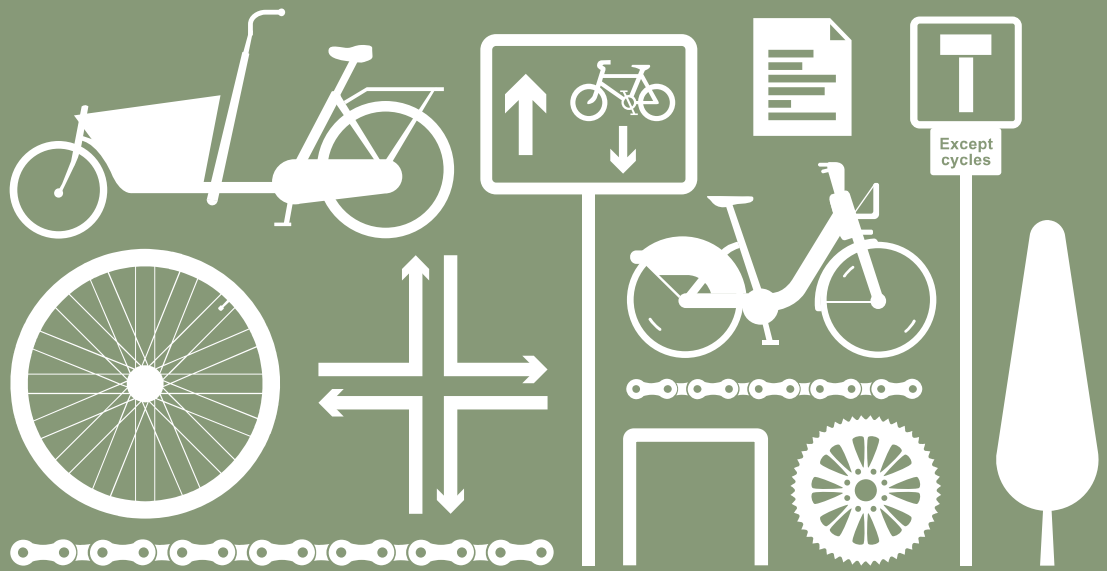
2. Tools and techniques

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 objective of efficiently delivering safer, more comfortable, direct, coherent, attractive and adaptable cycling infrastructure.



Version control

Version 1 (Dec 2014) – Published

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2.1.3 Stakeholder involvement

Stakeholder support and consultation throughout the process is important for schemes to be successful. To be meaningful, it needs to be conducted at times when it can positively influence outcomes without causing delay and can be done in a proportionate manner. Engagement of stakeholders at the start of a project can help avoid errors that would be harder and more costly to rectify at a later stage. Stakeholders can provide valuable information and local knowledge during route planning and scheme development.

Two distinct functions need to be considered: incorporating and responding to stakeholder interests, and keeping stakeholders informed of issues that affect their interests.

It is recommended that the following people and organisations are involved at a meaningful time in the design process:

- Ward councillors and highway authority
- Local cycle user groups and cycling organisations
- 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
- Freight industry representatives
- Local disability groups
- Groups with an interest in pedestrian accessibility
- Groups with an interest in inclusive cycling
- Metropolitan Police Service – specifically, traffic management officers
- 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
- Schools and colleges

Conduct of an Equality Impact Assessment (EqIA) or Accessibility Audit can be a useful tool for engaging some of the above groups on issues around accessibility and improving the environment for people with protected characteristics under the Equality Act (2010). This includes cyclists and public and private transport users as well as pedestrians. Where schemes propose significant close interaction of pedestrians and cyclists – any proposal involving shared use, for example – an EqIA is recommended.

2.2 Cycling Level of Service assessment

2.2.1 Background

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 should be used on any scheme that has an impact on the street environment.

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.

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.

The CLoS assessment 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 represents one intermediate level of service, the second a higher level.

2.2.2 When to assess

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.

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

2.2.3 Scoring

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.

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.

Users are encouraged to set expectations that are ambitious while also being achievable.

Zero scores should be considered as not meeting the required standard for programmes and projects funded under the Mayor's Vision for Cycling but there may be some latitude in exceptional circumstances.

Zero scores should generally be a prompt for examining whether the factor in question will have a negative impact on the propensity to cycle.

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 as an interim measure – a scheme that registers as 'critical' on any one indicator has not met the required standard. To be given greater weighting in the scoring system, it is suggested that the 0, 1 or 2 scores should, for critical factors, be multiplied by three.

At the route planning stage, it is not likely that all factors can be measured. 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)*	Highest CLoS *(score=2)*	Score
Safety						(48)
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 junctions	
	Collision alongside or from behind	Nearside lane in range 3.2m to 4.0m	Cyclists in wide (4m+) nearside traffic lanes or cycle lanes less than 2m wide	Cyclists in dedicated cycle lanes at least 2m wide	Cyclists separated from motorised traffic	
	Kerbside activity or risk of collision with door	Cycle lanes <1.5m alongside parking / loading with no buffer	Frequent kerbside activity / effective width for cyclists of 1.5m	Less frequent kerbside activity / effective width for cyclists of 2m	No kerbside activity / No interaction with vehicles parking or loading	
	Other vehicle fails to give way or disobeys signals		Poor visibility, no route continuity across junctions and unclear priority	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	
Feeling of safety	Separation from heavy traffic		Cyclists in general traffic lanes or cycle lanes less than 2m	Cycle lanes at least 2m wide	Cyclists physically separated from other traffic at junctions and on links, or no heavy freight	
	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	
	Total volume of traffic (where cyclists are not separated)	>1,000 vehicles/ hour at peak	500 – 1,000 vehicles / hour at peak (but becomes 'critical' if 5 per cent or more are HGVs)	200 – 500 vehicles / hour at peak (but becomes 'basic' if 2 per cent or more are HGVs)	<200 vehicles / hour at peak	
	Interaction with HGVs	Frequent, close interaction	Frequent interaction	Occasional interaction	No interaction	

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

Factor	Indicator	Critical*	Basic CLoS *(score=0)*	Good CLoS *(score=1)*	Highest CLoS *(score=2)*	Score
Social safety	Risk/fear of crime		High risk: 'ambush spots', loitering, poor maintenance	Low risk: area is open, well designed and maintained	No fear of crime: high quality streetscene and pleasant interaction	
	Lighting		Long stretches of darkness	Short stretches of darkness	Route lit thoroughly	
	Isolation		Route passes far from other activity, for most of the day	Route close to activity, for all of the day	Route always overlooked	
	Impact of highway design on behaviour		Layout encourages aggressive behaviour	Layout controls behaviour throughout	Layout encourages civilised behaviour: negotiation and forgiveness	
Directness						(8)
Journey time	Ability to maintain own speed on links		Cyclists travel at speed of slowest vehicle ahead (including other cyclists)	Cyclists can usually pass other vehicles (including cyclists)	Cyclists can always pass other vehicles	
	Delay to cyclists at junctions		Journey time longer than motor vehicles	Journey time around the same as motor vehicles	Journey time less than motor vehicles	
Value of time	For cyclists compared to private car use (normal weather conditions)		VOT 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	
Direct-ness	Deviation of route (against straight line or nearest main road alternative)		Deviation factor greater than 40 per cent	Deviation factor 20-40 per cent	Deviation factor less than 20 per cent	

Figure 2.3 Cycling Level of Service assessment matrix (part 3)

Factor	Indicator	Critical*	Basic CLoS *(score=0)*	Good CLoS *(score=1)*	Highest CLoS *(score=2)*	Score
Coherence						(6)
Connections	Ability to join/leave route safely and easily		Cyclists cannot connect to other routes without dismounting	Cyclists share connections with motor traffic	Cyclists have dedicated connections to other routes	
	Density of other routes		Network density mesh width >400m	Network density mesh width 250-400m	Network density mesh width <250m	
Way-finding	Signing		Basic direction signing (cyclists follow road signs and markings)	Some cycle-specific direction signing	Consistent signing of range of routes and destinations at decision points	
Comfort						(20)
Surface quality	Defects: non cycle friendly ironworks, raised/ sunken covers/gullies	Major defects	Many minor defects	Few minor defects	Smooth, high-grip surface	
Surface material	Construction		Hand-laid asphalt or unstable blocks/sets	Machine laid asphalt concrete or HRA; smooth blocks	Machine laid asphalt concrete; smooth and firm blocks undisturbed by turning vehicles	
Effective width without conflict	Clear nearside space in secondary position or motor vehicle speed/ volume in primary position	Secondary: <1.5m Primary: high motor vehicle flow	Secondary: 1.5m Primary: medium motor vehicle flow	Secondary: 1.5-2.0m Primary: low motor vehicle flow	Secondary: >2.0m Primary: no overtaking by motor vehicles	
Gradient	Uphill gradient over 100m		>5 per cent	3-5 per cent	<3 per cent	
Deflections	Pinch points caused by horizontal deflections		(Remaining) lane width <3.2m	(Remaining) lane width >4.0m or <3.0m (low motor vehicle flow)	Traffic is calmed so no need for horizontal deflections	
Undulations	Vertical deflections		Round top humps	Sinusoidal humps	No vertical deflections	

Figure 2.3 Cycling Level of Service assessment matrix (part 4)

Factor	Indicator	Critical*	Basic CLoS *(score=0)*	Good CLoS *(score=1)*	Highest CLoS *(score=2)*	Score
Attractiveness						(12)
Impact on walking	Pedestrian Comfort Level (PCL)		Reduction in PCL to C, D or E	No impact on pedestrian provision or PCL never lower than B	Pedestrian provision enhanced by cycling provision or PCL A	
Greening	Green infrastructure or sustainable materials incorporated into design		No greening element	Some greening elements	Full integration of greening elements	
Air quality	PM10 & NOX values referenced from concentration maps		Medium to High	Low to Medium	Low	
Noise pollution	Noise level from recommended riding range		>78DB	65-78DB	<65DB	
Minimise street clutter	Signing required to support scheme layout		Large amounts of regulatory signing to conform with complex layout	Moderate amount of signing, particularly around junctions	Minimal signing, eg for wayfinding purposes only	
Secure cycle parking	Ease of access to secure cycle parking on- and off-street		No additional secure cycle parking	Minimum levels of cycle parking provided (ie to London Plan standards)	Cycle parking is provided to meet future demand and is of good quality and securely located	

Figure 2.3 Cycling Level of Service assessment matrix (part 5)

Factor	Indicator	Critical*	Basic CLoS *(score=0)*	Good CLoS *(score=1)*	Highest CLoS *(score=2)*	Score
Adaptability						(6)
Public transport inte-gration	Smooth transition between modes or route continuity maintained through interchanges		No 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.	
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	
Growth enabled	Route matches predicted usage and has exceedence built into the design		Provision does not match current levels of demand	Provision is matched to predicted demand flows	Provision has spare capacity for large increases in predicted cycle use	
TOTAL (max 100)						(100)

**For highlighted critical indicators, score is multiplied by 3 (basic = 0, good = 3, highest = 6)*