

Interurban transport advice note on roads policy

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- improve competitiveness
- improve quality of life
- support climate resilience and the transition to net zero carbon emissions by 2050.

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- **develop fresh approaches and ideas** – basing our independent policy recommendations on rigorous analysis
- **focus on driving change** – building consensus on our policy recommendations, and monitoring government progress on their delivery.

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Interurban transport advice note on roads policy

This note sets out the Commission's interim advice to government on roads policy, ahead of analysis the Commission will publish in full in the second *National Infrastructure Assessment*. This advice is being published now to help inform government's upcoming draft third Road Investment Strategy.

In the Commission's view, ongoing enhancement of road connectivity can support growth and help narrow disparities between regions, provided government also sets out robust, credible commitments to achieve decarbonisation and environmental improvement so that road travel can become a sustainable choice. On this basis, the Road Investment Strategy should set out a long term vision for improving road connectivity based on systematic analysis of where enhancements can most effectively support regional growth, and this should be the first step towards a longer term interurban transport strategy that prioritises effectively between road and rail.

The government needs a strategy across all interurban transport

The government needs an interurban transport strategy to guide investment across road and rail in a way that will support growth across regions and address the uncertainty that can surround projects, while meeting its net zero and environmental commitments. This would enable strategic choices to be made about prioritisation. It would also set a clear long term strategy to ensure dependent development can be aligned and complementary interventions designed to maximise the benefit of transport investments.

The Commission is providing government with advice on national roads ahead of the second National Infrastructure Assessment because upcoming work on the next Road Investment Strategy presents an opportunity to begin to develop a long term interurban transport strategy. Further advice on the overall approach to an integrated interurban transport strategy will follow as part of the second National Infrastructure Assessment in autumn this year.

Developing an integrated interurban transport strategy is clearly a large and complex task, and the Commission's work will not amount to a detailed design for such a strategy. Rather the Commission's advice will illustrate the key issues that such a strategy should address for roads and develops tools to help analyse these issues from a strategic perspective. These are not a replacement for the analytical approaches used in assessing individual schemes, or for tools such as Department for Transport's modelling of national transport networks – they are intended to be complementary. These approaches will require further work and refinement before any final investment decisions can be made. However, they do demonstrate the factors that should be considered to deliver an effective strategic vision for the network.

Investment in roads needs to be shaped by a vision to create significant economic opportunity and narrow disparities between regions, whilst protecting and enhancing the environment

Enhanced road connectivity offers a significant opportunity to contribute to economic growth, and particularly to help with narrowing regional productivity imbalances.

Road is the primary form of connectivity for most journeys, most places and most businesses.¹ 82 per cent of passenger journeys over ten miles being made by car² and 77 per cent of domestic freight is moved by road.³ Almost everywhere in the country has significantly better connectivity by road than it does by public transport⁴ though many roads are also used by public transport. Outside of congested urban areas, for many places and businesses road is – and will remain – the main viable connectivity option available, due to the dispersal of demand and the freight volumes currently moved by road.

Enhancing connectivity through road investment is relatively cheap compared to other modes, quicker to deliver, and provides a wider pool of direct beneficiaries.⁵ Increasing the supply of transport infrastructure by one per cent has been estimated to lead to an increase (at the upper end) of around 0.06 per cent in GDP⁶ – and the scale of this impact is likely to be higher for roads than it is for rail.⁷ Possible future technological development could further amplify the benefits of road connectivity by offering more efficient and accessible travel – notably the deployment of connected and autonomous vehicles.

However, as things stand, travel by road comes with negative impacts that are not sustainable and must be addressed to meet legal obligations.⁸ Transport produced 24 per cent of the UK's total carbon emissions even in 2020 and remains the largest emitting sector in the UK.⁹ The majority (91 per cent) of emissions from domestic transport come from road vehicles (89 MtCO₂e).¹⁰ Longer distance travel is a large part of the problem: car journeys of over ten miles account for 55 per cent of personal travel mileage by road.¹¹ The road network (and enhancement of it) also has a significant impact on other environmental issues like biodiversity and air quality which feature prominently in the government's Environment Improvement Plan ambitions as well as legal targets.

These sustainability challenges must be resolved for road transport to continue providing connectivity even at today's levels, before any expansion can be considered for the longer term. The next Road Investment Strategy must confront this problem, setting out a clear link between plans for environmental improvement and plans for road improvements and network management. It should set out a long term plan for how the network will be developed over time, with options for investment and intervention being considered in light of their impacts on the end goals. This would also enable Mayoral Combined Authorities, Subnational Transport Bodies and others to plan complementary investment and interventions, and would lay the foundations for consistent, effective delivery.

To be robust, plans for road transport must anticipate what is necessary to achieve decarbonisation and environmental improvement

The road network must be decarbonised to meet net zero obligations. Biodiversity net gain and air quality improvement are also legally mandated. Achieving these goals is accordingly a non-negotiable part of roads policy which a strategy for roads investment should appropriately detail.

The carbon problem is a result of the current fleet and journey patterns,¹² and will need addressing regardless of any plans for enhancement. While improvements to road connectivity can contribute to increasing traffic volumes by way of induced demand,¹³ this effect is much less (~0.6 to 1.3 per cent)¹⁴ than the potential growth in traffic demand from economic growth (ten to 28 per cent 2022-2035)¹⁵ that policy must prepare for in any case. Successful enhancements would also increase the speed of vehicles which would also increase emissions. The potential economic benefits of greater connectivity means all efforts should be made to deliver sufficiently rapid decarbonisation to allow enhancements to be considered.

Based on the evidence the Commission has analysed, rapid and transformative action is necessary to achieve compliance with carbon budget trajectories. This commitment, and accompanying measures, should be clearly set out as part of the next Road Investment Strategy. The response also needs to reflect the level of inherent uncertainty in carbon outcomes, as reflected by the range of traffic growth forecasts¹⁶ as well as the potential variation in efficacy of measures targeted at fleet electrification. Planning to decarbonise across the range of this uncertainty will mean carbon impact arising from potential induced demand is accommodated from the start.

Since travel by road is economically and socially valuable, the priority should be accelerating the transition of the vehicle fleet, and all feasible measures to hasten this transition should be considered. Transition to zero emission vehicles allows journeys to continue whilst reducing carbon emissions,¹⁷ (if the government takes the necessary action on decarbonising electricity generation) preserving the economic value of connectivity. Acting quickly and effectively on this will reduce the risk that more difficult measures may be needed later, though it will ultimately reach practical limits.¹⁸

Given the scale of the task and necessity of guaranteeing carbon budget compliance, it makes sense for the strategy to provide for the development of other interventions in parallel with the acceleration of fleet transition, with a commitment to deploy them if they prove necessary. This will ensure that they are practically available if and when required, and will enable the public and business to prepare on an adaptive basis.

As part of this toolkit of future possible interventions,¹⁹ it is the Commission's view that widespread demand management measures for the purpose of reducing carbon cannot be ruled out. There are a wide variety of different measures that could be considered under the

umbrella of demand management, and further work will be required on design, including the relative impacts of different options on different user groups, and appropriate engagement ahead of implementation to ensure there is public support for any measures required.*

Construction of new infrastructure also contributes to carbon emissions. National Highways has a plan to decarbonise construction by 2040,²⁰ which is broadly consistent with the reduction trajectory for emissions in industry and construction set out by the Climate Change Committee.²¹ Decarbonising construction is a vital part of the sustainability of ongoing improvements in road connectivity, and as with operational emissions, an understanding of options, preferences and substitutability will be an important part of a strategy's robustness.

Air quality enhancement also requires strategic consideration. Most of the places with the worst air quality issues are within large conurbations,²² and unlikely to be directly affected by interurban road enhancements.²³ However, some projects may have the effect of increasing traffic in areas that do not meet air quality standards.²⁴ If design cannot achieve sufficient mitigation, this will need to be addressed through phasing in line with fleet electrification which in the long term will bring air quality impacts down, though not eliminate them.

Biodiversity net gain likewise requires the plan to be backed with an understanding of strategic opportunities. This can ensure that mitigation of road enhancement impacts achieves maximum net positive benefit. Such an approach should ensure that both the portfolio as a whole, and schemes individually, contribute to net gain. The Commission believes this will achieve more than tackling issues on a scheme-by-scheme basis. The costs of delivering any mitigations to achieve this standard must also be reflected in the core budgets of individual schemes.²⁵

The scale of action required to make road use sustainable is challenging but proportionate to the benefits that government wants to achieve for climate, health and nature. Moreover, a clear strategy that commits to doing what is necessary to achieve those goals and legal obligations is also effectively a precondition for government to improve transport connectivity and realise the benefits this brings. Demonstrating that these targets can and will be met would enable government to commit with confidence to a long term plan to improve the road network, ensuring transport makes the greatest possible contribution to the economy, regional growth and quality of life.

Maintenance and resilience are vital to sustain the economic contribution of the existing network

The existing road network is mature and reaches virtually every settlement in the country,²⁶ and the wider economy is structured around the network as it exists now.²⁷ It follows that ensuring the network performs in a way that sustains economic functionality should be seen as a priority.

* There may be other reasons for pursuing road charging schemes such as congestion management or revenue raising. The Commission is considering mechanisms to address congestion on urban road networks in the second NIA.

Most of the key links on the network were originally designed during the 1960s and a number of structures need renewing or work to extend their life.²⁸ Risks associated with ageing assets, heavy use, extreme weather linked to climate change, a maintenance backlog on local roads, and in some cases a lack of alternative routes all present increasing challenges to resilience.²⁹ Maintenance forms a crucial part of resilience – reducing the likelihood of infrastructure failure and vulnerability to weather shocks.³⁰ However, uncertainty will remain, which needs to be taken account of with adaptive planning.

Road Investment Strategy 3 should therefore, in the Commission's view, plan for investment in maintaining and renewing the existing network as a top priority. The growing risks from climate change and ageing assets may well mean that investment in maintenance and renewals needs to increase against historic levels to ensure continuation of current performance. Resources available for enhancements should reflect a need first to set out and fund appropriate standards of performance and resilience.

A strategy for enhancements should focus on achieving growth across all regions

Conventional transport appraisal tends to focus on the impacts of specific projects and programmes and is a valuable tool for assessing the viability of these.³¹ But it does not provide a framework for deciding where to look on the network for improvements – this requires a more strategic analysis of the effects of transport on regional growth.

The starting point for this is setting a strategic goal for policy to work towards. In line with our remit, the Commission identifies the objective as being to support faster growth in low productivity regions balanced with maintaining the economic performance of high productivity regions.³² This would help to reduce disparities between regions in the long term, as part of a wider policy programme.

Achieving this strategic goal means particularly supporting the economies of regional cities. Large cities in the Midlands and the North are not achieving their productivity potential, which is the main driver of the overall disparities between regions.³³ Providing good transport links between them is a necessary – if not sufficient – condition to improve economic performance.³⁴ High income towns tend to be near cities with higher productivity, indicating that the benefits of successful cities spread out into their surrounding regions.³⁵

With that goal in mind, an effective strategy needs to focus on the economic mechanisms by which transport can most benefit city regions. For interurban journeys over longer distances, the key mechanism is trade in both services and goods – including freight and business travellers.³⁶ Better transport, enabling more trade, could help places to specialise more in particular sectors and increase their productivity, concentrating sectors that focus on tradeable goods and services in regional cities. This is because improving trade means increasing access to new markets for firms and specialisation enables the realisation of cluster benefits such as increased potential for innovation.³⁷

Given that commuting levels dramatically decrease for journey times of more than 30 minutes,³⁸ commuting and labour market effects are relatively less important for longer distance travel. Even very significant improvements in interurban transport would be unlikely to lead to more than a minority of people living and working in different city regions. The final report of the second *National Infrastructure Assessment* will consider what improvements may be needed to local urban transport.

Effective prioritisation of road projects therefore requires a focus on the links that will be most significant for trade between major regional cities. Promotion of trade in services requires analysis of links between large population centres, while supporting trade in goods needs to understand patterns of movement between key freight distribution nodes like ports and distribution hubs.

Prioritisation of enhancements should reflect the connectivity issues that hold back regional growth

A successful strategy for road investment should use two parallel sources to inform decisions: systematic analysis of network performance and more localised assessment provided by regional stakeholders.

Systematic analysis of the network should be used to indicate where it is underperforming relative to the goals indicated by the economic strategy outlined above.

A process for doing this would begin by identifying the routes that are most important for connecting cities, towns, ports and freight distribution centres, accounting for their relative size and distance between them. The size and distance between locations are a useful indicator of potential demand, compared to using current traffic flows as these are determined by the nature of the existing network. For example, if routes are particularly slow or unreliable this may reduce the volume of traffic using them. This would then enable analysis to show which of these important routes provide slow, or unreliable, travel speeds.

In addition, it is necessary to identify where links between key destinations are limited by the structure of the current network, reflecting that even fast travel speeds may provide poor connectivity if it is necessary to travel by very indirect routes.

These analytical approaches would indicate a range of potentially underperforming routes and links of significance to major economic centres. Applying feasibility and cost constraints would then provide a list of routes which merit development of detailed project options.

This systematic analysis should be placed alongside engagement with regional stakeholders, particularly Subnational Transport Bodies and Mayoral Combined Authorities. This is necessary to establish where local economic opportunities may exist that require transport enhancement to succeed but which would be missed by analysis focused on how the existing transport network performs. This would include an overview of key development sites and industrial clusters within their geography which could have a substantial impact on the performance of the transport network or will need improved infrastructure in order to reach their full potential.

Together these inputs will enable the road enhancements portfolio to focus on the improvements needed to take advantage of both incremental and transformational opportunities for economic growth. This avoids the tendency for current economic performance to set a place's future growth trajectory and infrastructure needs permanently. Both sets of evidence should be based on the economic mechanisms that interurban transport investment can trigger. It is important that the investment strategy uses both kinds of evidence to inform decision making rather than setting one above the other.

Moreover, a strategic approach to road connectivity should include both the Strategic Road Network operated by National Highways and the Major Road Network operated by local authorities. Currently, improvements to the Major Road Network are made in a relatively piecemeal way, with local authorities bidding for individual projects of local concern.³⁹ A process of the type indicated above would enable government to identify and fund priority enhancements across the whole road network – whether on the Strategic Road Network or Major Road Network – in a more strategic and integrated way.

Road network analysis shows the key routes that currently perform poorly

The Commission has carried out the first stages of a systematic analysis of connectivity performance for the road network.

The maps and commentary below summarise the key findings from this initial analysis. It should be noted that the maps reflect the network based on current data, not projected future performance, so some of the improvements being delivered as part of Road Investment Strategy 2 may address some of the issues highlighted.

The next step will be to identify where road enhancements or other transport interventions could address the issues highlighted. This would involve consideration of feasibility and cost constraints to build a portfolio of priority potential enhancements. This final analysis will be published in the second *National Infrastructure Assessment*.

The first map, figure 1, shows where routes on the existing national road network have the highest potential demand, based on both connecting urban settlements and key parts of the freight network, and the average travel speeds of these high demand routes. This enables the identification of sections of road that are important and have the slowest average travel speeds, identifying connectivity problems of potential significance.

For instance, cross country routes between the core motorway network often underperform the routes to and from London. These tend to be east-west routes connecting large towns and smaller cities, such as the A45 and A605 between Northampton and Peterborough, the A40 between Oxford and Gloucester or the A52 between Grantham and Nottingham. These slow speeds may be a result of either congestion or due to road layout and local accesses limiting the speed limit on a route. As these are relatively important links with poor average speed it indicates a lack of suitable alternative routes.

Key roads in urban areas are also often congested – and these are challenging to improve.⁴⁰ To a certain extent, improvements to urban public transport may help to address these issues although the scale of any effects will be highly context specific. This would be by providing better alternatives to car travel and eliciting modal shift, reducing locally generated demand on the network in these areas. The Commission will make recommendations on urban transport and congestion in the second *National Infrastructure Assessment*.

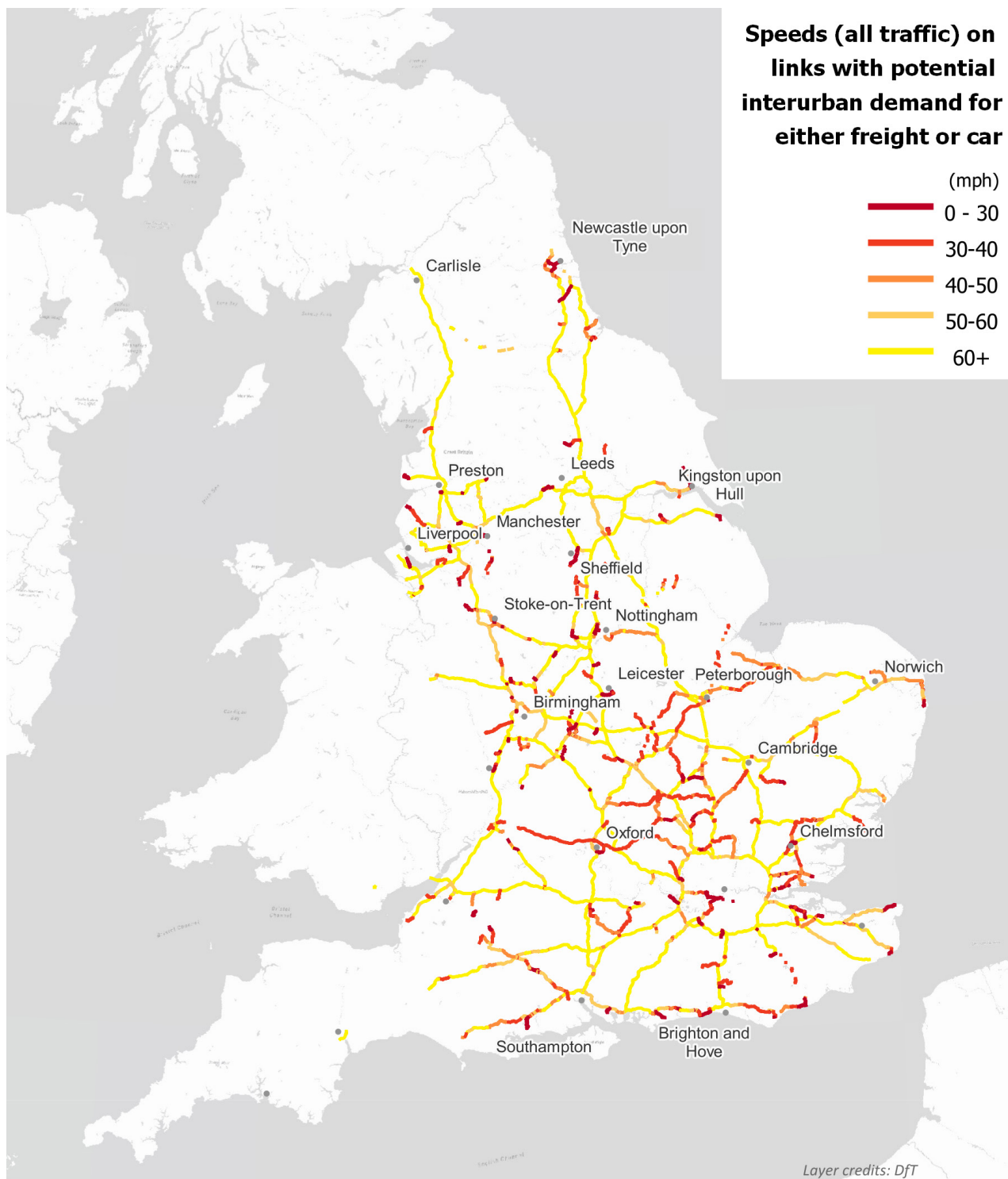
The second map, figure 2, shows analysis of where direct links between large cities and towns tend to underperform. This is done by dividing the travel time between them by the straight-line distance to give a crow flies equivalent speed. Routes slower than 35mph by this measure and with high levels of potential interurban demand are shown, which may indicate the lack of a direct, fast route. The cause of this may vary from geographic features prohibiting direct links to slower road standards or the effects of congestion on the interurban or urban road networks. In some cases, there may be very difficult obstacles to creating more direct connectivity, which may lead to many of these routes being considered unfeasible or not cost effective to improve.

Both maps are intended to be complementary and to identify different performance issues. The first identifies which sections of the network have high potential interurban demand and slower speeds, the second looks at the ease at which it is possible to move between different pairs of places with high potential demand. The first analysis shows potential interaction across the spine of England reflecting patterns of population and density of the road network. The second identifies more peripheral locations and places without direct motorway or dual carriageway connections.

The analysis also demonstrates the importance of complementing any systemic analysis with input from regional stakeholders to identify additional economic opportunities and needs of different regions. Areas such as Cornwall and Cumbria are examples of this limitation: both are not only relatively sparsely populated but geographically peripheral and are therefore underweighted in any systematic analysis such as this.

Figure 1: Average road speeds vary across the country, with a number of important routes having relatively slow average speeds. These often include A roads running east to west.

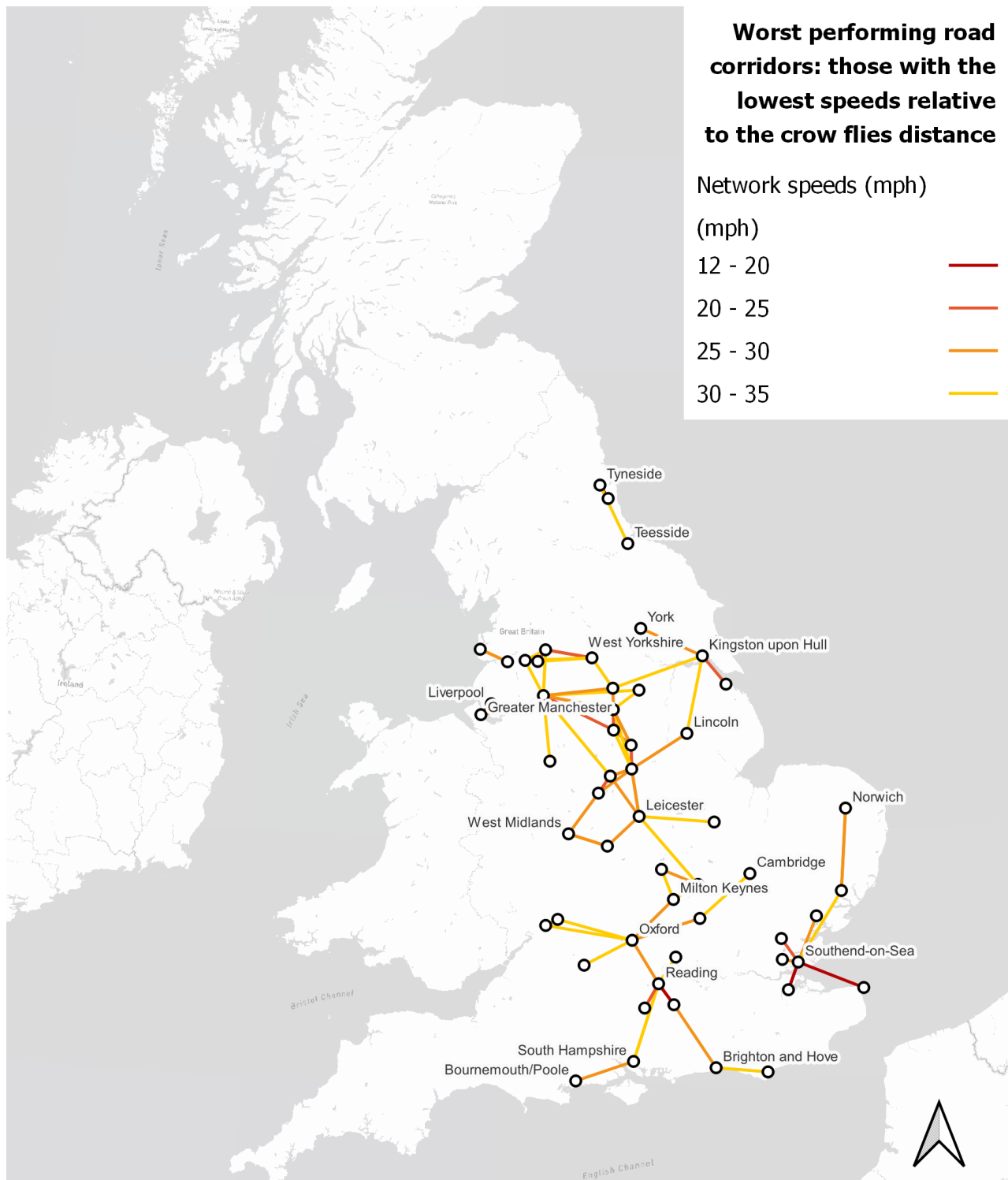
Average speeds of the road network on links with high levels of potential interurban demand for either freight or car traffic



Source: Steer analysis for National Infrastructure Commission, using Department for Transport (2022) Average speed, delay and reliability of travel times (CGN)

Figure 2: There are a range of direct connections with relatively slow travel times given the distance between the places

Average journey times between cities and towns converted to a crow-fly, or direct, speed for cities and towns with high levels of expected interurban demand. In some cases, there may be very difficult obstacles to creating more direct connectivity, which may lead to many of these routes being considered unfeasible or not cost effective to improve.



Source: Steer analysis for National Infrastructure Commission, using Department for Transport (2022), Average speed, delay and reliability of travel times (CGN)

A long term strategy should account for uncertainty, particularly the opportunities for technological change

Travel patterns are subject to significant sources of uncertainty including: the potential for disruptive technology to change how infrastructure is used, the impact of different levels of economic growth, changes in behaviour, population and climate change. The third Road Investment Strategy should proactively consider scenarios and sensitivities that address the implications of these.

For instance, connected and autonomous vehicles could improve connectivity without significant upgrades to the road network, with cars operating at higher speeds more safely than with drivers. There are also potential capacity benefits by optimising traffic patterns particularly when weaving and merging which is a significant factor in motorway delay.⁴¹ The Commission's work for the final report of the *National Infrastructure Assessment* will include some illustrative analysis of the connectivity benefits that might be possible through deployment of this technology.

Another live example relates to behaviour change. The Covid-19 pandemic and associated restrictions on in-person working saw a significant decline in business travel, with 50 per cent decline between 2019 and 2021.⁴² Business travel by rail declined more sharply compared to road during this same period.⁴³ By comparison, freight activity has not been so affected, with volumes exceeding pre-pandemic levels.⁴⁴ However published data does not show how far business travel has recovered since the end of restrictions, and it is too early to say what the long term pattern will be, although the data does show road travel back at approximately pre covid levels.⁴⁵ This uncertainty may affect the business case for longer term transport investment, and the relative importance of freight and business travel for the economic case.

Overall, the third Road Investment Strategy should therefore build on the core pipeline and adaptive approach that the Commission recommended in the Rail Needs Assessment for government.⁴⁶ A longer term pipeline of development options – with more projects developed than are expected to be delivered in the immediate future – will enable government to make adaptive decisions for delivery during each five-year Road Investment Strategy period. The longer term strategy will need to be refreshed every five years to ensure the pipeline adapts to a rolling 30-year horizon. But schemes committed for delivery should be chosen as part of a risk-balanced portfolio, and not revisited once they proceed to an advanced stage of development unless there has been a significant change in circumstances.

The strategy should maximise the social value benefits of investment, including for accessibility

Enhancing road connectivity will not just provide benefits for business and productivity but will also offer increased opportunity for social and leisure travel for a wide range of the public.

It is important to acknowledge that these benefits may fall disproportionately towards those who are most able to make use of the road network.⁴⁷ This should though be seen in the context of a wider portfolio of investment, including in rail and local public transport, which taken together will benefit a wider section of the public. In the longer run, road transport may become more accessible, if widespread use of connected and autonomous vehicles (CAVs) enables people who cannot themselves drive to travel more easily by car.⁴⁸

Additionally, the Road Investment Strategy should ensure that new or renewed infrastructure will be designed to modern standards that will maximise accessibility. This could for instance include ensuring that access across roads for pedestrians, cyclists, or those using mobility assistance, is available and easy to use.

Projects should apply the *Design Principles for National Infrastructure* that the Commission has previously recommended, both to enhancements and renewal projects.⁴⁹ Good design at an early stage of projects can address many of the accessibility and inequality issues associated with interurban transport networks, both adding value and de-risking projects⁵⁰.

The Road Investment Strategy should set out a long term vision for enhancing roads to support regional growth

As the government develops its Road Investment Strategy, including at the publication of its draft Road Investment Strategy this summer, it should:

- set out a long term vision for the road network that reflects the network's role in delivering and sustaining connectivity and supporting growth across all regions
- make the commitment that government will do what is necessary to ensure that its road strategy improves the environment and meets decarbonisation obligations
- use the economic principles and prioritisation method outlined here to help identify corridors for future scheme development that would help to reduce regional economic disparities, as a long term pipeline.

In the final report of the second *National Infrastructure Assessment* in the autumn, the Commission will provide further analysis of enhancement priorities to support, extending the initial analysis presented here to rail, and completing feasibility and cost analysis to provide a prioritised portfolio of development options across both modes to support growth across regions.

The Commission will also provide further analysis of the options for decarbonisation measures that may be necessary to respond to more challenging scenarios for reducing emissions. This will be accompanied by analysis on the potential benefits associated with future transport technology.

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