

Adapting Level of Traffic Stress for England: A Network-Scale Cycling Infrastructure Assessment in the West Midlands

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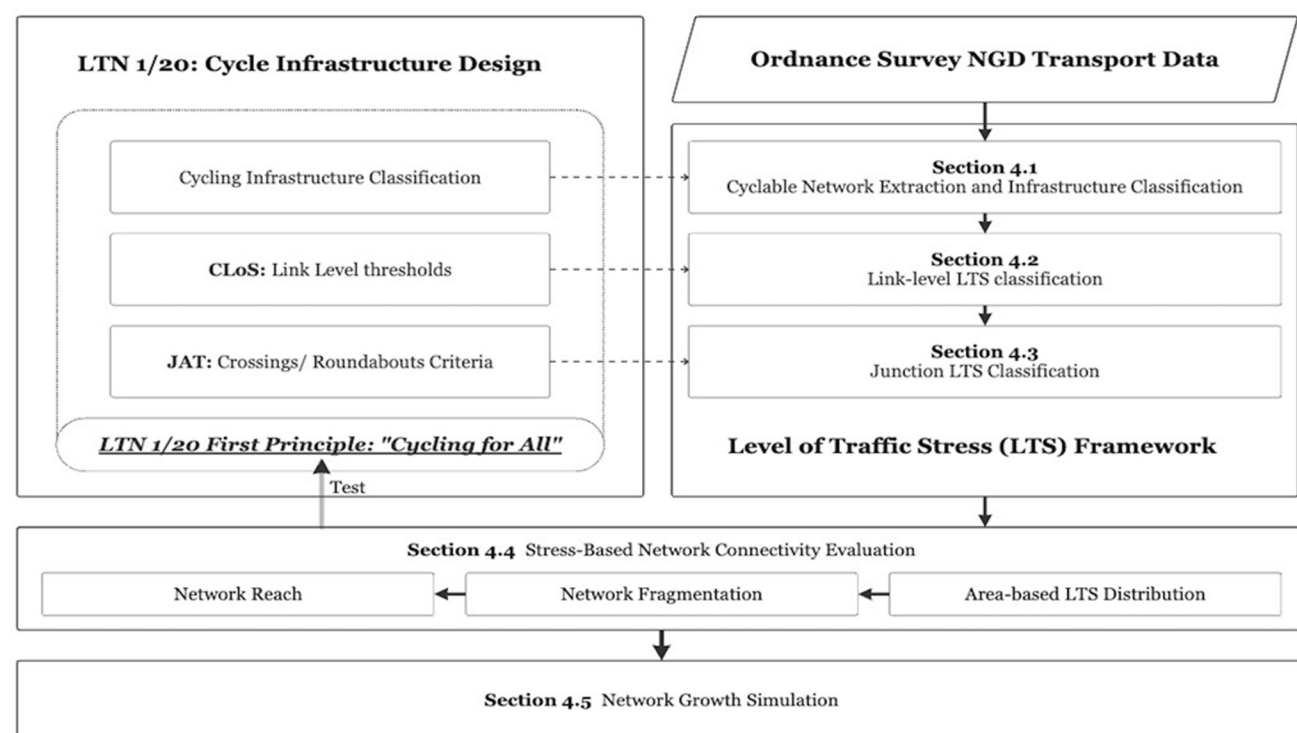
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Background and Motivation

The most comprehensive national design standard for cycling infrastructure in England, LTN 1/20, requires that infrastructure be accessible to everyone, including children. [Its evaluation instruments provide rigorous criterion-level scoring but were conceived for scheme-level audit](#) — they can confirm that a corridor meets the standard, but cannot reveal whether compliant corridors connect into a usable network. As investment in cycling infrastructure grows under Active Travel Fund requirements, no established method exists to assess whether individually adequate schemes cohere into a coherent, low-stress network.

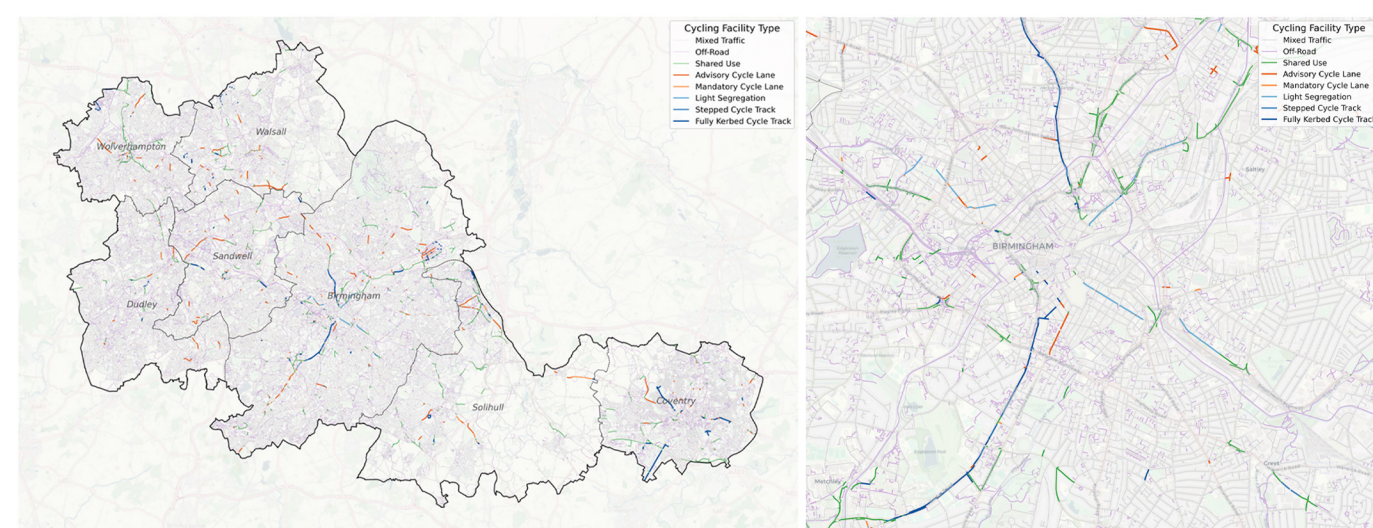
Methods and Data

This work presents [the first Level of Traffic Stress classification calibrated to English design standards](#), deriving all thresholds from LTN 1/20's criteria and [operationalising them on Ordnance Survey NGD Cycle Lane Data and the newly released Cycle Lane Feature layer](#). The framework introduces junction stress assessment with bearing-based conflict detection and roundabout-specific criteria absent from prior implementations. The framework is then applied to evaluate network-level connectivity, fragmentation, and accessibility across the West Midlands, testing LTN 1/20's "cycling for all" principle, and to simulate the impact of alternative upgrade sequencing strategies. [Built on nationally consistent data and thresholds, the framework is directly transferable to any English authority area](#).

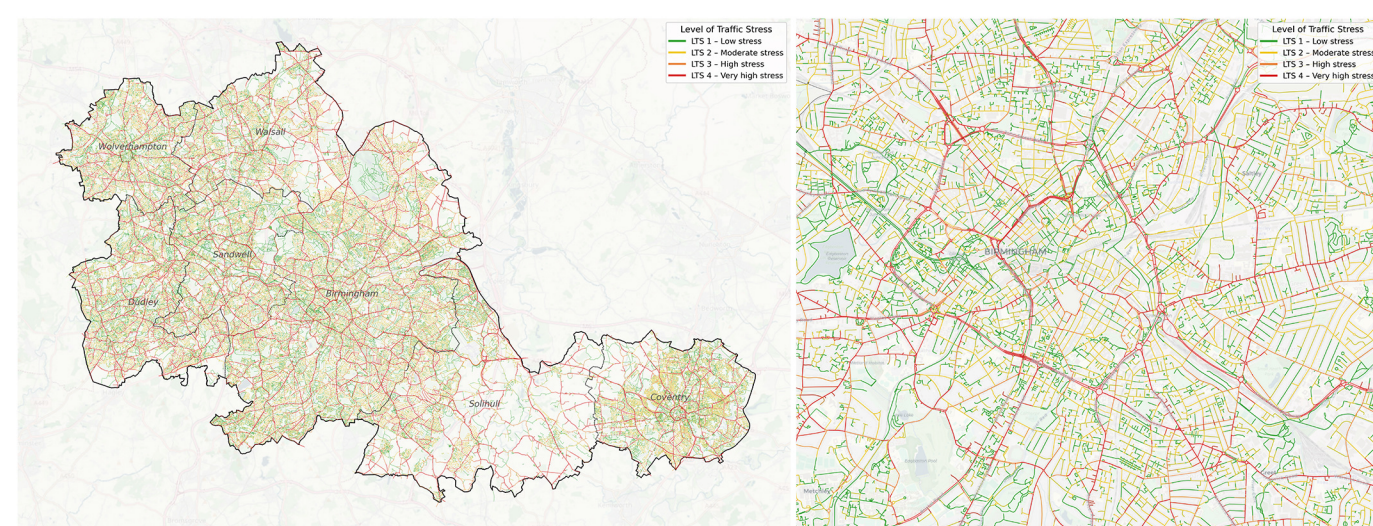


Key Findings

Cycling Infrastructure Profile The West Midlands cyclable network spans 23,301 km, of which 81.3% is mixed traffic with no dedicated provision. Physically separated cycling infrastructure — kerbed tracks, stepped tracks, and light segregation — totals just 49.7 km (0.2%). What dedicated provision exists is concentrated in Birmingham and Coventry; the remaining boroughs have very little.



Level of Traffic Stress Classification Nearly 80% of network length is classified as low-stress (LTS 1–2) — but this figure is misleading. Low-stress segments are short, clustered residential streets. The remaining 22% forms a continuous arterial grid of high-stress roads that encloses these clusters and prevents them from connecting into usable routes.

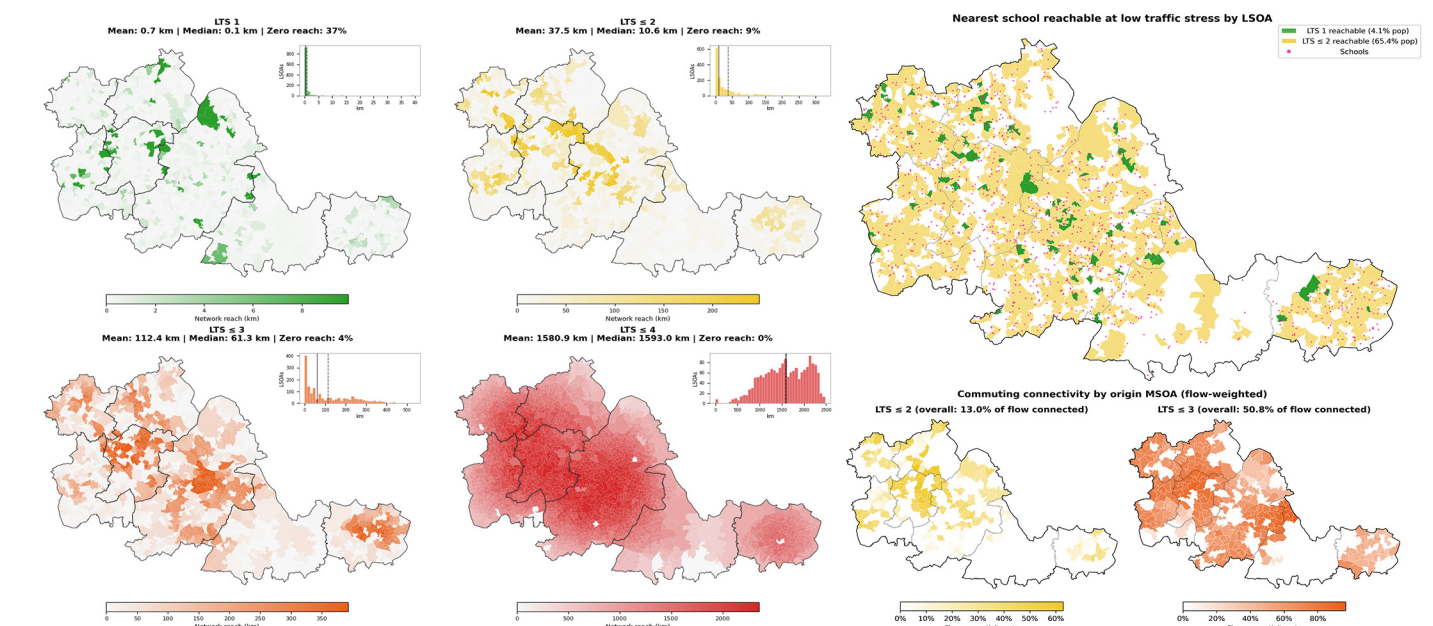
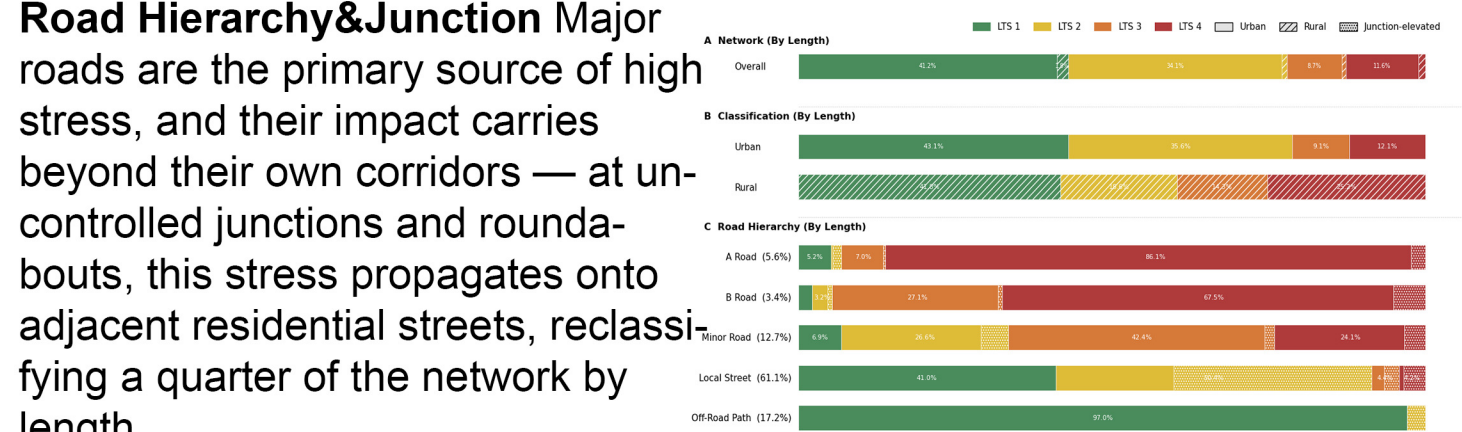


Urban–Rural Disparity High-stress roads account for 21.2% of urban network length but 39.5% in rural areas. The difference lies almost entirely in LTS 2: local streets that provide moderate-stress alternatives in urban areas are scarce in rural settings, replaced by higher-classification roads.

Road Hierarchy&Junction Major roads are the primary source of high stress, and their impact carries beyond their own corridors — at uncontrolled junctions and roundabouts, this stress propagates onto adjacent residential streets, reclassifying a quarter of the network by length.

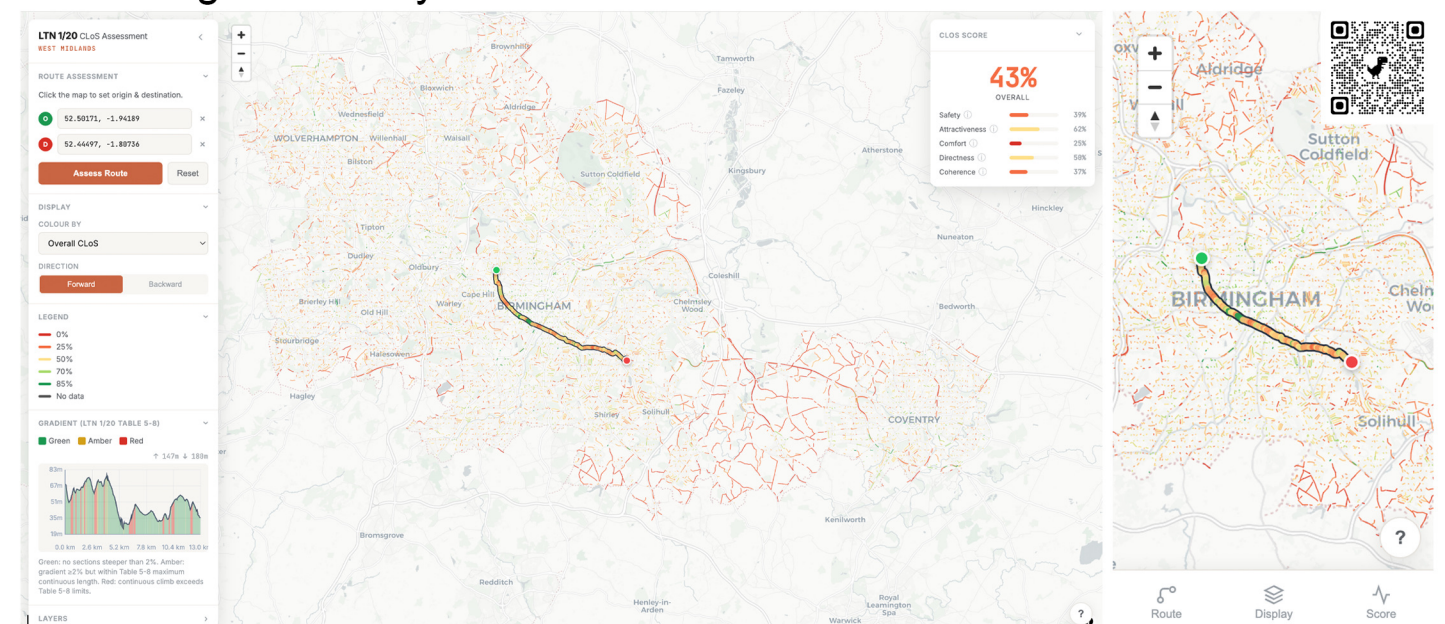
Network Reach and Accessibility Fragmentation collapses into inaccessibility. At low-stress conditions, a cyclist can reach less than 1% of the network available to one willing to tolerate any road. Only 4.1% of residents can reach their nearest school at conditions suitable for children, and only 13.0% of commuting flow is connected at stress levels tolerable to mainstream adults — with detours roughly doubling journey distance.

[The network delivers cycling for the few, not for all — an infrastructure reality behind the region's 0.9% cycling mode share.](#)



LTN 1/20 Web Assessment Tool

Beyond the dissertation's analytical framework, a [parallel industry deliverable](#) was developed in partnership with Transport for West Midlands to meet practitioner needs that differ from academic ones — [desktop screening](#), [corridor comparison](#), and [before-and-after monitoring](#) rather than network-level metrics. The tool scores 183,923 road links against LTN 1/20's criteria, giving practitioners an interactive, map-based alternative to commissioning site surveys.



Value of the Research

LTN 1/20 established the most comprehensive national design standards for cycling infrastructure in England, but its evaluation instruments can only confirm that individual schemes meet the standard — not whether those schemes connect into a network that people can actually use. This work shows that LTN 1/20 contains the material for its own network-scale evaluation. [By translating its design criteria into a stress classification, the standard can be turned back upon the networks it governs, revealing in quantitative terms the distance between the ambition of cycling for all and the infrastructure through which that ambition must be realised.](#)