

Midlands to Wales and Gloucestershire Route Strategy Evidence Report April 2014



Document History

Midlands to Wales and Gloucestershire route-based strategy evidence report

Highways Agency

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1 Introduction

1.1 Background

- 1.1.1 The Highways Agency is responsible for planning the long term future and development of the strategic road network (SRN).
- 1.1.2 Route-based strategies (RBS) represent a fresh approach to identifying investment needs on the SRN. Through adopting the RBS approach, we aim to identify network needs relating to operations, maintenance and where appropriate, improvements to proactively facilitate economic growth.
- 1.1.3 The development of RBS is based on one of the recommendations included in Alan Cook's report [A Fresh Start for the Strategic Road Network](#), published in November 2011. He recommended that the Highways Agency, working with local authorities (LA) and local enterprise partnerships (LEPs), should initiate and develop route-based strategies for the SRN.
- 1.1.4 The then Secretary of State accepted the recommendation in the Government's [response](#) (May 2012), stating that it would enable a smarter approach to investment planning and support greater participation in planning for the SRN from local and regional stakeholders.
- 1.1.5 The Highways Agency completed the following three pilot strategies which have been published on the [Highways Agency website](#):
- A1 West of Newcastle;
 - A12 from the M25 to Harwich (including the A120 to Harwich); and
 - M62 between Leeds and Manchester.
- 1.1.6 Building on the learning from those pilot strategies, we have divided the SRN into 18 routes. A map illustrating the routes is provided in Appendix A. The Midlands to Wales and Gloucestershire route is one of that number.
- 1.1.7 RBS are being delivered in two stages. Stage 1 establishes the necessary evidence base to help identify performance issues on routes and anticipated future challenges, takes account of asset condition and operational requirements, whilst gaining a better understanding of the local growth priorities.
- 1.1.8 In the second stage we will use the evidence to take forward a programme of work to identify possible solutions for a prioritised set of challenges and opportunities. It is only then that potential interventions are likely to come forward, covering operation, maintenance and if appropriate, road improvement schemes.
- 1.1.9 The RBS process will be used to bring together national and local priorities to inform what is needed for a route, while delivering the outcomes in the performance specification.

1.1.10 Using the evidence base and solutions identification studies, we will establish outline operational and investment priorities for all routes in the SRN for the period April 2015 – March 2021. This will in turn feed into the Roads Investment Strategy, announced by the Department for Transport in [Action for Roads](#).

1.2 The scope of the stage 1 RBS evidence report

1.2.1 During the first stage of RBS, information from both within the Highways Agency and from our partners and stakeholders outside the Highways Agency has been collected to gain an understanding of the key operational, maintenance and capacity challenges for the route. These challenges take account of the possible changes that likely local growth aspirations, or wider transport network alterations will have on the routes.

1.2.2 The evidence reports:

- Describe the capability, condition and constraints along the route;
- Identify local growth aspirations;
- Identify planned network improvements and operational changes;
- Describe the key challenges and opportunities facing the route over the five year period; and
- Give a forward view to challenges and opportunities that might arise beyond the five year period.

1.2.3 The 18 evidence reports across the SRN will be used to:

- Inform the selection of priority challenges and opportunities for further investigation during stage 2 of route-based strategies; and
- Inform the development of future performance specifications for the Highways Agency.

1.2.4 A selection of the issues and opportunities identified across the route are contained within this report, with a more comprehensive list provided within the technical annex. This is for presentational reasons and is not intended to suggest a weighting or view on the priority of the issues.

1.2.5 The evidence reports do not suggest or promote solutions, or guarantee further investigation or future investment.

1.3 Route description

1.3.1 The Midlands to Wales and Gloucestershire route comprises two complete motorways (M50 and M54) from the Midlands to Wales, via the A40 and A5 respectively, and includes the A458 and A483 linking the A5 with mid Wales. The A49 connects these two corridors providing a north-south link through the Welsh Marches parallel to the Welsh border. Strategic links from Gloucestershire include the A40 into Wales and the A417/A419 to the south. A map of the route is shown in Figure 1.

- 1.3.2 The route links Birmingham to the locally important cities of Worcester, Hereford and Gloucester and major towns of Telford and Shrewsbury, carrying traffic between these cities and the Welsh border. The A49 is also used as a strategic route between North and South Wales.
- 1.3.3 The two motorways on the route, M50 and M54 are both dual lane motorway standard with a hard shoulder. The onward section of A5 to the Welsh border is mostly single with some sections of dual carriageway; the onward section of A40 is all dual carriageway. Other sections of the route are all purpose trunk roads, including the A49 which is the main north-south link in the area, being predominantly single carriageway and, for historical reasons, not conforming to current construction standards. Most of the junctions within the route, apart from the motorway sections, are at level rather than grade separated.
- 1.3.4 The A417 and A419 trunk roads, between Gloucester and Swindon, provide an important link between the M5 and M4 Motorways. It forms a strategic corridor of predominantly dual carriageway between the Midlands and the North and the South of England. This section of the route is maintained and operated on behalf of the Highways Agency as part of the private finance initiative under a Design, Build, Finance and Operate (DBFO) contract. It is managed by Road Management Services (Gloucester) Limited.
- 1.3.5 On an average day, over 4.5 million vehicle miles are driven on this route. There is a mix of long-distance commercial journeys due to the key strategic route from the Welsh borders to the Midlands. On the all purpose trunk road sections a significant proportion of the traffic is locally based making short trips.
- 1.3.6 The route is a key element in supporting tourism across the west of England and Wales and an increase in traffic flows is seen in the summer months. There are heavier traffic flows on the M54 around Telford, extending to the M6 junction and surrounding routes, for the V Music Festival held annually at the end of August.
- 1.3.7 According to Highways Agency data contained in Table 2.2, the least reliable journey-time location across the whole SRN in 2012/13 was on this route.
- 1.3.8 This route connects with a number of other routes for which RBS are also being developed. These are:
- London to Scotland West (connects M54 to M6);
 - South Midlands (connects M54 to A5);
 - Birmingham to Exeter (connects M50 to M5, A40 to M5 and A417 to M5); and
 - London to Wales (connects A419 to M4)

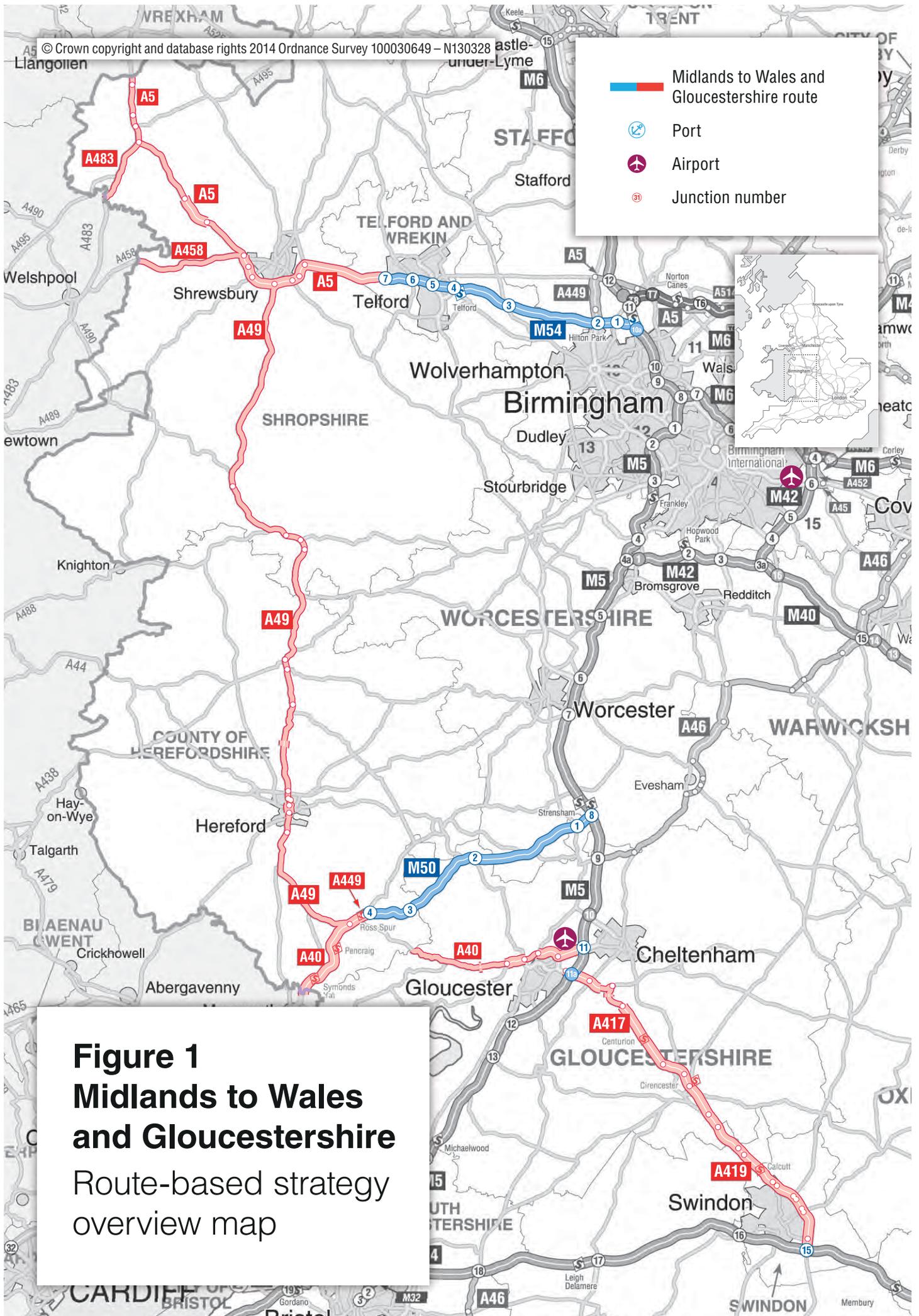


Figure 1
Midlands to Wales and Gloucestershire
Route-based strategy overview map

2 Route capability, condition and constraints

2.1 Route performance

- 2.1.1 The SRN comprises only three per cent of England's road network, but it carries one-third of all traffic. Around 80 per cent of all goods travel by road, with two-thirds of large goods vehicle traffic transported on our network.
- 2.1.2 Comparatively low traffic flows are a feature of this route due to its generally rural nature and the high proportion of single carriageway trunk roads. The highest flows are seen on the M54; these are predominantly on the eastern part of the route close to junction 10A of the M6 near Wolverhampton. Traffic travelling northbound to the M6 and the M6 Toll use junctions 1 or 2 of the M54, accounting for the high flows on the links.
- 2.1.3 The A417/A419 forms the north east side of a roughly equilateral triangle of motorways and trunk road. The M4 between junctions 15 and 20 forms the southern side of that triangle and links Swindon and the east to the Bristol/South Gloucestershire conurbation and onwards to Wales. To the south of this section, where the M4 meets the A419, there are high flows for this route around Swindon on the A419.
- 2.1.4 There are a high proportion of heavy goods vehicles, particularly at the southern end of the route on the M50 and A40.
- 2.1.5 The ten most trafficked sections of this route are presented in Table 2.1. This is for the reporting period 1st April 2012 to 31st March 2013.

Table 2.1 Ten busiest sections on the route (1 April 2012 to 31 March 2013)

Rank	SRN section	Annual Average Daily Traffic (AADT)	National Rank
1	M54 between M54 J1 and M54 J2	28,139	985
2	A419 between M4 J15 and A4259	27,675	1,004
3	A419 between A4259 and M4 J15	27,328	1,023
4	M54 between M54 J2 and M54 J1	27,023	1,030
5	A419 between A4259 and A420	26,488	1,057
6	A419 between A361 and A420	25,309	1,116
7	A419 between A420 and A4259	25,043	1,126
8	A419 between A420 and A361	24,855	1,140
9	M54 between M54 J3 and M54 J2	24,386	1,165
10	M54 between M54 J4 and M54 J3	24,207	1,179

- 2.1.6 However, busy roads in themselves don't necessarily represent an issue – our customers' experience of driving on the network is important to us. The [Strategic road network performance specification 2013-15](#), sets us

high level performance outcomes and outputs under the banner of an efficiently and effectively operated SRN. We currently measure how reliable the network is based on whether the 'journey' time taken to travel between adjacent junctions is within a set reference time for that period, i.e. 'on time'.

- 2.1.7 The ten least reliable journey-time locations on this route are presented in Table 2.2. The least reliable link within this route, the M50 between M5 junction 8 and junction 1, is also ranked the least reliable route across the SRN. In the opposite direction, the link also performs poorly, ranked the second least reliable for this route and 14th across the SRN. Recently there have been major roadworks on the M50 which will have contributed to the unreliability.
- 2.1.8 Historically, junction capacity has been a concern at the junction of the A40 and the A49 near Ross-on-Wye (known as Wilton roundabout). The junction is not grade separated and there are difficulties with visibility. This will account for the poor performance in terms of reliability on the A40 and A49 links with the A4137.
- 2.1.9 The A49 at Hereford Bridge (between A465 and A438) performs poorly in relation to other links within the route and was raised by stakeholders as an on-going issue. This section is dual carriageway, which constrains the ability of traffic to flow through Hereford where it meets a significant amount of local traffic.
- 2.1.10 As shown in the table above, flows around Swindon on the A419 are high for the route and this section also experiences unreliable journey-times.
- 2.1.11 Junctions 6 and 7 of the M54 are used by traffic to access the major town of Telford. The volume of traffic travelling to and from Telford is causing reliability issues on this section.
- 2.1.12 The A417 between A429 and A436 is commonly known as the Crickley Hill section or the 'Missing Link'. This is a section of single carriageway with a steep gradient and experiences unreliability due to the inconsistency in the change of design standards from dual to single and back again. This section also suffers from unreliable journey-times due to the issues for heavy goods vehicles climbing the hill and the resulting slow moving traffic which forms behind. Heavy goods vehicles are 11% of the total traffic on this section.

Table 2.2 Ten least reliable journey-time locations on the route (1 April 2012 to 31 March 2013)

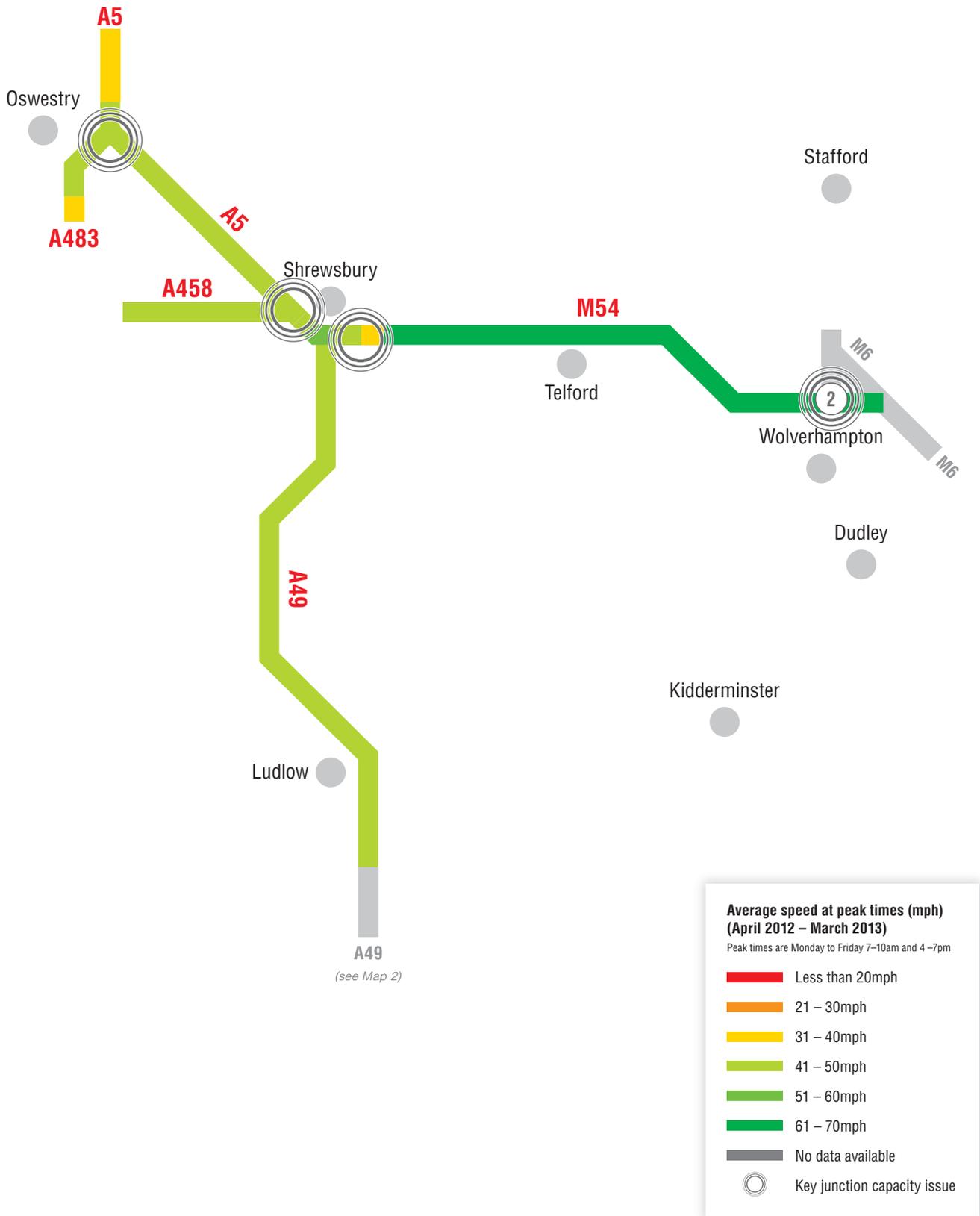
Rank	Location	On-time reliability measure	National Rank
1	M50 between M5 J8 and M50 J1	8.2%	1
2	M50 between M50 J1 and M5 J8	51.6%	14
3	A40 between A4137 and A49	55.2%	25
4	A49 between A465 and A438	60.0%	77

5	A419 between A4259 and M4 J15	60.2%	80
6	A49 between A438 and A465	60.5%	85
7	M54 between M54 J6 and M54 J7	63.4%	180
8	A5 between A483 and A495	63.6%	187
9	A40 between A49 and A4137	64.2%	222
10	A417 between A429 and A436	64.4%	237

- 2.1.13 Figure 2.1 illustrates the average speeds during weekday peak periods between 1 April 2012 and 31 March 2013. The peak periods are generally the busiest periods on the network and help us to understand the impact of the worst congestion on customers' journey-times. Figure 2.1 also shows any known performance or capacity issues where the local road network interfaces with the route.
- 2.1.14 In terms of the average speed at peak times the route performs well compared to the SRN. The section with the lowest average speeds on the route is the A49 through the city of Hereford.
- 2.1.15 Generally, the rest of the A49 operates at around 41 to 50mph on average at peak times. The A49 is predominantly single carriageway and carries a mix of vehicles including HGVs, agricultural traffic and non-motorised users.
- 2.1.16 The A419 near the junction with the M4 at Swindon also experiences lower than expected peak hour speeds of 31 to 40mph. The junctions along this section also have junction capacity issues where there are several junctions in close proximity (junction with the M4, Commonhead junction and the junction with the A420).

Figure 2.1

Network performance 2012/13
Peak period speeds

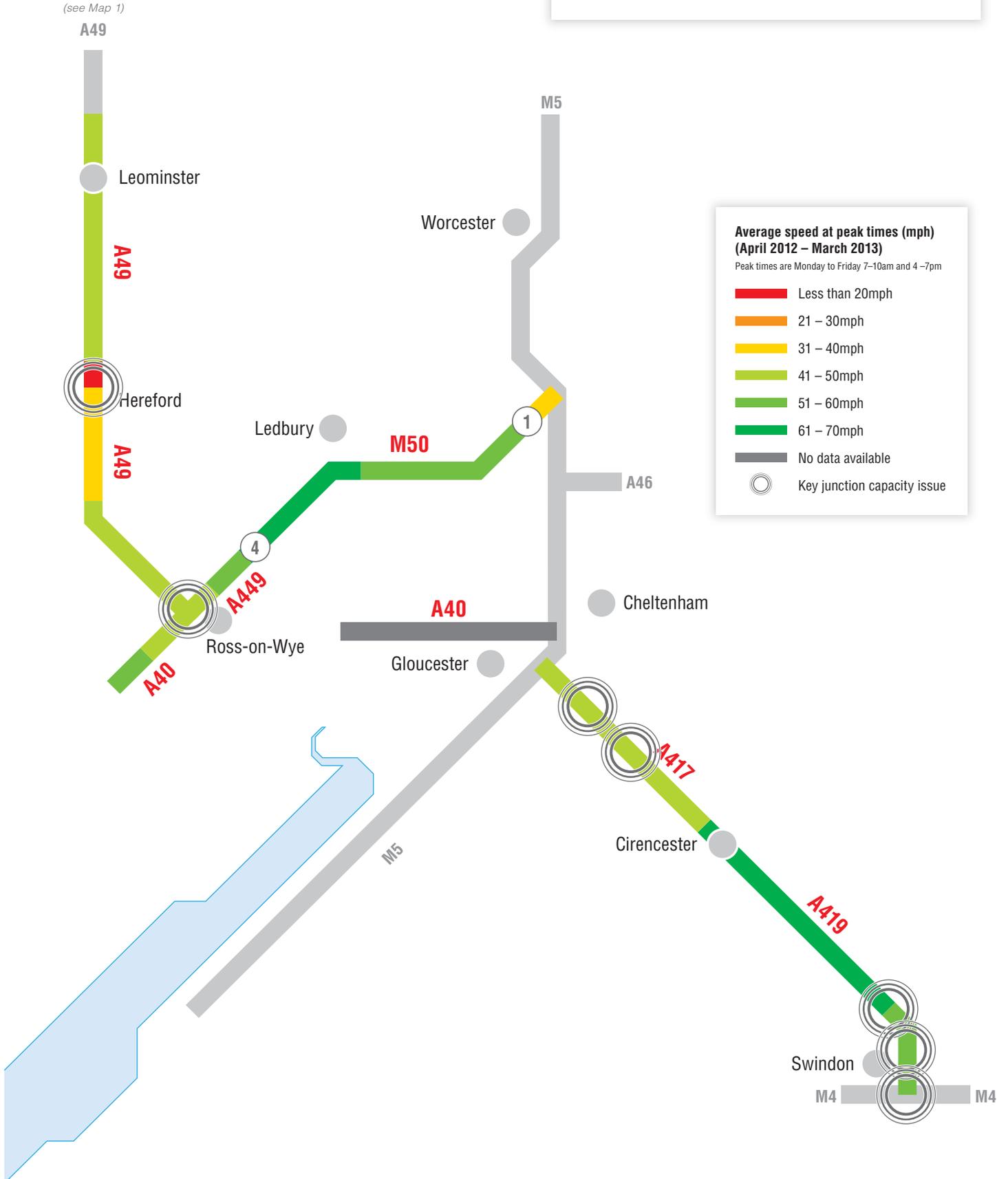


Illustrative

Midlands to Wales and Gloucestershire
– Route-based strategy – Map 2 of 2

Figure 2.1

Network performance 2012/13
Peak period speeds



- 2.1.17 The SRN is key in promoting growth of the UK economy, and alleviating congestion can realise economic benefits.
- 2.1.18 Figure 2.2 shows the delay on our network compared with a theoretical free-flowing network.

Figure 2.2

Network performance 2012/13

Delay



(see Map 2)

**Vehicle Hours Delay
(April 2012 – March 2013)**

Vehicle Hours Delay is an estimate of the total travel time experienced by all road users over and above the expected theoretical free-flow travel time.

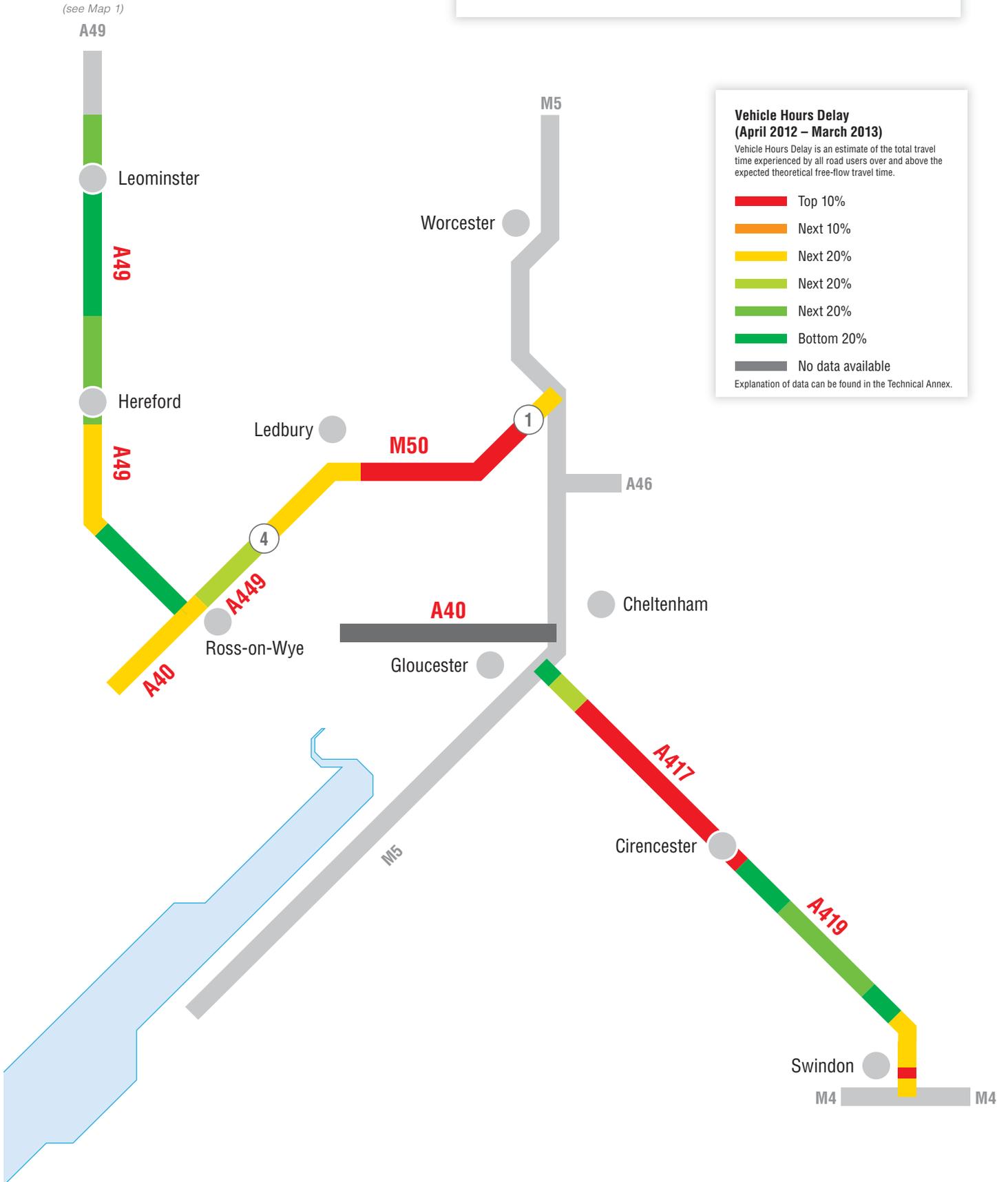
- Top 10%
- Next 10%
- Next 20%
- Next 20%
- Next 20%
- Bottom 20%
- No data available

Explanation of data can be found in the Technical Annex.

Figure 2.2

Network performance 2012/13

Delay



- 2.1.19 Delay on this route is identified on the motorway sections and on the A417/A419, the key strategic route between the M4 and M5. The M50 has had significant roadworks at this location which accounts for some of the delay on these and the surrounding sections of the M50.
- 2.1.20 The A419 near Swindon also experiences congestion, which shows that this section is performing poorly on multiple measures including reliability and peak hour speeds. This is also one of the highly trafficked sections of this route.
- 2.1.21 As an all purpose trunk road the A419 faces different challenges as it runs in close proximity to the M4. Moving from high speed traffic to an APTR, this section has recently developed a livestock market close to the water park (just beyond Cricklade) and a regional farmers market, and therefore attracts various types of traffic including trailers and slow moving vehicles.
- 2.1.22 The A49 also experiences performance issues across multiple measures, particularly through the Hereford bridge where average speeds are less than 20mph. Also raised was the lack of resilience here as there is only one bridge crossing of the River Wye in the city, which has the effect of channeling all through traffic to one point. This was also supported by the Freight Transport Association and described by stakeholders as not suitable for more strategic HGV traffic.
- 2.1.23 The M54 between junctions 1 and 2 to the north of Wolverhampton is the busiest section of this route. The section also experiences congestion and has junction capacity issues at junction 1. There is no motorway to motorway link from the M54 northbound to M6 and M6 toll. Instead, road users use junction 1 to the A449 for accessing the M6 northbound. This causes junction capacity issues at this location and subsequent congestion on the M54.
- 2.1.24 Sections that perform well in comparison to the rest of the route are parts of the network that are more rural in nature which includes the A49 from the north of Hereford to its junction with the A5 and to the north west of the route (A485 and the A5). Daily traffic is relatively low on the section compared to the rest of the route and nationally resulting in a good performance overall in terms of average peak hour speeds and low delays.

2.2 Road safety

- 2.2.1 As a responsible network operator and through the [Strategic road network performance specification 2013-15](#), the Highways Agency works to ensure the safe operation of the network.
- 2.2.2 By 2020, [The strategic framework for road safety 2011](#) forecasts the potential for a 40% reduction of the numbers killed or seriously injured on the roads compared with 2005-2009. We are working toward this aspirational goal.

- 2.2.3 Figure 2.3 illustrates the rates of injury collisions and the top 250 casualty locations on the SRN between 2009 and 2011. Injury collisions are collisions where people were injured and their injuries were slight, serious or fatal. Damage only incidents have not been included. The top 250 casualty locations have been calculated nationally, and are based on the number of casualties which occurred within a distance of 100m. Locations with the same number of casualties have been given a “joint” ranking and therefore, there may be some locations with the same rank number.
- 2.2.4 Between 2008 and 2012 there were 1,459 collisions on the route. The number per year has ranged from 252 to 318 over this 5 year period and there is a downward trend.
- 2.2.5 Of the 1,459 collisions recorded 38 (3%) included fatalities, 155 (11%) included serious injuries and the remaining 1,266 (87%) included only slight injuries. The number of fatalities has dropped across the 5 year period, with 12 in 2008 and 3 in 2012.
- 2.2.6 Within the 1,459 collisions there were 2,238 casualties, at a rate of 1.53 casualties per collision.
- 2.2.7 In terms of vehicles/road users involved in the collisions:
- 81% involved more than one vehicle;
 - 13% of vehicles involved were HGVs;
 - Where the age of drivers was known 7% were young drivers (aged 16-19); and
 - 16% were older drivers (aged 60 or over).
- 2.2.8 The causation factors for collisions indicate that in the main driver error or behaviour were the main causes. A summary of the main factors are as follows:
- 43% occurred where the driver ‘failed to look properly’;
 - 40% occurred where the driver ‘failed to judge other person's path or speed’;
 - 22% involved ‘loss of control’;
 - 17% cited ‘careless, reckless or in a hurry’;
 - 16% involved ‘poor turn or manoeuvre’;
 - 13% were ‘travelling too close’;
 - 10% cited ‘slippery road’;
 - 10% involved ‘sudden braking’; and
 - 8% were ‘travelling too fast for conditions.’
- 2.2.9 While we aim to reduce the numbers killed or seriously injured using and working on the SRN, we will always identify more safety interventions than our budget allows us to implement. We use a prioritisation process to help us and we review this regularly to ensure

we are targeting the locations with the greatest propensity to save lives and reduce the severity of injury.

- 2.2.10 The overall safety performance of this route is variable. Referring to Figure 2.3 the performance of the M50, M54, A40 and the A417/A419 DBFO falls mainly within the lowest 2 categories of casualty rate, i.e. generally good performance.
- 2.2.11 The performance of the A49, between Ross-on-Wye and Shrewsbury is poorer with 40% of the length of the road falling into the highest two categories of casualty rate and the remaining 60% falling within the mid performance category.
- 2.2.12 The A5 from its junction with the M54 to the Welsh border falls mostly within the mid-range category of casualty rate. However the northbound carriageway between the junction of the A458 and A483 at Oswestry performs well, falling within the lowest category.
- 2.2.13 The performance of the short sections of the A458 and A483 falls within the higher two categories of casualty rate indicating there may be some causal factors associated with these roads. Recently, a speed reduction scheme has been completed on the A483 near Oswestry bringing the speed limit down from 60mph to 40mph. As this was completed in 2014, the results of this scheme will not be included within the data presented in Figure 2.3.
- 2.2.14 Figure 2.3 identifies a number of locations along the route where the collision statistics are clustered. The most prominent of these are:
- 2.2.15 A49 in Hereford City Centre, at the junction of A49/A438/A465 Belmont Roundabout (Asda) – a top 50 casualty location nationally;
- 2.2.16 A40 at Gloucester and on the A419 at Swindon - a top 100 casualty location nationally; and
- 2.2.17 A49/A5 junction near Shrewsbury, the A449/M50 junction at Ross-on-Wye and on the A5/A49 junction at Shrewsbury – a top 250 casualty location nationally.
- 2.2.18 A number of problem junctions and collision cluster sites on the route have been highlighted and actions proposed for each. Some of the response will involve studies and reviews, but in other cases resolution will come from proposed future improvement schemes. For example, cluster analysis has identified the A49/A438/A465 Belmont Roundabout (Asda) at Hereford within the top 10 problem areas and a scheme is planned to address the safety issues at this location. A cluster analysis has also been carried out on collisions recorded on the A417/A419 for 2011.
- 2.2.19 The A49 through Hereford experiences high volumes of traffic with complex junctions that are at grade without signal control. These features all have the potential to contribute to the A49 being the highest ranked casualty location on the route.
- 2.2.20 On the A49 north of Hereford, a recent scheme has been implemented to reduce the speed limit to support safety improvements. However, due

to the latest safety data covering the period from 2009 to 2011, these changes will not yet be reflected in the figures.

- 2.2.21 Stakeholders also identified concerns about congestion and safety on the A49 through Hereford and particularly labeled the A49 as “not HGV friendly”.
- 2.2.22 Safety concerns on the A40 arise from collisions that have occurred on cross-over points between Ross and Pencraig, especially at the Boat Lane to Glewstone cross-over and at the Glewstone to Pencraig cross-over to the Westbound carriageway of the A40. A study is planned to look at the cause of these collisions in more detail.
- 2.2.23 There are concerns about the recent performance of A419. Between 2002 and 2011 there were 69 injury collision on the route and 12 fatalities. In 2011 there were 24 reported injury collisions resulting in 40 casualties, including 1 fatality and 9 serious injuries. The section of the A419 north of Swindon lies within the highest risk banding (10%) for injury collisions nationally. This is a decline in performance as previously this section was showing in the top 20% risk banding.
- 2.2.24 Stakeholders identified the A417 Air Balloon roundabout as a key junction giving rise to concerns relating to congestion, safety and environmental performance. The workshop also identified issues with the ability of the A417/A419 to function as a major strategic road linking the M4 and M5 whilst serving local needs, due to heavy traffic levels and consequent safety risks and congestion.
- 2.2.25 There have been recent collisions on the A417 at Crickley Hill. These fatalities fall outside the period of the data collated for this report and validated data for 2013 is not yet available.
- 2.2.26 The Highways Agency has received an increase in correspondence in relation to HGVs using the A483 through the village of Pant. An increase in this traffic is a result of wind farms being built in the area. Although this wasn't raised at the stakeholder events, there are safety, social and environmental concerns held by local residents. From Figure 2.3, we can see that part of the northern section of the A483 is ranked in the highest category for the total casualties per billion vehicle miles. The A483 is predominantly a rural single carriage way running between the A5 at Oswestry and the Welsh border. Vehicle turning movements at three key locations Maesbury cross roads, Llyncllys cross roads and the junction of the B50069 and the A483 have contributed to an above average collision rate. A483 Llyncllys cross roads speed limit reduction scheme came into force on 15th November 2013, which will now be monitored.
- 2.2.27 The Midlands to Wales and Gloucestershire route extends across the area of interest of the Warwickshire and West Mercia, Staffordshire, West of England, and Gloucestershire Road Safety Partnerships. Safety initiatives led or promoted by the Regional Partnerships are focused on enforcement initiatives relating to mobile phone use and speeding plus educational initiatives to promote road safety. In addition the Highways

Agency is promoting a road worker safety campaign including driver engagement at motorway services areas.

2.2.28 The Technical Annex provides additional detailed performance figures for the route and details of smaller local schemes relevant to safety concerns on sections of this route.

Figure 2.3

Safety on the network

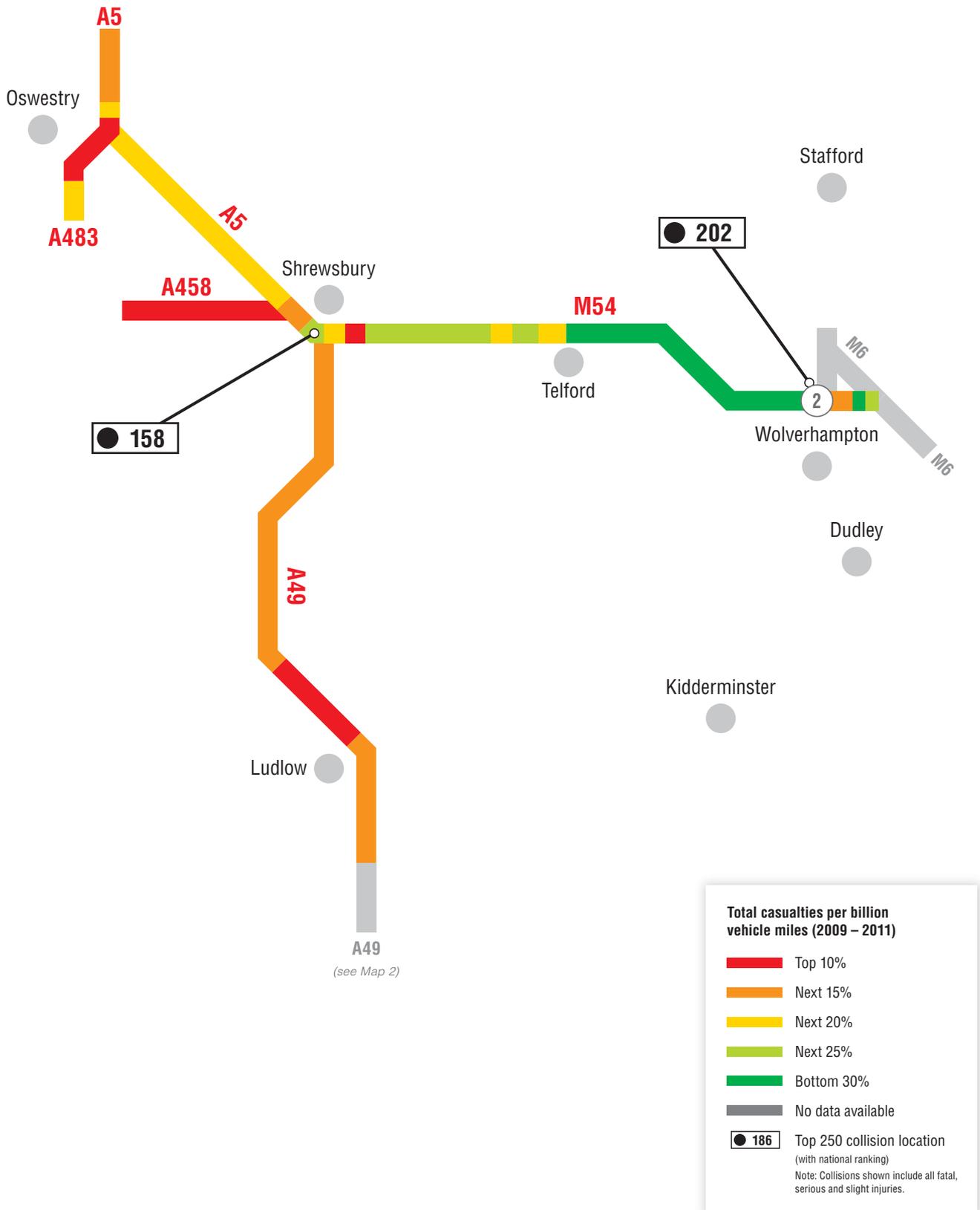


Figure 2.3

Safety on the network

(see Map 1)



2.3 Asset condition

- 2.3.1 We carry out routine maintenance and renewal of roads, structures and technology to keep the network safe, serviceable and reliable. We also ensure that our contractors deliver a high level of service on the SRN to support operational performance and the long-term integrity of the asset.
- 2.3.2 From new, assets have an operational 'life' within which, under normal conditions and maintenance, the risk of failure is expected to be low. Beyond this period, the risk of asset failure is expected to increase, although for many types of asset the risk of failure remains low and we do not routinely replace assets solely on the basis that they are older than their expected operational life. We use a combination of more regular maintenance and inspection along with a risk-based approach to ensure that assets remain safe while achieving value for money from our maintenance and renewal activities.
- 2.3.3 We maintain a National Asset Management Plan as an annual summary of the Highways Agency's network asset inventory and condition. It is aimed at ensuring there is sight of future issues affecting the asset and enabling strategic decision making.
- 2.3.4 To the south, the route includes the A417/A419 DBFO linking the M5 and M4 (from M5 junction 11A to M4 junction 15, which includes the Air Balloon Roundabout). The section will be handed back to the Highways Agency in 2026; until then Road Management Services (Gloucester) Limited are responsible for maintaining the road.

Carriageway Surface

- 2.3.5 The road surface on the SRN is primarily surfaced with two types of flexible bituminous materials, namely Hot Rolled Asphalt (HRA) which has an approximate design life of 25 years and Thin Surface Course System (TSCS) with a lower construction cost and shorter design life of 10-15 years. Large tranches of HRA were laid in the 1990s and TSCS tranches laid in the 2000s resulting in a significant proportion of the network reaching the end of its design life by 2020.
- 2.3.6 It should be noted that, although carriageway surfacing may be identified as reaching or exceeding its design life, the surfacing will not necessarily require treatment at this point. Carriageway surfacing that is beyond its design life is at a higher risk of failure, with such risk increasing the further that the surfacing exceeds its design life. The increasing age of the surfacing could manifest in an increased frequency of maintenance interventions which, if a renewals scheme is not funded, may result in a higher cost both financially and in terms of disruption to road users to maintain the asset in a safe and serviceable condition.
- 2.3.7 In common with the network as a whole, carriageway surfaces across the route are deteriorating due to generally increasing traffic volumes and delays in intervention as a result of competing demands for

available funding. The severe winter conditions experienced in recent years have also affected carriageway performance.

- 2.3.8 Key sections of the route will require intervention before 2021, including sections of the east and west bound carriageways of the M50 between the River Severn crossing (Queenhill Viaduct) and M5 (junction 8). More than 70% of the M50 as a whole will reach the end of its design life by 2020, with signs of deterioration in parts of the remaining 30%.
- 2.3.9 Approximately 50% of the carriageway of the A49, from its junction with the A40 near Ross-on-Wye to its junction with the A5 near Shrewsbury, is likely to reach the end of its design life by 2020, with the remaining 50% having a variable remaining design life. The A40 is in a similar condition.
- 2.3.10 Further north, the A5 from its junction with the M54 to the Welsh border is in variable condition. The section from the M54 to the junction with the B4396 (south of Oswestry) is likely to reach the end of its design life by 2021. The remaining section appears to be in reasonable condition. Both the A458 from Shrewsbury to the Welsh border and the A483 from the A5 at Oswestry to the Welsh border are in a similar condition with short sections likely to reach the end of their design life by 2020.
- 2.3.11 Any interventions on the single carriageway sections of the route will likely be disruptive due to the requirement to close the network for maintenance activities. This will be a particular issue for the A417 and the A49. We know from Section 2.2 these are congested sections within this route.
- 2.3.12 We also have concrete road surface material but this is only a very small proportion when compared to the length of flexible road surfaces. The amount of concrete road surface is also reducing as it is replaced by flexible material at the end of its serviceable life. Concrete is not a material we now use in new carriageway construction on any of the motorway and trunk road network.
- 2.3.13 There is a section of concrete road surfacing on the A417/A419 which is maintained as part of the DBFO section.

Structures

- 2.3.14 A specific issue for this route is that the condition of structures on the M50 has become very poor in recent years. However, recent works have replaced the structures at Bushley and Ripple viaducts, with a long term maintenance plan being undertaken at Queenhill viaduct.
- 2.3.15 There are two structures on the A40, which lie within the Midlands to Wales and Gloucester route. These are Walham Viaduct and Over Bridge that are identified as having management issues. This is due to the age of the structures which were not built to today's standard. The structures cross the River Severn flood plain and so are over a significant length presenting challenges to how the section is maintained.

Other key asset issues for routes

- 2.3.16 Geotechnical issues affect the M50 where embankments of reworked Lower Lias Clay are showing signs of deterioration, which may ultimately mean stabilisation and consolidation work will be necessary.
- 2.3.17 The hillside at Leys Bends on the A40, just before Monmouth, has been under observation for many years due to movement of the hillside. Whilst we continue to monitor this section, it is raised due to the high impact on the network if this risk, movement of the hillside, was to occur.

2.4 Route operation

Incident Management

- 2.4.1 We work hard to deliver a reliable service to customers and to reduce the number and impacts of incidents on road users.
- 2.4.2 Across the whole network, the Highways Agency Traffic Officer Service responds to around 20,000 incidents each month. We measure how effective we are at managing incidents by looking at the time incidents affect the running lanes.
- 2.4.3 We have a good understanding of the types of incidents which are quick to clear up and those which take longer. In general, there are far more incidents which don't affect the running lanes for very long, and mostly these are caused by breakdowns in the live lanes, debris or damage only collisions. The longest duration incidents are mostly caused by infrastructure issues, such as road surface repairs, bridge strikes, barrier collisions and spillages.
- 2.4.4 We continue to work with our partners in the emergency services to reduce the impacts on our network from serious collisions and long-duration incidents.
- 2.4.5 The operational coverage of this route has an emphasis on providing information services and strategic and tactical overview where available, but there is no dedicated traffic officer on-road incident management response. The exceptions to this are the M50 junctions 1 to 3 and M54 junctions 3 to 7, where there are dedicated Traffic Officer Service patrols.
- 2.4.6 The West Midlands Regional Control Centre (WMRCC) has relatively little capability on the trunk road sections of this route. This is due to a combination of limited roadside technology, both in terms of information gathering and dissemination, and a lack of trunk road experience amongst the on road Traffic Officer Service.
- 2.4.7 The West Midlands Traffic Officer Service has concentrated on building and maintaining a strong relationship with the Central Motorway Police Group, who patrol the same motorway routes and share a control room. This facilitates enhanced cooperation in the management of incidents on the motorway network. Similar relationships have not yet developed with regional police forces who operate on the trunk road sections of the route due to the focus on sections that are patrolled.

- 2.4.8 The highest incident durations for this route (information is only available for the M50, M54 and the A5 from the M54 to the junction with A49 east of Shrewsbury) are along the A5 where the average is above 60 minutes.

Flooding

- 2.4.9 We have a responsibility to reduce flooding. Flooding of the Highways Agency network impacts upon network performance and the safety of road users. Flooding off the network has an impact on third parties living adjacent to the network.
- 2.4.10 Based on recorded flooding incidents, we have identified those parts of the network that are at risk of repeated flooding.
- 2.4.11 This route lies within the Severn River Basin, which includes the River Severn itself and its tributaries.
- 2.4.12 There are sections of the M50 and the A49 which we have categorised as having a higher risk of flooding than the rest of the network. Historic and current flooding issues have occurred on the M50. A scheme to alleviate the flooding was implemented recently but this may not have resolved the problem completely.
- 2.4.13 The A483 at Lower Sweeney is prone to surface water collection and flooding.

Severe Weather

- 2.4.14 The Highways Agency aims to minimise where possible the impacts of severe weather, ie strong winds and snow, on network performance and the safety of road users.
- 2.4.15 Some roads along the network have become more susceptible to severe weather than others.
- 2.4.16 Sensitive areas for severe weather along the A49 include Dinmore Hill and Callow Hill, which have significant gradients and are therefore more susceptible to snow and ice. Generally the more rural routes which are more likely trafficked compared to other sections are more prone to be affected by severe weather such as ice.
- 2.4.17 The A417 'Missing Link' also suffers from the effects of bad weather, due to the gradients on the route and the height of the Cotswold escarpment.
- 2.4.18 Strong winds can occur on the M50 between junction 2 and M5 junction 8, particularly on the Queenshill viaduct.

2.5 Technology

- 2.5.1 The Highways Agency works hard to deliver a reliable service to customers through effective traffic management and the provision of accurate and timely information. We provide information to our customers before and during their journeys.

- 2.5.2 We monitor key parts of our network using CCTV and use sensors in the road to monitor traffic conditions. These are used by our National Traffic Operations Centre and seven Regional Control Centres to provide information to customers before their journeys, eg on the [Traffic England website](#) or through the [hands-free traffic app](#) for smartphones. Whilst on the network, we also inform our customers using variable message signs (VMS).
- 2.5.3 Technologies such as overhead gantries, lane specific signals and driver information signs also forms part of how we can operate our network efficiently. In some locations we have controlled motorways, which is where we can use variable mandatory speed limits to help keep traffic moving. Smart motorways use both variable mandatory speed limits and the hard shoulder as an additional live traffic lane during periods of congestion. Ramp metering manages traffic accessing the network via slip roads during busy periods to help avoid merging and mainline traffic from bunching together and disrupting mainline traffic flow.
- 2.5.4 Technology provision on the two motorway sections within the route includes message signs, signals and limited CCTV coverage. In comparison, the trunk roads within the route have no technology provision except emergency roadside telephones, apart from limited CCTV coverage on A417 and A419.
- 2.5.5 Due to the predominantly rural character of this route, there is a current lack of power and roadside telecommunications alongside more remote trunk road sections which explains some of the reasons for the limited technology, especially on the western side of the route.

2.6 Vulnerable road users

- 2.6.1 For the purposes of the document, vulnerable road users are defined as pedestrians, cyclists, motorcyclists and horse riders.
- 2.6.2 On the motorway and high standard dual carriageways of the route there is limited access for vulnerable users. The main concern is to facilitate safe crossing at junctions and designated crossing points.
- 2.6.3 The route as a whole is rural in nature and there is a high dependency on road transport and high levels of car ownership. Whilst many sections are rural, the route does pass through many communities where there are a significant proportion of vulnerable road users either using or crossing the network.
- 2.6.4 Several concerns were raised by stakeholders about the risks of crossing parts of the route by cyclists, particularly in relation to the A417 at Birdlip, the A419 at Cricklade and the A40 around Gloucester. Stakeholders noted that, although cycle lanes and crossings have been provided, cyclists tend not to use them due to a standard design being applied.
- 2.6.5 The Highways Agency has received an increase in correspondence concerning the issues faced by cyclists attempting to cross the A5, which severs Shrewsbury from local villages. Correspondence has also

been received relating to cyclists on the A49 where the single carriageway can be narrow and there is a lack of overtaking points. Footways are also limited along the A49.

2.6.6 Several villages along the route have requested pedestrian crossings be introduced in order to make crossing the A49 safer and easier.

2.6.7 There was general consensus from stakeholders that there is a need to promote more sustainable transport modes within the Marches and Worcestershire areas.

2.7 Environment

2.7.1 As a responsible network operator and through the [Strategic road network performance specification 2013-15](#), the Highways Agency works to enhance the road user experience whilst minimising the impacts of the SRN on local communities and both the natural and built environment.

Air quality

2.7.2 We recognise that vehicles using our road network are a source of air pollution which can have an effect on human health and the environment. We also appreciate that construction activities on our road network can lead to short-term air quality effects which we also need to manage.

2.7.3 The Highways Agency is committed to delivering the most effective solutions to minimise the air quality impacts resulting from traffic using our network. We will operate and develop our network in a way that works toward compliance with statutory air quality limits as part of our broader [Environmental Strategy](#).

2.7.4 The Air Quality Strategy for the UK sets the Government's targets and details pollution concentrations to which people should not be exposed. If this appears to be a consequence of construction then the local authority must declare an Air Quality Management Area (AQMA) and prepare an Action Plan to address the situation.

2.7.5 Generally where there are sensitivities in terms of air quality, and so where the SRN has the most impact, is near the major towns and cities.

2.7.6 Along the M54, South Staffordshire Council has declared two AQMAs that the route impacts on, which are located to the north of Wolverhampton.

2.7.7 The A49 travels through two local authority areas, Herefordshire Council and Shropshire Council, with each declaring AQMAs. Similarly the routes A5, A458 and A483 (Oswestry to Welsh border) fall within five AQMAs declared by Shropshire. The A417 in Gloucestershire passes through an AQMA, currently a monitoring plan is being worked on by Cotswold District Council which the Highways Agency will continue to work with the council on.

Cultural heritage

- 2.7.8 The Highways Agency is committed to respecting the Environment across all its activities and to minimising the impact of the trunk road on both the natural and built environment. Wherever possible, balanced against other factors, Agency schemes are designed to avoid impacts on cultural heritage assets. These are described as a range of geographical components of the historic environment which have been positively identified as having a degree of significance meriting consideration in planning decisions.
- 2.7.9 The Ancient Monuments and Archaeological Area Act 1979 provides legislative protection to a selection of archaeological sites and monuments considered as of national importance.
- 2.7.10 The route has a number of protected monuments and areas of historical interest. There are legally protected monuments along the M54 and the A40. In addition there are other areas of protection which affect this route, including two National Trust properties, three registered Parks and Gardens. The Hereford City Walls is one of the more significant monuments along this route.
- 2.7.11 The A417/A419 travels through the Cotswolds, which is designated as an Area of Outstanding Nature Beauty (AONB). It is the largest of 38 AONBs in England and Wales, and the second largest protected landscape in England after the Lake District National Park. This area can attract 23 million visitors per year meaning that it has a significant impact on the operation of the A417/A419. The Roman town of Cirencester is also located on this route.

Ecology

- 2.7.12 The Highways Agency's activities, including road construction projects and maintenance schemes, have the potential to impact on protected sites, habitats and species. We aim to minimise the impact of our activities on the surrounding ecology and wherever possible contribute to the creation of coherent and resilient ecological networks by maximising opportunities for protecting, promoting, conserving and enhancing our diverse natural environment.
- 2.7.13 The M50 and the M54 are located within or directly adjacent to areas which are considered to be ecologically sensitive, mainly due to ancient and semi-natural woodland.
- 2.7.14 The A5 (Oswestry to the Welsh border) is located adjacent to, or partly within, a number of designated sites including four natural areas, four Sites of Special Scientific Interest (SSSI), a Special Area of Conservation (SAC), a local nature reserve and ancient and semi-natural woodland. The A458 is also located directly adjacent to or within a natural area and one SSSI.
- 2.7.15 There are a number of designated sites along the A40. The majority of these are located within the southern section including three SSSI and two SACs, as well as the majority of the ancient and semi natural woodland.

- 2.7.16 Areas of environmental importance located within or adjacent to the A49 includes the River Wye SAC, which is also an SSSI. In addition there are five natural areas, five local nature reserves, four Millennium Greens and a country park.

Landscape

- 2.7.17 Roads and other transport routes have been an integral part of the English landscape for centuries. However, due to large increases in traffic, combined with modern highway requirements, they can be in conflict with their surroundings. We are committed, wherever possible, to minimise the effect of our road network on the landscape.
- 2.7.18 Due to the nature of the landscape within this route, there are several environmentally sensitive areas which must be considered when planning any new road improvements.
- 2.7.19 The M50 falls adjacent to or within the Wye Valley, Malvern Hills and Cotswolds AONBs. The A40 and A49 also pass near to the Wye Valley AONB.
- 2.7.20 The Shropshire Hills AONB is also adjacent to the M54 and close to the A5 and A49.
- 2.7.21 Numerous Conservation Areas affect the roads in this area including the A40, A49, A458 and A483.

Noise

- 2.7.22 Traffic noise arising from the Highways Agency's network has been recognised as a major source of noise pollution.
- 2.7.23 The Highways Agency takes practical steps to minimise noise and disturbance arising from the road network. This includes providing appropriate highway designs and making use of materials with noise reducing properties.
- 2.7.24 In 2012, Defra completed the first round of noise mapping and action planning which identified the top one per cent of noisiest locations adjacent to major roads. These were based on the conditions in 2006. The locations in this top one per cent are known as Important Areas.
- 2.7.25 Important Areas have been identified between junctions 1 and 2 on the M54. Further Important Areas have been identified on the M50 at Bromsberrow Heath and Linton where in recent years noise fences have been installed.
- 2.7.26 The Highways Agency has received correspondence in relation to surrounding villages near the M50 which have experienced noise from HGVs travelling over bridge joints. The Highways Agency is continuing to look into measures to mitigate this as similar noise issues have been identified on other parts of the network.
- 2.7.27 The A5, A458 and A483 (Oswestry to the Welsh border), A40 and A49 are situated in predominantly rural areas with a low population density and traffic noise here is minimal in comparison to busier routes.

2.7.28 Stakeholders raised concerns regarding noise on the A419 due to the concrete road surface from Cirencester to Cricklade.

Water pollution risk

2.7.29 We have a duty not to pollute water courses and ground water. We have identified those highway discharge locations across our network where there is an existing potential water pollution risk.

2.7.30 Across the route there are few locations where water pollution is a risk. There are a cluster of sites with increased potential risks on the A5 on the section between the M54 and Shrewsbury. There are two pollution control stations towards the Shrewsbury end of this section. These pollution control stations prevent the pollution of water bodies, such as rivers and lakes, and the spread of pollution during times of flooding.

3 Future considerations

3.1 Overview

- 3.1.1 There is already a lot known about the planned changes to and around the route. Local authorities and the development community are already pushing forward the delivery of their housing and economic growth aspirations, as set out in their local plans. The Highways Agency has a large programme of schemes it has to deliver, plus an even larger programme of pipeline measures that could come forward after the general election. Local authorities are progressing measures to improve the operation and performance of their transport networks and facilities.
- 3.1.2 All of these issues have the potential to directly influence the ongoing performance and operation of the route. Figure 3 summarises the anticipated key future issues and the following sections summarise those issues in more detail.

Figure 3

Key future considerations for the route

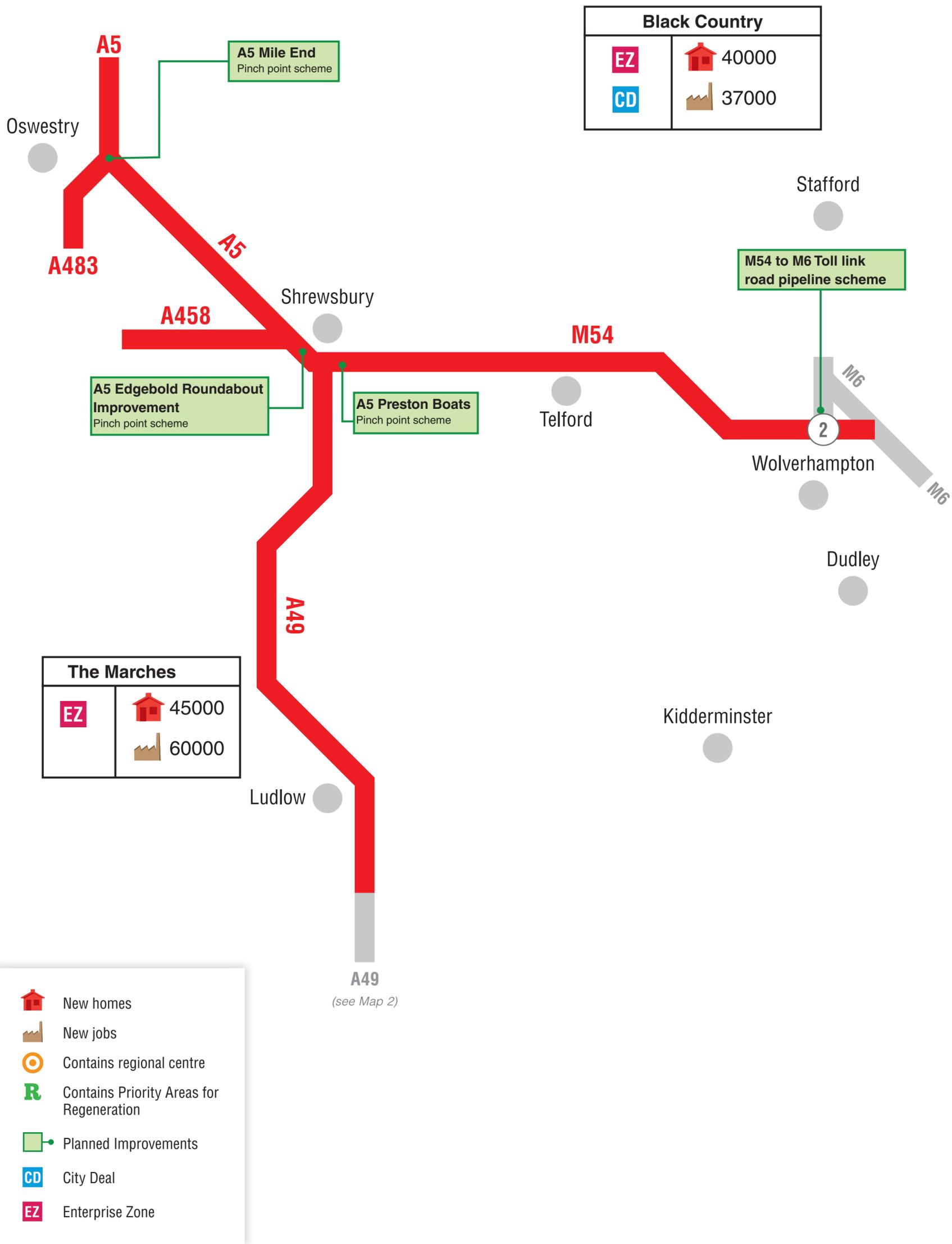
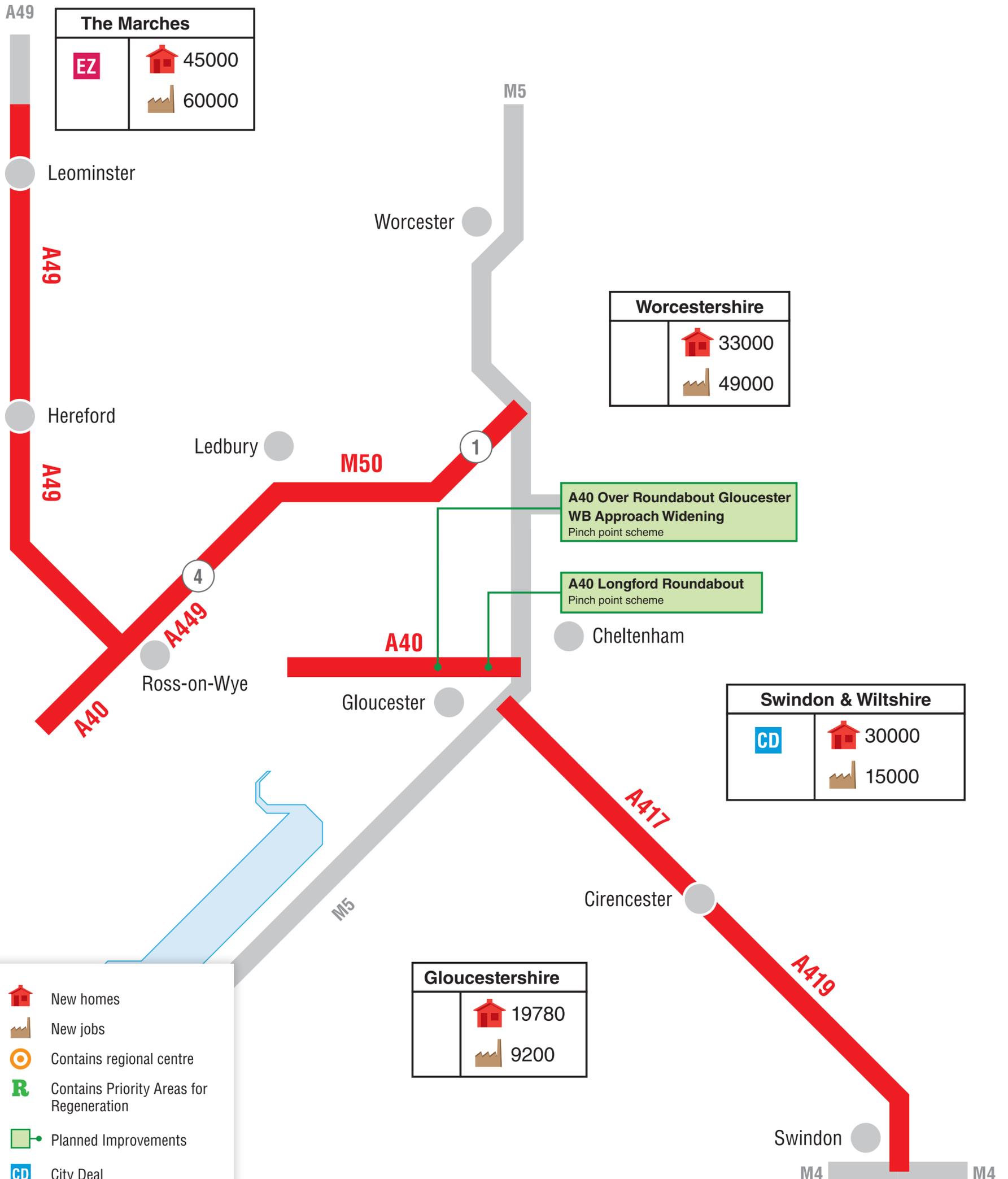


Figure 3

Key future considerations for the route

(see Map 1)



3.2 Economic development and surrounding environment

3.2.1 A key aspect of managing the route effectively will be ensuring that it is capable of supporting future local housing and economic growth aspirations. This will involve preparing the route through effective management and public investment to be in the best possible position to cater for the planned demands placed upon it, whilst ensuring that the developments themselves effectively mitigate their local impacts.

3.2.2 Figure 3 summarises the known key housing and economic growth aspirations that would impact on the route, with Table 3.1 below providing more context about some of those key developments the nature, scale and timing of the proposals.

Table 3.1 Key housing and economic growth proposals

Location of Development	Development Type	Scale by 2015	Scale by 2021	Scale by 2031	Anticipated Location of Impact on Route
Commonhead, Swindon	Residential and commercial	178 dwellings and 3ha employment	534 dwellings and 9ha employment	831 dwellings and 14ha employment land	A419
Tadpole Farm, Swindon	Residential and commercial	339 dwellings and 1ha employment land	1017 dwellings and 3ha employment land	1582 dwellings and 5ha employment land	A419
South of Cirencester	Residential	375 dwellings	1125 dwellings	1750 dwellings	A417/A419
Eastern Villages, Swindon	Residential and commercial	1200 dwellings and 8ha employment land	3600 dwellings and 24ha employment land	5600 dwellings and 37ha employment land	A419
Kingsdown, Swindon	Residential	330 dwellings	990 dwellings	1540 dwellings	A419
Hereford Enterprise Zone	Commercial	1500 jobs		4200 jobs (by 2022)	A49
Bullingham, Hereford	Residential and commercial		1000 dwellings		A49
Holmer West, Hereford	Residential		500 dwellings		A49
Three Elms, Hereford	Residential and Commercial		500 dwellings	1000 dwellings and 10ha employment land	A49
Urban Village, Hereford	Residential	100 dwellings	600 dwellings	800 dwellings	A49
Bullingham, Hereford	Residential		500 dwellings	10000 dwellings	A49

Holmer, Hereford	Residential		500 dwellings		A49
Shrewsbury South Sustainable Urban Extension	Residential and commercial		579 dwellings and 2377 jobs	321 dwellings and 1320 jobs	A5
Shrewsbury West	Residential and commercial		482 dwellings and 1235 jobs	268 dwellings and 687 jobs	A5
Oswestry	Residential and commercial		750 dwellings and 1800 jobs		A5/A483
Southwater, Telford	Residential and commercial		1050 dwellings and 3956 jobs		M54
Land at Lawley, Telford	Residential		2425 dwellings		M54
I54, Wolverhampton Part of Black Country Enterprise Zone	Commercial	1400 jobs	2900 jobs	3466 jobs	M54 J1-2
Four Ashes SRFI, South Staffordshire	Commercial		1145 jobs	2291 jobs	M54

- 3.2.3 Within the route, there are five Local Enterprise Partnerships, two of which have been designated Enterprise Zones, and these are shown in Table 3.1 above.
- 3.2.4 The Black Country is the one area with a City Deal which is currently subject to negotiation.
- 3.2.5 Significant growth around Swindon is expected with around 22,000 dwellings planned up to 2026, which will have major impact on the A419 around the town. From Figures 2.1 and 2.2, this section already suffers from existing congestion and junction capacity issues. Eastern Villages is the largest urban extension in England, this Local plan has yet to be confirmed by the Planning Inspector but has been submitted and is expected to be adopted by April 2014. The A419 White Hart junction is the closest junction to Eastern Villages and will be therefore the most affected by this development.
- 3.2.6 Cirencester, located on the A417/A419 is anticipating significant growth of around 3360 dwellings up to 2031 with 2500 dwellings located on a single site to the south of the town.
- 3.2.7 Hereford is looking to develop major sites around the city as part of a wider strategy of housing and employment growth within the County. Around 6,500 new dwellings are proposed for Hereford and the designation of the Enterprise Zone in the south east of the city will have an impact on the A49. The Enterprise Zone will have a defence and security focus and is located on the outskirts of the city. Concerns were raised by stakeholders on the ability of the A49 to support this growth where there are issues with performance including unreliable journey-times, delays and the highest ranked casualty location on the route.

- 3.2.8 The A5 around Shrewsbury is seeing growth in residential and commercial developments. Concerns were raised about the ability of Shrewsbury to attract further growth as the M54 Motorway ends some miles east of the town.
- 3.2.9 Stakeholders raised concerns about capacity at the A5/A483 junction and the effects of proposed developments between Oswestry and Wrexham. Oswestry itself is expecting 25% more housing development than originally thought and this will place more pressure on the Oswestry bypass (A483 and A5) and may even constrict growth.
- 3.2.10 Stakeholders highlighted the need for careful consideration of the i54 Enterprise Zone near Wolverhampton (one site of two comprising of the Black Country Enterprise Zone) as part of this strategy. The i54 development is a significant opportunity for regional growth that will be a major traffic generator. I54 is located adjacent to the M54 and will be served by a dedicated access at junction 2. The site will be focused on accommodating space for technology, advanced manufacturing and leisure industries and offices.
- 3.2.11 Although not specifically raised at the stakeholder workshops, Telford and Wrekin is looking to develop significant sites along the M54 corridor, which could increase the pressure on junctions 4 to 6.

3.3 Network improvements and operational changes

- 3.3.1 The Highways Agency is already delivering a large capital programme of enhancement schemes nationally. This includes Major Schemes greater than £10m in value, plus smaller enhancement schemes including the current Pinch Point Programme. Table 3.2 below summarises the current committed enhancement schemes proposed along the route, which have also been represented on Figure 3.

Table 3.2 Committed SRN enhancement schemes

Location	Scheme Type	Completion Year	Anticipated Benefits
A49 / A438 Newmarket Street improvement, Hereford	Pinch Point scheme	Completed	Widening of the A49 southbound approach to improve capacity at this junction
A49 / A465 Belmont Road Junction	Pinch Point scheme	Completed	Reduce collisions and congestion through providing a dedicated right hand turning lane
A49 / A4103 Starting Gate Junction, Hereford	Pinch Point scheme	Completed	Reduce congestion and support Hereford Enterprise Zone by increasing the capacity at this junction
A5 Preston Boats	Pinch Point scheme. Junction improvements	2014	Introducing a controlled junction to reduce daily congestion
A5 Churncote Island	Pinch Point scheme. Increasing junction capacity	Completed	Reduce congestion through increasing the capacity on the approach to the junction and A5 northbound

A5 Emstrey Island	Pinch Point scheme	2014	Reduce congestion on A5 by introducing traffic lights
A5 Mile End	Pinch Point scheme	2015	Increasing the capacity of the junction to provide access to the planning employment and housing sites, supporting local economic growth
M54 J5 Forge roundabout	Pinch Point scheme	2015	Signalise sections of the roundabout to improve congestion
A5 Edgebold roundabout improvement, Shrewsbury	Pinch Point scheme	Completed	This scheme will tackle congestion by widening the carriageway and improving road markings and signs
A40 Longford roundabout, Gloucester	Pinch Point scheme	2015	Improve flow by the installations of traffic lights on A38(N) and A40(W) arms
A40 Over roundabout Gloucester	Pinch Point scheme, west bound approach widening	2015	Increasing the capacity of the junction to improve flow and reduce congestion

3.3.2 [The 2013 Spending Review](#) and subsequent report from HM Treasury [Investing in Britain's Future](#) referenced a series of potential new pipeline schemes for the SRN. Table 3.3 below provides a summary of the pipeline improvement schemes that would impact this route, subject to value for money and deliverability.

Table 3.3 Declared pipeline schemes

Location	Scheme Description
M54 to M6 Toll link road	New link road improving access from the M54 to the M6 and M6 Toll

3.4 Wider transport networks

3.4.1 The June 2013 report from HM Treasury [Investing in Britain's Future](#) also listed the local transport schemes either completed, under construction or due to start before May 2015.

3.4.2 There are no committed local transport network enhancement schemes that affect this route. The A5 Dobbies roundabout and Oxon link road are included in The Marches Local Enterprise Zone's Category 1 priority list of schemes for the area but funding has not yet been committed.

4 Key challenges and opportunities

4.1 Introduction

4.1.1 This chapter summarises the key challenges and opportunities as identified by our internal and external stakeholders and supported by evidence. It is not possible to show all the challenges and opportunities identified however a full list is provided in the Technical Annex.

4.1.2 Figure 4 summarises the key challenges and opportunities that the route will experience during the 5 years from 2015, with the following sections and Table 4.1 explaining these issues and challenges in more detail.

Timescales

4.1.3 To understand the timescales of when the key challenges identified become critical and when opportunities on the route could be realised, the following definitions have been made in Table 4.1:

- **Short Term:** current
- **Medium Term:** before March 2021
- **Long Term:** not before 2021

4.1.4 These timescale categories provide a guide for informing when a future intervention may be required to meet the anticipated future operational performance needs, or when interventions may be needed to help facilitate local housing and economic growth aspirations.

Local Stakeholder Priorities

4.1.5 Input from stakeholder and road user groups linked to the route has been used to inform the development of this evidence report. This included getting views on their “top priorities” locally.

4.1.6 Table 4.1 presents a summary of whether the challenges and opportunities identified were a priority for our stakeholders in their particular area. This exercise does not seek to prioritise the challenges and opportunities along the length of the route by trying to compare one issue against another, but reports the feedback from local discussions.

4.1.7 This picture of stakeholder priorities is subjective and has been informed by discussions regarding the top priorities locally at the stakeholder events, and in conversations with stakeholders who couldn't attend the events.

4.1.8 We recognise that the picture we build through this categorisation will be influenced by the representatives and organisations we have engaged with and that consequently we may not have achieved a statistically balanced view. We will be conscious of these limitations in the reporting of stakeholder priorities as we move into the second stage of RBS.

4.2 Operational challenges and opportunities

- 4.2.1 The majority of this route is all purpose trunk road and it has limited coverage by our Traffic Officer Service. Data on the impacts of incidents on the route is also fairly limited. There is an opportunity to increase our knowledge of incidents on the network through liaison with emergency services. To date, we have focused on liaising with police forces that operate on the sections that we patrol as this has been important for day to day operational management. Furthering local engagement to include other regional police forces that have a responsibility for dealing with issues on the all purpose trunk road network could enable us to gather more knowledge about the impacts of incidents on the operation of this route.
- 4.2.2 There is also limited technology installed along the route which makes it difficult to provide real time information to road users. There may be an opportunity to improve the technology provision in some areas although this will be particularly challenging due to the rural nature of the route. For example, provision of a power supply may not be possible or cost prohibitive.
- 4.2.3 During the stakeholder workshops concerns were raised about the resilience of this route, in particular the A49 through Hereford and the A417/A419 which connects the M4 and M5.
- 4.2.4 Overall, the concerns of stakeholders that attended the workshops were not focused on the operation of the route and incident management. Where the operation of the route was discussed the issues were not given a high priority by these stakeholders.

4.3 Asset condition challenges and opportunities

- 4.3.1 The asset within this route is in relatively good condition with recent and upcoming maintenance schemes being delivered to address current issues. Ongoing deterioration is anticipated with a number of assets reaching the end of their design life over the route based strategy period. The main assets of concern within this route are the condition of the pavement. This is particularly the case along the A49, M50, A5 and A40. Managing the impact of maintenance schemes on road users and road neighbours will be a key challenge, especially along the single carriageway sections.
- 4.3.2 There are also two important structures which carry the A40 over the River Severn flood plain in Gloucestershire which have complex maintenance challenges. These are aging structures that will require maintenance activity before 2021. The unique design of these structures mean that delivering cost effective maintenance with minimum disruption will be particularly challenging.
- 4.3.3 Few concerns were raised about the condition of assets during the stakeholder workshops. There were greater concerns regarding the capacity on the route, especially in and around towns and cities and single carriageway sections. Where significant maintenance is required

in such locations then extra care will be needed to manage the impact of such works.

4.4 Capacity challenges and opportunities

- 4.4.1 The route generally performs well in comparison to other parts of the SRN in terms of journey-time reliability, average speeds and average delays. However there are some capacity challenges at key locations which are predominantly around the larger settlements. These include existing issues as well as those anticipated as a result of planned economic growth.
- 4.4.2 At the stakeholder events two of the highest priority issues identified were the capacity challenges along the M54 near Wolverhampton and the A49 in Hereford.
- 4.4.3 The current capacity issues around Wolverhampton focus on the section between junctions 3 and 2 of the M54. There are also capacity issues along the A449 and A5 which are noted in the South Midlands route based strategy evidence report and are linked to these capacity issues along the M54. These sections carry northbound traffic as it leaves the M54 at junction 2 and travels along the A449 and A5 to reach the M6. This route is taken as there isn't a direct northbound connection between the M54 and the M6.
- 4.4.4 There are significant development plans in and around junction 2 of the M54. It is expected that the traffic generated from these developments will exacerbate these existing capacity issues. This includes the Enterprise Zone at i54 which has a dedicated access from junction 2. Further development at the i54 Enterprise Zone could exacerbate capacity issues in the area.
- 4.4.5 There is a scheme in the pipeline to provide a new road linking the M54 to the northbound M6 and M6 Toll. It is expected that such a scheme could resolve these capacity issues over the medium to long term.
- 4.4.6 The capacity issues in Hereford are predominantly along the section of the A49 between the A465 and A438. This section carries a high proportion of local as well as strategic traffic over the River Wye through the city centre. The route is restricted by the single river crossing. The evidence shows that this section has the slowest traffic speeds of the route and is in the top 10 worst performing links for journey-time reliability in this route.
- 4.4.7 There are a number of large development proposals planned for Hereford including the Enterprise Zone at Rotherwas. Three Pinch Point schemes have been delivered at key junctions along the A49 in Hereford. These will alleviate some existing issues as well as facilitate development in the short term. However, it is anticipated that additional capacity improvements will be required to support further economic growth over the medium to long term.
- 4.4.8 There are two other locations in this route where the existing capacity challenges are relatively significant. These are the A417 north of Cirencester and the A419 around Swindon. Although these were not

raised as high priorities during the stakeholder events, they have since been identified as a high priority by the Gloucestershire Local Enterprise Partnership.

- 4.4.9 Generally, the A417 is dual carriageway apart from a single carriageway section from Cowley roundabout to Brockworth bypass, known locally as the 'Missing Link'. This 3 mile section situated between Cirencester and Gloucester includes intermediate at grade junctions with A436 at Air Balloon roundabout, the B4070 Birdlip junction, and numerous minor rural roads and accesses. This is the only single carriageway section on the A417/A419 route between M4 junction 15 and M5 junction 11a. There is a significant change in level as the road rises from Brockworth bypass to the Birdlip junction and the gradient over this section is significantly in excess of current trunk road standards. The climb up the Cotswold escarpment also includes a sharp turn for trunk road traffic of over 270 degrees.
- 4.4.10 This section carries local, commuting and strategic traffic. It experiences delays and is within the top ten least reliable links on the route. Whilst there are no schemes in the current programme, detailed studies have been undertaken over many years to identify potential improvements. Gloucestershire County Council and the Gloucestershire Local Enterprise Partnership have identified addressing the congestion along the A417 'Missing Link' section as essential to support economic development and growth within the area.
- 4.4.11 Nine miles of the A417/A419 section of this route include the precipitous escarpment of the Cotswolds gateway coming in from the M5, and lies within the nationally important protected landscape, the Cotswolds AONB.
- 4.4.12 The section of the A419 around Swindon, where it approaches the M4, carries the highest volume of traffic of all the trunk roads in this route. It is one of the poorer performing sections in terms of delays, reliability and average speeds. This is due to the high traffic flows and the closely spaced junctions. There are no current plans to improve the A419.
- 4.4.13 There are a number of developments planned in Gloucester, Cirencester and Swindon which are expected to impact on the A417 and A419. These include Eastern Villages which is the largest development identified within this route area. We are proactively working with the Regional Growth Board, Gloucestershire LEP and Swindon and Wiltshire local Transport Body to better understand the impact of this development on the future performance of the A417/A419. Given current capacity constraints and the scale of development planned between M4 and M5, interventions are likely to be required during the route based strategy period.
- 4.4.14 The evidence presented also shows a couple of other locations with existing capacity concerns and where planned development could further exacerbate these issues. These are the A5 around Shrewsbury and at Oswestry. Pinch Point schemes are being delivered at five of the key junctions along the A5 at most of these locations. These schemes are expected to address the majority of existing capacity challenges as

well as support economic growth over the medium term. However, there isn't an improvement scheme planned for one key junction, the A5 / A49 Bayston Hill Roundabout. It is anticipated that capacity issues at this junction could constrain growth during the strategy period and therefore the challenge will be to identify appropriate interventions for this location.

4.4.15 Stakeholders also suggested that reclassifying the A5 from Shrewsbury to the M54 as a motorway could lead to benefits of increased inward (particularly international) investment. We are carrying out an investigation into the potential costs and implications of such a change. There will be an opportunity within this period to consider the deliverability and appropriateness of such a reclassification.

4.4.16 In summary, the key locations where we currently anticipate that capacity improvements may be required by 2021 are as follows:

- M54 junction 3 to 2 (in conjunction with the A449 and A5);
- A5 / A49 Bayston Hill Roundabout;
- A49 through Hereford;
- A417 between Cowley and Brockworth (the 'Missing Link'); and
- A419 to the east of Swindon, including M4 junction 15.

4.4.17 There is an opportunity to work with developers, Local Enterprise Partnerships and Local Authorities to secure funding for the delivery of capacity improvements that may be necessary to support economic development.

4.4.18 Finally, the evidence in this report has indicated that there are delays and reliability issues along the M50. Examination of the data has shown that this was due to major maintenance that has been taking place along the route. The capacity issues identified are therefore only temporary and the performance of this section is expected to improve without the need for capacity improvements.

4.5 Safety challenges and opportunities

4.5.1 The overall safety performance of this route is variable. The highest casualty rates were noted on the A49, A458 and parts of the A5 and A40. The majority of these sections are single-carriageway roads with numerous at grade junctions and direct accesses.

4.5.2 The highest casualty collision site within this route is along the A49. A number of safety improvements have been implemented along the A49 from Ross-on-Wye to Hereford over the last two years. As the evidence presented in this report covers validated safety data from 2008 to 2011 it won't reflect the impact of these schemes. There are also a number of improvements planned along this route as part of the Pinch Point programme. Whilst the focus of these is on providing capacity enhancements, safety issues have also been considered as part of the scheme designs.

4.5.3 Safety along the A483 was raised as a medium priority by stakeholders. This was the highest priority assigned to a safety concern. A recent study suggested speeds in the area were high and indicated that a speed limit reduction through the junctions may improve overall link safety. This came into force in November 2013. Monitoring the effectiveness of this speed reduction in improving safety will be the main focus for short term. Enforcement is an issue to be addressed by West Mercia Police.

4.5.4 Stakeholders also identified safety concerns about the A417 'Missing Link'. This concern has been highlighted by recent fatal collisions however due to the data timescales this won't be captured in the data presented in this report. There is an opportunity to carry out further study work to update the safety information for this location to ensure that concerns raised by stakeholders are understood and, any issues subsequently identified, addressed.

4.6 Social and environmental challenges and opportunities

4.6.1 This route has a high proportion of trunk roads in comparison to other routes and as such passes directly through a number of settlements and communities. Facilities for vulnerable road users are therefore particularly important along this route. Whilst issues weren't raised during the stakeholder workshop about such facilities, we receive correspondence from customers who have queried the adequacy of footpaths, cycle lanes and crossing points along the A49 and at the A40/A449/A49 Wilton Roundabout.

4.6.2 Stakeholders also raised concerns about the air quality around A417 Air Balloon roundabout which is within an Air Quality Management Area, administered by Cotswold District Council. The air quality issues here are a result of high levels of traffic and congestion along with the close proximity of buildings to the junction.

4.6.3 There are noise challenges identified for this route along the A417/A419 between Cirencester and Cricklade and at M54 junction 2. When this surfacing deteriorates, there will be an opportunity to address the noise concerns at the same time as delivering a maintenance scheme by using low-noise surfacing.

4.6.4 The Environment Agency attended the stakeholder workshops and they identified consideration of the Water Framework Directive as their highest priority. This subsequently emerged as a high priority for the route as a whole. We have a Memorandum of Understanding with the Environment Agency and work closely with them to ensure all our maintenance, operations and improvements adhere to the relevant directives. There is an opportunity throughout this period to further develop this working relationship to ensure we maintain an up-to-date understanding of legislation and best practice.

Table 4.1 Schedule of challenges and opportunities

	Location	Description	Is there supporting evidence?	Timescales			Was this Identified through stakeholder engagement?	Stakeholder Priorities		
				Short-term	Medium-term	Long-term		Low	Medium	High
Network operation	A417 / A419 (heading north west)	Some drivers heading from the south east to Wales use this road as an alternative to the M4 on the grounds that the M4 might be congested. With better advance signage on the M4 this could be avoided.	No	X			✓	✓		
	A417 / A419 (heading south east)	Some drivers heading from the Midlands to Chippenham and the west side of Swindon use this road as an alternative to the M5 on the grounds that the M5 might be congested. With better advance signage on the M5 this could be avoided.	No	X			✓	✓		
	APTR sections	The majority of the route is APTR where we have limited data on incident types (especially where there is no injury) and durations. This is a challenge to understand the operational needs for the route.	Yes	X			X			
Asset condition	M50 (River Severn Crossing to junction with M5)	70% of the pavement is predicted to reach the end of its design life by 2021.	Yes		X		X			
	A49 (junction with A40 to junction with A5)	50% of the pavement is predicted to reach the end of its design life by 2021.	Yes		X		X			
	A5 from M54 to Welsh border	Section is predicted to reach the end of its design life by 2021.			X		X			
	A40 Walham viaduct and overbridge	Aging structure which has access challenges for maintenance.	Yes		X		X			

	Location	Description	Is there supporting evidence?	Timescales			Was this Identified through stakeholder engagement?	Stakeholder Priorities		
				Short-term	Medium-term	Long-term		Low	Medium	High
Capacity	M6T-M6-M54 Link, Featherstone	Potential transport impact of strategic employment sites in the vicinity. Slow journey-times between M54 and M6 Toll.	Partial		X		✓			✓
	A49 Hereford	Capacity of A49 is a challenge to development in Hereford. Lack of resilience with only one bridge crossing of the River Wye at Hereford. Has impact on M5/M6/M50 as other routes are used to avoid area.	Yes	X	X		✓			✓
	A49 Dorrington / Bayston Hill	Accessibility is limited due to single carriageways through Dorrington and Bayston Hill. Vehicles get stuck behind lorries on single-carriageways, leading to unreliable travel times and slow journey-times speeds.	Partial	X			✓	✓		
	A5 Shropshire	A5 Shrewsbury east to west Midlands - should be upgraded to motorway network to attract inward investment and increase safety.	No	X			✓	✓		
	A5 / A483	A5 / A483 exhibit general poor performance. With development growth between Ostwestry and Wrexham there is a need for additional capacity.	Yes	X			✓		✓*	

	Location	Description	Is there supporting evidence?	Timescales			Was this Identified through stakeholder engagement?	Stakeholder Priorities		
				Short-term	Medium-term	Long-term		Low	Medium	High
	A417	Air Balloon roundabout suffers congestion and queuing. In Gloucester area, but has significant impact on Swindon and Wiltshire. Linkages to the M5 are significant. Congestion issues, particularly at peak times at Cowley Roundabout. Congestion both ways at A417 between junction with the A436 and A429 'Missing Link'. This is particularly at the top of Crickley Hill during the peak hours. In the evenings, returning from Swindon is a particular problem. Single carriageway length a particular problem.	Partial				✓			✓
	A419 Swindon	Evidence presented within RBS report show congestion problems around Swindon. Significant development expected on this section as well.	Yes	X	X		✓	✓		
	All	Access on to SRN is difficult because of traffic growth and causes additional HGV delay.	No	X			✓		✓	
Safety	A483	A483 has a bad safety record.	Yes	X			✓		✓*	
	A49 Dobbies junction	Collision blackspot.	Yes	X			✓	✓		
	A417 Air Balloon Roundabout	Issues for traffic leaving roundabout down Crickley Hill.					✓	✓		

	Location	Description	Is there supporting evidence?	Timescales			Was this Identified through stakeholder engagement?	Stakeholder Priorities		
				Short-term	Medium-term	Long-term		Low	Medium	High
	All	Lorry parking and the location and availability of lay-bys is becoming an increasing issue. Lay-bys on the SRN are being used increasingly by HGV drivers to take rest breaks which they are required to take by law. However the HGVs often become a target of anti-social behaviour. Recent expansion of parks on A5; similar facilities are required in other areas.	Partial	X			✓	✓		
Social and environment	All	Flood risk map shows flooding issues to be a lot less extensive than the Environment Agency have ascertained. Need to improve forward planning of maintenance to address environmental damage caused by flooding at bridges and culverts. Night maintenance has improved network performance. Need to consider Water Framework Directive when planning new roads. Possible need for new drainage technology.	Yes	X	X	X	✓			✓
	A417 Air Balloon Roundabout	Air quality issues at Air Balloon Roundabout.		X			✓	✓		
	A419	Noise is a problem, and an action group has now been set up because of this. There is a concrete section from Cirencester to Cricklade which causes particular problems.		X			✓	✓		
Other	A417/A419	Economic growth in Gloucestershire is hampered by 'Missing Link'. The challenge is finding evidence to support this. Road users avoid this road.	Partial	X			✓	✓		

4.7 Conclusion

- 4.7.1 The Midlands to Wales and Gloucestershire route includes mostly trunk roads with just two motorways, the M54 and M50, to the eastern edges of the route. The route is relatively rural in nature and includes a number of long stretches of single carriageway roads. As well as carrying strategic traffic, the route also carries a large proportion of local traffic. In a number of places the route goes directly through or adjacent to the main settlements.
- 4.7.2 The evidence compiled about this route shows that the current capacity challenges tend to focus around the major towns and cities, in particular along the M54 around Wolverhampton, the A5 around Shrewsbury and Oswestry, the A49 through Hereford and the A417/A419 around Swindon and between Cowley and Brockworth. These areas also tend to be the focus for economic growth. This route serves a critical role in supporting economic development in these towns and cities.
- 4.7.3 There is already considerable investment planned to improve the capacity of this route. This includes 12 Pinch Point schemes which will all be delivered by March 2015. This is a relatively high proportion of schemes compared with other routes. These include 5 schemes at key junctions along the A5 past Shrewsbury and Oswestry. These schemes are expected to address the majority of existing capacity issues as well as facilitate development planned over the short and medium term. However, there isn't an improvement scheme planned for one key junction, the A5 / A49 Bayston Hill Roundabout.
- 4.7.4 Three of the Pinch Point schemes have been delivered at key junctions along the A49 through Hereford. These are expected to improve the existing capacity issues and facilitate some development over the short-term. However, these schemes are not expected to mitigate the anticipated growth over the medium to long term. The Marches LEP strategic economic plan has identified the A49 within the list of its priorities.
- 4.7.5 There is also a scheme in the pipeline which is investigating options for a link road between the M54 to the M6 and M6 Toll. We anticipate that such a link would address the existing and long-term capacity issues along the M54 and A449 around Wolverhampton.
- 4.7.6 Currently there are no improvement plans for the A417 through Cirencester or the A419 around Swindon. Stakeholders have highlighted the single-carriageway section from the A417/A436 Air Balloon junction to the A417 single carriageway 'Missing Link' section as the key capacity constraint within this area. Given the existing capacity issues identified along the A419 it is expected that this road will also be a key capacity constraint for development within the Gloucester and Swindon catchments. The A419 and some of its key junctions with the A420 and at Commonhead are key transport priorities for the Swindon and Wiltshire LEPs. There are existing capacity issues on the route and our stakeholders have ambitions for considerable growth within these cities, which will present a future challenge for the route.
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- 4.7.7 Stakeholders attending our workshops identified Addressing the A49 at Hereford, the M54 west of Wolverhampton and the A417 as the highest priorities. Gloucestershire LEP have also since identified the A417 'Missing Link' as their highest priority to support economic growth.
- 4.7.8 Elsewhere the route tends to currently perform relatively well when looking at the capacity metrics and only limited development is planned in these locations. Whilst it could be argued that development would be more suitable in such areas due to capacity on our network, there are wider planning considerations which mean that significant development in these areas may not be appropriate.
- 4.7.9 The safety challenges along this route are particularly focused around the single-carriageway sections of the route. This is consistent with the national situation as trunk roads, particularly rural single-carriageways, tend to have higher casualty rates. Key locations of concern within this route include the A49 through Hereford and the A417 'Missing Link'.
- 4.7.10 A Pinch Point improvement scheme has recently been delivered at the A49/A465 junction in Hereford. There have also been a number of schemes delivered along the A49 over the last two years. The challenge for the Highways Agency here will be to monitor the impact of these schemes.
- 4.7.11 Although the A417 'Missing Link' was not highlighted as a safety issue in the data presented in this report, stakeholders raised concerns which have been heightened by the recent fatal collisions in the area. We are aware of these incidents and believe that there may be value in reassessing more recent casualty records to understand the situation.
- 4.7.12 From an operational perspective, there was very little evidence available as the majority of the route is not covered by the Traffic Officer Service and there is limited technology. There are opportunities to develop our understanding of the types of incidents, durations and management of incidents particularly on the single carriageway sections. The focus of this could coincide with where capacity and reliability issues have been identified such as the A49 through Hereford, A419 around Swindon and the A417 from Cirencester to the M5. Developing a better understanding of incidents along the route will also provide information to enable further opportunities to communicate this information to road users. The rural nature of the route does present a number of challenges in relation to the provision of technology.
- 4.7.13 The assets along the route are in reasonable condition however deterioration can be expected over the route-based strategy period. This is particularly the case for the pavement in key areas as significant sections are expected to reach the end of their design life by 2021. This is particularly along the A49, M50, A5 and A40. Managing the impact of maintenance schemes on road users and neighbours will be a key challenge. This will be particularly difficult in the single carriageway sections where there can be long diversion routes and where there are high traffic volumes and capacity issues, such as along the A49.

- 4.7.14 Other specific asset issues identified include the two structures on the A40 over the River Severn flood plain. These will require maintenance before 2021. These have complex maintenance issues and finding cost effective maintenance solutions which have minimal disruption to road users will be the key challenge for these structures.
- 4.7.15 A number of social and environmental issues have also been identified. For example, the route passes through a number of sensitive environmental areas. Particular care will be required when developing any improvements for parts of the route which traverse through these areas such as the A417 which is in the Cotswolds Area of Outstanding Natural Beauty (AONB).
- 4.7.16 The trunk road routes, in particular the single carriageway sections, are often used for local journeys by vulnerable users. Stakeholders raised several concerns about crossing the route, particularly as a cyclist.
- 4.7.17 Concerns over air quality were increasingly noted in those areas with high traffic flows compared to the route design and where buildings are located in close proximity to the road. These tend to be in similar places to where there are safety and capacity issues. There could be opportunities to address the air quality issues at the same time as improving the capacity or safety of locations. However, air quality could also be a constraint as care will need to be taken to ensure that improvements do not result in breaches of the European air quality limits.
- 4.7.18 Customers have raised concerns about noise along the A417/A419 between Cirencester and Cricklade and at M54 junction 2. When this surfacing deteriorates, there will be an opportunity to address the noise concerns at the same time as delivering a maintenance scheme by using low-noise surfacing.
- 4.7.19 This route interacts with the following other route based strategies:
- London to Wales - M4 junction 15 has an impact on this route where there is congestion on the A419 around Swindon towards this junction;
 - Birmingham to Exeter – A417, A40 and M50 all have junctions with the M5. Evidence suggests that we do not see congestion on this part of the route due to the interaction with the M5;
 - London to Scotland West – the M54 joins the M6 at junction 10a; and
 - South Midlands – the A449 joins the M54 at junction 2. Traffic travelling east bound splits at M54 junction 2, either going north to the M6 and M6 toll via the A449 and A5 or southbound to the M6 on the M54. Capacity is a concern on the A449 due to the volume of traffic travelling north bound on this dual carriageway trunk road and this links to the capacity concerns on the M54 between junctions 3 and 2.
- 4.7.20 The Midlands to Wales and Gloucestershire route covers one of the more rural parts of our network. The challenges evidenced within the
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report are consistent with those expected for rural roads. For example, overall traffic flows are lower than elsewhere on our network, as it is mostly a single carriageway route, but become higher around key towns and cities. It is these locations where capacity and often safety issues occur. These are also the locations that have more notable economic development plans which are likely to generate additional traffic. Safety issues are also particularly noted on the lower standard roads within the route.

4.7.21 This report has identified a number of key challenges and opportunities. It has shown that capacity, safety and sometimes environmental issues often occur in similar locations along the route, including:

- M54 junctions 3 to 2 (in conjunction with the A449 and A5 covered by the South Midlands RBS);
- A5 / A49 Bayston Hill Roundabout;
- A49 through Hereford;
- A417 Cowley to Brockworth, the 'Missing Link'; and
- A419 around Swindon.

4.7.22 At the workshops, stakeholders identified the first three locations listed above as the highest priorities for this route, suggesting a need to address safety, capacity and environmental concerns at these areas.

Figure 4
Key opportunities and challenges for the route

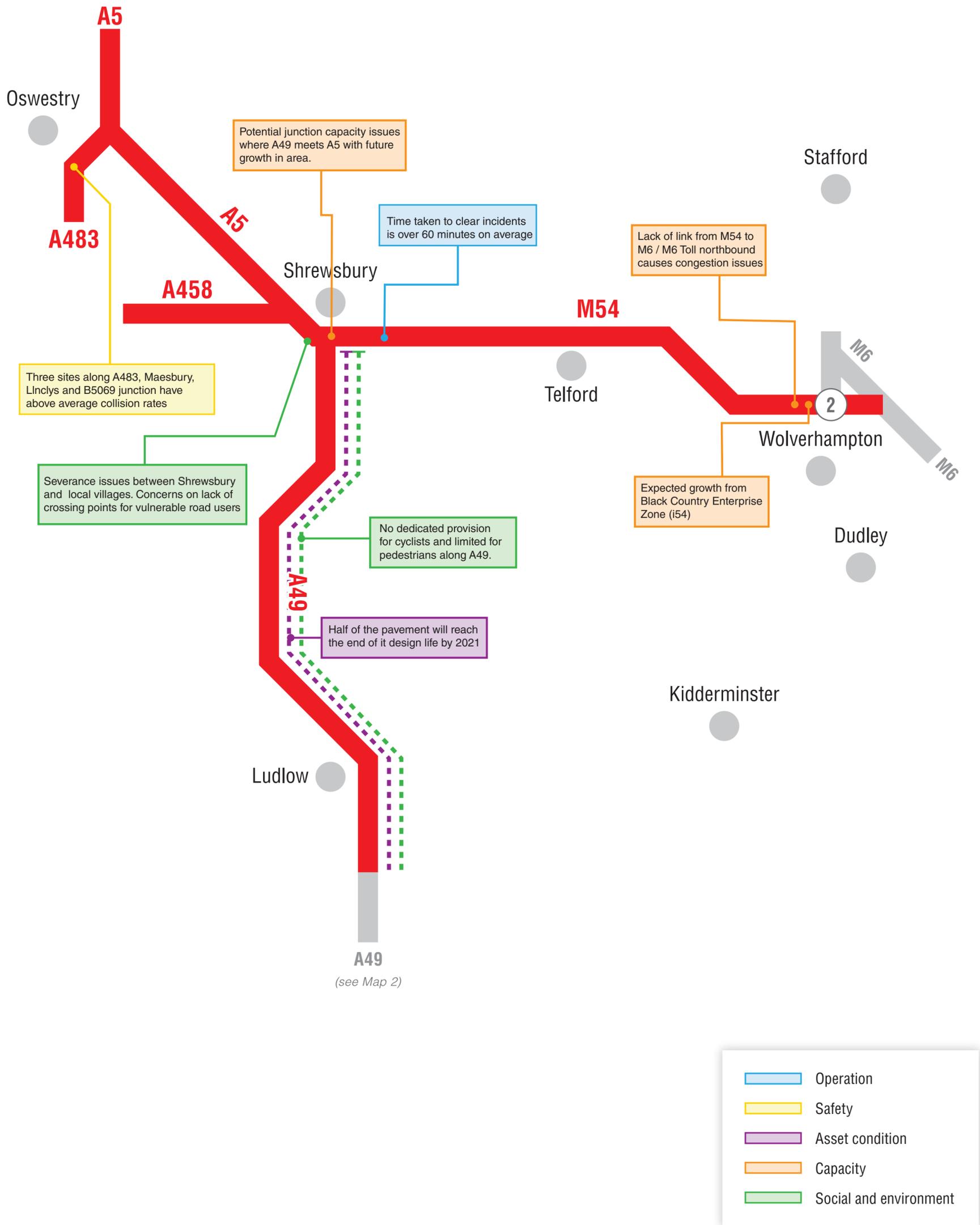
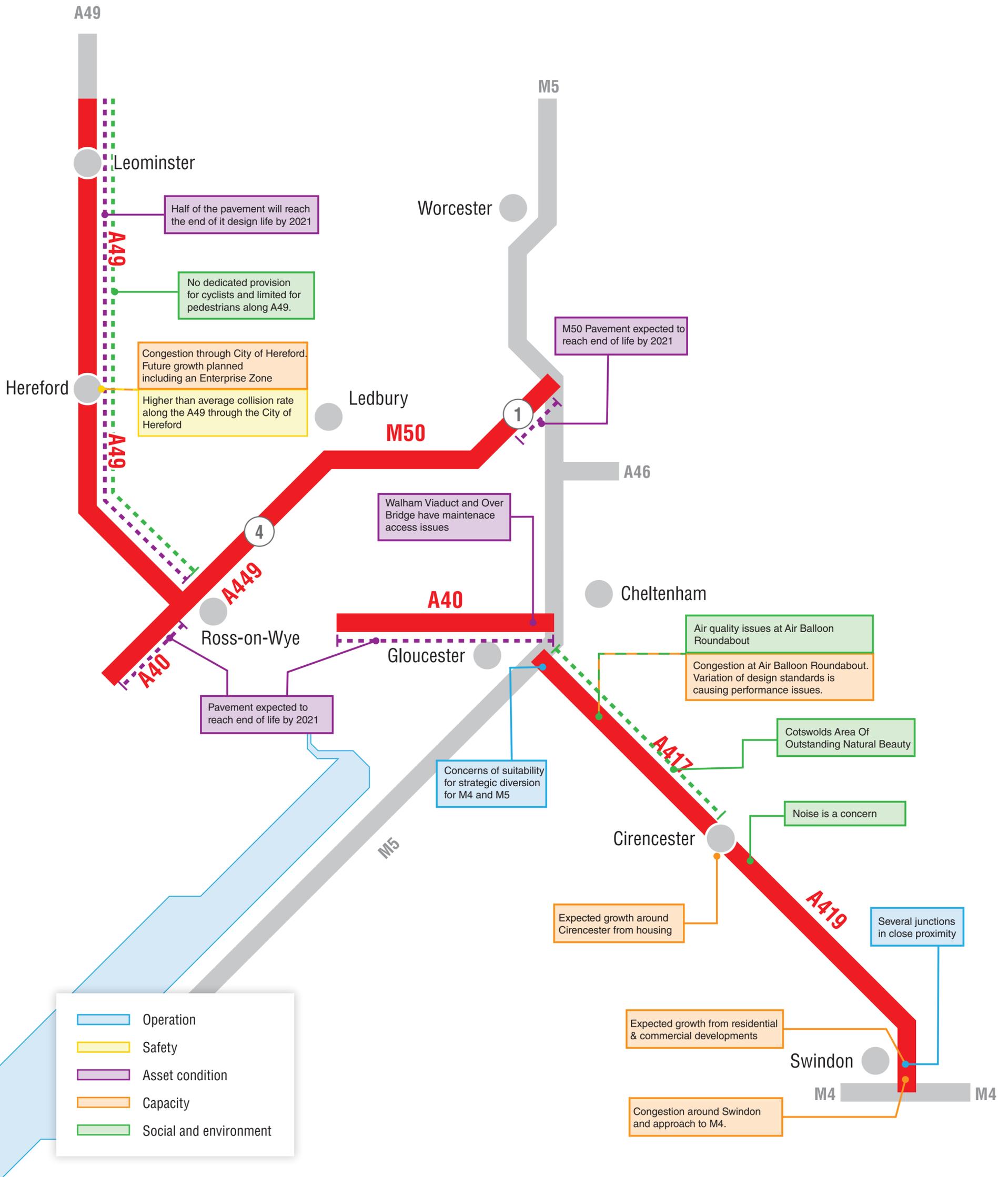


Figure 4

Key opportunities and challenges for the route

(see Map 1)



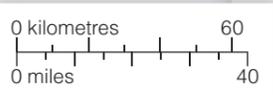
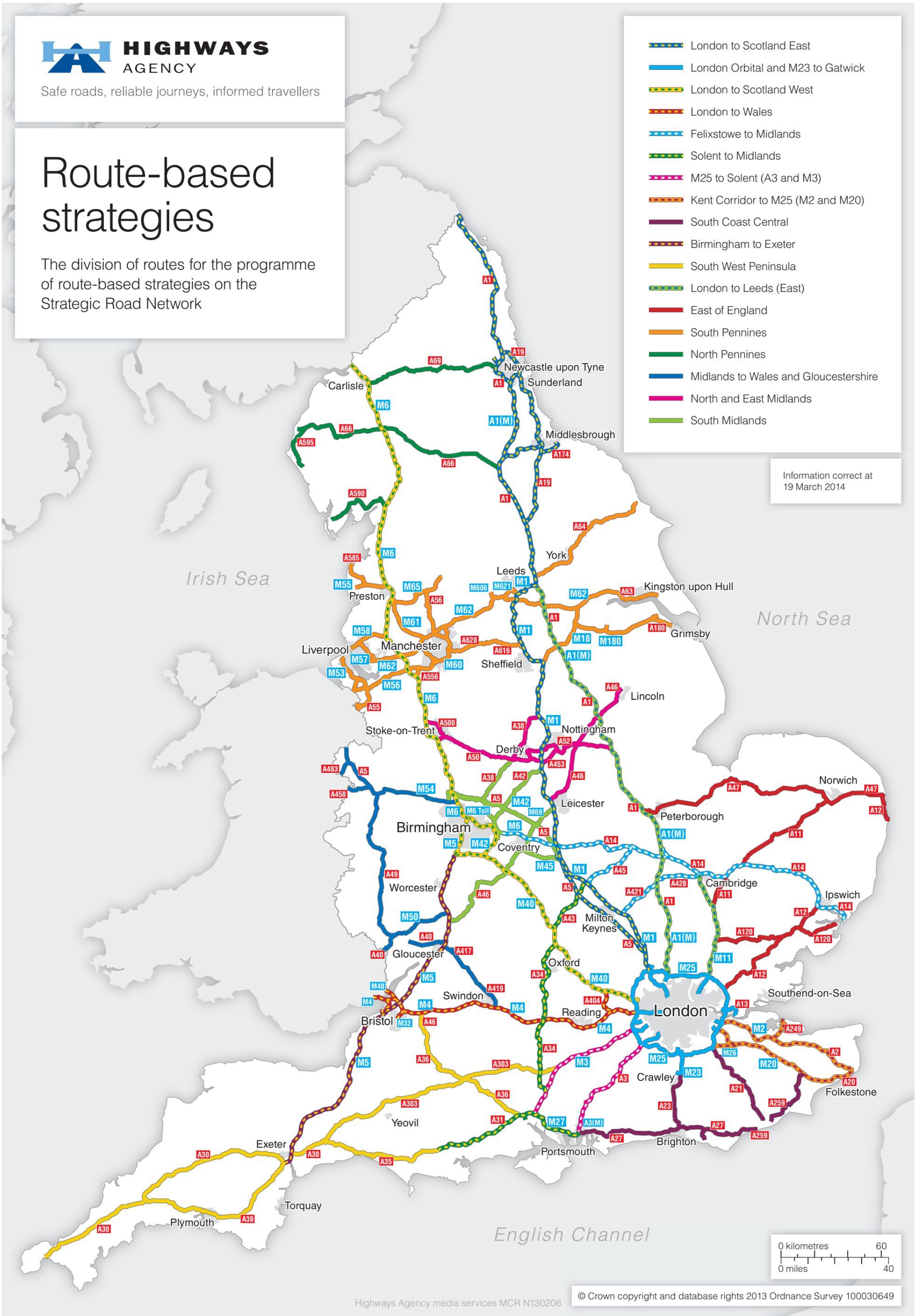
Appendix A Route map

Route-based strategies

The division of routes for the programme of route-based strategies on the Strategic Road Network

-  London to Scotland East
-  London Orbital and M23 to Gatwick
-  London to Scotland West
-  London to Wales
-  Felixstowe to Midlands
-  Solent to Midlands
-  M25 to Solent (A3 and M3)
-  Kent Corridor to M25 (M2 and M20)
-  South Coast Central
-  Birmingham to Exeter
-  South West Peninsula
-  London to Leeds (East)
-  East of England
-  South Pennines
-  North Pennines
-  Midlands to Wales and Gloucestershire
-  North and East Midlands
-  South Midlands

Information correct at 19 March 2014



Appendix B Glossary

Abbreviation	Description
AADT	Annual Average Daily Traffic
ANPR	Automatic Number Plate Recognition
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
CCTV	Closed circuit television
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
FPL	First Priority Location
HRA	Hot Rolled Asphalt
IA	Important Area
LAs	Local Authorities
LEPs	Local Enterprise Partnerships
MIDAS	Motorway Incident Detection and Automatic Signalling
NO ₂	Nitrogen Dioxide
NTOC	National Traffic Operations Centre
RBSs	Route-based strategies
RCC	Regional Control Centre
SACs	Special Areas of Conservation
SPA	Special Protection Area
SRFI	Strategic Rail Freight Interchange
SRN	Strategic road network
SSSI	Sites of Specific Scientific Interest
TEN-T	Trans European Transport Network
TSCS	Thin Surface Course Treatment
TOS	Traffic Officer Service
VMS	Variable Message Signs

Appendix C Stakeholder involvement

Further information on those stakeholders who were involved in the stakeholder events can be found within part B of the Midlands to Wales and Gloucestershire Technical Annex.

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