# Chapter 2

# Tools and techniques

## 2.1 The Tube Network for the Bike

### Overview

**2.1.1**

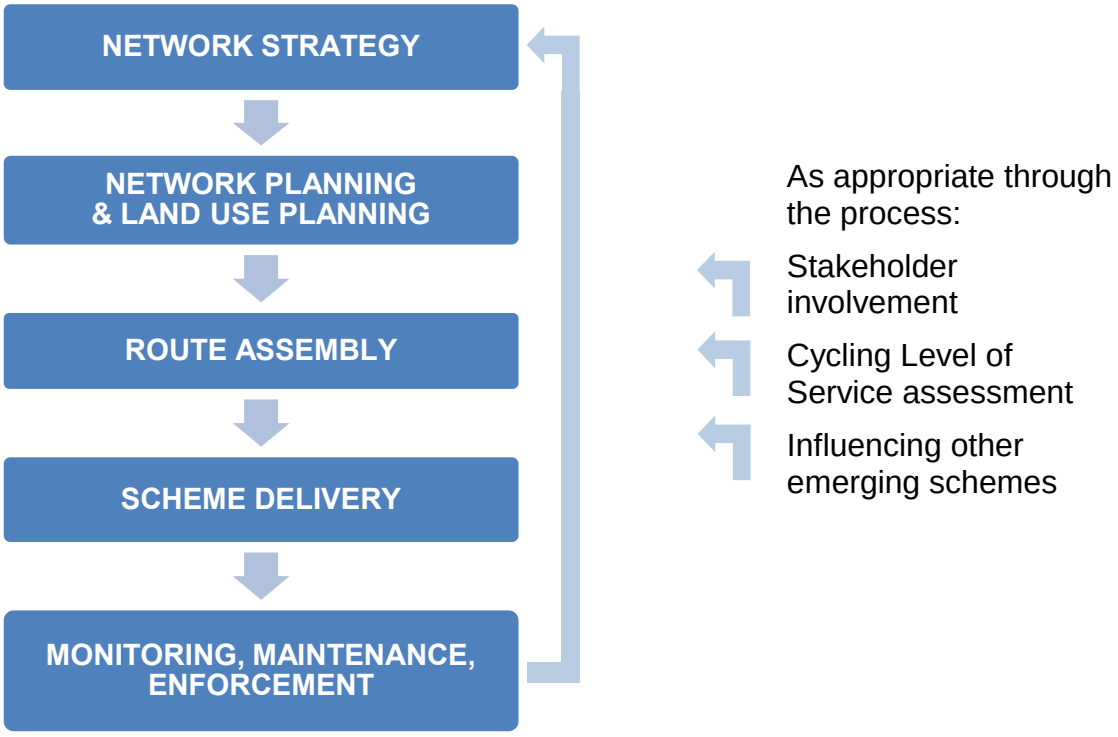
This chapter sets out network planning, route planning and implementation tools and techniques, showing how planning, design and delivery are related. All the tools described here are intended to serve the over-riding objectives of efficiently delivering safer, more comfortable, direct, coherent, attractive and adaptable cycling infrastructure. They should be applied in a proportionate manner.

The level of route delivery planning, design and stakeholder involvement needs to be appropriate for the level of intervention proposed. Where there are limited changes to be made, as is likely for large stretches of Quietway routes, then a minimal approach should be taken and procedural demands should not be allowed to impede delivery.

**2.1.2**

The relationship between different techniques and procedures is shown in figure 2.1 below.

**Figure 2.1 Overview of techniques and procedures for delivery cycle infrastructure**



## London's cycling network strategy

**2.1.3**

The network strategy for London is the development of the 'Tube Network for the Bike' approach described in The Mayor's Vision for Cycling. Its application in London is geared to enabling more people to cycle more safely, mindful of the expected growth in numbers of cyclists. Routes and schemes that contribute to the network in outer London are aimed at transforming cycling in areas where numbers of cyclists may be low or stable but where there is great potential for further growth.

**2.1.4**

The elements that make up the network are:

- **Cycle Superhighways**
  New Superhighways
  Upgrade of the four existing Superhighways

- **Quietways**
  Central London Grid
  New Quietways in inner and outer London

- **Mini-Hollands**
  Transformation of town centres and associated areas in three boroughs: Enfield, Kingston-upon Thames and Waltham Forest

**2.1.5**

Different approaches have been planned for areas of different cycling potential. Area-wide infrastructure is appropriate for central London or specific outer London town centres, where there is a high density of potential and existing cycle journeys. Outside these urban centres, the cycling potential is less concentrated, so planned infrastructure such as Superhighway or Quietway routes will be adapted accordingly.

### Superhighways

**2.1.6**

The first four Superhighways brought about an average 77 percent increase in cycling on the routes concerned – 30 per cent of those cycling trips are new or switched from another mode. The contribution of the Cycle Superhighway programme to the overall network has been revised in the light of the aspirations set out in the Mayor's Vision for Cycling. Cycle Superhighways in the new network will include upgraded versions of the existing routes and new routes.

**2.1.7**

The Cycle Superhighways programme has a large interface with the responsibilities of London boroughs and others. In some cases, the route is on borough-owned roads and there needs to be close working between TfL and the boroughs to obtain approvals and buy-in to any proposals. Even where TfL is the highway authority, boroughs should still be closely involved in the design process as the measures implemented are likely to have an impact beyond the TLRN highway.

## Quietways

**2.1.8**

Assessment criteria for prioritising potential Quietways routes, including those that form part of the Central London Grid, are set out in figure 2.2. Routes should be assessed against these measures as far as possible before final route selection and detailed design.

**Figure 2.2 Quietways route prioritisation criteria**

Network Prioritisation

- contribution to a network – a geographical spread of routes that capture trip attractors and connect key points across London
- deliverable along the entire length of a route over an agreed period
- awareness of other schemes being delivered in the area that may influence phasing or impact the selected route

Directness and Cohesion

- following cycle desire lines, public transport routes or routes used for short trips by car
- connecting places of interest
- minimising delays and avoiding unnecessary diversions (preferably using the same roads in each direction)
- overcoming specific barriers to cycling, particularly at junctions
- easy to navigate and homogeneous

Attractiveness

- avoiding or treating significant collision hotspots
- secure and offering a feeling of safety
- accessible at all times, or with a suitable ‘after-hours’ alternative
- having priority at junctions/intersections/crossings (ideally)
- making use of streets with limited traffic access (ideally)

Traffic composition and impact to other users

- minimising use of heavily trafficked roads (<3,000 PCUs per day)
- with limited use by freight vehicles and other HGVs
- having limited points of conflict with oncoming and crossing traffic, parked vehicles and loading bays
- improving pedestrian facilities, if possible, and with the ability to manage movement through areas of heavy pedestrian use

Buildability

- known significant outstanding land ownership, access issues or ecological issues
- with significant sections already to a good standard
- limited requirement for signals work
- practicality and cost effectiveness of any modification to junctions

Political support

- with support in principle for the entire route from the managing authority, senior officer and/or relevant Member
- with agreement on alignments and improvements secured between all boroughs involved

## Stakeholder involvement

**2.1.9**

Stakeholder support and consultation throughout the process is important for schemes to be successful. They can provide valuable information and local knowledge during route planning and scheme development. To be meaningful, it needs to be conducted at times when it can positively influence outcomes without causing delay and done in a proportionate manner. Stakeholder involvement has two distinct functions: incorporating and responding to stakeholder interests, and keeping stakeholders informed of issues that affect their interests.

**2.1.10**

Stakeholders are likely to include:

- ward councillors and highway authority
- TfL, including modal specific representatives such as buses and taxis and private hire
- local employers and other generators (or potential generators) of significant cyclist movement, such as higher education establishments and hospitals
- cycling organisations
- freight industry representatives
- groups with an interest in pedestrian accessibility
- developers or landowners whose land may be affected or who may be asked to contribute to funding
- residents, local amenity groups, conservation groups and English Heritage.

## Cycling Level of Service assessment

**2.1.11**

A Cycling Level of Service (CLoS) assessment has been developed in order to set a common standard for the performance of cycling infrastructure for routes and schemes, and for individual junctions. The purpose of the CLoS assessment is to frame discussion about design options so that schemes are appealing for existing cyclists and can entice new cyclists onto the network. It may be used on any scheme that has an impact on the street environment.

**2.1.12**

As it is focused on ‘rideability’, the experience of cycling and the performance of links and junctions, CLoS does not differentiate between street types. Infrastructure appropriate to the street type is a prior consideration, although acceptable scoring ranges may need adjustment by street type according to how programme-specific requirements are defined.

**2.1.13**

CLoS builds on the knowledge of existing systems such as the CIHT Cycle Audit and Cycle Review, the London Cycling Campaign’s User Quality Audit and 'Love London, Go Dutch' matrix and the Dutch 'Bicycle Balance' system. It does not replace any existing audit system such as the Road Safety Audit, Non Motorised User Audit or Cycle Audit. It is designed to raise issues already covered by regulatory and statutory documents rather than introducing new requirements and can be used in conjunction with toolkits such as PERS and FERS, the pedestrian and freight environment review systems.

**2.1.14**

Anybody can undertake the CLoS assessment but highway authorities or consultants working within the industry are capable of giving extra quality assurance in using the tool. The assessment is designed to promote discussion, and should be balanced with the judgement of the engineer or planner involved.

**2.1.15**

The CLoS should fit into several stages of the lifecycle of a scheme:

- at planning stage, it could help to identify issues, frame objectives and quantify benefits arising from potential improvements to inform a business case (by using existing economic evaluation procedures) – this particularly refers to route assessment and route prioritisation
- at design brief stage, it could be used to give a baseline score for the existing conditions
- at a preliminary design stage, several feasibility options could be measured against each other and the differences used to inform discussion with stakeholders
- post-completion, it could help ensure that maintenance of the route remains a priority

**2.1.16**

CLoS is based on the six design outcomes of safety, directness, coherence, comfort, attractiveness and adaptability. It then breaks down each into specific factors. At the next level of detail are indicators that can be used to measure performance against each factor. For example, the 'safety' element contains three factors: collision risk, feeling of safety and social safety. CLoS focuses on environments that would entice new cyclists to switch journeys from other modes and maintain this modal shift for the long term.

**2.1.17**

As figure 2.3 shows, each indicator has a set of descriptions and score values – either 0, 1 or 2. The 'basic' level of service, or zero score, may trigger the need for improvement, but this depends on the overall context of the route and of the project. Zero scores should be a prompt for examining whether the factor in question will have a negative impact on the propensity to cycle. Users are encouraged to set expectations that are ambitious while also being achievable.

**2.1.18**

Certain factors also have 'critical' scores, which describe circumstances that should be a cause for particular concern. Clients and designers must address these as a priority, even if only to 'lift' them to a zero score – a scheme that registers as 'critical' on any one indicator has not met the required standard for programmes and projects funded under the Mayor's Vision for Cycling. To be given greater weighting in the scoring system, it is suggested that the 0, 1 or 2 scores for where critical factors are identified should be multiplied by 3.

**2.1.19**

At the route planning stage, it is not likely that all factors can be measured, largely because routes are likely to include many types of additional cycling provision. In this case, factors that are of greatest importance and relevance at the network level should be prioritised.

**Figure 2.3 Cycling Level of Service assessment matrix (part 1)**

| Factor | Indicator | Critical | Basic CLoS (score=0) | Good CLoS (score=1, or 3 for critical indicators) | Highest CLoS (score=2, or 6 for critical indicators) | Max score |
|---|---|---|---|---|---|---|
| Safety | | | | | | |
| Collision risk | Left/right hook at junctions | Heavy streams of turning traffic cut across main cycling stream | Side road junctions frequent and/or untreated. Conflicting movements at major junctions not separated | Fewer side road junctions. Use of entry treatments. Conflicting movements on cycle routes are separated at major junctions | Side roads closed or footway is continuous. All conflicting streams separated at major junction | 6 |
| | Collision alongside or from behind | Nearside lane in pinch point range 3.2 to 3.9m | Cyclists in wide (4m+) nearside traffic lanes or cycle lanes less than 2m wide | Cyclists in cycle lanes at least 2m wide | Cyclists with a high degree of separation from motorised traffic | 6 |
| | Kerbside activity or risk of collision with door | Narrow cycle lanes <1.5m alongside parking/loading / no buffer | Frequent kerbside activity on nearside of cyclists / cycle lanes giving effective width of 1.5m | Less frequent kerbside activity on nearside of cyclists / cycle lanes giving effective width of 2m | No kerbside activity / Parking and loading on outside of cycling facility | 6 |
| | Other vehicle fails to give way or disobeys signals | | Reasonable visibility, route continuity across junctions and priority not necessarily clear | Clear route continuity through junctions, good visibility, priority clear for all users, visual priority for cyclists across side roads | Cycle priority at signalised junctions; visual priority for cyclists across side roads | 2 |
| Feeling of safety | Separation from heavy traffic | | Cycle lanes 1.5-2m wide / ASLs at junctions | Cycle lanes at least 2m wide / some form of separation | Cyclists physically separ-ated from other traffic at junctions and on links | 2 |
| | Speed of traffic (where cyclists are not separated) | 85th percentile greater than 30mph | 85th percentile greater than 25mph | 85th percentile 20-25mph | 85th percentile less than 20mph | 6 |
| | Volume of traffic (where cyclists are not separated) | >1,000 vehicles / hour at peak | 500 -1,000 vehicles / hour at peak < 5 per cent HGV or critical | 200 - 500 vehicles / hour at peak, <2 per cent HGV | <200 vehicles / hour at peak | 6 |
| | Interaction with HGVs | Frequent, close interaction | Some interaction | Occasional interaction | No interaction | 6 |
| Social safety | Risk/fear of crime | | Risk is managed: no ‘ambush spots’, reasonable level of street maintenance | Low risk: area is open, and well designed and maintained | No fear of crime: high quality streetscene and pleasant interaction | 2 |
| | Lighting | | Some stretches of darkness | Few stretches of darkness | Route lit thoroughly | 2 |
| | Isolation | | Route generally close to activity, for most of the day | Route close to activity, for all of the day | Route always overlooked | 2 |
| | Impact of highway design on behaviour | | Seeks to controls behaviour in parts | Controls behaviour throughout | Encourages civilised behaviour: negotiation and forgiveness | 2 |
| Directness | | | | | | |
| Journey time | Ability to maintain own speed on links | | Cyclists travel at speed of slowest vehicle/cycle ahead | Cyclists can usually pass traffic and other cyclists | Cyclists choose their own speed (within reason) | 2 |
| | Delay to cyclists at junctions | | Journey time slightly longer than motor vehicles | Journey time around the same as motor vehicles | Journey time less than motor vehicles (eg cyclists can bypass signals) | 2 |
| Value of time | For cyclists compared to private car use (normal weather conditions) | | VOT only slightly greater than private car use value due to some site-specific factors | VOT equivalent to private car use value: similar delay-inducing factors and convenience | VOT less than private car use value due to attractive nature of route | 2 |
| Direct-ness | Deviation of route (against straight line) | | Deviation factor 35-50 per cent | Deviation factor 20-35 per cent | Deviation factor <20 per cent | 2 |
| Coherence | | | | | | |
| Connec-tions | Ability to join/leave route safely and easily | | Cyclists do not have to dismount to connect to other routes | Cyclists can connect to other routes relatively easily | Cyclists provided with have dedicated conn-ections to other routes | 2 |
| | Density of other routes | | Network density mesh width >400m | Network density mesh width 250 - 400m | Network density mesh width <250m | 2 |
| Way-finding | Signing | | Basic road markings provided | Some signs and road markings, making it hard to get lost | Consistent signing of range of routes and destinations at decision points | 2 |

**Figure 2.3 Cycling Level of Service assessment matrix (part 2)**

| Factor | Indicator | Critical | Basic CLoS (score=0) | Good CLoS (score=1, or 3 for critical indicators) | Highest CLoS (score=2, or 6 for critical indicators) | Max score |
|---|---|---|---|---|---|---|
| Comfort | | | | | | |
| Surface quality | Defects: non cycle friendly ironworks, raised/ sunken covers/gullies | Major defects | Some localised defects but generally acceptable | Minor defects only | Smooth high grip surface | 6 |
| Surface material | Construction: asphalt concrete, HRA or blocks/bricks/sets | | Hand laid asphalt; no unstable blocks/sets | Machine laid asphalt concrete or HRA; smooth blocks | Machine laid asphalt concrete; smooth and firm blocks undisturbed by turning vehicles | 2 |
| Effective width without conflict | Allocated riding zone range. Lane allocation each direction | <1.5m Superhighway <1.2m elsewhere | 1.5-2.0m Superhighway 1.2-1.5m elsewhere (or 3-3.2m shared bus/cycle lane) | 2.0-2.5m Superhighway 1.5-2.0m elsewhere (or 4.0m+ bus lane) | >2.5m Superhighway >2m elsewhere | 6 |
| Gradient | Uphill gradient over 100m | | >5 per cent | 3-5 per cent | <3 per cent | 2 |
| Deflect-ions | Pinch points caused by horizontal deflections | | (Remaining) lane width <3.2m | (Remaining) lane width >4.0m | Traffic is calmed so no need for horizontal deflections | 2 |
| Undu-lations | Vertical deflections | | Round top humps | Sinusoidal humps | No vertical deflections | 2 |
| Attractiveness | | | | | | |
| Impact on walking | Highway layout, function and road markings adjusted to minimise impact on pedestrians | | Largely achieves Pedestrian Comfort Level (PCL) B but C in some high activity locations | No impact on pedestrian provision / PCL never lower than B | Pedestrian provision enhanced by cycling provision / PCL A | 2 |
| Greening | Green infrastructure or sustainable materials incorp-orated into design | | No greening element | Some greening elements | Full integration of greening elements | 2 |
| Air quality | PM10 & NOX values referenced from concentration maps | | Medium to High | Low to Medium | Low | 2 |
| Noise polution | Noise level from recommended riding range | | >78DB | 65-78DB | <65DB | 2 |
| Minimise street clutter | Signage and road markings required to support scheme layout | | Little signage in excess of regulatory requirements | Moderate amount of signage, particularly around junctions | Minimal signage, eg. for wayfinding purposes only | 2 |
| Secure cycle parking | Ease of access to secure cycle parking within businesses and on street | | Minimum levels of cycle parking provided (ie to London Plan standards) | Some cycle parking provided above minimum, to meet current demand, and attention to quality and security | Cycle parking is provided to meet future demand and is of good quality, securely located | 2 |
| Adaptability | | | | | | |
| Public transport inte-gration | Smooth transition between modes or route continuity maintained through interchanges | | No additional consideration for cyclists within interchange area | Cycle route continuity maintained through interchange and some cycle parking available | Cycle route continuity maintained and secure cycle parking provided. Transport of cycles available. | 2 |
| Flexibility | Facility can be expanded or layouts adopted within area constraints | | No adjustments are possible within constraints. Road works may require some closure | Links can be adjusted to meet demand but junctions are constrained by vehicle capacity limitations. Road works will not require closure; cycling will be maintained although route quality may be compromised to some extent | Layout can be adapted freely without constrain to meet demand or collision risk. Adjustments can be made to maintain full route quality when roadworks are present | 2 |
| Growth enabled | Route matches predicted usage and has exceedence built into the design | | Provision copes with current levels of demand | Provision is matched to predicted demand flows | Provision has spare capacity for large increases in predicted cycle use | 2 |
| TOTAL (max 100) | | | | | | |

**2.1.20**

User satisfaction surveys can be particularly useful for capturing some of the more subjective judgements in the assessment. It is important to make a clear connection between the needs of the local users and the reasons for making certain design decisions. As figure 2.3 shows, subjective safety – therefore the perception of risk – is a key factor in measuring the fitness-for-purpose of a cycling facility, even where the collision history of a location, for example, might indicate that the objectively measured risk is low.

**2.1.21**

The impact on walking is a critical element in the assessment, even though it may not be directly linked to level of service for cyclists. A Pedestrian Comfort Assessment, as described in TfL's Pedestrian Comfort Guidance, should be used as in the CLoS to provide an objective rating for the balanced profile.

## Junction assessment tool

**2.1.22**

As collisions tend to be clustered around junctions, a supplementary process for assessing junctions has been developed. This may be used to inform a broader assessment of a given location, or in order to inform scoring of the collision risk criteria in the CLoS assessment.

**2.1.23**

Rather than going through the entire CLoS assessment for each possible movement of a cyclist through a junction, an estimation of potential conflict can be done through briefly assessing each of the potential movements in turn and marking them on a plan of the junction, as shown in figure 2.4. Each movement can be rated 'red', 'amber' or 'green' according to how safely and comfortably it can be made by cyclists:

- where conditions exist that are most likely to give rise to the above collision types, then the movement should be represented on the plan as a red arrow
- where the risk of those collision types has been reduced by design layout or traffic management interventions, then the movement should be coloured amber
- where the potential for collisions has been removed entirely, then the route should be coloured green
- 'green' should be taken to mean suitable for all cyclists; 'red' means suitable only for a minority of cyclists (and, even for them, it may be uncomfortable to make)

**2.1.24**

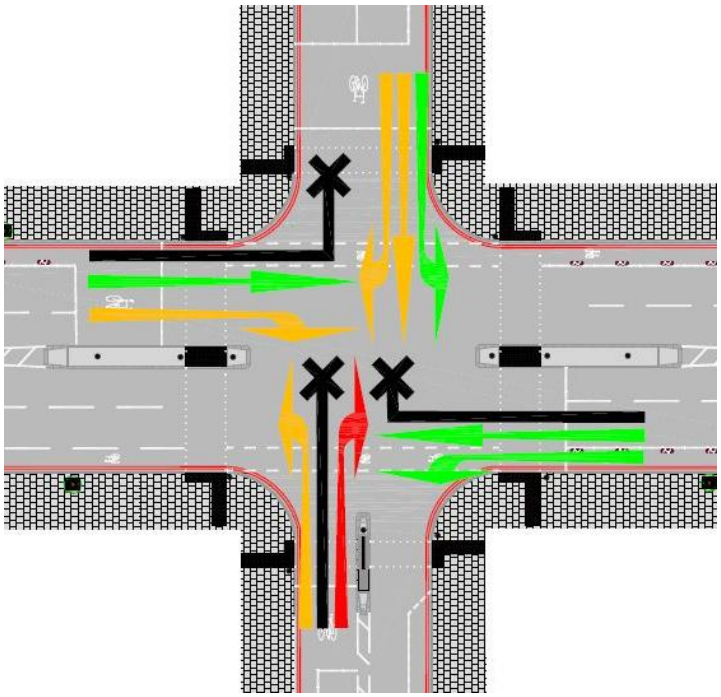
Any banned movements for cyclists should be shown in black with a cross at the end. Movements that can be made but would involve a particularly high level of risk to the cyclist should be noted with a red cross at the end. These are movements that most cycle trainers would advise against making.

**Figure 2.4 Example assessment for a generic junction**

Ahead movements in two directions are aided by lanes marked through junctions and have been marked as green.

The street at the top is one-way – showing the banned cycling movements highlights a potential need to open it up to contraflow cycling.

The three possible right turns are all relatively difficult to make, being opposed turns, although ASLs help in each case.



In two cases, the pedestrian crossing island on the opposite arm gives some protection for right-turning cyclists from opposing traffic, so these have been scored as amber.

However, the right turn from the arm at the bottom scores a red because it would be hard for a cyclist to find a safe waiting place while ahead and right-turning traffic emerges from the one-way street.

**2.1.25**

For ‘red’ movements, one solution might be to enable the movement at a location away from the main point of potential conflict, but there may be many different ways of reconfiguring the junction to provide better and safer provision for cyclists (see chapter 4 for more details on junction design).

**2.1.26**

To help in comparing options, a score can be given based on each movement: 0 for red, 1 for amber and 2 for green. In this way, a total can be generated for the junction, or even for individual routes through the junction (if it is the case that one route or movement for cyclists is a significantly higher priority than another). The highest possible score for a crossroad junction would be 24 and for a T-junction 12. In order to help assess junction movements, figure 2.5 suggests typical scenarios that might lead to a ‘red’, ‘amber’ or ‘green’ rating.

**Figure 2.5 Indicative criteria for scoring junction assessments**

| Factors needing removal or mitigation | Possible improvements | Further improvements |
|---|---|---|
| **RED** | **AMBER** | **GREEN** |
| Heavy left turn movement with high HGV mix<br>Opposed right turns with general traffic accelerating quickly into opportunistic gaps<br>Left slip lane<br>Guard-railing<br>Large junction radii<br>High speed motor traffic through junction<br>Uphill gradients<br>Wide junction crossings<br>No clear nearside access<br>Multiple lanes | Entry treatment at side road junction<br>Continuation of lane across junction<br>Right-turn protected island<br>Tight corner radii; pinch points removed (avoiding nearside lane of 3.2-3.9m)<br>Bus lane of 3.0-3.2m or of 4.5m or more<br>2m wide central feeder lane<br>ASLs (preferably 5m+ deep)<br>Signal adjustments to cycle movements | Left turn ban for general traffic<br>Opposing right turn banned for general traffic<br>Physically protected turn<br>Left bypass of signals<br>Segregation of cycle movements using dedicated cycle signals<br>Raised tables<br>Area-wide speed limit/reduction |

**2.1.27**

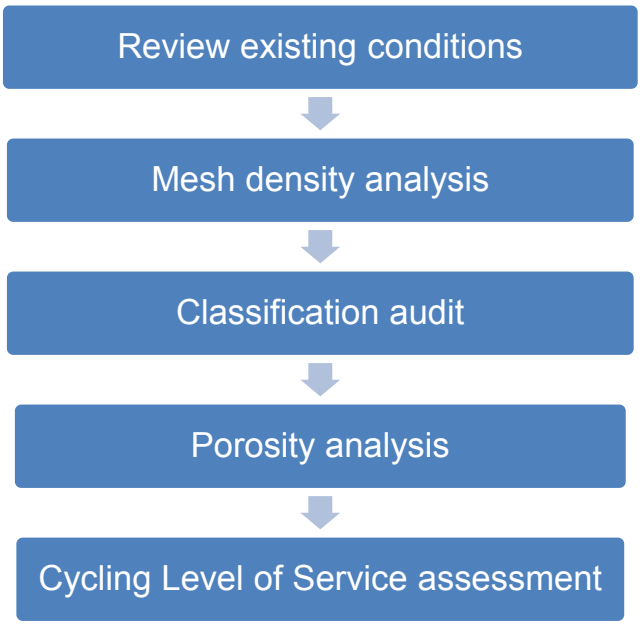
The CLoS assessment also provides an argument for how improvements for cycling could be made in stages. A closure to motor vehicles, allowing filtered permeability for cyclists, may be a first stage of meeting longer-term objectives for area improvements, making streets better, safer places for all. The first stage represent one intermediate level of service, the second a higher level.

## 2.2 Developing a coherent cycle network

**2.2.1**

This section covers examples of techniques that can be used to help network planning. Step-by-step it covers the full process for planning a network for cycling, taking into account urban form and land use as well as street types and route characteristics – as summarised in figure 2.6. In reality, some of the network is likely to be in place (but may be in need of upgrading) and some of the analysis may already exist, so these steps are not requirements in route planning and scheme development. They are presented here as helpful techniques that may be applied to support the development of a coherent network and that could be used in communicating what a good network for cycling looks and feels like.

**Figure 2.6 Planning a cycle network from the beginning**




### Review of existing conditions

**2.2.2**

Figure 2.7 shows a typical London street layout with a railway line, a canal, a park and different road classifications such as connectors, high roads, high streets, city streets, city places and local roads. These are suggested by the road thickness and frontages. Character buildings and major trip generators have also been highlighted. Proposals for cycling should reflect the character of an area and the movement and place functions of its streets. Cycling infrastructure should improve the quality of streets and so coherent network planning needs to be sensitive to its surroundings.

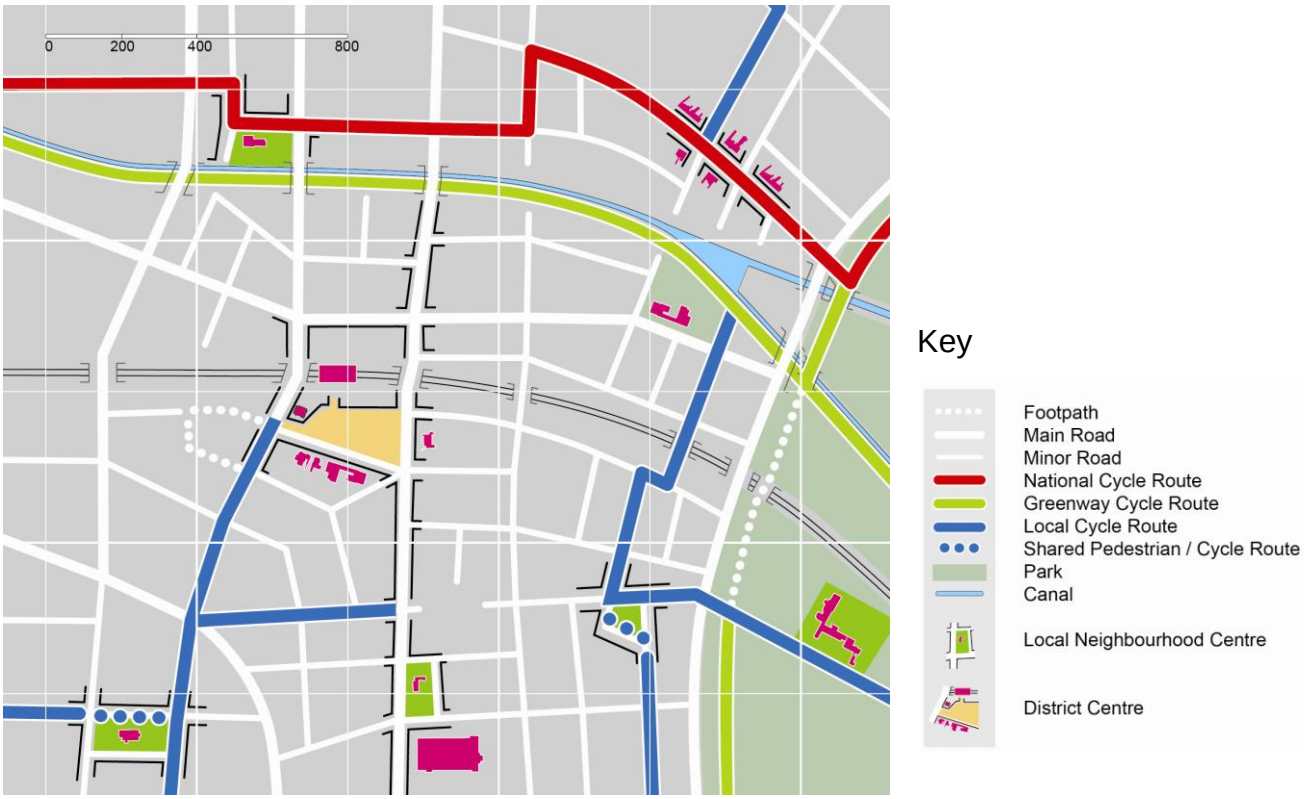
**2.2.3**

Overlaid on the street plan is a 400m by 400m grid: this is also the standard mesh density sought for cycle networks in central London, as referenced in the CLoS. The coloured lines show the existing cycle networks. In this case, the red route forms part of the national cycle network which spans the UK and, in some cases, joins up with the international EuroVelo network. It should be recognised that this network has a strategic importance and any changes to it could affect many users. The blue routes shown are local routes that may well have been developed as part of the London Cycle Network programme and so may serve a strategic function as part of long-held desire lines for cyclists. Routes of this type can date back many years, may be best considered for future network adoption and often already feature cycle-friendly interventions. The green route shows a route along a canal towpath that may form part of the greenway network. This route may not be suitable for all types of cyclists, particularly commuter cyclists, but could form a part of the area cycle network due to its attractive, traffic-free condition.

**2.2.4**

In any area the remnants of previously planned strategic cycle networks should be evident and these should be referenced on the base plan so that gaps or other failures can be assessed. It is important to view routes in context and incorporate cycling within the unique layout of the area without compromising strategic network considerations such as coherence and directness. At all stages of this process, it is also important to source up-to-date and accurate information.

**Figure 2.7 Existing context showing base network**



**Method**

- briefly assess place characteristics: natural features, key constraints (eg waterways or railways, including bridging points), local centres, land uses, trip generators (see figure 2.17 for a fuller list)
- identify key trip generators, active frontages, character buildings
- classify roads based on RTF street types (or refer to street type maps where this work has already been done)
- overlay existing cycle networks, including strategic and local routes

**Analysis**

- look for gaps in the existing cycle networks
- look to see if cycling provision is appropriate for the RTF street type
- look for desire lines between trip generators
- identify character areas and heritage areas

## Mesh density analysis

**2.2.6**

In a properly joined-up cycle network, cyclists should not have to travel more than 400m to get to a parallel route of similar quality. As referenced in CLoS, this attribute of a cycle network is known as ‘mesh density’: it describes whether the grid of cycle routes is tighter (with more route choice) or looser (less extensive).

**2.2.7**

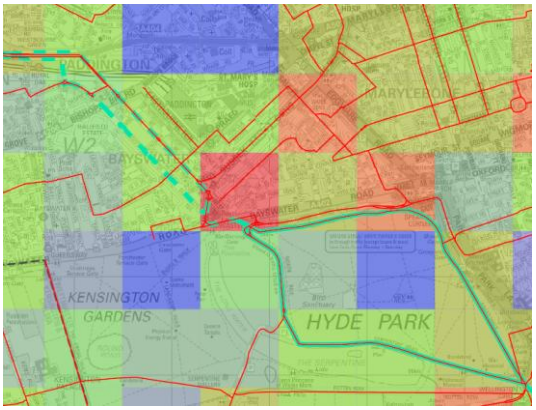
Analysis of mesh density is best undertaken with GIS software and there are two main methods to follow – see figure 2.8. The first involves dividing the area into cells and measuring the length of cycle network in each cell. A 1km by 1km cell should have 4km of cycle network. The second method involves starting with the cycle network and its routes and measuring the size of the areas bounded by the routes. An area of 160,000sqm would be present inside a 400m by 400m mesh and so this can be used as the standard to measure against. Smaller areas should show as hotter on the heat map (reds and oranges) as there is more coverage than required and higher areas should show as cooler (blues) as there is not enough coverage.

**2.2.8**

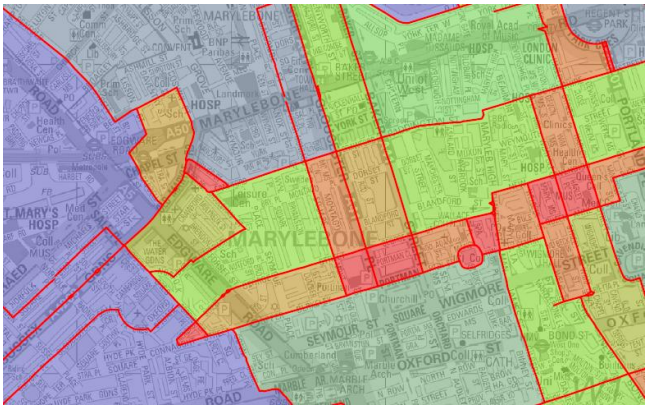
Sections of network that run across major barriers to cycling, such as major untreated junctions and gyratory systems, should not be counted in either method. The data used in the Transport for London Cycle Guides represents the best available picture of cycle routes in London but local authorities may have more up-to-date information about the condition and extent of local networks.

**Figure 2.8 Heat map representation of the density**

Cell example



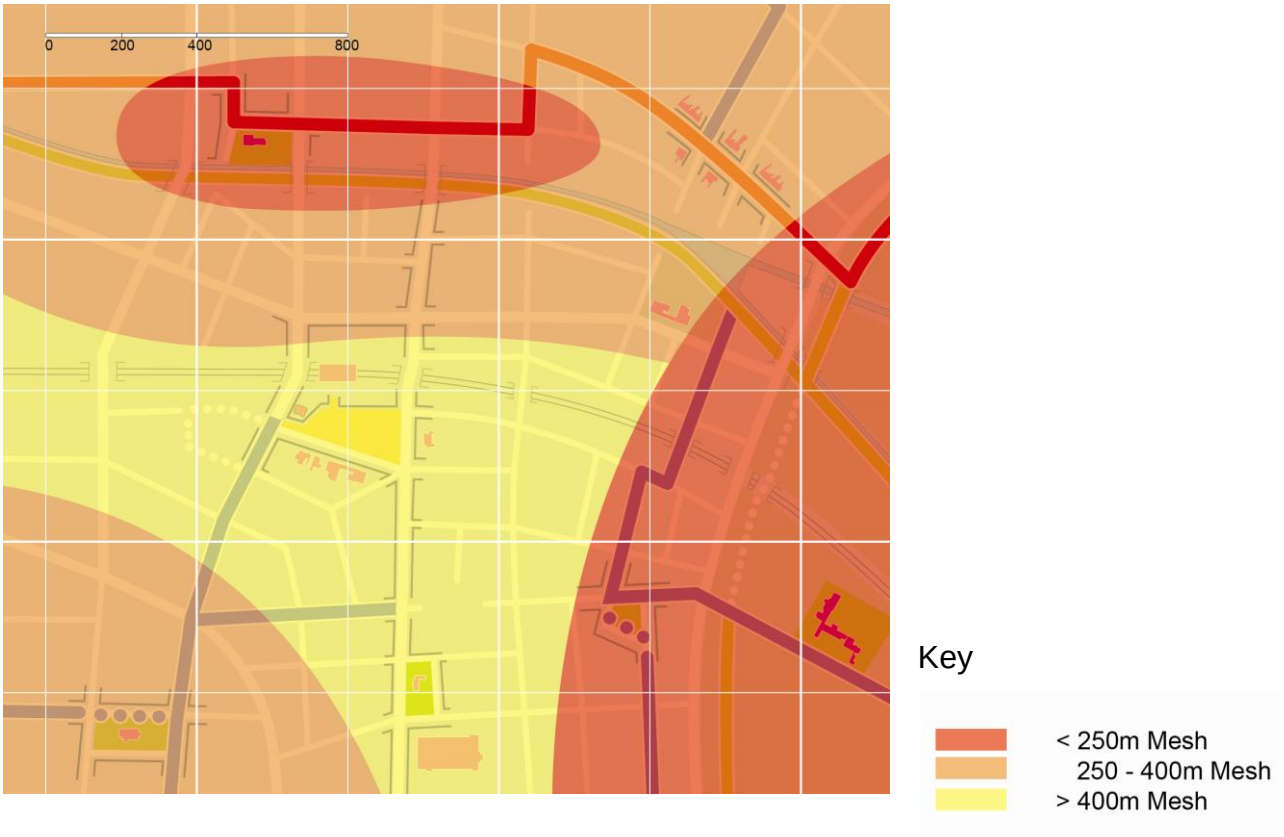

Area bound example




**2.2.9**

Figure 2.9 shows a heat map representation of the density of routes in the study area. The analysis highlights in yellow the 'cooler' areas, with poorer cycle network coverage. The 'hotter' red areas have a lower mesh density: less distance between parallel routes. This type of analysis can be used to test the impact of planned interventions and can be run after networks have been extended to test even coverage.

**Figure 2.9 Mesh density heat map**



**Method**

- assess cycle networks for major barriers
- load cycle network data into
- overlay existing cycle networks, strategically planned and local routes
- highlight bridges, natural features and constraints

**Analysis**

- look for areas of low network coverage and identify potential route options
- look for areas of high network coverage and identify most strategic alignments

## Accessibility classification

**2.2.10**

Figure 2.10 shows a reclassification of every road in the area based on the level of experience needed to ride it comfortably. Primary roads (coloured red) suggest a high level of confidence, secondary roads (amber) are cyclable in comfort by most cyclists and routes free of motorised traffic (green) are suitable for cyclists of any age and experience. The majority of London's roads are secondary and so are rideable but certain primary roads can be intimidating for new cyclists and so it is important to identify these. Local knowledge and the input of cycle trainers within the authority should help identify the correct classifications. The main determinants are street types, speed and volume of traffic, mix of vehicle types and the extent to which cyclists are required to integrate with general traffic and perform manoeuvres whilst in traffic.

**2.2.11**

This red, amber and green approach can also be taken to assessing crossings in the area. The difference between primary and secondary crossings of primary roads is particularly important in network terms as cyclists tend to migrate towards the more comfortable crossing conditions. Local cycling stakeholders should be able to provide information about where these pleasant crossings are located if resources are not available to do a full network audit. Ordnance Survey GIS systems also provide this data.

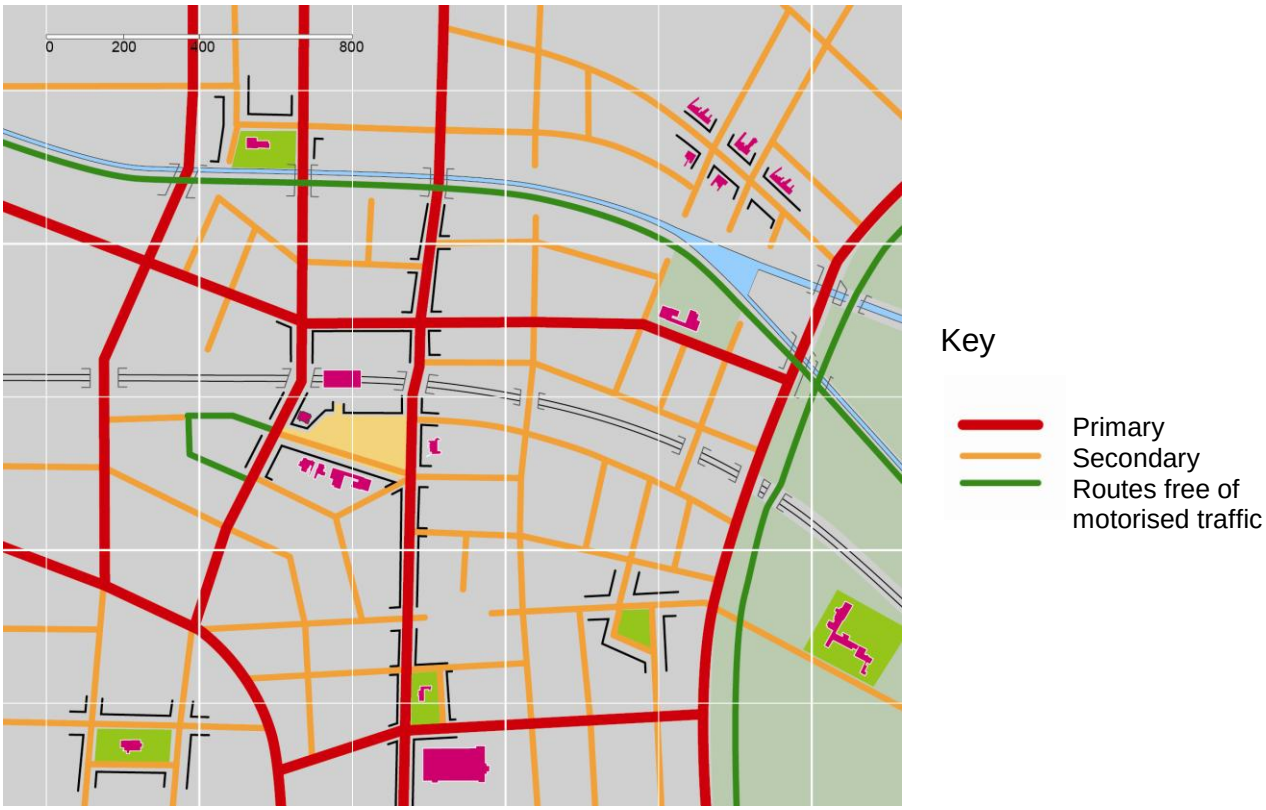
**Method**

- Assess all links on the network to determine level of experience needed to cycle in comfort
- Highlight comfortable secondary crossings of primary roads

**Analysis**

- Look for potential new crossing sites, bearing in mind the benefits that can be secured for other users as well as cyclists (ensuring a balanced approach)
- Look for areas dominated by primary roads and consider interventions

**Figure 2.10 Accessibility classification of road network**




## Area porosity analysis

**2.2.10**

Area porosity is a measure of how many places there are for cyclists to enter, pass through and leave an area comfortably. A location that is 'porous' is a space that cyclists can pass through with ease and comfort – usually a junction. If the porosity of an area is high, then overall it is very permeable for cyclists (but often less so for other vehicles). Figure 2.11 shows areas bound by primary roads. Comfortable (porous) secondary crossings are shown as gateways as these effectively open up areas to less confident cyclists. The provision of a gateway crossing can enable many square kilometres of route options to be opened up and also serve as key navigational points across areas.

**2.2.11**

Where areas are bound by primary roads and have no gateways, then they are coloured red. Where they have one gateway they are coloured amber and where then have two they are coloured green. Rather than focussing on routes, this method shows the porosity of an area by highlighting different crossing options on different streets. This approach is particularly useful when planning routes to schools as it allows children and their parents to be clear about the standard of roads they will encounter and where key crossings are.

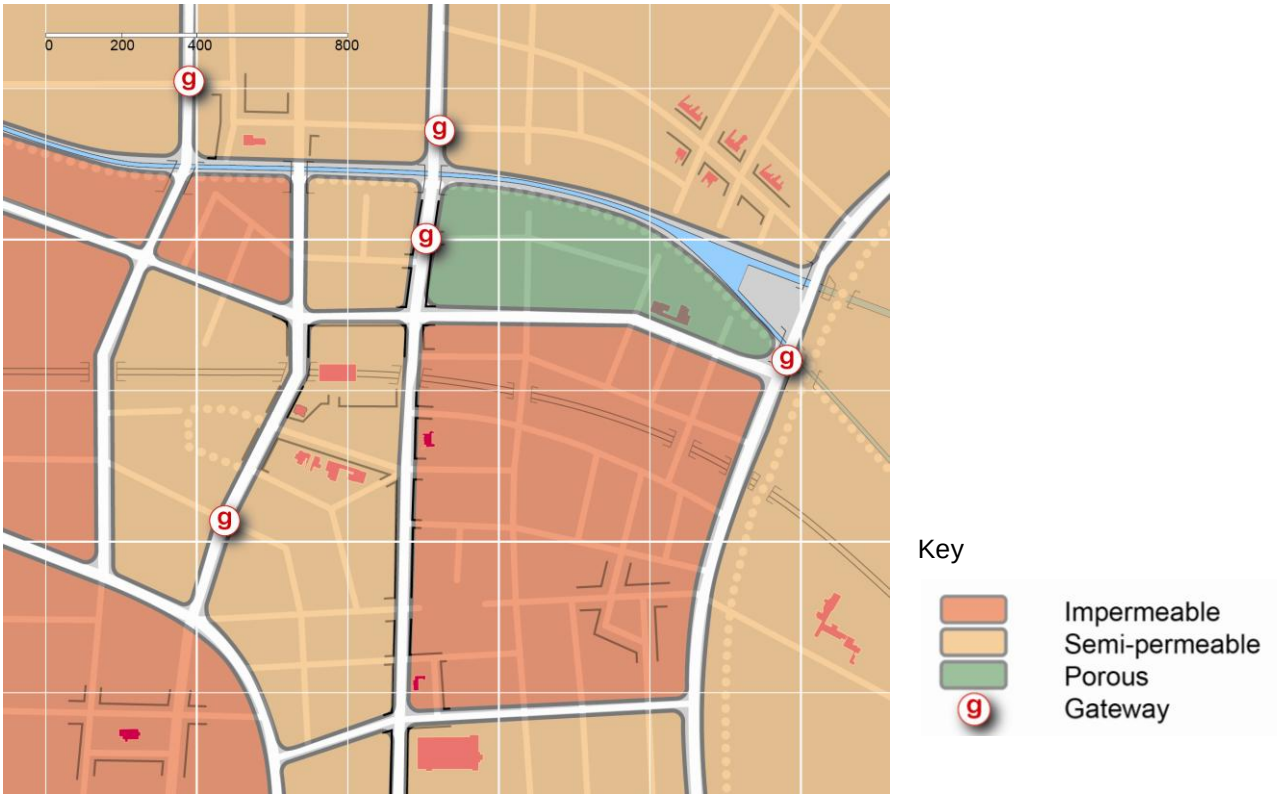
**Method**

- Create areas bound by primary roads
- Gather information as to where the current comfortable secondary crossings and access points are
- Colour in bounded area based on the number of access points

**Analysis**

- Look for areas that are effectively cut off as they are bound by busy primary roads
- Assess where the likeliest new crossing can be provided into an area
- Identify where access is needed for maintenance (for vehicles carrying out maintenance works)
- Plan adjustments to networks to incorporate gateways, mindful of the directness design outcome

**Figure 2.11 Area porosity analysis showing areas bound by primary roads and number of gateways**




## Cycling Level of Service audit

**2.2.12**

Figure 2.12 shows road classification based on the Cycling Level of Service. This takes time to complete in full but gives a comprehensive baseline of the rideability of the streets in an area. Routes that fall below the standards stipulated in the CLoS should be considered for upgrading or, if constraints are too great, then this approach can highlight alternative alignments. The red, amber and green colouring is likely to look similar to the accessibility classification system: this approach, based on the key design outcomes, adds a greater level of sophistication, should it be required. Note that the value ranges may

need to be adjusted according to specific programme requirements. On the example in figure 2.12, the greenway route along the canal is rated as amber in CLoS as there may be concerns about social safety, connections, effective width and lighting.

**2.2.13**

Potential strategic routes in the chosen area may require substantial investment, which may need detailed justification. It is important that the junction assessment tool is used on all junctions along planned strategic network routes and where cycle routes pass across busier roads. If multiple roads are assessed, then the effect of area traffic management improvements can be measured against the established baseline. This method is the most time-consuming but helps collect vital information to underpin scheme prioritisation and area traffic network strategies.

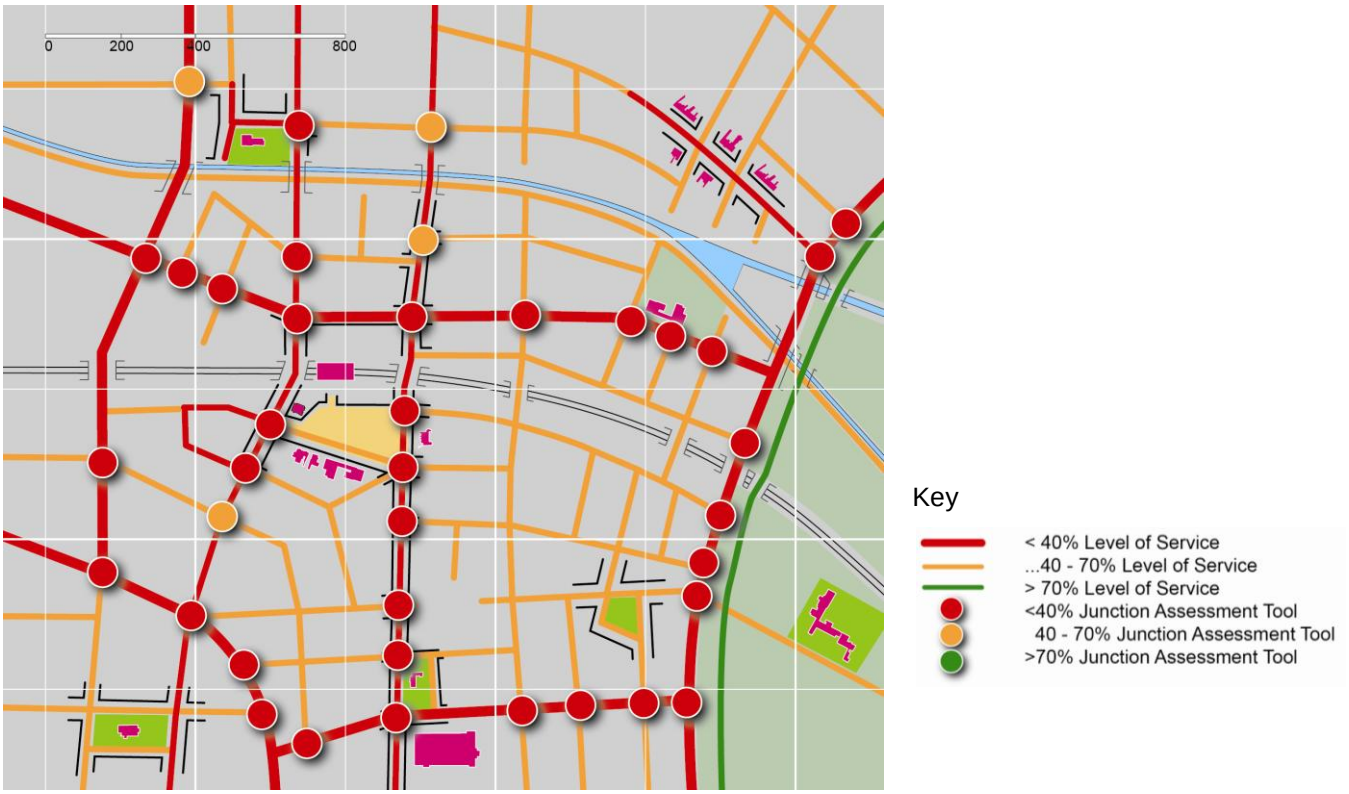
**Method**

- Use the CLoS and junction assessment tool to assess the area network or focus on particular established or planned strategic routes

**Analysis**

- Look where best conditions are and assess whether these can be connected to form routes
- Assess potential for upgrading junctions to higher CLoS standards
- Assess the standard of existing networks routes and look for potential improved alignments

**Figure 2.12 Cycling Level of Service indicative ratings for network links and key nodes**



## Example approaches to developing the network

**2.2.14**

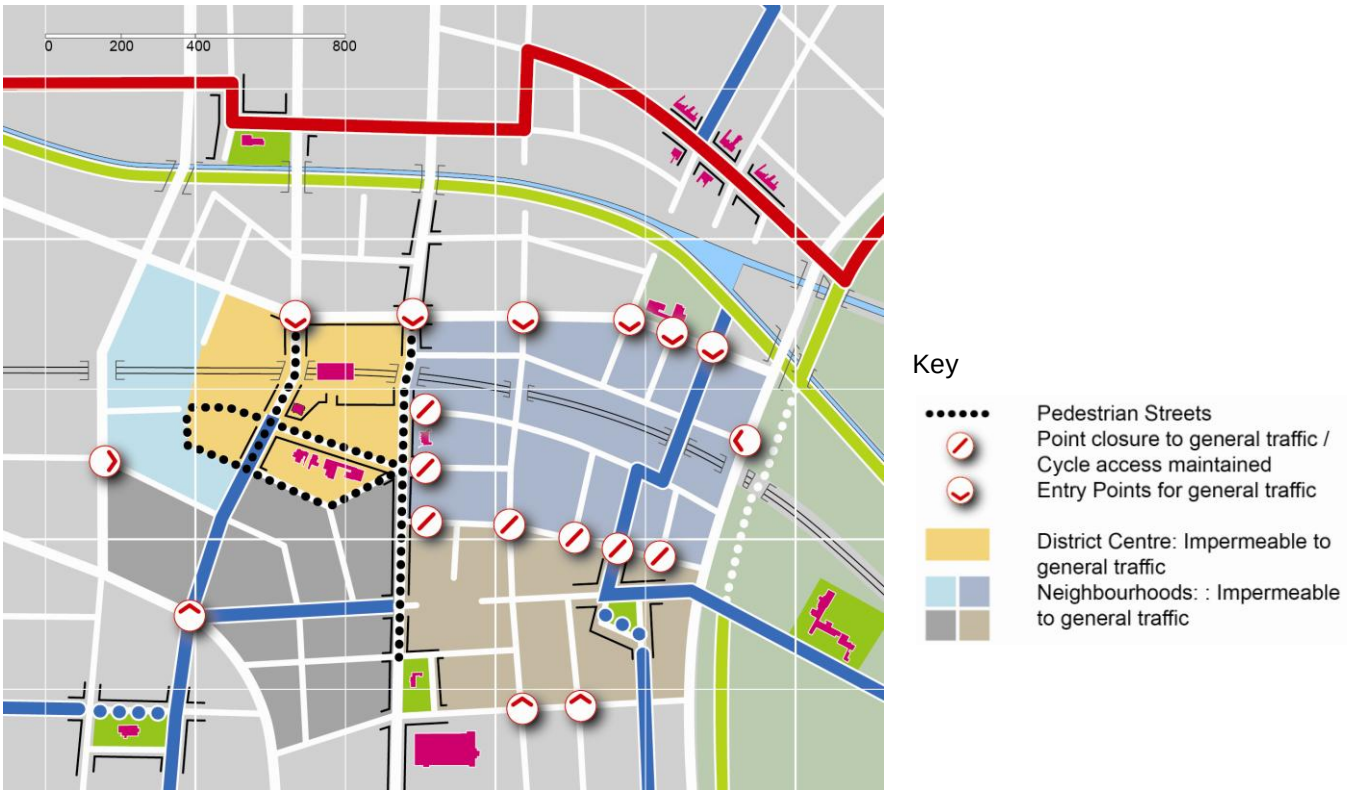
These tools can help identify where interventions would make the whole area accessible to all cyclists. To develop this into a strategy, there are two main options: area-based approaches and route-based approaches. The examples below describe how the application of these strategic approaches may work in practice. In both cases, working through the detail involves engaging with the impact on all modes and considering existing on-street infrastructure and the potential for improving it for a broader range of users.

### Area option – filtered permeability

**2.2.15**

Figure 2.13 shows a potential intervention that takes an area-based approach to improving conditions for cycling by removing through motor traffic in zoned areas around a traffic-free centre. Motorised traffic can enter and leave the zones but cannot pass between them without using the primary routes or alternative roads outside the zones. Cyclists can pass freely through motorised traffic restrictions between zones and so are favoured in terms of journey time and convenience. Residents benefit from removal of through-traffic and their homes can still be served by deliveries and parking. Most motorised vehicle movements will be made by residents themselves. The general level of traffic is reduced to such an extent that the CLoS scores are improved on all roads dramatically without the need for cycle-specific infrastructure. This is a bold approach but delivers a high level of service for cycling in a cost-effective manner.

**Figure 2.13 Filtered permeability area treatment example**



**2.2.16**

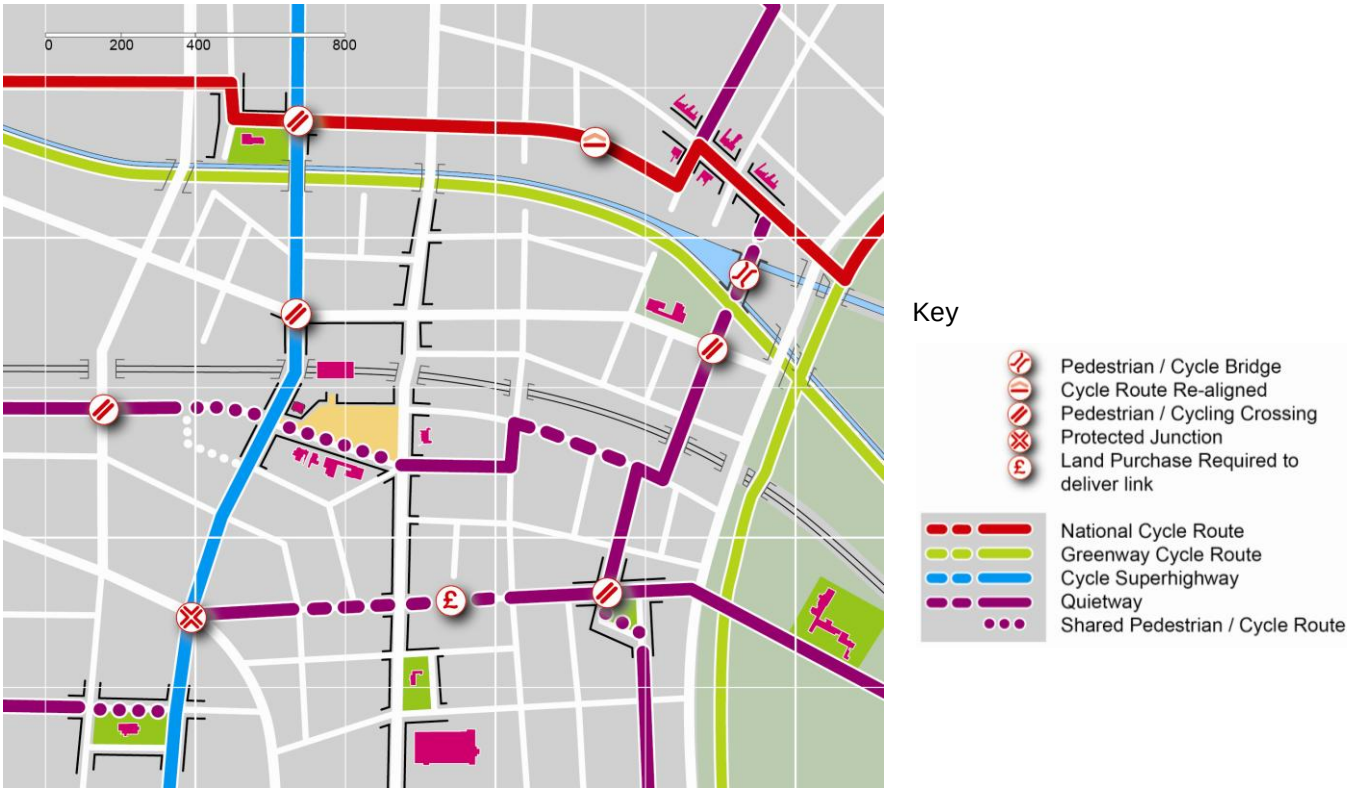
This approach has no obvious cycling facilities to entice new cyclists but is a method employed by many towns and cities with high mode shares for cyclists. The London Borough of Hackney has implemented this approach in certain areas and has the highest modal share for cycling in London. Other cities and towns have used features such as rivers and railway lines to divide areas into zones. If quick and easy access for pedestrians and cyclists are implemented across these barriers then these modes will flourish, while motorised traffic has to take longer, more circuitous routes.

## Route option – network delivery

**2.2.17**

Figure 2.14 shows a route-based approach, where networks have been expanded, connected and revised based on the five-step analysis. In the example, major interventions such as a full junction redesign on a connector road where a Superhighway meets a Quietway have been proposed as well as a new bridge link allowing a Quietway to continue within the stipulated mesh density range. Land purchase has been suggested through some private land acquisition to the south-east of the town centre, enabling two Quietways to connect. New parallel secondary crossings have also been proposed to increase area porosity.

**Figure 2.14 Network delivery route treatment example**



**2.2.18**

Some of the interventions are likely to be costly but justification can be made with reference to the five-step process. This presents a logical, best practice assessment of an area's cycling potential and clearly points out network deficiencies and potential improvements.

**2.2.19**

Cycle networks are often planned at a strategic, city-wide level but this process shows how these can be adjusted locally to reflect the character, constraints and opportunities of the surrounding area. Each local authority should incorporate these approaches into their area planning strategies and this should lead to the mainstream establishment of cycling as a viable mainstream transport option in line with the Mayor's Vision.

## Planning cycling into new development

**2.2.20**

The cycling network strategy should be an important influence on the planning of larger development areas and should be integrated into authority- and area-wide spatial planning frameworks as well being reflected in site-specific proposals. Figure 2.15 summarises how the cycling design outcomes might be addressed in these plans and strategies.

**2.2.21**

Cycling infrastructure cannot be fitted into the streets of a new development once it has been designed. High quality cycling provision must be designed into all new development from the beginning. This does not mean token cycle parking, token painted separation on footways or token advanced stop lines. It means designing new developments so that the way cyclists move through the development meets the standards set down in this document from the moment the first residents or tenants move in.

**2.5.22**

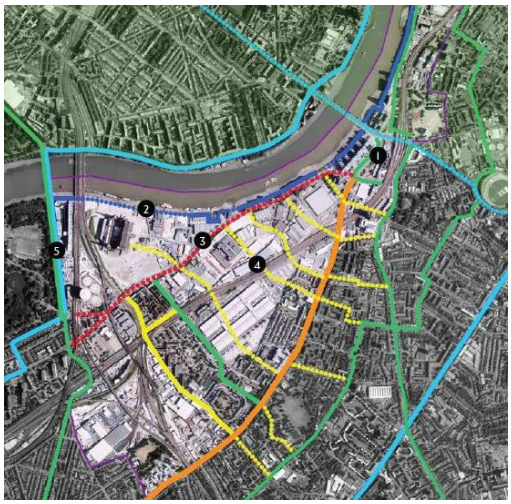
TfL's online Transport Assessment Guidance tool describes the purpose and content of transport assessments as part of the planning application process. This deals with areas such as consideration of pedestrian and cycle linkages, trip generation, modelling and impact. It is important to establish that access for cyclists to and through a development will be provided to a desired quality. This is likely to require the input of cycling officers to the development control process. Through pre-application discussions, the application stage and enforcement, the planning process should ensure that proposals meet policy requirements, that they are fit for purpose for the proposed site and development, and that they are implemented as planned.

**2.5.23**

The right balance needs to be struck between prescription and flexibility when planning cycling infrastructure. When negotiating Section 106 contributions and Community Infrastructure Levy (CIL) from developments to help fund improvements to cycling in an area, it is better to describe the desired outcomes rather than specifying in the legal agreement exactly what must be built. Where Section 106 requirements and CILs are overly restrictive, they can be difficult to enact, or enacting them may have adverse consequences for cycling.

**2.5.24**

In an outline planning consent, there should be a commitment to providing dedicated cycling facilities, but some flexibility should remain about the type and exact location of cycling provision. Over-prescription at this stage could undermine attempts to design the most appropriate treatments once detail of street and building design becomes clearer. Setting out the strategy for cycling in an outline application is more important than the detail: ideally this should draw on an existing network strategy (see section 2.1).



Cycling Strategy –
Vauxhall Nine Elms on the South Bank

**Figure 2.15 Support for cycling in planning policies, strategies and site-specific proposals**

| Strategic: planning and policy-making | Area-wide planning | Site specific (planning applications) |
|---|---|---|
| **Safety**<br>Commitments to reducing death and injury on London's streets, and to creating low speed environments. | Analysis of existing conditions for cyclists and pedestrians. Commitment to meeting design standards in improving provision. | Road Safety Audit, Non-Motorised User Audit or Quality Audit as part of Transport Assessment |
| **Directness**<br>Policy that prioritises sustainable forms of transport and supports accessible, legible, permeable urban form. | Analysis of the relationship between origins and destinations (schools, local centres, parks, homes, places of work), how cycling links will be provided between them and how all road user needs should be balanced. | Detail on proposed route(s), showing analysis of directness and likely delay for cyclists. Identification of barriers to be overcome by improving cycling provision. |

| Strategic: planning and policy-making | Area-wide planning | Site specific (planning applications) |
|---|---|---|
| **Comfort**<br>Linking air quality and environmental improvements to shifts from motorised forms of transport. | Requirements on level of service to be provided on identified routes. Evidence of responding to identified future demand for cycling. | Sufficient detail to allow analysis of effective width, gradient, deflections and capacity and surface quality. Should describe impacts on pedestrian comfort (using TfL's Pedestrian Comfort Guidance). |
| **Coherence**<br>Commitment to sustainable forms of development and good integration between transport modes. | A hierarchy of streets and routes that clearly shows a joined-up, legible network for cycling. | Details of how proposals contribute to the development of a coherent network in the wider area. |
| **Attractiveness**<br>Recognition of the benefits of more people walking and cycling and interventions that promote better places for all. Provision of good quality, well located, secure cycle parking to help support growth in cycling. | Design guidance or code that deals with public realm quality – for example, setting out indicative street types that clearly how show good provision for cyclists will be provided. This should include indicative locations and quantity of cycle parking. | Detailed proposals for materials, cycle parking, other street furniture, signage, landscaping, management arrangements and maintenance costs. |
| **Adaptability**<br>Provision for measuring and monitoring strategic outcomes on cycling (eg route use, vehicle volumes and speeds) to help adapt to changing contexts. | Implementation plan that allows (re)assessment of cycling provision during and beyond the various development phases. Consideration of how improvements to cycling and walking are to be funded, for example through CIL or S106. | Proposals that set out how cycling facilities operate with other uses and kerbside activity and how provision can respond to change in demand over time. |

## 2.3 Scheme delivery

**2.3.1**

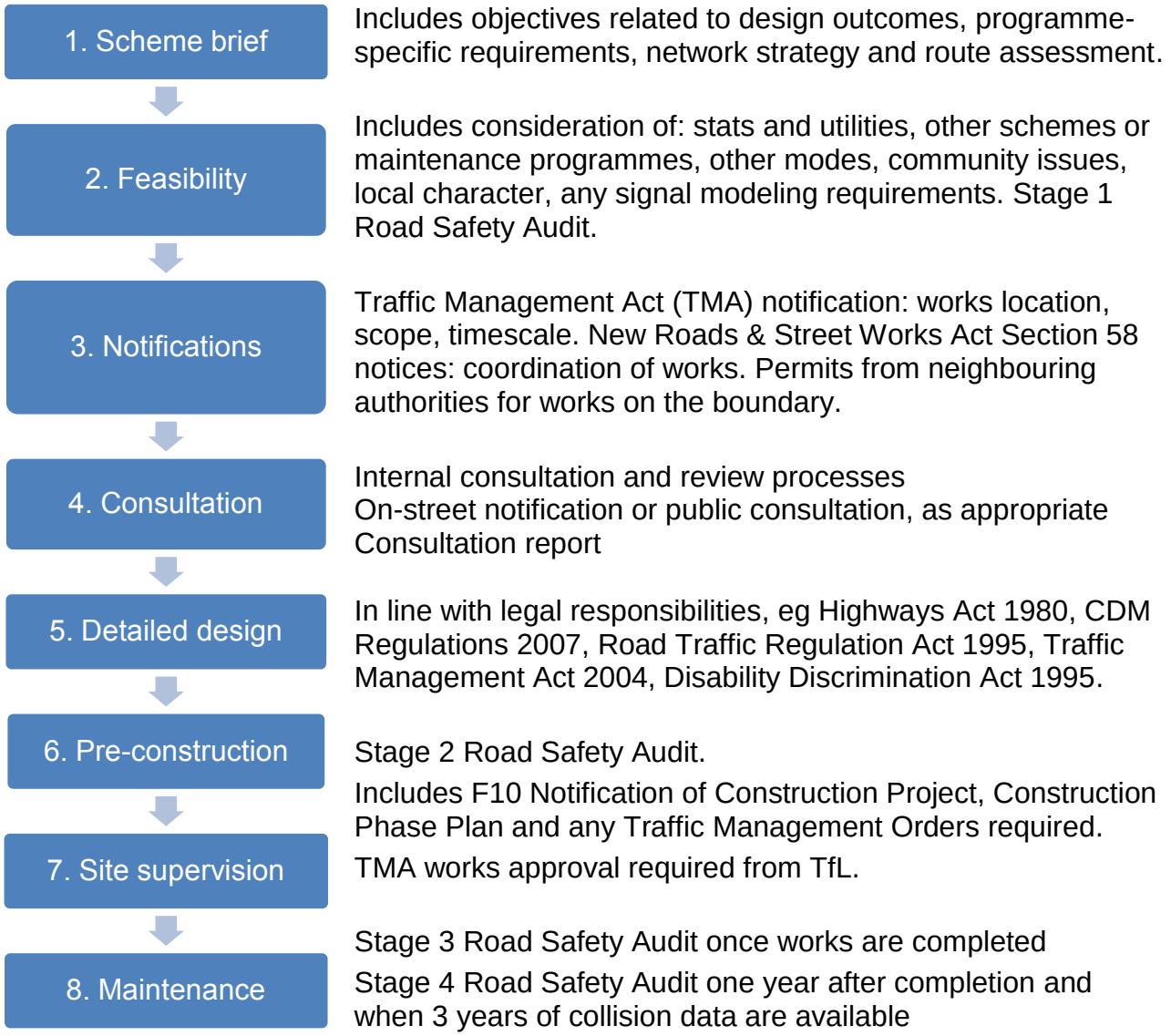
The network planning stage provides a framework for assessing and prioritising routes in more detail. Once a route has been selected, the progress of a scheme involving substantial intervention will normally follow the stages shown in figure 2.16 below.

### Scheme stages

**2.3.2**

The full process set out here should include all necessary consultation, approvals, checks and audits. The six design outcomes – safety, comfort, directness, coherence, attractiveness and adaptability – should be used to frame scheme objectives, together with recognising the intended outcomes for other modes besides cycling.

**Figure 2.16 Scheme stages**



**2.3.2**

Figure 2.17 below shows the type of information that could be assessed in order to inform design options in the feasibility stage. An assessment may have already been undertaken during network planning (see section 2.2), but there may be a need to revisit this in more detail once routes have been prioritised. Data collection needs to be done in a proportionate manner, appropriate to the level of intervention proposed.

**Figure 2.17 Current route characteristics**

| | |
|---|---|
| Place characteristics | Land uses and mix of activities<br>Trees and other planting<br>Materials<br>Lighting<br>Height, scale and massing of buildings |
| New developments and other schemes | Changes to physical layout<br>New or removed generators of cycle movement |
| Major barriers/severance | Waterways, railways and main roads<br>Large, contiguous landholdings |
| Legal aspects | Traffic Orders<br>Land ownership<br>Conservation areas and Listed buildings<br>Tree Preservation Orders |
| Pedestrian amenity and activity | Conflicting movements at junctions and crossings<br>Volumes of pedestrians<br>Levels of pedestrian comfort<br>Shared use and shared space<br>Intersection with (off-highway) walking routes, including Strategic Walk Network |
| Traffic operations | Volume, speed and mix of traffic<br>Capacity of links and junctions<br>Heavy turning movements<br>Main conflicting movements at junctions |
| Kerbside activity | Loading/unloading provision, including loading bays<br>Parking provision, including parking bays<br>Bus stops and stands<br>Activities of taxis and private hire vehicles<br>Frontage access and islands |
| Cycle movements and cyclists' needs | Routes, flows and main movements<br>Collision statistics<br>Complaints and comments |
| Available widths | Highway, carriageway and footway<br>Specific pinch-points and narrowing |
| 24-hour access | Time-limited bus and mandatory cycle lanes<br>Limits on access through parks and green spaces (formal and risk-based) |

**2.3.3**

If signal works are necessary then these should be programmed with TfL during the feasibility stage. If modelling capability is not present in-house then a consultant should be commissioned to run through the Model Auditing Process (MAP) with TfL. MAP is a requirement for schemes that have an impact on the TLRN or Strategic Road Network, and represents good practice for any other scheme. It has been developed to ensure that models submitted to TfL for audit are developed, calibrated and validated to an appropriate standard and is described fully in TfL's Traffic Modelling Guidelines (2010). Signal design should then be agreed with TfL during the detailed design stage – further information is provided in chapter 4.

**2.3.4**

Road safety audits (RSAs) are well-established procedures, widely applied to cycling and other traffic schemes. RSAs consider the road safety implications of all measures and their impact on the network under all anticipated operating conditions. The effects on all classes of road user are considered. In the hands of competent practitioners, RSAs improve the design and safety of cycle schemes. TfL has produced guidance on its safety audit procedures in the form of document SQA-0170, Road Safety Audit, Issue 4 (2011).

**2.3.5**

A balanced approach needs to be taken to RSAs in order to ensure that risk reduction measures and restrictions are proportionate and appropriate for the street environment. It is important that they contribute fully to the six design outcomes for cycling. Note that RSAs are not appropriate tools for determining cycling priorities and requirements that will support growth.

**2.3.6**

Changes to schemes are recommended as the audit team considers appropriate. On receipt of the safety audit report, the scheme engineer/designer should consider its content and amend the scheme accordingly. If the project sponsor authority does not wish to incorporate some or all recommendations of the safety audit they are required to prepare an 'exception report' stating the reason(s) why they consider the recommended action is not appropriate.

**2.3.7**

During the pre-construction phase, TMA works approval should be submitted to TfL. Works notification should happen by letter to those affected at least 2 weeks before works begin. Notice required for parking suspensions is 17 days, bus suspensions 3 days and signal switch-offs 3 days. If the works do not proceed then a cancellation notice should be submitted. Works permits should be submitted a minimum of 10 days before works start. Start notice should be submitted by 4.30pm the next working day and stop notice should be submitted by 4.30pm the next working day following the end of the works. The CDM coordinator should approve the construction phase plan before any works progress.

## Traffic Regulation Orders for cycling schemes

**2.3.8**

Proposed changes to regulations stand to give highway authorities greater discretion to take decisions about procedures relevant to cycling infrastructure. This has the potential to streamline processes that have previously added time and complexity to schemes, such Traffic Regulation Order (TRO) requirements. Importantly, the Briefing on the Government's ambitions for cycling (2013) commits to removing the requirement for a TRO for creating mandatory and contraflow cycle lanes, and for creating exemption for cyclists from certain prohibitions for other vehicles. This includes simply adding 'except cycles' to an existing 'no entry' restriction.

**2.3.9**

The Consultation on the draft Traffic Signs Regulations and General Directions 2015 (2014) confirms this intention, which will come into effect in 2015, subject to the results of consultation. Until that time, TROs should still be prepared as set out by the Road Traffic Regulation Act (1984) (RTRA). Should TROs no longer be required, it will still be important for authorities to engage key stakeholders in an appropriate, timely and proportionate way on any proposed changes to highways.

**2.3.10**

Traffic authorities are empowered under the RTRA to make TROs to regulate and manage the speed, movement and parking and loading of vehicles and to regulate pedestrian movement. The Environment Act 1995 enables Orders to be made in pursuit of national or local air quality management strategies. The use of TROs to exempt cyclists from certain prohibitions is an important tool in delivering coherent cycling infrastructure, particularly as part of a 'filtered permeability' strategy.

Exemptions for cyclists in City of London: Fann Street and Milton Street

**2.3.11**

The detail of TROs is also relevant to cycling where it places prohibitions on parking and waiting. On-street, these are shown by yellow line markings on the carriageway and the kerb (see section 3.5 for more details). In environmentally sensitive areas, the

intrusiveness of standard yellow line road-markings may be reduced by using narrower lines and a paler shade of yellow.

**2.3.12**

TROs may be permanent, experimental (up to 18 months) or temporary (in most cases up to 18 months). Temporary traffic orders are normally used for road works or emergencies. Where they are required, specific consideration should be given to maintaining conditions for cycling on cycle routes (see appendix B for further guidance on dealing with cyclists at roadworks). Experimental orders may be useful where monitoring the effect of and public reaction to an exemption, for example, may help make the case for a permanent change.

## Procedures for creating cycle tracks and shared use paths

**2.3.13**

Scheme delivery may also need to build in the process for designating certain infrastructure as being appropriate for cyclists. All on-highway but off-carriageway cycle surfaces (cycle tracks, shared use paths and shared areas) must be formally approved and have effective Notices in place. This will entail approval (by delegated authority) under Section 65(1) of the 1980 Highway Act. For the TLRN this is carried-out by a TfL designated officer. For roads managed by London boroughs, this is normally delegated to a senior officer. As well as major areas of shared use and cycle track, the shared use sections to either side of Toucan crossings will need to have effective Notices.

**2.3.14**

The TfL Traffic Orders Team hold copies of all Notices for existing TfL/TLRN cycle track, shared use and adjacent/segregated use. These are recorded under HA Section 65(1), not TROs. London boroughs normally have a similar system within their Traffic Order section.

**2.3.15**

Cycling is not permitted on public footpaths, unless an order has been made under Section 3 of the Cycle Tracks Act (1984) to convert the footpath to a cycle track.

Shared use path away from the highway, Queen Elizabeth Olympic Park

Footpath part-converted into cycle track, Hackney

## 2.4 Maintenance

**2.4.1**

Effective maintenance for cycle routes needs to be to a higher standard than Highway Act (1980) stipulations suggest. Minor defects can unseat a rider and rough surface quality can increase the effort required to cycle to the extent that it deters cycle use. Cycle route maintenance should therefore be prioritised over roads of equal degradation. Access by maintenance vehicles to all parts of a route needs to be provided for.

**2.4.2**

Relevant to effective maintenance are ownership issues and the New Roads and Street Works Act, 1991. NRSWA provides a legislative framework for street works activities by all undertakers, with the aim of coordinating them efficiently for the benefit of all road users. In some instances, certain responsibilities under the Highways Act and NRSWA are devolved to contractors.

**Figure 2.20 Maintenance issues for cyclists: surface quality**

Surface cracking or excessive rutting

Road markings: worn, barely visible, missing (not replaced after repairs), proud (usually resulting from excessive remarking) or low (masked off for repeated surface overlay).

Standing water due to uneven or slack gradients, blocked gullies, rutting of surface or leaking water valves.

Worn/smooth manhole covers

Unsuitable road gullies: dished, with longitudinal waterway gaps or with frame set below adjacent surface.

Missing surface material or failed reinstatement/use of smooth metal plates to ‘cover’ open trenches

**2.4.3**

Quietways and Superhighways need to be inspected regularly and resurfaced regularly as budgets permit. Examples of the main types of defects which effect cycle routes are shown in figure 2.20. Occurrences of any of these defects should be rectified in order to maintain the comfort level of service rating.

**2.4.4**

### Surface quality issues

The presence of issues set out in figure 2.20 should be assessed through regular maintenance inspections. Addressing them should be built into the highway authority's operational practices. An appropriate intervention level needs to be set, defining when action needs to be taken, and recommending repair methods as appropriate.

**2.4.5**

Standing water is a risk as it results in an unnecessarily slippery surface and cyclists swerving to avoid spray from passing vehicles. It needs to be treated as a priority all year round and not just in cold weather. Leaking water valves are the responsibility of the water authority and NRSWA coordinator.

**2.4.6**

Covers sitting low or loose in frames can, for cyclists, be a source of discomfort or even a safety risk where they need to swerve to avoid the cover. Most inspection covers (other than gullies and other surface water chambers) are the responsibility of service providers: electricity, water, gas, communications etc. These companies may have their own intervention levels but these may not adequately meet the needs of cyclists. Highway authorities may replace covers but may not be able to recover costs. Replacement covers must be 'badged' identifying the owner (as set out by NRASWA, 1991).

**2.4.7**

Poor maintenance practices can result in the tops of gullies being set unnecessarily low, which is not only a problem for cyclists but also results in vehicle impact loading and early failure. To avoid this issue, contract specifications should address materials and construction details and supervision of work is required.

**2.4.8**

### Refuse and spillages

Some maintenance issues should involve borough street cleansing and refuse collection teams in a programme of inspection and checking, or in the identification of problem areas such as spillages from refuse vehicles. Inspections should focus on typical problem locations, such as the areas around bus stops and petrol stations.

Refuse bags for collection left on edge of cycle lane

Diesel or oil spillage

Litter in cycle track

**2.4.9**

### Vegetation

Vegetation growing over the edges of cycle lanes and tracks can reduce the effective width of a facility, or mean that cyclists avoid it altogether. Certain overhanging trees and hedges that may not affect pedestrians or motor vehicles could be a significant barrier for cyclists. Inspections need to be proactive and enforcement letters to private owners under section 154 of Highways Act 1980 issued before the problem becomes unacceptable. The authority must have in place a procedure for checking out the works in default of a notice and an inspection regime for their own trees. Issues around grass encroaching on cycle tracks should be addressed to the borough street cleansing manager.

**2.4.10**

### Lighting

Inadequate lighting of cycling facilities ideally needs to be addressed through proper design and/or improvement schemes. Frequent inspections can help identify issues, which should be raised with the borough Highway Engineering Manager.

**2.4.11**

### Winter maintenance

Cycle lanes and tracks can become unusable without adequate salting or gritting. However, excessive grit accumulating by the road, in cycling facilities, is also a problem. Issues identified in regular inspections should be raised with the borough Winter Maintenance Manager

**2.4.12**

### Street furniture and signage

Maintenance inspections should highlight where any street furniture close to the kerb represents an obstruction for cyclists. This includes permanent, temporary or fly-posted signs attached to poles and lighting columns. Any missing or damaged signs should also be noted during inspections and reported to the borough Highway Engineering Manager.

Damaged sign obstructing cycle track

Obstruction by street furniture

Building materials left on cycle track

Contractors obstructing cycle route

**2.4.13**

### Obstructions to cycle infrastructure

Skips, hoardings, scaffold and building materials left on cycle lanes and tracks should be identified in inspections and reported to the borough licensing team for highway works. Effective planning, programming and supervision of works is required to avoid contractors and statutory and private utility companies obstructing cycle infrastructure with compounds, machinery, plant and equipment. Obstructions caused by advertising material or other unofficial street furniture, or by persistent parking, should be dealt with through enforcement and reported to the borough NRSWA team.