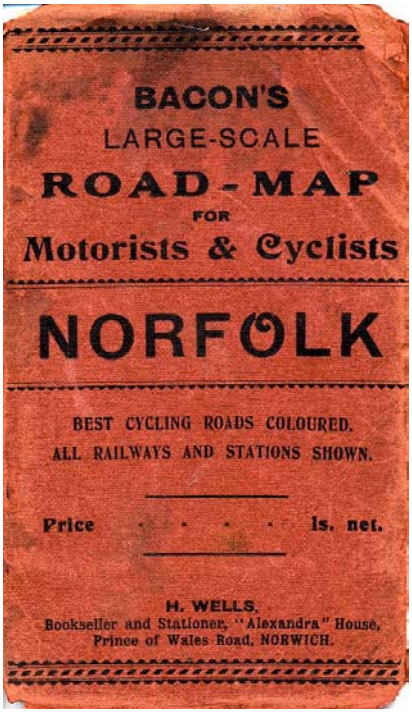
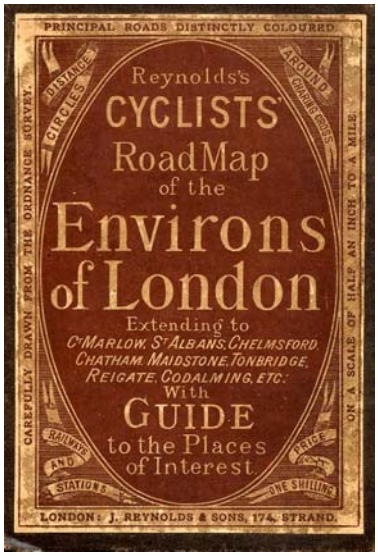
Mapping Cycle-friendliness –

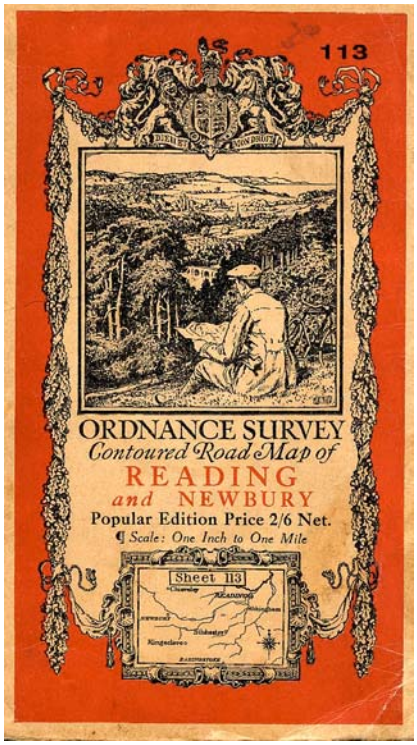
towards a national standard

Cyclenation in collaboration with CTC would like the guidance contained in the appendices to this paper to be adopted as the national standard for cycle mapping in the UK. Cycle mapping has become far too diverse with many maps bearing little relation to the actual conditions for cyclists on the ground, with a unhealthy preoccupation with 'facilities'. Now is the time to adopt a common approach to useful tool for all people using bicycles.

Cycling maps have a long history. For many years the cover of the Ordnance Survey 'Popular Edition' maps – precursors of Landranger maps - showed a cyclist studying the landscape with his map, while their main competitors, the "Barts" half-inch series, were produced in conjunction with CTC specifically for the cyclist market. Other maps too claimed to be for cycling – two early 20th century ones are shown below. Interestingly, the "Best Cycling Roads Coloured" on the Bacon's map are the main roads.





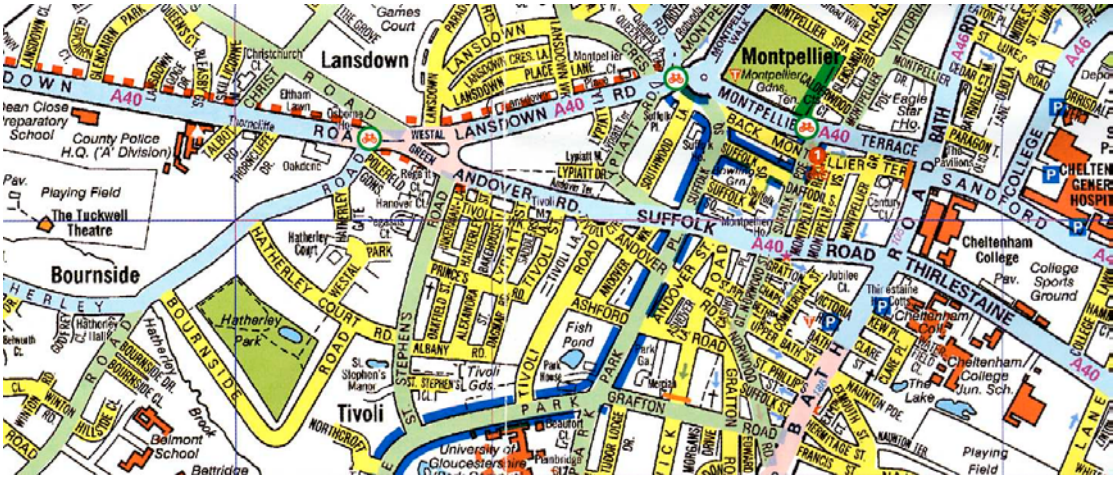


As special routes for cyclists in urban areas started to appear in Britain from 1975 onwards, so did leaflet maps of the routes to publicise them and to encourage their use. More ambitious route maps followed. Sustrans in particular, has published a range of very impressive long-distance route maps.

However these route maps would not necessarily help residents or visitors to plan journeys to school, work or shopping which would be within their capabilities of traffic skill and physical fitness and did not conveniently follow the cycle route provided.

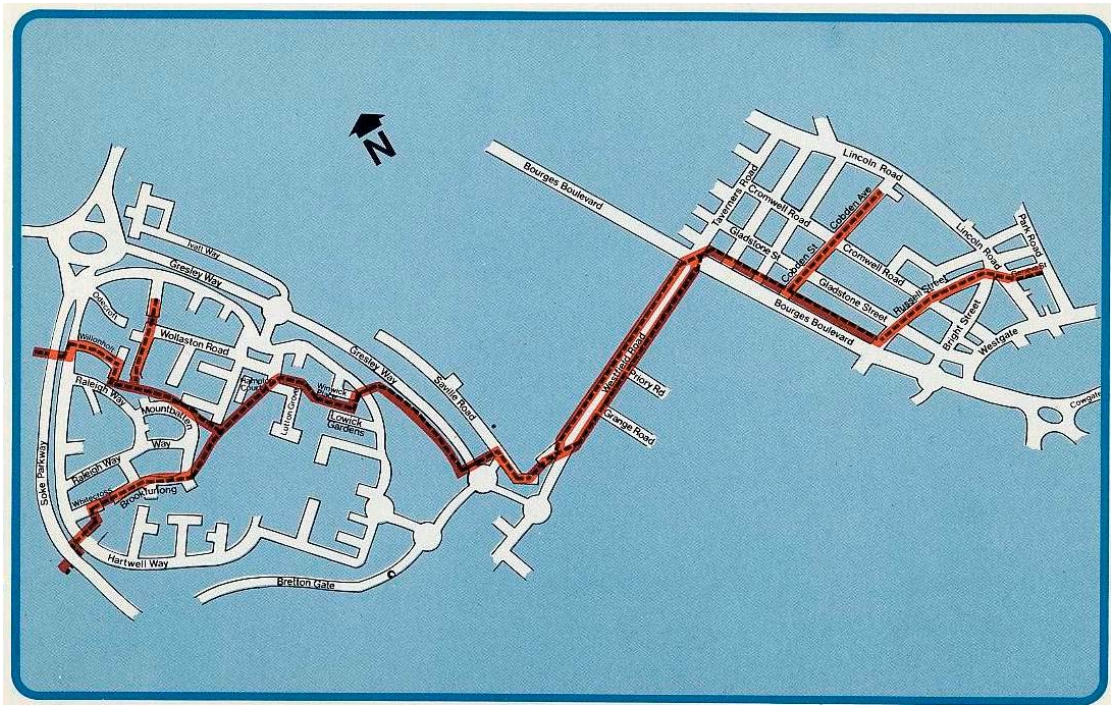
A map of Cheltenham was produced by the local cycle campaign group with

the specific intention of providing reliable information about the cycle-friendliness of all streets in the town. It used a colour coding system linked to the levels of cycling skill expected from cycle users who have undertaken national standard cycling training. Streets are coloured from yellow (the simplest level of skill needed) to purple (a high level of training and experience expected). An extract is shown below, along with an early simple route-based map for comparison.



Above: Cheltenham (2004)

Below: Peterborough (1977)



Appendix 1 explains the procedure that was developed in Cheltenham to classify every street in the town according to a five-point scale. This has now been adopted by a number of other towns. and Cyclenation in collaboration with CTC would like this to be the national standard.

The five points are described below, with a reference to the 3 different levels

of the national standard cycling training programme:

Yellow Quiet roads with little traffic and low traffic speeds. Generally suitable for all cyclists. These are mostly non-distributor residential streets or roads through parks.
Green Through routes with moderate traffic and low speeds. Suitable for Level 2 and Level 3 cyclists; perhaps Level I at less busy times, under supervision. Shopping streets and industrial premises should be classified green as a minimum due to the complexity of the traffic environment.
Blue Busy roads, including A or B roads, where road design is traditional and does not lead to excessive speed. Few HGVs. Road width allows safe overtaking of cyclists over the greater part of its length. Suitable only for Level 2 and Level 3 cyclists.
Red Busy principal roads, perhaps with some HGVs. Road width restricted, leading to increased risk from overtaking vehicles. Traffic speed high relative to road width with drivers less willing to cede right of way to cyclists. Complex junctions. Suitable for Level 3 cyclists and some Level 2.
Purple Fast, busy roads with frequent HGVs. Motor vehicle-orientated road design, such as use of slip roads, large roundabouts. Restricted lane width. Suitable only for Level 3 cyclists.

Cheltenham's classification is somewhat subjective, relying on the experience of a number of experienced cyclists who can compare their judgements on classifications and adopt a reasonably consistent scoring.

To allow a consistent result from other teams, without necessarily sharing the same high levels of expertise, a more objective approach is called for. This could involve recording measurable features of the road environment which would have an effect on its suitability for cycling. This approach was outlined in a discussion document produced by CTC in December 2005[1].

This used the concept of 'Cyclability' developed by researchers at TRL. In a research project[2] a number of volunteer cyclists were asked to rank different road links on a prescribed circuit according to their cycle-friendliness. The TRL report concluded:

"The research showed that cyclists considered safety, pleasure and a smooth road surface to be the most important features of the links (directness and convenience were not relevant in this experiment). It also showed that the subjective assessment of cyclability can be at least partly predicted from easily measurable traffic and carriageway conditions. The most significant appear to be vehicle speeds, lane width, gradient and side turnings."

[1] Using Cyclability – building route preference into cycle journey planning. Boyd, Howard, CTC 2005

[2] Cyclists' assessments of road and traffic conditions: the development of a cyclability index. N Guthrie, D G Davies, G Gardner, TRL Report 490, 2001

For relevance to cycling route selection, the following data could be collected or computed for each link.

Data description	Method of collection	Importance in influencing cycle journey route
Motor vehicle speed	Occasional speed surveys can provide a benchmark	High
Lane width	Sample measurements on site or can be measured (approximately) from OS 1:2500 or larger mapping)	High
Frequency of side turnings	Map, or perhaps Google Earth	High
Gradient	Map (e.g. number of contour lines per 1000 m of distance)	Medium
% of large / heavy vehicles	Traffic counts (manual or automatic)	High
Road surface condition	Road condition surveys, although automatic surveys may miss some of the features which are most annoying or dangerous for cyclists	High
Frequency of road traffic accidents involving cyclists	Local authority records from STATS 19 forms	Low
Frequency of complex / intimidating junctions	Site survey of major routes	High

Appendix 2 suggests how these data, collected on a street by street basis, can be used to help assess the cycle-friendliness of the highway network

The TRL research, and these assessment criteria, only consider link characteristics. Obviously cycle-friendly junctions are important ingredients of safe and convenient cycle journeys. Further work is needed before junctions can be adequately classified.

Appendix 1

Common Standards for Cycle Mapping

The 2004 Cheltenham Cycle Map is the first of its kind to be published in the UK, although maps of similar design have proved very popular for some years in parts of the USA. Instead of showing only specific cycle routes and other facilities, the map categorises the entire highway network according to the degree of skill and experience needed for cycling. This classification is linked to levels of cycling competence prescribed by the National Cycle Training Standard.

The map is based on the following principles:

- All roads (other than where cycling is legally prohibited) are cycle routes, but the amount of skill needed for using them varies according to traffic volume and speed and the complexity of road design. Whilst inexperienced cyclists will not be competent to use more difficult roads, almost all roads are capable of being used safely by cyclists that can attain the Level III National Cycle Training Standard.
- The map should have the widest audience and provide information useful to cyclists of all abilities. However, not all of the information will be relevant to all cyclists. By providing 'higher level' information, less able cyclists may be inspired to extend their horizons by becoming more skilled.
- Whilst designated cycle routes and other facilities are clearly shown, they should not dominate the map. Facilities of low standard, particularly where there are safety concerns, should generally be omitted.
- The map as a whole should provide a 'do-it-yourself' tool to enable any individual, irrespective of their ability, to work out the route that is best for them between any two places. No network of designated cycle routes can ever provide such a comprehensive asset for all cyclists.

Base map

The map uses an Ordnance Survey digital base map with all roads shaded according to the experience required to use them. There are five classifications of road. Whilst all classification is subjective (and should be verified by cyclists of differing levels of skill), the following general criteria are applicable. Colours are applied incrementally along roads (not to roads as a whole), as conditions change.

Appendix 2 Suggested limiting values for road characteristics

Defining a link as ‘yellow’ or ‘purple’ etc may to a great extent be a subjective judgement. This table suggests the appropriate traffic levels and infrastructure features for each level. Assigning a colour to a street may be difficult if it combines features at different levels. Some of the limiting values have not yet been assigned to the appropriate level.

	Yellow	**Green**	**Blue**	**Red**	**Purple**
Motor vehicle speed (85^{th}%ile k/hr)	<= 25 k/hr	25-40 k/hr	40-55 k/hr	55-70 k/hr	>= 70 k/hr

	Yellow	Green	Blue	Red	Purple
Inside lane width (m) – related to daily traffic volume (‘000s). Recognises that lane widths between 3.5 and 4.0 m are relatively more stressful	10		Unlikely		
	9				
	8				
			8		
	7				

	Yellow	Green	Blue	Red	Purple
Frequency of kerbside conflicts: side turnings, bus stops, parking bays (per km)	Subjective assessment – research needed to set realistic values				
Gradient (max %) where a choice of route is feasible	<= 2.5%	4%	6%	8%	>= 10%
% of large / heavy vehicles (as % of all motor traffic)	<= 2%	3-5%	6-8%	9-11%	>= 12%
Road surface condition: number of severe defects per km	Subjective assessment – research needed to set realistic values				
Frequency of collisions involving cyclists as % of all recorded collisions	Subjective assessment based on 3-year highway authority casualty records				
Frequency of complex / intimidating junctions (per km)	0	0	1	2	>= 2

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