

Report:

For: *London Borough of Lambeth*



Cycle Network Review



By: **Transport Initiatives LLP**



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Final report:

Cycle Network Review

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1. Background

1.1 Outline of project

In January 2017 Transport Initiatives (TI) was commissioned by London Borough of Lambeth to review the council's cycle network, assess cycling potential and produce an outline revised network for future consultation and implementation.

The review consisted of a number of stages:

- Research into current situation for cycling in Lambeth, including an audit of the existing network
- Cycle Skills Network Audit (CSNA), including a full update of the 2013 Bikeability Audit
- Analysis following approach set out by TfL London Cycling Design Standards (LCDS) 2014
- Review of cycling potential, based on TfL's Strategic Cycling Analysis 2017
- Proposed cycle network for future development
- Assessment & prioritisation of Gateways, with outline design of top 10 Gateways including rough costs

1.2 Deliverables

A number of outputs were set for the study. These comprised:

- A. All data collected, recorded as GIS layers (tables) and/or spreadsheet as appropriate, and provided to Lambeth in digital form. This includes the following:
 - i. All roads and tracks, coded by CSNA level
 - ii. All crossings of roads above Level 2 identified, coded by audit level and labelled with a unique reference
 - iii. LCDS compatible analyses of Mesh Density and Area Porosity
 - iv. A schedule of existing and proposed Gateways
- B. A brief report (i.e. this document) setting out the findings and giving any other information that could not be included in the mapping output. This includes plans showing the findings.

2. Cycle Skills Network Audit (CSNA)

2.1 Background

As part of the network review, TI undertook an audit of the borough based on Bikeability levels, using the Cycle Skills Network Audit (CSNA). This process provides a consistent and objective means of auditing an area's roads and traffic-free paths, taking into account the skill level needed to cycle along them in relative safety.

A CSNA identifies roads and tracks which are immediately suitable for inclusion in an advisory network, as well as those which might be converted for cycle use by a variety of engineering and legal measures. It can help deliver a more effective way of providing for people who currently cycle, or would like to, by focusing on "routes for people cycling", rather than simply "cycle routes".

The classification uses a system based on the three core levels of the National Standard for Cycle Training (Bikeability) – see <https://bikeability.dft.gov.uk>. Details on the audit methodology are provided in Appendix A.

Level 1 – Beginner	<i>The cyclist has the skills and understanding to be able to make a trip and undertake activities safely in a motor traffic free environment and as a pre-requisite to a road trip</i>
Level 2 – Introduction to Riding on the Road	<i>The cyclist has the skills and understanding to be able to make a trip safely to school, work or for leisure on quiet roads</i>
Level 3 – Advanced	<i>The cyclist has the skills and understanding to be able to make a trip safely to school, work or leisure on busy roads and using complex junctions and road features</i>

The CSNA process has been developed by TI since 2009, initially in partnership with London Borough of Ealing. To date, audits have been carried out covering part or all of 14 London Boroughs in addition to Lambeth. They have also been carried out for many local authorities in the UK outside London as well as in the Republic of Ireland.

CSNA Levels – roads and paths

Bikeability Levels are used as the basis for eight levels of road and path classification.

Level	Type of route	Suitability for cycle network
Potential Level 1	Motor traffic free off-carriageway routes where either: i. cycling is not permitted or ii. cycling is not possible due to physical restrictions (e.g. barriers) or lack of adequate surfacing	Potentially suitable for cycle route network
Level 1	Motor traffic free off-carriageway routes where cycling is permitted, plus a small number of “home-zone” type streets with low level of calmed traffic <i>NB not all cycle tracks alongside roads will be Level 1</i>	Suitable for cycle route network
Level 2	i. Roads on which a cyclist with Bikeability Level 2 skills (achieved through training or experience) can cycle comfortably and carry out all manoeuvres ii. Cycle tracks & other paths which require a degree of attention equivalent to that needed on a Level 2 road (e.g. shared-use footways crossing frequent side roads or private accesses)	Suitable for advisory and cycle route networks
Off-peak Level 2	Roads that during off-peak periods have Level 2 characteristics but during peak traffic periods have Level 3 characteristics <i>Peaks may be related to rush hour traffic or other specific reasons such as traffic to schools.</i>	May be suitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network
Level 3	i. Roads on which a cyclist with Bikeability Level 3 skills can cycle and carry out all manoeuvres ii. Cycle tracks which require a degree of attention equivalent to that needed on a Level 3 road	Unsuitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network
Beyond Level 3	Roads where level of risk is a barrier to even the most competent and experienced cyclists	Unsuitable for advisory or cycle route networks
Private	Private roads or lengths of a road with restricted access (usually equivalent to Level 2 if public roads)	Unsuitable for advisory or cycle route networks
Level 4	Roads where cycling is prohibited (e.g. motorways)	Outside scope of network

CSNA road and path levels



Example of Level 2 road (Newport St)

CSNA Levels – crossings

All pedestrian crossings on roads classified above Level 2 are classified using similar criteria. These comprise both crossings which cyclists can currently use while cycling (e.g. Toucan crossings) and those where they must dismount (e.g. Zebra crossings). The latter are designed for pedestrian use and hence are assessed from the perspective of a dismounted cyclist wheeling a bicycle.

Crossings rated as 'Beyond Level 3' are very rare. At these crossings the level of risk is so high that their use is not considered advisable.

There are seven levels of classification used for crossings.

Level	Type of crossing	Suitability for cycle network
Potential Level 1	Motor traffic free (grade-separated) crossing where either: i. cycling is not permitted or ii. cycling is not possible due to physical restrictions (e.g. steps)	Potentially suitable for cycle route network
Level 1	Motor traffic free (grade-separated) crossing where cycling is permitted (e.g. subway)	Suitable for advisory and cycle route networks
Level 2	Crossings suitable for a dismounted cyclist with Bikeability Level 2 skills	Suitable for advisory networks
Level 2 - cycling	Crossings suitable for a cyclist with Bikeability Level 2 skills without dismounting	Suitable for advisory and cycle route networks
Level 3	Crossings only suitable for a dismounted cyclist with Bikeability Level 3 skills	Unsuitable for advisory network
Level 3 - cycling	Crossings only suitable for a cyclist with Bikeability Level 3 without dismounting	Measures needed to become Level 2 to be suitable for cycle route network
Beyond Level 3	Crossings where level of risk is a barrier to even the most competent and experienced cyclists, whether dismounted or cycling	Unsuitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network

CSNA crossing levels



Level 2 crossing being used by dismounted cyclist (NB not in Lambeth)

2.2. CSNA assessment process

The auditors cycled around the whole of Lambeth area at least twice to carry out the audit – firstly to assess and record the road and path network, and secondly to assess crossings. The second visit also gave an opportunity to revisit any less clear-cut sections of roads or paths, or to observe conditions at a different time of day/week. In a small number of cases where it was still not clear what classification should be assigned, a further visit was made by a second auditor.

All CSNA findings were recorded on site on digital mapping layers, using Mapinfo GIS.

While undertaking the survey, TI also reported any infrastructure and maintenance issues or defects that were considered to potentially pose a direct significant risk to the public.

2.3 CSNA findings

The CSNA study for the London Borough of Lambeth shows that much of the road network is suitable for Level 2 Bikeability trained cyclists to use in comparative safety, but that these form small areas with barriers between them comprising roads where Level 3 Bikeability skills are needed.

Plans 1 - 6 below show the overall findings of the CSNA (roads, tracks and crossings shown separately to assist legibility). The classification of some areas in neighbouring boroughs are also shown where data is available, including the CSNAs carried out by TI for Merton (2012), City of London (2013) and Southwark (2015) as well as the Bikeability audit carried out for Wandsworth by SDG (2013).

Note that these plans are for indicative use. More detailed versions have been produced by Lambeth from the GIS data supplied by TI.

Roads

Plans 1 and 2 below show an overview of the CSNA classification for all roads in Lambeth. The findings are generally what might be expected, with the majority of main (A and B) roads and secondary distributors classified as Level 3. The only roads in Lambeth classified as Beyond Level 3 were the Vauxhall and Tulse Hill gyratories.

The survey is particularly useful in finding other roads that on the surface would not appear to be Level 3, including those used as rat runs. These are classified as either Level 3 or off-peak Level 2 (depending on whether there is heavy traffic all day or at peak times only). They include many streets whose primary function is residential, where filtered permeability interventions may be appropriate.

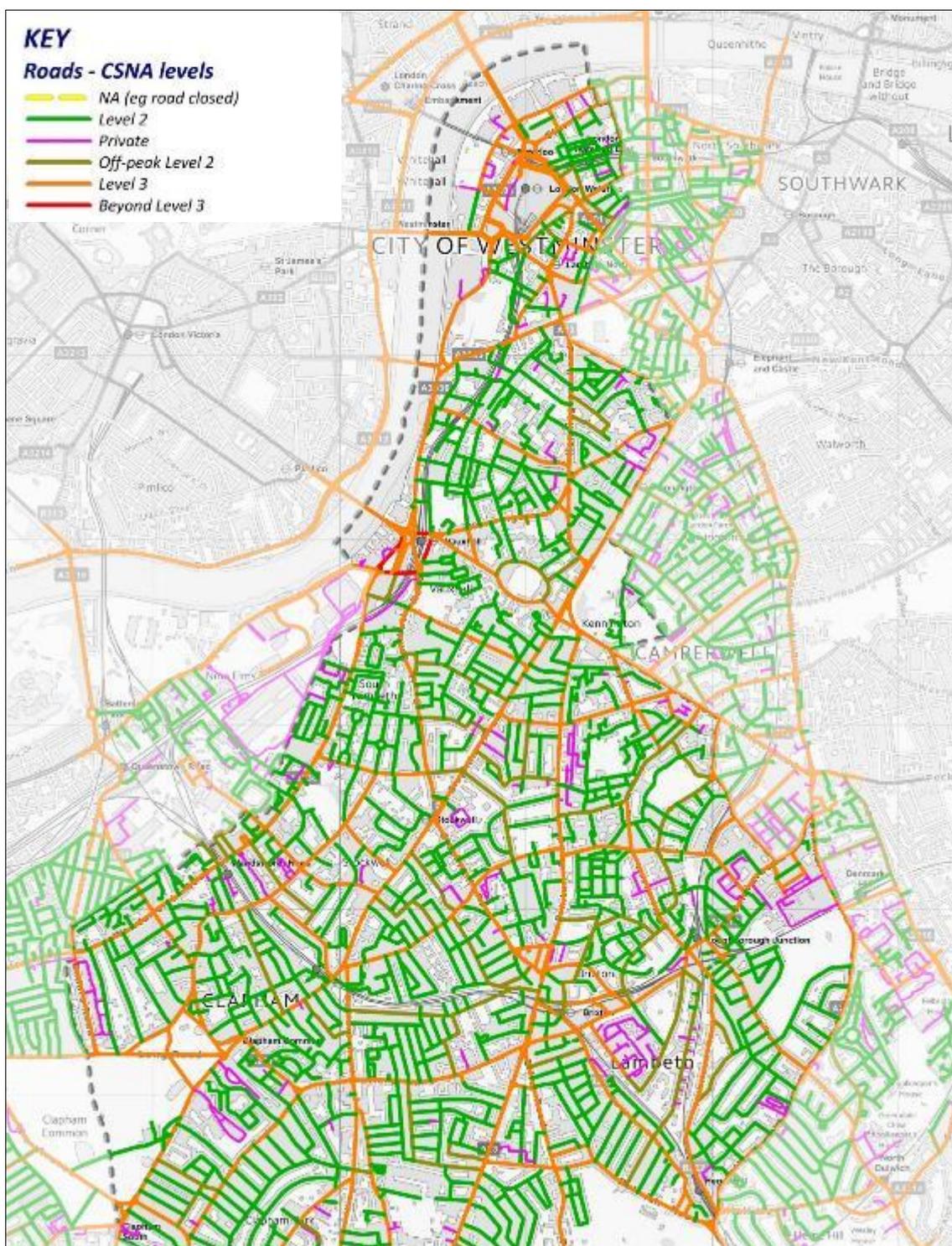
Approximately 431.6km of roads were surveyed across Lambeth. Table 1 shows the lengths of roads in each CSNA classification. It should be noted that these figures are approximate since some sections of dual carriageway are measured in both directions (due to the way roads are recorded in OS Mastermap).

Level	Length (km)	Proportion
Closed for works	0.8	0.2%
Level 2	226.4	52.4%
Private	33.2	7.7%
Off-peak Level 2	38.1	8.8%
3	131.9	30.6%
Beyond Level 3	1.2	0.3%

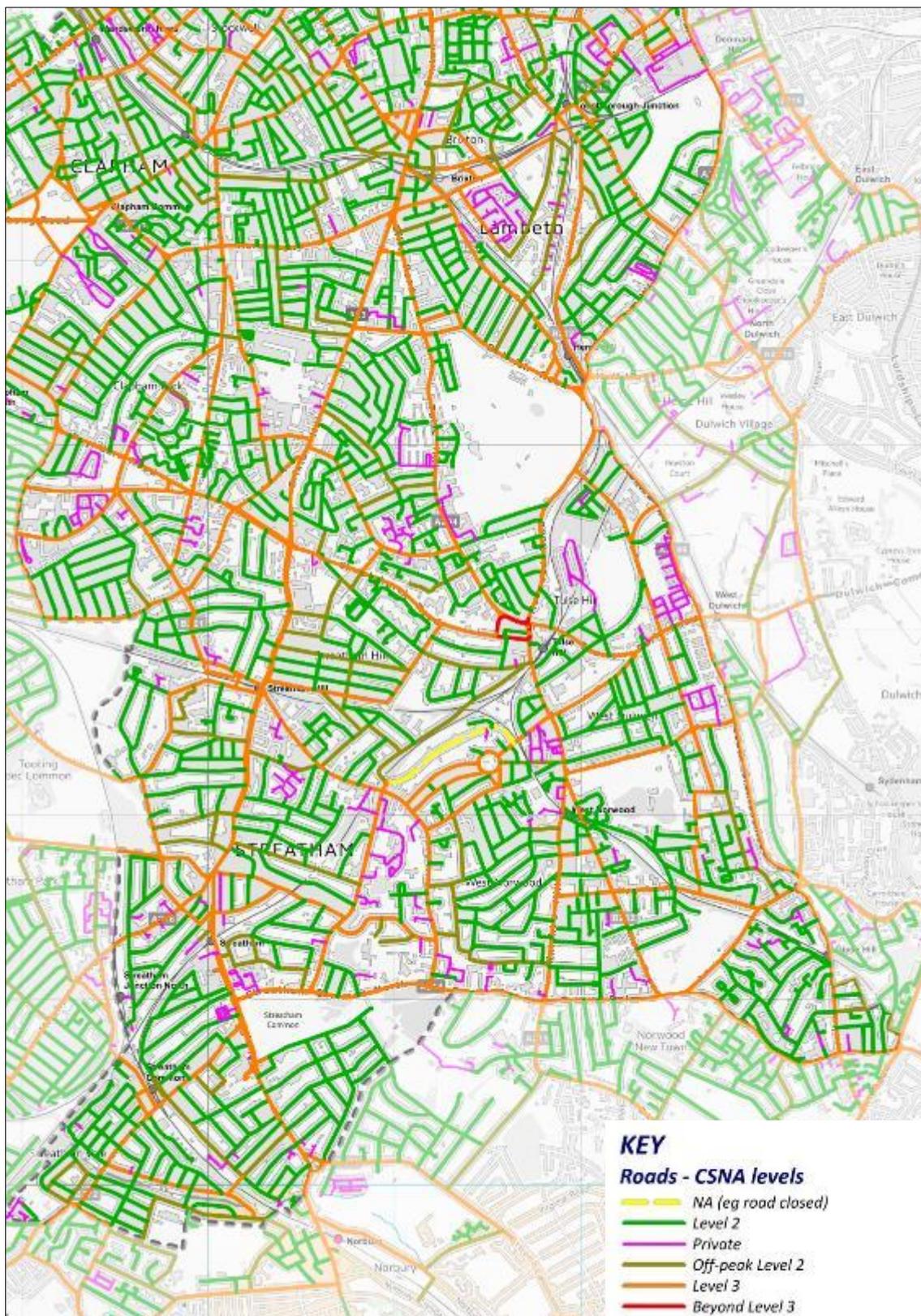
Table 1 Approximate length of roads by CSNA Level

Roughly a third of the network is comprised of Level 3 roads and these are the greatest barrier for people who feel less confident or experienced when cycling. However, the high level of cycling on some of these roads demonstrates they do not necessarily deter more confident individuals. Generally, these will be cyclists trained to Level 3, or who have developed skills at this level through experience.

While these roads may be busy, in some locations cycle infrastructure and pedestrian crossings enable moderately confident cyclists to travel through junctions, where they will feel most at risk, with reasonable ease. However, these are infrequent and do not provide a coherent network suitable for people without Level 3 training or experience.



Plan 1 Roads by CSNA level – north of Lambeth



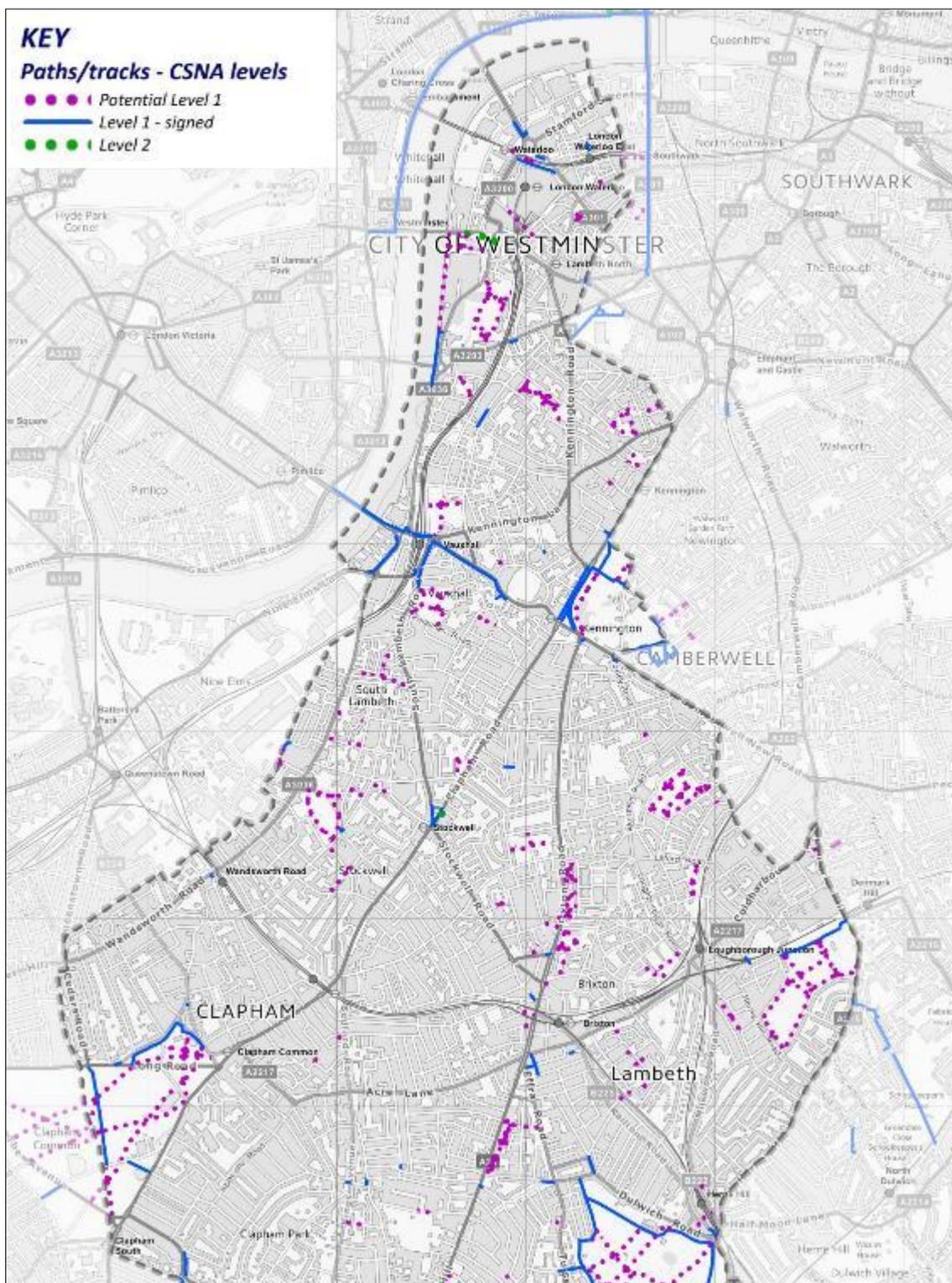
Plan 2 Roads by CSNA level – south of Lambeth

Note that Knolly’s Road (between Streatham and West Norwood) is shown yellow in Plan 2 as it was shut to through traffic for works when surveyed. The effect of this temporary closure is likely to have affected the outcome of the survey on neighbouring roads as drivers will have sought alternatives to the closure. We would therefore suggest a review of the survey in this area once Knolly’s Road has been reopened.

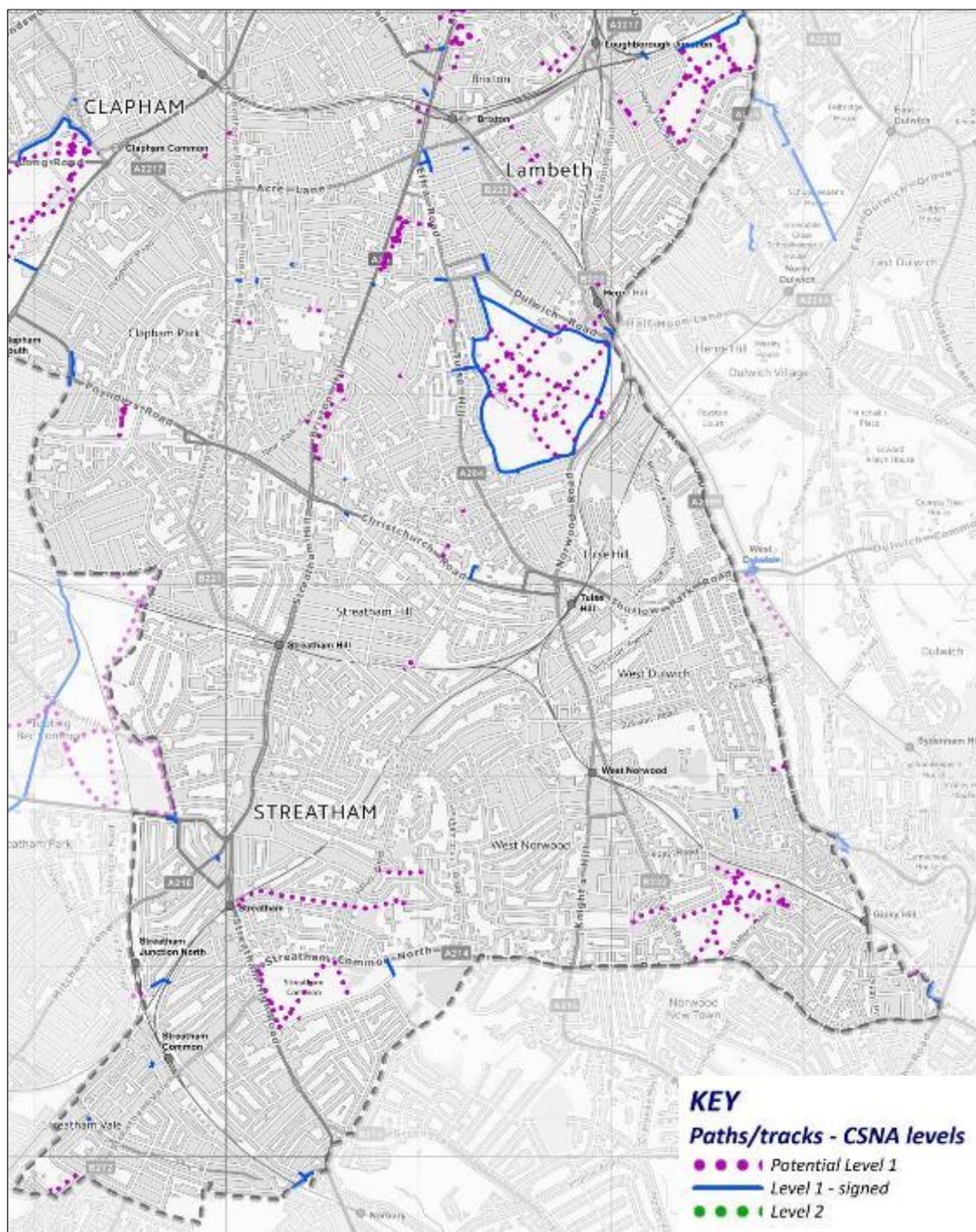
Tracks

Plans 3 and 4 below gives an overview of the cycle tracks and other motor traffic free paths in the borough.

The assessment of these includes both paths/tracks that can be cycled legally (Level 1) and footpaths which might provide useful links for dismantled cyclists wheeling their bicycles (potential Level 1). This category also includes paths where cycling is permitted, but the surface condition makes it difficult or inconvenient.



Plan 3 Tracks – north of Lambeth



Plan 4 Tracks – south of Lambeth

The starting point for the audit of paths and tracks was the OS Urban Paths theme (part of the Mastermap dataset). This contains a substantial number of paths, which would take an inordinate amount of time to inspect all on site.

However, many could be eliminated quickly by a desk-based inspection which showed paths which would give little or no advantage (e.g. alleys to the rear of rows of terraced housing, and other paths with restricted access).

Cycling is permitted in a number of parks and open spaces in Lambeth. Where this is clearly signed paths are shown as Level 1 (e.g. perimeter of Brockwell Park). However, this is not true for every path in every park. Where there is no indication that cycling is permitted we have shown the path as Potential Level 1 (e.g. most of Ruskin Park).

Table 2 shows the lengths in each classification surveyed by Transport Initiatives Around 38.6km of paths and tracks were surveyed.

Level	Length (km)	Proportion
Potential Level 1	28.13	72.9%
1	10.15	26.3%
2	0.32	0.8%

Table 2 Length of paths by CSNA Level

The findings are generally what might be expected, with the majority of paths not available for (legal) cycling. Only two sections of cycle track in Lambeth were classified as Level 2:

- The short section of CS7 (southbound) by Stockwell underground station (due to volume of cyclists at peak times)
- The white line separated shared footways to the north of St Thomas's Hospital (between Westminster Bridge and Westminster Bridge Road). Note that these are being completely reconstructed with completion due in late 2017.

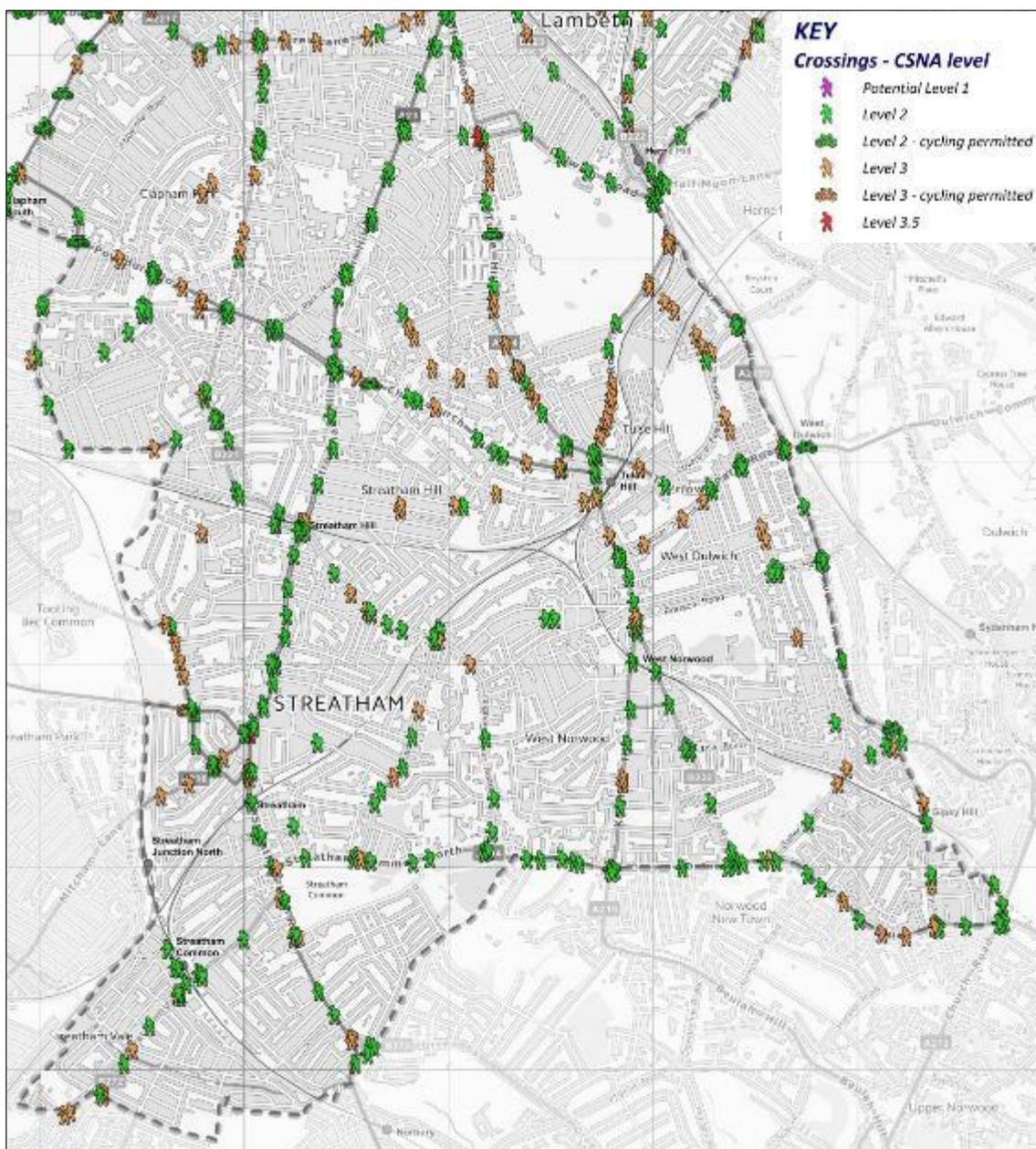
It must be stressed that the classification of a path as Potential Level 1 does not automatically lead to a recommendation that cycling should be permitted or that works should be carried out. As noted above, these paths provide useful links for **dismounted** cyclists. They commonly fall into the category shown in amber on TfL's printed Local Cycling Guide with the notation "*Pedestrian only route which connects cycling sections – you must dismount as cycling is not permitted at any time*".

However, the schedule of paths classified as Potential Level 1 would be useful as the starting point for a programme of investigation of future traffic-free routes for cycling. Whether or not it might be possible for these paths to be suitable for cycling will depend on a number of factors, and would have to be addressed on a case by case basis.

All told some considerable advantage can be gained by cyclists from using a number of the paths available in the borough. In particular, the permission to cycle on some paths in parks in Lambeth provides considerable advantage to cyclists where it exists. It also shows that cyclists and other park users generally coexist quite amicably. This was confirmed by repeated observation during the survey.

The network of cycleable paths in the Rotherhithe peninsula area is particularly good, although some sections have rough surfaces and hence may be less attractive in darkness and in winter. This is a common issue with off road paths, not unique to Southwark.

Compared with other CSNA surveys carried out by Transport Initiatives, Lambeth has a relatively low level of off-road cycling provision. However, there is plenty of opportunity to improve this by increasing access to many useful link paths in the borough.



Plan 6 Crossings – south of Lambeth

Pedestrian crossings are surveyed in a CSNA because they can often provide a safe link which cyclists with Level 2 skills can use on foot to gain access between sections of road classed Level 2. Used this way they can help reduce the barriers that roads classed above Level 2 create for less confident cyclists.

However, only crossings that actually exist can be assessed. The survey does not consider where crossings would be useful but are not provided. Further deeper analysis of the CSNA findings would allow the council to build a picture of where new crossing provision, or improvements in existing provision, could best be provided.

In all, 858 at-grade road crossings in Lambeth (plus one subway and one footbridge) were assessed, with a further 38 crossings shown which were outside the borough. Table 3 shows details of the road crossings at each level in Lambeth.

The proportion of crossings assessed as Level 1 or 2 was around 75%. This is quite high and can usefully be compared to the figures for Merton (47%), Southwark (72%) and Camden (87%, the highest we have assessed in London). This figure gives a rough idea of the overall quality of pedestrian crossing provision.

Level	Number		Proportion	
	Pedestrian only	Cycle / pedestrian	Pedestrian only	Cycle / pedestrian
Potential 1	2		0.2%	
1	-		-	
2	598	45	69.5%	5.2%
3	210	2	24.4%	0.2%
Beyond Level 3	3		0.3%	

Table 3 Crossings by CSNA Level (in Lambeth only)

As with cycle tracks, the findings are generally as expected. Most crossings are not legally available for people cycling, with just over 5% of formal crossings cyclable.

In addition to 210 pedestrian crossings, two pedestrian/cycle crossings in Lambeth were classified as Level 3. At these crossings, described below, less confident cyclists might be deterred from using them while cycling.

- **LC792 Cycle/pedestrian phase crossing of Tooting Bec Road, west arm of signalled junction with Garrad's Road/Tooting Bec Gardens** – refuge too narrow for a standard bicycle, and turns onto the shared use footways to north and south are very tight.

Note: changes have been proposed here by TfL to create a new Toucan crossing of Tooting Bec Road a short distance to the west. It is not clear if the current crossing will revert to a pedestrian only crossing.

- **LC046 Toucan crossing of Waterloo Road just south of Exton St** – refuge too narrow for a standard bicycle, and signing for the shared use footways is unclear.

Note: changes have been proposed here by TfL to create a new Pelican crossing of Waterloo Road a short distance to the north, with the existing crossing removed. TfL incorrectly showed the existing crossing as a pedestrian only crossing in their consultation material.



Level 3 pedestrian/cycle crossings – Tooting Bec Rd (left) / Waterloo Rd (right) (© 2017 Google)

In addition, three crossings were classified as 'Beyond Level 3', all pedestrian only.

- **LC781 Crossing of Streatham High Road (TLRN), south arm of signalled junction with Mitcham Lane** – no pedestrian phase, signal sequence forces pedestrians to wait in very narrow refuge with traffic queuing over the crossing
- **LC376 Crossing of Effra Road, north arm of signalled junction with Brixton Water Lane/Tulse Hill** - no pedestrian phase, signal sequence forces pedestrians to wait in very narrow refuge with traffic possibly approaching from behind
- **LC378 Crossing of Brixton Water Lane, west arm of signalled junction with Effra Road/Tulse Hill** - no pedestrian phase and signal sequence gives little time for slower moving pedestrians to cross safely

Table 4 lists the different types of road crossings with subcategories. A full schedule of crossings has been provided separately in spreadsheet form.

Type	Sub-category (if any)	Number
Cycle phase		2
Cycle only signals		3
Cycle/pedestrian phase		5
	<i>in parallel</i>	2
	<i>with refuge(s) and/or island(s)</i>	23
Dropped kerbs with narrowing (build-outs)		16
Dropped kerbs with refuge or island	<i>Refuge</i>	177
	<i>Island</i>	6
Pedestrian phase		183
	<i>with refuge(s) and/or island(s)</i>	180
Pelican		50
	<i>with refuge(s) and/or island(s)</i>	28
Pedex (formerly Puffin)		9
	<i>with refuge(s) and/or island(s)</i>	3
Raised table at junction		6
	<i>with refuge(s) and/or island(s)</i>	2
	<i>with narrowing</i>	2
Raised table junction		1
Raised table		1
	<i>with narrowing</i>	4
	<i>with refuge(s) and/or island(s)</i>	9
	<i>with refuge and narrowing</i>	3
Signalled junction (no pedestrian phase)	<i>with dropped kerbs only</i>	6
	<i>with refuge(s) and/or island(s)</i>	9
	<i>with raised table and narrowing</i>	1
Bridge / subway	<i>Bridge</i>	1
	<i>Subway</i>	1
Toucan		6
	<i>with refuge(s) and/or island(s)</i>	7
	<i>with refuge on raised table</i>	1
Zebra		45
	<i>with refuge(s) and/or island(s)</i>	28
	<i>on raised table</i>	25
	<i>with refuge on raised table</i>	2
	<i>with narrowing</i>	8
	<i>on raised table with narrowing</i>	4

Table 4 Types of road crossings

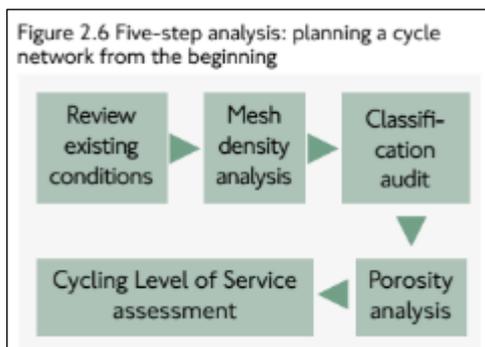
One concern is the number of refuges that are too narrow for dismounted cyclists to wait in them safely (1.6m or less). There were 182 crossings recorded as narrow – over 20% of all crossings. This includes a significant number of zebra and pelican crossings and signalled junctions (i.e. with no pedestrian phase).

Normally crossings with refuges are classed as Level 2, but where refuges or islands are narrow these become Level 3. At these a person walking or riding a standard cycle cannot wait without part of the cycle protruding into traffic. The situation is worse for non-standard cycles such as cargo bikes or child trailers. Such crossings are also unsuitable for wheelchair users and for parents or carers with pushchairs or prams.

3. London Cycling Design Standards (LCDS) analysis

2.1 Background

These stages follow the approach set out by TfL in LCDS 2014. Chapter 2 “*Tools and Techniques*” covers TfL’s recommendations for network analysis, network planning and route development, showing how planning, design and delivery are related. LCDS section 2.3.1 provides guidance on “Developing a coherent cycle network”, setting out a five-step process for planning a cycle network (see LCDS Figure 2.6).



The work carried out for this study covers the first four stages of this analysis process. The CSNA forms part of the first stage with a review of the existing cycle being the remainder of this stage.

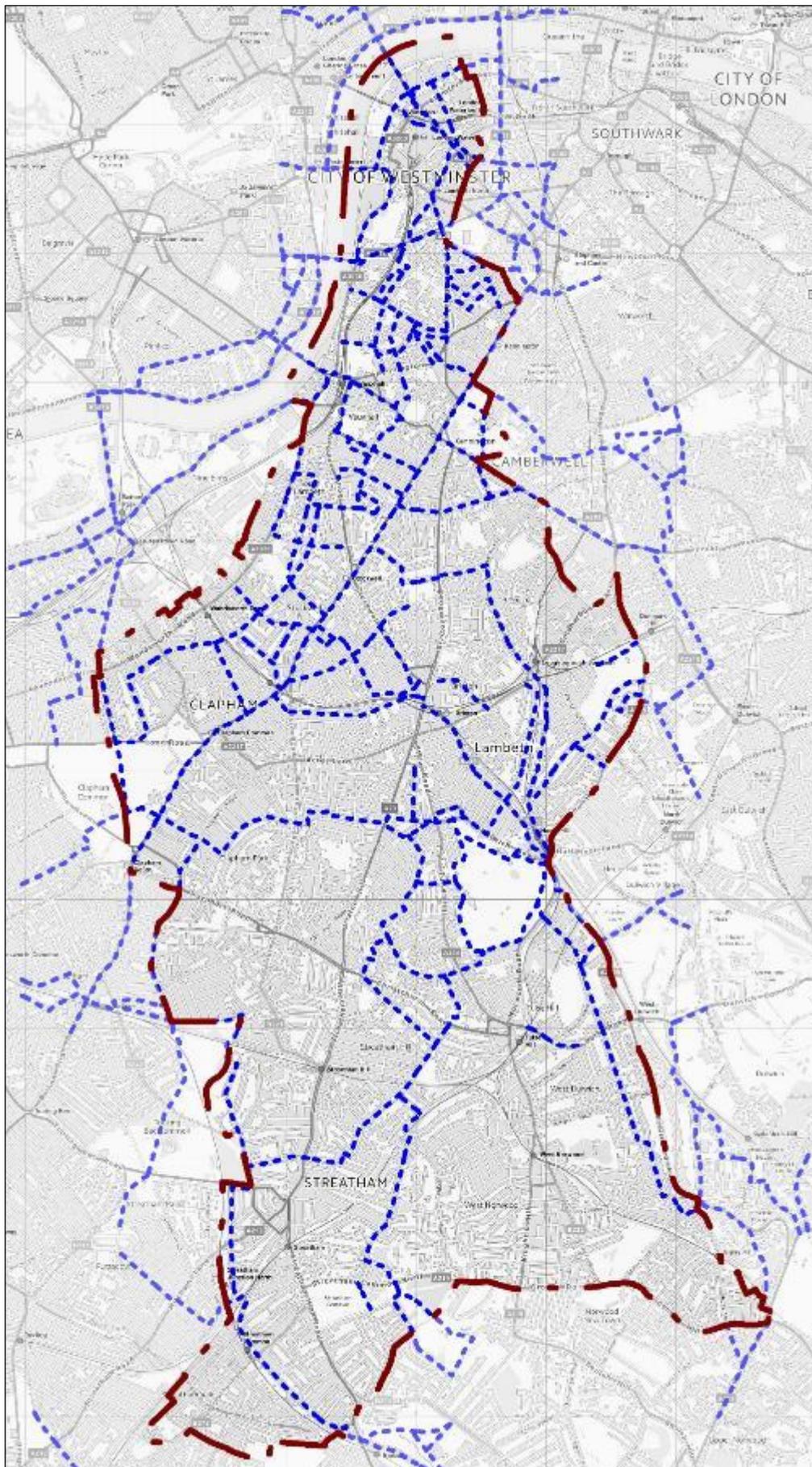
2.2 Review of existing cycle network

This comprised a low-level audit of cycle provision in Lambeth. An initial desktop review was carried out using available information on cycle routes (whether signed only or using dedicated infrastructure). Route alignments were obtained from a range of sources, including Lambeth, TfL (online mapping and printed cycle guides), Google maps and Open Cycle Map.

A basic site audit was then carried out to determine whether routes existed on the ground in a recognisable form (i.e. whether they had any cycle signing). In some locations, this audit was combined with the CSNA for efficiency.

It must be stressed that no quality assessment was carried out. Hence recorded routes ranged in quality from new, fully separated infrastructure along CS6 to older sign-only advisory routes along busy roads or following tortuous back street alignments. Many of these had faded markings or difficult to follow signing. Routes in open spaces (e.g. Brockwell Park) were only recorded where there was some indication

Plan 7 below shows all sections of cycle route recorded during this stage. Note that for neighbouring boroughs only routes immediately adjacent to Lambeth were recorded.



Plan 7 Recorded cycle routes – Lambeth & immediately adjacent areas

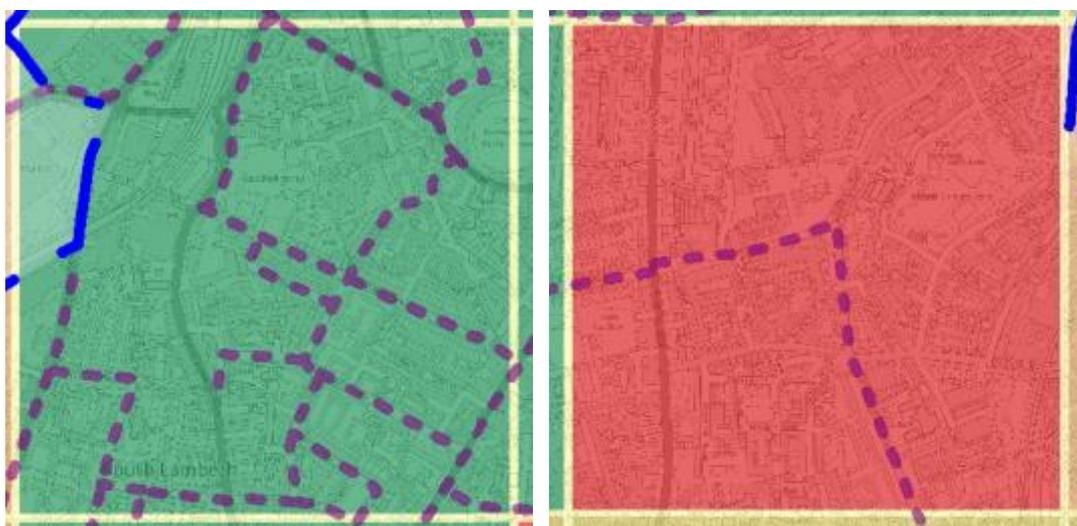
2.3 Mesh Density

In a well-connected cycle network, cyclists should not have to travel far to get to a parallel route of similar quality. TfL's aim, as set out in LCDS, is that nobody should be more than 400m from a route of acceptable quality. This would ideally produce a grid of routes at 400m spacing. How far this aim is achieved can be determined by assessing the density of cycle routes – this is known as 'Mesh Density'.

The Mesh Density is measured by calculating the total distance of cycle routes in each 1km² cell across the borough (including those which lie partly in neighbouring boroughs). If routes are spaced at 400m intervals then there will be a total of 4km of routes in each cell.

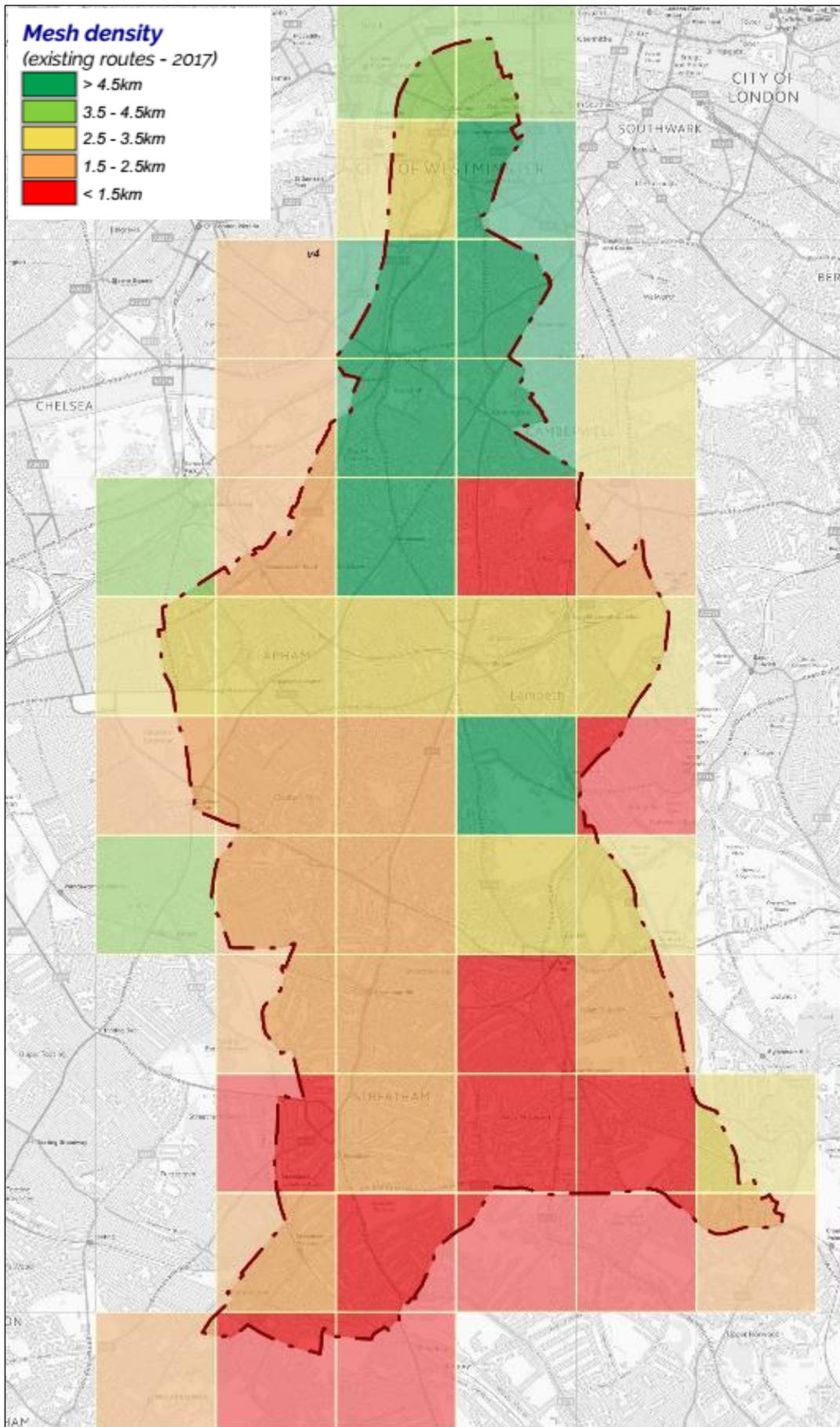
If Mesh Density is tight (high) this means that routes are close together, giving greater choice. On the other hand, if it is loose (low) then there is a greater distance between routes, and people cycling have fewer options for convenient routes.

Examples of high and low Mesh Density cells are shown below.



Cells with high Mesh Density (left) / low Mesh Density (right) showing routes

The assessment of Mesh Density of the existing network in Lambeth shows how well routes serve people currently cycling. This allows the production of a 'heat map' representing the density of routes, shown in Plan 8 below. However, note that as in 2.2 routes have not been checked for quality.



Plan 8 Mesh Density of recorded cycle routes – Lambeth & immediately adjacent areas

2.4 Cycle Accessibility Classification

The next stage in the LCDS analysis is a Cycle Accessibility Classification (CAC). This is a simplified version of the CSNA with a Red/Amber/Green assessment of the highway network (roads and paths). Plan 9 below shows the CAC for Lambeth.

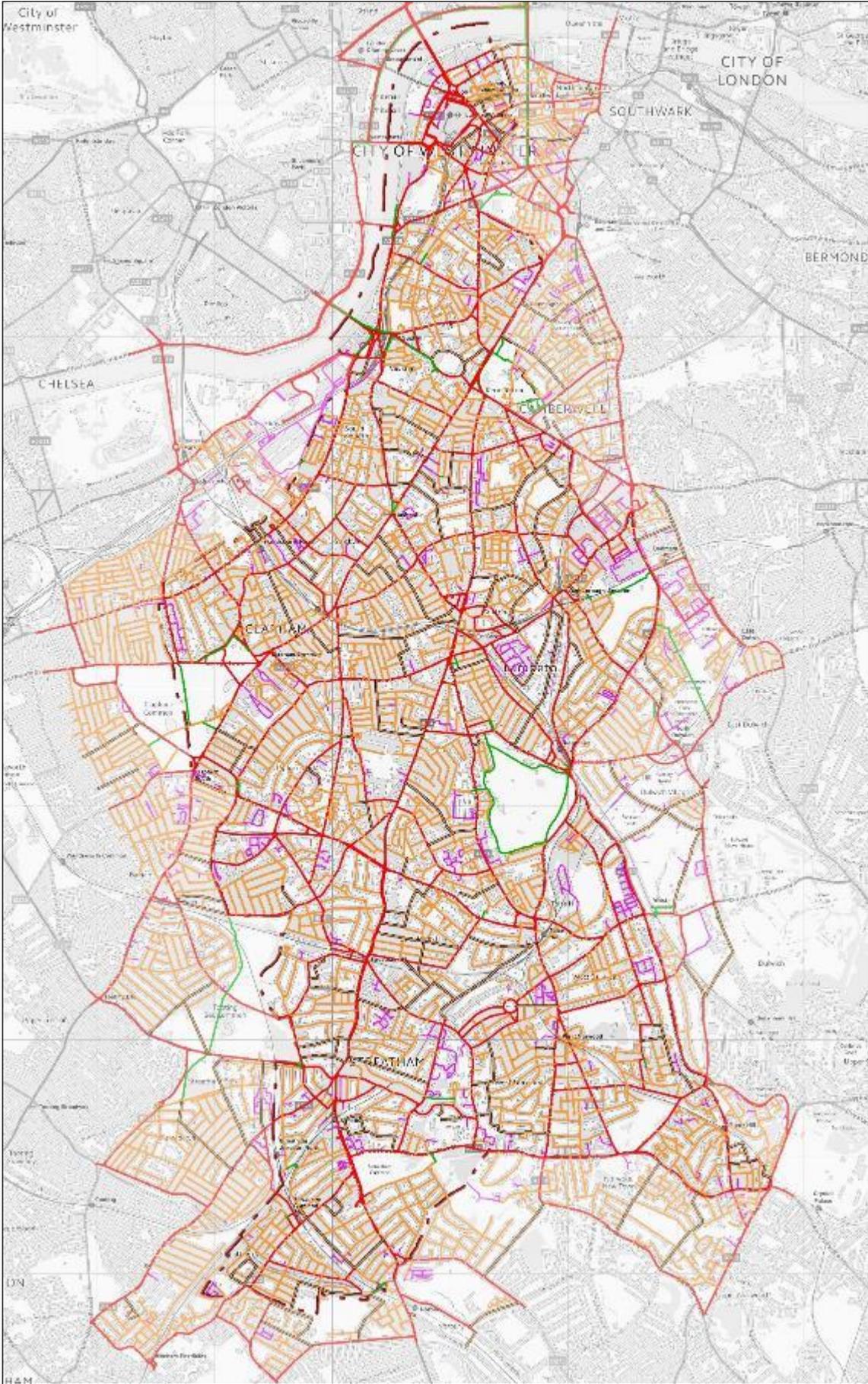
It is important to note that TfL's guidance states that the CAC should default to the worst case. For example, a road classified as Off-peak Level 2 by the CSNA classification (i.e. a rat run) would be considered a "Red Road" under CAC. This is due to it not being suitable for less experienced cyclists at all times.

However, we have used the information available from the CSNA to show clearly on Plan 9 the difference between 'Red Roads' which are unsuitable at all times, and 'Red/Amber Roads' which may be acceptable off-peak. This is only for clarity and we have followed TfL's guidance when carrying out the further stages of analysis.

In addition, we have also shown private roads on Plan 9. While these can often form useful informal routes, by their nature they cannot be signed as cycle routes unless an agreement is reached with the land-owner.

Level	Type of route	Suitability for cycle network
Red	Roads requiring a high level of confidence (equivalent to Level 3)	Measures needed to be classified as Amber to be suitable for advisory or cycle route networks
Red/Amber	Roads that during peak traffic periods have Red characteristics but during off-peak periods may be Amber <i>Peaks may be related to rush hour traffic or other specific reasons such as traffic to schools.</i>	May be suitable for advisory network Measures needed to be classified as Amber to be suitable for cycle route network
Amber	Roads cycleable in comfort by most cyclists (equivalent to Level 2)	Suitable for advisory and cycle route networks
Private	Private roads or lengths of a road with restricted access (usually equivalent to Level 2 if public roads)	Unsuitable for advisory or cycle route networks
Green	Routes free of motorised traffic and suitable for cyclists of any age and experience.	Suitable for advisory and cycle route networks

Amended Cycle Accessibility Classification levels



Plan 9 Cycle Accessibility Classification – Lambeth and adjacent areas

2.5 Area Porosity and Gateways

This stage comprises an analysis of the existing highway network showing how accessible it is for less experienced cyclists. It comprises two elements

- **Gateways** – Gateways comprising safe and comfortable ‘amber crossings’ effectively open up areas to less confident cyclists. They can enable large areas with a range of route options to be accessed, and can also serve as key navigational points between areas.
- **Area Porosity Analysis** – assessment of zones across the district bounded by primary roads with no cycle provision, or other barriers, based on their accessibility by cycle

The analysis is based on the appreciation that areas bounded by ‘Red Roads’ (or other physical barriers such as railway lines) confine people who are less experienced cyclists to a limited area. They will not be able to enter or leave the area with using roads or crossings where they feel unsafe or uncomfortable. These areas can range from large (with many useful destinations and services) to small (meaning that cycling trips do not serve a useful function).

There are three stages to this process:

- i. Define the zones bounded by Red Roads or other barriers (see Plan 10)
- ii. Locate possible Gateways, comprising key crossings of Red Roads and other barriers such as railway lines. This will make use of the schedule of crossings produced as part of the CSNA. (see Plan 11)
- iii. Area Porosity Analysis – combine stages i. and ii. to produce a plan with zones classified by the number of Gateways (see Plans 12 and 13)

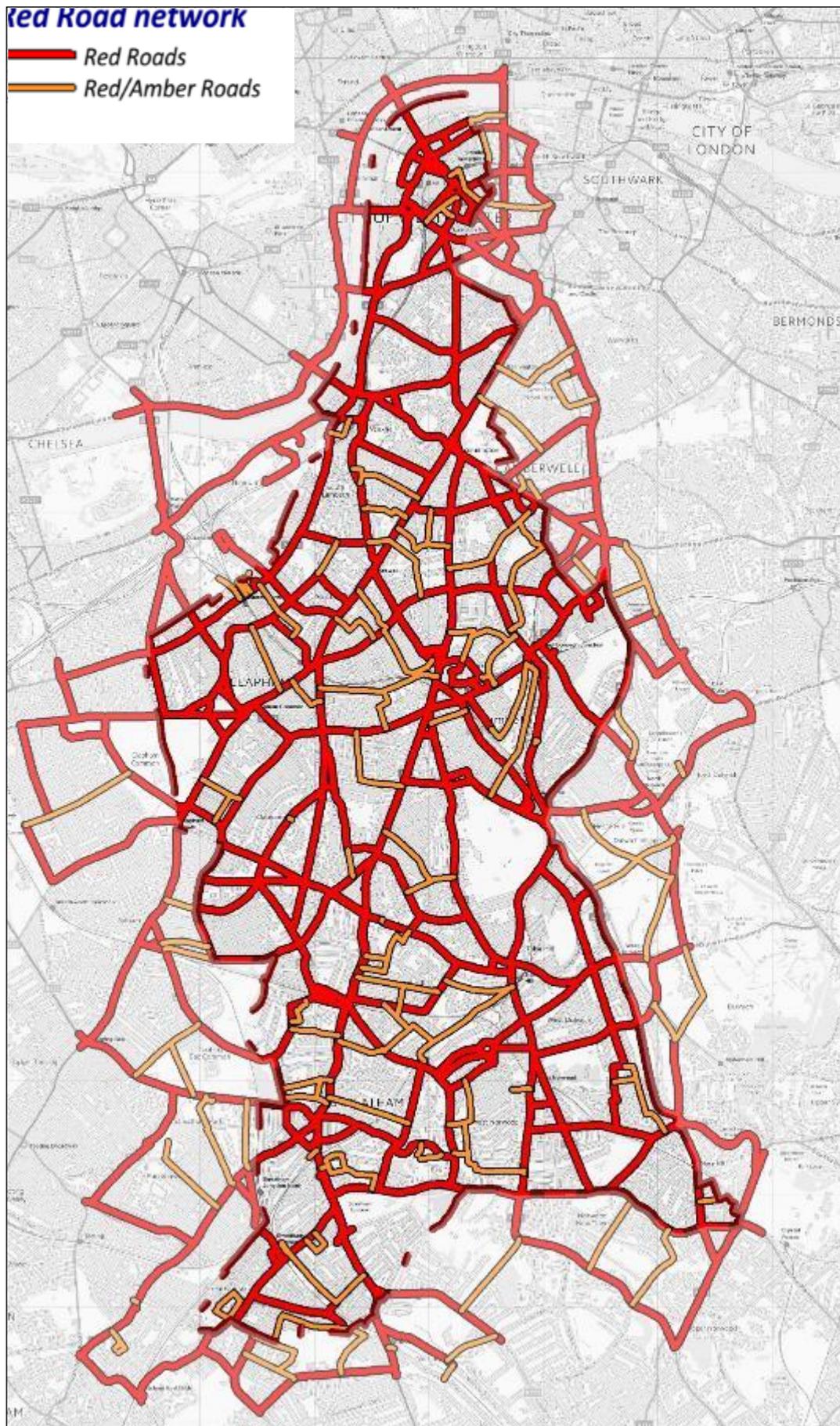
More specifically, barriers in the network can be created by:

- Major ‘Red Roads’ (crossing movements and/or cycling along them)
- Busier ‘Red/Amber Roads’ i.e. rat runs
- Areas of open land
- Rivers, canals and railways
- Impermeable housing and development layouts

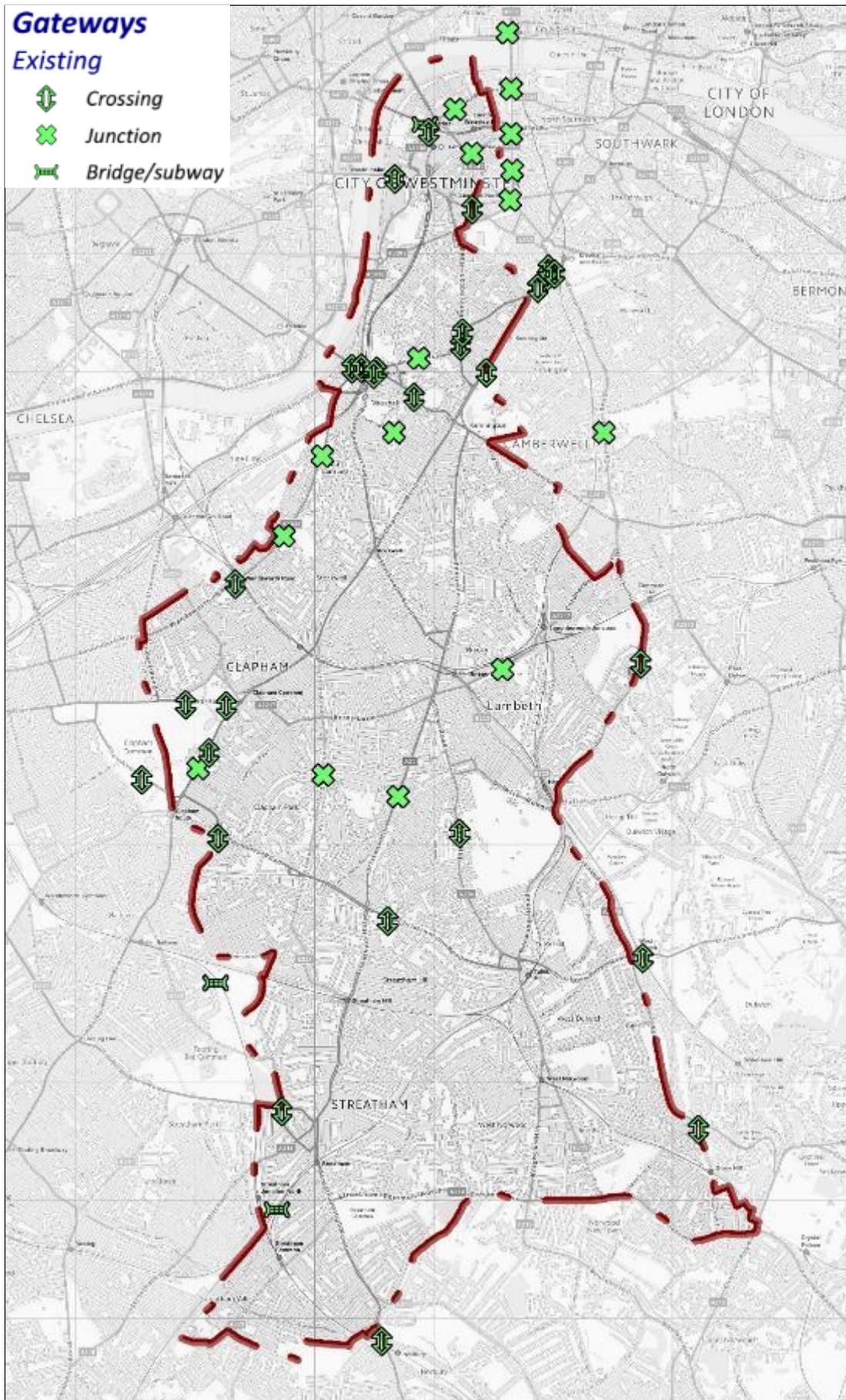
We have used the following classifications for zones. While the first three are those set out in LCDS, we have added a fourth category to reflect our finding that even some ‘Porous’ areas have low accessibility in practice, for example where gateways are close to each other.

- **Impermeable** – areas with no gateways to neighbouring areas
- **Semi-permeable** – areas with one gateway (or two very close together)
- **Porous** – areas with two well-spaced gateways (excluding any very close together)
- **Very porous** – areas with three or more gateways (excluding any very close together)

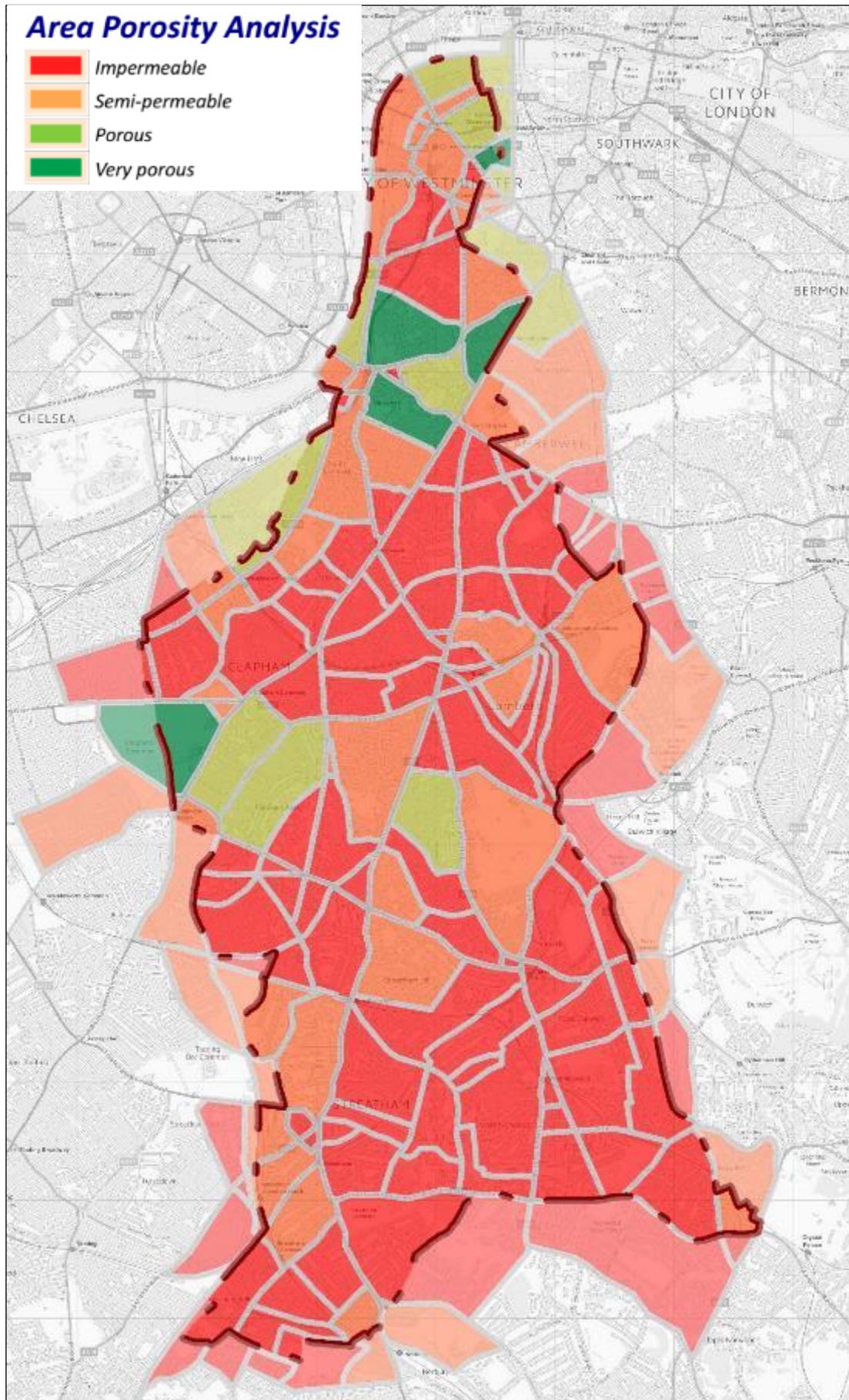
Note that not all barriers are used to define zones. Those that do not completely surround a zone are not used. In addition, where zones are very small (e.g. around Herne Hill station) they have been combined with an adjacent zone.



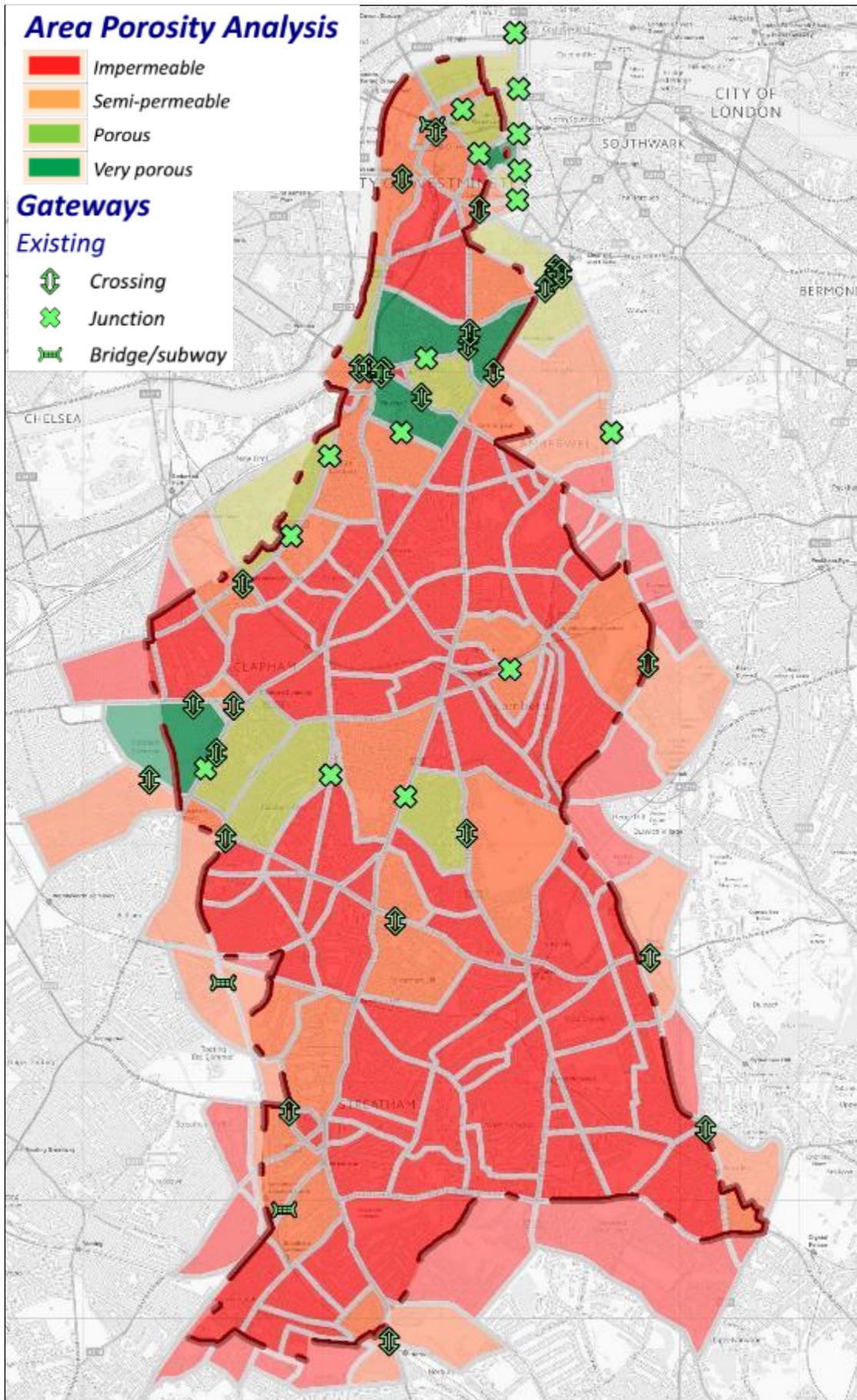
Plan 10 Cycle Accessibility Classification – Red and Red/Amber



Plan 11 Gateways



Plan 12 Area Porosity Analysis



Plan 11 Area Porosity Analysis, with Gateways

4. Assessment of cycling potential

4.1 Background

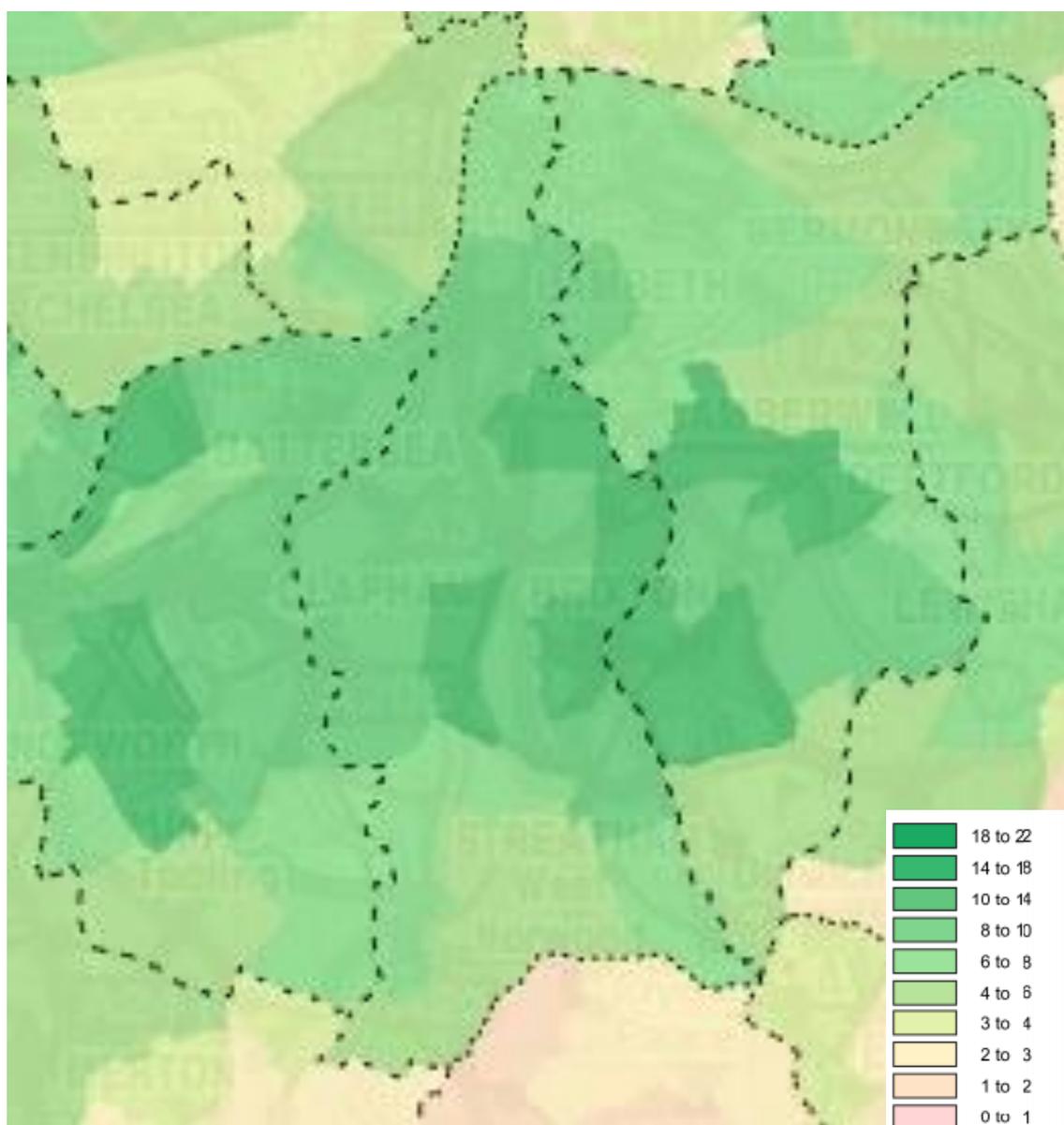
Until mid-2017 the main tools available to assess the potential for cycling was the Propensity to Cycle Tool developed by DfT. This is based on the 2011 census travel to work data.

However, during 2017 TfL published the Strategic Cycling Analysis and we were able to make use of a detailed version of this to assess potential in Lambeth.

Both these approaches were used to help define options for future development of the cycle network.

4.2 Census data

Plan 12 below shows the variation in cycling to work levels across Lambeth



Plan 12 Ward level cycling mode share of all travel to work trips in Lambeth (2011 census)

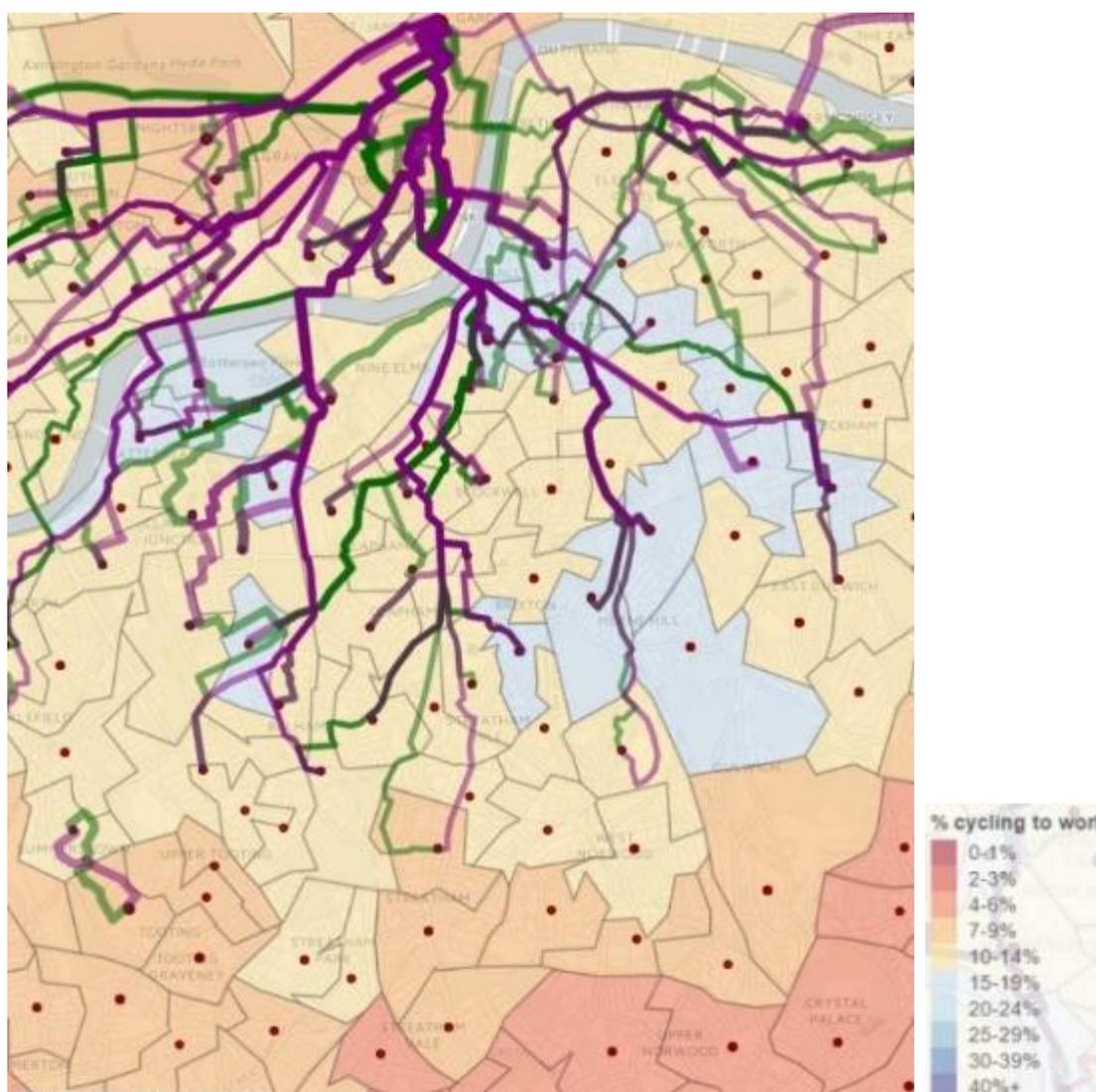
4.3 Propensity to Cycle Tool (PCT)

The Propensity to Cycle Tool (PCT) has been developed for DfT as part of the Cycling & Walking Investment Strategy. It aims to assist transport planners to prioritise investment in new cycle-friendly infrastructure. It does this by offering an online system for assessing the potential for cycling at local, city and regional levels.

The tool was built specifically for cycling and initially shows the current cycling rate across Medium Super Output Areas (MSOA) in a town or borough such as Lambeth. It can then be used interactively to indicate where the highest concentration of cyclists is located and provides an interactive visualization of flows.

PCT allows ‘visioning’ for long-term future and illustrates a variety of possible scenarios when specific barriers are removed – for example if women cycled as much as men, or if e-bikes are taken into account. As a result, the tool can help target specific areas and routes with high cycling potential, and thus facilitate strategic long-term planning.

Plan 13 below shows PCT modelling of the Government target for a doubling of cycling across England. Under this situation, a number of areas show an increase in cycling to nearly 20%. Note that this plan does not show borough or ward boundaries, but Lambeth lies in the centre. It can be seen that the highest increases in cycling are in the centre and north of the borough, with most new trips being radial.



Plan 13 PCT modelling of Government target for doubling of cycling in England

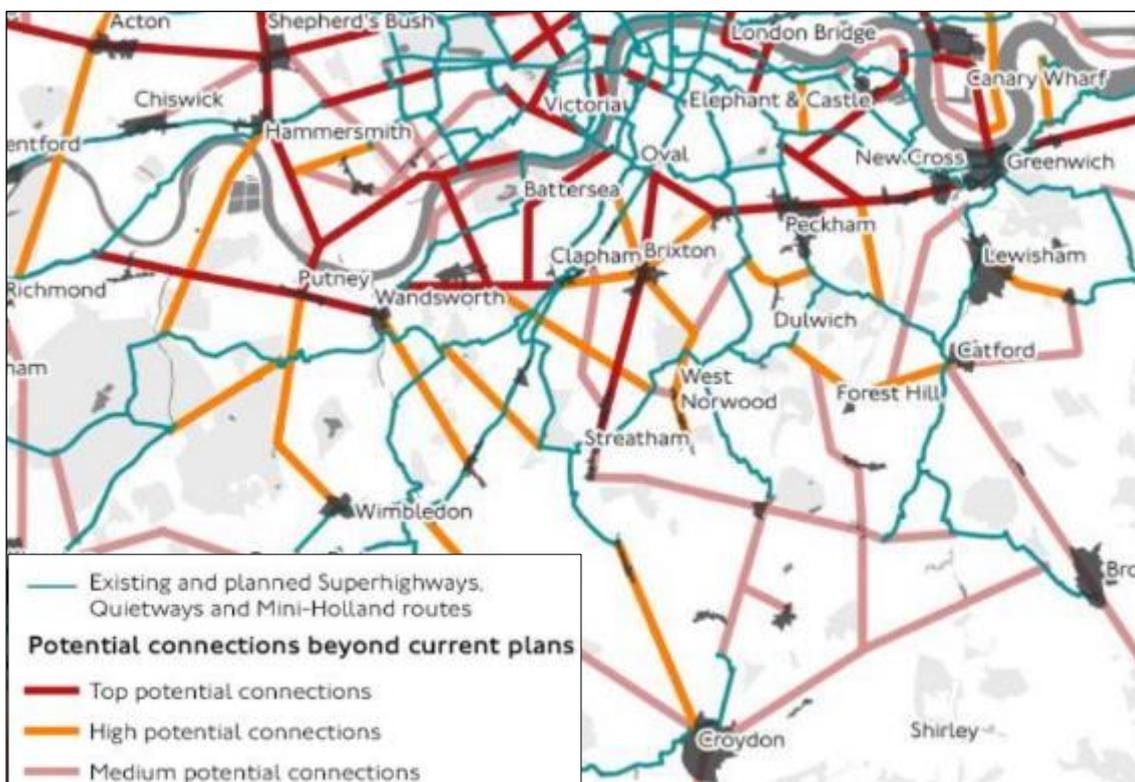
4.5 Strategic Cycling Analysis

TfL published its Strategic Cycling Analysis (SCA) in June 2017, partway through the study. The SCA presents in depth what the latest datasets, forecasts and models show about potential corridors and locations where current and future cycling demand could justify future investment. It also identifies where demand for cycling, walking and public transport coincide, thus highlighting where investment is most needed.

TfL considers that the SCA identifies a number of schematic cycling connections which could contribute to the growth of cycling in London and help achieve the Mayor’s ambitions for Healthy Streets. This analysis is expected to help boroughs plan for cycling in a more strategic way that aligns with the Healthy Streets Approach.

The SCA follows a number of complex and detailed analysis steps to produce a plan of ‘Prioritised Strategic Cycling Connections’. Plan 14 below (Figure 2.4 of SCA) shows an excerpt from this covering south London.

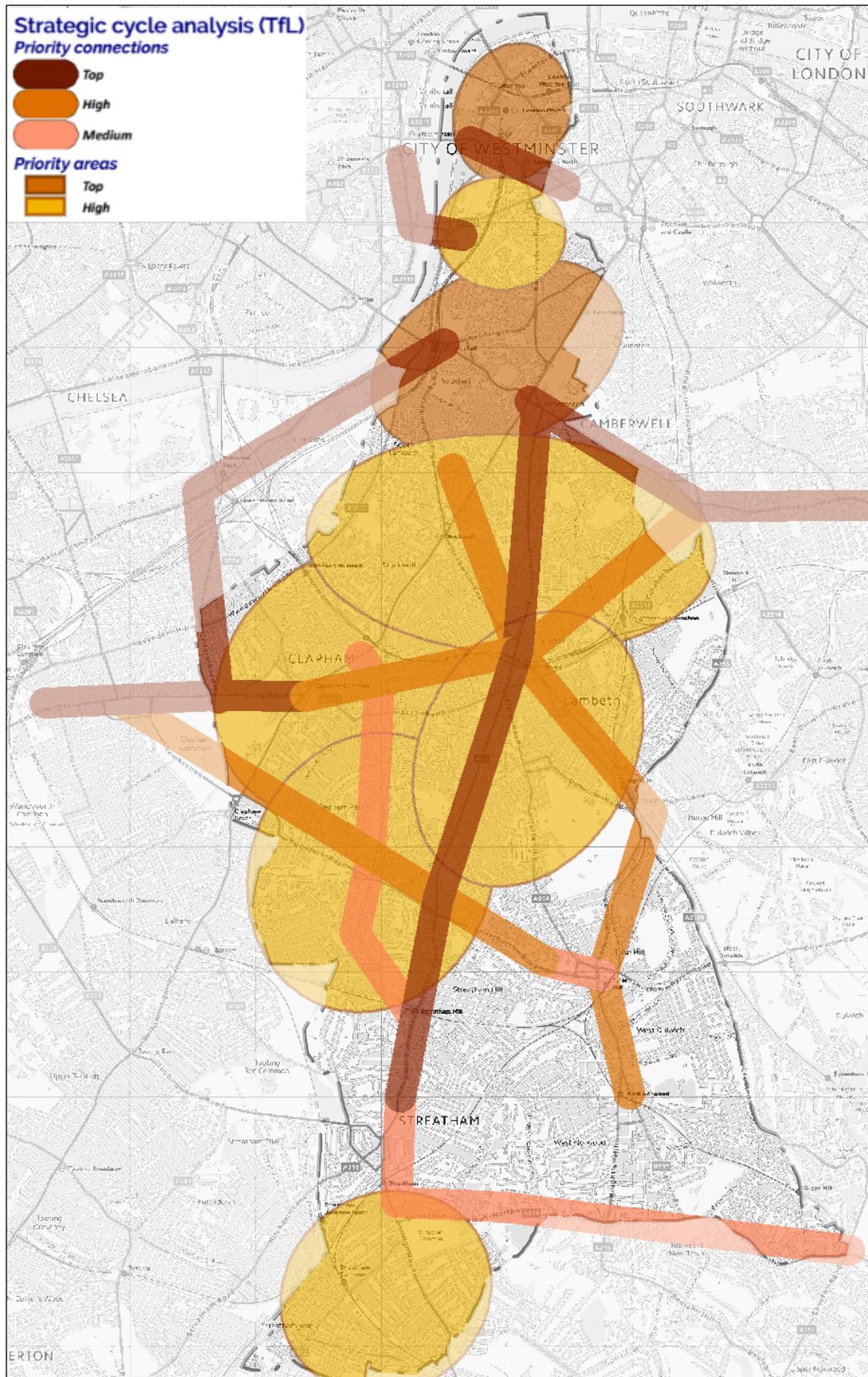
It is important to note that this map does not represent specific alignments for routes, or a delivery plan. These corridors are only prioritised from a cycling perspective. Under the Healthy Streets Approach, they would need to be considered in terms of their wider impacts and deliverability.



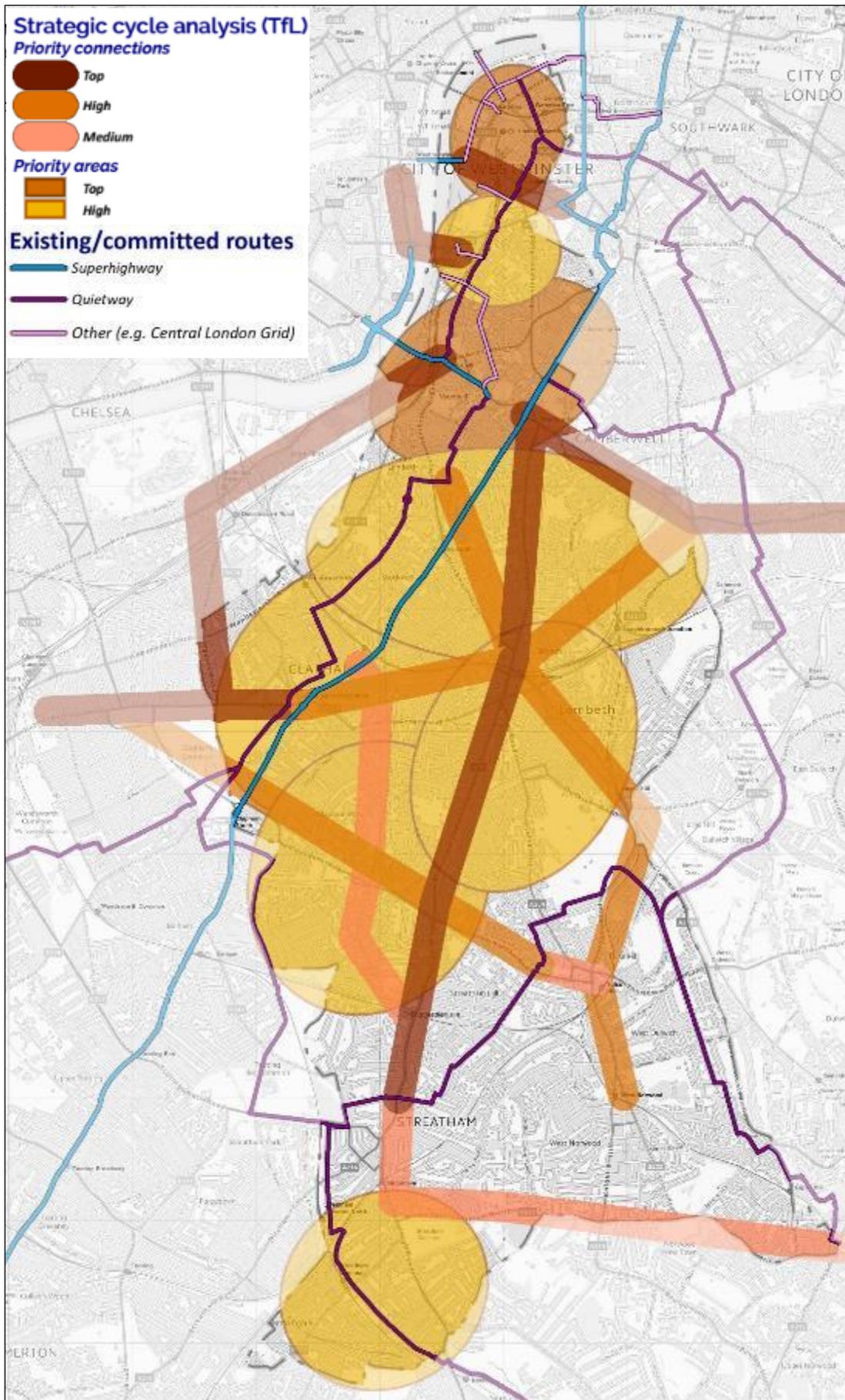
Plan 14 Links with the highest potential cycle flow (top 20% of network) – Figure 2.4 SCA

As part of the study, discussions took place with TfL and more detailed information was provided focusing on Lambeth. We were therefore able to replot the connections in more detail. We were also able to incorporate information in SCA Figure 4.2 which showed area-wide opportunities to expand cycling.

Plan 15 shows the priority connections and areas, while Plan 16 shows these with existing or committed routes.



Plan 15 SCA priority connections and areas, Lambeth (TfL, redrawn by TI)



Plan 15 SCA priority connections and areas, plus existing/committed routes

5. Proposed network

5.1 Approach

Based on the outputs from the cycle network review (supply) and the assessment of cycling potential (demand) we developed a draft schedule of route and location based interventions. We then sifted these using a range of criteria as well as feedback from Lambeth officers. Among the criteria used were the following (note these are not in any priority order):

- Local plans and policies
- Traffic generators, major employment sites, retail areas, district centres
- Major cycle flows identified by SCA
- Areas with a high propensity to cycle (as shown by PCT)
- Existing route network capable of being upgraded (including adjacent boroughs)
- Gaps and barriers
- Roads and junctions with clusters of cycle crashes or a high crash risk
- Suitable sections of existing route network plus Level 2 routes identified by CSNA
- Feedback from stakeholders

5.2 Stakeholder engagement

A number of means of obtaining stakeholder views were used.

Healthy Streets Forum – March 2017

An evening day stakeholder workshop was undertaken to discuss the analysis of demand and the review of the existing network. This was chaired by Lambeth's Cabinet Member for Transport. Those attending included a range of key stakeholders including ward councillors, London Cycling Campaign/Lambeth Cyclists, Sustrans, Living Streets, representatives from local amenity and environmental groups, plus a number of individual residents.

The workshop was facilitated by TI and the Dutch consultancy Mobycon, ensuring an experienced independent view applying the Dutch approach to network planning.

The workshop was relatively informal with issues and opportunities discussed freely. Suggestions were made about key routes/areas to be investigated and ideas were presented on the approach to be taken to route development. Feedback from the workshop provided input into the prioritisation process of key issues and opportunities for network enhancements.

Lambeth Cyclists meeting – September 2017

TI and Lambeth Council gave a presentation on the draft outputs of the study to a meeting of Lambeth Cyclists. Feedback was used to help refine the final details of the review in preparation for the next stage.

5.3 Public consultation

A version of the outputs from the review is currently being used by Lambeth in its public consultation process to obtain views on priorities for future network development.

See <https://lambethhealthyroutes.commonplace.is>

5.4 Proposed new gateways

The audit of crossings was assessed to consider which might be considered to be potential gateways. These took into account the potential for improvements e.g. an existing Pelican might be suitable for conversion to a Toucan, or a location where a Level 2 crosses a main road might be suitable for traffic signals.

However, no assessment of practicality or costs was made at this stage.

An outline schedule of 96 proposed gateways was drawn up, which was then assessed using a range of criteria as well as feedback from Lambeth officers. These are shown in Plan 16.

The criteria used comprised the following (note these are not in any priority order), which were scored as shown in Table 5 below. The maximum score possible was 13.

Criteria	Description	Level	Score
Route	Closeness to existing/planned cycle route	Strategic	3
		Quietway	3
		Local	2
		Link	1
TfL connection	Along corridor assessed by TfL as having good cycling potential	Top	3
		High	2
		Medium	1
TfL area	In area assessed by TfL as having good cycling potential	Top	3
		High	2
		Medium	1
Pedestrian benefit	Could improvements for cycling also benefit walking	Yes	1
School	Closeness to Secondary and/or Primary school	Both	3
		Secondary	2
		Primary	1

Table 5 Criteria for gateway prioritisation

Out of the 96 proposed Gateways, any scoring 7 or higher (i.e. over 50%) were considered to be Top priority, with any scoring 6 considered High priority. These included both crossings on Lambeth roads (considered to be Lambeth's responsibility) and those on TLRN (considered to be TfL's responsibility).

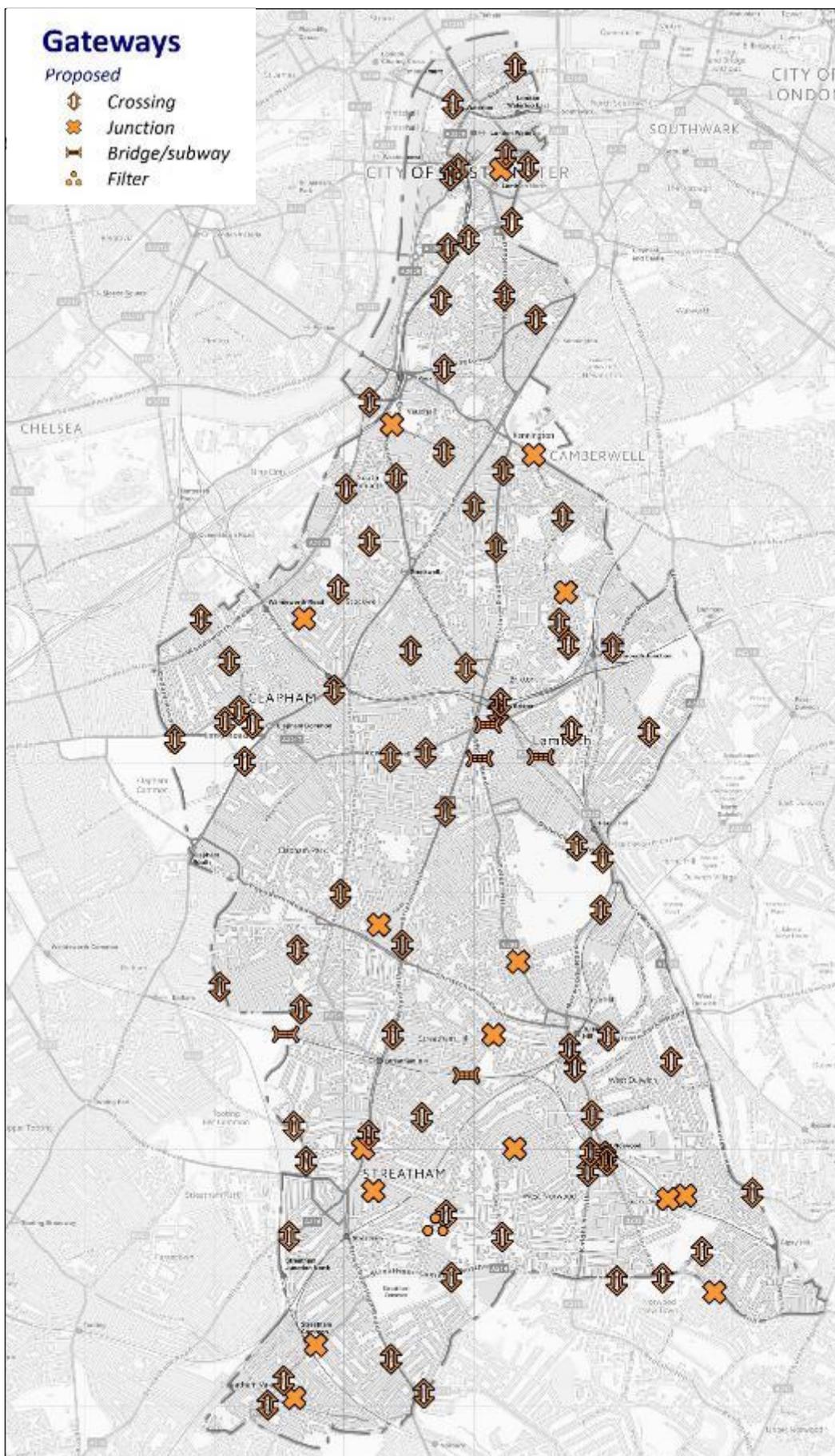
In total, 42 crossings were Top or High priority, as shown in Table 6 below.

Priority	Lambeth	TfL
Top	10	8
High	15	9

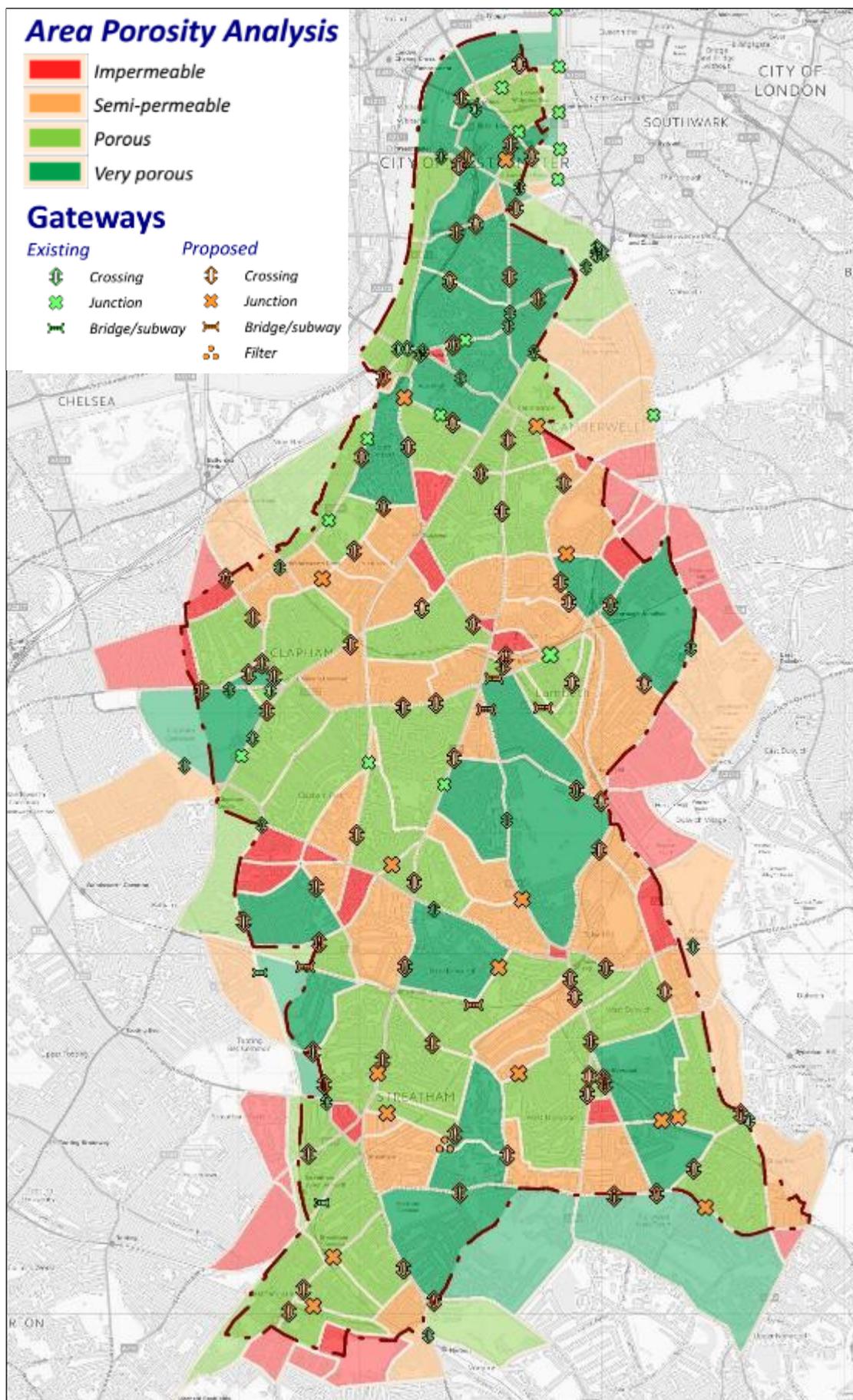
Table 6 Priority gateways on Lambeth roads / TLRN

Further work was carried out on the Top 10 priority Lambeth gateways – see Section 6 below.

If all the proposed Gateways were introduced, this would have a significant effect on the Area Porosity of cycling across the borough. Plan 17 shows the existing and proposed Gateways combined, with the resulting Area Porosity. This shows a significant improvement over the existing situation, shown in Plan 12.



Plan 16 Proposed Gateways



Plan 17 Area Porosity Analysis, with Proposed Gateways

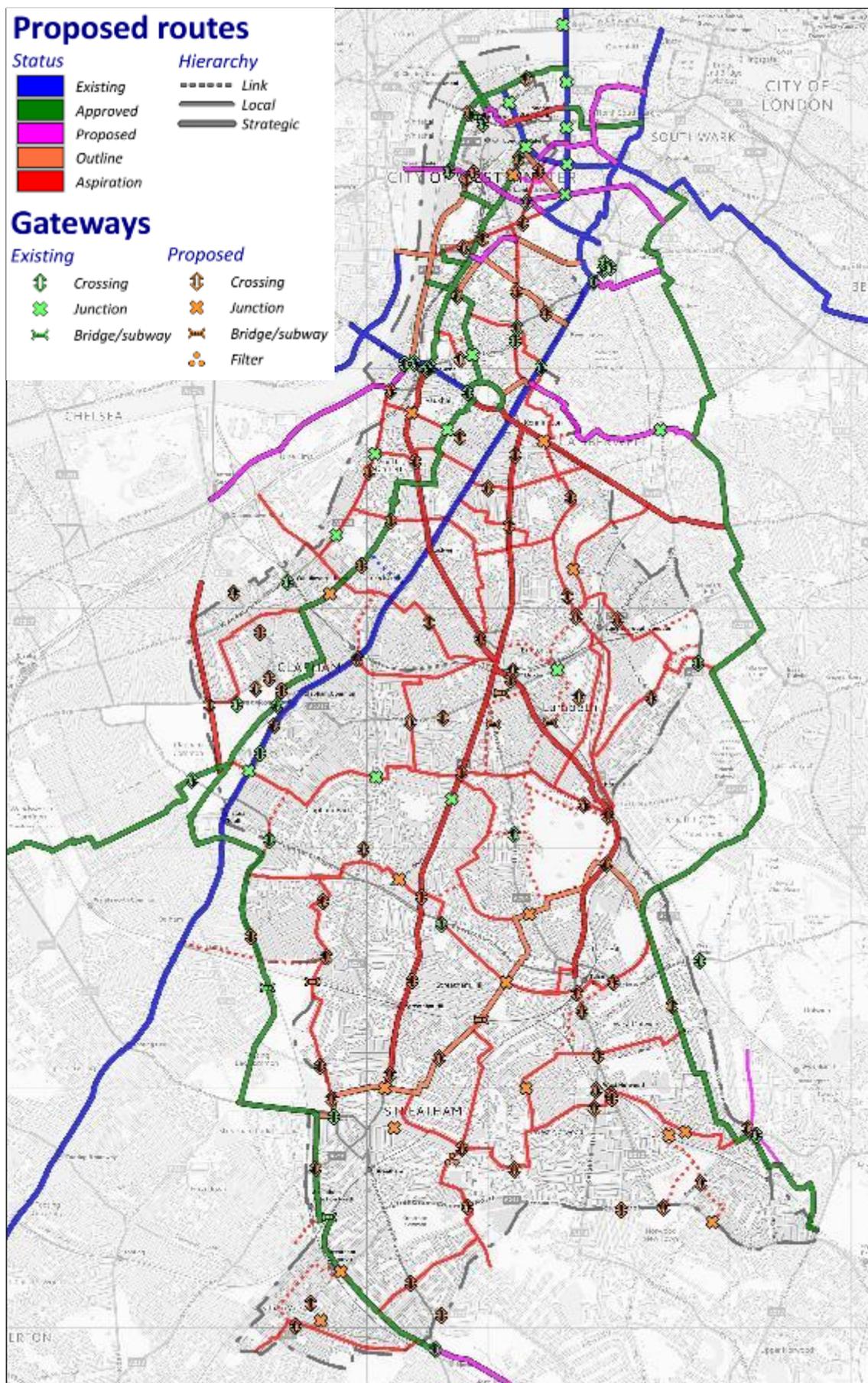
5.5 Proposed new routes

The final stage of the network review was the development of a proposed route network, to be taken forward for future development by Lambeth

Three levels of route development were considered:

- Larger strategic routes to address TfL's connections assessed as having Top/High cycling potential
- Smaller local interventions between proposed new Gateways (thus improving accessibility by cycle) or connecting the more strategic routes.
- Short local links to fill in gaps

Plan 18 below shows the aspirational network, combined with existing, approved and other proposed routes (such as Quietways currently only in outline stage).

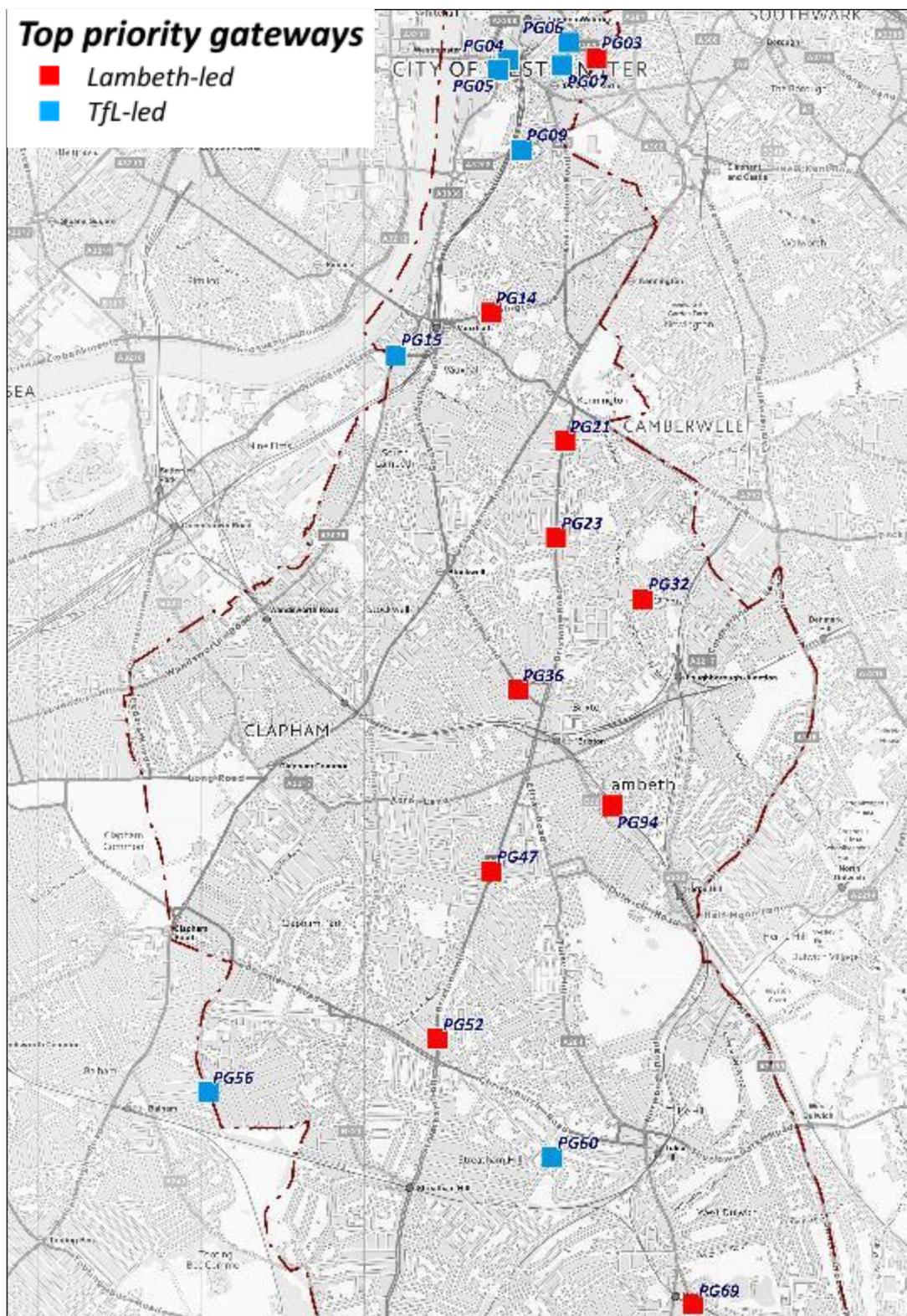


Plan 18 Aspirational cycle network for Lambeth

6. Priority gateways

6.1 Top 10 gateways

Plan 19 below shows the 10 top priority gateways on Lambeth roads, plus the eight top priority gateways on the TLRN.



Plan 19 Top priority gateways

Table 7 below shows the 10 top priority Lambeth gateways.

Ref	Location	Type	Description	Comments	Recommendations
PG03	Waterloo Rd / Morley St	Junction	Priority	T junction to north is signalised	Extend signal junction to include Morley St & filter Gray St
PG14	Kennington Lane	Crossing	Toucan	Links St Oswalds Place & school. Just west of existing gateway	Complete link to Oval Way removing barriers on path to Kennington Oval
PG21	Brixton Rd	Crossing	Pelican	Link between Handforth Rd & Cranmer Rd. Footpaths quite busy, wide on east side	Replace with toucan to south (NB high pedestrian use of west footway)
PG23	Brixton Rd	Crossing	Pelican	Links Hillyard St & Normandy Rd	Convert to Toucan & improve end of Normandy Rd
PG32	Lilford Rd	Junction	Priority junction	Wide crossing between Minet Rd & Knatchbull Rd. Being addressed as part of Greenways scheme.	Add zebra across Lilford Rd
PG36	Stockwell Rd	Crossing	Toucan phase with refuge	Existing crossing links Stockwell Ave to main roads to north & east	Create link between Stockwell Ave & Benedict Rd via bank adjacent to skate park
PG47	Brixton Hill	Crossing	Signalled crossroads with one Level 2 arm	Key link between Brixton Water Lane & Lambert Rd. All green crossing phase.	Cycle crossing to/from west side of Brixton Hill. Also open up route through Rush Common linking all side streets.
PG52	Brixton Hill	Crossing	Pelican	Links Morrish Rd & Holmewood Rd - connecting paths across corners	Convert to toucan & improve links
PG69	Norwood High St	Crossing	Pelican	Awkward series of one-ways	Convert to toucan & improve for two-way cycling
PG94	Somerleyton Passage	Bridge	Subway & path	Staggered barriers, cycling not clearly welcomed	Replace barriers with bollards & allow cycling. Improve open space on eastern side.

Table 7 Highest priority gateways on Lambeth roads

6.2 Development of Gateway options

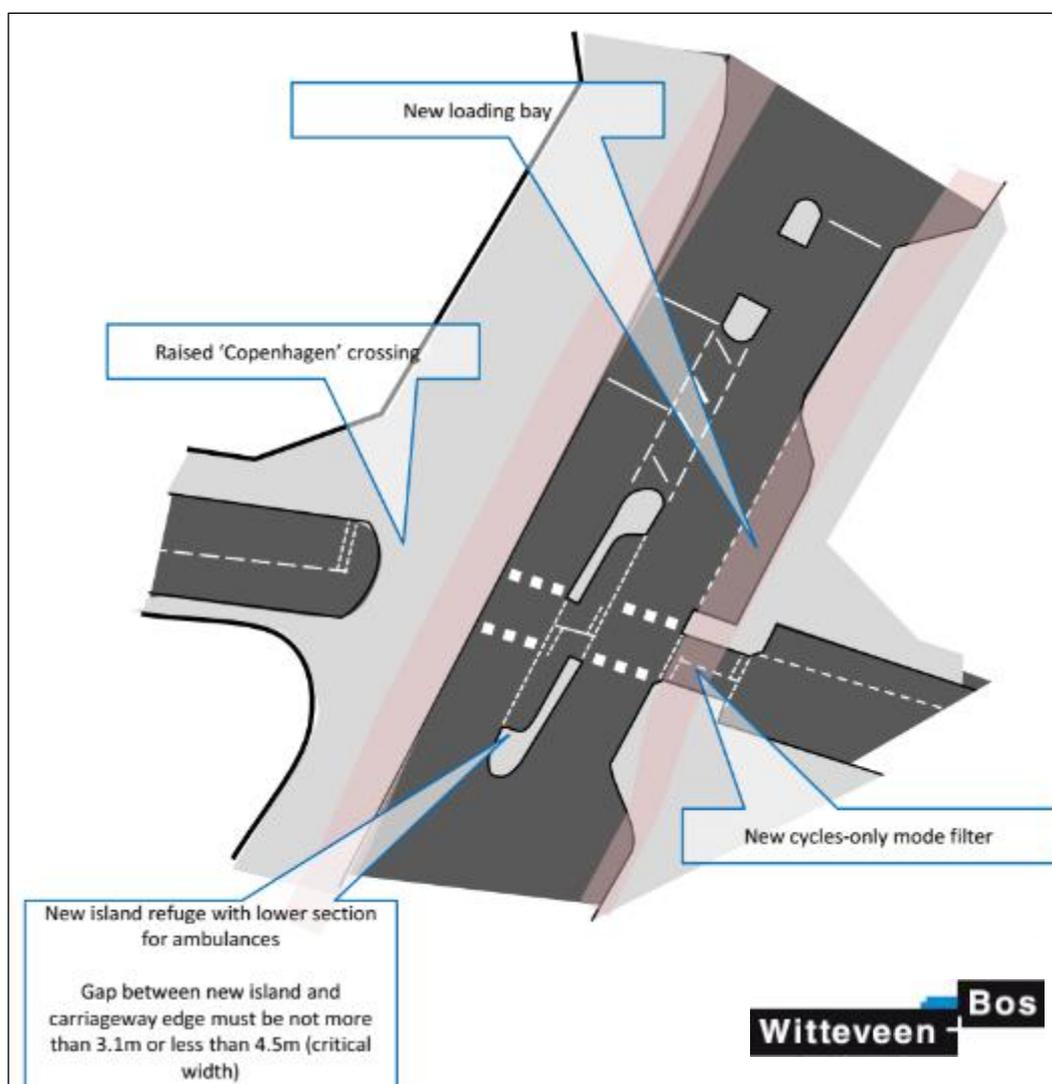
TI worked with our partners Witteveen+Bos to draw up outline sketch designs for gateway options. The main intention was to provide an indication of factors (such as safety, directness and convenience), as well as costings, to allow a final detailed prioritisation to be carried out. For each intervention, W+B provided at least one high level design or description and a draft outline cost.

Initial sketch designs were checked and amended by W+B's Dutch highway engineers who are used to designing high quality, innovative cycling infrastructure. A cost was estimated based on UK data.

The outputs from W+B was sense-checked by TI to ensure that they are compatible with all UK practice, although we will note areas where the retention of Dutch good practice would deliver an improved option.

The proposals from W+B has been supplied to Lambeth separately as Appendix B.

An example of one of the outline designs, for PG03 (Waterloo Rd/Morley St) is shown below.



Appendix A CSNA & LCDS Processes

Cycle Skills Network Audit (CSNA)

1. Purpose

This methodology sets out the background and methodology for a CSNA.

The CSNA classifies sections of roads, including junctions, and off carriageway facilities usable by cyclists, by the Bikeability standard that cyclists would need to have achieved to be able to ride on them in comparative safety. All formal pedestrian crossings on roads identified as having higher risk are also audited and classified in the same manner. Bikeability is the name given to the UK National Standard for Cycle Training.

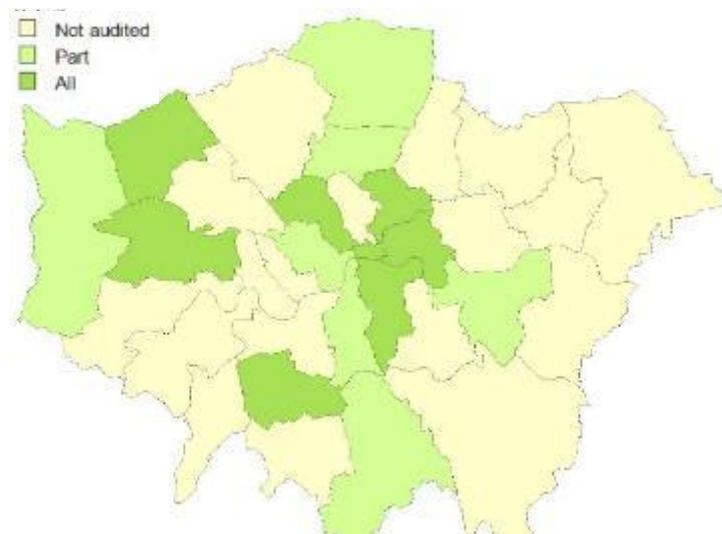
The guidance first explains the benefits of carrying out an audit. It then explains three Bikeability levels of achievement and how these are adapted into eight levels for the purposes of the audit. It then gives detailed explanations of the characteristics that define roads at each of the levels. Finally, the guidance explains how an audit should be carried out.

2. Benefits

The information provided by a CSNA can be used in a number of ways. An audit can be used for some of the purposes set out below:

- It can be used as to identify roads where a more detailed study could be carried out, such as a Cycle Level of Service (CLOs) audit
- It can be used to identify key barriers between areas
- Production of maps or guides for local cycle users enabling them to plan journeys based on their level of skill
- Identifying barriers to cycling and accessibility. Audits include assessment of pedestrian crossings by the Bikeability levels
- Targeting of cycle training to schools where improved skills are most needed within their catchment areas

The CSNA process has been developed by TI since 2009, initially in partnership with London Borough of Ealing. To date, audits have been carried out covering part or all of 14 London Boroughs in addition to Lambeth. They have also been carried out for many local authorities in the UK outside London as well as in the Republic of Ireland.



Boroughs where TI has carried out a CSNA (prior to current study)

3. Bikeability (National) Standard and Audit Levels

The description of the National Standard for Cycle Training (Bikeability) levels is repeated below for clarity. Further details can be found at <https://bikeability.dft.gov.uk>.

The detailed description of the CSNA levels can also be found in the body of the main report.

Level 1 – Beginner	<i>The cyclist has the skills and understanding to be able to make a trip and undertake activities safely in a motor traffic free environment and as a pre-requisite to a road trip</i>
Level 2 – Introduction to Riding on Road	<i>The cyclist has the skills and understanding to be able to make a trip safely to school, work or for leisure on quiet roads</i>
Level 3 – Advanced	<i>The cyclist has the skills & understanding to be able to make a trip safely to school, work or leisure on busy roads and using complex junctions & road features</i>

Bikeability Levels are used as the basis for eight levels of road and path classification.

Level	Type of route	Suitability for cycle network
Potential Level 1	Motor traffic free off-carriageway routes where either: i. cycling is not permitted or ii. cycling is not possible due to physical restrictions (e.g. barriers) or lack of adequate surfacing	Potentially suitable for cycle route network
Level 1	Motor traffic free off-carriageway routes where cycling is permitted, plus a small number of “home-zone” type streets with low level of calmed traffic <i>NB not all cycle tracks alongside roads will be Level 1</i>	Suitable for cycle route network
Level 2	i. Roads on which a cyclist with Bikeability Level 2 skills (achieved through training or experience) can cycle comfortably and carry out all manoeuvres ii. Cycle tracks & other paths which require a degree of attention equivalent to that needed on a Level 2 road (e.g. shared-use footways crossing frequent side roads or private accesses)	Suitable for advisory and cycle route networks
Off-peak Level 2	Roads that during off-peak periods have Level 2 characteristics but during peak traffic periods have Level 3 characteristics <i>Peaks may be related to rush hour traffic or other specific reasons such as traffic to schools.</i>	May be suitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network
Level 3	i. Roads on which a cyclist with Bikeability Level 3 skills can cycle and carry out all manoeuvres ii. Cycle tracks which require a degree of attention equivalent to that needed on a Level 3 road	Unsuitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network
Beyond Level 3	Roads where level of risk is a barrier to even the most competent and experienced cyclists	Unsuitable for advisory or cycle route networks
Private	Private roads or lengths of a road with restricted access (usually equivalent to Level 2 if public roads)	Unsuitable for advisory or cycle route networks
Level 4	Roads where cycling is prohibited (e.g. motorways)	Outside scope of network

Seven levels of classification are used for crossings.

Level	Type of crossing	Suitability for cycle network
Potential Level 1	Motor traffic free (grade-separated) crossing where either: i. cycling is not permitted or ii. cycling is not possible due to physical restrictions (e.g. steps)	Potentially suitable for cycle route network
Level 1	Motor traffic free (grade-separated) crossing where cycling is permitted (e.g. subway)	Suitable for advisory and cycle route networks
Level 2	Crossings suitable for a dismounted cyclist with Bikeability Level 2 skills	Suitable for advisory networks
Level 2 - cycling	Crossings suitable for a cyclist with Bikeability Level 2 skills without dismounting	Suitable for advisory and cycle route networks
Level 3	Crossings only suitable for a dismounted cyclist with Bikeability Level 3 skills	Unsuitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network
Level 3 - cycling	Crossings only suitable for a cyclist with Bikeability Level 3 without dismounting	
Beyond Level 3	Crossings where level of risk is a barrier to even the most competent and experienced cyclists, whether dismounted or cycling	Unsuitable for advisory network Measures needed to become Level 2 to be suitable for cycle route network

4. Carrying Out the Audit

Initial scoping

An initial desktop scoping of the area can be carried out to establish the roads most likely to be classified higher than Level 2. This enables a timetable to be devised for the practical audit on site.

A quick cycle ride around the area on the roads identified as probably higher than Level 2 is carried out to help familiarise the auditors with the area, although the audit may begin without such a ride having been undertaken.

Roads classified higher than Level 2 (including off-peak Level 2)

These are generally major routes through an area and mixed residential/local distributors. Some apparently minor residential roads may be used as rat runs, particularly in peak traffic periods, which may raise the level of classification. Auditors should make measurements of road widths where clarification is considered necessary. This will most likely be in situations where some of the following features are identified:

- where road width may be the factor that would give a higher classification
- where there is an obvious change in road width
- where regular parking on one or both sides of the road changes the effective road width for through traffic (measure of both total road width and available carriageway width may be made at these points)
- where there are pedestrian islands, the width of each carriageway lane and of the island may be recorded
- at any other points where the auditors feel width may be a factor

The pedestrian and cycle crossings on these roads should all be classified and recorded.

Roads classified Level 2 or lower

Estate roads and terrace streets will usually have very similar characteristics. It should not be necessary to ride along every one of these roads. After consulting a map of the road network, it will often be possible to cycle along each residential distributor and view down the lesser residential streets from their ends to confirm their status. However, particularly where there are cul-de-sacs, it may be necessary to cycle down Level 2 streets to identify and tracks/paths that may exist between them and other streets.

In some residential streets the width of available carriageway (may be that within lines of parked cars on either side of the street) can be a factor in classification at Level 2. However, in this case the level of traffic should allow any measurement to be carried out by a single auditor. Observation may also preclude measurement as it may be obvious that the road width is too narrow for two vehicles to pass.

Only identified cycle-only crossings on Level 2 roads should be recorded although they will never be classified at higher than Level 2.

Crossings

All pedestrian and crossings on roads classified above Level 2 are classified, as well as all cycle crossings on Level 2 roads.

These comprise both crossings which cyclists can currently use while cycling (e.g. Toucan crossings) and those where they must dismount (e.g. Zebra crossings). The latter are designed for pedestrian use and hence are assessed from the perspective of a dismounted cyclist wheeling a bicycle.

Crossings rated as 'Beyond Level 3' are very rare. At these crossings the level of risk is so high that their use is not considered advisable

LCDS

Outputs

The analysis methodology broadly followed the guidance set out in the London Cycling Design Standards (LCDS) 2014.

A number of outputs were set for the study. These comprised different aspects of the strategic analysis of the current cycle network, informed by the 2017 CSNA. T

- **Existing network** – assessed by TI in partnership with Lambeth officers
- **Mesh Density Analysis (MDA)** – an assessment of the whole borough, together with production of a heat map representing the density of the proposed cycle route network
- **Area Porosity Analysis (APA)** – an assessment of the whole borough, together with production of a RAG map based on the number of access points to the identified cells (based on up-to-date CSNA data)
- **Accessibility Classification** – LCDS compatible network classified into Red, Amber and Green roads/routes, derived from CSNA
- **Lambeth Strategic Cycle Analysis** – redrawing of the TfL SCA showing areas and corridors considered to have high cycling potential
- **Proposed network** – assessed by TI in partnership with Lambeth officers with input from TfL Strategic Cycle Analysis (SCA)

Process

The following stages were followed:

- i. **LCDS-compatible network** defined using the 2017 CSNA
- ii. **Route network** derived from a combination of data from Lambeth officers, existing routes as surveyed on the ground, and Cycle Superhighway and Quietway routes supplied by TfL
- iii. Route network overlaid with 1km² cells and the length of route in each cell calculated using GIS to give the **Mesh Density**
- iv. **Mesh Density Analysis** plan produced using a 5 level colour coding agreed with Lambeth. NB This differs from LCDS guidance in order to make it consistent with the output from stage ix (i.e. lower density cells in red, higher density cells in green).
- v. Output from stages i and ii combined, with Amber Road and Green Routes removed, to produce the **“Red Road Network”**.
- vi. Red Road network combined and **bounded areas** derived using GIS. Limited adjustments made e.g. if very small areas or in the centre of junctions.
- vii. Schedule of **Gateways** produced, defined as Amber and Green crossings using the LCDS definitions (see 2.4 above)
- viii. Number of gateways used to calculate the **Area Porosity** for each area, based on:
 - Impermeable:* 0 gateways
 - Semi-permeable:* 1 gateway
 - Porous:* 2 gateways
 - Very Porous:* 3 or more gateways

NB close / adjacent gateways connecting the same areas were discounted as these do not add to the porosity of the area
- ix. Plan showing **Area Porosity Analysis** produced, based on the TfL guidance, but enhanced to reflect four levels rather than three