M25 South West Quadrant Strategic Study

Stage 3 Report

Department for Transport

highways england

Page intentionally blank

Contents

Page intentionally blank

1 Executive Summary

1.1 Introduction

1.1.1 The requirement for the M25 South West Quadrant (M25SWQ) strategic study was set out in the first Road Investment Strategy (RIS), published in 2014, which announced a programme of new Strategic Studies to explore options to address some of the Strategic Road Network's (SRN) largest and most complex challenges.

1.1.2 The strategic aim of the study is to identify and appraise options for improving the performance of the transport network across all modes in and around the M25SWQ[1], boosting economic growth and prosperity, and improving journeys.

1.1.3 This document describes the study findings and explores the case for investing in a range of interventions which impact on transport and travel in and around the M25SWQ. It identifies the elements which are likely to present the strongest business cases for investment, and proposes a strategic framework through which they could be delivered.

1.2 Context

1.2.1 The M25SWQ is a nationally significant piece of infrastructure. As part of an orbital motorway, the M25SWQ enables connections to be made between a number of strategic roads radiating out from London. It facilitates the movement of goods and provides business opportunities. It further plays a significant role in connecting people with jobs, leisure, and cultural venues. Journeys from all parts of the UK use the M25SWQ to reach key destinations and it caters for a mix of short and long distance journeys, such that many of the origins and destinations lie outside the immediate study area.

1.2.2 The M25SWQ has consistently been the busiest section of the UK motorway network since it opened in the late 1980s. Nine of the ten busiest sections of the SRN are in this area. Today the busiest section (between J14 and J15) carries more than 220,000 vehicles every day. Severe congestion is a regular occurrence with a 12 hour 'peak period' effectively lasting from 6am to 6pm.

1.2.3 The road links many high capacity radial routes – the A3, M3, M4 and M40/A40 – and much of the traffic on the M25 is getting to, from or between these radials. This makes the road central to a wide range of journeys – both locally within the study area and for national journeys between the south of England and areas to the north and west of London.

1.2.4 In the M25SWQ, this position is reinforced by a lack of viable alternative routes. In the study area the M25 is the only continuous, high standard route for orbital journeys. If the SWQ is compared with the northern sections, where there are more supporting routes, it can be seen that traffic is lower and journey times are generally more reliable. This suggests that the problems of the M25SWQ cannot be considered in isolation from the surrounding network.

[1] The South West Quadrant of the M25 is defined as the road between Junctions 10 and 16

1.3 Strategic case

1.3.1 The economy of the study area and the wider south east region has continued to do well over recent years despite the occurrence of regular congestion and delay on the transport system, most notably on the M25 itself. Incremental improvements in the transport system over recent years have failed to keep pace with the ever-increasing demands placed upon it. As such, the M25SWQ is experiencing regular severe congestion, accompanied by increasingly unreliable journey times across the majority of the day. This passes additional costs on to both passengers and freight traffic. It also causes air quality and noise problems for residents and businesses in the local area.

1.3.2 These additional travel costs impact upon local, regional and longer distance strategic journeys. The impact of problems on the M25SWQ extend beyond the study area, affecting journeys across the rest of the south east, and into the midlands and the north.

1.3.3 The south east in general, and the M25SWQ in particular, is ideally placed to perform a vital role for UK plc for years to come. The potential for economic growth is very clear, not least in the current growth plans of the LEPs in the region. Consequently, demand for movement in the M25SWQ will continue to grow, adding to the current level of suppressed demand in the transport system. If nothing is done, congestion will increase and journeys will become even more unreliable. The impacts will be felt on local roads and on public transport, in addition to the M25 itself.

1.3.4 This growth cannot take place without additional transport capacity in some form, and on a significant scale. Whilst there are a number of committed transport schemes across a range of transport modes which will assist in aiding future traffic movements, they will not be sufficient to address the severe problems which the area faces in the years ahead. The continued worsening of already poor travelling conditions will gradually reduce the competitiveness and attractiveness of the area, with the attendant risk that economic growth aspirations in the local area will be thwarted and undermine the important role it has in the regional and national economies. Lack of transport capacity will deprive business of the space to grow. The growth in demand to use the M25SWQ will also hamper the ability of the road to support economic activity across the country.

1.3.5 More locally, air quality and noise issues will continue to affect surrounding communities and the environment. Improvements in vehicle emissions could be countered by increased traffic and congestion. Associated noise impacts from traffic could also become more severe.

1.3.6 As the M25SWQ cannot be considered in isolation from the study area, the case for further interventions to improve travel conditions applies throughout the whole study area. There is a compelling case for change.

1.4 Option Development

1.4.1 Option development was a collaborative process. The existing evidence base provided a starting point to generate an initial list of interventions which was then shared with a full range of stakeholders including local authorities, environment, transport, user and business groups.

1.4.2 Ultimately, the scale of traffic on the M25 means that it is unlikely to be solved by a single proposal. Stakeholders were invited to add interventions which, in their view, could contribute to fulfilling the study objectives. Ultimately, more than 250 interventions which covered a wide range of possibilities that spanned scale, transport modes and geography were generated by the call for ideas. They encompassed both infrastructure improvements and non-infrastructure interventions.

1.4.3 An initial sifting exercise was undertaken by the study team to reduce this list to a more manageable Long List. The resultant long list of 132 interventions was subjected to the Early Assessment and Sifting Tool (EAST) process as is good practice when preparing a Transport Business Case[2]. This assessment required each possible intervention to be considered against a range of criteria including economic growth, carbon emissions, socio-distributional impacts, local environment, wellbeing and value for money.

1.4.4 In tandem to the EAST assessment, stakeholders were asked to provide their views on each intervention by either indicating that a particular intervention should be retained (and considered for inclusion within the recommended package) or whether it should be removed from further consideration. Stakeholders were provided with a web-based tool to ensure this was undertaken in a consistent way.

1.4.5 This combined process enabled the study team to develop a picture of the types of interventions which would be likely to best fulfil the study objectives whilst having broad support from the stakeholder community.

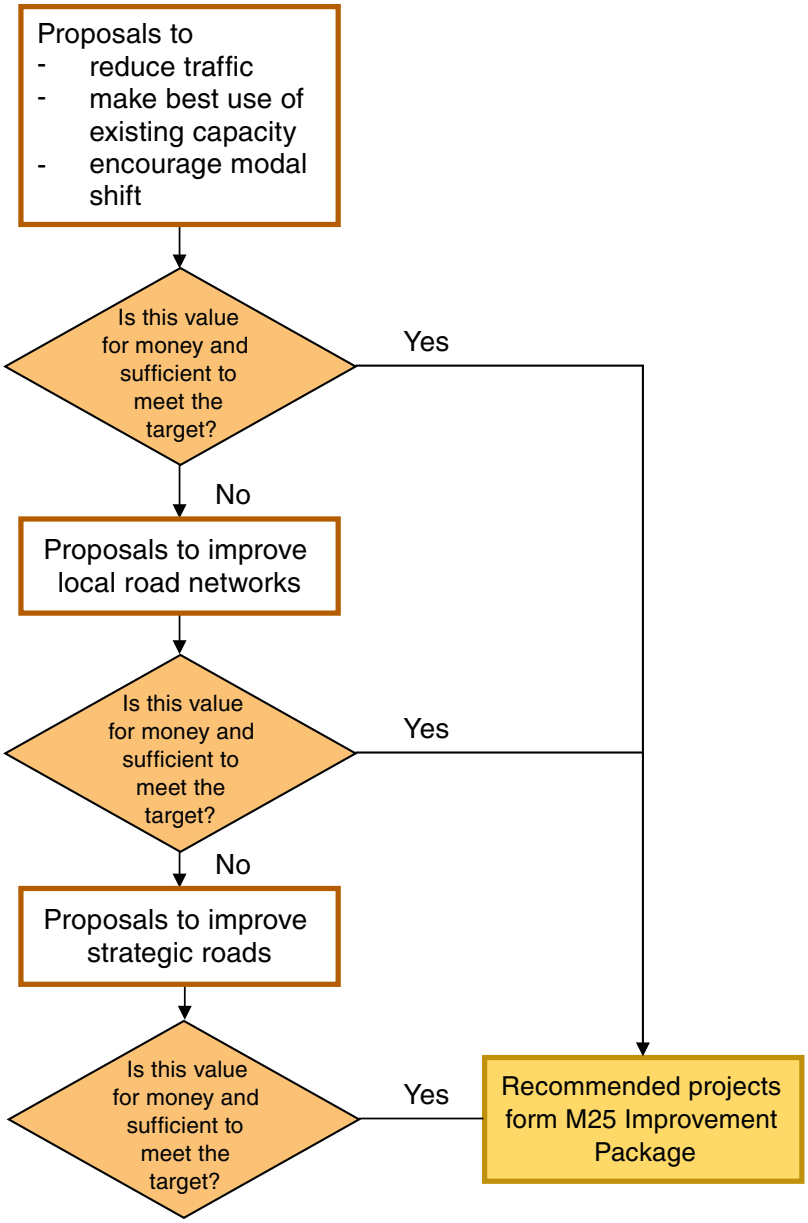
1.5 Key Findings and next steps

1.5.1 The evidence gathered to date suggests that directly adding capacity to the M25 (beyond what is already committed in the first Road Investment Strategy) is technically challenging and would have significant effects on surrounding communities. It also shows that where alternative capacity exists away from the M25, conditions are better. This suggests planners should think about the M25SWQ as a corridor and not an asset which ends at the motorway's boundary fence.

1.5.2 This study recommends that the focus of future work should not be on widening the existing road. Instead, attention should be given to how to reduce pressures and provide parallel capacity to relieve the motorway network. This should work first to find alternatives to travel, or to move traffic to more sustainable modes. But the volume of travel means that road enhancements are also likely to be needed.

2 https://www.gov.uk/government/publications/transport-business-case

1.5.3 This problem is urgent, and all solutions will take years to develop. A wait-and-see approach that relies on one measure providing a comprehensive solution would carry great risks for the communities and businesses that depend on the M25 continuing to function. Plans for different packages of measures should therefore develop in parallel, with implementation decided upon in light of what other measures seem able to deliver. The decision tree below highlights the process that could be followed in further work and in influencing future decisions on investment priorities.



1.5.4 Central government, in addition to developing or supporting individual proposals, should ensure that the total impact is large enough to ensure a meaningful improvement in road conditions. It is recommended that government establishes a numerical target for how much additional capacity it intends to add to the M25, either by reducing existing pressures or by increasing available capacity. An overall improvement equivalent to 20-25% of current capacity could be an achievable goal.

1.5.5 Central Government cannot solve the issues on the M25 in isolation. Instead a collaborative approach is needed which draws on a full range of delivery partners. This study recommends two pieces of further work.

- The first is to join up local partners and transport providers to understand in detail the viable options on the local road network and railways. This means understanding the feasibility and scale of impact options on the local road network and public transport would have on the M25SWQ. These should reduce the need to travel, improve public transport and enhance local roads to reduce pressure on the M25.
- In parallel the Department for Transport and Highways England should explore the potential for new and enhanced highway capacity. This is likely to begin with developing upgrades for existing roads in the study area but could also investigate options for roads away from existing alignments to fill in the gaps between existing roads. Any proposals for additional highways should find the most efficient and least disruptive options, whilst making best use of environmental mitigation and design.

1.5.6 Together these will provide a plan for the interventions necessary to improve journeys on this part of M25.

2 Study Background

2.1 M25 South West Quadrant strategic study

2.1.1 The requirement for the M25 South West Quadrant (M25SWQ) strategic study was set out in the first Road Investment Strategy (RIS), published in 2014, which announced a programme of new Strategic Studies to explore options to address some of the Strategic Road Network's (SRN) largest and most complex challenges.

2.1.2 As the RIS Investment Plan explains:

> *'It is time for a far-reaching study that can consider all of the options for transport in this area, taking account of any relevant findings from the Airports Commission. This will need to consider how to make best use of different transport modes and the local road network. It will also need to consider whether it is possible to strengthen or provide alternative routes for traffic to relieve pressure on the M25 itself. The end result needs to be a lasting solution, which can keep people moving for a generation to come.'*

The RIS Overview also states:

> *'The M25 South-West Quadrant is the busiest part of the network. We are commissioning a study to plan for its future, supporting local people, strategic travellers and those using Heathrow. It will need to look at all options, including different modes and extra capacity, to make sure the route is resilient for the generation to come'*

2.2 Strategic aim of study

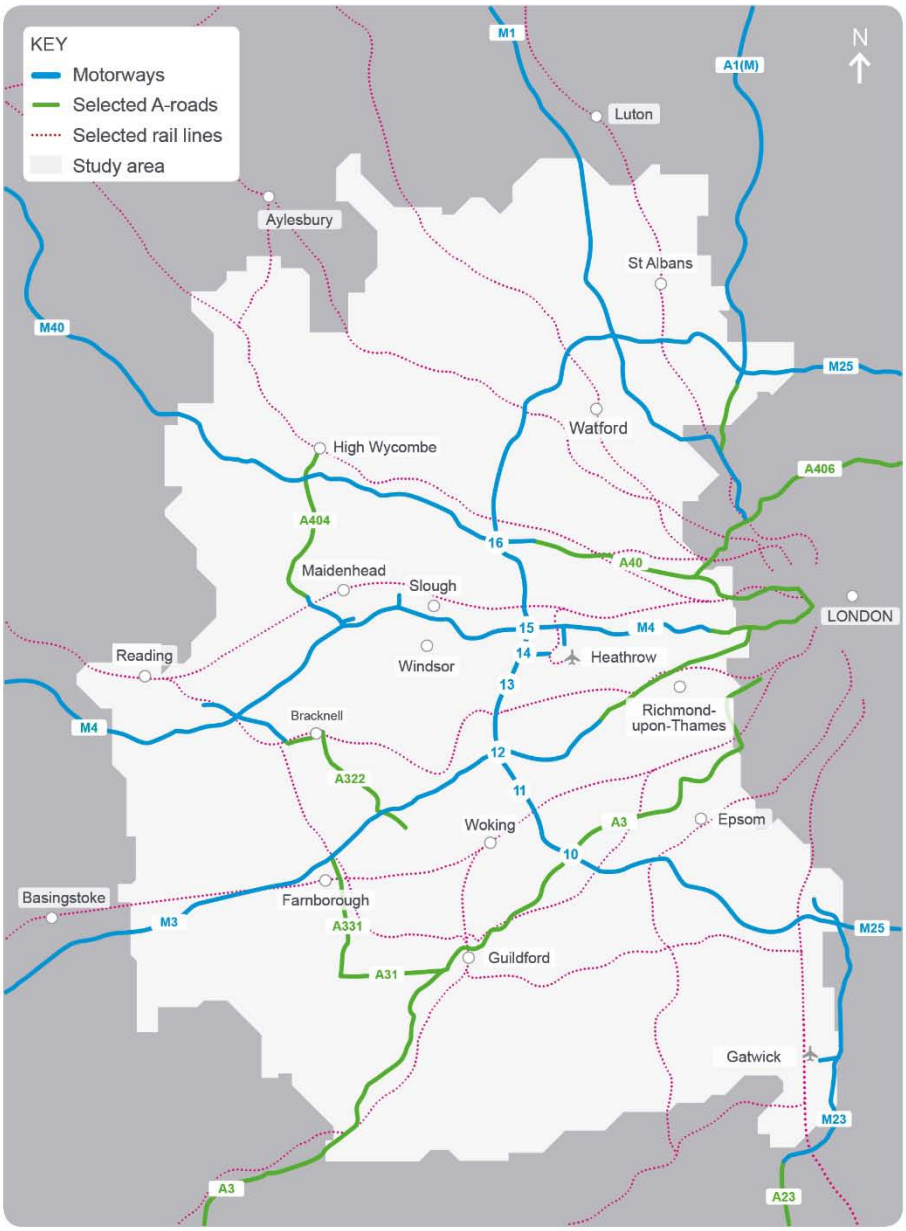
2.2.1 The strategic aim of the study is to identify and appraise options for improving the performance of the transport network across all modes in and around the M25SWQ, boosting economic growth and prosperity and improving journeys. More specifically, the identified solutions should:

- Support Government (and regional) aspirations for economic growth;
- Improve the flow of through traffic travelling around the M25 between junctions (J) 10-16 and local roads in the study area;
- Improve road safety for all, including road users, non-motorised users, road workers and local residents; and
- Reduce and eliminate where possible adverse environmental impacts, addressing existing:
  - Air Quality Management Areas (AQMAs) and ensure no further air quality issues are created as a result of any selected option; and
  - Noise Important Areas (NIAs) and ensure no further noise issues are created as a result of any selected option.

2.3 Study area

2.3.1 The M25SWQ is defined as the section of the M25 between and including Junction 10 with the A3 and Junction 16 with the M40. For the purposes of this study the M25SWQ corridor is considered to extend up to 15 miles beyond the relevant section of the M25, and an indicative study area, based on local authority boundaries, and for the purposes of statistical analysis, is shown in **Figure 1**. It covers west London, much of Berkshire, Buckinghamshire and Surrey and parts of Hampshire, Hertfordshire and West Sussex. Locations further afield are considered in the study where their relationship to the M25SWQ is a strong one. The report uses the terms 'M25SWQ study area' and 'study area' to refer to locations within this boundary.

Figure 1: Study area showing motorways, selected A-roads and rail lines



3 Strategic Case for Intervention

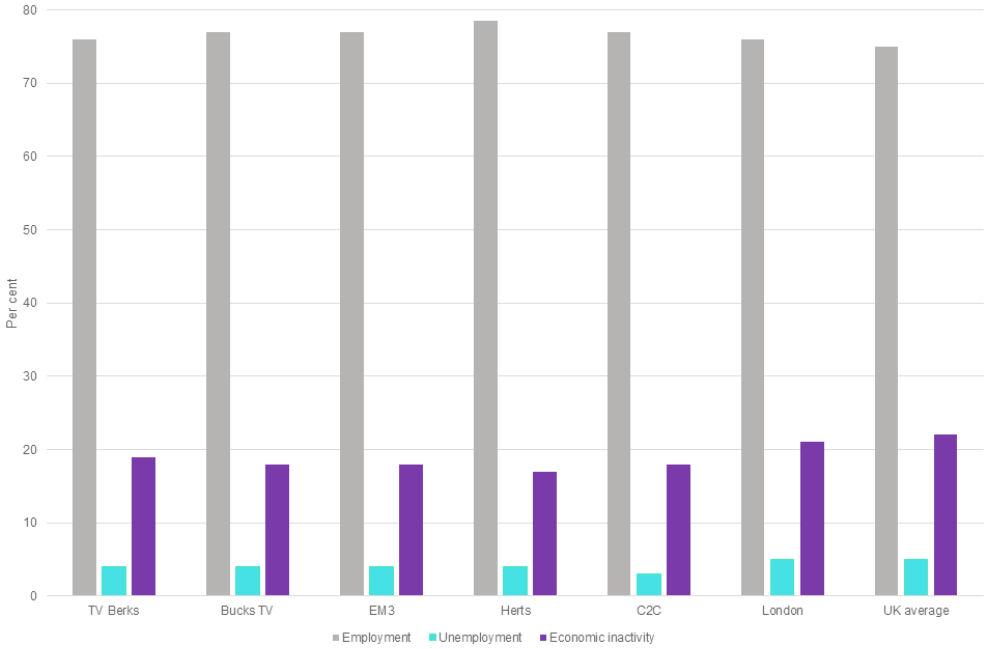
3.1 Introduction

3.1.1 The strategic case has been informed by comprehensive analysis of evidence in terms of how the transport networks currently operate, the nature of the economy, the environmental context and future pressures. It discusses how these factors present a strong case for intervention.

3.2 Economic context

3.2.1 The study area covers parts of six different Local Enterprise Partnerships (LEPs) – Buckinghamshire Thames Valley, Coast to Capital, Enterprise M3, Hertfordshire, London and Thames Valley Berkshire. Much of the study area is economically prosperous with a strong, highly skilled labour market, high employment rates, very low levels of unemployment, and low levels of economic inactivity when compared to the national average (**Figure 2**). Furthermore, it is densely populated, being home to 4.5 million people, which represents 8% of the England and Wales population in approximately 2.5% of the land area.

Figure 2: Employment, unemployment and economic activity by LEP compared to the UK average



3.2.2 The economy of the study area is characterised by high-performing, knowledge-based industries in key sectors:

- the professional, scientific, and technical sector, which accounts for the greatest number of jobs within the study area and a disproportionately large share of employment relative to the national average; and
- the information and communication sector, which accounts for around 183,000 jobs in the study area, double the proportion of people employed in the sector relative to the national average.

3.2.3 These clusters are of national importance, many are world-leading innovators and attract talented people into the area. Workplace salaries and Gross Value Added per hour worked are above the national average in each LEP in the study area. The region has also been chosen by a large number of global businesses as the location for their corporate headquarters which contributes to the national economy. Heathrow, the UK's biggest air freight and passenger airport, directly employs 69,700 on site, 7,000 off-site, and a further 40,000 full time equivalent jobs through its supply chain making it the largest single employment location in the study area.

3.2.4 Other than Heathrow there are a number of other large employment centres which are characterised by extensive travel to work catchment areas, with a higher than average proportion of employees undertaking long commuting journeys to reach them. Contributory factors include the extremely imbalanced ratio of jobs to resident workers in key economic centres including central London and Reading and the very substantial housing affordability issues. Much of the area has a strong functional relationship with central London, with 300,000 residents regularly commuting there.

3.2.5 However, the study area also benefits from a large number of smaller, locally important centres of economic activity with busy town centres and active office and industrial sites throughout. The strength and range of economic activity within the study area contributes to the complexity of travel movements as businesses attract employees from and undertake trade with a wide range of localities.

3.2.6 The study area is also home to a wide range of nationally and internationally significant sporting venues, leisure, tourist and cultural attractions. They are of importance to the national economy; many are located close to the M25SWQ and are substantial travel generators, often focused on specific event days. Excellent customer accessibility is a key factor in their success.

3.3 The M25SWQ

3.3.1 The M25SWQ is a nationally significant piece of infrastructure. As part of an orbital motorway, the M25SWQ enables connections to be made between a number of strategic roads radiating out from London. It facilitates the movement of goods and provides business opportunities. It further plays a significant role in connecting people with jobs, leisure, and cultural venues. Journeys from all parts of the UK use the M25SWQ to reach key destinations and it caters for a mix of short and long distance journeys, such that many of the origins and destinations lie outside the immediate study area.

3.3.2 The M25SWQ has consistently been the busiest section of the UK motorway network since it opened in the late 1980s. Nine of the ten busiest sections of the SRN are in this area. Today the busiest section (between J14 and J15) carries more than 220,000 vehicles every day. Severe congestion is a regular occurrence with a 12 hour 'peak period' effectively lasting from 6am to 6pm.

3.3.3 The road links many high capacity radial routes – the A3, M3, M4 and M40/A40 – and much of the traffic on the M25 is getting to, from or between these radials. This makes the road central to a wide range of journeys – both locally within the study area and for national journeys between the south of England and areas to the north and west of London.

3.3.4 In the M25SWQ, this position is reinforced by a lack of viable alternative routes. In the study area the M25 is the only continuous, high standard route for orbital journeys. If the SWQ is compared with the northern sections, where there are more supporting routes, it can be seen that traffic is lower and journey times are generally more reliable. This suggests that the problems of the M25SWQ cannot be considered in isolation from the surrounding network.

3.4 Key characteristics of the M25SWQ

3.4.1 Traffic using the M25SWQ has the following key characteristics:

- It is used by traffic with an extremely complex trip pattern, with a wide range of origins and destinations dispersed across most of the UK. For example, **Figure 3** shows that trips from origins as diverse as West London, Norwich, Coventry, Stansted Airport and Reading use the southbound carriageway from J14 to J13 to south London, Gatwick, Basingstoke, Southampton and Dover, and that an equally diverse pattern of movement occurs in the northbound direction (see **Figure 4**);
- A substantial proportion of trips using the M25SWQ (between 38% and 48% depending on the section of M25) are long-distance (more than 60 miles (100km) in length), but many only use the M25 for a small proportion of that longer journey. Less than a third of traffic is making journeys of under 30 miles (50 km);
- Freight – both heavy goods vehicles and vans – comprise nearly a quarter of all traffic on the M25SWQ; and
- The majority of trips (52%) are already on the M25 when they enter the SWQ, and either use one of the study area radials to travel away from London (30%) or towards London (22%) (see **Figure 5**). A further 25% of trips enter the M25 on one of the study area radial routes and transfer to another radial route in the same direction. Less than one-fifth of trips (15%) use the M25SWQ for trips which start and finish outside the M25, by switching between study area radial routes. Only 6% of trips on the SWQ start and finish inside the M25, and just 2% of vehicles travel the full length of the M25 between J10 and J16.

3.4.2 The points above clearly demonstrate the strategic function of the M25SWQ and its role in facilitating movements across the UK and to access the global economy via international ports and airports.

Figure 3: Origins and destinations of anticlockwise (southbound) M25 traffic between J14 and J13, average weekday 08:00-09:00

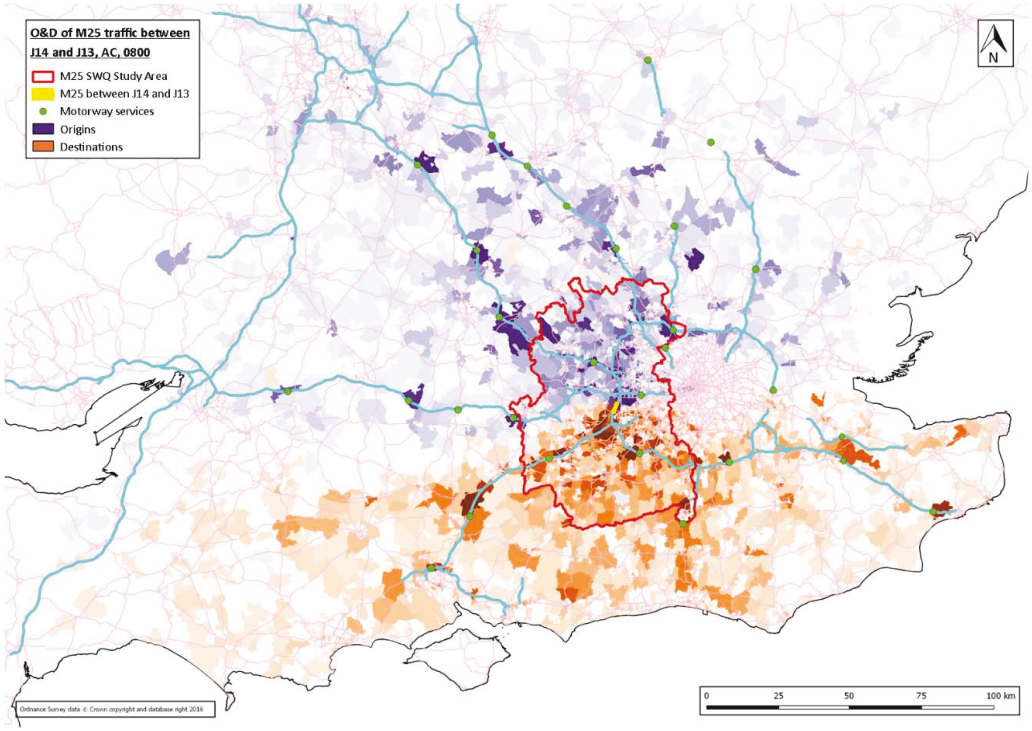


Figure 4: Origins and destinations of clockwise (northbound) M25 traffic between J13 and J14, average weekday 08:00-09:00

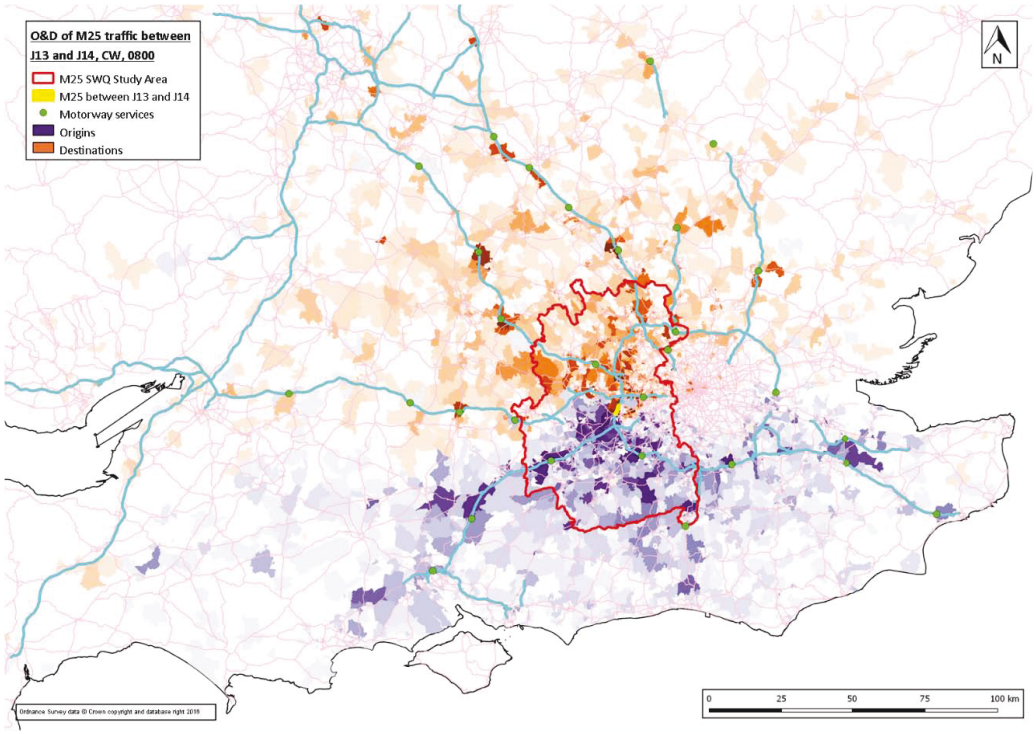
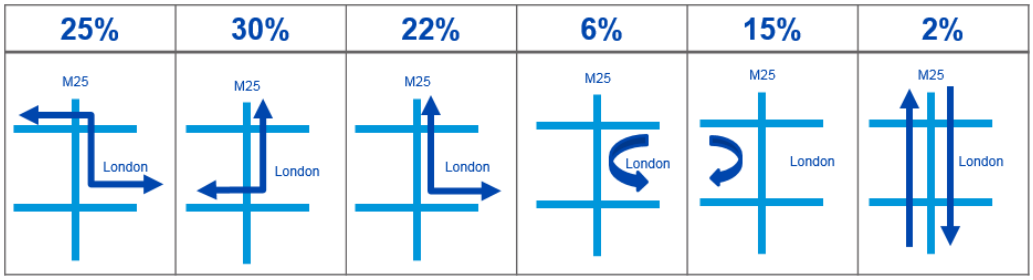


Figure 5: Types of traffic movement within the M25SWQ



3.5 Key issues on the M25SWQ

- Traffic volumes are at or close to capacity on all weekdays – with a 12-hour 'peak period' effectively lasting between 06:00 – 18:00 (see **Figure 6**).;
- Severe congestion is a regular occurrence, often extending well beyond the morning and evening peaks. This is characterised by:
  - Low average speeds – falling below an average of 35mph in the evening peak period in the clockwise direction and lower still between J13 and J14 in particular (**Figure 7**);
  - Longer journey times – the entire M25SWQ falls within the worst performing 10% of the SRN in terms of total vehicle hours delay;
  - Journey time unreliability, particularly between the traditional morning and evening peak periods; and
  - Safety / collisions are common, although accident rates are similar to other motorways, the volume of traffic means that the absolute number is greater. The high volume of traffic also impacts on recovery time after incidents which can often extend over several hours due to consequential queues taking time to clear.

Figure 6: Hourly two way traffic flows

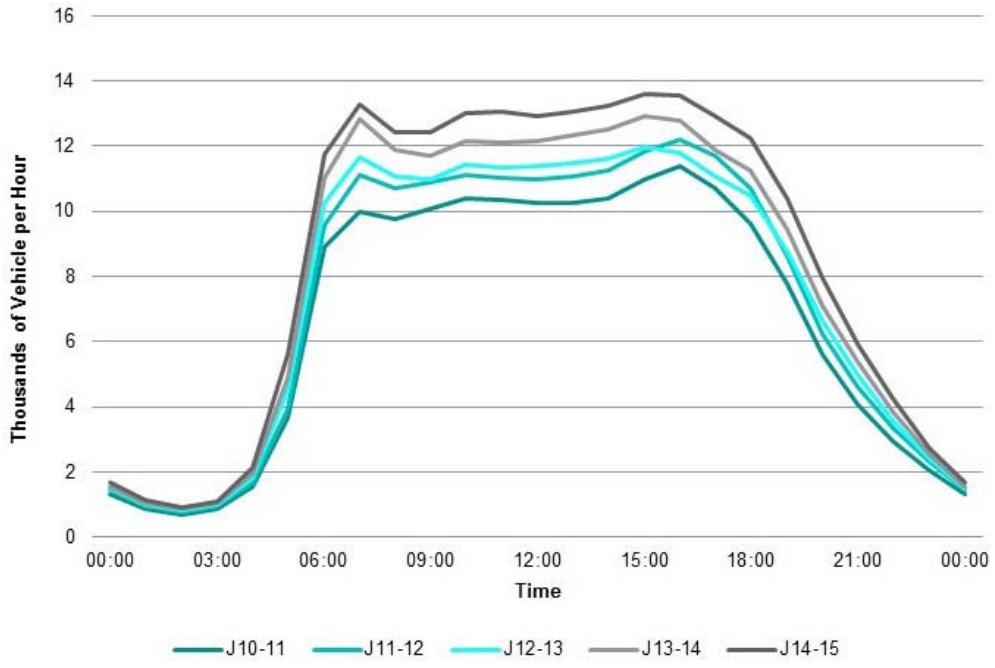
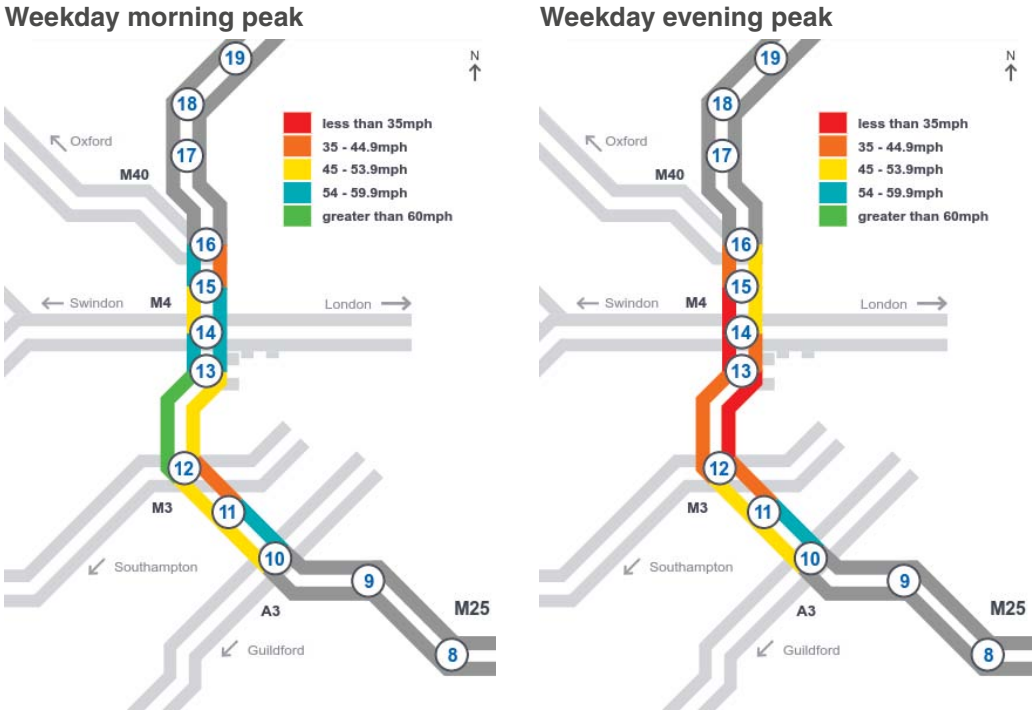


Figure 7: Average speeds - weekday morning peak (07:00 - 10:00) and Weekday evening peak (16:00 - 19:00)



Relationship between the M25SWQ and the surrounding highway network

3.5.1 A relatively dense network of inter-urban and urban 'A' roads and 'B' roads caters for a wide variety of purposes, including accommodating the complex pattern of commuting journeys to the large number of economic centres across the study area. The overriding feature of the whole network is that of intensive use, which can lead to significant congestion in the peak periods with slightly less intensive use (and lower levels of congestion) during the working day, hampering business performance. Some of the congestion is a result of journeys spilling over from more strategic routes, including the M25, particularly when incidents disrupt these routes.

3.5.2 There are only a limited number of routes which could be defined as providing alternatives to the M25SWQ for some strategic journeys in the wider South East. Within the M25 there are few orbital routes of substantial capacity, even between adjacent radial routes. Outside of the M25, roads provide individual but disconnected links between radials, including the A31/A331 between the A3 and M3, the A322 / A329 from the M3 to the M4, and the A404 between the M4 and M40. Further afield, the A34 between Winchester and Oxford provides an alternative route for some long-distance travellers.

3.5.3 The absence of high quality alternatives affects the overall resilience of the road network and in particular places extra pressure on the M25 to fulfil this role. This is in contrast to some other segments of the M25, where more viable alternatives exist. For example, the northern section of the M25 between junctions 21 and 27 is shadowed by London's North Circular and by the A414. Sections with supporting capacity of this kind tend to have less traffic, higher speeds and greater reliability.

Rail, bus and coach services

3.5.4 The study area is served by an extensive and relatively dense rail network (including parts of TfL's Underground and Overground network), with some of the most intensively used sections of rail line in the country. Rail travellers benefit from a large number of stations and a generally high frequency of services. However, rail demand has grown strongly over the last two decades and in many places the rail network is running at capacity, both in terms of the number of services which can operate on lines and levels of passenger crowding on trains.

3.5.5 A defining characteristic of the network is its radial nature, with routes serving London terminals dominating the pattern of service and providing good connectivity between settlements along each route and into London. Conversely, opportunities to make orbital journeys by rail tend to be more fragmented or have lower frequency services. This radial characteristic limits the ability of the rail network to cater effectively for the wide variety of orbital or long-distance journeys taking place on the M25SWQ.

3.5.6 Bus services in the study area tend to radiate out from, and terminate in, a relatively limited number of hubs, either significant town centres or trip attractors. Bus journeys tend to be short in distance, with average trip lengths being about 5 miles. Relatively few settlements in the study area are served by coach services; however, the UK coach network relies heavily on the SRN in the study area. This makes them particularly vulnerable to delays and congestion experienced on the M25.

3.6 Future challenges

Growth ambitions

3.6.1 A range of evidence suggests that strong levels of growth can be expected to continue in this economically successful area. Over the next 20 years it is anticipated that 375,000 new homes will be required in the study area alone, with much of the area forecast to experience higher than average increases in the number of new households. Alongside this, each LEP in the study area has set targets for ambitious employment growth in key national sectors of the economy. The anticipated levels of new employment and housing, new homes, combined with aviation expansion centred on Heathrow, will increase the demand for travel across the study area. This will, in combination, place substantial additional strain on transport networks and services.

Road and rail

3.6.2 National traffic levels are expected to increase during the period between 2010 and 2040 and the growth will predominantly be driven by the projected increases in population levels. According to the Department for Transport's 2015 Road Traffic Forecasts the levels of growth could range from 19% to 55% over the period, depending on the number and types of journeys that people make, the effect of rising incomes on car ownership and car use, and future trends in income growth and fuel prices. Growth in national traffic levels masks much more variation across areas, road and vehicle types. Growth is expected to be particularly strong on the SRN – ranging between 29% to 60% from 2010 to 2040 – compared to 12% to 51% on other principal roads and 10% to 54% on minor roads. Growth in Light Goods

Vehicle traffic (vans) is an important contributor to the forecast growth in national road traffic.

3.6.3 These forecasts highlight that, without intervention, traffic conditions in the study area, and on the M25SWQ in particular, run the risk of continuing to deteriorate. More road sections will reach capacity for longer periods, with severe implications for regional economic performance.

3.6.4 Increasing automation of vehicles is likely during the next two decades and this is anticipated to unlock the potential for further road safety, network efficiency and congestion reduction benefits. However, very substantial take-up is likely to be required before any perceptible congestion benefits arise and the nature and role of the new technology is still unclear.

3.6.5 Alongside the growth in vehicle traffic, substantial growth in the use of the rail network is also predicted to continue. Rail passenger numbers are forecast to double on the network as a whole in the next 25 years, with flows on some routes anticipated to grow faster still, such as 109% peak passenger growth on the West London line, the existing network would not be able to accommodate these levels of growth.

3.6.6 Whilst a wide range of interventions are planned to increase capacity and avoid constraining rail use, the shortfall between capacity and demand is likely to persist. This has implications in terms of limiting the ability of travellers to choose rail over road for their journeys.

Aviation

3.6.7 Government policy is set out in the 2013 Aviation Policy Framework, which identifies the key objective of ensuring the UK's air links continue to make it one of the best connected countries in the world. Government has accepted the need for additional airport capacity in the south east, having endorsed the Airports Commission's recommendation for a new Northwest runway at Heathrow Airport. A new northwest runway at Heathrow is the Government's preferred option for airport expansion. Expansion will be associated with both additional demand for travel to airports and pressure on existing transport infrastructure in the study area.

3.6.8 The Government has recently laid before Parliament a draft Airports National Policy Statement and commenced a public consultation process and an accompanying Parliamentary scrutiny process. The Airports National Policy Statement, if designated, would provide the planning policy framework for making decisions on any future development consent application of a new Northwest runway at Heathrow.

3.6.9 It is evident that upgraded and new transport infrastructure will be required to support additional airport capacity. The challenge will be to ensure airport-related travel demand does not unduly impact on the efficient operation of the transport networks.

Committed transport schemes

3.6.10 In addition to the strategic studies, the RIS Investment Plan outlines a series of major improvements for the SRN, two of which are relevant to this study. These are:

- M25 Smart Motorway – An upgrade to the section between J12 and J16 through a mixture of enhancements, including hard shoulder running between

J15 and J16, as well as four-lane through-junction running between J10 and J12. Construction is intended to commence late in Road Period 1 (2015-2020); and

- A scheme to improve M25 J10 / A3 Wisley Interchange, currently subject to public consultation on options.

3.6.11 Elsewhere in the study area key sections of the M4 and M23 leading up to the M25 are also programmed to be converted to Smart Motorways, in addition to the section of M3 currently underway. The RIS also announced that a scheme would be developed for the A3 in Guildford between the A320 to the A31 Hog's Back Junction for Road Period 2 (2020-2025).

3.6.12 A substantial number of schemes are also being brought forward for the local road network in the study area; however these tend to be addressing more localised issues and are not generally of a scale which will influence the way in which the M25 is used. Across the wider area of influence, there are a number of other major road schemes in the pipeline which could influence the extent to which drivers choose to use the M25SWQ. These include:

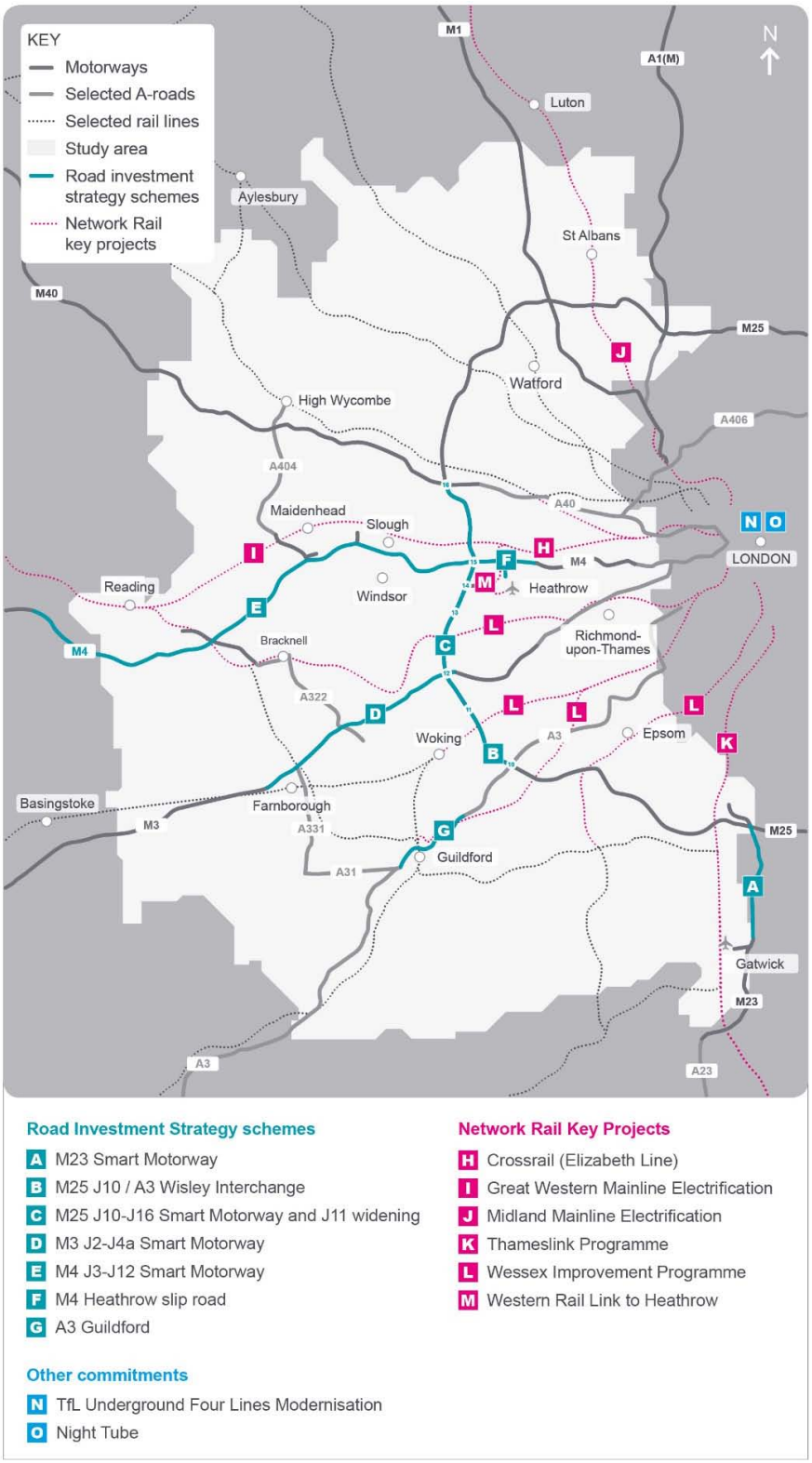
- The Lower Thames Crossing, downstream from Dartford (committed in RIS), which aims to take pressure off the M25 Dartford Crossings;
- Schemes within the Oxford to Cambridge corridor, including those recommended by the Oxford to Cambridge Expressway Strategic Study; and
- Schemes along the A27 South Coast corridor in Hampshire and Sussex.

3.6.13 There are also a number of major public transport investments underway or with some degree of commitment in the study area. Of particular significance are:

- Crossrail 1 (to be known as the Elizabeth Line), which will provide additional east-west capacity through central London, and free up capacity on the Great Western Mainline (GWML);
- Electrification of the GWML and Midland Mainline, to enable faster trains with more capacity;
- High Speed 2 (HS2), the new rail line from London to the West Midlands and North of England, with an interchange at Old Oak Common;
- TfL's first stage of the Four Lines Modernisation, with new, higher capacity, walk-through trains introduced on the Circle, Hammersmith & City, Metropolitan and District lines;
- Night Tube, introducing night-time services on Fridays and Saturdays on selected lines including the Piccadilly Line to Heathrow T1-3 and T5;
- Thameslink Programme, a combination of signalling, track and station works to increase train frequency through central London, along with new and longer, higher-capacity rolling stock; and
- Wessex Improvement Programme, comprising infrastructure improvements and train lengthening to deliver a 30% increase in capacity on the lines into Waterloo; and
- Western Rail Link to Heathrow, to connect the Great Western Main Line to Heathrow Terminal 5.

3.6.14 A common thread running through the majority of the major investment programmes is emphasis on radial improvements, rather than orbital connections, and on tackling existing capacity issues which will persist into the future. There are, however, notable schemes which will improve orbital journeys, including the Western Rail Link to Heathrow and Metropolitan Line Extension and the proposed Southern Rail Access to Heathrow.

Figure 8:- Major planned road and rail schemes in the study area



3.7 Physical and environmental issues make the study area complex

Physical constraints

3.7.1 The study area covers some of the most densely populated parts of the UK and the existing M25 is threaded between significant built-up residential areas, including Byfleet, New Haw, Addlestone, Chertsey and Egham. Improvements to the motorway since its initial opening have tended to use all the available land within the highway boundary, limiting any further options for further widening.

3.7.2 The motorway route is also close to extensive industrial and employment areas, reservoirs and rivers, and runs through the Colne Valley Regional Park, which provides important recreation space. In addition, a substantial proportion of land in the study area is designated as Green Belt, the fundamental aim of which is to keep land permanently open and undeveloped.

3.7.3 Taken together, these land uses and planning policy instruments present significant constraints or barriers to locating new transport infrastructure in the study area. Few corridors exist where additional transport infrastructure could be located with minimal impact on existing land uses or residents.

Quality of the Natural and Built Environment

3.7.4 The study area as a whole benefits from some very significant positive environmental attributes, particularly in terms of landscape, natural habitats and heritage, and designations to protect them are numerous and extensive. These environmental characteristics contribute to a high quality of life, which is valued by residents and also makes the area attractive to businesses.

3.7.5 The study area contains the landscapes of the Chiltern Hills and Surrey Hills, both designated as Areas of Outstanding Natural Beauty, as well as a large number of sites designated for their national or international biodiversity importance. In some cases the M25 runs immediately adjacent to protected habitats, including reservoir and lowland heath habitats with European or international designations. Alongside these are additional areas designated as Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), or as priority habitats identified in the UK Biodiversity Action Plan (UKBAP) including Ancient Woodland.

3.7.6 The study area also includes a large number of cultural and heritage assets, including a World Heritage Site, Grade I listed buildings and Scheduled Ancient Monuments. Within 500m of the M25SWQ corridor there are 8 Scheduled Ancient Monuments (SAM) and 81 Listed Buildings.

Air quality and noise

3.7.7 The highest profile environmental issues within the immediate corridor of the M25SWQ are air quality and noise. Traffic volumes, levels of congestion and frequent changes to vehicle speeds are significant contributory factors to these detrimental conditions. Poor air quality and high noise levels can harm human health, quality of life and impact on wildlife.

3.7.8 Approximately 85% of the length of the M25SWQ is designated as an Air Quality Management Area (AQMA), along with most of the wider study area to the east of M25 between J12 and 16 towards London. Road transport is a key contributor to the poor air quality in the designated AQMAs. In addition Noise Important Areas

(NIA) have been declared for the sections of M25 where it passes close to residential properties. The largest NIA is between J12 and 13 as it passes the settlements of Thorpe, Egham and Staines.

3.7.9 In terms of responses to these impacts, continuing trends towards more efficient vehicles with lower carbon emissions and increasing use of alternative fuels (such as hybrid or fully electric vehicles) will all contribute to road travel's lower environmental impact in the future. The government expectation is for almost every car and van in 2050 to be an ultra-low emission vehicle. However, increased demand for road travel could partly cancel out improvements which technology is expected to deliver.

3.8 Case for change

The strategic case

- **A critical component of the UK economy:** the successful economy of the study area is critical to the country's GDP and it competes globally to attract talent and business. Constraining its success could jeopardise the whole country's economic performance;
- **Slow, unreliable journeys:** Road users of the M25SWQ, and the study area, regularly experience severe congestion, and increasingly unreliable journey times across the majority of the day. These place additional financial costs on all businesses which makes them less efficient and less attractive to employees;
- **Unmet demand:** the problems experienced on the M25 deter or prevent substantial numbers of journeys both on the motorway and alternative local roads, reducing business and social activity;
- **Worsening transport network performance:** the transport investment planned or underway, particularly for road infrastructure, is not anticipated to be sufficient to reduce the severe congestion problems which currently exist. As a consequence already difficult travelling conditions will worsen further. This could gradually reduce the competitiveness and attractiveness of the area, with the attendant risk that economic growth aspirations in the study area will be thwarted and undermine the important role it has in the regional and national economies;
- **National significance:** The impact of problems experienced on the M25SWQ extend beyond the study area, affecting long-distance journeys to the rest of the UK, and hampering access to international ports and airports;
- **Widening local impacts:** Problems on the M25 will continue to result in journeys diverting away from the motorway, making local roads congested, unreliable public transport and impacts being felt in an increasing number of local communities;
- **Growing future travel demand:** Key factors including population growth, new developments, airport expansion and an economic success will all continue to place additional demands on the transport network, including the M25. If nothing is done, congestion will increase and journeys will become even more unreliable;
- **A largely radial public transport system:** there are limited opportunities to make orbital journeys on public transport, particularly by rail. Many journeys

currently require interchange at congested central London stations and parts of the region have poor public transport access to key economic centres and major airports; and

- **Poor air quality and noise:** Road transport contributes to poor air quality and noise problems for residents and businesses across the study area. These have the potential to worsen in the near future if the deployment of vehicle technology improvements does not accelerate.

3.8.1 In summary the study area is ideally placed to continue performing its vital role for the UK economy for years to come. The potential for economic growth is very clear, not least as expressed in the current plans of the LEPs in the region. Conversely a poorly performing transport network runs the risk of undermining or limiting economic opportunity and causing reputational risk to the region and country.

3.8.2 However the existing infrastructure is subject to significant limitations. The constraints on the existing route limit options for improvement and existing capacity is already substantially used. The surrounding transport network is also limited in its ability to support orbital movements – it is not designed in a way that effectively facilitates the full range of transport movements in the region. Where better alternatives exist journeys are generally quicker and more reliable

3.8.3 The case for investing to improve the transport network and maintain the region's economic competitiveness is very strong. A clear set of interrelated problems exists, which, if left unresolved, could substantially hamper the country's economic performance and the region's quality of life.

3.8.4 The nature of both the opportunities and the challenges surrounding the M25SWQ extend beyond the road itself. To address this problem in a meaningful way it is necessary to look beyond the M25, to the whole corridor. However, there are a significant number of physical constraints and environmentally sensitive areas which would make any new infrastructure difficult to deliver without some adverse impacts. This creates a need to balance continued growth and protecting valuable (and valued) environments.

4 Study approach

4.1 Introduction

4.1.1 The approach to the study included consideration of evidence of how the transport networks were operating, the performance of the economy and the environmental and planning constraints which will shape any interventions. It has also considered work carried out by previous studies in the area.

4.1.2 This has been used to develop a strategic case for investment across all modes to ensure that the strategic and local road networks, along with public transport, all play their part in underpinning the vision of supporting economic growth, improving travel conditions and improving environmental conditions.

4.1.3 The study has considered the interventions set out in the RIS, local authority and LEP proposed investments, changes to the rail network planned by Network Rail and Transport for London and the committed investment plans of other infrastructure operators such as Heathrow Airport.

4.1.4 The benefits and impacts of any planned interventions have been assessed in terms of congestion relief, reliability, safety and environmental outcomes, and have considered connectivity at local, regional, national and international scales.

4.1.5 A key consideration in the appraisal has been the value of the wider economic benefits, in particular their impacts on the local labour market and productivity, and the economic geography of the Study Area. The approach adopted has sought to understand to what extent each of the potential interventions act to support economic growth without imposing worsening travel conditions or has an adverse impact on the environment.

4.2 Stakeholder Engagement

4.2.1 The study team engaged with a range of stakeholders throughout the duration of the study. A Stakeholder Reference Group (SRG) was established to ensure that stakeholder views were understood and properly considered throughout the study process. The SRG met on three occasions during the study to understand and comment on the evidence and to indicate whether interventions should be included as part of a recommended package. As well as the SRG meetings, the study team also invited other stakeholder representations and engagement throughout the process.

4.3 Study-Specific Objectives

4.3.1 The identification of study-specific objectives, to be used during the identification and assessment of interventions and packages, formed a key early task. These study-specific objectives were informed by the evidence base gathered and were developed by a wider study team. They were then reviewed and agreed by the Study's Project Board and the Stakeholder Reference Group. They are shown in **Table 1**.

Table 1: Study Objectives

Objective
Boost Economic Growth and Prosperity ■ Facilitate growth and investment, support business connectivity and widen labour markets ■ Improve access to international ports and airports ■ Enhance access to leisure attractions and social activities
Improve Transport Conditions ■ Reduce traffic congestion on M25 between Junctions 10 to 16 ■ Make journey times more predictable on M25 between Junctions 10 to 16 ■ Improving road safety for all, including road users, non-motorised users, road workers and local residents ■ Improving public transport and local highway networks to reduce trips and the need to use the M25 for short distance trips ■ Widen travel choice ■ Facilitate the efficient movement of freight
Improve Environmental Conditions ■ Improve air quality and reduce the impact of traffic noise on the M25 Junctions 10 to 16 and make sure no further air quality management areas or additional noise priority areas are created ■ Protect sensitive habitats and ecosystems ■ Protect the settings and appearance of cultural and heritage features ■ Respect important landscapes and minimise visual intrusion of proposed interventions.

4.4 Development of Interventions

4.4.1 Given the study requirement to consider interventions across all modes throughout the Study Area, and potentially beyond, it was imperative that the net was cast as widely as possible. Interventions of all scales were included in the initial long list and the study team were not bound by cost, legislative constraints, complexity or timeframe.

4.4.2 Consideration of the evidence base helped to generate an initial list of interventions which was then shared with stakeholders. The stakeholders were invited to add interventions which, in their view, could contribute to fulfilling the study objectives. Ultimately, more than 250 interventions which encompassed a wide range of possibilities that spanned scale, transport modes and geography were generated by the call for ideas. They encompassed both infrastructure improvements and non-infrastructure interventions.

4.4.3 An initial sifting exercise was undertaken by the study team to reduce this list to a more manageable Long List. The first pass removed a small number of interventions which were either small-scale with negligible impact on the M25SWQ or very remote from it; it also grouped types of intervention together based on common characteristics.

4.4.4 The resultant Long List of 132 interventions was subjected to the Early Assessment and Sifting Tool (EAST) process as is good practice when preparing a Transport Business Case . This assessment required each possible intervention to be considered against a range of criteria including economic growth, carbon emissions, socio-distributional impacts, local environment, wellbeing and value for money.

4.4.5 A key test of each intervention was its ability to support the study objectives. This focussed on analysis of how an intervention would change journey times, support economic activity, impact on the physical environment and affect local communities.

4.4.6 In tandem to the EAST assessment, stakeholders were asked to provide their views on each intervention by either indicating that a particular intervention should be retained (and considered for inclusion within the recommended package) or whether it should be removed from further consideration. Stakeholders were provided with a web-based tool to ensure this was undertaken in a consistent way.

4.4.7 This combined process enabled the study team to develop a picture of the types of interventions which would be likely to best fulfil the study objectives whilst having broad support from the stakeholder community.

5 Options development

5.1 Introduction

5.1.1 Whilst the evidence presents a compelling case for intervention, the issues are complex and difficult to resolve. Solutions which meet the three main study objectives in combination (or which do not create significant adverse impacts) are particularly challenging to identify. In considering interventions, a significant trade-off is almost always required between one objective or another.

5.1.2 As outlined above, the physical constraints presented by land uses alongside the M25 are considered to represent very substantial challenges to adding further capacity beyond that which is programmed in Road Period 1 (2015-2020).

5.2 Discounted options

Further M25 widening

5.2.1 As part of the analysis consideration was given to the feasibility and benefits of further widening. Since the M25 was first constructed it has been subject to widening and there are plans in place to roll out sections of Smart Motorway in this part of the M25, further increasing capacity within the current highway boundary.

5.2.2 While further widening is technically feasible there are a number of considerations that make this an undesirable option to pursue in future:

- Proximity of environmentally sensitive areas and communities such as Egham, Addlestone and Byfleet.
- Physical constraints on the current road caused by structures on the motorway, which limit the scope for further Smart Motorway arrangements.
- The impact on user experience. Some parts of the M25SWQ are already six lanes; further significant widening would make arrangements complex and difficult to navigate.
- Further widening is likely to demand the full-scale reconstruction of much of the road and the further expansion of the road's footprint. Added to this, proposed construction of a new runway over the M25 could place limits on future road widening or capacity enhancements at that location.

5.2.3 The study also considered alternative methods of providing additional capacity to the M25, using sections of elevated motorway or parallel tunnels. The simplest arrangement from a design and engineering perspective would be to connect J10 to J16 directly, but as only 2% of traffic on the M25 travels this distance such a scheme would provide limited benefit. Conversely, a tunnel or elevated lane arrangement giving the most traffic relief – by allowing for interchange at every intermediate junction on the M25 – would be very complex and challenging to construct, with significant land required for the accompanying junctions or tunnel portals.

5.2.4 On the basis of the evidence and analysis, it is not proposed to take forward options for substantial capacity interventions on the M25 itself. Rather, the evidence suggests that it is more beneficial to focus on the improvements away from the M25 in other parts of the study area in order to offer drivers a choice of good quality routes and make the overall network more resilient.

Road charging

5.2.5 As part of the study process some of the recommendations made in previous studies of the M25 were revisited to assess whether they are still relevant today. The most important of these studies was the ORBIT multi-modal study which reported in November 2002. Its overall aim was to develop a long-term sustainable management strategy for the M25 which '*solves, or at least ameliorates, the problems on the M25, both now and in the future*.'

5.2.6 It recommended, amongst other things, that the M25 should be widened in its entirety to dual four lanes and that the benefits should be 'locked in' via area-wide road pricing to avoid induced traffic being encouraged to fill the additional space provided. It advocated that an area-wide road pricing scheme should be in place by 2011, and that in the intervening period induced traffic could be dissuaded from using the M25 by the introduction of ramp metering on its slip roads. However, the report was also explicit that road pricing should not be introduced in isolation from other key measures.

5.2.7 Since the ORBIT report, the M25 has been widened in various sections along its length and other changes have been introduced to increase its capacity and improve its operation. Ramp metering has not been widely introduced and neither has an area-wide road pricing scheme. This means that traffic has been allowed to take advantage of the increased capacity and a new pattern of trip making has been established in the area.

5.2.8 This study considered a variety of options which would require road users to pay a charge to use the M25SWQ, as a mechanism of reducing congestion on the motorway. These ranged from flat-rate charges to a scale of charges based on distance travelled charging or charging for use of particular slip roads, for example.

5.2.9 Whilst in principle road charging on this section of the M25 offers the potential to reduce demand on the M25, the overall impacts are more mixed and less clear-cut: some people would opt to pay the charge, others would choose to use local ('uncharged') roads, some would opt to use public transport and some may choose not to travel at all. This means the benefits and costs would be felt in different ways – those paying to use the road would benefit from quicker journeys, but for some this would be offset by delays in accessing the M25 from a more congested local network.

5.2.10 Introducing charging on the M25SWQ, without additional capacity, will present users with a choice between either paying the charge or changing their behaviour to avoid it, which, in turn, would mean diverting to use local roads and causing significant disruption. For charging to improve conditions on the M25, it would need to change the decisions of tens of thousands of travellers every day. Transport capacity away from the M25 is sufficiently limited that it could not absorb more than a small fraction of these journeys. Without further investment in the transport network, a charge would either mean the frustration of many existing journeys, or would fail to produce a meaningful improvement to conditions on the M25.

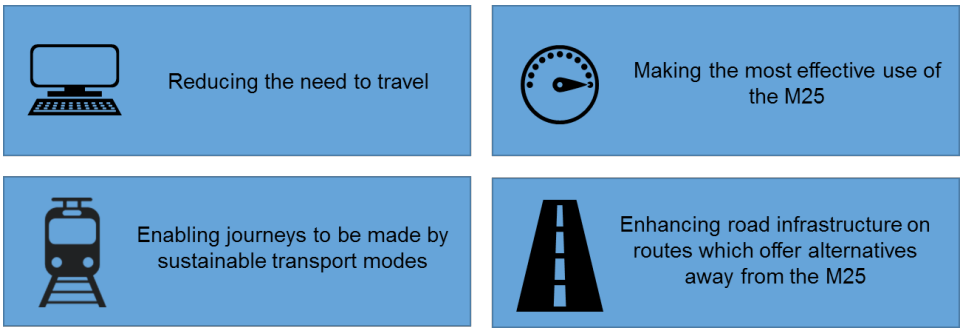
5.2.11 On this basis it has been concluded that it is not an appropriate time to proceed with the option of introducing a charging regime and focus should instead be on improving transport infrastructure.

5.3 Approach

5.3.1 The complexity and breadth of the issues faced on the M25SWQ means that no one category of improvement on its own is likely to successfully tackle all the issues present. That is, the study objectives will be best met by a package of measures which will have varying degrees of impact in meeting the study objectives.

5.3.2 Four themes have been identified which offer a hierarchical approach based on the principle that improvements which maximise the efficiency of existing infrastructure are considered before new infrastructure options. They are:

Figure 9:- M25SWQ option themes



5.4 Options framework

5.4.1 At this stage of analysis it is too early to make firm conclusions about which options should be taken forward for consideration in future investment plans. Instead, a framework of options has been developed which will be used to inform further investigation and analysis, before taking a decision on final options. The options in this framework vary considerably in scale, geographical remit, and transport modes addressed, but can be grouped into the four themes identified above. The study has concluded that no intervention or package of interventions will resolve the problems on the M25 and that the business case for any intervention will rely in part or whole on benefits unconnected with the M25.

A – Reducing the need to travel

5.4.2 This theme includes a range of measures which are aimed at reducing the need to travel, and the need to travel on the M25 in particular. It includes measures which would benefit from comprehensive implementation by a range of bodies across the study area, as well as policy, regulatory or technology interventions which go beyond existing national arrangements but which could provide benefits for the M25SWQ. Options include:

- Planning policies in the study area which locate and configure development so as to operate with exceptional levels of sustainability; and
- Accelerating the provision of superfast broadband connections.

B – Making the most effective use of the M25

5.4.3 This theme covers measures which maximise the capacity, efficiency and resilience of the existing M25SWQ in addition to what is already planned to improve this part of the M25 as part of RIS1. This category of intervention will not result in increased capacity but will improve the operation of the existing route. Options here are:

- Next-generation area-wide traffic management technology, covering both the strategic and local road network;
- Engineering works on the M25SWQ to improve drainage, prevent future flood risks and make journeys safer;
- More responsive incident management techniques to ensure that the motorway returns to full operation more quickly;
- Harnessing technology to make more advanced information available to the travelling public to optimise their journey planning; and
- Infrastructure and measures to support the introduction of increasingly autonomous vehicles.

C – Enabling more journeys to be made by sustainable transport modes

5.4.4 This theme covers infrastructure improvements which make sustainable transport modes easier, faster, and a more attractive choice, especially rail. Particular emphasis should be given to improving orbital public transport connections, and enabling more rail journeys to be made without the need for interchange in central London. Options here are:

- Improvements to capacity on existing routes, such as longer trains or enhanced frequencies, and upgrades to track and signalling to speed up journeys and make them more reliable;
- Accelerating the availability of smart ticketing options for rail, bus and coach travel, enabling more passengers to make use of these;
- Adopting new and emerging operational models to better coordinate and develop public transport outside London and metropolitan areas;
- Comprehensive packages of infrastructure to boost levels of walking, cycling and bus use along with supporting programmes such as personalised journey planning;
- Creation of new or improved rail links, such as to Heathrow from the south and improvements to the North Downs Rail Line in the context of a national rail programme.

D – Enhancing road infrastructure on routes which offer alternatives away from the M25

5.4.5 This theme brings together road improvements which enhance or create alternative orbital corridors, providing motorists with options to using the M25 for some journeys and also providing additional road capacity and connectivity in the study area.

5.4.6 The priority is to look to local roads first to identify potential orbital capacity in the area around the M25. The local road network in Surrey and Berkshire was not designed to enable orbital journeys on scale now required, and improvements to capacity and management may be able to give local travellers a better alternative to the M25.

5.4.7 This work could include improvements to local junctions, and better measures to provide local drivers with information. It is also likely to involve the creation of new road capacity, properly aligned to the geography of the settlements of today. The routes would be high standard but not necessarily to Expressway or motorway standards. They would also need to provide useful capacity for bus travel, walking and cycling. Taken together, they would enable some journeys travelling between radial routes to transfer more easily onto alternatives and will better connect key economic centres in the region.

5.4.8 Given the scale of traffic on the M25, it may also be necessary to introduce more strategic highway capacity. During the long list and sifting exercise, stakeholders proposed upgrades to the A322 / A329 route (M4 to M3) and A404 corridor (M4 to M40) to create a continuous upgraded route between the M40 and M3. Further capacity could link these routes together to provide an alternative route for long-distance traffic that avoids the M25 altogether.

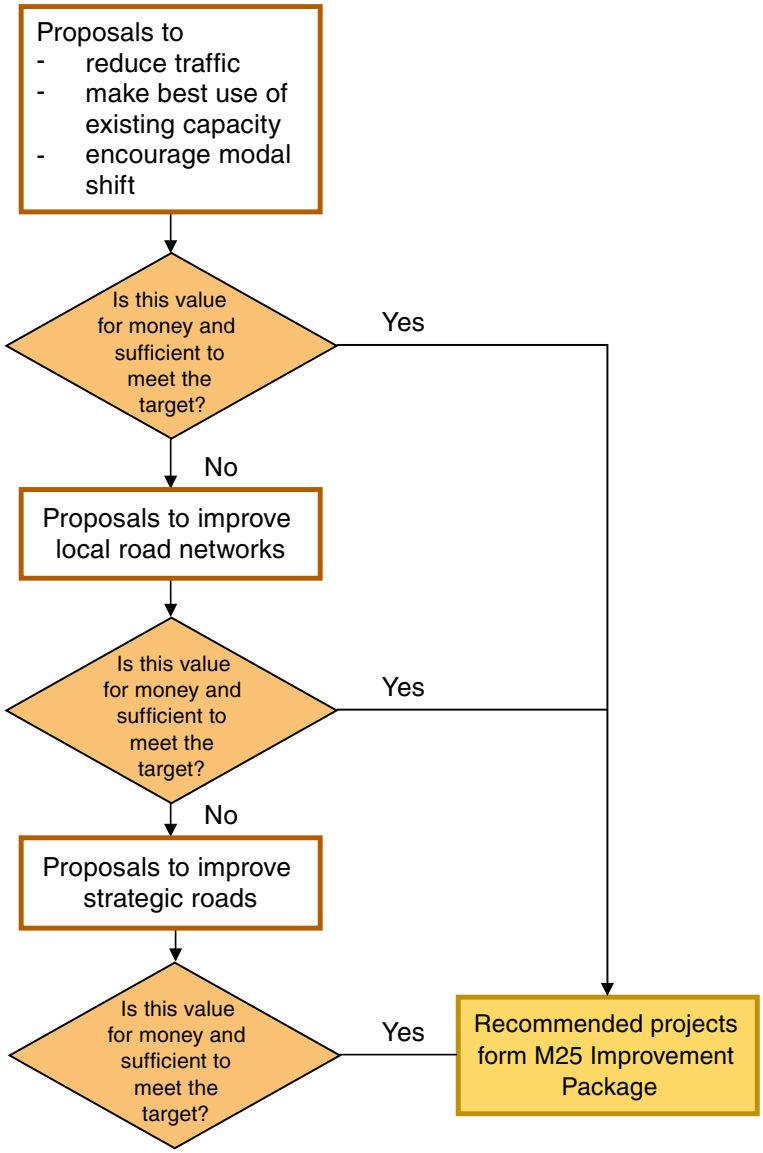
5.4.9 This study has not examined route choices, and further work would be needed to determine what can be achieved within the physical and environmental constraints of the area. This means that further analysis on potential options will form part of the next stage of work, with reference to the full range of measures available to minimise the impact on the environment and local communities.

5.5 Making decisions

5.5.1 Options will have different degrees of impact in terms of benefits and costs. It is recognised that in environmental terms some options will have fewer costs than others, and these are the options that should be starting with. Decisions should take place on the principle that it is only when there are no alternatives that more environmentally damaging and disruptive options should be pursued. A decision tree has been established to aid in decision making.

5.5.2 The decision tree is based on the four themes of intervention identified above. It represents a sequential approach to decision making and is based on the principle that it is only when a theme or option cannot meet the transport objectives or does not offer value for money that decision makers should consider proposals to proceed to the next set of options.

Figure 10:- M25SWQ Future options decision tree



5.5.3 A key factor in determining which options proceed will be having a common understanding of what success looks like. The study objectives, highlighted in section 4, go some way in describing this but it is also important to think about what scale of improvement is being targeted. There are a number of ways that this could be approached. As a starting point it could be considered that increasing capacity of the transport network by 20 to 25% could have a meaningful impact for the study area. This could be by reducing demand, increasing infrastructure capacity, or almost certainly from a combination of the two.

5.5.4 The scale of the challenge means no single option is likely to provide the solution – there is no silver bullet. While a sequential process has been established for decision making, to ensure a solution can be identified as quickly as possible it is essential that work on options across all four themes runs in parallel, even if not all are progressed. It will be for the Department for Transport to consider the collective impact of options and decide which are necessary to address the problem in hand. Decisions will need to be made in full knowledge of their impacts and understanding of how environmental and design mitigation practices can best be deployed.

6 Likely benefits and opportunities

6.1 Introduction

6.1.1 Given the early stage of the option development it is not possible to provide a quantitative assessment of potential impact. As such the study has sought to explain in qualitative terms what the potential generic benefits could be. As work progresses there will be a better understanding of the benefits and costs, which will be used to inform decision making.

6.1.2 In general terms it is expected that the options framework will contribute to the study objectives in the following key ways:

- **Boost Economic Growth and Prosperity** – by allowing more people to travel through increasing the capacity of road and rail networks, as well as improving productivity by supporting more people working in sustainable locations. It would contribute to enhanced access to key airports and ports and strengthen business connections;
- **Improve Transport Conditions** – by improving the performance of the transport network and make more journeys in the study area predictable and reliable. They would widen travel choice through the combination of rail interventions and support the efficient movement of freight. The provision of or improvements to alternative orbital routes could strengthen network resilience. However, in view of travel pattern, the levels of demand and anticipated levels of supressed demand for travel the package may not remove congestion on the M25SWQ at peak times; and
- **Improve Environmental Conditions** – rail improvements, and many of the non-infrastructure measures in the options framework, which will encourage and enable more journeys in the study area to be undertaken by public transport rather than by road. Also, the priority of improving existing roads as opposed to building new ones would minimise the impact on sensitive and important environmental assets.

6.1.3 An inherent feature of the options framework will be the need to make difficult decisions about the trade-offs which are required between competing objectives. Achieving one set of objectives runs the risk of limiting the ability of the options framework to achieving another. For example environmental designations limit where and how transport conditions can be improved; further improvements to transport conditions would generally be associated with a higher environmental impact. **Table 2** overleaf summarises the likely key benefits and opportunities associated with the options framework.

Table 2: Key Benefits and Opportunities

Objective	How the options framework achieves the objective
Boost Economic Growth and Prosperity	
■ Facilitate growth and investment, support "business connectivity" and widen labour markets ■ Improve access to international ports and airports ■ Enhance access to leisure attractions and social activities	■ The combination of measures to increase sustainable transport use and enhancing road infrastructure away from the M25 could provide a substantial boost to economic growth and prosperity, through extending the labour market and enhancing business connections. It also provides more travel choices for more people to use the ports, airports, leisure attractions and undertake social activities in the study area and beyond, by a range of travel modes; ■ Making the most effective use of the M25 improves journey time reliability which is a crucial factor for businesses making decisions to locate and stay in the study area; ■ There are options which could address key areas with poor public transport accessibility to airports, including southern access to Heathrow and North Downs Line to Gatwick, allowing travellers further alternatives to driving to either airport; ■ Improvements to the public transport network could divert some road users to rail at key times of the day and on key routes, reducing the pressure on the M25; ■ The corridor approach to public transport and road enhancements could enable key economic hubs to be better connected, keeping these locations attractive to businesses, and supporting Local Economic Partnership aspirations; ■ The option framework also covers investment in broadband infrastructure to enable more efficient movement of information, rather than people. This forms a key part of the Strategic Economic Plans for the area and is a driver for economic growth.

Objective	How the options framework achieves the objective
Improve Transport Conditions	
■ Reduce traffic congestion on M25 between Junctions 10 to 16 ■ Make journey times more predictable on M25 between Junctions 10 to 16 ■ Improving road safety for all, including road users, non-motorised users, road workers and local residents ■ Improving public transport and local highway networks to reduce trips and the need to use the M25 for short distance trips ■ Widen travel choice ■ Facilitate the efficient movement of freight	■ The theme of making the most efficient use of the M25 (through online improvements and technology) achieves these objectives, including journey time predictability, improving road safety and reducing congestion as incident management in combination with next-generation traffic management reduces response times to incidents and helps the motorway to return to normal operations more quickly; ■ Options aimed at reducing the need to travel could reduce the overall level of transport demand across all networks in the area, albeit only at the margin; ■ Overall, the M25 could see an improvement in transport conditions. However, the impact may be less than it might otherwise be in peak periods due to the knock-on effect of traffic re-routeing to take advantage of the change in the operation of the motorway; ■ Sustainable transport options could widen travel choice and could ensure viable alternatives are in place. This could encourage some orbital travellers to choose public transport, reducing the need to use the M25; ■ The option of strengthened planning policy offers the opportunity to reduce the intensity of future demand for using the M25 from new developments; ■ Road safety benefits could also be concentrated in locations where road infrastructure is enhanced or sustainable transport infrastructure is improved; ■ The enhancing road infrastructure theme could facilitate more efficient movement of freight, improve road safety and offer alternative routes at times of congestion on the M25; and ■ If additional investment was channelled into road infrastructure away from the M25 greater benefits are likely to accrue for the freight and logistics sector.

Objective	How the options framework achieves the objective
Improve Environmental Conditions	
■ Improve air quality and reduce the impact of traffic noise on the M25 Junctions 10 to 16 and make sure no further air quality management areas or additional noise priority areas are created ■ Protect sensitive habitats and ecosystems ■ Protect the settings and appearance of cultural and heritage features ■ Respect important landscapes and minimise visual intrusion of proposed interventions.	■ The themes of reducing the need to travel, investing in the M25 itself and enabling more journeys by public transport could limit the requirements for new and additional transport infrastructure. This makes options to avoid, reduce and monitor the environmental impact of transport schemes easier to identify, quantify and design, and maximises opportunities to monitor and improve them during construction and use; ■ In terms of options to enhance transport infrastructure, significant trade-offs would almost always be required between achieving the transport conditions and environmental objectives; ■ Changes in air quality and noise would mainly be influenced by the scale and location of new transport infrastructure. The way in which the impacts would be felt will depend on how close it is to residential properties or key habitats; and ■ The strongest opportunities to address existing environmental impacts in the M25 corridor are likely to arise through national programmes to accelerate the take-up of ultra-low emissions vehicles.

7 Conclusion and Next steps

7.1 Strategic case

7.1.1 The economy of the study area and the wider south east region has continued to do well over recent years despite the occurrence of regular congestion and delay on the transport system, most notably on the M25 itself. Incremental improvements in the transport system over recent years have failed to keep pace with the ever-increasing demands placed upon it. As such, the M25SWQ is experiencing regular severe congestion, accompanied by increasingly unreliable journey times across the majority of the day. This passes additional costs on to both passengers and freight traffic. It also causes air quality and noise problems for residents and businesses in the local area.

7.1.2 These additional travel costs impact upon local, regional and longer distance strategic journeys. The impact of problems on the M25SWQ extend beyond the study area, affecting journeys across the rest of the south east, and into the midlands and the north.

7.1.3 The south east in general, and the M25SWQ in particular, is ideally placed to perform a vital role for UK plc for years to come. The potential for economic growth is very clear, not least in the current growth plans of the LEPs in the region. Consequently, demand for movement in the M25SWQ will continue to grow, adding to the current level of suppressed demand in the transport system. If nothing is done, congestion will increase and journeys will become even more unreliable. The impacts will be felt on local roads and on public transport, in addition to the M25 itself.

7.1.4 This growth cannot take place without additional transport capacity in some form, and on a significant scale. Whilst there are a number of committed transport schemes across a range of transport modes which will assist in aiding future traffic movements, they will not be sufficient to address the severe problems which the area faces in the years ahead. The continued worsening of already poor travelling conditions will gradually reduce the competitiveness and attractiveness of the area, with the attendant risk that economic growth aspirations in the local area will be thwarted and undermine the important role it has in the regional and national economies. Lack of transport capacity will deprive business of the space to grow. The growth in demand to use the M25SWQ will also hamper the ability of the road to support economic activity across the country.

7.1.5 More locally, air quality and noise issues will continue to affect surrounding communities and the environment. Improvements in vehicle emissions could be countered by increased traffic and congestion. Associated noise impacts from traffic could also become more severe.

7.1.6 As the M25SWQ cannot be considered in isolation from the study area, the case for further interventions to improve travel conditions applies throughout the whole study area. There is a compelling case for change.

7.2 Findings

7.2.1 The evidence gathered to date suggests that directly adding capacity to the M25 (beyond what is already committed in the first Road Investment Strategy) is technically challenging and would have significant effects on surrounding communities. It also shows that where alternative capacity exists away from the M25, conditions are better. This suggests planners should think about the M25SWQ as a corridor and not an asset which ends at the motorway's boundary fence.

7.2.2 This study recommends that the focus of future work should not be on widening the existing road. Instead, attention should be given to how to reduce pressures and provide parallel capacity to relieve the motorway network. This should work first to find alternatives to travel, or to move traffic to more sustainable modes. But the volume of travel means that road enhancements are also likely to be needed.

7.2.3 This problem is urgent, and all solutions will take years to develop. A wait-and-see approach that relies on one measure providing a comprehensive solution would carry great risks for the communities and businesses that depend on the M25 continuing to function. Plans for different packages of measures should therefore develop in parallel, with implementation decided upon in light of what other measures seem able to deliver. The decision tree highlights the process that could be followed in further work and in influencing future decisions on investment priorities.

7.3 Next steps

7.3.1 Central government, in addition to developing or supporting individual proposals, should ensure that the total impact is large enough to ensure a meaningful improvement in road conditions. It is recommended that Government establishes a numerical target for how much additional capacity it intends to add to the M25, either by reducing existing pressures or by increasing available capacity. An overall improvement equivalent to 20-25% of current capacity could be an achievable goal.

7.3.2 Central Government cannot solve the issues on the M25 in isolation. Instead a collaborative approach is needed which draws on a full range of delivery partners. This study recommends two pieces of further work.

- The first is to join up local partners and transport providers to understand in detail the viable options on the local road network and railways. This means understanding the feasibility and scale of impact options on the local road network and public transport would have on the M25SWQ. These should reduce the need to travel, improve public transport and enhance local roads to reduce pressure on the M25.
- In parallel the Department for Transport and Highways England should explore the potential for new and enhanced highway capacity. This is likely to begin with developing upgrades for existing roads in the study area but could also investigate options for roads away from existing alignments to fill in the gaps between existing roads. Any proposals for additional highways should find the most efficient and least disruptive options, whilst making best use of environmental mitigation and design.

7.3.3 Together these will provide a plan for the interventions necessary to improve journeys on this part of M25.

This document is also available on our website at **www.gov.uk/highways**

If you have any enquiries about this publication email **info@highwaysengland.co.uk** or call **0300 123 5000***.
Please quote the Highways England publications code **PR254/16**.

Highways England creative job number N160510*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls. These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
Highways England Company Limited registered in England and Wales number 09346363