Department for Transport

Road Investment Strategy: Strategic Vision

December 2014

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Contents

1. Foreword

Roads are fundamental to modern living. They make it possible for people to travel for work and leisure, and for businesses to move goods and materials. As the backbone of our transport system, carrying 90% of passenger journeys and almost 70% of freight[1], roads keep the population connected and the economy flowing.

The government is directly responsible for the busiest of English roads: the Strategic Road Network. These motorways and all-purpose trunk roads were planned and developed between the 1930s and the 1960s. In the decades that followed, traffic volumes have grown to a point where the network now transports over four million vehicles a day[2]. Investment has, however, not increased with such demand. As a result, the quality of the network has declined and the likes of congestion, noise and poor air quality are problems at numerous hotspots across the network.

Continued underinvestment is no longer a realistic option – as our roads age further, they will increasingly fail to meet the social, economic and environmental aspirations we have as a nation. In simple terms: a modern country needs modern roads. This means we need a better network with smarter roads – ones that harness developments in technology and road building to address today's challenges and maximise tomorrow's opportunities.

This Road Investment Strategy outlines how we can grasp the opportunity to transform both our roads and the experience of driving on them, whilst also addressing strategic imperatives such as economic growth and climate change. It sets out our vision for smooth, safe and reliable motoring, more sustainable roads, and how we should foster cutting-edge technologies.

Combined with the reform of the Highways Agency, this is a genuinely transformational moment. We will ensure that the Strategic Road Network exemplifies – and drives – the country we want to live in and the thriving nation we want to be.

1 DfT Statistics
2 DfT Statistics

2. Executive summary

The Strategic Road Network (SRN, or the network) is entering a time of transformation. The management of the SRN is being reformed, with the Highways Agency becoming the government-owned Strategic Highways Company (the Company). Long term strategic planning and funding of the network is also being introduced through the first Road Investment Strategy (RIS), a suite of documents of which this Strategic Vision is part. These changes are underpinned by a step-change in investment in our strategic roads, worth over £15 billion to 2021. Taken together, this scale of reform and investment has allowed us to dramatically increase our ambitions for the SRN.

This is critical because the SRN requires upgrading and improving to ensure it can deliver the performance needed to support the nation throughout the 21st century. Inconsistent and insufficient investment in roads has left our network paying the price, with capacity being close to breaking point at certain points, poor connectivity at others, and increasingly common environmental black spots. Certainty of funding, the ability to plan for the long term and the opportunity to drive increased efficiency – the products of Roads Reform – will give us the tools to bring lasting improvements to the network of the future.

And that future appears to be an exciting place for the network. The greater uptake of existing technologies and the likely emergence of new innovations will transform the way we use our roads. More Smart Motorways will increase the capacity of motorways by a third while only slightly increasing their physical footprint. Better access to data will enable drivers to make smarter, informed travel choices. Ultra Low Emission Vehicles (ULEVs)[3] will reduce the carbon and other harmful emissions generated through SRN use. And, in the longer term, assisted driving technologies and autonomous vehicles will increase safety and reduce the stress of driving.

Setting our aspirations for the future

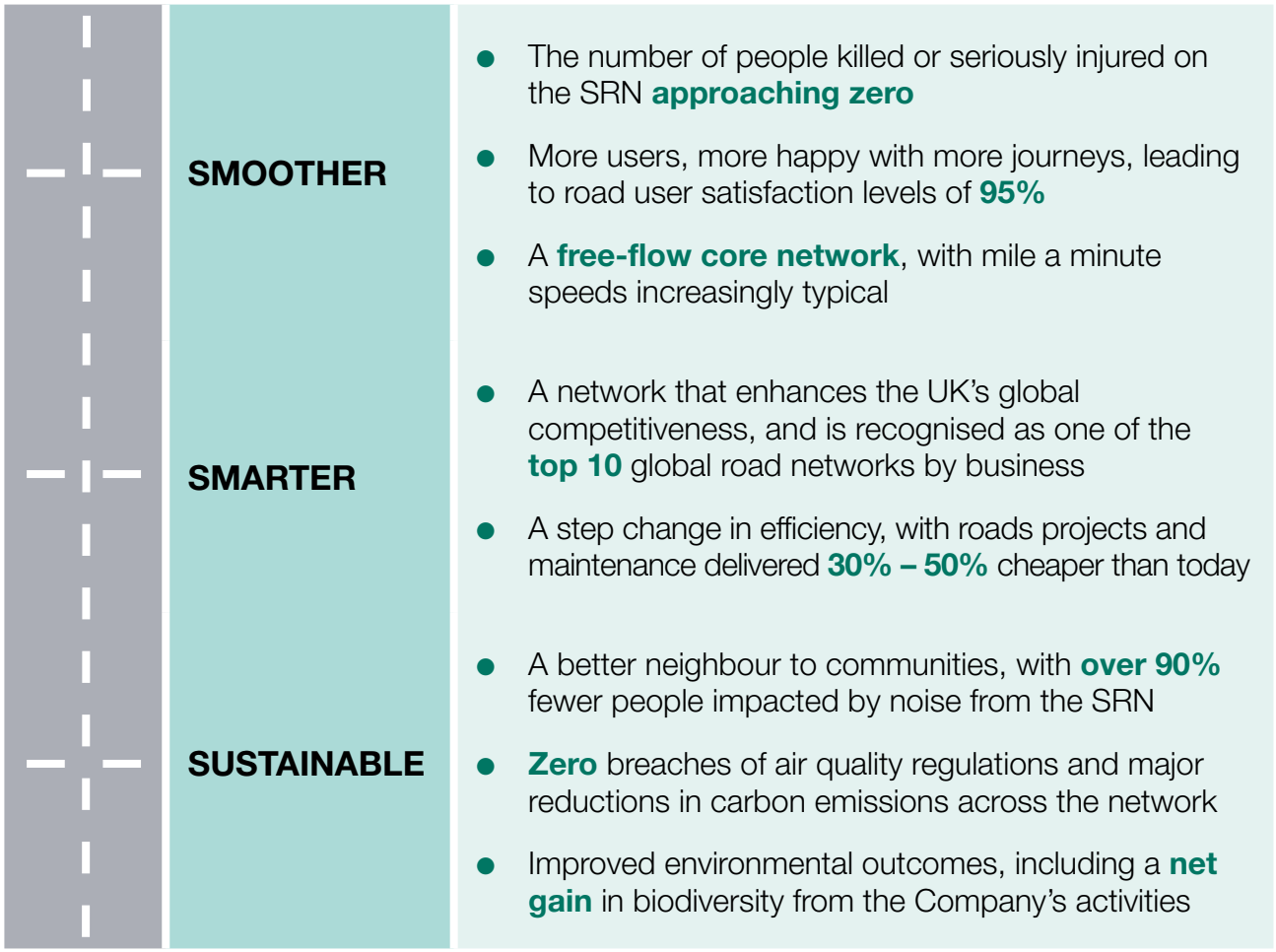
Our ambition for the next 25 years is to revolutionise our roads and create a modern SRN that supports a modern Britain, making a real difference to people's lives and businesses' prospects.

The reform of the Highways Agency and the step-change in investment gives us the confidence to aim high, and develop challenging, yet achievable, aspirations for the network. With that in mind, we want to

3 The Department for Transport uses ULEVs to refer to vehicles with significantly lower levels of tail-pipe emissions than conventional vehicles. In practice, the term currently refers to electric, plug-in hybrid and hydrogen fuel-cell vehicles. In this document, vehicles with fully electric powertrains and cars with tail-pipe emissions below 75 g/km of CO_2 have been included at this stage

have transformed the SRN by 2040, delivering the safer, more stress-free journeys that everyday users need, as well as the enhanced reliability and predictability that is so important to business. The SRN of the future must also be more socially and environmentally sensitive, working more harmoniously with its surroundings.

By 2040, we aspire to a network that will be:



SMOOTHER

- The number of people killed or seriously injured on the SRN **approaching zero**
- More users, more happy with more journeys, leading to road user satisfaction levels of **95%**
- A **free-flow core network**, with mile a minute speeds increasingly typical

SMARTER

- A network that enhances the UK's global competitiveness, and is recognised as one of the **top 10** global road networks by business
- A step change in efficiency, with roads projects and maintenance delivered **30% – 50%** cheaper than today

SUSTAINABLE

- A better neighbour to communities, with **over 90%** fewer people impacted by noise from the SRN
- **Zero** breaches of air quality regulations and major reductions in carbon emissions across the network
- Improved environmental outcomes, including a **net gain** in biodiversity from the Company's activities

"The reform of the Highways Agency and the step-change in investment gives us the confidence to aim high, and develop challenging, yet achievable, aspirations for the network."

Targeting areas for improvement

Achieving these stretching aspirations will require considered and strategic action. This means targeting improved levels of performance in the short term that will put us on course to deliver the network the country wants and needs in the long term.

To this end, we have identified eight areas of focus which form the Performance Specification for the Company and the SRN over the next five years[4]. We expect the Company to make the network *safer* and improve *user satisfaction,* while *smoothing traffic flow* and encouraging *economic growth*. We want to see the company delivering *better environmental outcomes* and *helping cyclists, walkers, and other vulnerable users* of the network at the same as time as *achieving real efficiency* and *keeping the network in good condition*.

Taking the first steps

In total, we have committed over £15 billion of capital investment. We will also undertake 127 major schemes over the course of the first Road Period. These wide-reaching plans represent good value for money; the Company has proposed efficiency savings of over £1.2 billion during the first Road Period, with a target of at least £2.6 billion over the next ten years[5]. The Investment Plan element of the RIS outlines how the Company will deliver improvements to the SRN in the short term, and put us on course to deliver our long term vision of a revolutionised network. Our investment is targeted, and makes use of all of the tools at the Company's disposal.

Looking to the future

These plans will deliver benefits quickly and begin to reverse the consequences of decades of inaction. In the next five years, our network will directly contribute to economic growth through, amongst other things, improved connectivity and better access to our international gateways. Users will benefit from safety improvements and reduced congestion, while the actions of Company will deliver better environmental outcomes.

Our plans for the first Road Period are just the start. As we look to the longer term, and to achieving our 2040 goals, we want an upgraded network, enabled by technology, and ultimately a transformed SRN. Smart Motorways will become the standard for the busiest sections of the network, bringing smoother traffic flow, increased capacity and improved safety. Our busiest A-Roads will become Expressways, providing improved standards of performance, with technology to manage traffic and mile a minute speeds. Improved design standards will give greater consideration to the needs of walkers, cyclists and local communities along with the aesthetic appearance of the network.

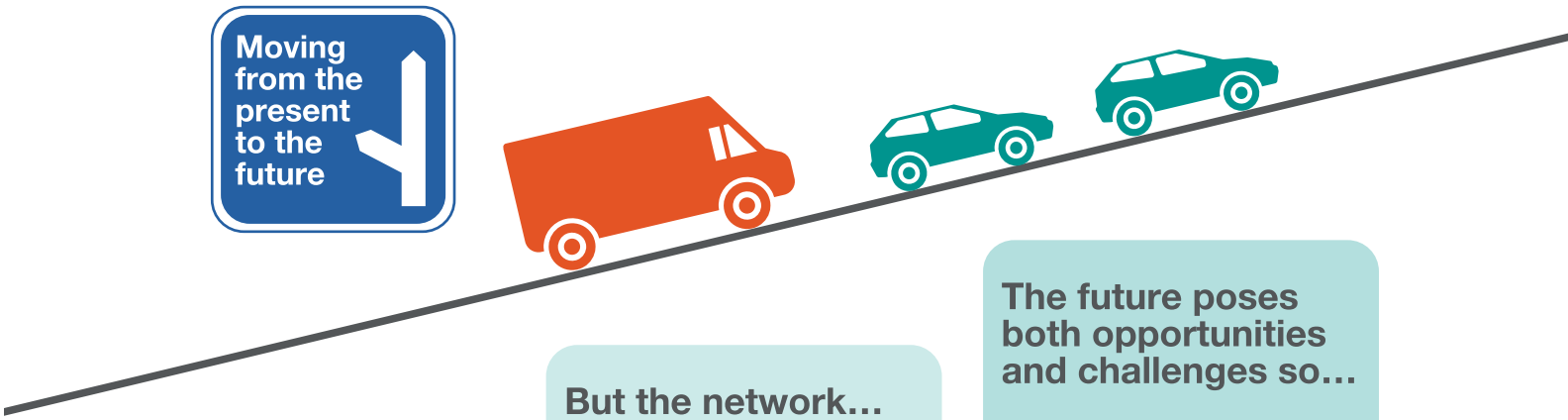
This Road Investment Strategy is laying the foundations for a better future – foundations on which future Road Investment Strategies will build, as we strive to achieve our vision of a revolutionised SRN that will underpin progress and prosperity for generations to come.

4 The Performance Specification covers the first Road Period from 2015/16 to 2019/20

5 This target figure is in nominal terms, and is based on the efficiency assumptions used to develop the Investment Plan

Our strategic vision

“Our ambition for the next 25 years is to revolutionise our strategic roads to create a modern SRN that supports a modern Britain”



The SRN currently…

…Connects the population, linking people, places, communities and different transport modes

…Keeps the economy flowing, providing capacity to support growth on both a national and local level

…Supports delivery of environmental goals, striving to improve the impact it has on the natural landscape and the SRN’s neighbours

But the network…

…Has suffered from inconsistent and inadequate investment

…Needs a transformation in the way it is managed, with a move to longer term planning and investment, supported by the wider Roads Reform agenda

…Must continue to work with the wider transport network and support new transport developments

The future poses both opportunities and challenges so…

…We have assessed strategic trends that will have a significant impact on how we use the SRN

…We have forecast the future traffic on the network and predicted growth in demand

…We have identified specific pressures that will influence network planning

Our aspiration for the network in 2040 is that it will be…

…Smoother – connecting people and businesses safely, swiftly and seamlessly

…Smarter – a world leader in road building and traffic management technology

…Sustainable – driving the transition to a decarbonised, environmentally and locally sensitive network

We will work to achieve this vision in the first Road Period by…

…Focusing on eight performance areas, outlined in our Performance Specification

…Investing in the areas which need it most, as detailed in our Investment Plan

…Providing ring-fenced funding for actions beyond business as usual, including Environmental, Innovation, and Cycling, Safety and Integration funds

We know that such transformation cannot be achieved overnight…

…So consideration of the second Road Period and beyond has begun to ensure that the next RIS will have what it needs to continue this transformation

3. The Strategic Road Network

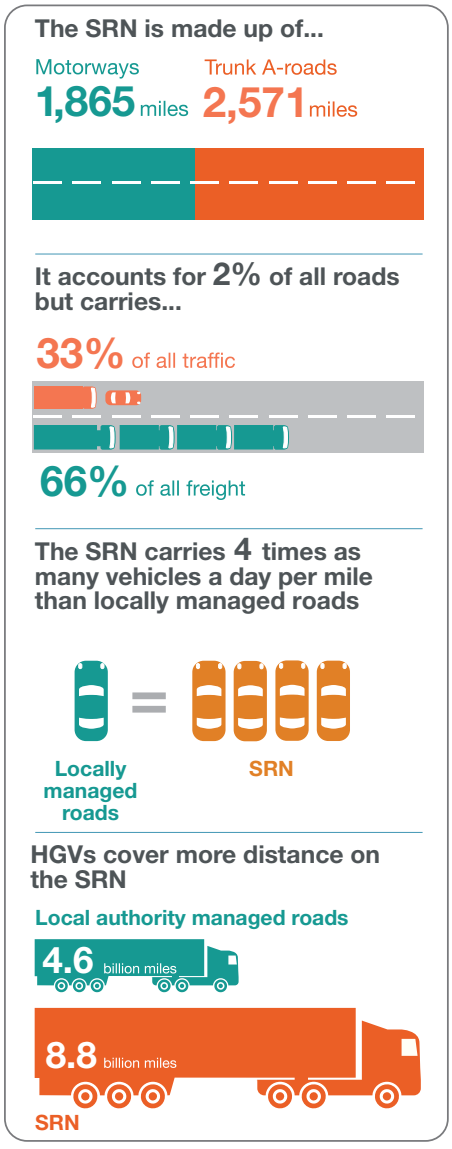
"The quality of a nation's infrastructure is one of the foundations of its rate of growth and the living standards of its people"

National Infrastructure Plan, 2013

Connecting the population, driving the economy

Roads are a critical element of our country's social, economic and environmental wellbeing. Despite only accounting for 2% of the road network as a whole, the SRN is the most heavily used part, carrying one third of all traffic and two thirds of all freight[6].

The network's physical size and volume of use means that it has a vital role to play in delivering government's goals for our national transport networks, as outlined in the four strategic goals of the National Network National Policy Statement (NN NPS)[7], detailed in the following pages.



Source: DfT Statistics

6 DfT Statistics

7 It is important to note that the NN NPS is a high level planning document, which is non-spatially specific. The RIS outlines where decisions have been made on particular schemes and investments over this Road Period (2015/16 – 2019/20)

1: Providing capacity and connectivity to support national and local economic activity

The SRN is vital to British businesses and to the successful functioning of our local and national economies. The network not only includes England's main freight and logistics arteries, which connect our international gateways, logistics interchanges and distribution centres, but also inter-urban connections, which help put more people within reach of a wider range of jobs. This pivotal role is recognised by the public, with recent research indicating that 93% of people consider the SRN important to Britain's economy, and approximately two thirds (69%) also confirming that the SRN is important to them personally[8].

However, capacity has become a major issue in recent years, with parts of the network becoming increasingly congested. It is important that we continue to address this to ensure that the network drives, instead of constrains, growth.

> *"It's no surprise that our European head office is in between those two kinds of major transport roads. That [was] the decision….taken several years ago and continues to ensure that our personnel [are] able to recruit the best individuals."*
>
> Frequent commercial road user (London), DfT Social Research

Enabling and supporting local economic growth

The SRN drives local economic activity – it enables new housing and business developments, encourages trade, and attracts investment to local areas. In the West Midlands, for example, Tata Group committed to long-term investment in automotive manufacturing at the i54 business park alongside the M54 in Wolverhampton and at Brown's Lane in Coventry near the M6 and M42. Along with the scheduled improvements to the network, the transport infrastructure offered in the area was a key factor in Tata Group's decision to invest.

Improvements to the SRN are also designed to bring economic benefits to the local area and wider region. For instance, a new junction arrangement on the A30, near M5 Junction 29, substantially enlarged junction capacity and opened up access to the Exeter and East Devon Growth Point. This is a strategic development targeted at driving economic growth and prosperity in the area, which includes the Exeter Science Park and Skypark business developments. Taken together, these developments are expected to create more than 10,000 jobs and generate £450 million in private sector investment, as well as featuring an intermodal freight and distribution facility. The improvements to the A30 were delivered by Devon County council, in partnership with the Highways Agency.

8 DfT'S Public Attitudes to Roads in England: Wave 3

2: Supporting and improving journey quality, reliability and safety

The SRN is only as good as the journeys it can provide. Many businesses rely heavily on a smoothly functioning SRN to carry out their core activities, while individuals need to be able to trust their journeys will only take as long as expected. The network is also invaluable to logistics: a reliable SRN helps supermarkets to keep prices low and enables consumers to order goods online and receive them the following day.

> *"When it goes wrong... you can lose half a day, a day, and it's just a huge cost which no-one will pay for, my customers won't pay for"*
>
> Frequent commercial road user, (North West), DfT Social Research

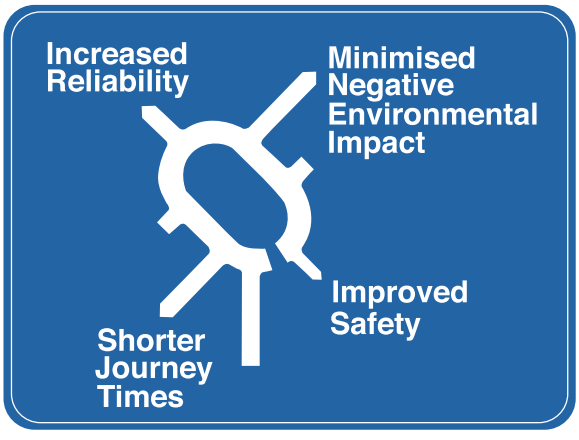
Today we have a network of mixed performance. On the one hand, congestion is a real problem in certain areas, threatening the quality and reliability of journeys. On the other hand, safety on the network has improved markedly over the last two decades[9]. Encouragingly, evaluation evidence has shown that investment in the SRN makes a real difference, with clear social and economic benefits.

Analysis of major schemes shows…

Scheme-specific objectives were met

For every £1 spent, the average return was more than £4 in long term benefits

The biggest benefits were:



Source: Analysis of all major schemes completed on the SRN from 2002–2010 through Post Opening Project Evaluations

9 DfT Statistics

3: Joining our communities and linking effectively to each other

The road network brings communities closer together, providing users with a freedom and flexibility of travel that is unrivalled by any other mode of transport. Almost all journeys start or end on a road and, given their ability to provide access to railway stations, ports and airports, roads are, in many ways, the glue that joins the transport network together.

The SRN is a key part of such connectivity, linking people, places, and different transport modes. This is particularly true outside of the big cities, where the range of transport options may be more constrained. In a recent survey, 64% of individuals who used the SRN at least once a month stated that it would be difficult or impossible to do their most frequent journey without using the network[10]. Road transport, including journeys on the SRN, also plays an important role for those with mobility difficulties – many of whom rely on their car as their primary means of transport. Indeed, nearly two thirds (64%) of older, less mobile car owners surveyed said that they would only travel by train or bus if they had no other option[11].

However, we recognise that the SRN can also have a negative impact on communities. Busy roads can generate noise, and sever access in towns and villages, impeding cyclists and walkers. Solving these issues has been a focus of the Highways Agency, and it is important that the new Company strives to do even more to deliver improved outcomes for those living and working near the network.

Connecting Cambridge and Huntingdon through an improved A14

At the 2013 Spending Round, the government committed to improving a 21 mile stretch of the A14 between Cambridge and Huntingdon. One of the busiest parts of the SRN between the Midlands and East Anglia and the Port of Felixstowe, it was also a long-standing congestion hotspot and area of concern for local communities. £100 million of the £1.5 billion scheme cost was contributed by partners, including Local Authorities and Local Enterprise Partnerships.

Through widening sections, improving junctions, creating a new Huntingdon Southern Bypass and de-trunking a large stretch of the old road, the scheme will provide benefits to both road users and local communities. It will keep heavy through-traffic away from villages, reduce community severance, and relieve congestion on a critical part of the network, making travel and commuting easier, safer and more reliable. Changes to the old road will improve air quality and reduce traffic noise, and will give an opportunity to improve conditions for walkers, cyclists and equestrians through new crossings. The improved stretch of motorway will be open to traffic in this decade.

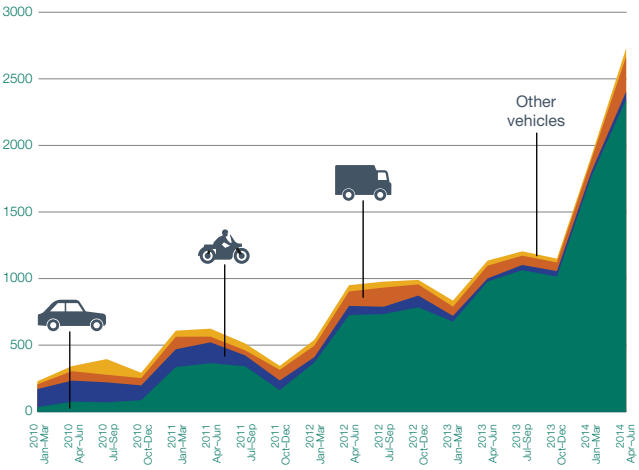
10 DfT's Public Attitudes to Roads in England: Wave 3
11 DfT's Climate Change and Transport Choices: Segmentation Study

4: Supporting delivery of environmental goals and the move to a low carbon economy

Roads have a significant impact on the environment. Their construction can impact the built and natural environment and threaten biodiversity, while traffic is a cause of air pollution and accounts for nearly a fifth of UK's carbon emissions[12].

Yet, today, there are more options to mitigate environmental impact than ever before. Since 2001, for example, the average emissions of new cars has fallen by 29%. In April-June 2014, the average CO_2 emissions from new cars fell by 2.3% when compared with the same time period in 2013[13]. ULEVs are becoming more common, and will dramatically reduce carbon and other emissions generated on the SRN. Improved construction standards and better road design can improve the aesthetic appearance of the network, mitigate biodiversity impacts and reduce the effect on the built and natural environment.

Retrofitting the SRN with low-noise surfacing can also reduce the impact of roads on local communities.



ULEV registered for the first time in the United Kingdom, January 2010 to June 2014

- All cars (inc. quadricycles)
- Motorcycles & tricycles
- All vans
- Heavy goods vehicles, buses, coaches and other vehicles

Source: DfT Statistics

Protecting ancient woodland along the A21 for future generations

Ancient woodlands are irreplaceable features of our landscapes, rich in biodiversity and culture. When it was discovered that the approved development to widen the A21 would damage or destroy nine hectares of ancient woodland, an alternative solution was sought by the Highways Agency: habitat translocation. Alongside salvaging key woodland features, this will create 18.1 hectares of new woodland (double the area lost), to be managed by the Highways Agency for at least 25 years. Ancient woodland soil, ground flora and coppice stools will be transferred to sites with similar soil characteristics to the original site to protect the complex ecosystem of the woodland. The 26.4 hectares of remaining ancient woodland will be managed for ten years to improve its condition while the new planting becomes established. To help ensure success, some advance environmental work has already begun in advance of the main construction work, which will start in Spring 2015.

12 DfT Statistics
13 DfT Statistics

Gathering road user perspectives on the SRN

The Department for Transport undertook a large scale programme of social research to understand how individuals and commercial organisations interact with, and perceive, the SRN. The results highlighted:

The need for SRN investment

The SRN is an unfamiliar concept to most road users. However, once understood, they recognise the network's economic and strategic importance.

If all roads were in comparable condition, users believe that investment in the SRN should be prioritised over investment in other roads. Road users think it is particularly important to invest in the SRN to ensure that it is safe and well-maintained.

As well as supporting investment in physical improvements, road users are keen to see upgrades in how the network is managed. They advocate strategic, joined up, long term planning for the SRN, and roads in general.

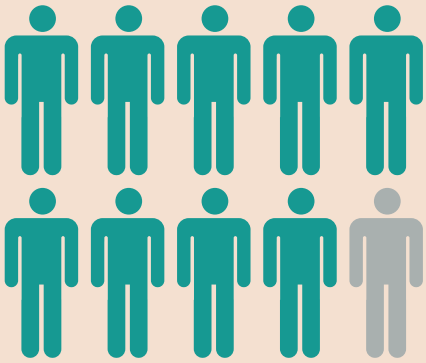
The effect of widespread congestion

The prevalence of congestion on England's roads means that it has become expected and accepted. Road users have learnt to adapt their behaviour, planning journeys defensively.

It is crucially important to road users that their journeys are predictable and reliable. The cost of delays and congestion is particularly high for businesses. Above all, they seek to prevent passing on these 'costs' of congestion to customers.

Source: Roads Reform Social Research Programme

The SRN plays an important role in the national economy



In our recent social research, **nine** in **ten** individuals surveyed recognised the importance of the SRN to the economy

Delays are of particular concern to business road users

Additional time spent on the road reduces business productivity

Stop-start driving and longer journey times increase fuel costs

Unforeseen delays can result in the loss of business through missed opportunities

Late delivery of goods and services can cause reputational damage and jeopardise relationships with clients/customers

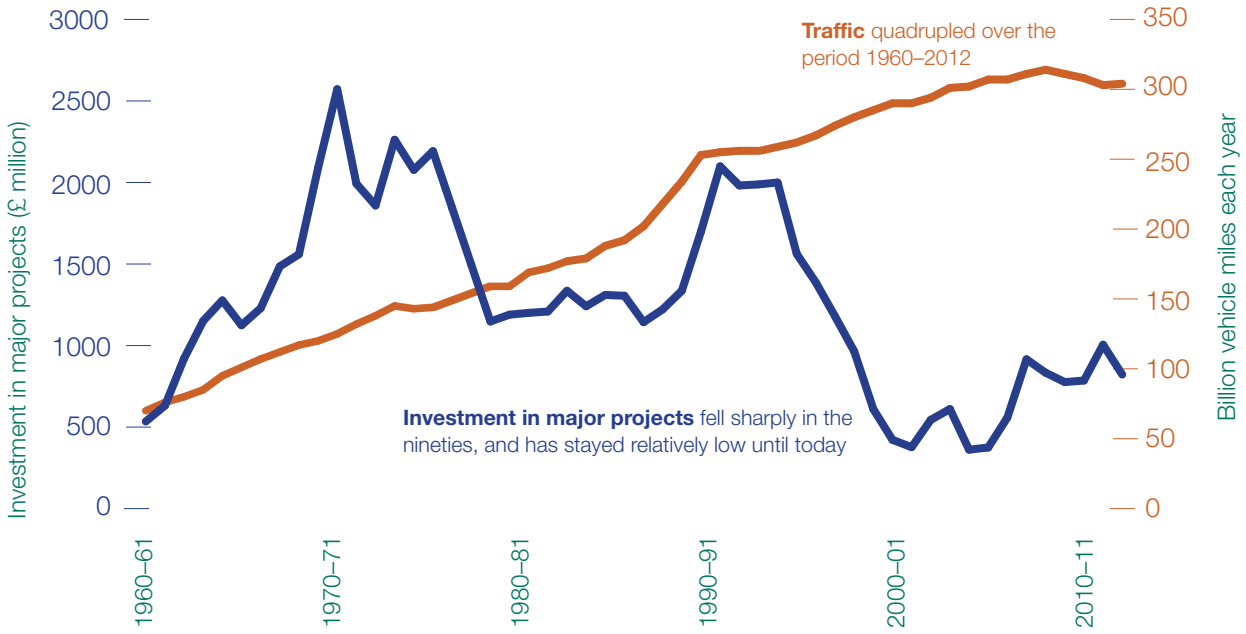
Transforming to meet future needs

We live in a modern, vibrant and internationally competitive country and, to maintain and build on this, our country needs a high-performing SRN that matches the aspirations we have for the future.

The legacy of insufficient and inconsistent investment

The SRN was originally planned in the 1940s and built primarily in the 1960s and 1970s. In the decades that followed, traffic volumes grew and overall investment in England's roads reduced. In the 1990s, annual spending in real terms on trunk road schemes fell sharply, reducing from over £2 billion to less than £0.4 billion[14]. Spending has remained at a relatively low level ever since, despite the number of vehicle miles driven on the SRN reaching 85 billion in 2013, a 14% increase since 2000[15].

The recent low levels of investment in our SRN are in contrast to those made by many of our international competitors, including our European neighbours. This is highlighted by relative per capita spending on all roads, which in 2010 was 75% higher in France and at least 40% higher in Germany than it was in UK[16]. As a result, our network has fallen behind and our international standing has suffered: in 2014, the UK's road infrastructure



Investment v Traffic

Investment in major projects (£ million)

Billion vehicles miles per year

Source: Traffic estimates from DfT Statistics; spending data collected from a range of published government documents and HA spend data. Note that for the spending data, there have been minor changes to the classification of road projects over time.

14 DfT Business Plans and HA spend data
15 DfT Statistics
16 International Transport Forum

ranked 30th in the World Economic Forum's Global Competitiveness Index[17], down from 14th in 2006 and far behind European nations such Portugal, Austria, France and the Netherlands, who are all ranked in the top five.

Now, in certain places, our strategic roads have already reached or exceeded capacity, resulting in areas of significant congestion, particularly around larger cities. Relative congestion levels across Europe highlight the challenges we face, even accounting for differences in respective networks. For instance, traffic density on UK motorways is 113 million vehicle miles per mile of road compared to 47 million in Germany and 39 million in France[18].

Such congestion not only undermines the driving experience for SRN users, it also amounts to around £2 billion per year in lost time. By 2040, we believe that congestion will cost £10 billion a year in lost time, and the freight industry £2.2 billion unless action is taken[19].

Roads reform and the transformation of the Highways Agency

With this RIS and the government's broader Roads Reform agenda, we are taking a markedly different approach to SRN investment. We are moving to longer term investment and planning, seeking to deliver a better network and a better deal for taxpayers.

In this RIS we therefore set out an ambitious, long term vision for the SRN and outline a multi-year investment plan that will put us on the path to achieving our vision.

These changes are underpinned by the step-change in investment announced at the 2013 Spending Round. Over £15 billion of capital investment has been committed to road investment between 2015 and 2021, with annual funding on enhancements tripling to £3 billion per year by 2021. Such commitment reflects government's belief in the importance of the SRN to the nation's transport networks, economy and society.

Alongside this RIS, the Highways Agency is being transformed into a government-owned company. Such a change will allow it to operate like the best-performing infrastructure providers in other sectors, and enable the organisation to deliver better roads more quickly and at a lower cost. Transport Focus will act as the motorists' champion and ensure that the needs of road users are being heard and responded to by the Company. The Office of Rail Regulation has taken on the role of independent monitor and will hold the Company to account for delivering to quality, time, and budget.

Investment across the transport network

It is, however, important that we continue to invest across the tranport system as a whole, with the aim of enabling more choice and smoother journeys for all.

Road and rail, for instance, can often offer different options for passengers and freight[20].

17 The Global Competitiveness Report assesses the competitiveness landscape of 144 (2014) economies, providing insight into the drivers of their productivity and prosperity. It is based on statistical data and an Executive Opinion Survey

18 International Transport Forum

19 DfT National Transport Model Analysis

20 *Planning Ahead*, Network Rail, 2010

While roads may be better placed to serve smaller freight loads and journeys that start or end outside of city centres, other markets, such as commuting and bulk freight, are often more suited to rail transport.

So, while we are investing in the SRN, we are also taking investment to record levels across the wider transport network. This includes continued investment in the rail network, building on the £25 billion which has been invested since 2005[21]. Between 2014 and 2019, Network Rail will invest £38 billion in the rail network, while a further £16 billion will be invested in HS2 over the next Parliament.

Local transport, too, will continue to benefit, with the Local Growth Fund making £3 billion available to support local transport projects between 2015 and 2021, and £1 billion per year for maintenance of roads maintained by the local highways authorities. This follows the £4 billion spent between 2011 and 2015 on local highway maintenance and other transport investments, as well as the £266 million Local Pinch-Point Fund, which funded 112 local road schemes across England.

21 HM Treasury Statistics – Country and Regional Analysis

4. Planning for the long term: trends and forecasting

"It is already clear that some parts of the system are under severe strain, and looking ahead, significant challenges are looming"

Sir Rod Eddington, The Case for Action, 2006

To ensure we meet the future needs of the SRN, we must aim to understand the wider context for roads over the coming decades. However, the challenge of doing so should not be overstated. In looking ahead, this RIS does not seek to predict the future, but takes into account a range of possible outcomes, underpinned by broad evidence, which the Department will continue to build on and review. This includes an assessment of the trends that are likely to have a significant impact on road use, and what these trends mean for traffic volumes on the SRN specifically, now and in the future.

Assessing the strategic trends

As part of developing this RIS, we have looked to identify trends that will have a significant impact on how we use the SRN over the next 25 years. While we recognise that there are a vast number of trends that could potentially have an impact, a small number have been prioritised as those that are most likely to shape the network of the future.

Population growth and demographic shifts

The Office for National Statistics (ONS) projects that the English population will rise to 63 million by 2040, some 20% (10 million) higher than the population in 2010[22]. All else being equal, this means millions more potential drivers on the SRN.

It is not just population levels but the structure of the population which will shape demands on the network, with different groups and people in different areas exhibiting varying needs and attitudes to travel. For instance, average life expectancy is expected to increase over the coming decades. This could see greater demand for road travel, with the over 60 age group showing the highest growth in car mileage in recent decades[23]. Migration, too, could have an influence, with some evidence showing that migrants tend to drive less on average, although evidence also suggests they tend to 'transport assimilate' by taking on the travel

22 ONS population projections

23 T. Kuhnimhof, D. Zumkeller and B. Chlond (2013). "Who Made Peak Car, and How? A Breakdown of Trends over Four Decades in Four Countries." Transport Reviews 33(3)

patterns of the domestic population over the long-term.

Where people live will also influence their transport needs and behaviours. For much of the second half of the twentieth century, de-urbanisation was the primary trend, with more people choosing to live in suburban areas, smaller towns and rural areas. Combined with the development of offices and retail parks on the outskirts of cities, the result was growing car use as people travelled longer distances to get to work and go shopping.

Over the past two decades, however, such trends have reversed, with more people moving back to cities – 82% of the UK population is said to now live in urban areas[24]. This trend is expected to continue, meaning we are likely to see increasingly dense urban cores, still surrounded by large hinterlands. Given the greater options and the frequency and reliability of public transport, we would expect to see increased usage as a result of this shift. However, with significant proportions of the population still living on the outskirts of cities, and significant economic activity taking place in these outskirts, road-based travel will remain a critical element of urban transport needs.

Growing economy

The Office for Budgetary Responsibility (OBR) predicts that the UK economy will continue to grow through the coming decades, with a central prediction of 85% total GDP growth and 60% per capita growth by 2040. However, the future will see the UK facing increasing international competition with established and emerging economic powers. Such global economic challenges are likely to increase the focus on ensuring the country is competitive, reinforcing the emphasis on infrastructure as a key enabler of national competitiveness.

From a roads perspective, traffic has historically grown with rising incomes. However, as car ownership has grown, this relationship has gradually weakened over time[25]. Going forwards, the nature of GDP growth – the way it is allocated across individuals, and feeds through into disposable incomes – will be important. The available evidence continues to show a positive relationship between GDP and demand for travel by road[26], and growing GDP growth per capita is therefore still expected to be a driver for continued increases in car ownership and road travel.

Energy

Over the coming decades, there will be increasing pressure on traditional energy sources. UK oil production currently accounts for 65% of demand and is declining[27]. In the short to medium term, as domestic production declines, our dependence on imported oil and gas will grow and we will become increasingly exposed to the pressures and risks of global markets. Over the same period, global energy consumption is anticipated to increase significantly, implying increasing competition for available resources.

Despite this, fuel costs are not projected to rise significantly over this time period. It is anticipated that vehicles will have increasingly

24 The World Bank data table, Urban Population %

25 Road Transport Forecasts 2013

26 *The Department commissioned RAND Europe to undertake a review of road traffic demand elasticities, with respect to GDP, fuel costs and population changes. The findings of this review will be published shortly*

27 Energy Security Strategy – UK Government, November 2012

efficient engines partly in response to longstanding emissions targets, including those mandated by the EU. We expect to see the rise of ULEVs – with an expectation that, by 2050, almost every car and van in the UK will be an ULEV[28]. These improvements in fuel efficiencies, and uptake in ULEVs, are expected to increase traffic levels by reducing the cost of driving, whilst simultaneously reducing – dramatically – the environmental impact of vehicles and of the road network as a whole.

Environmental shifts

At a global level, consideration of the environment, and the increasingly apparent effects of human activity, is having an ever more profound impact on industry, society and how we approach development and our future. Transport and infrastructure are no exception; appreciating potential environmental shifts is important as we develop a robust, resilient network that is fit to face the challenges of the future.

The implications of environmental change for the road network are potentially wide ranging. The imperative to reduce carbon dioxide and other greenhouse gases in response to climate change is likely to drive increasingly efficient, low-emission vehicles, as noted above[29]. In addition, increasing instances of extreme weather will expose any vulnerabilities in the overall network, testing its resilience, as the challenge to minimise disruption and keep the country moving, whatever the weather, intensifies.

These and other emerging challenges will ensure that the need to improve the SRN's environmental impact remains at the forefront of decision making. This includes our support for ULEVs and alternate fuels, our work with vehicle manufacturers and international partners to improve emission standards, and our determination to enable improved choice across transport options by investing across all modes.

Technological developments

New technologies are changing the nature of transport both in terms of how we travel and also why we travel.

Technology provides an incredible opportunity to change how people use the SRN and improve the driving experience. In 2000, 25% of the world's information was stored digitally – today it is more than 98%[30]. On this trajectory, and with the forecast dramatic increase in computing power, by 2040 there will be around 20,000 times more digital information[31]. The ability to collect and analyse this growing volume of information has been termed 'Big Data'. From a transport perspective, Big Data is already making a real difference to journeys and has the potential to unlock more value from the SRN. Real-time mapping on smart phones already saves one billion hours of travel time and 3.5 billion litres of fuel globally per year[32]. Floating vehicle

28 Driving the Future Today – a strategy for Ultra Low Emission Vehicles in the UK, 2013

29 The EU ambient air quality directives set limits and targets for concentrations of various pollutants in outdoor air for the protection of health and ecosystems. The Climate Change Act (2008) established a target for the UK to reduce its emissions by at least 80% from 1990 levels by 2050

30 Global Strategic Trends – Out to 2040, fifth edition, Ministry of Defence

31 Global Strategic Trends – Out to 2040, fifth edition, Ministry of Defence

32 Oxera quantifies the benefits of Geo services to global consumers and businesses on behalf of Google (Oxera.com January 2013)

data[33] and mobile phone location data can be used to give better real time management of traffic, enabling predictive and personalised traffic information for road users.

We are also likely to see increasing automation on the roads as we transition from existing vehicles, via assisted driving services like platooning[34], to the deployment of fully autonomous vehicles. While driverless technology still has to mature, it clearly has the potential to transform the UK's transport networks – improving safety, reducing congestion, and lowering emissions.

While the timing of development and mass market adoption of many of these technologies is unclear, what is certain is that changes are coming, the impact of these changes on the road network of the future will be real, and we need to support such advances as much as possible.

Connecting vehicle and infrastructure information on the A14

The Highways Agency are undertaking a pilot on a 50-mile section of the A14, which is to become Britain's first internet-connected road. A network of sensors will be placed along this stretch, creating a digitally-enabled road which can monitor traffic by sending signals to and from mobile phones in moving vehicles. Sensors in cars and on the roads can monitor the build-up of congestion and wirelessly send this information to a central traffic control system, which automatically smooths the flow of traffic. This system could also communicate directly with cars, directing them along diverted routes to avoid the congestion and managing speeds to ensure journeys are both quick and safe. We expect to see more of such schemes over time.

33 This is defined as the collection of localisation data, speed, direction of travel and time information from mobile phones in vehicles that are being driven

34 Platooning is the electronic coupling of one or more vehicles to a lead vehicle, which takes control of the speed and direction of all the vehicles in the platoon, and can decrease the distance between vehicles thus increasing road network capacity

Technology and the vehicles of the future

Significant trends in vehicle technology are evolving quickly and offer exciting opportunities, with the potential to transform the way we travel. In particular:

- **Automation**, allowing vehicles to "see" the surrounding environment and provide advice about, or take control of, decisions on how to navigate it
- **Connectivity**, where vehicles communicate in real time with other vehicles and the infrastructure, opening up new services for drivers and allowing traffic to behave cooperatively so the whole system flows better
- **Ubiquitous data**, which could result in more advanced information about the wider transport network and the world around us, optimising the way that we use personal transport and the transport network
- **New ownership models**, such as car clubs and lift sharing, enabled by better data, better mobile connectivity and better journey planning
- **Low-emission technology**, including hybrids, plug-in hybrids and pure electric vehicles, powered by batteries at first and potentially hydrogen fuel cells in the medium to long term.

This is, of course, a complex agenda and uncertainties remain, but the realisation and convergence of these various emerging trends could radically change the way we think about transport. They are likely to have major impacts on safety, network capacity, asset management, energy consumption, emissions, driver behaviour and mobility more generally.

Government has a vital role to play in understanding the opportunities and challenges these developments bring, and ensuring that we are well-placed to respond to, enable and capitalise on them for the benefit of all. Government will need to work in partnership with the Company to establish firm plans for how the SRN can best enable and benefit from the technologies. Capitalising on these advancements must be a focus of the Company's approach to innovation, technology and research, and also the Innovation Fund. Building on the previous work of the Highways Agency, these provide the means for the Company to position itself at the vanguard of global efforts in this area (see the Performance Specification and Investment Plan for more information).

With so far-reaching an issue, a partnership approach is essential. The Department and the Company must be an active contributor in efforts to ensure the UK takes advantage of these global technology trends, facilitates investment and boosts overall UK capability. Together with the Company, we will engage closely with industry, operators, local authorities and other stakeholders to position the government. Our aim for 2015 is to see a consensus built and plans developed about how the UK will move, with the assistance of the vehicles of the future, towards a vision of better network flow, exemplary safety and improved efficiency.

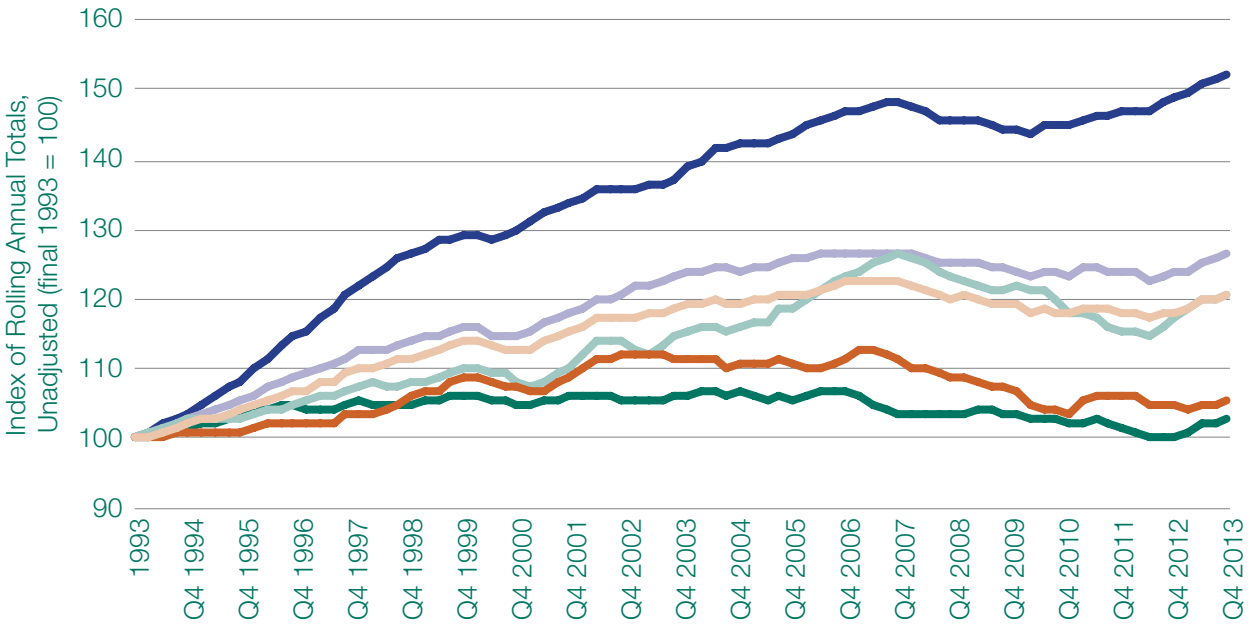
Forecasting future traffic

We are aware that traffic on the wider road network is at a similar level to ten years ago – in 2013, traffic for all vehicle types across all roads was just 0.4% higher than in 2003[35]. There is, however, increasing debate and uncertainty over what this means for future levels of traffic. Some of the emerging trends we identified in the previous section, such as growing concentrations of people living and working in urban areas and technological advancements, along with changes in social behaviours and attitudes, are seen by many to be playing an increasingly important role in reducing demand for the motor vehicle. In the following pages, we take a closer look at traffic trends and the impact on the SRN.

Demand on the SRN

Whilst overall traffic has levelled off, demand for the SRN has continued to grow, with the exception of a levelling off during the recessionary years of 2008 and 2010[36]. Since 2010, daily traffic flows on the SRN have increased steadily, and are now at an all-time high. According to the latest quarterly data, motorway traffic is 2.3% higher in the summer of 2014 than it was in the same period a year earlier[37].

There is, therefore, little sign of the demand on the SRN abating, indicating that the impact of the broader strategic trends moderating traffic growth may be having a



Index of rolling annual traffic totals by road class in Great Britain (1993 = 100)

- Motorway
- Rural A-road
- Urban A-road
- Minor rural road
- Minor urban road
- All roads

35 DfT Statistics

36 DfT Statistics

37 DfT Statistics

greater impact on the local road network. Furthermore, there is emerging evidence that demand on these roads is also picking up again as the economy recovers. The latest data shows that traffic across all vehicle types and road classes has increased by 2.2% since 2013[38], the highest quarterly total recorded since 2008, with economic growth likely contributing to the upward trend.

Understanding drivers

The Department recognises how important it is to fully understand what is happening with traffic and why, to forecast what future road demand might look like, and ensure investment is allocated to the network on the best possible basis.

To this end, we have been undertaking a systematic review of the existing evidence base to understand the trends in road traffic in more detail, including how they vary across different areas and groups, and the extent to which different factors have contributed to these trends. The findings and conclusions of this review will be published separately. A summary is presented on pages 29 and 30.

Implications for future road demand

There are clearly a wide range of factors affecting overall traffic levels, some of which are well understood. These include income, costs and demographics, which have been at the core of the Department's road traffic forecasts. Other are less clear and, as a consequence, there is an uncertain outlook for future levels of traffic.

Where there is uncertainty, the effect on current and future road demand could be either positive or negative. Changing lifestyles and social attitudes, for example, may reduce car travel amongst young people, but increase it amongst women, whilst improving health and life expectancy may drive up car usage amongst older people.

Some trends which may have reduced levels of car usage in recent years are also unlikely to continue and will therefore not have an ongoing effect on road demand; trends such as increasing educational participation and having children later in life can only go on for so long. The effect of changes to company car taxation, which has been found to have contributed to the recent levelling off in overall traffic levels, has now largely been fed through.

Meanwhile, evidence suggests that the factors which have traditionally been seen as important determinants for national traffic levels, particularly income and costs, continue to be so.

38 Data comes from provisional quarterly estimates of road traffic volume in Great Britain – for Quarter 3 (July to September) 2014. Final data will be available in June 2015

Understanding drivers of road demand – summary of findings:

Trends in car usage

In Britain in 2013 there were 304 billion vehicle miles travelled compared to 30 billion in 1949. Cars have shown the greatest growth of all vehicle types over this period. In recent years traffic growth has slowed, largely being driven by a reduction in car traffic: in 2013, car traffic was 1% lower than in 2002. This compares to strong growth in van traffic, which has risen 19% since 2003.

Analysis of the National Travel Survey (NTS) reveals this levelling off in national car traffic masks a fall in the average vehicle miles individuals have travelled, offset by a growing population. The decline in average individual mileage has been brought about mainly by a fall in the number of trips people make; the proportion of trips taken by car has increased slightly, and trip lengths have stayed broadly constant.

The aggregate trend also masks different trends across different groups and locations. Reductions have been concentrated amongst men, young people and urban areas. By contrast, car travel has increased amongst older people, women and, importantly, on motorways.

	Growing	Falling/Flat	Details
Area/road type	Motorways (+15%) Rural (+8%)	Urban (-4%)	Transport Statistics Great Britain (TSGB), major roads – GB, 2000-2013
Age	60-69 (+13%) 70+ (+25%)	17-20 (-15%) 21-29 (-25%)	NTS, individual mileage, 2002-2012
Gender	Females (+5%)	Males (-15%)	NTS, individual mileage, 2002-2012

Drawing on evidence from across social and economic research, statistics, surveys and econometrics:

Well-established factors

Some factors are well-established as having a significant effect on traffic levels – most notably costs and income:

- *Costs of driving:* The NTS shows that younger people (under 30s) consistently cite the high cost of learning and insurance as the main reasons why they are not learning to drive
- *Employment:* Labour Market Statistics show that the employment rate for people aged 18–24 years old fell by 10.5 percentage points from 2001 to 2011, and was falling behind other groups even before the recession
- *GDP:* In a literature review of travel demand elasticities, commissioned by the Department, almost all studies found a significant and positive impact of GDP on traffic
- *Taxation:* Company car use has declined by over a third in the last two decades (Le Vine and Jones, 2012) which is likely attributed to company car taxation policy.

Factors with moderate impact

Other emerging trends have influenced changes in car travel behaviour. However, the effect on overall road traffic to date appears to be relatively modest.

- *Urbanisation:* Evidence suggests that recent trends of relocation from rural to urban areas have not had a large effect on total traffic: in 2011, only 6.7% of the population was distributed differently[39] from 1971. It is therefore thought that the impact on national traffic will be relatively small
- *Having children and getting married later in life:* Over a number of decades there has been a trend of these significant life events occurring at older ages. Analysis of Understanding Society data by a research team, that included the Department, shows such a trend has a positive impact on car ownership, which is now happening later. However, only a small proportion of the population is affected (3.1% have a child, 1.6% gain a partner in any year)
- *Increased use of public transport:* Public transport has become more popular in urban areas as services have expanded and become more reliable but the impact of this on overall road traffic appears to be small, given the share of total travel these entail
- *Telecommuting:* ONS analysis suggests the role of technology may only have had a modest impact on home working to date; the home working rate (defined as the proportion of those employed staying at home to work) has only risen 2.8 percentage points over the last 16 years.

Factors with mimimal impact

There are some factors that have been cited as potential causes for car trends but appear, on the basis of limited evidence, to have minimal impact on travel behaviour:

- Environmental concerns: Self-reported awareness and concern for environmental issues does not appear to have translated into a change in travel demand. The NTS reports that only 0.4% of respondents quoted this as the main reason for not learning to drive.

Factors where there is insufficient evidence

Finally, there are a number of factors where the Department feels that the evidence is currently insufficient to draw firm conclusions from:

- *Educational participation:* The effect of an increasing educational participation rate on trips and distances travelled
- *Immigration:* Although there is some evidence to suggest that migrants travel less by car, this behaviour appears to reduce over time, and the degree to which the travel decisions of this group affect overall traffic levels is unclear
- *Desirability of the car:* There is little evidence to indicate the extent to which societal and cultural changes – above and beyond those caused by technological developments – may have led to the car becoming less desirable
- *Technological developments:* While they do not appear to have been an important factor to date, the role of social media and other technological advancements is unclear

Further work is needed to understand the role these last set of factors are playing, and could play in the future. The Department will be investigating this going forwards.

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39 Headicar, Peter. 2013. "The Changing Spatial Distribution of the Population in England: Its Nature and Significance for 'Peak Car'." Transport Reviews no. 33 (3):pp 310-324

A steady rise in fuel prices since the turn of the century, and more recently the economic recession, have undoubtedly dampened traffic levels over the last decade, and contributed to the recent decline in the average distance people travel. However, the future, projected growth in GDP per capita and improved fuel efficiencies should drive up demand – increasing both the number of car trips people take and the distances they travel.

With the predicted growth in demand combined with the likely strong growth in population levels, the outlook is therefore for continued growth on the road network, and on the SRN particularly.

Road traffic forecast scenarios

The extent of growth depends on how other strategic trends evolve, and their impact on how, and how much, people travel. To account for this uncertainty, the Department have forecast road traffic levels – using the National Transport Model[40] – under a number of different scenarios. These take account of some of the key uncertainties which have been identified in our review of the existing evidence base[41].

One key uncertainty is how and whether the decline in the number of trips people make will continue into the future. As this has been the main reason for the decline in individual mileage over the last decade, we have considered future traffic levels under two alternative assumptions – one where the current rate of decline continues into the future[42] to 2040, and another where they remain at their historical levels.

In reality, the number of trips might decline at a slower rate, or level off before 2040. It might even increase in the future. But, by considering a scenario (Scenario 3) where they are assumed to continue declining throughout the whole forecasting period – whether this is due to changing social attitudes, technological developments, or demographics – we can ensure that our forecasts better reflect the uncertainty which sits around recent trends and their implications for the future. This in turn will help ensure that the Investment Plan included in this RIS is sufficiently robust to deal both with today's problems and those the future may bring.

There is also uncertainty over how some of the strategic trends may affect people's decision to own a car, travel by other modes (eg use public transport), or travel different distances. To account for this, we have forecast traffic under an alternative scenario where car ownership levels, the proportion of trips taken by car and the distance people travel are all unresponsive to future GDP growth (Scenario 2).

40 The National Transport Model is a multi-modal four stage behavioural model that forecasts travel demand bottom up using highly disaggregated input data. The forecasts reflect updates to our modelling assumptions, to better reflect speeds and capacities in London, and take account of latest forecasts for GDP growth, fuel costs and efficiencies, as well as latest data on the number of trip people make

41 Full details of this work will be published soon as part of the next update to the Department's road transport forecasts

42 Trip rates are estimated by journey purpose. On average they have been falling, although for some journey purposes they have been increasing

While the evidence suggests the link between road traffic and GDP has been weakening over time, there is virtually no evidence to suggest it will have no effect in the future.

Finally, the recent trends in fuel prices and GDP show that there remains considerable uncertainty around the path these may take in the future. So, as before, we have also forecast traffic under different outcomes for these key drivers to demonstrate the sensitivity of future traffic levels to different economic outcomes (Scenario 1 low and high).

Our range of forecasts, therefore, capture the most important uncertainties around future road demand both in terms of the impact of different drivers, and also the outcome for the main components of traffic – namely, trips, mode choice, and distance travelled.

Strong predicted traffic growth on the SRN

Based on latest trends, the available evidence on the drivers of road demand, and taking account of the key sources of uncertainty in a range of forecast scenarios, it is reasonable to plan for growing levels of traffic.

The scenarios give a range of outcomes for road demand, but all point to strong positive growth. On the SRN, we forecast that traffic (in terms of total miles driven) will be between 27% and 57% higher in 2040 than it was in 2013[43].

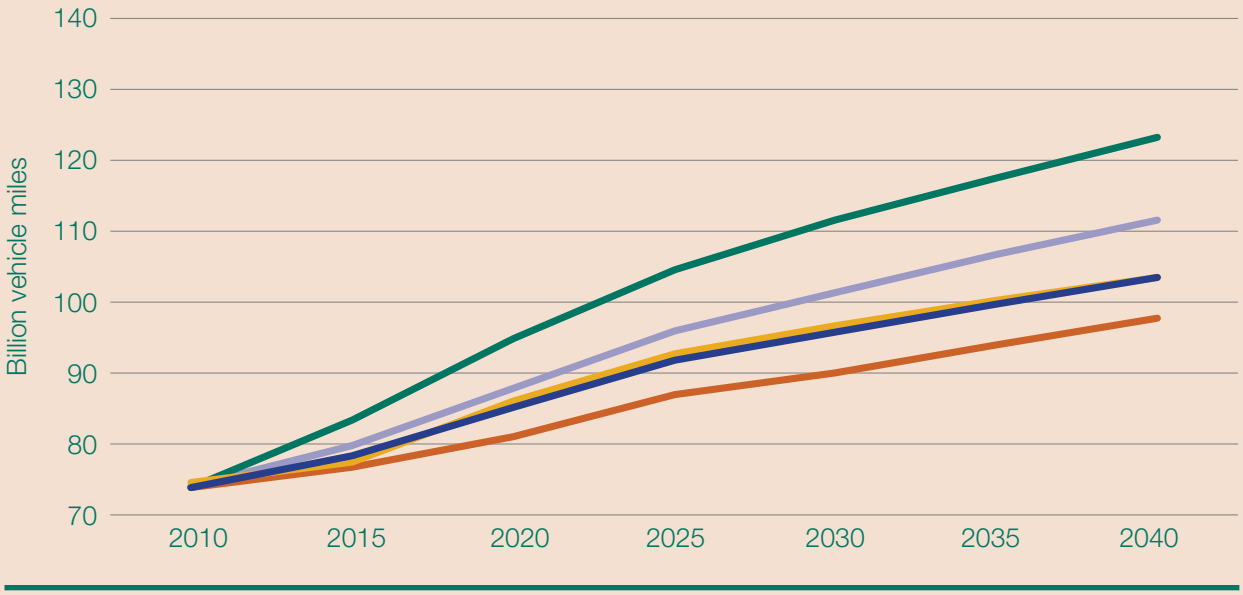
This implies average annual traffic growth on the SRN of between 0.9% to 1.6%. This is lower than, albeit broadly in line with, recent traffic data – with latest figures showing overall traffic levels in Great Britain as 2.2% higher than a year ago, and motorway traffic levels specifically 2.3% higher.

Even in a scenario where the number of trips people take continue to decline in the future, overall traffic grows because more people are taking trips (due to population growth), more of these trips are taken by car, and people are travelling further (due to falling fuel costs and rising income). Where car ownership and car use do not increase with rising incomes, population growth and improving fuel efficiencies will continue to mean more people travelling by car and for longer distances.

Of course, it is possible that there could be other outcomes and future road demand may fall outside of this range. The Department thinks the scenarios presented provide a plausible range, but will remain vigilant, monitoring and reviewing the evidence, and will develop our understanding of road demand over time. Future Road Investment Strategies will respond to any changes in outlook.

43 DfT National Transport Model analysis

Forecast SRN traffic



Forecast SRN Traffic – England (billion vehicle miles)

Scenario 1
Scenario 2
Scenario 1 (low)
Scenario 3
Scenario 1 (high)

The scenarios

- **Scenario 1** assumes trip rates remain constant going forwards, and that car ownership, choice of mode and distance travelled all change in response to changing demographics, income and costs (as previously assumed in the NTM). Traffic on the SRN is forecast to be **43%** higher than in 2013.
- **Scenario 1 (high)** and **Scenario 1 (low)** assume the same as Scenario 1 but use the OBR's high and low productivity GDP forecasts, and use high and low oil price forecasts from the Department for Energy and Climate Change. Traffic growth on the SRN is forecast to range between **27% and 57%**.
- **Scenario 2** is based on the same assumptions as Scenario 1, but with the link between income and car ownership and car travel removed. Traffic on the SRN is forecast to be **34%** higher in 2040 than 2013.
- **Scenario 3** is based on the same assumptions as Scenario 1, but with the decline in trips observed between 2003 and 2010 continuing until 2040. Traffic on the SRN is forecast to be **34%** higher in 2040 than in 2013.

The maps that follow on the next two pages show congestion on the network in 2010, and the forecast level of congestion in 2040, according to Scenario 1.

Congestion on the Strategic Road Network in 2010

Source:
DfT National Transport Model, 2014

DfT gisu 1415j082

Predicted congestion on the Strategic Road Network in 2040

Source:
DfT National Transport Model, 2014

DfT gisu 1415j083

The impact of increased congestion

By 2040, without sustained investment and other action, congestion will become a serious problem for many important routes.

These projections, which relate to the high growth scenario, translate to **16 hours** stuck in traffic for every household each year, **28 million** working days lost per year and a **£3.7 billion** annual cost to the freight industry, which could see prices increase on the High Street and beyond.

Difficulties could include:

- Impeded travel between regions that hampers business
- Longer travel times that constrain possible job opportunities
- Negative impacts on efforts to spur economic growth, with enterprise zones, potential housing sites and areas of high growth held back by bottlenecks
- Increased stress on roads to ports and airports, making it harder for British businesses to access export markets
- Safety and the environment suffering as congested traffic is more polluting and there is an increased risk of accidents.

Our Scenario 1 road traffic forecasts indicate that, by 2040, around **25%** of the entire SRN, and **32%** of the motorway network will experience severe congestion at peak times and suffer poor conditions at other times of the day.

5. Planning for the long term: pressures and challenges

Understanding the pressures for network planning

While the strategic trends discussed in the previous chapter can provide us with a sense of how the network may be used in the future, and the future traffic forecasts can indicate the amount of vehicles expected to use the SRN, a range of other factors must also be taken into account when planning future investments on the network. These can range from national issues, such as an aim to support the growth of particular industries or regions, to very local issues like the need to enable access to a new housing development. An overview of a number of these factors, each influencing future network planning, is outlined below.

Economic growth

As stated previously, the government is aiming to secure robust and resilient economic growth across a broad range of sectors and regions. The Department for Business, Innovation and Skills' Industrial Strategy identifies a number of priority industries and highlights how these are clustered across the country.

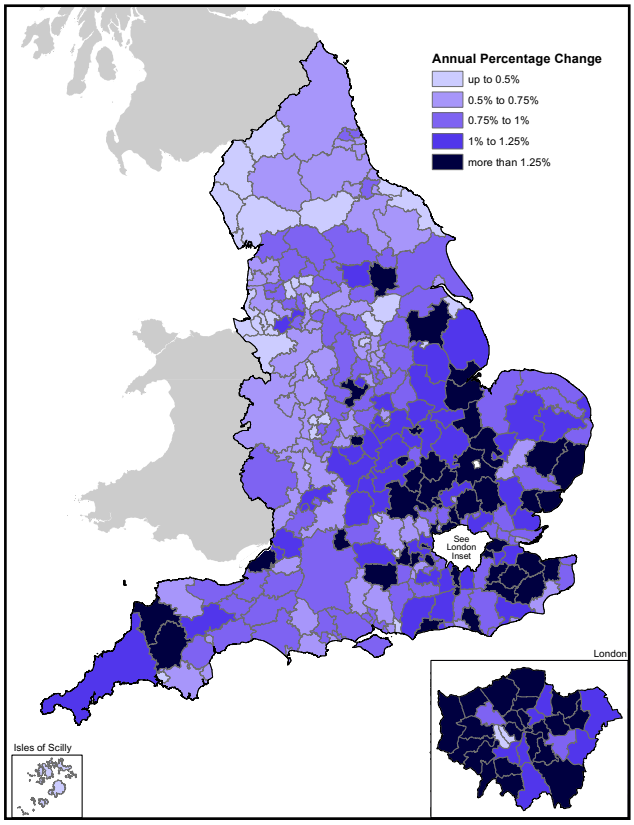
The SRN can act as an enabler and supporter of growth for these industries, and also has a role to play in supporting broader economic priorities. For example, recent statements about creating a 'Northern Powerhouse' will need to be underpinned by effective transport connectivity between the economic hubs of the north, including, for instance, the deployment of Smart Motorway technology between Leeds and Sheffield and across the Pennines, linking Manchester and Leeds.

Additionally, a lack of connectivity can act as a constraint on the growth of a particular area, especially where there are areas of strong growth nearby. Improved SRN connectivity between areas of low and high economic activity can give people better access to jobs, and businesses better access to markets, potentially stimulating broader, more widespread growth.

Connectivity and quality

One of the primary purposes of the SRN is to connect England's significant urban areas. While the network performs well in many areas, there are still, however, some notable gaps. The standard of the SRN also varies significantly, from single carriageway roads to multiple lane Smart Motorways. Future investment may be required to address inherited deficiencies, where there are connectivity gaps between urban areas or where the quality of connectivity is insufficient to support economic and social needs.

Number of households, annual average percentage change, 2011–2021



Source:
Department for Communities and Local Government, OS Boundary-Line

Housing growth

With a growing population, it is unsurprising that significant housing growth is forecast, which in turn will place pressure on transport.

As shown in the map, growth is expected across the country but it will vary by region. Key growth areas include:

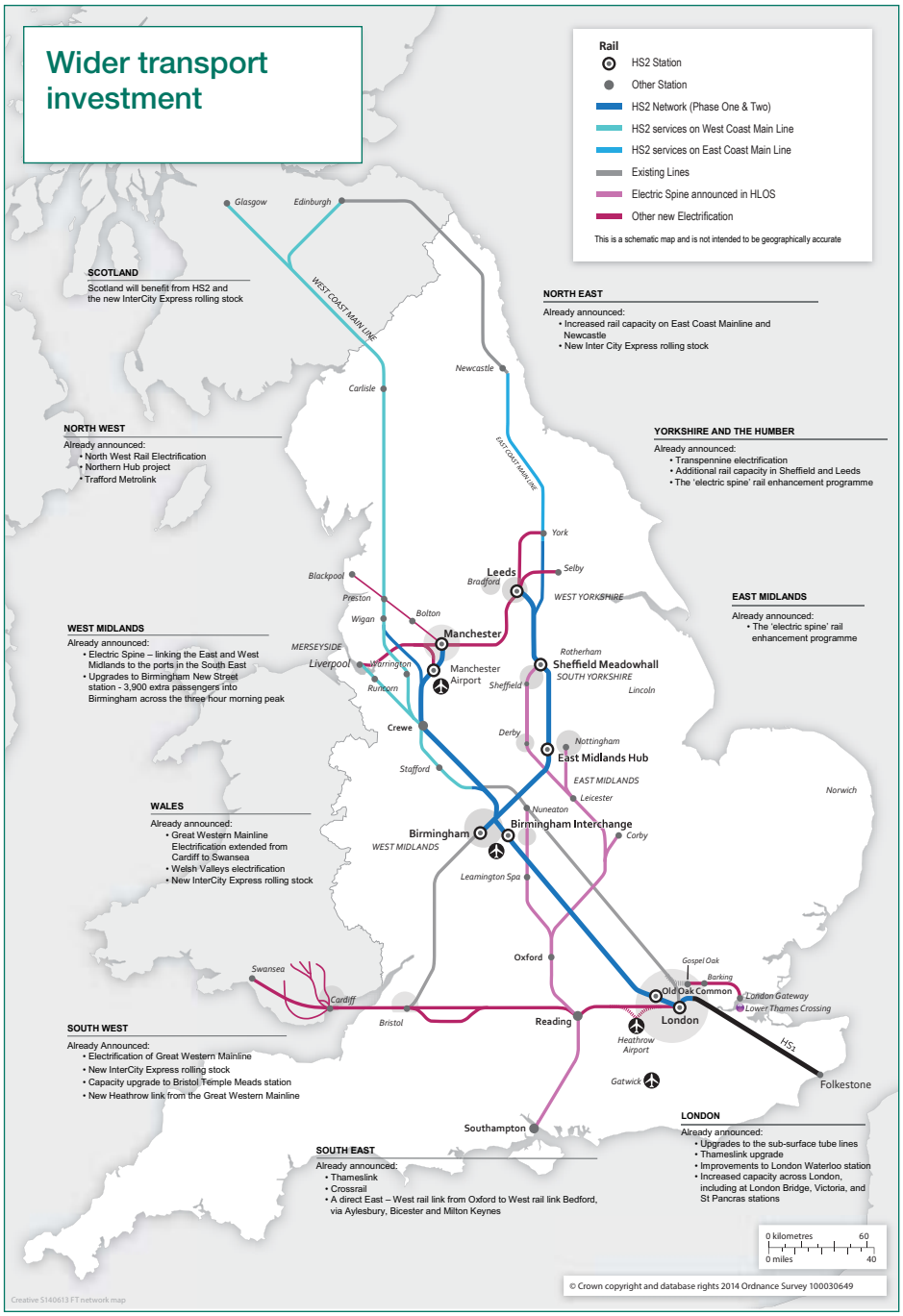
- An arc of growth stretching from East Anglia through Cambridgeshire and Northamptonshire to Oxfordshire
- Growth in the North, particularly a band across the Pennines
- Patches of strong growth in the South West.

We expect the SRN to continue to play a key role in unlocking access to new housing developments. New schemes will also support this area. For example, a scheme on the A2 will support the development of a Garden City at Ebbsfleet, while a new junction on the A14 near Kettering will directly benefit housing development in the area. We are also establishing a £100 million Growth and Housing Fund to provide further support.

Wider transport developments

Given the contrasting strengths of its component parts, our overall transport network is at its most effective when the modes work together to enable real choice and smooth journeys.

There are many transformational developments planned for the wider transport network over the coming decades. The map below illustrates transport investment across rail and high speed rail networks:



Many investments in the wider transport network focus on North-South connectivity and the spine of the country. These areas have historically been the busiest and most economically significant transport routes in the country. The SRN should also look to provide balance, including focusing on improved East-West connectivity and those areas served less well by our main rail routes, which roads may be better placed to support.

The SRN should also work with other modes more directly. Schemes in this RIS will follow the requirement set in the NNN PS to give proportionate consideration to alternate modes, as they progress through the investment decision making process. Looking across the wider transport network, we see our strategic roads working with other modes during the first Road Period in the following ways:

HS2

With work set to start in 2017 and the first trains between London and Birmingham planned for 2026, HS2 is fast becoming a reality. To drive maximum benefits, it is important that we give full and early consideration to how the SRN can dovetail with, and support, HS2. Connectivity to stations, particularly the new Parkway Stations, is vital. Access to HS2 stations will be assisted by the planned improvements to the M1 in Nottingham (Junctions 24 – 25), as well as schemes on the M1 in Yorkshire (Junctions 32 – 35A) and the M42 (Junction 6) near Birmingham Airport.

Rail

Government continues to support the growth of rail travel, and expects the Company to work in conjunction with Network Rail to identify areas where it can help. This is likely to include identifying where access to rail stations may be improved, focusing in particular on areas which will remove traffic from the SRN, as well as supporting the transfer of freight from road to rail, with the aim of facilitating sustainable rail freight growth. To this end, it is important that the Company and Network Rail give consideration to each other's investment plans. Sharing information, such as demand forecasts and long term strategic thinking, will help maximise the efficacy of future investment.

Aviation

The SRN should continue to support and improve access to existing airports across England and respond to the forecast increase in demand for air travel, which shows 1% – 3% growth per year to 2050[44]. Plans for the first Road Period include the rolling out of Smart Motorway technology and all-lane running between Junctions 8 and 10 of the M23, which serve Gatwick Airport, as well as schemes on the M56 to improve access to Manchester Airport. The Company will also help deliver the requisite surface access capacity following any decision on the future expansion of South East airport capacity.

Ports

With approximately 95% of the UK's goods trade by volume, and 75%[45] of its value, being handled by ports in England and Wales, along with two thirds of all freight being carried on the SRN, the linkages between our ports and strategic roads are vital. Their importance will only grow with the

44 DfT Aviation Forecasts 2013
45 National Policy Statement for Ports, 2012

forecast long-term growth in imports and exports by sea. The SRN must enable smooth access to ports, allowing goods and services to be moved into and around the country efficiently and reliably. Schemes such as the upgrade of the A14 to improve access to Felixstowe, and the A5036 Port of Liverpool road are firmly focused on this. During this Road Period, we will also assess how to improve the 'last mile' of roads to ports to improve access.

Local transport

The SRN and local networks should work together to provide flexibility and door-to-door connectivity for all users. Schemes such as the A453 upgrade highlighted below do just this, and we have also set aside funding in the ring-fenced Cycling, Safety, and Integration Fund to further support connectivity with local networks. Over the longer term, we expect such investment to support the development of transport hubs that connect to the SRN and provide users with access to a range of local transport options.

Cycling and walking

The government is committed to improving active travel options, such as cycling and walking. Too often the SRN often acts as a barrier to these activities, so we are committed to improving access through building new bridges, crossings and cycle paths. The Investment Plan has allocated £100 million to invest in 200 projects to improve cycling and walking across and alongside existing stretches of the SRN. The Company has also committed to cycle-proofing new schemes as standard, as well as working with Local Authorities to improve end-to-end cycling and walking journeys.

Improving links to local transport through the A453

The dualling of the A453 will allow traffic from the M1 to access the new Nottingham Tram Park and Ride site in Clifton more quickly and easily. The improvement will also make it easier for people in south Nottingham to access the new East Midlands Parkway station, where they continue their journey, for example to London, without having to use the motorway.

Five long term challenges for the SRN

Our review of the predicted trends, forecasts and pressures suggests that demands on the SRN and how users will interact with the network could be set to change radically. The future picture is complex and constantly evolving so our approach must be flexible in order to address the issues the SRN may face. The following section highlights five overarching challenges that require consideration.

Access around major cities

Our major cities are anticipated to be the drivers of the greatest growth over the coming decades. Yet some major cities, particularly London, have serious congestion around their peripheries, which is set to worsen given the growing, urbanised population. A lasting solution that makes the best of all transport modes is important for the long term health and prosperity of our economy.

Connecting outlying areas

The SRN is a national network that tends to provide the best coverage to the spine of the country. Regional growth can be helped by providing better links from outlying regions, such as the South West, North East and East Anglia, to the centre of the country to help businesses compete in the national and international economy.

Improving East/West connectivity

Rail and road connectivity traditionally links the North and the South, with our main arteries not serving East – West travel as comprehensively. Indeed, there is only one continuous dual carriageway or better link from East to West between Derby in the South and Edinburgh in the North. This serves as a major barrier to the development of the economies of the North. For instance, the lack of adequate Trans-Pennine connectivity must be addressed to realise the desire for a Northern Powerhouse.

Radial versus ring

A glance at the map of England's road network clearly illustrates that it has been built like a series of spokes heading out from major cities. In some places, cross-connections are missing, meaning that it can be difficult to travel between certain places even though they are close geographically. This can prevent nearby communities from benefiting from each other's growth; improving these cross-connections could help unlock more balanced growth across the country.

Building a smarter network

New developments and technology innovations are likely to fundamentally change the way we use and operate our roads in coming years. The technology that enables emission-free, driverless vehicles has progressed rapidly in recent years, although uncertainties remain as to how this will scale up. Alongside smarter vehicles, smarter infrastructure can unlock the potential of our roads, as we are already seeing through the deployment of Smart Motorways. A key challenge for government and the Company will be to drive forward these changes and developments so we can maximise their potential and make the most of the network of the future.

6. The network of the future: our vision

"If motorways and trunk roads are to meet the needs of a growing UK economy, we must make a clear break from [the] pattern of short term thinking and stop-start investment"

Alan Cook, A fresh start for the Strategic Road Network, 2011

Looking to 2040

By 2040, we want to have transformed the busiest sections of the SRN to deliver the safer, more stress-free journeys that everyday users desire, and the enhanced reliability and predictability that is so important to business users and freight. We see the SRN working more harmoniously with its surroundings, impacting less on local communities and the environment.

These are ambitious plans and it will take time to make our vision a reality. But, with the planned reforms to the Highways Agency and the funding commitments made in Investing in Britain's Future[46], complemented by the technological advancements expected in the coming years, we are acting from a position of strength.

Our aspiration

By 2040 we aspire to have a network that is:

- **Smoother**
  Connecting people and businesses safely, swiftly and seamlessly
  - The number of people killed or seriously injured on the SRN **approaching zero**
  - More users, more happy with more journeys, leading to road user satisfaction levels of **95%**
  - A **free-flow network**, with a mile a minute speeds increasingly typical across the network

46 Investing in Britain's Future, 2013

- **Smarter**
  A world leader in road building and traffic management technology
  - A network that enhances the UK's global competitiveness, and is recognised as one of the **top 10** global road networks by business[47]
  - A step-change in efficiency, with roads projects and maintenance delivered **30% –50%** cheaper than today

- **Sustainable**
  Driving the transition to a decarbonised, environmentally and locally sensitive road network
  - A better neighbour to communities, with **over 90%** fewer people impacted by noise from the SRN
  - **Zero** breaches of air quality regulations and major reductions in carbon emissions across the network
  - Improved environmental outcomes, including a **net gain** in biodiversity from the Company's activities

Envisaging the future network

Realising our vision will require a network that works in a fundamentally more effective way. This means updating infrastructure to make the best use of technology, improving how drivers, vehicles and non-users interact both on and with the network, and placing the customer at the heart of how the network is managed.

Modern infrastructure

Smart Motorways

Today's Smart Motorways are at the cutting edge of technology and we want it to stay that way. This means keeping pace with innovation and incorporating emerging technologies, allowing for continued improvements to journeys where it matters most. To ensure this happens, we are requiring the Company to set out its approach to innovation, technology and research during the early part of this Road Period.

Conventional motorways, which will remain for England's less busy motorways, should still offer mile a minute journeys, and will benefit from junction improvements, capacity enhancement and the deployment of new technologies where needed.

47 As measured by the World Economic Forum

The story of Smart Motorways

In 2013, the Highways Agency coined a new term, Smart Motorways, to describe the different designs of actively controlled motorways. These motorways use technology to convert the hard shoulder into an additional, controlled running lane, increasing the capacity of our busiest motorways by a third at a fraction of the cost of traditional lane widening. The latest design involves 'all lane running' motorways, for example on certain roads around Manchester and Birmingham, and along the M1, where there is no longer any dedicated hard shoulder. CCTV cameras and variable message signs are used to regulate speed and close lanes in the event of an incident or congestion, and regularly-spaced emergency refuges mean that there is always somewhere to go in the event of a breakdown.

By smoothing traffic flow, Smart Motorways reduce congestion and improve journey times. There is also strong evidence that they improve safety: on the M42 Smart Motorway in Birmingham, the frequency of accidents fell by more than half after the Smart Motorway was opened[48]. Environmental impacts are also limited compared to a widening scheme as the extra capacity can be created without significantly enlarging the network's physical footprint.

Expressways

It is not just the motorway network that must be transformed in order to realise our vision. Our major A-roads, too, must be upgraded to ensure the necessary improvement in performance across the network.

Users of motorways know they can expect a broadly consistent standard from the whole of their road, and that this ensures they have a safe, free-moving journey. The same is not true of A-roads, where piecemeal upgrades have often resulted in inconsistency and substandard stretches of the road that are often less safe and a regular cause of congestion.

By 2040, we want to have transformed the most important of these routes into Expressways: A-roads that can be relied upon to be as well-designed as motorways and which are able to offer the same standard of journey to users. At a minimum, this means:

- Largely or entirely dual carriageway roads that are safe, well-built and resilient to delay
- Junctions which are largely or entirely grade separated, so traffic on the main road can pass over or under roundabouts without stopping
- Modern safety measures and construction standards
- Technology to manage traffic and provide better information to drivers.

This means an Expressway will be able to provide a high-quality journey to its users. Most Expressways should be able to offer mile a minute journeys throughout the day, particularly outside of urban areas. Safety levels should match the highest standards

48 Smart Motorways fact sheet one

of the network and, for many parts of the country, an Expressway will be able to provide a motorway-quality journey for drivers.

While this standard is already met at many points on the network, certain routes that may justify Expressway status are inconsistent, repeatedly switching from dual to single carriageway and back again, or suffering serious congestion at a particular roundabout. We will prioritise fixing these problems to provide better journeys.

Modern trunk roads

Not all trunk roads need to be upgraded to Expressway standard, and not all motorways will need to be a Smart Motorway to provide a good service to users. This could be because a road is not subject to serious congestion, because of environmental or engineering constraints upon a route, or because an upgrade would not offer good value for public money. In these cases, investment in the route will need to be targeted on where it makes the greatest difference for road users.

A network to achieve our goals

All of the above actions will come together to deliver an optimised network capable of achieving the nation's goals. The routes to be targeted, and the priorities for intervention, will be informed by the next generation of Route Strategies, which will ensure the inclusion of local community and business views, and also by a new generation of strategic studies.

For further details about how we believe the network of 2040 could appear, see the map on the following page. It shows a host of Smart Motorways and Expressways providing smoother traffic flow, increased capacity and improved safety.

The network towards 2040

An environmentally and socially sensitive network

We are determined to ensure that improvements to network performance do not come at the expense of the environment. By 2040, we expect to have completed a wide-ranging retrofit of the network that raises environmental standards and helps the network fit more seamlessly with its human and natural surroundings. The Company will already have at their disposal many of the tools required to make this happen, while the development of new technologies and techniques will broaden the range of available options.

It is also important that serving the needs of the motorist does not come at the expense of others. Instead, the network should account for the needs of walkers and cyclists, and not act as a deterrent to active travel options. The network must be easier to get over, under or around to ensure that roads do not divide communities, and that the associated health and wellbeing benefits of walking and cycling are felt as widely as possible.

Embracing new technology

The driver and the SRN

In the future, drivers will be more informed than ever before. Better sources of data, such as mobile phone location data, and the ability to communicate through smart phones and in-car technology, will increase the quality, and speed up the flow, of information. Control will be returned to drivers, with personalised, predictive travel information helping plan alternative routes to avoid roadworks or unexpected disruption, leading to improved journeys at a more reliable speed.

Vehicles and the SRN

As already stated, intelligent vehicles, which communicate with road infrastructure and each other, have the potential to significantly enhance road safety and efficiency, and reduce congestion. In the Autumn Statement 2013, the government demonstrated a desire for the UK to be at the forefront of the driverless car industry, commiting to part-funding a £10 million competition for UK cities to bid to host driverless car trials and announcing trials on public roads in 2015[49]. We want to capitalise on this momentum and fully exploit new technology to deliver real benefits for the network.

Management of the network

Creative and considered management of the network, driven by the needs of customers, will also help make strides towards the achievement of our aspirations for the SRN. This could involve further developments in customer-focused operations, while better planning and innovative construction practices also provide the opportunity to limit lane and road closure times, and therefore disruption to journeys.

The adoption of more novel approaches can also help to improve conditions on the network. More strategically-positioned park and rides, greater numbers of high volume vehicles, such as coaches, on the SRN, and better integration with the passenger rail and strategic rail freight network would all increase choice and take vehicles off the road.

49 Government Fast Tracks Driverless Cars

7. Taking steps to realise our vision for the network

Targeted outcomes to achieve our vision

Given the extent of our ambitions, we need to take a considered and strategic approach to delivering the network of the future. We have targeted eight areas for improved performance in the short term. These areas form the basis of the Performance Specification, which sets specific expectations for the SRN and the Company over the first Road Period. The outcomes sought in the Performance Specification have been chosen to help us make progress in achieving our long term aspirations. They are reflected in, and have informed, the allocation of funding and the investments being made over the next five years, as described by the Investment Plan.

The interventions being funded by government have been targeted to provide value for money for the taxpayer. That often means focusing on where there are clear signals of sub-optimal performance, where the network is most critical in supporting economic growth, and where there are complementary policy priorities or transport initiatives that need to be supported.

The eight performance areas

A long term aspiration for each area is outlined below. For more details of specific targets for the next five years, see the Performance Specification.

- *Making the network safer*

  Safety is an important consideration for road users owing to the significant impact of serious and fatal accidents. A considerable economic cost is also associated with collisions on all roads, estimated at £15 billion annually to the UK economy[50]. We will never stop striving to ensure the safety and welfare of all those who use, work on, or are indirectly impacted by the road network, with the ultimate aspiration of eliminating fatalities and serious injuries on the network.

- *Improving user satisfaction*

  The satisfaction of network users is an important measure of both operator performance and the quality of the network, and can highlight areas where greater attention or investment is needed. Satisfaction levels are also a reflection of expectations. In the long term, we want to radically change what all road users expect of the network,

50 DfT Statistics

making them more demanding of improved performance, while encouraging the Company to improve on existing satisfaction levels, achieving a user satisfaction score of 95%, or better.

- *Supporting the smooth flow of traffic*

  Keeping traffic moving on the SRN is vital to our economic wellbeing as a country, and our personal wellbeing as individuals and families. We want to improve journeys and allow users to drive at consistent speeds and enjoy predictable travel on our roads. In the long term, we are setting the bar high in this regard and aspire to make mile a minute speeds typical across the core of the network by improving resilience and reducing both planned and unplanned delay.

- *Encouraging economic growth*

  To ensure the SRN positively impacts growth, we must tackle congestion and delay on the network, particularly on the main freight arteries that connect cities and international gateways. The network must dovetail with other transport developments over the coming decades to improve domestic connectivity, encourage trade and investment, and enable British business to compete in international markets. The Company will, therefore, engage with other infrastructure providers and private developers to build long-standing relationships that help unlock opportunities for growth, including the construction of new housing, industrial and business sites, while also collaborating with local authorities to identify interventions on and off the network.

- *Delivering better environmental outcomes*

  Roads, both in their construction and use, have a significant impact on the environment. The Company will therefore exploit the growing toolkit of mitigation measures in the short term, while keeping a firm eye on the longer term, and environmentally-positive technologies, such as the mass take up of ULEVs. Taking this approach, as well as working closely with local authorities and environmental groups, will allow the Company to limit, and even reverse, the effects that the network has on its surroundings. It will also move us towards our aspiration of a dramatically lower emission SRN that delivers a net gain in biodiversity and leaves a strong environmental legacy.

- *Helping cyclists, walkers, and other vulnerable users of the network*

  The network does not just impact on motorists. The safety and access of cyclists and walkers are also affected, while communities located near the SRN can be inhibited as well as enabled by its presence. Better provision is needed to ensure the SRN acts as an even more considerate neighbour. Amongst other things, that means bypassing towns and villages where appropriate, creating more segregated cycleways alongside trunk roads, ensuring safer junctions, and providing clearer road markings.

- *Achieving real efficiency*

  The Cook report[51] highlighted the opportunity for the Highways Agency to develop into a more commercially-minded organisation. Thanks to the transformation of the Highways Agency and the advent of this RIS, we expect this opportunity to be seized. The Company has the chance to build on recent progress, extract maximum value from every pound spent and, in the long term, deliver schemes and maintenance faster and 30%–50% cheaper than today.

- *Keeping the network in good condition*

  Effective asset stewardship, in terms of monitoring and management, is vital to the successful operation and maintenance of the SRN. It helps spot problems and identify solutions before failures occur, and reduce costs in the long term. The Company's harnessing of new technology to improve data collection techniques and provide a more in-depth and up-to-date understanding of the asset base will ensure that maximum value is wrought from maintenance investment.

51 A fresh start for the Strategic Road Network, Alan Cook, November 2011

Investing to achieve our vision – network interventions

The Performance Specification sets out what we want from the network during the first Road Period. The Investment Plan, on the other hand, outlines how the Company will turn our intentions into reality by delivering performance improvements in the short term.

Investment announced prior to the first RIS

Government has already announced, and is delivering, a substantial level of investment in the SRN. Investments include nine schemes to help develop a 145 mile 'smart spine' linking London, Birmingham and the North West. Schemes will also improve critical freight routes, such as the £1.5 billion A14 schemes and improvements to the M6 in Cheshire. In addition, £6 billion has been set aside to resurface 80% of the SRN and keep our network in top condition.

Investment announced as part of the first RIS

The Investment Plan for this RIS announces the next round of investment. 69 schemes will enter construction in the first Road Period across every region of England to improve safety, ease congestion, unlock growth, and begin the process of upgrading our most important A-roads to Expressways. Highlights include:

- Schemes to help seven major ports and five major airports
- Completing the dual carriageway from Milton Keynes to Cambridge
- Dualling the A30 in Cornwall.

A further 15 schemes have been announced for the second Road Period, including upgrading the A1 in Yorkshire to motorway standard and completing Smart Motorway connections across the Pennines.

The package of investment also contains the outcomes of the six feasibility studies conducted into some of the longest standing and most notorious hotspots on the network. In total, we have committed to over 20 proposals across the six feasibility study areas, and made some longer term commitments to further work in some areas. Commitments from the studies include:

- Transforming connectivity to and from the South West by dualling the entire A303 from the M3 to the M5 at Taunton, and building a tunnel as the road passes Stonehenge
- A new bypass on the A27 at Arundel together with on-line improvements at Worthing and Lancing
- Dualling the A1 north of Newcastle between Morpeth and Ellingham
- Widening schemes on the A1 Newcastle-Gateshead Western Bypass
- Construction of the Mottram Moor Link road together with overtaking and safety improvements and dualling the A61 to improve Trans-Pennine connectivity
- A range of dualling and junction improvement schemes on the A47/A12 corridor supporting growth at Peterborough, Norwich, Great Yarmouth, and Lowestoft

Ring-fenced investment funds

The Investment Plan also contains a series of ring-fenced funds for actions beyond the business as usual. These will help the Company make significant progress in a range of areas to ensure that network performance continues to improve and that such improvements are delivered in a sustainable fashion.

- *Environment*

  To ensure more is done to limit the impact that the SRN and its users have on the environment, we have ring fenced £300 million in an *Environment Fund* to deliver improved environmental performance across carbon, noise, water, biodiversity, landscape and cultural heritage. The funding will deliver additional environmental benefits where new schemes have standards built in, and will also allow for measures to retrofit the existing network to tackle current problems. In addition to the Environment Fund, we are also establishing a £100 million *Air Quality Fund* to ensure a specific focus and real improvements in this area.

- *Cycling, safety, and integration*

  The effect of the SRN on local communities can be profound, particularly where it severs pedestrian and cyclist access routes. We are determined to do more to ensure the SRN acts as a good neighbour so we have set aside £250 million in a *Cycling, Safety, and Integration Fund*. This funding is aimed at improving safety, increasing provision for cyclists on and near the SRN, and enhancing access for a variety of users, including pedestrians, horse riders and the disabled. This will involve both bespoke interventions and enhancements to new and existing schemes.

- *Innovation*

  This document has already identified the potential of technology to revolutionise how we build and use roads in this country. We have an aspiration to develop a technology-led SRN that supports innovation and industry so we can be a world leader in roads development and operations. To help us get there, we have created a £150 million *Innovation Fund* to allow the Company to place a greater emphasis on the future technologies that will positively impact users and the network. It will involve the full range of research, development, demonstration, and deployment activities.

- *Growth and housing*

  Given the number of people and the amount of freight the SRN carries, not to mention its nationwide coverage, the SRN is vital to England's growth. To ensure that the Company is sufficiently equipped and flexible to respond to future development opportunities, including those relating to new housing and enterprise zones, we have established a *Growth and Housing Fund*. This fund is worth £100 million and will be used to match-fund infrastructure to enable new developments.

Strategic studies

Building on the feasibility studies produced in preparation for this Investment Plan, we are commissioning a series of six new strategic studies, focused on making major improvements to the capacity and connectivity of SRN. Detail on each of the studies below is contained in the Investment Plan:

- Northern Trans-Pennine
- Trans-Pennine Tunnel
- Manchester North-West Quadrant
- A1 East of England
- M25 South West Quadrant
- Oxford to Cambridge Expressway.

Where to find out more

Further information on the steps we are taking to deliver our vision for the future of the SRN can be found in the documents that accompany this Strategic Vision.

The Performance Specification provides more detail on the eight performance areas outlined here, including Key Performance Indicators and Performance Indicators for the first Road Period (2015/16 – 2019/20).

The Investment Plan offers a breakdown of all of the schemes planned for the first Road Period and more detail on the five ring-fenced funds and future strategic studies.

The Overview provides an introduction to our vision and plans for the network. It outlines the areas of key impact from the investment package for the first Road Period, as well as outlining six regional investment stories.

8. Transforming our roads

With the creation of this Road Investment Strategy, we have an opportunity to transform our SRN so that it truly meets the needs of commuters, freight hauliers, and the country as a whole. A well-functioning SRN – with safer, less congested roads, better information and reliable journeys – will make a real difference to people's lives and businesses' prospects. By looking to the long term, both in this strategy and its successors, we can improve outcomes today while ratcheting up our ambition for the future.

We cannot, of course, be certain of exactly what the world will look like in 2040. By then, autonomous, ultra low-emission vehicles could be well on the way to revolutionising how we travel. But we can more readily envisage what users of the network could expect following 25 years of consistent investment: a well-functioning road network, offering improved connectivity and reliability, that makes everyday life and business easier. Such a network will be a boost to industry, help in the quest to satisfy the demand for new housing, contribute to the realisation of a more economically-balanced country and, ultimately, be a driving force behind sustained growth across England.

Grasping this opportunity will require a long term commitment and sustained investment. We must be smart, adaptable and collaborative as we tackle the inevitable challenges of the future while looking to exploit advances in technology. The investments being made over the course of the first Road Period represent an important step in that direction as we set about raising the bar and redefining what users expect from the SRN.

We live in a fast changing world so developing the network of the future will be an iterative process. Our plans and aspirations, while remaining broadly focused on the same core areas, will develop as circumstances change and more information becomes available. It is, therefore, imperative that both government and the Company continue to work with all of our stakeholders to build on this first step and ensure the SRN is developed in a way that drives growth, delivers a positive environmental and societal legacy and, ultimately, helps achieve our goals as a nation and as individuals.

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