxhall Bridge (seven daytime routes) and Kennington Lane/Harleyford Road (four daytime routes each) to enter/leave the Gyratory and North-South using Wandsworth Road (three daytime routes) and Albert Embankment (three daytime routes) to enter/leave the Gyratory.

The bus station extends over the Underground station forming a good interchange for users. There are nine clearly labelled bus stops and three bus stands within the bus station space. There are a further ten stops in close proximity to the gyratory.

A detailed Collision Analysis was carried out over a thirty-six month period to 31 July 2009. This revealed that there were 92 collisions (102 casualties) in the area of Vauxhall Gyratory involving:

- Dark conditions – 43.5% (TfL road average 31.2%)
- Non Dry conditions – 26.1% (16.8%)
- Pedestrians – 23.9% (20.5%)
- Cyclists – 22.8% (16.9%)
- Fatal and Serious – 16.3% (15.4%)

2.3 Vauxhall Cross Area

River walk

The river walk within the Vauxhall Cross area is associated with the St George Wharf development and has a high quality finish, which is a continuation of the landscaping within the development site.

The river walk can be accessed through the development, which has a number of active ground level uses on the river side that encourage outdoor activity such as alfresco eating.

However, there is no continuous route along the river at this point at the moment, and this will continue until the final phase of the St George Wharf development is complete.

Strategic Links

A number of tunnels allow east-west access through the railway viaduct (Figure 2.3.4), one of these being a pedestrian only route and another, a cycle and pedestrian route. However the bus station layout and related highway infrastructure provides a barrier to access to the riverside and other areas (Figure 2.3.5).



Figure 2.3.2: Fragmented public realm within the gyratory.



Figure 2.3.3: Vauxhall gyratory



Figure 2.3.4: Pedestrian tunnel through railway viaduct



Figure 2.3.5: Vauxhall Bus station

2.4 Nine Elms and Battersea Area

Nine Elms and Battersea Area

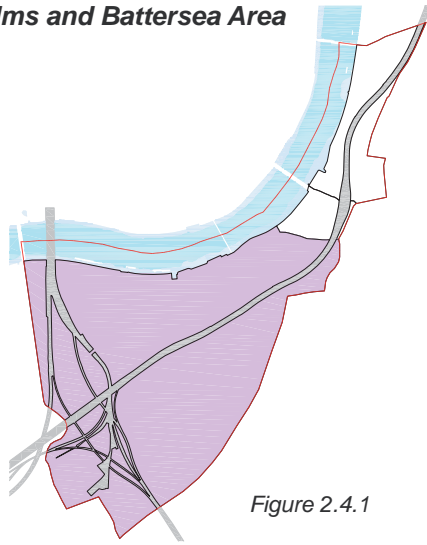


Figure 2.4.1

The Nine Elms and Battersea area (Figure 2.4.1) is primarily an industrial area characterised by large, big box building formats in commercial uses. The industrial sites together with the railway infrastructure sever the residential hinterland from the riverside. Views and access to the river are limited to three small open spaces located along Nine Elms Lane. The rest of the river walk is blocked off by two residential developments (Riverside Court and Elm Quay Court), a number of working wharfs, some industrial estates and Battersea Power Station, which are all located in the strip of land between Nine Elms Lane and the river edge.

Nine Elms Lane and Battersea Park Road

Nine Elms Lane and Battersea Park Road is a TLRN road with narrow to standard width pavements finished in a mix of precast concrete setts and small flag paving. Substandard cycle lanes are provided on the pavements, further narrowing the footways (Figures 2.4.2, 2.4.3 and 2.4.4).

There is some tree planting along Nine Elms Lane, in clumps within the open spaces on the river side and alongside sections of the pavement, within private property. There are very few trees within the pavement itself.

Very few pedestrians use Nine Elms Lane in both directions due to the limited number of residential properties. Currently 1,500 in the three hour morning peak use Nine Elms Lane near the gyratory but this reduces significantly moving away from the Gyratory.

Pedestrian crossing facilities are present at the key junctions along this link, a mix of straight across and staggered.

In terms of traffic movement Nine Elms Lane /Battersea Park Road is an underused TLRN road (A3205) with spare capacity. It currently operates within capacity with typical two-way peak hour traffic flows of approximately 1900 PCU.

The carriageway mainly consists of one traffic lane and one bus lane in each direction, however additional traffic lanes are provided at some of the junctions and towards the gyratory. A central reservation is present along sections of Nine Elms Lane splitting the eastbound and westbound carriageway. This appears to contribute to the speeding problem along this road.

Key junctions along the link include:

- Nine Elms Lane / Pondon Road junction.
- Nine Elms Lane / Kirtling Street / New Convent Garden Market junction.
- Battersea Park Road / Prince of Wales Drive junction.
- Battersea Park Road / Queenstown Road junction.

Bus lanes are present along most of the length of this link, but they are narrow at just 3 metres and are often broken by left-turn lane facilities.

There are 2 bus services along Nine Elms Lane resulting in 17 buses per peak hour. Daily two-way bus passengers are only 9121, low compared to other approaches to Vauxhall gyratory.

Cycle facilities are provided on the footways. These are of a very poor standard with narrow lanes which often conflict with both pedestrians and street furniture making them unusable for the majority of cyclists. The off-road facilities often terminate forcing cyclists back into the carriageway. Space is particularly narrow around bus stops and crossings. Very few cyclists use the cycle lanes.

A detailed Collision Analysis was carried out and this revealed

that there were 17 collisions (17 casualties) in the area of Nine Elms Lane

- P2Ws – 60% (TfL average 29.4%)
- Right turn – 47% (1.7%)
- Dark conditions – 41% (31.4%)
- Goods vehicles – 35.3% (12.7%)
- Cyclists – 23.5% (12.8%)
- Fatal and Serious – 23.5% (15.2%)

River walk

The river walk is continuous from Vauxhall Bridge up to the pumping station on Nine Elms Lane. Thereafter it is blocked by a number of working wharfs and industrial estates.

2008 AM peak pedestrian flows are low on the Nine Elms Lane sections of the riverwalk - 0 to 30 across the 3 hour peak, owing to the dislocated nature of the path along this stretch.

The accessible section of the river walk between the St George Wharf development and the pumping station is narrow in sections with no possibility of widening. It has a utilitarian appearance with concrete setts paving and exposed concrete embankment behind Riverside Court (Figure 2.4.5) and the open spaces (Figure 2.4.6) and buff flag and brick paving pattern and brick/metal railing embankment behind Elm Quay Court.

Strategic Links

Thessaly Road is the only direct north-south link connecting Battersea Park Road to the residential hinterland. Large commercial/light industrial sites including the Royal Mail Sorting Office and the CGMA markets located to the north and south of the railway viaduct and extensive railway infrastructure block pedestrian access to the riverside in the rest of the Nine Elms and Battersea area.

2.4 Nine Elms and Battersea Area



Figure 2.4.2: Nine Elms lane - cycle lanes and footways



Figure 2.4.3: Nine Elms Lane



Figure 2.4.4: Nine Elms Lane



Figure 2.4.5: Section of river walk behind Riverside Court.



Figure 2.4.6: Open space adjacent to Riverside court linking Nine Elms Lane to the river walk.

2.5 Environmental Conditions

Assessment of Baseline Conditions

A summary of the assessment of baseline conditions is included in Section 3.2 of the Environmental Appraisal Report. The assessment was carried out using existing Environmental Appraisal Records (EAR) for the Vauxhall Nine Elms Battersea (VNEB) study area. Key findings of the assessment are as follows:

Noise Levels

The following locations within the VNEB study area experiences Category C noise levels (i.e.in excess of 65dB(A)): Vauxhall Gyratory with the centre often reaching 75dB(A); frontage of Nine Elms Lane and Battersea Park Road and Albert Embankment on the approach to Vauxhall Gyratory. Road traffic noise levels would require an increase of 50% in traffic volume to generate a discernible increase (3dBA) above these levels.

Air Quality

High concentrations of NO2 are notable throughout the study area, particularly around Vauxhall Gyratory, along Nine Elms Lane and Albert Embankment where concentrations greatly exceed UK air quality standards. PM10 concentrations greatly exceed UK air quality standards in and around Vauxhall Gyratory. The latest Mayoral Air Quality Strategy seeks to implement measures to reduce levels of emissions at location where exposure to pollution is high.

Water Environment

The VNEB study area in its entirety is designated as an area that benefits from flood defences (Figure 2.5.1). However, there remains a residual risk of flooding from overtopping or breach of the flood defences. In addition, the heavily developed nature of the site suggests that the potential for surface water flooding is increased.

Physical Fitness

Walking journeys predominantly focus on accesses to the various transport and interchange facilities of London Underground Victoria Line Station, Vauxhall over ground train station and the bus station. The gyratory is complex to navigate for cyclists due to high traffic speeds and weaving traffic. Cyclists using existing off-road facilities incur significant time delays due to the large number of crossing facilities and conflicts with pedestrians during periods of heavy footfall as well as conflicts with lamp posts and other obstacles where cycle lanes are incorporated into narrow pavements (eg northern pavement along Nine Elms Lane) (Figure 2.5.2).

Journey Ambience

The existing conditions do not provide a high degree of journey ambience for pedestrians and cyclists (Figure 2.5.3). This could be enhanced by more dedicated pedestrian and cycling facilities including wider pavements and an improved pedestrian environment. Excessive speeding was also identified to be a problem.

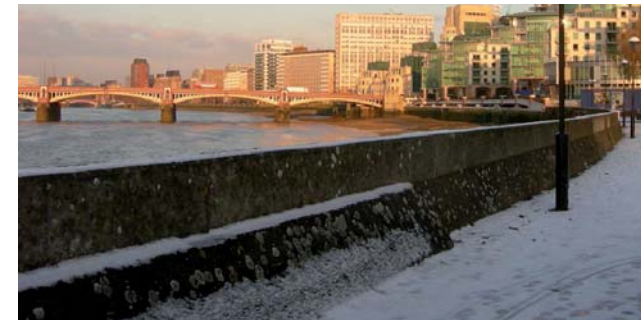


Figure 2.5.1: Continuous embankment.



Figure 2.5.2: Current condition of cycle lanes on Nine Elms Lane.



Figure 2.5.3: Unfriendly conditions for pedestrians.

3. Vision for the Area

3.1 The London Plan

The broad vision for the area is set out in the London Plan, the Opportunity Area Planning Framework and various London Borough policy documents. These have been listed and summarised below:

The London Plan Consolidated with Alterations since 2004, February 2008

The VNEB OA lies partly within London's Central Activities Zone (CAZ) as defined in the London Plan Consolidated. Policy 5G.1 and map 5G.1 in the London Plan identify the boundary of the CAZ and describe it as being suitable for development including government, tourism, culture, education, entertainment, retail and residential.

The VNEB OA is identified by the London Plan as an opportunity area for mixed use development providing a minimum of 3,500 homes and an indicative employment capacity of 8,000 jobs.

Paragraphs 5.141 and 5.142 from the London Plan set out the policy background for the VNEB OA requiring that all developments relate to existing and improved public transport capacity, help improve the degraded environment and strengthen links with the rest of central London. Good public transport coupled with strong traffic management, easier pedestrian movement, major environmental improvement and scope for intensification is considered necessary for increasing housing and commercial capacity in the OA.

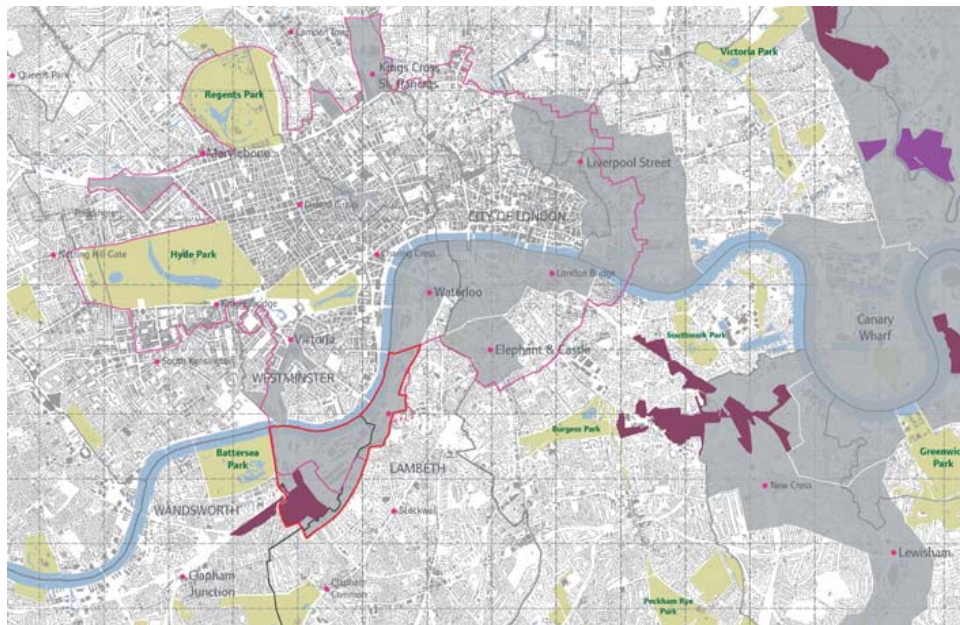


Figure 3.1.1: Opportunity areas, central activities zone and strategic industrial locations (source: VNEB OAPF)



Figure 3.2.1: OAPF Vision for the river walk (source: VNEB OAPF)



Figure 3.2.2: OAPF Vision for Nine Elms Lane (source: VNEB OAPF)

- Vauxhall Nine Elms Battersea Opportunity Area
- Opportunity Areas
- Central Activities Zone (CAZ)
- Preferred Industrial Location (PIL)
- Industrial Business Park (IBP)

3.2 VNEB Opportunity Area Planning Framework

VNEB OAPF, Consultation Draft, November 2009

The VNEB Opportunity Area Planning Framework (OAPF) is a spatial planning framework produced on behalf of the Mayor of London by the GLA, in partnership with the London Development Agency (LDA), TfL, London Boroughs of Lambeth (LBL) and Wandsworth (LBW) and English Heritage.

The aim of the OAPF is to establish a policy framework that brings together London Plan and Borough development plan documents to guide the delivery of development in the area within the plan period.

The OAPF supported by a Transport Study addresses all aspects of development and puts forward a number of strategies and interventions to guide and support the forthcoming changes in the area to a Revised Scenario 5 level.

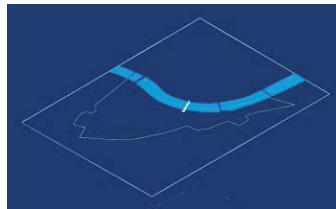
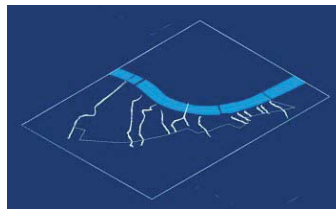
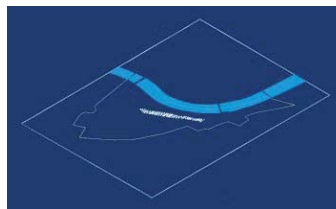
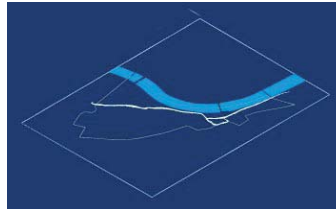
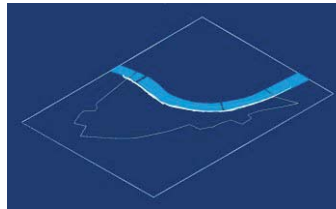
The area in 2026 – OAPF ‘Revised Scenario 5’

Revised Scenario 5 (RS5) is the preferred development capacity option that includes high density residential providing a minimum of 16,000 homes, CAZ frontage and office destination providing 20,000 to 25,000 jobs, and 16000 housing units. A new CAZ frontage of significant scale is proposed at Battersea Power Station with 60,000 m2 of retail space, 160,000m2 of office and 80,000m2 of other employment uses.

The RS5 development levels are to be supported by a set of transport interventions and public realm improvements set out in a public realm strategy.

The recommended transport interventions include:

- Pedestrian and cycling routes within the OA and to/from surrounding areas
- Capacity related improvements at Vauxhall Underground and National Rail stations and interchange
- Northern Line extension
- A cross-river pedestrian/cycle bridge (Nine Elms – Pimlico)
- Remedial measures to deal with the increased pressure of traffic increases on the Vauxhall gyratory and other local and strategic roads within the OA
- Wider traffic management measures, including restraints on car parking levels to minimise traffic impacts.



Figures 3.2.3 to 3.2.7 : Five public realm interventions. (source: VNEB OAPF)

Five principle public realm interventions have been set out in the public realm strategy:

- **An improved river walk** – The OAPF seeks to deliver a continuous riverside path from Lambeth Palace Gardens to Battersea Park with substantial public realm improvements along its length and activation with development along its edges (Figure 3.2.1).
- **Road environment improvements** along Albert Embankment and Nine Elms Lane. Nine Elms Lane is expected to undergo major changes as the bulk of new developments within the OA are located in the Nine Elms area. Improvements to include two-way segregated cycle routes, wide, well surfaced pavements with extensive tree planting and active edges (developments should provide active frontages to the street), unified street lighting, regular, wide pedestrian/cycle crossings along desire lines, and creation of pause points along the length of the street to humanise it. Entrances to new development sites to be minimised to reduce impact on traffic (Figure 3.2.2).
- **A new linear park** is proposed in Nine Elms where there is an existing deficiency in open space provision. The linear park will act as a focal point and recreational facility for the new community in Nine Elms.
- **Strategic river links** to connect the currently segregated residential hinterland to the riverside. New pedestrian/cycle crossings will be required on existing strategic routes to ensure good quality linkages are delivered.
- **A new pedestrian/cycle bridge** connecting Nine Elms to Pimlico to improve the connectivity of the OA to the CAZ.

3.3 Better Streets

Better Streets, November 2009

Better Streets published by the Mayor of London's office is a practical guide that sets out six guiding principles for the creation of better streets that will encourage people to walk, cycle and linger. The aim is to re-balance the amenity of different road users so as to remove the visual and functional dominance of motor vehicles in the street, especially in high streets and other places where there is a high pedestrian demand through innovative design, the use of good quality, sustainable materials and high levels of craftsmanship without compromising road safety or hampering traffic flows (see examples - Figures 3.3.1 and 3.3.2).

The six guiding principles include:

- **Understand function** - understand the function of a particular street so that improvements reflect whether the street is primarily a retail high street, a residential road, a busy through route or other.
- **Imagine a blank canvas** - challenge every existing feature as to whether it really needs to be preserved to successfully minimise clutter. Every feature that remains or is replaced should be carefully justified.
- **Decide the degree of separation** - avoid segregation of road users wherever possible unless it is clearly essential for safety or other functional reasons.
- **Reflect character** - design improvements/changes should reflect the historic character through recognition that the street is the foreground to the buildings on it.
- **Go for quality** - use materials of the highest quality and durability as these often last longer, have a better appearance and are less expensive to maintain. Good workmanship and attention to detail is also important.
- **Avoid over-elaboration** - maintain simplicity of design that complements the buildings on the street and creates a backdrop for human interaction.

Better Streets also emphasises that it is important to realise that bringing improvements to streets often does not require complete change but can be done as small scale improvements on a phased basis or in the course of routine maintenance leading to a holistic vision developing incrementally over a period of time.



Figure 3.3.1: The Cut: a pedestrian friendly street with generous paved areas that include cycle racks, benches and street trees.

(source: Better Streets, Mayor of London)



Figure 3.3.2: Woolwich: The Plumstead Road super-crossing and associated improvements reconnect the town centre with the Royal Arsenal and provide much improved public space around the market.

(source: Better Streets, Mayor of London)

3.4 London Borough of Lambeth

London Borough of Lambeth Unitary Development Plan, August 2007

LB Lambeth published its UDP in August 2007. The UDP sets out a series of policies specific to Vauxhall:

Policy 75 emphasises the need to work with LB Wandsworth to secure regeneration benefits in the wider area;

Policy 76 supports the development of a strategic transport hub at Vauxhall Cross including a longer-term consideration of the removal of the gyratory system. In recognition of the poor quality of the environment for pedestrians and cyclists within the Vauxhall area, the policy requires that the hub at Vauxhall Cross should feature radical improvements to the pedestrian and cycling environment. The policy clearly states that major development is contingent upon sufficient public transport accessibility and capacity.

Policy 77 focuses on urban design and public realm improvements in Vauxhall such as the creation of a new public open space at the transport interchange, improved access throughout the area, better links to the river and through the viaduct and active frontages especially at Vauxhall Cross where the creation of a small district centre is supported.

London Borough of Lambeth Vauxhall Area Draft Supplementary Planning Document (SPD), June 2008

The SPD focuses specifically on the Vauxhall area and provides guidance for growth and new development, to supplement policies within the Lambeth Unitary Development Plan (UDP) as adopted in August 2007.

The SPD sets out a vision for Vauxhall area that sees it becoming a place of growth with a distinct heart, supported by excellent community and transport infrastructure (Figure 3.4.1).

The vision will be delivered through the following Strategic Objectives that provide general and specific guidance for new development. The strategic objectives include the following:

1. Managing Development Opportunity
2. Character, Identity and Sense of Place
3. Diverse Mixture of Uses
4. Access, Connections and Legibility
5. Public Realm, Streets and Spaces
6. Sustainable Development

The Strategic Objective 5 aims to provide, improve and enhance the public realm, streets, and public amenity spaces, ensuring that these areas are active, safe, and form the heart of the community.

Significant investment into the public realm is advocated to achieve a step change in the quality of the built environment in and around Vauxhall.

Vauxhall Cross is to continue its role as a key transport hub/interchange, however changes to the street hierarchy are to be considered along with good quality design and new development with active ground level uses to reduce the dominance of road vehicles, create a pleasant and accessible environment and a new public square.

Existing public spaces are to be enhanced. A series of linked, enclosed spaces are proposed to thread through the area from north to south, associated with the railway viaduct.

The appearance and character of Albert Embankment is to be enhanced, ensuring that it is highly accessible and well connected to the surrounding area, maintaining and improving safe access to the river. There is an aspiration to narrow the carriageway to improve the public green space adjacent to the railway arches, to create a usable amenity space for passive recreation and seating.

The river walk is to be maintained as a continuous, safe and accessible route, at least six metres in width.

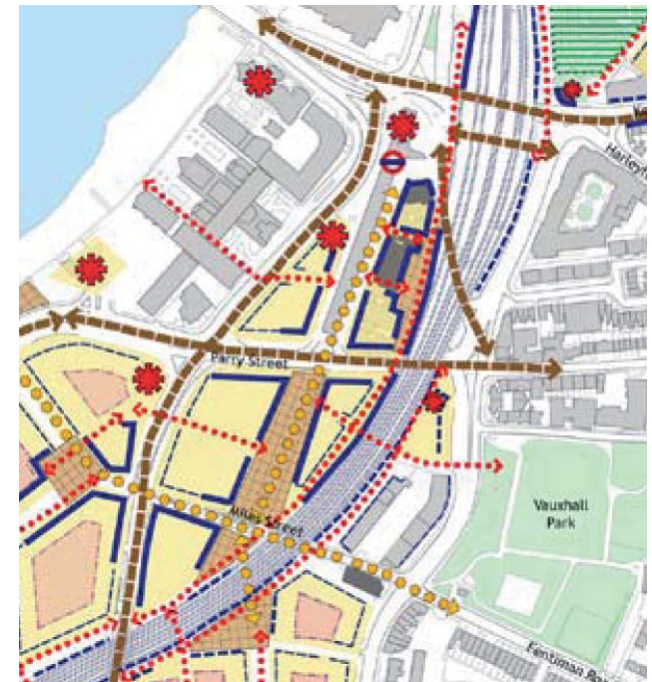


Figure 3.4.1: SPD Vision for the Vauxhall Heart (source: LBL Draft SPD)

3.5 London Borough of Wandsworth

London Borough of Wandsworth Core Strategy, Adopted Version, October 2010

The Core Strategy sets out the spatial vision and strategy for the borough with guiding principles for planning in Wandsworth for the next ten to fifteen years (Figure 3.5.1). It contains strategic objectives for the area together with a spatial strategy, core policies and a monitoring and implementation framework.

The Core Strategy recognises the potential for intensification in the Nine Elms and north east Battersea area to deliver new homes and jobs, with associated public transport and social infrastructure improvements. It also identifies improving public transport accessibility as being the key to unlocking development potential in the OA.

London Borough of Wandsworth Site Specific Allocations Document, Proposed Submission, October 2010

The Site Specific Allocations Document (SSAD) sets out the Council's ambitions for the future of Nine Elms. With landmark developments at the new US Embassy in Nine Elms Lane and the conversion and regeneration of the former Battersea Power Station and surrounding lands the scene is set to transform the area into a major international quarter. It is essential therefore that the quality of the public realm, and the streets in particular reflect the image of London as a world city.

The SSAD specifies that street enclosure ratios should be around 1:1 to avoid a canyon - like appearance and ensure that adequate sunlight penetrates public spaces. Given

that average building heights of around 8 - 10 storeys are expected in the Nine Elms area an enclosure ratio of around 1:1 would generate street widths that can accommodate larger growing tree species, such as London planes as generous street tree planting will be expected, to help define the character of the area. All new streets will need to be designed to the highest standards and be consistent with the Council's Streetscape Manual.

All new streets should provide for larger mature trees, such as London Planes, to be planted. These would contribute to defining the area's character through reinforcing enclosure, improve its visual appearance, mitigate the effects of climate change and improve biodiversity.

Specifically, with regards to Nine Elms Lane/Battersea Park Road, the SSAD states that this strategic road network in its current form provides a hostile environment for pedestrians and cyclists, cutting the area in two and creating a negative impression of the whole area. To overcome this, and provide effective links to and from the riverside between the sites to the south of Nine Elms Lane/Battersea Park Road, the road should be transformed along the lines of an urban boulevard to transform the street into a more pleasant place where pedestrians, cyclists and vehicles can be accommodated in a balanced way. This will require innovative design within the highway, and as many robust, active ground floor frontages as possible. To achieve this aim, the SSAD dictates the road be re-designed to deliver:

- (a) a 4m wide bus and cycle lane and 3m general traffic lane in both directions with some localised widening at junctions;
- (b) wide, well surfaced pavements for pedestrian use;
- (c) active frontages with residential and commercial entrances facing the street;
- (d) extensive mature tree planting of larger growing species;
- (e) unified street lighting;
- (f) regular and wide pedestrian/cycle crossings to the riverside well placed to connect to public realm improvements along the riverside, and to the development form/service entrances on sites to the south of Nine Elms Lane;
- (g) rationalised service entrances to new development sites;
- (h) creation of periodic small places or points of interest along its length to "humanise" the road.

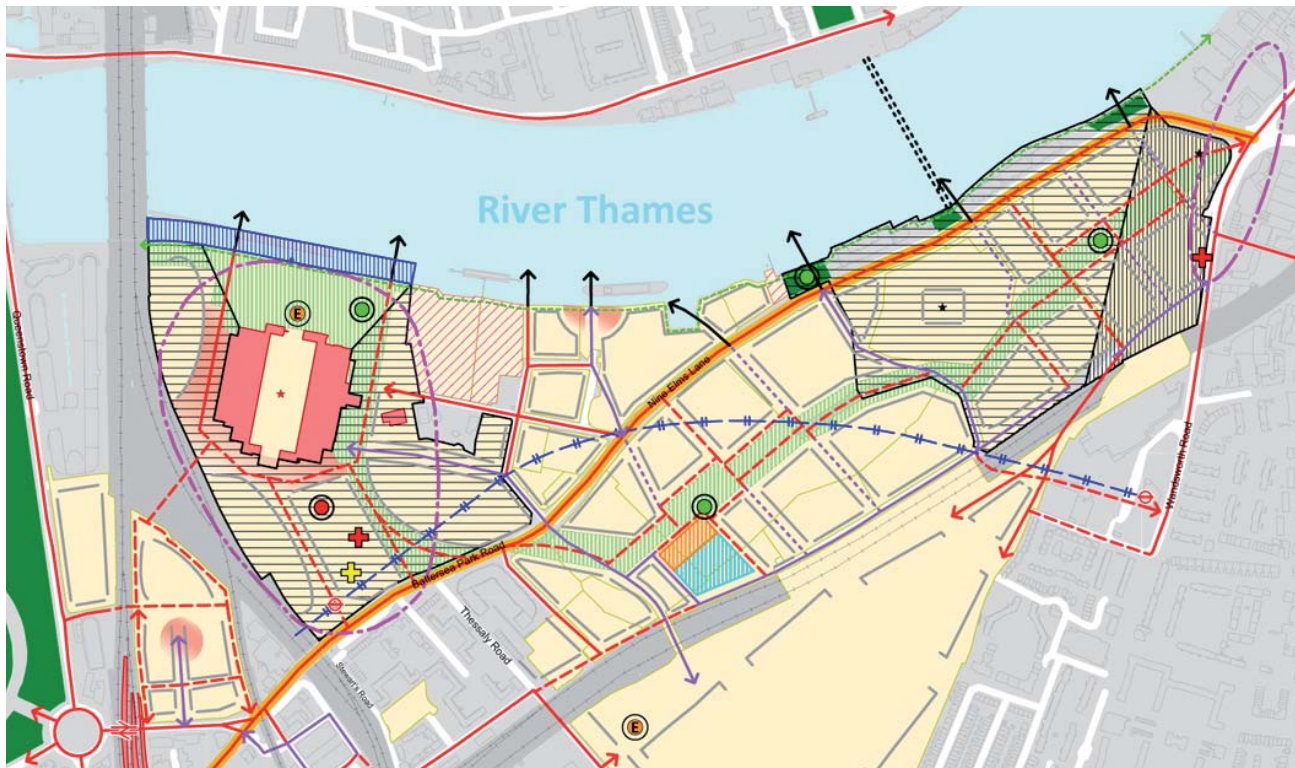


Figure 3.5.1: Area Spatial Strategy Queenstown Road to Nine Elms (source: LBW SSAD)

4. Stakeholder Engagement and Current Development Proposals

4.1 Stakeholder Consultation

Consultation Strategy

A consultation strategy based on the VNEB Transport Study Draft Consultation Strategy has helped facilitate consultation with LB Lambeth and LB Wandsworth and other key stakeholders ensuring ongoing engagement and maximum use of the collective knowledge available given the work already undertaken to date.

A number of key Stakeholders were identified during the Inception Meeting and several more added as the project scope changed and schemes options were developed. Below is a summary of the Project Team's engagement with these key Stakeholders:

Steering Group

A Steering Group made up of the relevant TfL businesses, GLA and representatives from the Boroughs was set up to help guide the design process and select / comment on improvement options for the OAPF. Two meetings/workshops were held at the middle of Stages 2 and 4 of the programme. Minutes of these meetings are set out in Appendix 1.

Key issues discussed at these Steering Groups were:

- The accuracy of the SKM Saturn Modelling was queried and a request was made for further calibration work to be carried out before undertaking detailed TRANSYT modelling.
- LB Lambeth's request for TfL to take a two way traffic solution along with an option of retaining a one way traffic option for Vauxhall Gyratory to the next stage of the design process.
- There was a resistance to reject any of the three main options for Vauxhall Gyratory until more detailed information on the impact of these options on the network was known.
- LB Lambeth felt that relocating the bus station towards the railway viaduct was very problematic due to complicated land ownership.

- TfL London Buses requested that any option for Vauxhall gyratory maintain existing bus station capacity and improve or maintain bus journey times.

Boroughs

In addition to providing guidance during the Steering Group meetings, representatives from the two Boroughs have provided invaluable information on existing conditions and Borough aspirations for the areas within the OA addressed by the Study during separate meetings held with them.

Transport Groups

Various parts of Transport for London have been consulted during the design development processes in order to obtain data/information crucial for the design development. These include:

- TfL Design (Client)
- TfL Highway Modelling
- TfL London Buses
- TfL Land Use Planning
- TfL Surface Transport and Interchange
- TfL Cycling Centre of Excellence
- TfL Walking and Accessibility
- TfL Road Network Development
- TfL Surface and Strategy
- Network Rail

Key Developers

Meetings with key developers were held at the beginning and during the design development stages to obtain information on the new developments within the OA and to discuss how they fit within the OAPF in terms of the public realm strategy and connecting into the overall highways network and impacting on it. Key developers consulted include:

- US Embassy
- Battersea Power station/Treasury Holdings
- Ballymore
- New Covent Garden Market Authority (CGMA)
- Tideway/St James Group
- Royal Mail Group
- Vauxhall Island site/Kylun Ltd

4.2 Current Development Proposals

Some Current Development Proposals

There are a number of major development sites within the OA. Planning permission has been granted for the new US Embassy and Wandsworth council has resolved to grant planning permission for the Battersea Power Station development. Planning applications have been submitted for the Tideway Site and Vauxhall Island. The majority of the remaining sites are at the pre-application stage. (Figure 4.2.1)

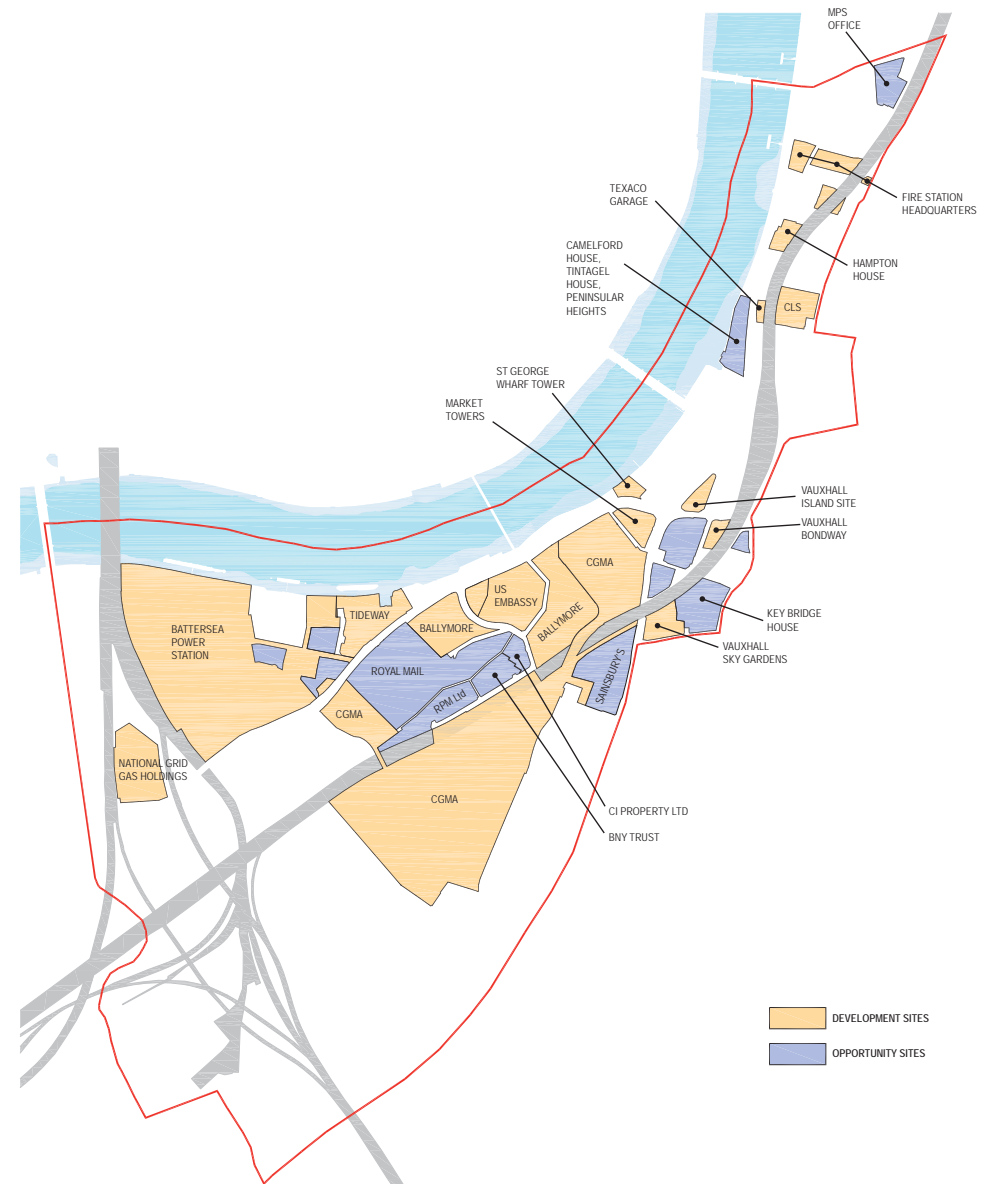


Figure 4.2.1: Key Development Sites and Opportunity Sites (information source: OAPF, LBL SPD, LBW SSAD)

5. Strategic Modelling

5.1 SATURN Modelling

Overview of the SATURN Modelling

The VNEB Transport Study undertaken by SKM examined a number of development scenarios for the OA and these were tested using a SATURN model based on CRISTAL-H. Following examination of the SKM SATRUN, Colin Buchanan (CB) found several areas of concern mainly because it did not replicate the observed flows with a good degree of accuracy in particular within the core study area and the highway network was not sufficiently detailed. Therefore the SKM model was not considered suitable to produce robust results for the TRANSYT modelling of the core study area. It was therefore proposed that before the model output was used for the study, it would need to be improved and refined in the area of interest for both the base and the future scenario.

The following sections provide an overview of the SATURN modelling undertaken for this study. A detailed analysis of the model can be found in Technical Note 3.

Model Description and Network Development

In order to improve the SATURN model around the area of interest, CB proposed to cordon an area around Vauxhall/Nine Elms, large enough to allow for possible reassignment but small enough to ensure accuracy in the core area of the model - Vauxhall Gyratory and Nine Elms Lane. The cordoned model (Vauxhall SATURN model) would then be refined and enhanced in terms of the highway network, zoning system and the trip matrix using the observed data in order to achieve a high level of validation. The latest version of Central London Highway Assignment Model (CLOHAM) was used for the SATURN modelling. Figure 5.1.1 shows the outline methodology.

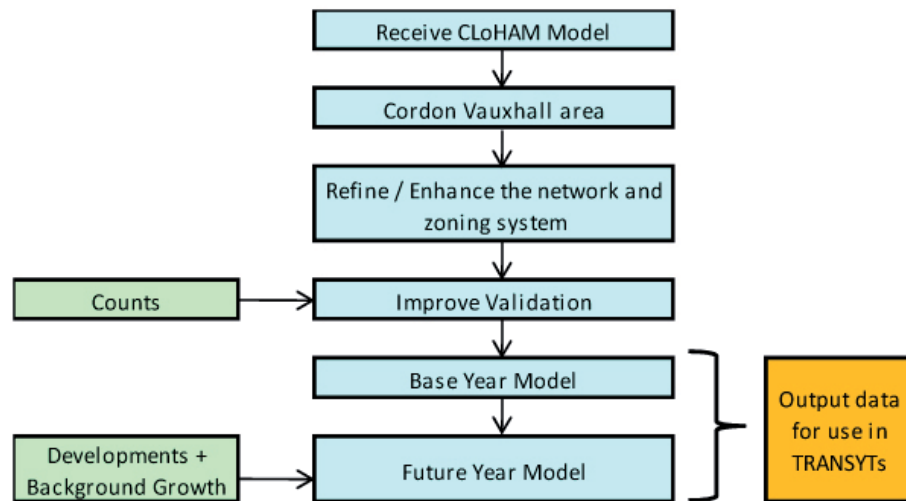


Figure 5.1.1: Flow Chart – Method to develop Vauxhall SATURN model

Study Area

To determine the extent of the study area prior to cordoning of CLoHAM, it was first necessary to run the whole CLoHAM model, with one of the scheme options coded in to assess the likely impact of the scheme on the wider network.

It was found that the -assignment impact of the scheme was not widespread and therefore the cordon area (Figure 5.1.2) was considered to be sufficient for the purpose of this assessment.



Figure 5.1.2: Study Area

5.1 Saturn Modelling

Highway Network

CLOHAM contained 7 zones within the study area, some of which were considered to be too coarse for the detailed impact analysis. It was therefore decided to disaggregate the CLOHAM zones into much finer zones and also to ensure compatibility with the SKM model. As a result, the cordoned model consisted of 72 zones including the cordon crossings.

It was also necessary to refine the network to include all main junctions and links within the study area (Figure 5.1.3). The SATURN network was refined to the same level as the TRANSYT model in order to make the two networks compatible.



Figure 5.1.3: SATURN Network

Traffic Data

Figure 5.1.4 shows the location of all counts used in the development of the model together with location of 3 Screenlines (SL) used for calibration (SL 2 & 3) and validation (SL 1).

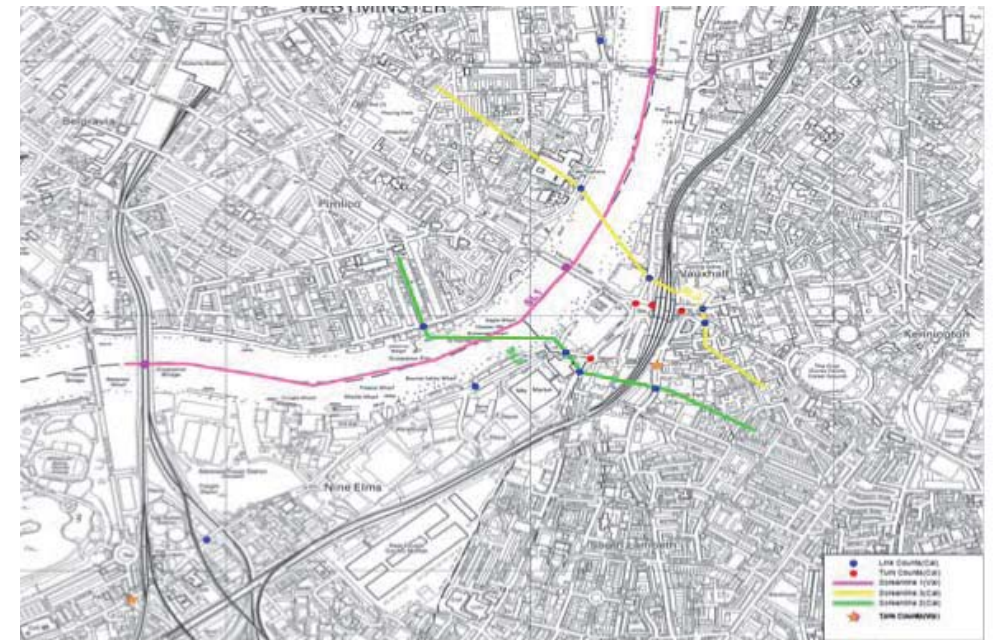


Figure 5.1.4: Counts data used in Vauxhall SATURN Model

5.1 Saturn Modelling

Model Calibration and Validation

The calibration and validation of modelled against observed flows is based on two alternative analytical criteria stipulated in Volume 12 of the DMRB:

Criteria 1: The GEH statistic

Criteria 2: Modelled over observed flows (% difference criteria)

The GEH statistic is a commonly used measure of the goodness of fit between modelled and observed flows. It is a form of the Chi-squared statistic that incorporates both relative and absolute errors between the two sets of data. A GEH value of less than 5 is deemed acceptable, according to DMRB, for both link counts and junction counts.

The calibration of the Vauxhall SATURN model has been an iterative process where a number of parameters and network characteristics used in the model have been refined and modified in order to achieve a good calibration. Figure 5.1.4 shows all data used in the calibration of this model.

Table 5.1.1 shows the summary of the calibration across all screen lines, link and junction counts for both AM and PM respectively. The results of the validation against independent data (not used in ME2 and calibration) are shown in Table 5.1.2 for both AM and PM periods.

	AM	PM
Screen Lines	100%	94%
Link Counts	60%	75%
Junction Turning	100%	79%
Average all Study Area	90%	84%

Table 5.1.1: Calibration Summary - %GEH

	AM	PM
Screen Lines	88%	88%
OD	80%	82%
Junction Turning	100%	91%
Average all Study Area	84%	84%

Table 5.1.2: Validation Summary - %GEH

2026 Forecasting

Figure 5.1.5 shows the outline methodology for producing the forecast trip matrices. This involves taking net changes between the base SKM and the future 2026 SKM models and adding them incrementally to the calibrated Vauxhall SATURN model.

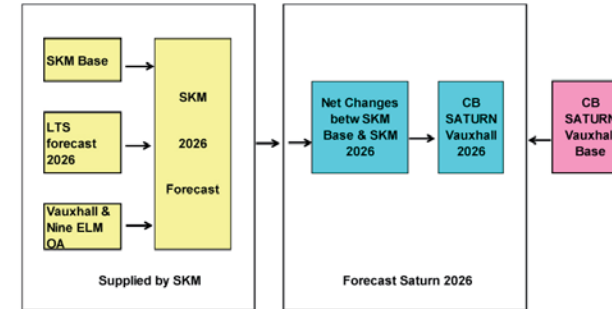


Figure 5.1.5: Forecast Methodology

However, for the new developments included in the OAPF along Nine Elms, the trip generation and distribution have been taken directly from the SKM forecast. This entails that all base year trips within the development zones have been replaced with the trips estimated in the SKM model. For the remaining zones only the absolute differences between the SKM 2026 and SKM base have been considered in the Vauxhall 2026 forecast.

The 2026 forecast growth shows an overall increase of 24% during the AM peak hour and an increase of 28% during the PM peak hour within the study area, compared to the base year. Nearly all of this increase in traffic is due to the new development sites on Nine Elms Lane.

Figures 5.1.6 and 5.1.7 shows the difference between the base and future modelled flow the green band shows the increase in traffic flow for AM and PM peak hours respectively.

The analysis of the demand turning flows at Vauxhall Gyrotary also showed the same degree of increases as the total matrix but the results clearly showed that in both the AM and PM peak hours this increase in traffic is unable to reach the gyrotary and if it was it was unlikely to be accommodated easily in the existing network.

Following this work, it was noted that the traffic increase as calculated by SKM due to the developments appeared very high in comparison to the estimated trip generation being submitted to TfL for some of the developments along Nine Elms Lane. This led to a further SATURN run being undertaken to assess the likely highway flows once the trip generation had been factored down to reflect the trip generation based on the TA's estimates.

As a result, the factored demand showed a much reduced volume of traffic predicted for Vauxhall gyrotary for the 2026 situation with an overall increase of 1090 PCU in the AM Peak hour (15%) and 1245 in the PM peak hour (19%).

5.1 Saturn Modelling

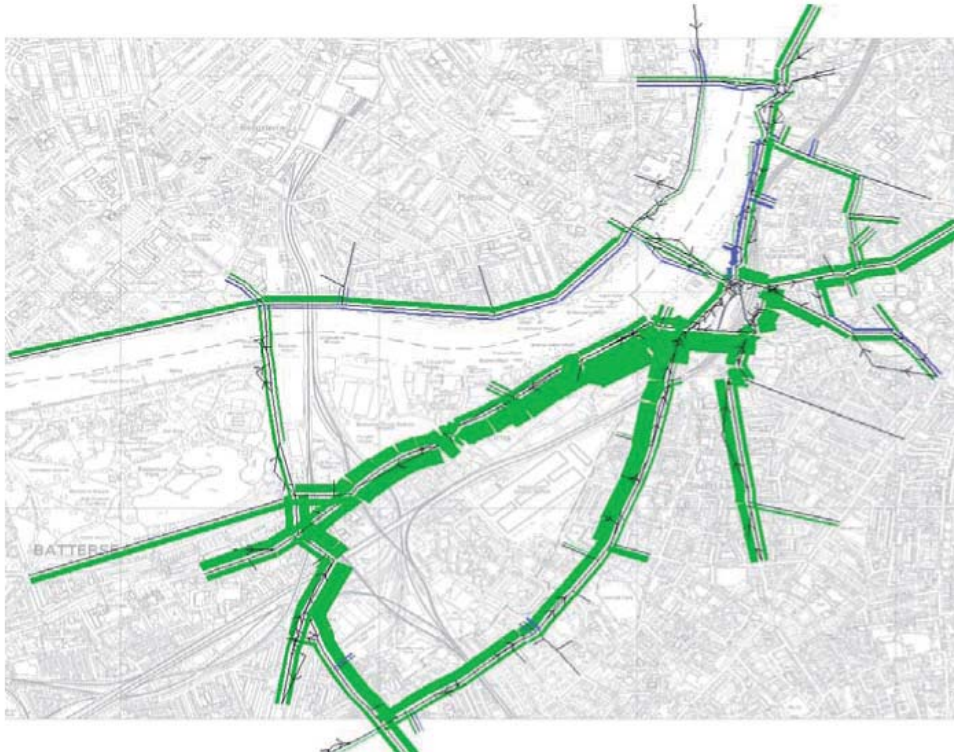


Figure 5.1.6: AM Difference in flow between Base and 2026



Figure 5.1.7: PM Difference in flow between Base and 2026

Conclusion

In summary the base year Vauxhall SATURN model produces results which replicate the observed data with good degree of accuracy. It is therefore considered that this model provides reliable traffic flows for the TRANSYT modelling, and is a suitable tool for future year assessment and option development.

The forecast traffic growth has been estimated by taking net changes between the base SKM and the future 2026 SKM models and adding them incrementally to the calibrated Vauxhall SATURN model.

The 2026 forecast growth initially showed an overall increase of 24% during the AM peak hour and an increase of 28% during the PM peak hour within the study area. However, following a discussion with the client it was agreed to reduce the generated trip from the developments in line with the estimates given in the TA which showed an increase of 15% during the AM and an increase of 19% during the PM peak. Therefore all TRANSYT analysis for both Vauxhall and Nine Elms should use these figures. However, consideration should be given to the traffic volumes predicted under SKM's analysis.

5.2 Pedestrian Modelling

Overview of the Pedestrian Modelling

The following summarises the base year and future year pedestrian modelling results and impacts on proposed schemes for the VNEB study. The results and approach are explained in detail within Technical Note 1 (base conditions) and Technical Note 2 (option development).

Base Year Conditions

Pedestrian movement analysis and forecasting was undertaken to determine future pedestrian flows and desire lines on individual footway links across the study area, and thereby inform the public realm design and test the impact of scenarios.

A pedestrian model was constructed (referred to here as VNEB-W); the structure of the model is summarised in Figure 5.2.1. It used the results of strategic modelling of public transport movements extracted from TfL's Railplan model (described for this study as VNEB-P) and background pedestrian movement and population/employment data from the LTS model to identify current and future levels of pedestrian activity on individual footway links across the study area.

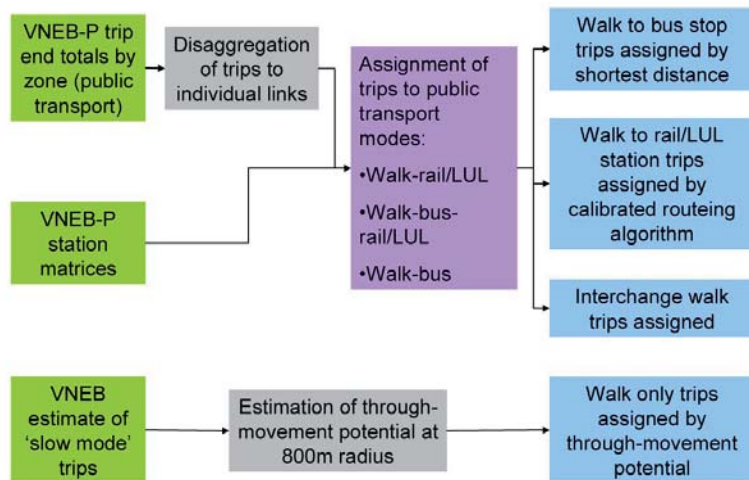


Figure 5.2.1: VNEB-W Model structure

The OA area covers an area of around 2.1m sq m and includes several rail stations and around 53 bus stops; the area surrounding it includes busy routes through to Oval in the east, Battersea / Clapham in the south and Pimlico / Victoria across the river. In order to account for the interaction of the study area and the area surrounding it, analysis was undertaken using a 'buffer' of 800m crow fly distance. The model used the Ordnance Survey ITN footway network, with quality and crossing variables coded onto the appropriate links and nodes. The network is illustrated in Figure 5.2.2.

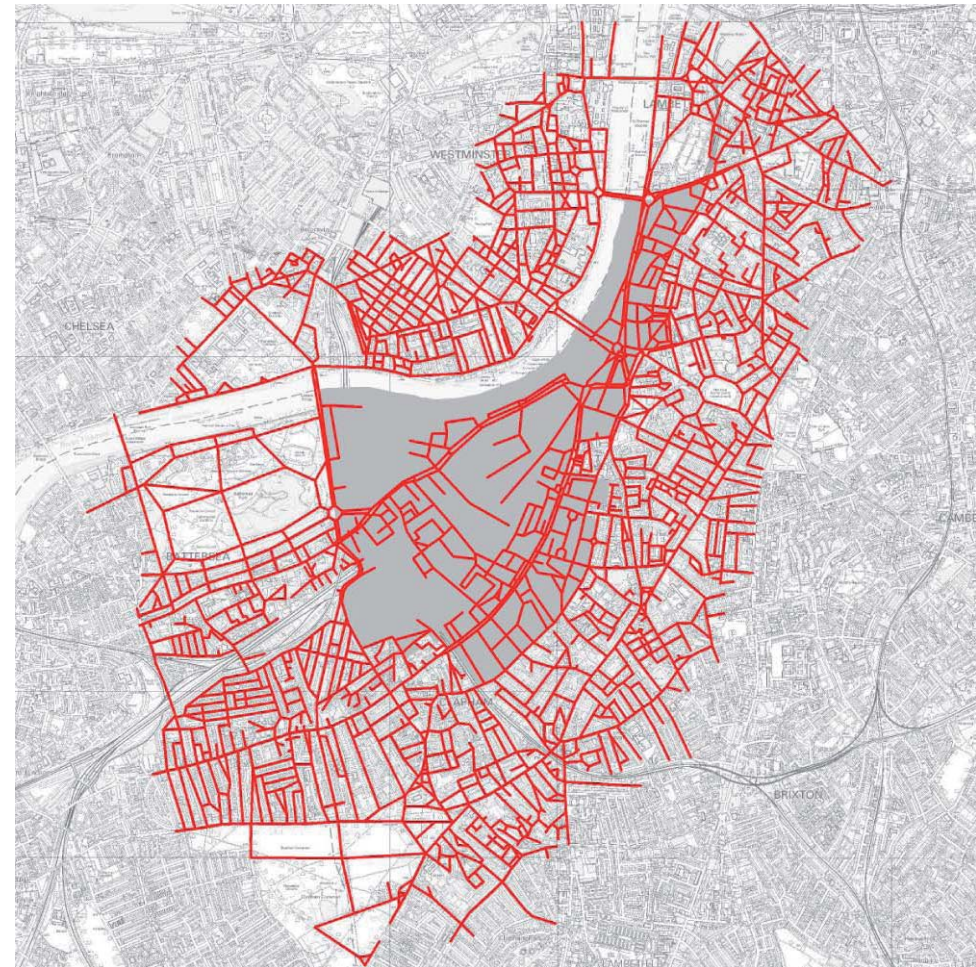


Figure 5.2.2: VNEB OA and Buffer pedestrian network

5.2 Pedestrian Modelling

Passenger count data indicated that fewer than 2,000 station entries & exits are observed in the base year AM peak period at Queenstown Road and Battersea Park stations, while around 13,700 and 19,400 passengers enter/exit Vauxhall NR and LUL stations respectively (including interchange between the two).

The model was calibrated to identify the walkable catchments of each station (and hence the propensity for people to catch a bus as part of their trip to the station) and also to understand the impact on route choice of factors including distance, the quality of footways, linearity of routes, crossing time and grade changes.

The results for a base year of 2008 during a weekday AM peak period from 0700 to 1000 hrs are presented here; as well as being the basis for the strategic modelling, surveys in the area confirmed this to be the busiest time particularly in the Vauxhall interchange area. Local centres often have their highest periods of activity during the PM peak, while New Covent Garden Market is busiest outside traditional peaks.

The base year model flows generated by VNEB-W closely replicated observed pedestrian counts across the OA area. Across all links the R-Squared value of 0.93 indicated a very good fit to the observed data and the analysis indicated that predicted values would fall within +/- 212 trips of the actual value over the peak period or 1.2 per minute (95% confidence level).

Across the OA walk trips to/from rail (some involving an intermediate bus journey) account for about 42% of all trips; other bus trips account for around 5% and the remainder (42%) are walk only (Table 5.2.1). Journeys to both Vauxhall LUL and the front NR entrance are typically around 650 m (around 8mins) in length (with a generalised or 'perceived' journey time around 50% longer than this). Journeys to the rear NR entrance are often longer but with fewer crossings or grade changes to negotiate the generalised time penalties to the rear entrance are less severe.

Trip Type	2008 Base AM Peak Trips
Total walk to/from rail/LUL	7,162
Total bus to/from rail/LUL	2,285
Total walk or bus to/from rail/LUL from outside OA	3,304
Total bus to LUL to rail interchange	12,006
Total bus only	6,293
Total walk only	27,900
Total trips	58,950

Table 5.2.1: Total pedestrian trips (2008 AM peak 0700 – 1000)

The OA area is characterised by a large variation in pedestrian movement (Figure 5.2.3). More than 93% of links may be defined as carrying low flows of fewer than 1,500 pedestrians across the three hour period currently (around 600 in the peak hour), five links in the vicinity of Vauxhall interchange have flows in excess of 2,500 pedestrians (around 1,000 in the peak hour, or 80-100 in a peak minute). The relatively dense street networks either side of Vauxhall and Lambeth bridges highlight their accessibility to the wider network across the river, in comparison with the much lower potential of Chelsea Bridge. Towards South Lambeth, Queenstown Road is much more significant for pedestrian connectivity, as is Thessally Road.

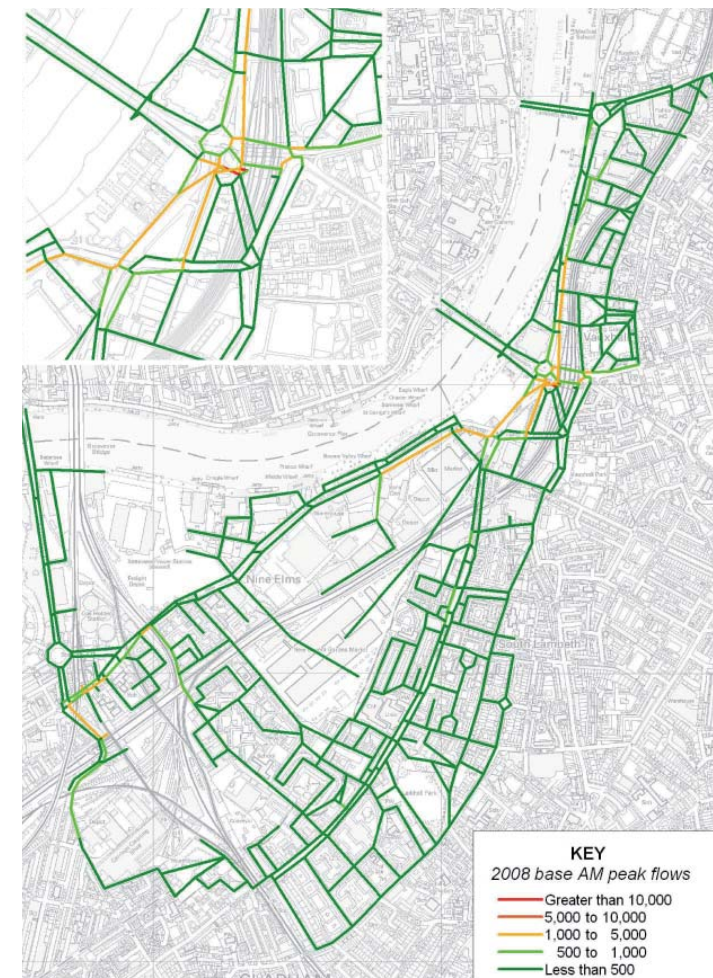


Figure 5.2.3: VNEB-W base 2008 AM peak period: estimated link flows

5.2 Pedestrian Modelling

Pedestrian Movement in 2026

Demand across the OA was generated using the same approach as for the 2008 model and used the results of Revised Scenario 5 (RS5). This scenario envisages the following:

- 16,000 new homes in the OA;
- 200,000m2 mixed use development in the OA;
- 60,000m2 of retail at Battersea Power Station;
- 160,000m2 of office at Battersea Power Station.

The 2026 pedestrian network was defined to reflect the changes to the layout and public realm expected in the OA to accommodate this growth (Figure 5.2.4). This included new pedestrian links through developments (and additional / amended crossings) and to the proposed Northern Line stations at Nine Elms and Battersea Power Station. Added to these, improvements to the quality of the streetscape particularly along the riverside, the proposed linear park and pedestrian/cycle bridge would be likely to improve the ambience of the area and its connections to the surrounding areas of London.



Figure 5.2.4: 2026 RS5 do-minimum footway network with quality scores

Results

The growth in population and employment densities and the Northern Line Extension (NLE) in particular will cause major increases in pedestrian flows on parts of the OA pedestrian network. Around Battersea Power Station in particular there will be a step change in pedestrian activity, in some cases in locations where footway / crossing capacity is already constrained.

As summarised in Table 5.2.2, the largest increases in movement stem from trips to rail/LUL stations (from within and outside the OA area). Also important is the increase in local walk trips (to/from shops and schools and so on) and the major change in patterns of movement caused by the new pedestrian links and bridge which considerably improve connectivity both within the OA area and to surrounding areas.

Trip Type	2008 Base AM Peak Trips	2026 RS5 AM Peak Trips	Change
Total walk to rail/LUL (from within OA)	7,162	23,937	+234%
Total bus to rail/LUL (from within OA)	2,285	3,428	+50%
Total walk or bus to rail/LUL from outside OA	3,304	14,484	+338%
Total bus to LUL to rail interchange	12,006	13,075	+9%
Total bus only (from within OA)	6,293	11,764	+87%
Total walk only	27,900	66,900	+140%
Total trips	58,950	133,588	+127%

Table 5.2.2: Total 3hr AM peak base and RS5 model pedestrian trips

Figure 5.2.5 shows the change in pedestrian flows from 2008 to 2026 in the RS5 model. The greatest increase is observed around the proposed Battersea Power Station LUL station, along with large increases to the east and south of Vauxhall interchange. Although the Battersea end of the Nine Elms study area is not identified as a major priority from a traffic perspective, the pedestrian issues are very acute in this area.

In essence the problem arises from the lack of east-west through routes in the area, caused by the railway lines. Therefore all pedestrians are channelled through the very limited capacity at the junction of Battersea Park Road / Queenstown Road, and along Battersea Park Road.

The scale of the increase in pedestrian activity is illustrated by the fact that footway links with a high flow (more than around 2,500 across the peak 3 hours or around 1,000 during the peak hour) are forecast to increase from less than 1% of the network in 2008 to 7% or 55 links in 2026. These are primarily located around the station entrances, with increases around Battersea Power Station and Battersea Park Road / Queenstown Road.

Including short walk trips to bus stops, the average walk trip is forecast to be around 522m in 2026 (Table 5.2.2). The improvement in public transport accessibility results in a reduction in mean walk distance to stations from 650m in 2008 to around 600m in 2026 (the equivalent walk distance with development as proposed for 2026 but without the public transport interventions

5.2 Pedestrian Modelling

has not been estimated). Generalised walk times to stations are forecast to be around 31% longer than actual, again much less than currently reflecting the considerable improvements proposed particularly to the physical quality and directness of pedestrian routes.

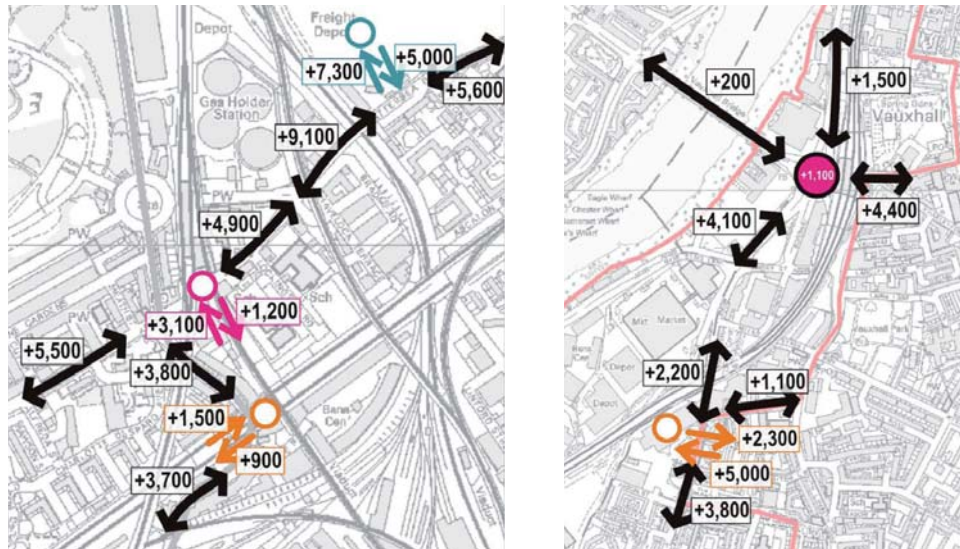


Figure 5.2.5: AM peak 0700 – 1000 change from 2008 base to 2026 RS5

	Total Trip Stages	Mean Distance (m)	Est. Mean Actual Journey Time (Seconds)	Generalised Journey Time (Seconds)
Vauxhall LUL	6,860	567	422	667
Vauxhall NR front entrance	1,375	542	414	611
Vauxhall NR rear entrance	289	625	470	647
Battersea Park	2,788	717	528	639
Queenstown Road	1,092	828	604	731
Nine Elms	3,742	696	505	572
Battersea Power Station	7,790	539	390	477
Walk to nearest bus stop	15,192	201	149	238
All interchange trip stages	27,010	124	91	n/a
Walk to stations from outside study area	10,507	419	319	467
Through movement	66,900	742	532	558
Total (trips or km or hours)	143,546	75,000	15,081	16,638
Average (m or mins)		522	6.3	7.0

Table 5.2.3: All trips: summary outputs 2026 RS5 AM peak 3 hrs

Impact of the pedestrian/cycle bridge

The impact of the pedestrian bridge on the local and strategic network was tested (the forecast change in trips that would result is shown in Figure 5.2.6). Trips reassigned to Vauxhall and Chelsea Bridges (a fixed trip matrix total was assumed) would in the case of Vauxhall Bridge add almost 50% more trips than were forecast with the pedestrian/cycle bridge in place. There are other localised impacts such as 7% fewer trips on Nine Elms Lane in front of the US Embassy. The loss of cross-river connectivity leads to longer and more circuitous walk trips, particularly for localised movements in the Embassy/Flower Market area (across all pedestrian journeys in this area the average walk length increases by around 70secs). Figure 5.2.7 shows the area of location for the future pedestrian bridge on the Nine Elms side.

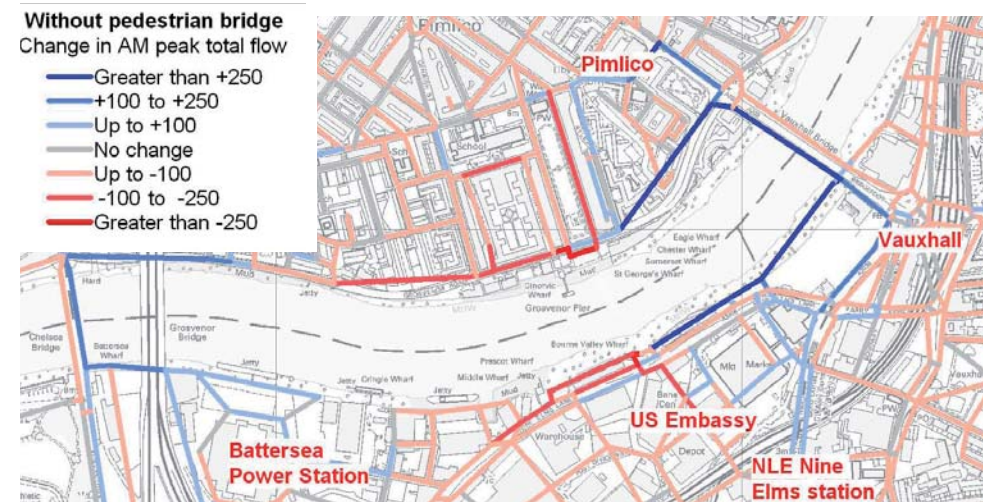


Figure 5.2.6: Change in AM peak flows without bridge



Figure 5.2.6: Area for future bridge location.

5.2 Pedestrian Modelling

Vauxhall Gyratory

Most of the crossings around Vauxhall would require 5-10 metres width to achieve a low level of pedestrian crowding at the peak times (US HCM Platoon Level of Service B) under any of these scenarios. Under the do-minimum scenario (the effective or usable footway and crossing width requirements for which are illustrated in Figure 5.2.7) the island site is predicted to have low pedestrian flows while pedestrian flows through the bus station to the pedestrian crossing on Parry Street require a width in excess of five metres.

A snapshot of footway occupancy during the peak 5 minute period used to generate these width requirement is shown in Figure 5.2.8, with individual pedestrians illustrated by an approx 1m diameter circle (representative of a typical 400mm body ellipse and a preferred zone of personal space of around 300mm in each direction; footways / subways are represented as a standardised 5.5m width for the purposes of illustration).

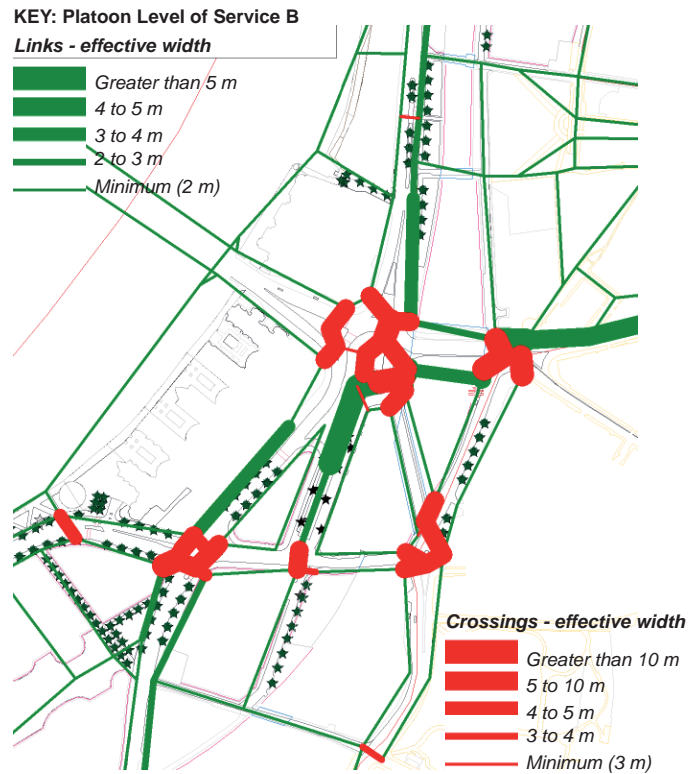


Figure 5.2.7: 2026 RS5 LOS B effective footway widths (Vauxhall)

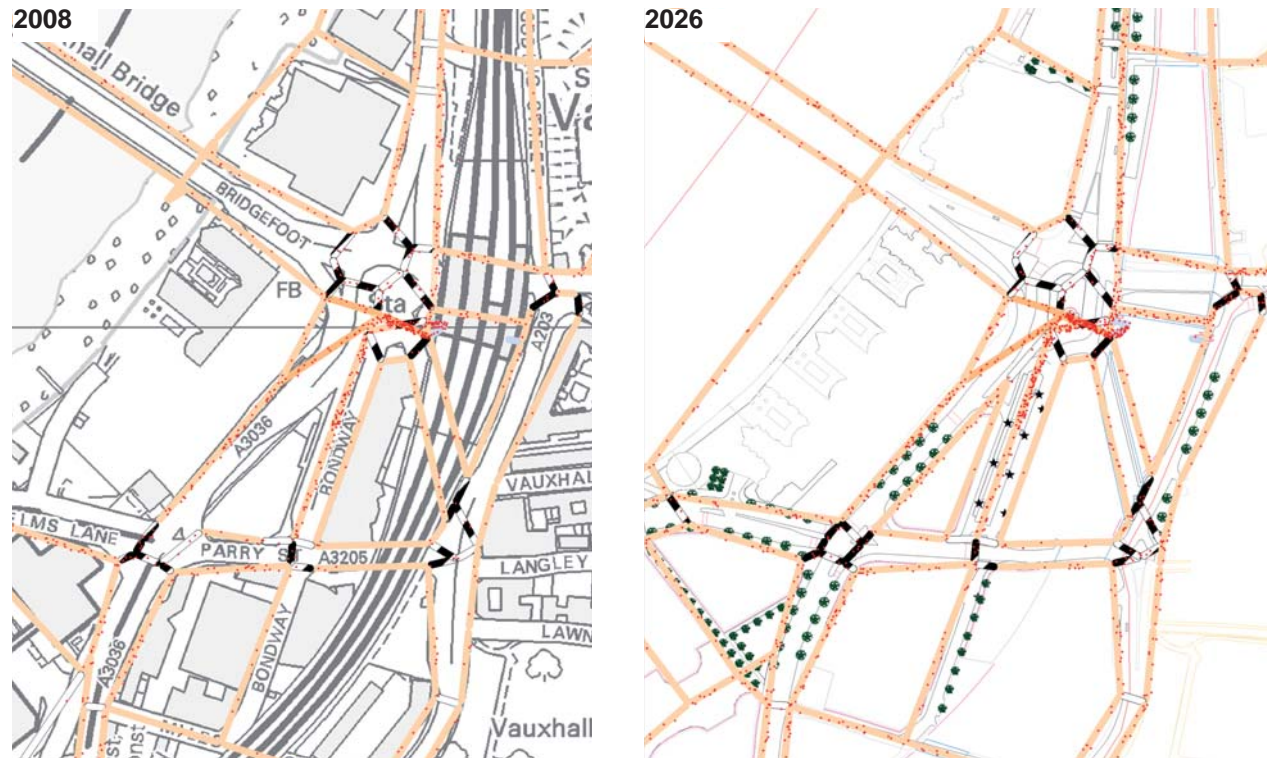


Figure 5.2.8: 2008 and 2026 RS5 AM peak 5min flows (Vauxhall)

5.2 Pedestrian Modelling

Nine Elms Lane

In order to improve the pedestrian experience on Nine Elms, it is proposed to promote a street design philosophy that visually narrows Nine Elms and minimises the perceived and actual negative impacts of traffic. Additionally it will be crucial for the success of the green link to provide an uncluttered visual and physical connection between the entrance to the green link and Battersea Power Station. The effective or usable footway and crossing width requirements for Nine Elms Lane are illustrated in Figure 5.2.9.

An equivalent snapshot of footway occupancy for Nine Elms during the peak 5 minute period is shown in Figure 5.2.10, with 5.5m footways and individual pedestrians illustrated by an approx 1m diameter circle.

Between the CGM entrance and the US Embassy, minimum footway width requirements on Nine Elms in the AM peak do not exceed a minimum of 2m effective width. However, it is expected that a portion of the street will take on a high street character with active frontages.

Although the AM peak flows are low on these sections, they are also in a similar range to those encountered on many Inner London high streets, e.g. Knightsbridge or Camden High

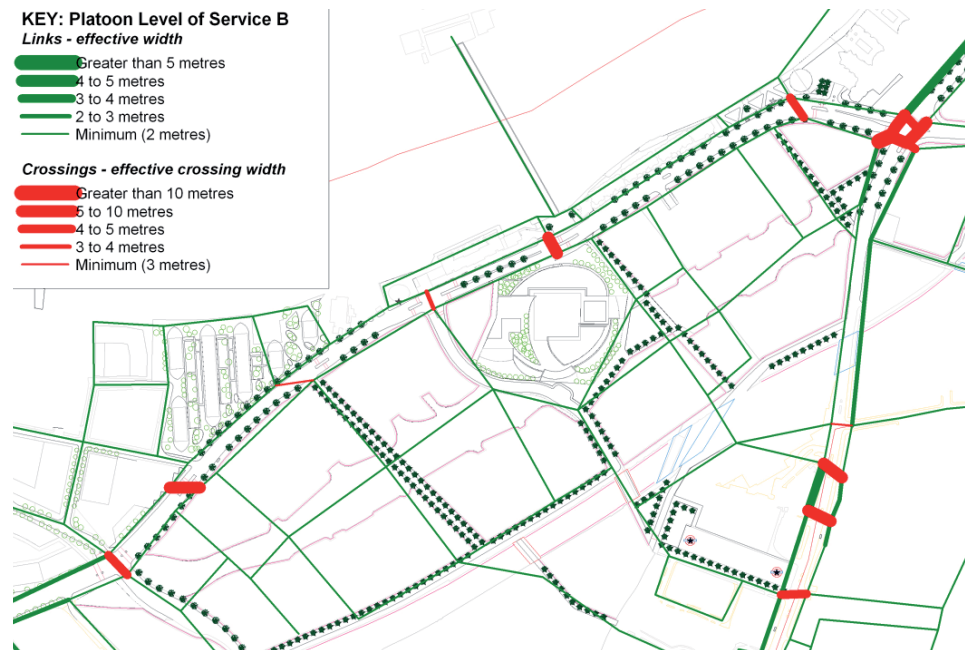


Figure 5.2.9: 2026 RS5 LOS B effective footway widths (Nine Elms)

Street where lunchtime and PM peak flows are significantly higher than the AM peak. Therefore it is recommended that wider footways are provided in the sections with a high street character.

A number of routes connecting Wandsworth Road and Nine Elms are identified in the RS5 network. These are important to improve connectivity by opening up new pedestrian through links, yet they should have sufficient footfall to provide adequate natural surveillance at all times. In particular, the results of the model suggest that there is merit in optimising the alignment of the through-route linking the proposed Nine Elms LUL station to the US embassy and the proposed pedestrian -cycle bridge. An attractive environment and clean sightlines through the railway tunnels should be sought with active frontages near to the tunnel entrances where possible.

Existing pedestrian through routes along Stewarts Road and Thessaly Road will become more important as a result of the Battersea Power Station development and LUL station. The latter street is in need significant enhancements to the quality of the public realm (de-cluttering, footway capacity and quality, and dealing with the dead frontage on CGM). These improvements ought to be prioritised over the creation of a new parallel link through CGM.

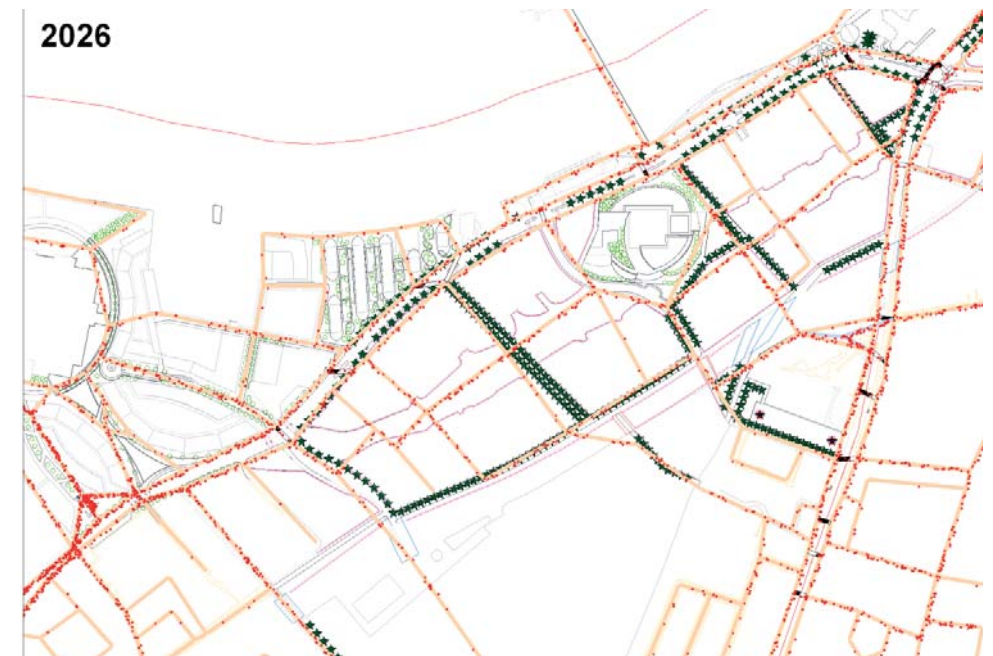


Figure 5.2.10: 2026 RS5 AM peak 5min flows (Nine Elms)

6. Options to Achieve the Vision

6.1 Options for Albert Embankment Area

Albert Embankment is expected to experience few problems for general traffic in 2026 at current carriageway widths (see Technical Note 2), requiring few highway design changes to improve bus and cycle lanes and pedestrian crossing facilities. The main focus is on improving public realm and pedestrian access.

Objectives:

- Reduce the impact of the Albert Embankment traffic corridor on the perceived and physical accessibility of the river edge
- Improve access to the riverside especially along desire lines from the residential hinterland
- Improve bus and cycle routes
- Improve the river walk.

Proposals:

Proposals have been developed to deliver the objectives for achieving an improved pedestrian environment and cycling facilities for Albert Embankment for 2026. The proposals include the following:

- Resurface the carriageway from Lambeth Bridge to Albert Embankment Gardens with anti-skid, buff coloured surface treatment to create visual continuity from the riverside wall to the facades of the buildings to the east of the carriageway. A number of new developments on Albert Embankment will have active ground level uses. A reduction in the perceived impact of the traffic corridor will encourage street activities and the use of the river walk and Albert Embankment Gardens, bringing life and animation to the area.
- Carriageway improvements would include regulating the varying widths of the north and south bound bus lanes to 4.0m where geometry allows. The current widths vary between 3.4 to 4.5m, causing problems for cyclists.
- The number of proposed office and retail developments along Albert Embankment will create local hubs of pedestrian activity that will draw pedestrians from Vauxhall Cross as well as the residential hinterland beyond the railway viaduct. East-west desire lines and existing pedestrian crossings along them have been identified for

upgrading to enhance the pedestrian experience along these routes. New crossings are to be provided along desire lines that lack access to the riverside across the Albert Embankment carriageway.

East-west links have been identified for improvements such as good quality paving and lighting and tree planting and street furniture where possible or creating shared surfaces.

These include:

- Black Prince Road
- Salamanca Street including the slip road and associated public realm along White Hart Dock.
- Tinworth Street
- Glasshouse Walk and
- New Spring Gardens Walk.

Existing crossings requiring improvements such as widening to accommodate increased pedestrian flows include:

- the crossing at the northern end of Albert Embankment,
- the crossing in line with the desire line along Black Prince Road,
- the crossing connecting the desire line along Tinworth Street to Albert Embankment Gardens and
- the crossings at the southern end of Albert Embankment.

Three new at grade signalled pedestrian crossings are to be provided at the following points along Albert Embankment:

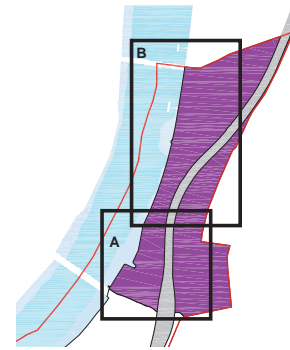
- Lambeth Bridge/Albert Embankment – this desire line connecting Albert Embankment to Lambeth Palace Road along the foot of Lambeth Bridge lacks an at grade crossing (a subway exists but requires a long detour along the river walk) to realise this link. It is proposed to reconstruct and realign the existing traffic island on the western arm to provide a signalled crossing facility that can be accommodated in the current signal control sequence. It is expected that this measure will have minimal impact on capacity.
- Albert Embankment (south of Salamanca Street) – Salamanca Street is an important desire line between Pedlars Park and the riverside. Currently there is an existing pedestrian refuge located south of Salamanca Street. It is proposed to convert this uncontrolled crossing into a signalled pedestrian crossing. This will require the northbound and southbound bus stops to be relocated

further downstream from the proposed crossing. The existing coach parking will have to be reduced to accommodate the new signalised crossing.

- Albert Embankment (south of Glasshouse Walk) – Glasshouse Walk is an important desire line that connects Spring Gardens and the residential hinterland to Albert Embankment and the river walk. It is proposed to introduce a new staggered signal controlled pedestrian crossing south of Glasshouse Walk to enable pedestrians currently crossing at this location (to/from the bus stops) to do so safely. This would require the northbound bus stop to be relocated further upstream and a central island to be created to provide a safe pedestrian refuge as this crossing will need to be staggered to accommodate traffic flows from/to Vauxhall Cross at this point.
- To accommodate the proposed central island within the Albert Embankment carriageway south of Glasshouse Walk, the southbound Albert Embankment carriageway will have to be reduced from two traffic lanes and a bus lane, to one traffic lane, measuring 3.6m and a 4.0m bus lane. The northbound lane merge will also need to be reduced to occur on the approach to New Spring Gardens Walk. This has been tested in the Vauxhall Gyrotory TRANSYT model and shows it can be accommodated within capacity.
- Tree planting is proposed on the central median created to reduce the impact of traffic and the road environment and link with the extended frontage to Spring Gardens.
- Improvements to the green spaces and public realm to the west of the railway viaduct to form a high quality frontage to Spring Gardens. Existing concrete block paving on both footways (along the M16 and open spaces) to be replaced by Yorkstone paving to provide continuity with the paving further to the north.
- Improvements to Albert Embankment Gardens including tree planting, landscape proposals, seating and lighting.
- Coach parking on the Albert Embankment northbound bus lane blocks views across the river and hampers cyclists and smooth bus flows and should be relocated if alternative locations can be identified.

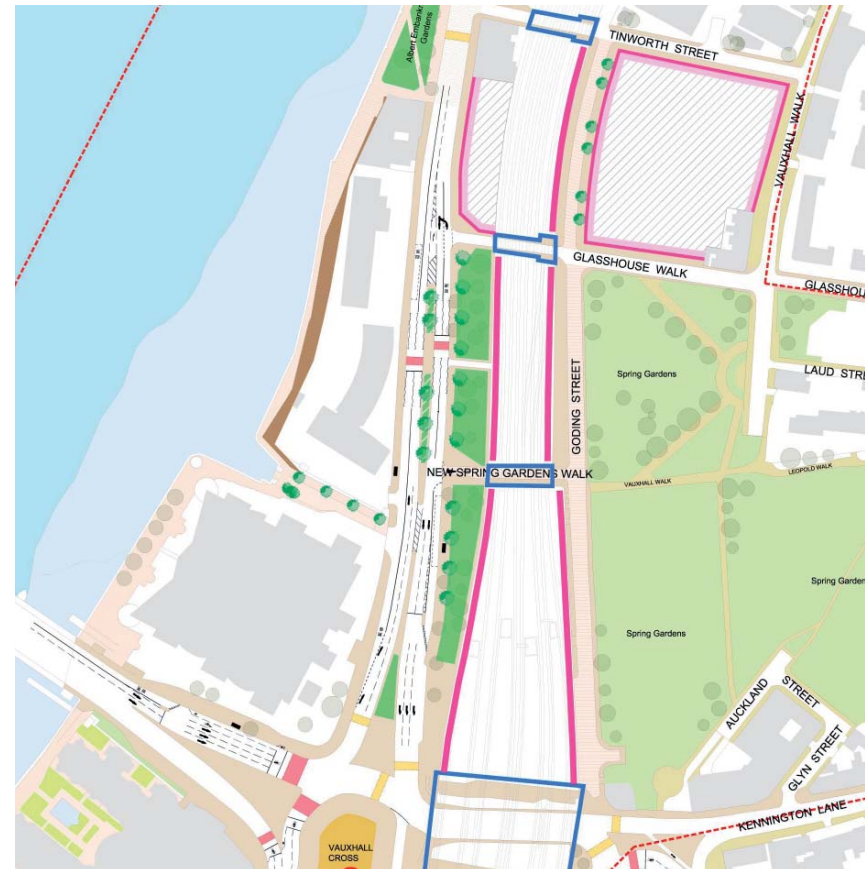
6.1 Options for Albert Embankment Area

- Public realm improvements such as Yorkstone paving and improved lighting to the section of the river walk behind Peninsular Heights, Tintagel House (including the Duck Tours jetty) to create continuity of the high quality treatment as exists north of Camelford House. It is proposed that this section of the river walk be widened to a minimum of six metres as part of new development if the properties alongside undergo redevelopment in the future. Refurbishment of the section of the river walk behind the MI6 building is proposed.
- It is proposed that Goding Street and Randall Road, which run parallel to the railway viaduct on its eastern side be turned into shared surfaces to better integrate the railway arches with the open spaces and new developments. This would encourage active uses within the arches and create an active and continuous pedestrian environment in what could now be considered the rear of the railway viaduct.

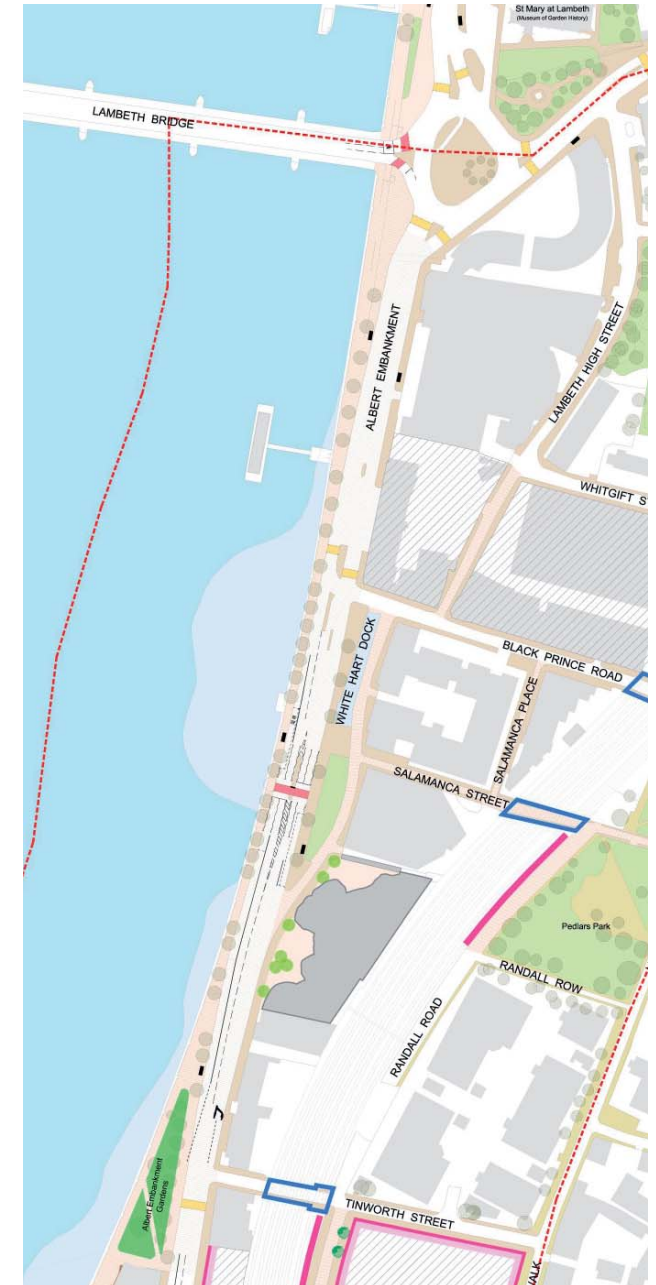


LEGEND

	VNEB opportunity area
	Existing built form
	Existing open spaces
	Existing trees
	Existing pedestrian crossings
	Opportunity development sites
	Proposed built form of new developments
	River walk
	River walk to be extended in conjunction with future development opportunity
	High quality environment
	Standard quality environment
	Proposed shared surface
	Proposed Albert Embankment carriageway surfacing
	New public square
	Upgraded / new open spaces
	Proposed private open spaces
	Proposed trees
	Proposed trees in private developments
	Proposed pedestrian crossings
	Viaducts/tunnels to be upgraded
	Proposed new viaducts/tunnels
	Proposed active frontages
	Zone of integration with developments



Part A



Part B

Figure 6.1.1: Albert Embankment Proposals

6.2 Options for Vauxhall Cross Area

With the expected increase in population due to the envisioned new developments in the Vauxhall, Nine Elms and Battersea area, Vauxhall gyratory as the main transport interchange (Figure 6.2.1) serving the area will experience a high increase in passenger / pedestrian footfall with the highest increase in movement being in the direction of the Nine Elms area. Traffic and public realm improvements will be required to upgrade the gyratory and interchange to improve pedestrian movement within the interchange area and to destinations around it.

Objectives:

- Improve accessibility to/from surrounding areas especially the Nine Elms area;
- Reduce the impact of road space while maintaining efficient traffic flows (including additional development traffic) and bus station operation in 2026;
- Explore two-way working of the street network;
- Improve conditions for cyclists;
- Improve modal interchange with a consideration of 2026 additional population;
- Create an attractive, accessible pedestrian environment with a new public square as a focal point to encourage modal shift towards more sustainable forms of transport such as walking and cycling

Option development:

In order to achieve the objectives set out above, a number of options have been developed for the Vauxhall gyratory informed by 2008 / 2026 Pedestrian Analysis and Transyt Analysis of 2026 flows (see Technical Notes 2 and 3).

In total, four options explore the possibility of changing the gyratory to two-way working and three options look at working with the existing gyratory system to achieve as many of the objectives as possible. All of the options with the exception of the 'do minimum' option have some degree of impact on traffic capacity. All of the options have an impact on bus station capacity and operation but deliver varying levels of public realm improvements.

The options follow and are described in more detail: Table 6.2.1 has a comparative summarising of the impacts and benefits of each.



Figure 6.2.1: Vauxhall Cross Existing Transport Interchange

6.2 Options for Vauxhall Cross Area

Option 1 - Two-way with Bus Station relocated to South Lambeth Road

Relocating the bus station to South Lambeth Road and turning the rest of the road network into a two-way system provides the following benefits and has the following impacts:

Benefits:

- Additional space within the central area for development and an improved public realm
- Consolidated public realm
- New Public Square at the Underground and National Rail station entrances.
- Simplification of the Vauxhall Bridge / Albert Embankment junction leading to reduction in accidents and improvements for cyclists
- Simplification of South Lambeth Road/ Parry Street junction and South Lambeth Road/ Kennington Lane/ Harleyford Road junction creating direct pedestrian crossings and widened footways at the junctions.
- Additional public realm/open space along railway viaduct at southern end of Albert embankment.

Impacts:

- Network capacity and resilience is reduced (traffic reductions of 31% and 22% required in the AM and PM respectively) leading to problems for emergency services, bus reliability and increased frequency of local network congestion problems.
- Traffic delays will increase and diverted traffic will impact on the wider network.
- Buses will experience extra delays / journey distances and
- Bus interchange with rail / underground will be less convenient due to bus station relocation.
- Bus station capacity will be reduced.

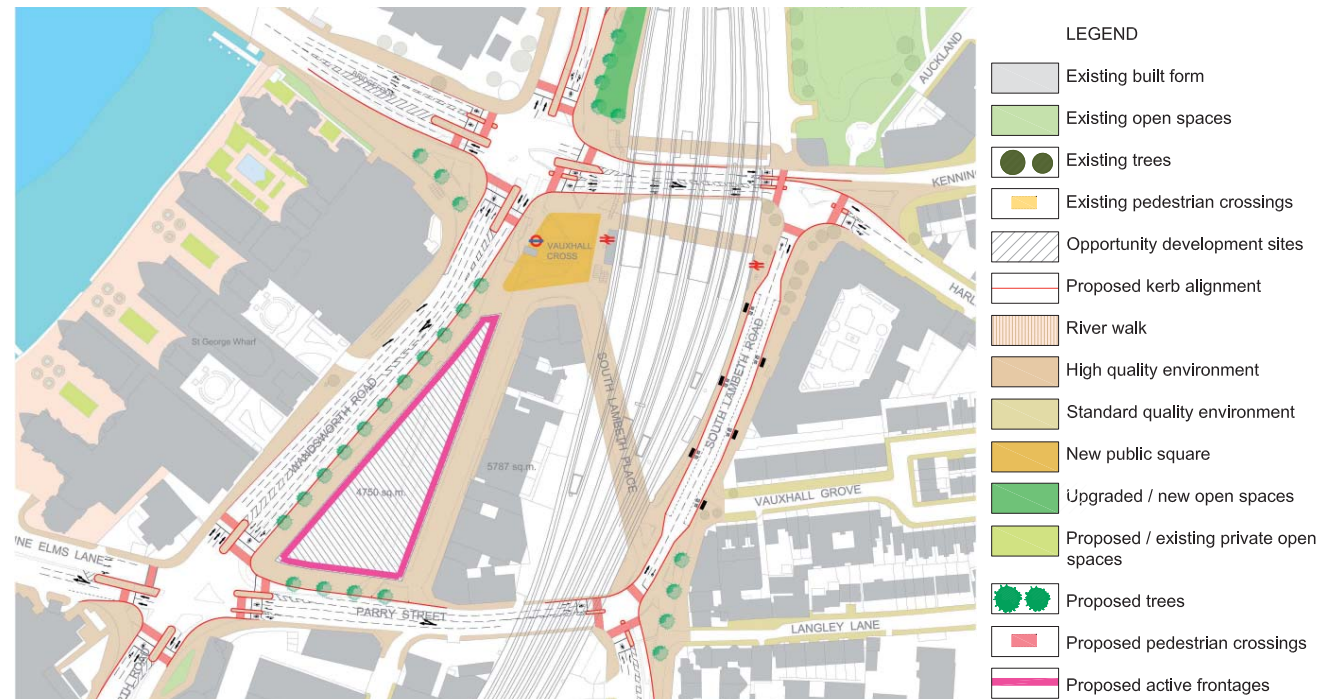


Figure 6.2.2: Vauxhall Gyratory Option 1

6.2 Options for Vauxhall Cross Area

Option 2 - Two-way with simplified layout at Nine Elms Lane / Wandsworth Road junction

This two-way option aims to create a strong visual and physical (pedestrian) link from the interchange towards the start of the linear park proposed within the Nine Elms development area by separating the Nine Elms Lane / Wandsworth Road link from the the Wandsworth Road / Parry Street link at the Wandsworth Road / Nine Elms Lane / Parry Street junction. Option 2 provides the following benefits and has the following impacts:

Benefits:

- Strong, uninterrupted visual and physical link between the interchange and the linear park in the Nine Elms area.
- Reduced carriageway on the Wandsworth Road arm of Vauxhall Cross adding to the public realm.
- Consolidated public realm within the gyratory central area.
- New Public Square at the Underground and National Rail station entrances.
- Changes to the Wandsworth Road / Nine Elms Lane / Parry Street junction reduces accidents and delays to traffic flows and improved conditions for cyclists at this junction.
- Simplification of the Vauxhall Bridge / Albert Embankment junction leading to reduction in accidents and improvements for cyclists
- Improvements for pedestrian crossings at other simplified junctions due to two-way working.
- Interchange between the train stations and the bus station works well as stops can be located along the periphery of the station layout, negating the need for pedestrians to cross carriageway space to access stops.
- Additional public realm/open space along railway viaduct at southern end of Albert embankment.

Impacts:

- Network capacity and resilience is reduced (traffic reductions of 40% required in the AM and PM) leading to problems for emergency services, bus reliability and increased frequency of local network congestion problems.
- Traffic delays will increase and diverted traffic will impact on the wider network.
- Buses will experience extra delays / journey distances due

to the amended bus station and access / egress points.

- The bus station structure will need to be removed
- Bus station capacity will be reduced significantly.
- Bus stops adjacent to the existing buildings along the railway viaduct will have limited capacity due to lack of footway space.

Variations on this option look at reconfiguring the Vauxhall Cross central space to optimize public realm benefits and improve bus station capacity. These propose removing the existing buildings and adding land associated with them to the developable land within the central area to allow consolidated development, and relocating the bus station to create an interchange zone parallel to the viaduct and an integrated public realm. This would also allow potential new uses of the South Lambeth Place and the viaduct arches.

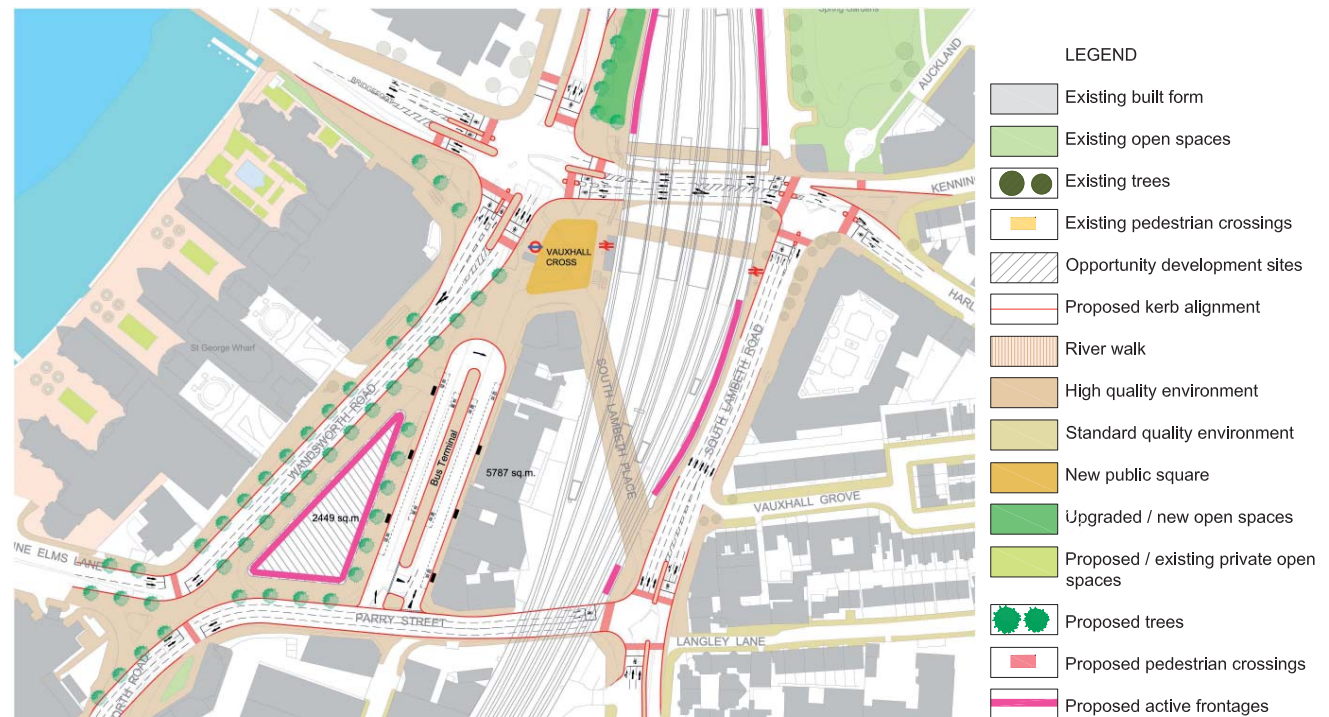


Figure 6.2.3: Vauxhall Gyratory Option 2

6.2 Options for Vauxhall Cross Area

Option 3 - Two-way with Buses and Cyclists only in Parry Street

Option 3 proposes turning the gyratory to two-way working and closing Parry Street to general traffic to allow only buses and cyclists through. This option provides the following benefits and has the following impacts:

Benefits:

- Significant improvements for pedestrians crossing at the Parry Street arm of the Nine Elms Lane / Wandsworth Road junction and along the whole of Parry Street.
- Reduced carriageway / widened footways on Parry Street, reducing crowding and adding to the public realm.
- Possibility of creating a shared space on Parry Street.
- Consolidated public realm within the gyratory central area.
- New Public Square at the Underground and National Rail station entrances.
- Reduced pedestrian crowding and conflict with passengers waiting for the buses in the bus station.
- Simplification of the Vauxhall Bridge / Albert Embankment junction and the Wandsworth Road / Nine Elms Lane / Parry Street junction leading to reduction in traffic delays and accidents and improvements for cyclists and pedestrians.
- Improvements for pedestrian crossings at other simplified junctions due to two-way working.
- Interchange between the train stations and the bus station works well as stops can be located along the periphery of the station layout, negating the need for pedestrians to cross carriageway space to access stops.
- Additional public realm/open space along railway viaduct at southern end of Albert embankment.
- Potential new uses of South Lambeth Place and its arches.

Impacts:

- Network capacity and resilience is reduced (traffic reductions of 36% and 31% required in the AM and PM respectively) leading to problems for emergency services, bus reliability and increased frequency of local network congestion problems.
- Traffic delays will increase and diverted traffic will impact on the wider network.

- Buses will experience extra delays / journey distances due to the amended bus station and access / egress points.
- Bus station structure will need to be removed.
- Bus stops adjacent to the existing buildings along the railway viaduct will have limited capacity due to lack of footway space.

Variations

Variations on this option look at reconfiguring the Vauxhall Cross central space to optimize public realm benefits and improve bus station capacity. These propose removing the existing buildings and adding land associated with them to the developable land within the central area to allow consolidated development, and relocating the bus station to create an interchange zone parallel to the viaduct and an integrated public realm. This would also allow potential new uses of the viaduct arches.

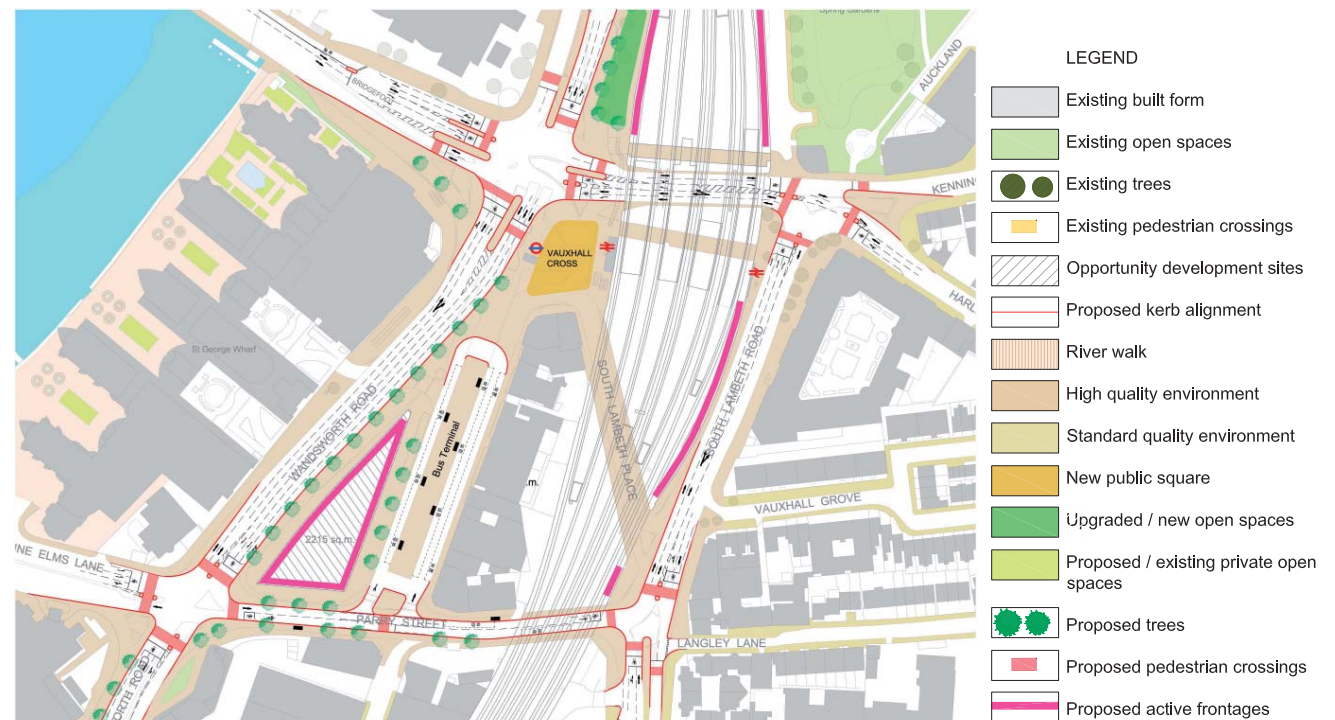


Figure 6.2.4: Vauxhall Gyratory Option 3

6.2 Options for Vauxhall Cross Area

Option 4 - Two-way with Buses and Cyclists only in Wandsworth Road

Option 4 proposes turning the gyratory to two-way working and closing the Wandsworth Road arm of the gyratory to general traffic to allow only buses and cyclists through. This option provides the following benefits and has the following impacts:

Benefits:

- Significant improvements for pedestrians wishing to cross at the Wandsworth Road arm of the Nine Elms Lane / Wandsworth Road junction and along the whole of Wandsworth Road (gyratory arm).
- Reduced carriageway / widened footways on the Wandsworth Road arm of the gyratory, adding to the public realm
- Possibility of creating a shared space on Wandsworth Road.
- Consolidated public realm within the gyratory central area.
- New Public Square at the Underground and National Rail station entrances.
- Simplification of the Vauxhall Bridge / Albert Embankment junction leading to reduction in traffic delays and accidents and improvements for cyclists
- Improvements for pedestrian crossings at other simplified junctions due to two-way working.
- Interchange between the train stations and the bus station works well as stops can be located along the periphery of the station layout, negating the need for pedestrians to cross carriageway space to access stops.
- Additional public realm/open space along railway viaduct at southern end of Albert embankment.

Impacts:

- Network capacity and resilience is reduced (traffic reductions of 50% and 51% required in the AM and PM respectively) leading to problems for emergency services, bus reliability and increased frequency of local network congestion problems.
- Traffic delays will increase and diverted traffic will impact on the wider network.
- Buses will experience extra delays / journey distances due to the amended bus station and access / egress points.

- Bus station capacity will be reduced significantly.
- Bus station structure will need to be removed
- Bus stops adjacent to the existing buildings along the railway viaduct will have limited capacity due to lack of footway space.

Variations on this option look at reconfiguring the Vauxhall Cross central space to optimize public realm benefits and improve bus station capacity. One variation proposes relocating the bus station alongside / in combination with Wandsworth Road to reduce the space required for the bus station and the impact on bus station operation. This will

however impact on the interchange between the train stations and the bus station as pedestrians will be required to cross the bus and cycles only / shared space of Wandsworth Road to access some of the stops.

Another variation proposes relocating the bus station to create an interchange zone along the viaduct and adding the existing buildings area to the Island site area to allow a consolidated development zone with integrated public realm. This would also allow potential new uses of the South Lambeth Place and the viaduct arches.

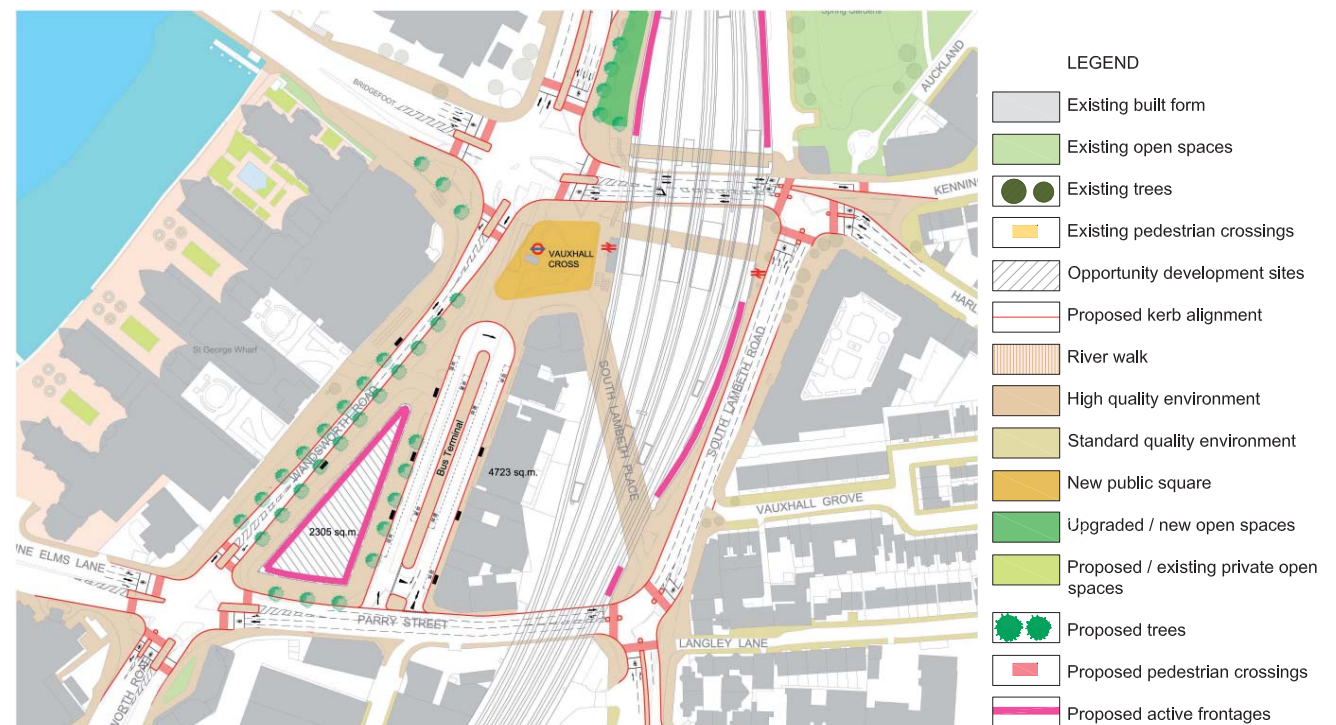


Figure 6.2.5: Vauxhall Gyratory Option 4

6.2 Options for Vauxhall Cross Area

Option 5 - One-way Do Minimum

The one-way do minimum option aims to provide some improvements to pedestrian facilities and cycle links through minimal intervention and minimal impact on the current network capacity of the gyratory and bus station operation and capacity.

Benefits:

- Improvements to pedestrian movement at the Nine Elms Lane / Wandsworth Road junction through addition of pedestrian crossings from the Island site.
- Widened pedestrian footway on south side of Parry Street through reduction in carriageway width.
- Introduction of contraflow cycle lane on Harleyford Road benefiting cyclists.
- Benefit for cyclists on the Cycle Superhighway route through the introduction of a nearside bus lane and bus pre-signal to replace the existing offside bus lane on Vauxhall Bridge.

Impacts:

- Negligible impact on traffic capacity, bus station operation and capacity.
- Loss of one bus stop within the station.
- No improvement to the fragmented public realm.
- No increase in the public space around the interchange for movement and stationary activity.
- Pedestrian congestion is expected to increase in 2026 particularly in the vicinity of the Nine Elms Lane / Wandsworth Road junction and the bus station.

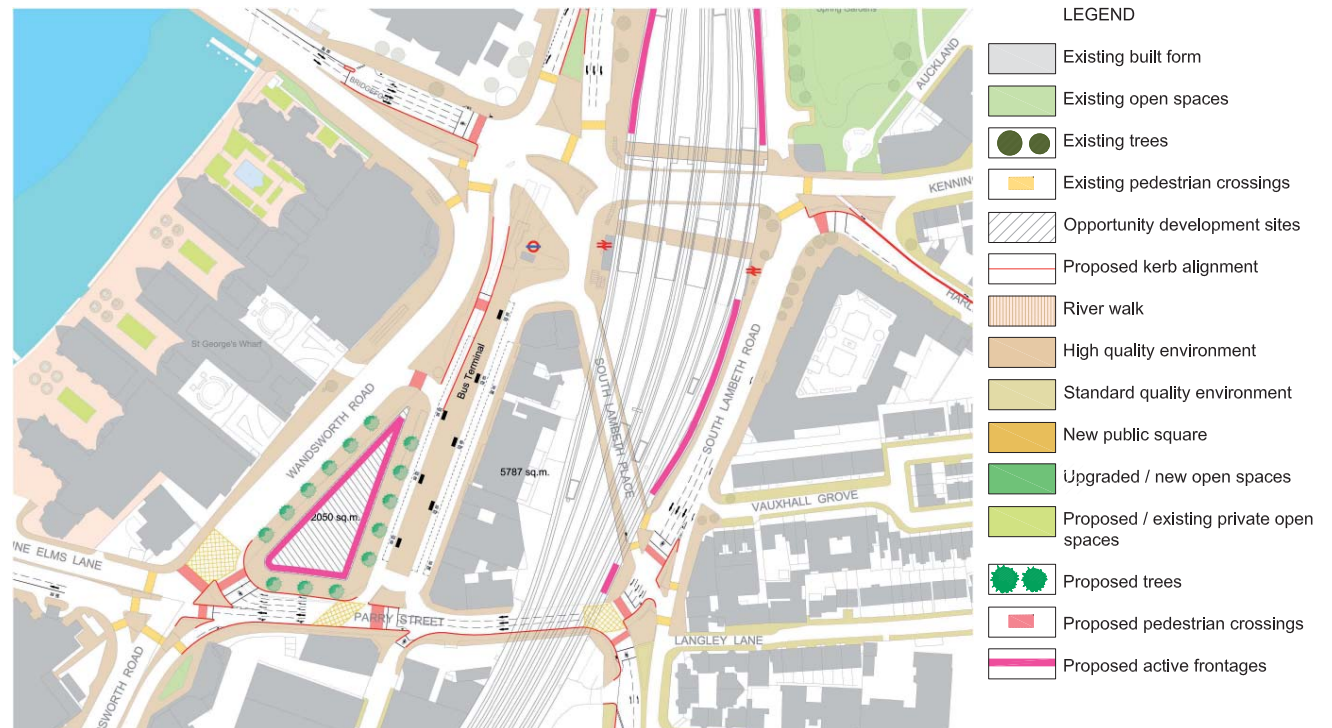


Figure 6.2.6: Vauxhall Gyratory Option 5

6.2 Options for Vauxhall Cross Area

Option 6 - One-way Do Something

Option 6 proposes significant amendments to the bus station including relocating it next to the railway viaduct in place of the block of existing buildings. The bus station will have an access only road from Kennington Lane immediately in front of station entrance, access and egress from Parry Street and egress only on to the Wandsworth Road arm of the gyratory.

Benefits:

- Simplification of the Vauxhall Bridge / Albert Embankment junction leading to reduction in accidents and improvements for cyclists
- Interchange zone along the railway viaduct and a consolidated development zone to the west with improved public realm.
- Consolidated public realm within the gyratory central area.
- New Public Square at the Underground station entrance.
- Removal of buses from South Lambeth Place, making this space a shared pedestrian and cycle route and
- Widened footways on the Wandsworth Road arm of the gyratory and South Lambeth Road through narrowing of carriageway widths,
- Improvements to pedestrian movement at the Nine Elms Lane / Wandsworth Road junction through addition of pedestrian crossings from the Island site.
- Improved pedestrian crossing in terms of efficiency and safety for users at the South Lambeth Road / Parry Street junction through simplified junction layout.
- Introduction of contra-flow cycle lane on Harleyford Road benefiting cyclists.
- Benefit for cyclists on the Cycle Superhighway route through the introduction of a nearside bus lane and bus pre-signal to replace the existing offside bus lane on Vauxhall Bridge.

Impacts:

- 10% reduction of traffic required in the AM.
- Requires the removal of the existing block of buildings to accommodate bus station alongside the railway viaduct.
- Negative impact on modal interchange. - train station entrances remain separated by carriageway at ground level though this is significantly reduced in width and has buses going in one direction only. The bus station is

completely separated by the entry and egress routes on either side of the Underground station entrance area.

- Buses will experience extra delays / journey distances due to the amended bus station and access / egress points.
- Bus station structure will need to be removed
- Bus station capacity will be reduced significantly.
- Pedestrian congestion is expected to increase in 2026 particularly in the vicinity of the Nine Elms Lane / Wandsworth junction and the bus station.

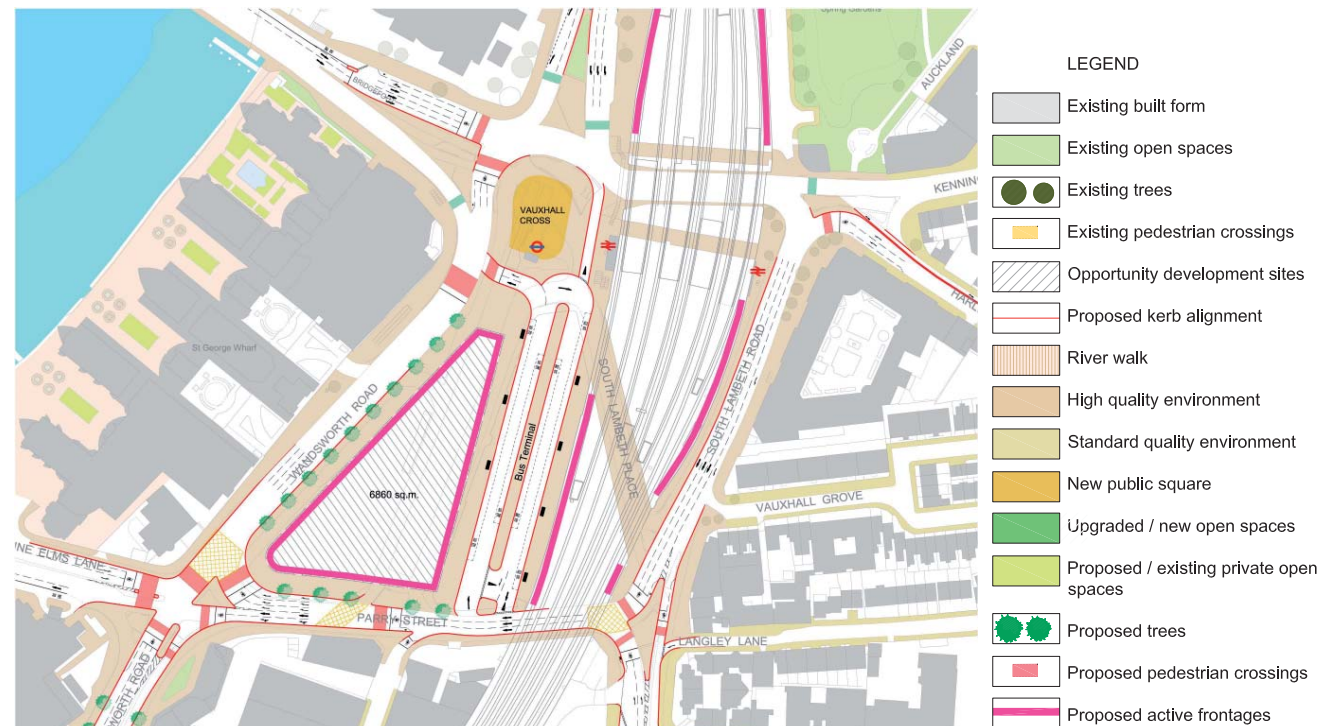


Figure 6.2.7: Vauxhall Gyratory Option 6

6.2 Options for Vauxhall Cross Area

Option 7 - One-way Do Something

Option 7 is similar to option 6 in that it creates a consolidated public realm/public square at the Underground station entrance. However in this option the bus station is maintained in its current position though the platform is shortened to allow modified bus circulation so that buses can enter from Kennington Lane. Buses can also enter from Wandsworth Road as the link to the north of the Island site is maintained, and enter/exit via Parry Street and South Lambeth Place.

Option 7 makes provision for a new pedestrian crossing across the Wandsworth Road arm of the gyratory. This was included during Stage 3 of the project and followed a request from TfL and Stakeholders to consider the provision of such a facility. This is discussed further in Chapter 4.8 to the Tech Note 3.

During stage 3 of the study it was agreed with the Client that the trip rates used in the original Sinclair Knight Merz (SKM) assessment were too high and should be reduced. The modeling results quoted in this report for this option make allowance for the corresponding reduction in 2026 flows around the Gyratory.

Benefits:

- Simplification of the Vauxhall Bridge / Albert Embankment junction leading to reduction in accidents and improvements for cyclists and pedestrians.
- Consolidated public realm within the gyratory central area.
- New Public Square at the Underground station entrance.
- Improved conditions for cyclists through reduction of left turn lane from Wandsworth Road onto Vauxhall Bridge Road.
- Additional space for the public realm through narrowing of carriageway on Wandsworth Road and South Lambeth Road, reducing the impact of the gyratory.
- Additional at-grade crossing from the central area of the gyratory to St Georges Wharf.
- Amendments to the Nine Elms Lane / Wandsworth Road junction to allow the addition of pedestrian crossings from the Island site
- Improved pedestrian crossing in terms of efficiency and safety for users at the South Lambeth Road / Parry Street

junction through simplified junction layout.

- Introduction of contra-flow cycle lane on Harleyford Road benefiting cyclists.
- Benefit for cyclists on the Cycle Superhighway route through the introduction of a nearside bus lane and bus pre-signal to replace the existing offside bus lane on Vauxhall Bridge.

Impacts:

- Some impact of on traffic capacity with a reduction of 17% and 8% in traffic levels required in the AM and PM respectively.
- The bus station structure is not affected however bus station operation is affected and capacity is reduced.
- Pedestrian congestion is expected to increase in 2026 particularly in the vicinity of the Nine Elms Lane / Wandsworth junction and the bus station.

- Negative impact on modal interchange. - train station entrances remain separated by carriageway at ground level though this is significantly reduced in width and has buses going in one direction only. The bus station is completely separated by the entry and egress routes on either side of the Underground station entrance area requiring pedestrians to cross busy carriageway to access bus stops.

The Island site, which will have a number of ground level active uses and integrated public realm remains separated from the rest of the public realm in the gyratory area. Pedestrian crowding is likely at the crossing connecting the station square to the north of the Island site. However there will be little incentive to encourage access from Nine Elms and Wandsworth Road as pedestrians will need to navigate multiple stage crossings.

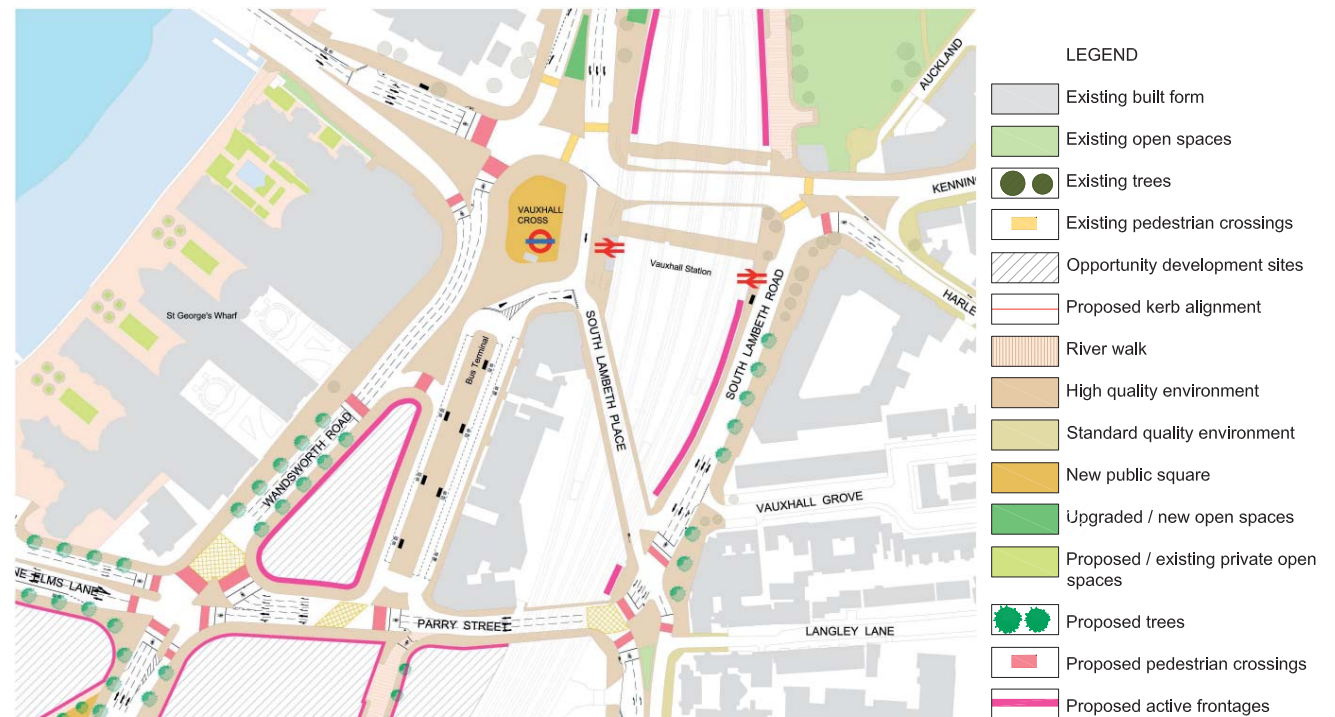


Figure 6.2.8: Vauxhall Gyratory Option 7

6.2 Options for Vauxhall Cross Area

Table 6.2.1: Comparison of options in terms of impacts and improvements

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7
Traffic reduction required:	0-10%					AM/PM 0%	0 % PM	8% PM
	10-20%						10% AM	17% AM
	20-30%	22% PM						
	30%+	31% AM	40% AM, PM	36% AM 31% PM	50% AM 51% PM			
Impact on bus station capacity		--	--	-	--	0	-	--
Impact on bus station operation		-	--	-	-	0	-	-
Pedestrian crossing improvements: Capacity and safety		+	++	++	+	-	-	-
Pedestrian crossing improvements: Connectivity and accessibility		+	++	++	+	0	+	+
Improved capacity for interchange and pedestrians		+/-	+	+	+	0	+	+
Public realm improvements: Station square		++	++	++	++	0	+	+
Public realm improvements: Improved routes to wider area		++	+	+	+	+	+	+
Public realm improvements: Active frontages achieved		++	+	+	+	+	++	+
Public realm improvements: Increased green space		0	0	0	0	0	0	0
Public realm improvements: Total area available for public realm		15611 sqm	18844 sqm	16766 sqm	17194 sqm	4434 sqm	16822 sqm	16418 sqm
Land assembly required		0	0	0	0	0	--	0

6.3 Options for Nine Elms and Battersea Area

The Nine Elms and Battersea area is expected to undergo considerable change with new developments throughout the area providing opportunity for significant improvements in terms of public realm, pedestrian access and traffic conditions.

Objectives:

- Create an urban boulevard that accommodates pedestrians, cyclists and vehicles in a balanced way
- Provide wide and well designed pavements that include tree planting
- Improve the river walk and connections to it
- Encourage new developments to provide active ground uses that open out to the street and activate its edges
- Street trees should be larger growing, sustainable trees, such as London Planes
- Improve bus and cycle routes
- Provide pedestrian and cycle crossings at regular intervals along desire lines to the riverside
- Rationalise and minimise accesses to new developments.
- Maintain traffic capacity on Nine Elms Lane and Battersea Park Road

Proposals:

Proposals for delivering the above objectives include:

- Design changes to Nine Elms Lane and Battersea Park Road provide widened footways with tree planting, street furniture and active frontages, rationalised carriageway widths with pedestrian crossings along desire lines linking the residential hinterland to the riverside, and improved bus and cycle routes. Footways will be widened to a minimum of 5.5m which will allow for an effective footway width of 2m with buffers of 0.5m to building/property wall and 0.5m to tree planting/street furniture zone, plus a tree planting/street furniture zone of 2.2m and a 0.3m kerb. Where active frontages (shops, restaurants etc.) are proposed, this area should be increased to allow for forecourts for tables+chairs. Proposals for Battersea Park Road have been developed as part of the Battersea Power Station development site. Three options have been developed for Nine Elms Lane.
- Public realm improvements to the river walk include Yorkstone paving and new lighting and design improvements to the three open spaces that link the river walk to Nine Elms Lane.

The design of the central open space will require careful integration of the future pedestrian and cycle bridge linking Nine Elms to Pimlico.

- Strategic links through the Nine Elms development area have been identified to connect the residential hinterland to the riverside. These links are to be integrated with the linear park and developed and delivered as part of the new developments. The strategic link between the Ballymore site and the Royal Mail site will require a railway arch to be opened up for pedestrian access into the proposed New Covent Garden market public area.
- Public realm improvements to Thessaly Road include enhanced paving, lighting, tree planting and street furniture as this is an existing direct link between the Battersea Power Station, future Northern Line station and the residential areas to the south. Improvements would include refurbishment of the tunnel through the railway viaduct.
- Public realm improvements including a new public square at the proposed Northern Line extension station at Pascal Street with two new and two refurbished tunnels through the railway viaduct connecting the station to the developments between the viaduct and Nine Elms Lane. The new tunnels will be for pedestrian access only. Of the two refurbished tunnels, the one to the east will be maintained for traffic access and the other will be changed to allow pedestrian access only.

Option development for Nine Elms Lane:

Option development for Nine Elms Lane has been informed by 2008 / 2026 Pedestrian Analysis, developer and stakeholder consultation (see chapter 4), traffic analysis (Saturn model) based on factored down Revised Scenario 5 2026 flows and precedent studies that look at similar London streets (see Technical Note 4 for detailed information on the development of the Nine Elms Lane options).

Three options have been developed for Nine Elms Lane that provide varying levels of public realm improvements as set out in the objectives.

All options include a significantly modified junction arrangement at the Battersea Power Station access on

Battersea Park Road.

All options address the interface to the river walk through upgraded open spaces and pedestrian crossing points that lead through green links to the residential developments beyond the railway viaduct.

All options propose highway design changes that create a carriageway made up of a 4m bus and cycle lane and 3m general traffic lane in both directions providing a consistent 14m wide carriageway. This width increases at junctions and pedestrian crossings to include additional lanes and refuge islands where required.

All options incorporate the consented Section 278 alignment at the US Embassy site, modified to ensure consistency with proposed lane widths. This allows widening of the central reserve to allow tree planting or a widened northern footway.

All options aim to minimise service diversions / co-ordinate with development proposals which are proposing relocation of services in the footways along their sites.

New tree planting is proposed either within new footway space extended into existing carriageway, at the back of existing footway in land outside the current highway boundary or where service diversions are proposed in conjunction with development proposals.

All options have been developed with an objective that NEL operates within capacity in 2026. This is achieved except at the Queenstown Road junction where significant highway constraints exist - this will need detailed consideration when development flows are more clearly defined. All options propose significant public realm improvements:

Key highway features include:

- Signal controlled junction at Vauxhall Tower Development (already approved).
- Priority controlled access to the Flower Market.
- Realigned Ponton Road with signal controlled access (as per US Embassy application).
- New priority controlled junction on the boundary of the Ballymore and Royal Mail sites
- Improved junction at Kirtling Street junction.
- A new signal controlled junction for the retail access to the BPS opposite Savonna Street.

6.3 Options for Nine Elms and Battersea Area

Do minimum - 'do minimum' option aims to minimise land take to the absolute minimum required by retaining the northern kerb line and back of footway except in the section to the west of the US Embassy site where the existing carriageway is very wide. In this section, a 5.5m wide footway is proposed to the south from the existing back of footway and additional footway space gained by narrowing the carriageway is added to the northern footway. This allows tree planting along the widened northern footway between the St George Wharf tower and the first block of the residential development opposite the CGMA Flower Market site. For the rest of the route, tree planting is possible only along the southern footway. The do minimum option would cost about £12.08 million to deliver and would require some land take from the Ballymore site, the Royal Mail Group site and the western section of the CGMA site.

This option does not realise the vision of an 'urban boulevard' in its entirety.



Figure 6.3.1: Nine Elms Lane - Do Minimum (plan)

6.3 Options for Nine Elms and Battersea Area

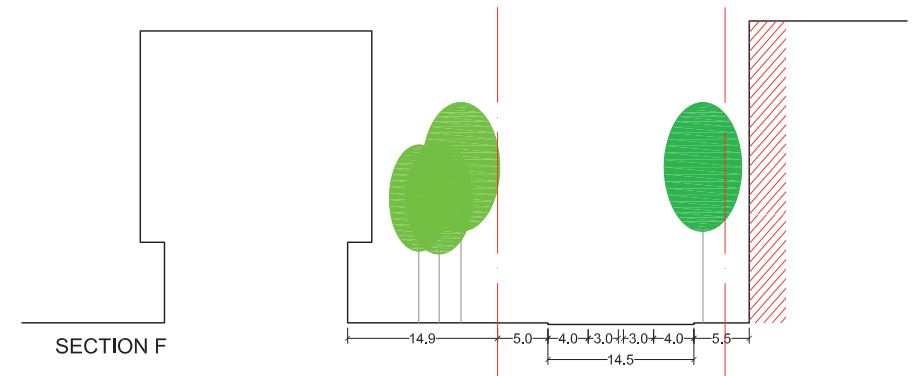
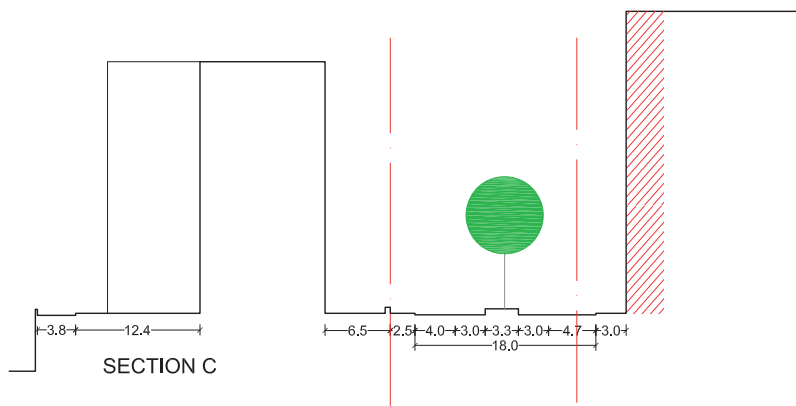
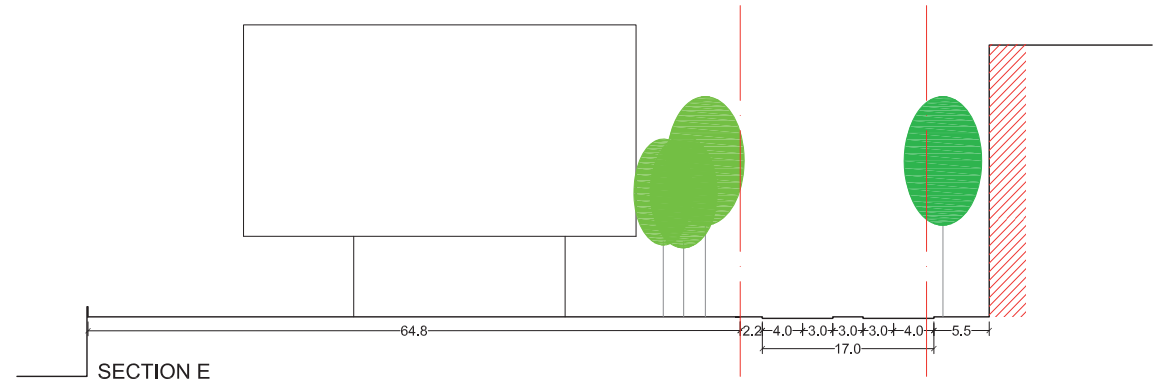
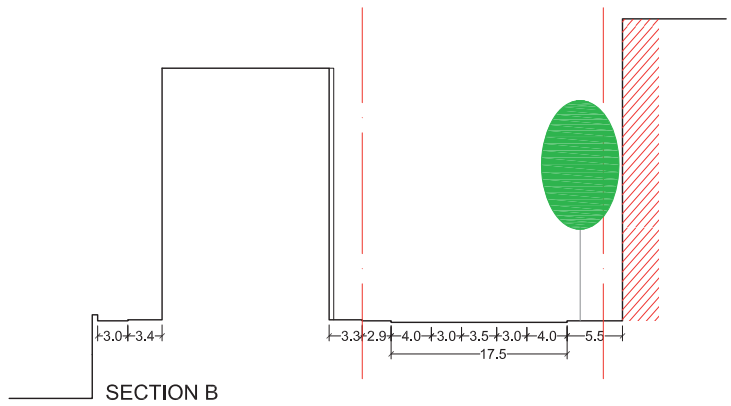
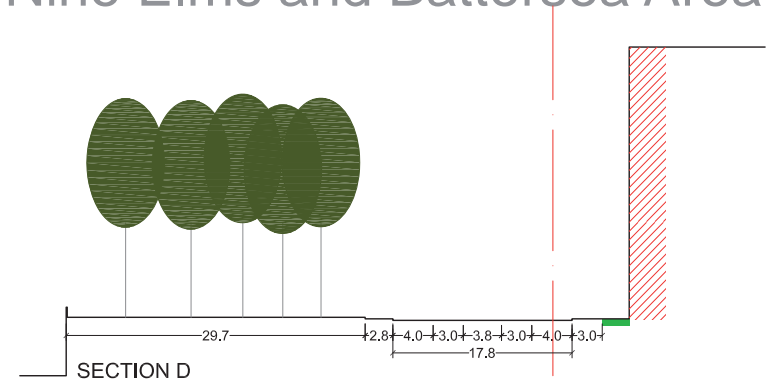
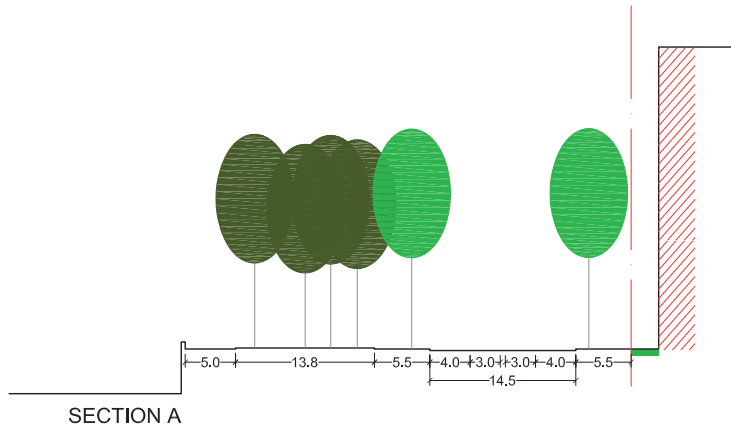



Figure 6.3.2: Nine Elms Lane - Do Minimum (sections)

 Additional width where active frontage

6.3 Options for Nine Elms and Battersea Area

Do something - the 'do something' option is similar to the 'do minimum' option with the addition of some land from the Tideway site and the pumping station (private forecourt between compound wall and public footway) to allow tree planting along the back of footway in this section of the northern footway, and some additional land take from the Ballymore site to the east of the US Embassy. This will allow sufficient widening of the northern footway to continue the tree planting up to the start of the open space opposite the US Embassy site, thus creating a boulevard effect in the two sections on either side of the US Embassy site, which forms the focal point with a line of trees in the central median.

This option would cost about £12.65 million to deliver and would realise the vision of an 'urban boulevard' with some land take from both sides of Nine Elms Lane.



Figure 6.3.3: Nine Elms Lane - Do Something (plan)

6.3 Options for Nine Elms and Battersea Area

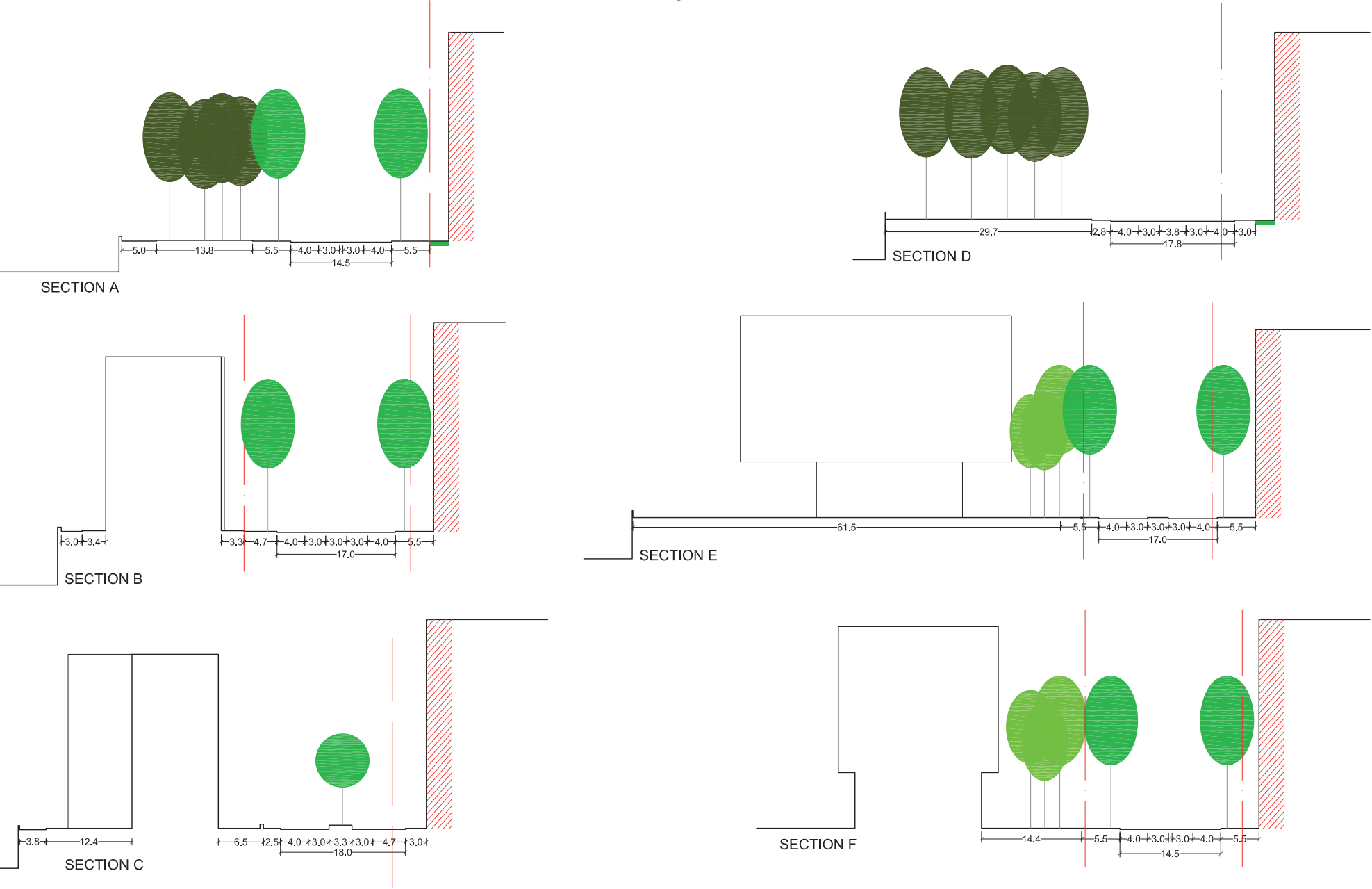


Figure 6.3.4: Nine Elms Lane - Do Something (sections)

6.3 Options for Nine Elms and Battersea Area

Do maximum - the 'do maximum' option proposes 5.5m wide footways on both sides of the carriageway requiring the realignment of both the north side and south side kerb lines. This would allow continuous kerbside tree planting along both footways, to the east and west of the US Embassy site. The visual effect is the same as the 'do something' option but with maximum land take from the developments to the south of Nine Elms Lane.

As with the 'do something' option, this option would realise the vision of an 'urban boulevard' but at a greater cost (approximately £13.38 million) and maximum land take from the developments to the south.



Figure 6.3.5: Nine Elms Lane - Do Maximum (plan)

6.3 Options for Nine Elms and Battersea Area

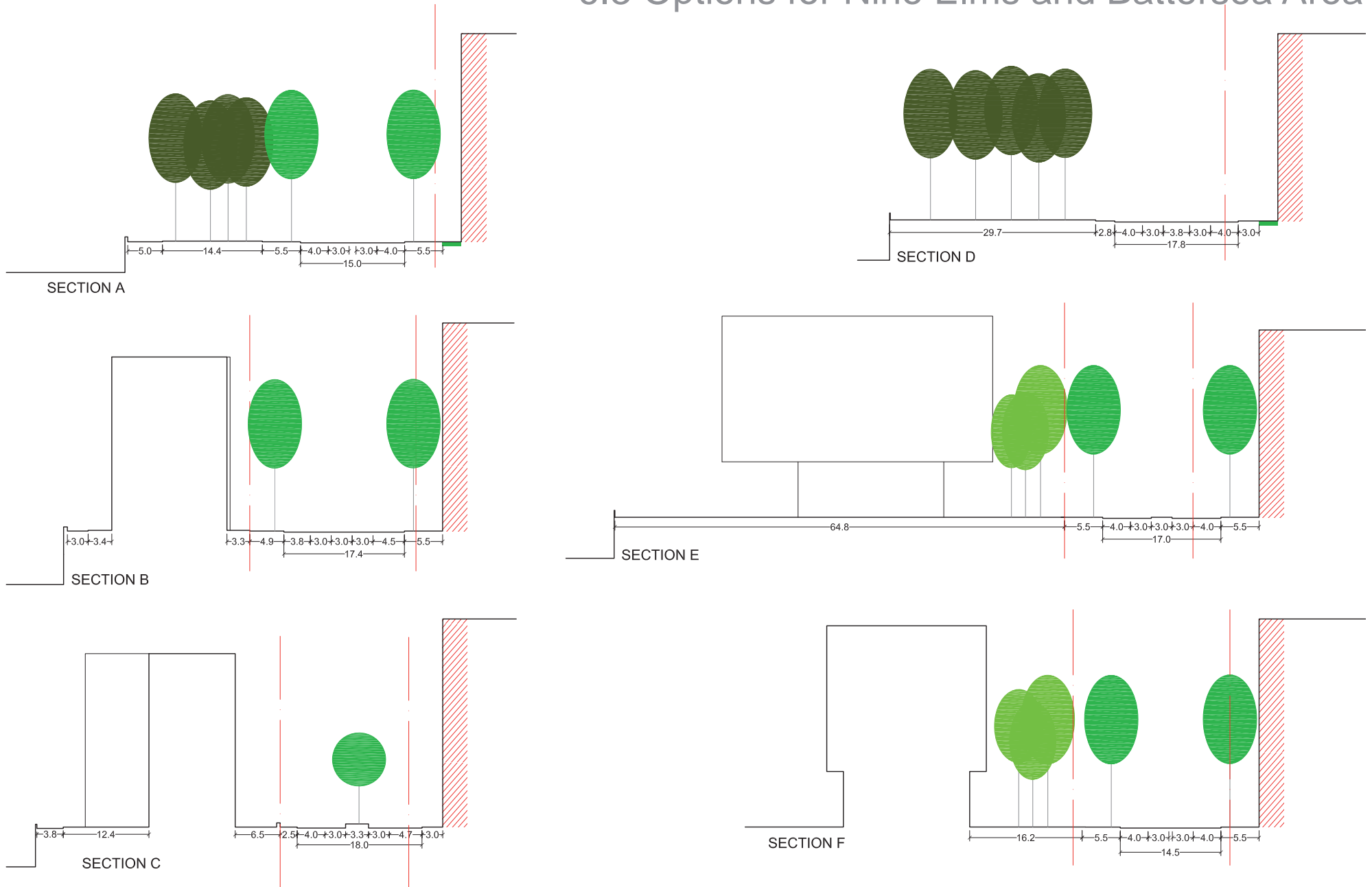



Figure 6.3.6: Nine Elms Lane - Do Maximum (sections)

 Additional width where active frontage

7. Integrated Public Realm and Highways Options

7.1 Albert Embankment Option

Based on the assessment of impacts and benefits of the various options developed and feedback received from TfL, GLA and other stakeholders, three Vauxhall gyratory options and the 'do something' Nine Elms Lane option have been identified as the preferred options for these areas. These should be taken forward for further investigation and integration with the Albert Embankment option for the delivery of an overarching public realm and highways strategy for the entire OA.

Albert Embankment Option

The main elements of the Albert Embankment option (Figure 7.1.2 aim to reduce the perceived and physical impact of the Albert Embankment traffic corridor on access to the riverside through:

- surface treatment changes to the carriageway intended to create visual continuity from the riverside wall to the facades of the buildings to the east of the carriageway
- improvements to existing crossings in terms of widths and positions in relation to desire lines
- the introduction of new crossings along desire lines that are disconnected from the riverside.

New crossings will include an at grade, signalled crossing at the foot of Lambeth Bridge connecting the desire line of movement from Albert Embankment to Lambeth Palace Road, a signalised pedestrian crossing to the south of the junction with Salamanca Street and a staggered signal controlled pedestrian crossing south of Glasshouse Walk to enable pedestrians currently crossing at this location (to/from the bus stops) to cross safely.

Strategic east-west links / desire lines that connect the residential hinterland to the riverside and north-south links that connect parks and railway arches along the eastern face of the viaduct have been identified for public realm improvements including creating shared surfaces along some links and refurbishment of the associated tunnels through the railway viaduct.

The following streets have been identified for converting into shared surfaces following feasibility studies at a future stage:

- Slip road along White Hart Dock
- Salamanca Street
- Section of Lambeth High Street between Whitgift Street and Black Prince Road,
- New Spring Gardens Walk
- Goding Street and
- Randall Road

Other improvements include improvements to the riverwalk, mainly the section between Albert Embankment Gardens and Lambeth Bridge to create continuity of the high quality treatment as exists in the northern section, improvements to the open spaces along Albert Embankment especially those that form a frontage to Spring Gardens, and tree planting where possible including in the proposed new median in the southern section of Albert Embankment (Figure 7.1.1).



Figure 7.1.1: Example of tree planting in the median at Greenwich Millennium Village

7.1 Albert Embankment Option



Figure 7.1.2: Albert Embankment Option

7.2 Vauxhall Cross Options

Vauxhall Gyratory Options

The three options identified for Vauxhall Cross include two gyratory options (Options 5 and 7) and one two-way option (Option 3).

Option 5 (do minimum) and Option 7 (do something) with some revisions such as making the Wandsworth Road arm of the gyratory into a four lane road with a new pedestrian crossing at its midway point, are the preferred gyratory options.

The proposed improvements provided by Option 5 (do minimum) and Option 7 (do something) could be implemented incrementally, subject to feasibility and design development, as funding becomes available.

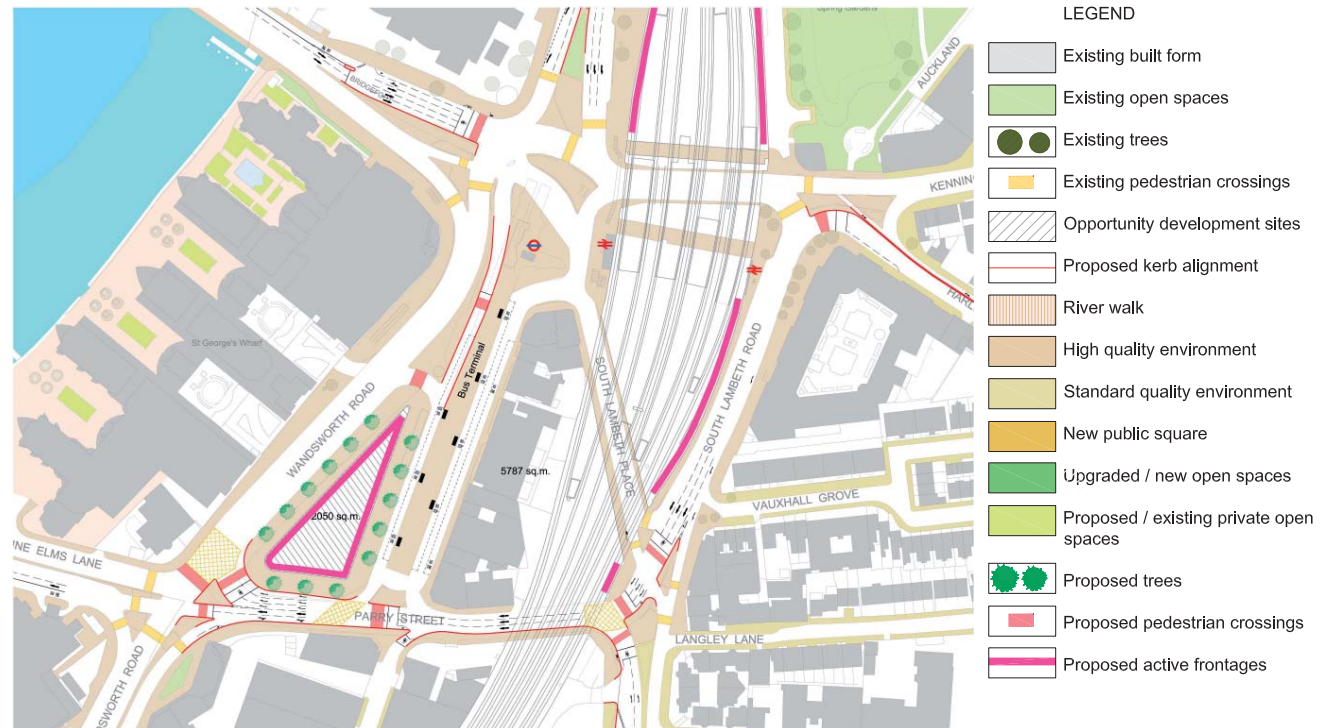


Figure 7.2.1: Vauxhall Gyratory Option 5

Option 5 – Do minimum.

The do minimum option (Figure 7.2.1) provides some benefits for pedestrian movement and cyclists with negligible impact on traffic capacity and bus station operation and capacity. It provides limited improvements to the public realm, which remains fragmented and overshadowed by road infrastructure. This option, however, does provide some quick wins that can be easily implemented in the near future.

Benefits for pedestrian movement are provided through pedestrian crossing improvements at Nine Elms Lane / Wandsworth Road junction including links to Island site, widened footways on Parry Street and the provision of wide footways on the Island site.

Benefits for cyclists include the provision of a contra-flow cycle lane on Harleyford Road and the replacement of the offside bus lane from Vauxhall Bridge with a nearside bus lane. The latter measure is of particular benefit for the cycle superhighway

The estimated cost for Option 5 is £11.17 million (this includes repaving the public realm with Yorkstone paving).

7.2 Vauxhall Cross Options

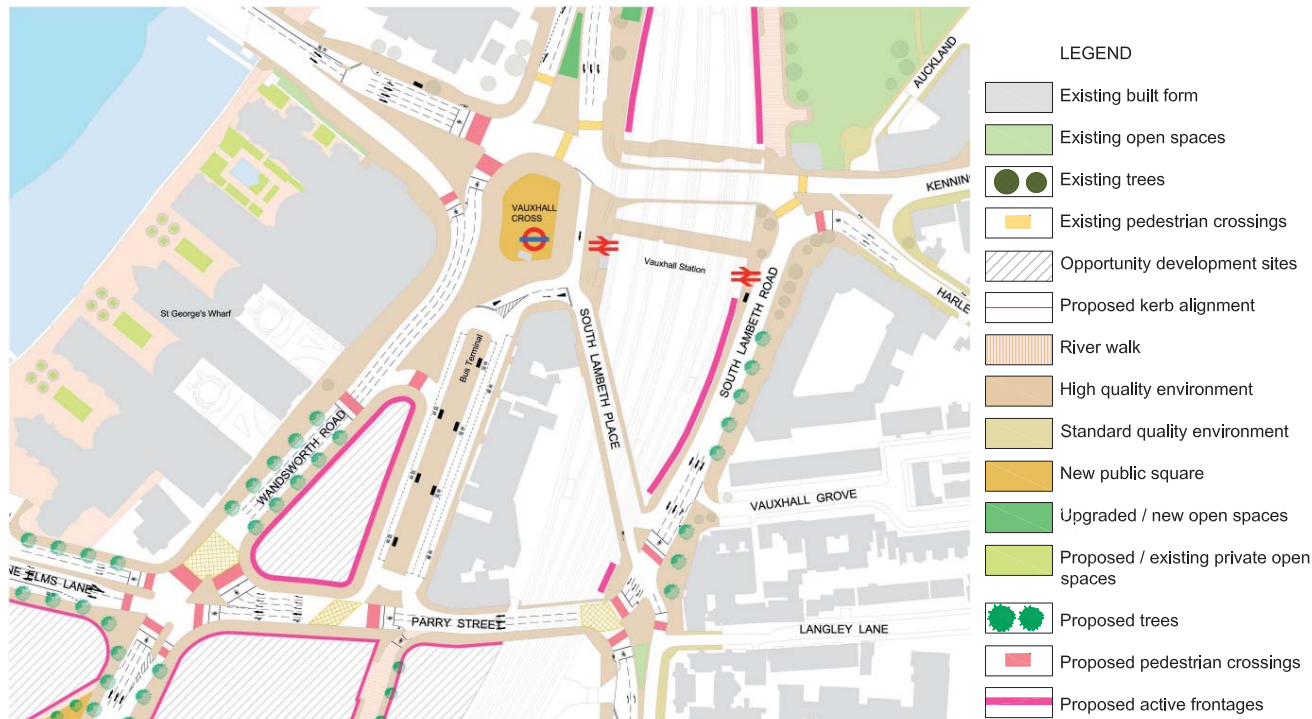


Figure 7.2.2: Vauxhall Gyratory Option 7

Option 7 – Do something (revised)

Of the two 'do something' gyratory options, option 7 (Figure 7.2.2) was found to be the more feasible despite greater impacts on traffic (17% and 8% reduction in traffic levels in AM and PM respectively) and bus station capacity as it maintains the bus station in the existing location within the central area and does not necessitate the removal of the existing block of buildings. This would require detailed negotiations with the various owners.

Option 7 provides all the benefits of option 5 plus an improved public realm with a station square, widened footways, improved pedestrian crossings especially at the Nine Elms Lane / Wandsworth Road junction and a new crossing across

the reduced (in width) Wandsworth Road arm of the gyratory. Pavement space is gained on Wandsworth Road (St. George Wharf side) allowing for tree planting. South Lambeth Road is also reduced in width allowing for wider pavements and tree planting.

The modifications to the bus station under this option results in pedestrians needing to cross a bus only carriageway in order to access either bus stops or the Underground Station. However, any safety risks associated with this issue could be resolved at the next stage of design through the provision of features such as raised crossing facilities. Existing stairways and lifts to the Underground Station can still be maintained under this option.

The estimated cost for option 7 is £15.10 million.

Option 3 – Two-way with Buses and Cyclists only in Parry Street,

Of the two-way options considered, option 3 was found to have lesser impact on traffic (36% and 31% reduction in traffic levels required in AM and PM respectively) than options 2 and 4 and a lesser impact on bus station capacity than options 1, 2 and 4.

Option 3 provides significant public realm improvements and significant benefits for pedestrian movements especially between the gyratory area and the Nine Elms area through the removal of general traffic from Parry Street.

Variation b has been considered the most feasible of the option 3 variations at this stage as it maintains the bus station in the existing location within the central area and does not necessitate the removal of the existing block of buildings, which would require detailed negotiations with the various owners.

The estimated cost for Option 3b is £21.51 million.

The two-way option is not endorsed by TfL since turning the gyratory into two-way working was found to impact heavily on traffic, requiring high levels of traffic reduction (22 – 51%) through large amounts of strategic and local traffic diversion. It also has significant impacts on the capacity and operation of the bus station and a high estimated cost to implement.

However, as it is the long term aspiration of LB Lambeth to remove the gyratory in favour of two-way working, option 3b was identified as the two-way option having the best balance between the impacts on traffic and the bus station (in comparison to the other two-way options) and the provision of significant benefits for public realm and pedestrian and cyclist movements.

The two-way option nevertheless does have a high impact on traffic and buses and would require extensive changes to the bus station including removal of the station structure which has a current design life of another twenty years, and significant change to the area. If the borough wish to pursue this option a further detailed feasibility study in consultation with adjacent boroughs would be required to test whether the impact on traffic and bus operations could be mitigated over a wider strategic level.

7.3 Nine Elms Lane / Battersea Park Road Option

Nine Elms Lane/Battersea Park Road Option

The three options developed provide the following similar benefits:

- a consistent carriageway with a 4m wide bus and cycle lane and a 3m wide general traffic lane in both directions
- limited access off Nine Elms Lane to prevent build-up of traffic and signalised or priority junctions at the accesses provided
- an improved public realm.

The 'do something' and 'do maximum' options deliver the following additional benefits:

- a traditional London tree lined street with trees along both footways.
- 5.5m wide footways (excluding the Section 278 scheme) that include a pedestrian movement zone of the required minimum effective width of 2m plus buffers to building edge and tree planting/street furniture for unhampered pedestrian flows plus the additional space for tree planting and street furniture allowing the pedestrian movement zone to be clear of any obstacles (Figure 7.3.1).

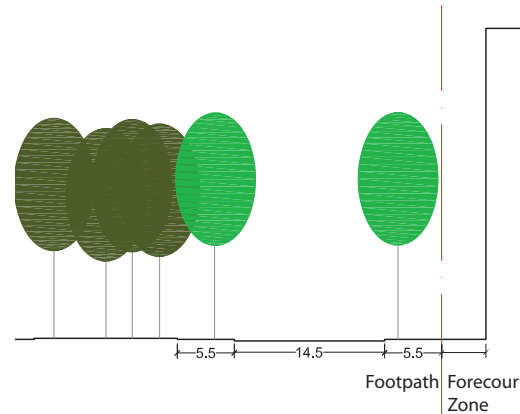
All three options require some additional land from beyond the highway boundaries to deliver an improved Nine Elms Lane. The 'do minimum' and 'do something' options maintain the north side kerb line in its existing alignment for most of the length of Nine Elms Lane while the 'do maximum' option requires both the north and south side kerbs to be moved to the south to accommodate widened footways. For this reason the 'do minimum' and 'do something' options require much less land from beyond the south side highway boundary in comparison to the 'do maximum' option. The 'do something' option requires some land from beyond the north side highway boundary at the Tideway development and the pumping station though this does not affect the development/buildings or site uses/activities on either property.

The 'do minimum' option is estimated to cost £12.1 million, the 'do something' option is estimated at £12.7 million, and the 'do maximum' option is estimated at £13.4 million.

The 'do something' option (Figure 7.3.2) emerges as the

preferred option since, through a combination/ modification of the 'do minimum' and the 'do maximum' option proposals, it provides many of the benefits of both -

- a complete urban boulevard that fulfils the 'vision' for the future Nine Elms Lane contained in OAPF and similar to the 'do maximum' option but at a lower cost
- a reduced land take requirement from developments to the north and south of the street.



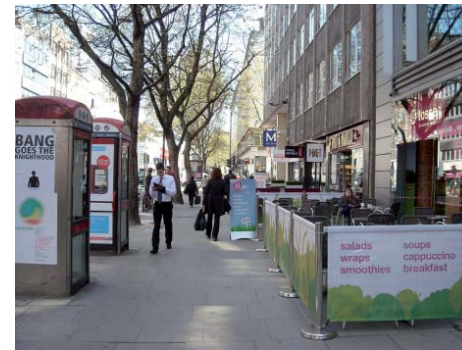
Typical section where forecourt zone included



Illustrative proposal of forecourt zone on Nine Elms Road



Active frontage on Kingsway, London



Active frontage on Tottenham Court Road, London

Figure 7.3.1: Illustration of proposed forecourt zone in conjunction with active frontages

7.3 Nine Elms Lane / Battersea Park Road Option



Figure 7.3.2: Nine Elms Lane - Do Something (plan)

8. Integrated Illustrative Masterplan and Recommendations

8.1 Integrated Illustrative Masterplan

Proposals for the Albert Embankment and Nine Elms/ Battersea area, including the Nine Elms Lane 'do something' option, have been combined with the Vauxhall gyratory revised option 7 to produce an integrated illustrative Masterplan as shown in Figure 8.1.1.

Though three options were identified for Vauxhall gyratory, the 'do something' option 7 has been integrated within the Masterplan as it is a feasible option that provides substantial public realm benefits in the mid term. The 'do minimum' option provides a series of quick-wins but very few public realm improvements. The quick-wins could be implemented as the first steps towards achieving the objectives of the 'do something' option.

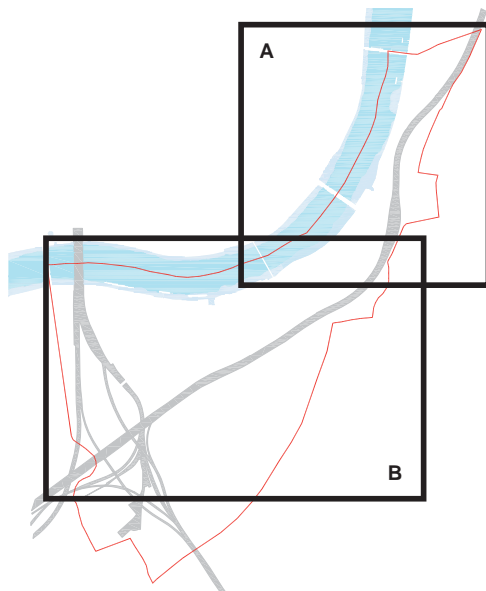


Figure 8.1.1: Illustrative Masterplan

Part A

8.1 Integrated Illustrative Masterplan

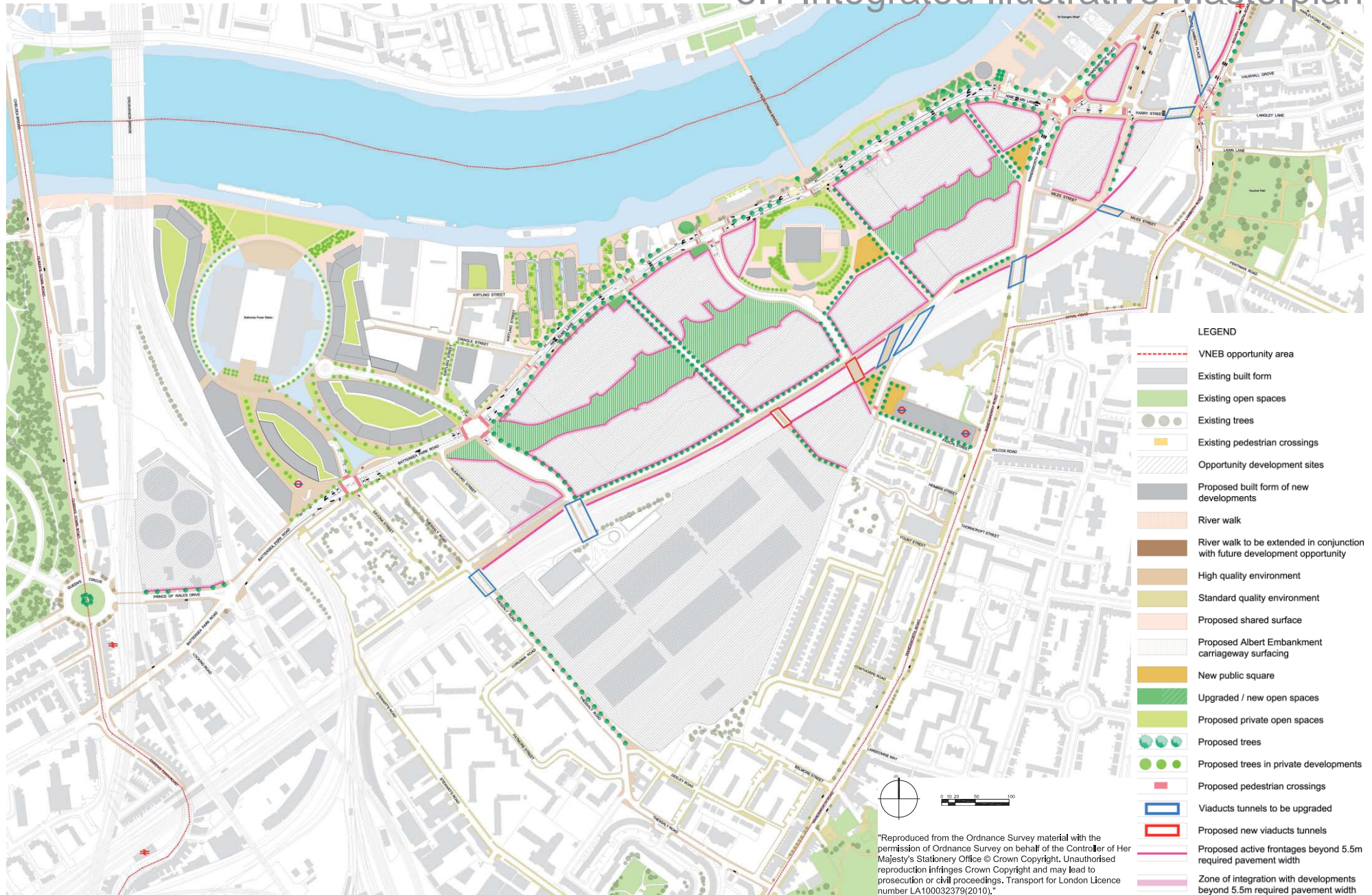


Figure 8.1.1: Illustrative Masterplan

8.2 Recommendations - Albert Embankment Area

Phased regeneration

Proposals for the three areas within the OA have been developed to be deliverable in phase subject to detailed design and affordability, can be implemented individually to bring about phased regeneration of the area. The various individual projects are listed for each area:

Albert Embankment Area

Projects include the following (Figure 8.2.1):

1. Albert Embankment traffic corridor
 - Improvements to bus lanes to regulate widths to 4m wherever possible,
 - Improvements to existing pedestrian crossings – northern and southern ends of Albert Embankment; north of Black Prince Road; south of Tinworth Street.
 - New pedestrian crossings – signalised crossings at the foot of Lambeth Bridge and south of Salamanca Street; staggered, signalised crossing south of Glasshouse Walk.
 - Carriageway narrowing and introduction of a median to facilitate the staggered crossing south of Glasshouse Walk. Tree planting within median, possible pleached.
 - Surface treatment of carriageway from Lambeth Bridge to Albert Embankment Gardens.
 - Public realm treatment as required along footways and improvements to the open spaces along the railway viaduct to the south.
2. Riverwalk improvements – upgrade of Albert Embankment Gardens including tree planting, landscape proposals, seating and lighting.
3. Riverwalk improvements – upgrade of the Duck Tours slipway includes good quality paving, improved lighting and tree planting.
4. Riverwalk improvements – refurbishment of the riverwalk behind the MI6 building including repairs to paving, lighting and seating and planting upgrade.
5. Riverwalk improvements (short term) – public realm improvements to riverwalk and embankment wall behind

Peninsular Heights and Tintagel House to match the traditional high quality treatment of the northern section.

6. Riverwalk improvements (long term) – widening of the riverwalk behind Peninsular Heights, Tintagel House and Camelford House to a minimum of six metres if and when the three properties undergo redevelopment in future.
7. Slip road near White Hart Dock – make into shared surface with good quality paving, lighting and landscape proposals around White Hart Dock.
8. Salamanca Street – create shared surface with good quality paving and lighting, and tree planting and street furniture inputs where possible.
9. Lambeth High Street between Whitgift Street and Black Prince Road - create shared surface with good quality paving and lighting, and tree planting and street furniture inputs where possible. This should be linked to the proposals for the redevelopment of the Fire Station site.
10. New Spring Gardens Walk and Goding Street - make into shared surface with good quality paving and lighting, and tree planting and street furniture inputs where possible.
11. New shared surface link between Tinworth Street and Glasshouse Walk – to be provided as part of the proposals for the new development to the east of the railway viaduct.
12. Randall Road - make into shared surface with paving, lighting and other public realm improvements.
13. Refurbish viaduct tunnels.

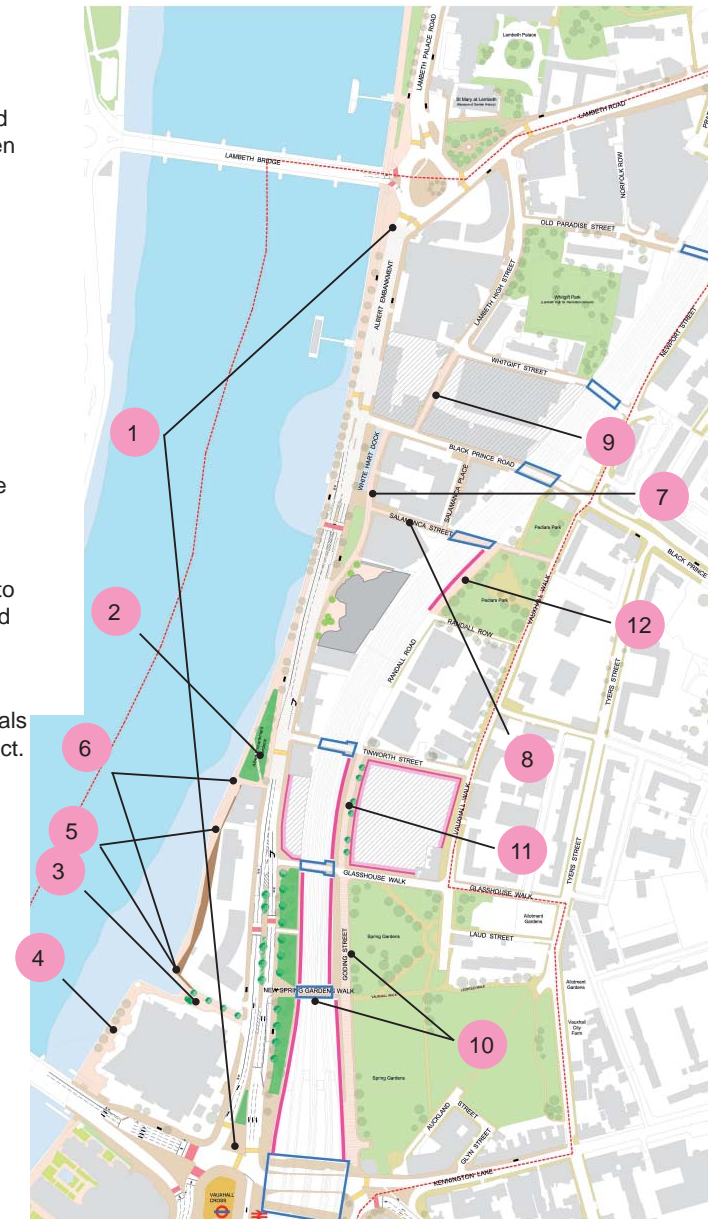


Figure 8.2.1: Albert Embankment - Projects

8.3 Recommendations - Vauxhall Cross Area

Vauxhall Cross Area

Projects include the following (Figure 8.3.1):

Do Minimum (Option 5)

1. Pedestrian crossing improvements at Nine Elms Lane / Wandsworth Road junction including links to Island site
2. Contra-flow cycle lane on Harleyford Road
3. Offside bus lane removed from Vauxhall Bridge and replaced with nearside bus lane (making way for Cycle Superhighway)
4. Widening of footway on the southern side of Parry Street

Do Something (Option 7)

5. Further improvements to the Nine Elms Lane / Wandsworth Road junction including banning the left turn from Wandsworth Road to Nine Elms Lane and removal of left-turn filter from Parry Street to Wandsworth Road to create more efficient and safer pedestrian crossings at this junction to allow better pedestrian crossings.
6. Wandsworth Road arm of gyratory – reduction in lanes, widening of pavements, public realm enhancements to pavements with Yorkstone paving, lighting, street furniture and tree planting. New signal controlled pedestrian crossing across the Wandsworth Road at midway point.
7. South Lambeth Road – reduction in lanes, widening of pavements, public realm enhancements to pavements with Yorkstone paving, lighting, street furniture and tree planting.
8. Removal of the bus access at the Vauxhall Bridge junction to create a consolidated public realm with station square and widened footways. Public realm enhancements to pavements with Yorkstone paving, lighting, street furniture and tree planting.
9. Public realm improvements within the central area of the gyratory that include Yorkstone paving, lighting, street furniture and tree planting.

The projects could be implemented incrementally from the do-minimum to the do-something stage, subject to feasibility and design development, as funding becomes available.

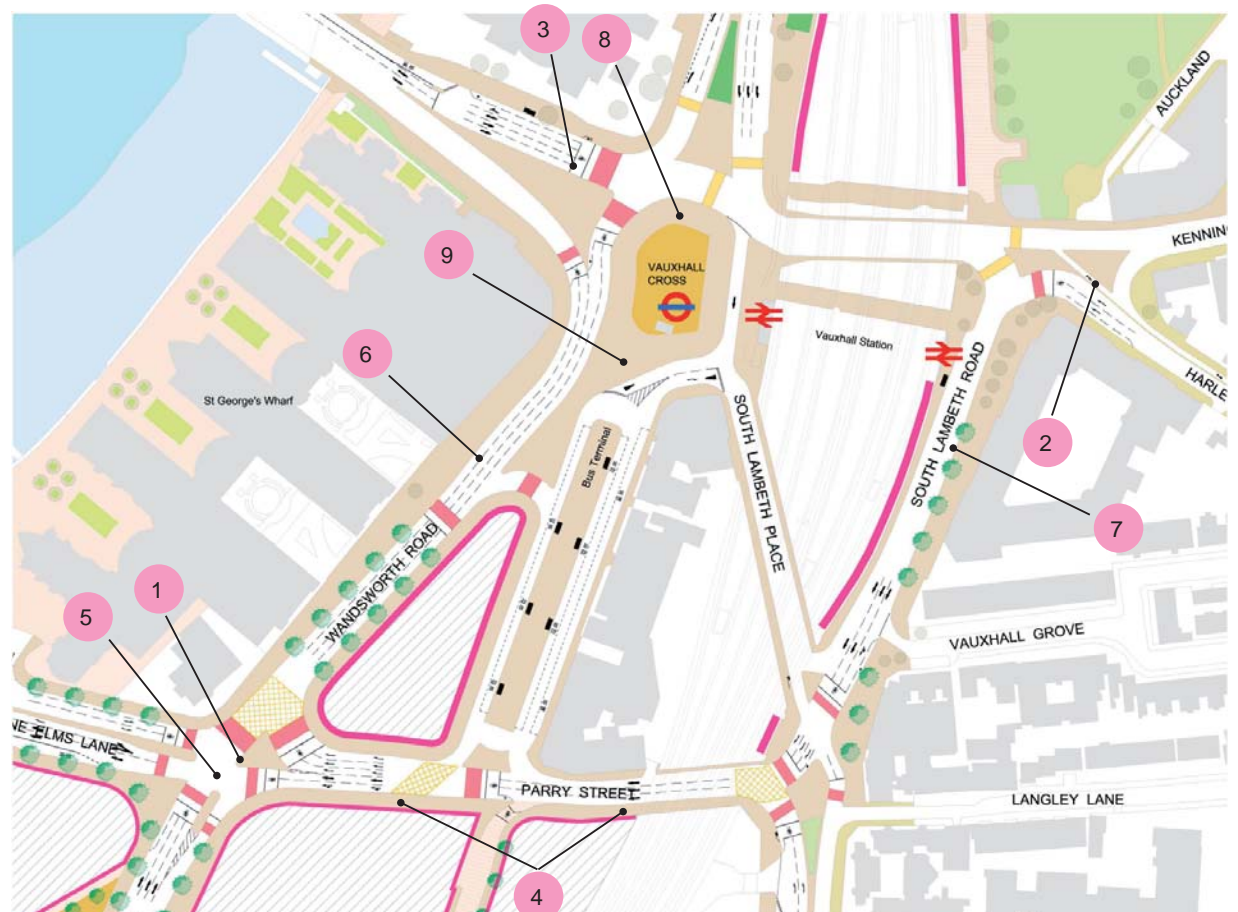


Figure 8.3.1: Vauxhall Gyratory - Projects

8.4 Recommendations - Nine Elms and Battersea Area

Nine Elms and Battersea Area

Projects include the following (Figure 8.4.2):

1. Nine Elms Lane

- Rationalised carriageway widths to provide a 3m wide general traffic lane and a 4m wide bus and cycle lane in both directions;
- Widened footways (5.5m) with tree planting, street furniture and active frontages;
- New junctions to allow access to new developments:
- Signal controlled junction at Vauxhall Tower Development (already approved).
- Priority controlled access to the Flower Market.
- Realigned Ponton Road with signal controlled access (as per US Embassy application).
- New priority controlled junction on the boundary of the Ballymore and Royal Mail sites
- Improved junction at Kirtling Street junction.

2. Battersea Park Road – Proposals for Battersea Park Road have been developed as part of the Battersea Power Station development site proposals. Some amendments proposed include a new signal controlled junction for the retail access to the BPS opposite Savonna Street.

3. Prince of Wales Drive – public realm improvements that include enhanced paving, lighting, tree planting and street furniture where possible.

4. Riverwalk (stretch between St. George Wharf Tower and the pumping station) – public realm improvements that include Yorkstone paving, new lighting, signage and street furniture and integration with improved open spaces.

5. Riverwalk open space 1 (between St. George Wharf Tower and Riverside Court) - design improvements that improve accessibility to the riverwalk from Nine Elms lane, and include new lighting, street furniture and signage.

6. Riverwalk open space 2 (between Riverside Court and Elm Quay Court) - design improvements that improve accessibility to the riverwalk from Nine Elms lane, include new lighting, street furniture and signage and consider the need to integrate access to the proposed pedestrian and

cycle bridge when it is implemented in the future.

7. Riverwalk open space 3 (between Elm Quay Court and the pumping station) - design improvements that improve accessibility to the riverwalk from Nine Elms lane, and include new lighting, street furniture and signage (Figure 8.4.1).

8. Thessaly Street - Public realm improvements that include enhanced paving, lighting, tree planting, street furniture and refurbishment of the tunnel through the railway viaduct.

9. Strategic north-south links through the Nine Elms development area to be integrated with the linear park and developed and delivered as part of the new developments. Links have been identified at the following locations:

- Between Market Towers and the CGMA site
- Between the US Embassy site and the Ballymore site to the east.
- Between the Ballymore site and the Royal Mail site. This link will include a new tunnel through the railway viaduct to allow pedestrian access to/from the proposed CGMA market.

10. New public square and public realm improvements as part of the Northern Line extension station development. This will include a new tunnel through the railway viaduct to allow pedestrian and access to/from development sites and Nine Elms Lane and refurbishment of the two existing tunnels, turning one into a pedestrian and cycle access only.

11. Miles Street and Bond Street - make into shared surfaces with paving, lighting and other public realm improvements.

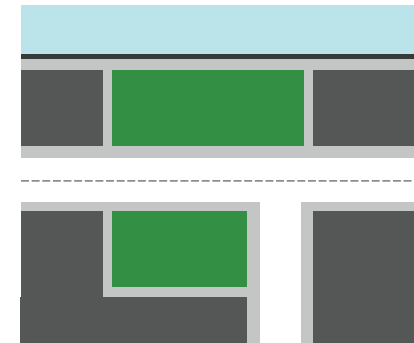


Figure 8.4.1: Diagram showing extension of riverwalk open spaces to the south of Nine Elms Road

8.4 Recommendations - Nine Elms and Battersea Area

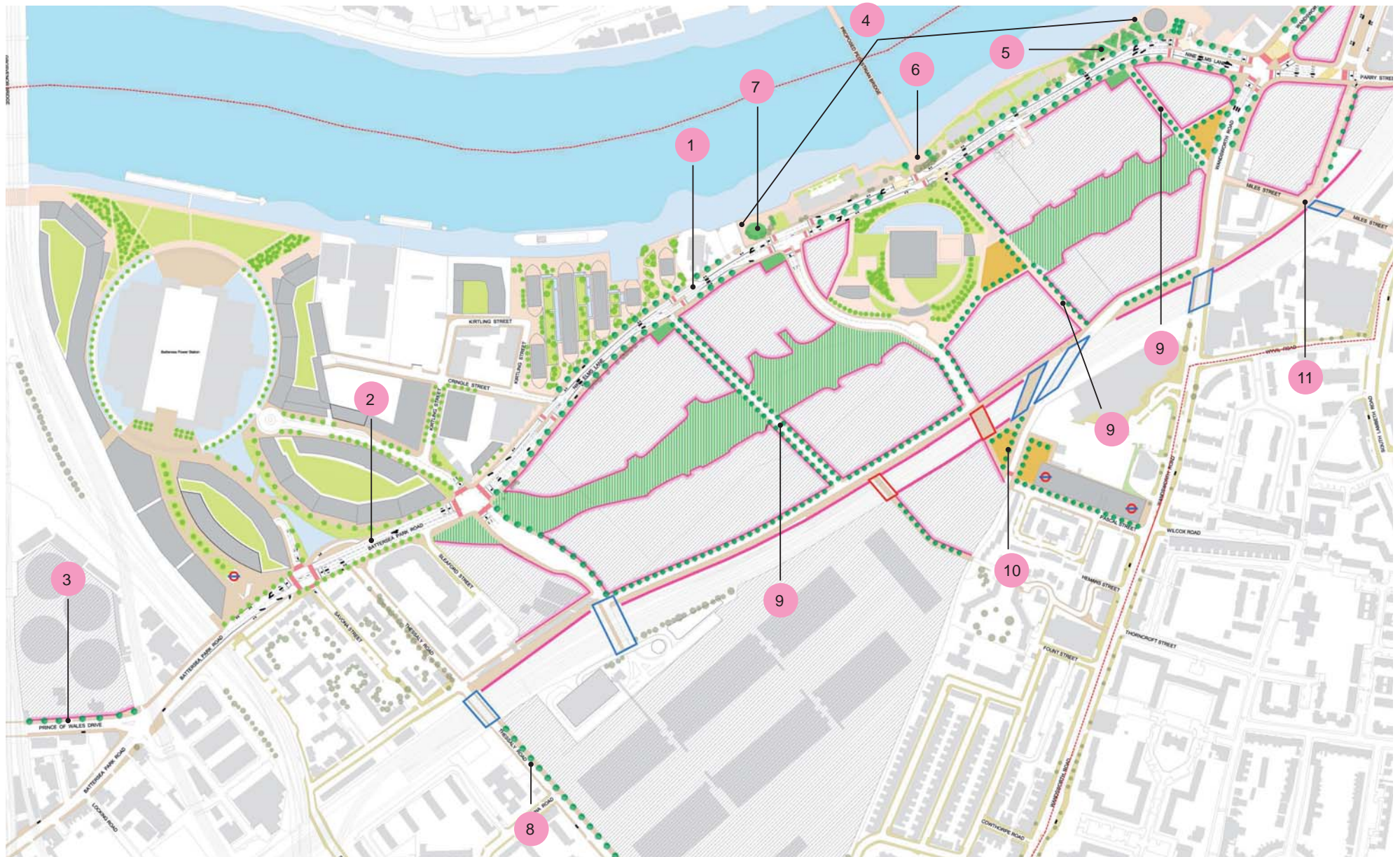


Figure 8.4.2: Nine Elms and Battersea - Projects

8.5 Precedent Images

Viaducts and Arches



Railway arches, Southwark, London



Railway arches, Joan Street, London

Public Realm and Highway Infrastructure



Barking Broadway Piazza, Barking



Place C Henu, Lyon

Streetscape



Southwark Street, London



Kingsway, London

River Walk



Thames Walk, London



River Walk by City Hall, London



Future vision for Nine Elms Lane

8.6 Materials Strategy

The materials strategy aims to provide a cohesive and high quality approach to the design of the public realm for both the road environment and the river walk. The approach adopted proposes a coordinated, hierarchy of materials and street furniture to be used across the study area. In general, materials and street furniture should be in accordance with TfL Streetscape Guidance and local borough guidance and of an appropriate character for a high density central London area.

Surface materials: Traditional natural stone materials (York stone and granite) are already used within the area around the Albert Embankment. It is proposed that these materials be adopted for the river walk and the Vauxhall Cross and Nine Elms Lane road environments. Elsewhere surface materials within streets should provide a consistent and coherent overall high quality public realm.

Planting: The overall planting strategy for the Albert Embankment, Vauxhall Cross and Nine Elms Lane would look to extend the use of London Planes currently existing along Albert Embankment to form boulevards of trees of a scale in keeping with the future high density development and reflecting the traditional use of London Plane trees along the river throughout central London. In addition existing green spaces should be enhanced and extended in conjunction with adjoining developments.

Lighting: A bespoke design could be considered to reinforce the area's local character and distinctiveness. Architectural lighting the viaduct facades would enhance their appearance for active uses and create an attractive feature that defines new routes proposed along them. Along the river walk in the Nine Elms area pedestrian lighting located at the back of the river walk or on building facades where buildings are adjacent to the river walk and architectural lighting and tree up-lighting would provide variation in lighting levels, and distinctive features along the river walk. The use of LED fixtures as a suitable, sustainable alternative to the traditional lighting is recommended for all pedestrian and architectural lighting.

Street Furniture and Wayfinding: All street furniture and wayfinding of one material and finish to maintain consistency either within the public highway, along distinct sections of the river walk or within individual development areas. Signage should be in keeping with the Legible London system and as appropriate local borough guidance.



Surface materials



Planting

Lighting



Street furniture

Signage

8.7 Next Steps

As part of the ongoing design process and conclusions drawn in this report, the following next steps are recommended:

- Carry out further Saturn Modelling to assess:
 - the impact of the preferred Vauxhall Cross Option(s) on a wider area using the CLOHAM model
 - the impact of the removal of the western extension to the congestion charge to traffic flows at Vauxhall gyratory and the OA area.
 - the Nine Elms Lane and Albert Embankment proposals on the wider area.
- Decide what improvement option(s) to take forward to next stage.
- Note comments raised by Stakeholders at last Steering Group and consider them during the next stage of the design process.
- Identify and undertake more feasibility studies for complementary measures once options are agreed.
- Carry out further modelling including:
 - full data collection exercise (flows, journey times etc);
 - updating base models for Vauxhall Gyratory with more recent traffic counts and new timing reviews implemented
 - preparing TRANSYT model for Albert Embankment to assess VNEB proposals
 - updating / preparing VISSIM model of Vauxhall gyratory, Albert Embankment and Nine Elms Lane –existing and proposed
- Review pedestrian routing reflecting the preferred layouts for Nine Elms and Vauxhall Gyratory including do-minimum improvements such as the proposed new subway
- Develop public realm design concepts to RIBA Stage C/D for the main public highway and the riverwalk with a focus on the design and location of crossings and pause points, the design of bus stops along Nine Elms Lane, allocation of road space including cycle lanes and pavement widths, possible building line adjustment, landscape design, wayfinding, street furniture, tree planting and lighting.
- Liaise with key developers to ensure that emerging proposals take into consideration any changes to existing highways boundaries that may be required for improved highways and pavement designs and interface in an appropriate manner with the public realm proposals.
- Investigate taxi issues at Vauxhall Gyratory and along Nine Elms Lane

8.7 Next Steps

- Carry out an assessment of bus stop locations along Nine Elms Lane given the new developments and proposed highway alignment/footway widths.
- Ensure compatibility between Stewarts Road Study and plans for Nine Elms Lane and access to the Battersea Power Station development.
- Review footway and crossing requirements of the preferred layouts and potential mitigation, and particularly at identified 'pinchpoints' including in the vicinity of Kennington Lane and Battersea Park Road / Queenstown Road. Given the limitations of space available, some pinchpoints would benefit from more detailed eg LEGION modelling;
- Identify the quantified benefits to pedestrian movement using VNEB-W of the preferred layouts for Nine Elms and Vauxhall Gyratory taken forward as a result of this study and assess the impact on pedestrians and traffic.
- Review critical junctions in more detail including the pedestrian/cycle bridge and nearby junction, close to the proposed Nine Elms station, and the connection from Nine Elms Lane to the linear park;
- Perceived risk of crime and natural surveillance are a key issue and this study has gone some way to identifying the likely through movement potential of the footway network in 2026. Approaches to deal with the railway arches, tunnels and key areas where lower footfall would warrant active / overlooked frontages.
- Assess impact of additional gyratory traffic on pedestrian crossing timings and layout relating to significant growth in pedestrian volumes forecast at the exit from rail towards Albert Embankment, the rear national rail exit towards Kennington Lane, and south across Parry Street towards Nine Elms Lane and Wandsworth Road / Linear Park
- Develop a public realm design code/guidance to provide a consistent standard and quality in line with the aspirations of the OAPF Public Realm Strategy, LB Lambeth's Supplementary Planning Document for the Vauxhall area, LB Wandsworth's Core Strategy and TfL's Streetscape Guidance.
- Stewarts Road and Thessaly Road pedestrian environment - although these are borough roads, bringing them up to standard is quite important as a complementary measure with BPS (and they are of interest to TfL since the P5 bus circles round here). One key output would be a planning brief for NCGM for the Thessaly Road frontage.
- Phasing of developments and PT schemes will have a significant impact on the distribution of traffic and pedestrian demand. This phasing along with the particular peaks of traffic and pedestrian activity associated with retail and other uses will need to be considered paying particular attention to the Nine Elms and the US Embassy programme.