

*Strictly Embargoed until 0001 7<sup>th</sup> November 2018*



Midlands Connect  
Powering the Midlands Engine

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# A46 Corridor Study – Stage One Enhanced Strategic Case November 2018



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## 1. Introduction

### 1.1 Background

The A46 corridor runs for 250 kilometres between the South West of England and Humberside, through the Midlands. The corridor comprises the M69 and short sections of the M1 and A45. At either end, the corridor divides into a number of corridors, notably the A15 and A173 in the north, and the A44 and A435 in the south (the A46 begins again in Cheltenham and continues via Stroud to Bath). The majority of the A46 corridor is within the area of interest for this study, as shown in Figure 1-1.

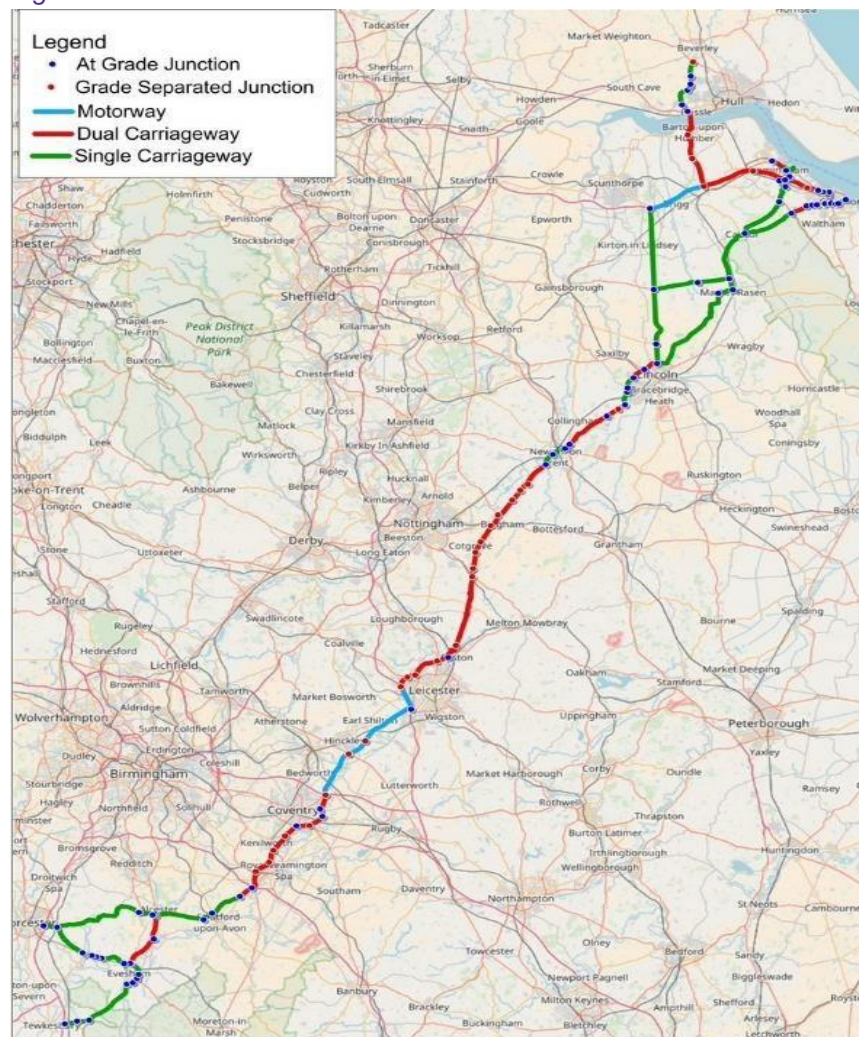
The A46 corridor performs many functions: a bypass to the major settlements along its length (such as Coventry, Leicester, Newark and Lincoln); a connection between radial road corridors (such as the M1 and A1); and providing access to the Port of Bristol, the Humber Ports, and South Wales.

The road's form is as varied as its function: from single carriageway 'A' road with local accesses to three-lane dual carriageways and motorways. As a consequence of the design of the roads in the corridor and the widely-varying demand for its use, the performance of the corridor also varies considerably. High demand around the urban areas results in peak time delays, as do many of the at-grade junctions. Road safety, noise and air quality issues are most prevalent where the roads pass close to, or through, communities. In general the problems on the corridor are well-understood, and in many cases local solutions have already been developed.

Despite the corridor largely comprising a single 'A' road, the corridor has not historically been considered as a whole; improvements to the original 1920s road have been delivered locally on a needs basis by the (then) Highways Agency and by local highway authorities (the section between the M5 and Lincoln is now part of the Strategic Road Network).

There are numerous and varied problems and issues along the corridor in terms of congestion and accident hotspots, environmental and community impacts which future investment should seek to address. Failure to do so will result in further worsening of current network performance, increased impacts on communities and the environment, and inhibit future economic and housing growth.

Figure 1-1: The A46 corridor



[www.openstreetmap.org](http://www.openstreetmap.org) 2011 OpenStreetMap contributors, CC-BY-SA

Despite the fact that the corridor provides relatively rare east-west connectivity, relatively few longer-distance journeys use the A46 for a significant distance due to the varied standards of the road and the resultant performance. In addition, the demand for travel along the length of the corridor is thought to be limited, potentially in part due to the lower standard of some of the corridor, but also reflecting the fact that there is no large city at either end. As discussed in Section 2, there are a large number of strategic housing and employment growth sites on or close to the corridor. This is significant in terms of the potential for the corridor to assist in these sites coming to fruition, however it is noteworthy that the majority of these sites are located where the A46 intersects with other, higher-quality sections of the SRN, such as the M40, M6 and M1. This suggests it is the connectivity offered by these roads, rather than the A46, which is determining the location of these sites.

## 1.2 Midlands Connect

Midlands Connect is a pan-Midlands partnership of local transport authorities, local enterprise partnerships and local business representatives working with the Department for Transport and its key delivery bodies. The Partnership now forms the transport component of the Midlands Engine.

The aim of the Partnership is to support the Midlands Engine to unlock the Midlands' economic potential and support the competitiveness of the whole UK through improving strategic transport links to speed up journey times and improve reliability, capacity and journey quality where it's needed. Midlands Connect's aspirations are for strategic transport networks which:

- are ready for HS2, and are able to fully exploit the economic and regeneration potential the new railway will bring;
- enable the productivity of Midlands businesses to be maximised;
- enable the population and employment growth critical to the future needs of the Midlands economy;
- enable Midlands businesses to efficiently access overseas markets through international gateways;
- enhance the quality of life of Midlands residents; and
- minimise the impacts of travel on the environment.

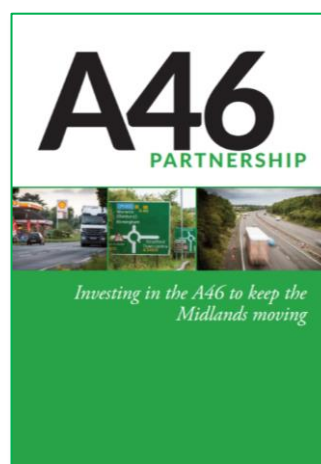
In March 2017, Midlands Connect published a long-term transport strategy which sets out the Partnership's views on the infrastructure capital programme needed over the next 25 years to improve connectivity between key economic hubs in the Midlands, and to the rest of the UK and overseas, and the benefits they will bring.

Since the publication of the Strategy, Midlands Connect has been successful in securing £6 million to fund an ambitious three-year programme of technical work to develop further the projects identified in the Strategy. This study is part of this technical programme.

### 1.2.1 The A46 Partnership

In recent years, interest in improving the A46 corridor has been growing. In 2015 the A46 Partnership was formed, comprising local authorities and Local Enterprise Partnerships. The objective of the A46 Partnership, since expanded to include authorities as far north as Leicester, is to work together to bring forward improvements on the corridor to address challenges including congestion, road safety, poor resilience and community severance.

The A46 Partnership published its prospectus, 'Investing in the A46 to keep the Midlands Moving', in December 2017.



### 1.2.2 Midlands Connect Strategy

In its 2017 Strategy, the Midlands Connect Partnership identified the potential significance of the whole A46 corridor in supporting economic growth in the Midlands. The Strategy notes that improvements to the corridor could:

- provide a strategic alternative to the M5/M42: reducing pressure on the Midlands Motorway Hub and increasing network resilience;
- improve connectivity between the South West and south Midlands, supporting the manufacturing, logistics and agricultural sectors along the corridor;
- improve journey time reliability for all journeys, including freight;
- assist in unlocking and accelerating numerous strategic housing and employment sites in the corridor; and
- overcome local community impacts such as safety and severance.

The strategy also sets out Midlands Connect’s aspirations for the strategic road network and the rail network. The ‘Conditional Outputs’ for roads (see Figure 1-2) describe the long-term aspiration for road journeys between key centres being both quick and reliable in terms of journey time. At this time, much of the A46 corridor does not meet either of these aspirations.

The Strategy included proposals for a strategic study of a potential expressway route between the M5 and the M40, as well as development of business cases for upgrades along the corridor. This study is the first part of this work; but with a broadened scope covering the corridor from the M5 to Humberside rather than the M40.

Figure 1-2: Midlands Connect Conditional Outputs - road



### 1.2.3 Long-Term Midlands Motorway Hub Study

The Midlands Motorway Hub spans key sections of the M42, M5 and M6, and lies at the heart of the regional and national strategic road network. Both Highways England and Midlands Connect Partnership have identified the critical importance of the Hub to both the regional and national economy.

However, the performance of much of the Hub network falls below what is required to support economic growth in the Midlands and further afield. Therefore, in late 2016, Midlands Connect and Highways England commissioned a study to prepare a long-term investment strategy to address challenges and meet the network performance, economic growth and wider objectives.

The study, which concluded in December 2017, examined a wide range of potential options for meeting these objectives, including measures to reduce demand on the Hub by providing alternative routes further afield. The A46 corridor between the M5 and M6 was identified as potentially providing an attractive alternative to the M5/M42/M6 route via the Hub.

The study examined the broad impacts of upgrading the A46 to a common expressway standard between the M5 and the M6/M69, which included: a mixture of new offline alignment and online dualling from M5 J9 to south of Evesham; online dualling of the Evesham Bypass; and online dualling between Alcester and the A439.

The initial assessment of the upgrade found that journey times could be reduced by as much as 13 minutes between the M5 and M40, but that congestion on the A46/A45 around Coventry could increase as more traffic is drawn into the corridor.

Wider economic benefits were not estimated for the scheme on its own, but the study concluded that investment in this route would deliver significant wider economic benefits resulting from:

- increased agglomeration and productivity gains through supporting inter-city movements;
- long-distance agglomeration arising from reduced journey times between the South-West, the Midlands and on to Yorkshire and the North-East; and
- a positive impact on economic growth from increased output and job creation through enabling growth in key business clusters and high value economic sectors.

The study concluded that improvements to the A46 were worthy of further consideration to better understand the potential national, regional and local benefits which it could deliver.

#### 1.2.4 A46 Corridor studies

The route has been subject to a range of studies across the years led by, Midlands Connect and local authorities. Most recently this has included the Midlands Motorway Hub, the work of the A46 Partnership and a range of Strategic Outline Business Cases (SOBCs) and Option Assessment Reports (OARs) produced to inform the South Midlands & North and East Midlands Route Strategies which guide Highways England's RIS process.

#### 1.2.5 Planned schemes

The route has a number of schemes proposed by Highways England and local authorities. These are at different stages of development but include:

- Binley Interchange (Coventry) - Part of Walsgrave and Binley improvement package. No confirmed delivery date.
- Walsgrave Interchange (Coventry) - Part of Walsgrave and Binley improvement package. No confirmed delivery date.
- Newark bypass – A46 Newark Northern bypass – Announced in RIS1 to be developed for potential construction in RIS2, subject to value for money and affordability.
- Lincoln eastern bypass - Due to be completed by late 2019.

### 1.3 Study objectives and scope

As a result of the findings of the Long-Term Midlands Motorway Hub Study, Midlands Connect has commissioned ACJV to undertake a study of the whole A46 corridor from the M5 to the M180. The purpose of the study is to enhance the evidence base behind this corridor, and to use it to develop a strategic case for investment along all or part of the corridor to support Midlands Connect's broader objectives.

The study objectives, as set out in the client brief are to:

- convey the current and potential future role and function of the A46 through the Midlands and nationally;
- develop a set of specific transport objectives for the A46, based upon the aspiration for its future role and operation;
- identify a long-list of options which could meet the transport objectives, and undertake a high-level assessment of the potential value for money (VFM), benefits and impacts of the different options;
- shortlist the better options to be carried forward;
- make recommendations as to how investment in the corridor should be sequenced;
- form a preliminary enhanced strategic case for improving the A46 based on the strategic and economic benefits; identifying the role and contribution each section makes to the overall case for investment;
- achieve strong stakeholder buy-in to the proposals being put forward; and

- scope the work required to take the first three sections of route to a Strategic Outline Business Case stage.

## 1.4 Study process

The project commenced in October 2017 and has subsequently progressed through five stages as illustrated in Figure 1-3. The figure also shows the deliverables for each stage and the actual or planned delivery date of the final version of each. This report is one of the deliverables of Task 4.

Figure 1-3: Summary of Study Process



This report will be summarised in a shorter Strategic Document and also in leaflet form. The final deliverable will be a technical note setting out the work required to progress the next phase of the corridor study with reference to how this work could link to Highways England's (HE) Project Control Framework (PCF) Stage 0 and beyond.

## 1.5 Stakeholder engagement

Stakeholder engagement has been an important part of this study and has supported an evidence-led approach and generated support for study findings. Stakeholders were engaged at two stages during this study; during Task 1 to understand the constraints and opportunities on the corridor and during Task 2 to help develop the long-list of options. Key stakeholders also sit on the Project Board. Further engagement has also taken place through attendance of study team members at the A46 Partnership meetings in December and May.

During Task 1, a range of interviews were held with LEPs, highway authorities, and planning authorities from across the corridor to understand the baseline conditions on the corridor. The findings from the interviews were complimented by 16 interviews with businesses and industry groups along the corridor. A selection of the LEPs, Highway Authorities, and Planning Authorities were engaged with again during Task 2 to provide input into the long-list of options.

Table 1-1 summarises the stakeholder engagement that has been undertaken as part of this study. A full list of the stakeholder organisations which participated in this study is provided in Appendix A.

Table 1-1: Summary of stakeholder engagement activities

Task	Activity/purpose	Method	Date
1	LEP interviews to establish growth priorities for each of the LEP areas on the A46 corridor.	Telephone	December 2017 – February 2018
	LA interviews to establish planned development sites and associated transport schemes.	Telephone	
	Business interviews to better understand how the A46 could act as a barrier to growth and investment.	Telephone	
2	Workshop 1 to establish options for the Gloucestershire and Worcestershire sections of the corridor.	Face-to-face	19/02/2018
	Workshop 2 to establish options for the Warwickshire, Coventry City, Leicester City and Leicestershire sections of the corridor.	Face-to-face	22/02/2018

	Workshop 3 to establish options for the Nottinghamshire, Lincolnshire and Humber sections of the corridor.	Skype	15/03/2018
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## 1.6 Purpose and structure of this report

This is the final main deliverable from the study and is intended to set out the case for investment in the corridor and set out the next steps towards delivering that investment. The following chapters are structured as follows:

- **Chapter 2** describes the strategic case for investment in the A46 corridor, emphasising the important economic role which the corridor already plays, and how this could be positively transformed in the future. This includes a summary of the appraisal of an illustrative package of measures which is intended to represent the maximum likely level of investment in the corridor.
- **Chapter 3** describes where on the corridor the case for investment is strongest.
- **Chapter 4** sets out our recommendations for the activities which are now required to progress towards detailed scheme development and delivery.

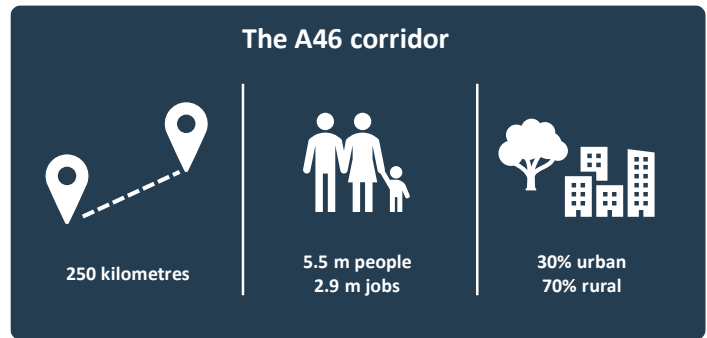
## 2. The case for investment in the A46 Corridor

### 2.1 Background and context

#### 2.1.1 The A46 corridor

The A46 corridor runs for over 250 kilometres from the M5 at Tewkesbury to Grimsby in Humberside. As well as the A46, the corridor includes sections of the A44, A422, A45, M69, M1, A15, M180, A160, and the A1173.

The characteristics of the road vary significantly along the corridor, from single carriageway rural sections to urban dual carriageways and motorways. Upgrades to the original roads have been piecemeal as the most pressing problems of congestion and safety have been addressed. However, at-grade junctions and single carriageway sections result in traffic bottlenecks, exacerbated by very high traffic volumes in some locations.



The character and function of the landscape the corridor passes through is also very varied. Approximately two-thirds of the corridor passes through rural areas, running adjacent to market towns and villages, but passing directly through relatively few, and connecting them to the wider Strategic Road Network.

The corridor serves many, sometimes conflicting, purposes for both local and longer-distance traffic including:

- providing access to international gateways including the Humber Ports, Port of Bristol, Humberside, Coventry and Birmingham Airports;
- linking locations on the A46 to other parts of the Strategic Road Network (SRN) and the rest of the country;
- providing critical connections between homes and jobs;
- providing access to existing jobs and housing sites;
- acting as a ring road and/or bypass for locations such as Warwick, Coventry, Leicester and Lincoln; and
- to a greater or lesser extent, providing connectivity for parts of long-distance journeys.

#### 2.1.2 The economic importance of the A46 corridor

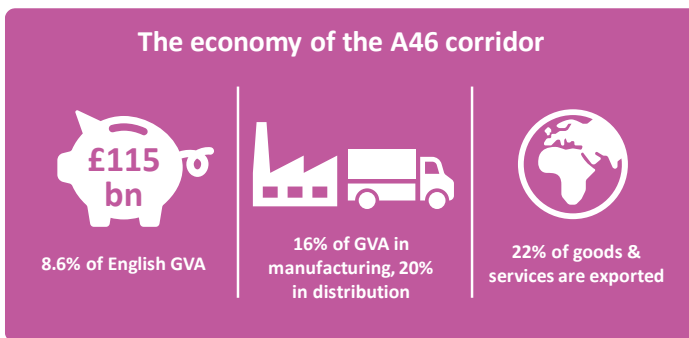
The A46 corridor is already an important economic spine; businesses in the corridor produced £115 billion output in 2015, nearly 9% of English GVA. The corridor is home to over 2.8 million jobs (over half of all jobs and GVA from the Midlands Connect area). The corridor is home to 5.5 million people and 2.4 million homes.

The Strategic Road Network is critical to the economy of the Midlands. 28% of Midlands GVA is in SRN-dependent sectors, such as construction, manufacturing, logistics and quarrying/mining, which is much higher than the English average (21%). SRN dependent sectors on the A46 make a significant contribution to the Midlands and UK economy - 10% of England's total output in these sectors is located on the A46 corridor. Some of the key sectors include automotive, aerospace, textiles and agriculture. Outputs from industries such as aerospace and automotive generate a large volume of exported goods due to the international profile and significance of the products created. In fact, 22% of goods and services are exported from the A46 corridor.

The largest single industrial sector is Distribution (Wholesale & Retail, Logistics & Transport & Food Services), which accounts for 20% of all economic output, whilst Manufacturing accounts for 16%. In comparison to England as a whole, the corridor's economy has a high share of Agriculture, Other Production (quarrying and mining) and Manufacturing (almost twice the English average, and 30% above the national average outside London); but a low relative share of economic activity in Information & Communication, Finance and Business Services.

Over a quarter of all jobs and GVA in the corridor are in sectors dependent on the Strategic Road Network such as retail, manufacturing and construction. The share of Midlands jobs in these sectors is higher than any other part of England and significantly above the UK average.

The agricultural industry, whilst not the dominant sector in any one location, is important to many areas along the corridor. The road network is vital in the distribution of perishables and produce but also in ensuring high quality staff are available to sustain the industry and ensures its future.



In the more peripheral parts of the corridor to the north-east and south-west, the dominant sectors tend to be manufacturing and less footloose sectors such as tourism and agriculture. The performance of these sectors is less dependent on peak-time network performance and more dependent on reliable journey times. The central part of the corridor, including the Coventry/Leicester economic hub and Warwick, has a more mixed economy including manufacturing and

logistics, but also a larger professional services sector which is dependent on peak period capacity, connectivity to labour markets and absolute journey times.

The East and West Midlands exports a higher share of GVA than any other region in England after the North East. Access to international gateways is therefore critical to the Midlands economy. Half of these exports are generated in the A46 corridor and are particularly important to the economies of Solihull, Coventry, North and North-East Lincolnshire, Warwickshire and Worcestershire.

Over the period 2015 to 2030, the economic output of the corridor is forecast to increase by 35% to £153 billion. Over the same period, the number of jobs in the corridor is forecast to grow by 146,000 or 5%, and the population by nearly 400,000. Jobs growth rates are particularly high in the logistics & freight, retail & wholesale and manufacturing sectors. But, this 'business as usual' (BAU) growth could be significantly higher with greater investment supporting productivity and new sites.

### 2.1.3 Conditions and use of the A46

Traffic flows (excluding the short M1 section) are highest on the Leicester Western Bypass (70-80,000 vehicles Annual Average Daily Traffic – AADT in 2017). Traffic levels on the Coventry-Leicester and Leicester-Newark sections are lower at approximately 40,000 AADT, whilst traffic levels on the more peripheral sections can fall to 20,000 AADT.

*"Making the route into a dual carriageway or more of a motorway-type road would have massive benefits. Traffic would be much more predictable."*

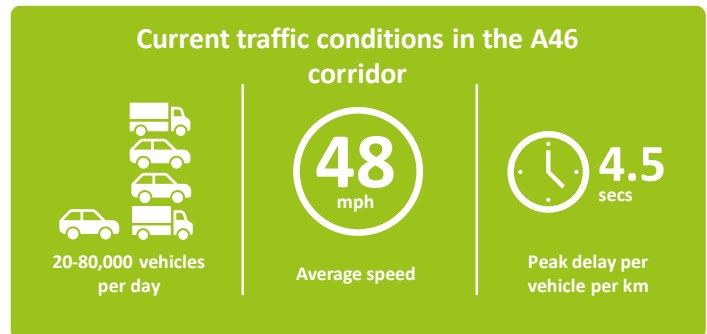
FCC Environment, Lincolnshire

The performance of the vast majority of the corridor falls below the Midlands Connect Conditional Output of an average speed during the peak periods of 60 mph. Average speeds tend to be higher where road standards are higher; such that where improvements have been made average speeds are consistent with the design standard. The only sections of the A46 which meet or exceed the conditional output are those which operate as either Dual-2 lane All Purpose or Motorway (D3) standard.

These sections are also where traffic is greatest, meaning that the sections with generally higher speeds are also those with higher traffic levels but also greater aggregate levels of delay which reflects the higher capacity of the links and junctions which are more typical in the central section. In this regard, the capacity and standard of the road does influence its use compared to alternatives, as a higher standard will make the A46 more attractive. But it is also clear that, historically, investment has occurred in those locations experiencing the greatest delays due to congestion, meaning that the capacity and/or standard of the road is influenced by demand for its use.

Both average speeds and journey time reliability are significantly impacted by at-grade junctions with the worst 'hotspots' including the M1/A46 around Leicester, Hobby Horse Interchange, the A1/A46 interchange, Lincoln bypass and the Coventry ring road. The absolute capacity of the road also causes delays where traffic is highest. Particularly high 'volume / capacity ratios' are observed around Evesham, Coventry, Leicester and Lincoln where local and longer-distance traffic interact.

Average journey times on the A46 are generally slightly lower than those on alternative motorway journeys (such as the M5/M42/M6). The evidence suggests that the A46 currently carries a relatively small proportion of national traffic as the variability of journey times on the motorway network tends to be lower, and the legibility of the route is poorer.



There are also currently relatively few journeys which currently travel along the entire corridor, which reflects the poorer legibility and performance of the corridor at present, but also the fact that there are currently relatively few journeys travelling between the South West and Humberside areas; investment in the corridor could fundamentally influence where businesses decide to locate, meaning that over time the A46 corridor could become a much more important economic spine.

Origin-destination patterns in the corridor are complex. A significant proportion of traffic is made up of sub-regional journeys of 50-100 kilometres in length, most of which begin, end or pass through the central section. Some sections also have a particularly important local function; for example, only 20% of traffic on the Leicester Western Bypass is through traffic (although the very high traffic volumes on this section mean it is also strategically important).

Road safety is a key issue for the A46 corridor due to a range of issues including road geometry and a number of single carriageway sections which results in overtaking manoeuvres and consequential accidents. Congestion at key junctions also results in a range of accidents. Accident blackspots tend to occur more frequently north of Newark and south of Coventry.

## 2.2 Objectives of intervention

The role and function of the A46 corridor is complex and varies greatly in different locations. This is reflected in the diversity of types of short, medium and long-distance trips using the corridor. The study has adopted a simplified model to understand and describe the role and function based on three geographic levels, and to define objectives of intervention.

The primary objective for intervention in the A46 is to unlock and enable economic growth. Transport investment can support this by:

- improving connectivity and reducing journey times for freight to support business productivity and reduce transport-related and other operational costs – bringing suppliers and markets closer to businesses;
- improving connectivity and reducing journey times for people on this critical part of the SRN to expand skilled labour pools, attract skilled labour through enhanced quality of life and make business to business interaction easier and cheaper (supporting agglomeration benefits);

- reducing the variability of journey times so that businesses can minimise costs associated with building in additional time into schedules to allow for delays in deliveries and ensure goods are delivered on time;
- providing additional capacity to enable growth in jobs and homes, including providing capacity for, and access to, key growth sites;
- improving links to international gateways, improving the attractiveness of the Midlands and wider UK economy for new international trade and investment; and
- raising the resilience of the network to planned maintenance, incidents and events so that businesses can continue to operate normally during periods of disruption.

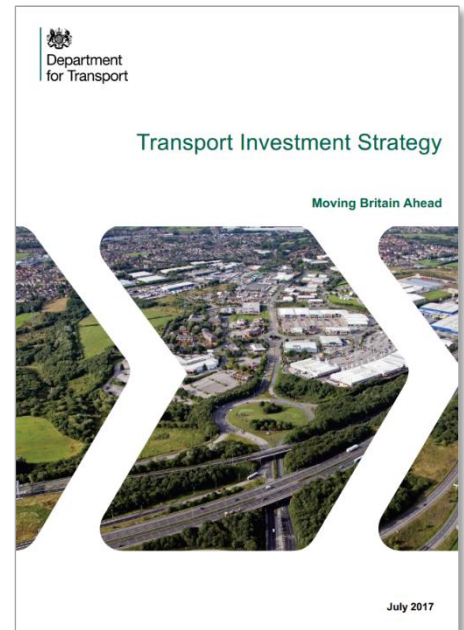
Table 2-1 summarises the agreed objectives for investing in the corridor for each of the three geographic levels.

*Table 2-1: Summary of objectives of intervention in the A46 corridor*

Level	Objectives of intervention
National	Provide viable alternative routes (to the M5, M42, M6, M1 and M18) for long-distance east-west traffic travelling between the M5 and M1 corridors, and between the M1 and A1 corridors, thereby improving network resilience. Providing an alternative to the congested M42/M6 Birmingham motorway box is particularly important.
	Minimise greenhouse gas emissions from traffic.
Sub-regional	Provide high quality connectivity (journey times and journey time reliability) between the Midlands economic hubs, in particular: Leicester/Coventry; Derby/Nottingham; Warwick/Leamington; and Birmingham/Black Country.
	Provide high quality connectivity to the rest of the UK and to international gateways. In particular between: <ul style="list-style-type: none"> <li>• settlements in the corridor and BHX, EMA and HS2 Interchange, Toton and/or Sheffield stations;</li> <li>• the Midlands and the South West (including Port of Bristol);</li> <li>• the Midlands and Humberside;</li> </ul>
	Support delivery of strategic employment sites along the corridor; and the longer-term supply of jobs.
	Support delivery of strategic housing sites along the corridor; and the longer-term supply of housing.
Local	Support delivery of local employment and housing sites.
	Minimising the negative impacts of the road corridor on communities: air quality, safety, noise and severance.
	Minimise the negative impacts of the road corridor on the built and natural environment.

The remainder of this chapter describes the case for investment in the A46 corridor as a whole. The case is structured around the Government’s four priority objectives for transport investment described in the Transport Investment Strategy <sup>1</sup>. As shown in Figure 2-1, the outcome objectives for the A46 corridor shown above relate closely to these priorities, and to the economic roles of the SRN defined by Highways England <sup>2</sup>. As such, the content of this chapter clearly demonstrates how investment in the corridor will support not only the objectives of Midlands Connect, but those of the Department for Transport and Highways England.

Figure 2-1: The government’s transport investment priorities, and the economic roles of the SRN



	Transport investment priorities (DfT)				Economic roles of SRN (HE)				
	Creating a transport network that works for all	Building a stronger, more balanced economy	Enhancing our global competitiveness	Supporting the creation of new housing	Supporting business productivity & effectiveness	Providing efficient routes to global markets through international gateways	Stimulating & supporting development of homes & employment spaces		
<b>A46 outcome objectives</b>	<b>National</b>								
	Provide viable alternative routes for long-distance east-west traffic to improve network resilience								
	Minimise greenhouse gas emissions								
	<b>Sub-regional</b>								
	Provide high quality connectivity between the Midlands economic hubs								
	Provide high quality connectivity to the rest of the UK and to international gateways								
	Support delivery of strategic employment sites and the longer-term supply of jobs								
	Support delivery of strategic housing sites and the longer-term supply of housing								
	<b>Local</b>								
	Support delivery of local employment and housing sites								
	Minimise negative impacts of the road corridor on communities								
	Minimise negative impacts of the road corridor on the built and natural environment								

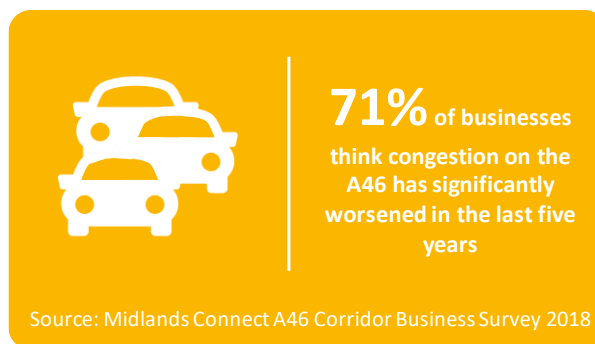
<sup>1</sup> As set out in Department for Transport (July 2017) Transport Investment Strategy: Moving People Ahead

<sup>2</sup> As set out in Highways England (March 2017) The Road to Growth: Our Strategic Economic Growth Plan

### 2.3 Creating a transport network that works for all users

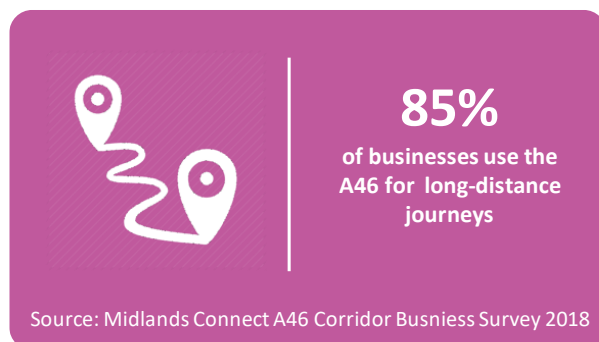
The current performance of the A46 is very mixed. In some places it performs well (such as the M69 and the Newark-Widmerpool section) but most of the corridor suffers from a range of performance issues. In particular, the poor standard of the road in some places, the remaining at-grade junctions, and the sheer volume of traffic result in congestion. The worst pinch points generally occur where the A46 intersects with other arterial routes (such as at Hobby Horse Interchange, the A1 at Newark, and the M1 at Leicester) or where there is significant interaction with local traffic (such as at Evesham, Coventry and Lincoln). As detailed elsewhere, average speeds in the peak and inter-peak can be low, and variability of journey times can be high. The latter is often of most concern to businesses, especially those in the manufacturing, construction and distribution sectors; reliable journey times are critical to allow businesses to operate efficiently using complex just-in-time delivery processes. This is a particular issue for trips to the ports (exporting activities are particularly important to the economies of Derby, Coventry and Kingston-upon-Hull). Therefore, better accessibility to the Port of Bristol and Humber ports via the A46 could help to sustain and grow the markets for these ports by attracting new business (some of which could be re-routed from other ports) especially in the Roll-on Roll-off (Ro-Ro) market.

Investment in the A46 corridor such as that proposed in the 'illustrative strategy' (see below) will transform the performance of the route in terms of its capacity to accommodate growth, and the speed and reliability of journeys. Doing so will create a new economic spine for the Midlands and UK supporting the productivity of businesses across the UK, supporting and enabling housing and jobs growth, and improving conditions for local communities (especially regarding air quality, severance and safety) and the environment. Without that investment, the performance of the route will decline, with consequent impacts on business performance and inward investment.



As a new economic spine, the A46 can serve local, regional and long-distance users, wherever they live or work by enabling fast, reliable access to jobs, labour markets, and supply chains. At a national level, the A46 could become an important national spine, proving much better connectivity between the South West, Midlands and east coast, critically offering a viable alternative to routes via the Birmingham Motorway Box which is critically congested. Improvements are needed on much of the corridor to achieve this, especially the section west of the M1.

At a sub-regional level within the Midlands, an improved A46 will offer better, more reliable connectivity between our economic hubs (particularly Leicester/Coventry, Derby/Nottingham and Warwick/Leamington Spa), to Birmingham and East Midlands airports and the ports of Humberside and Bristol. The current poor performance of sections of the corridor hold back growth in our region and nationally by inhibiting the efficient movement of people and goods.



The A46 also has an important role in supporting the local economies along its length, such as Lincoln and Evesham, by reducing the conflicts between local and longer-distance traffic and improving connectivity in a way which transforms the economic competitiveness of these locations. For example, a better A46 will provide the improved connectivity to make more peripheral land/premises more accessible and therefore viable; supporting profitability and helping to re-balance the economy (e.g. by broadening supply chains); widen markets and

connect people to jobs. It can help those communities which have been left behind economically to become more attractive locations to invest and for the businesses in those locations to perform more strongly.

As the Transport Investment Strategy notes, there are few significant lateral (east-west) arteries across England. Ensuring that these routes perform to their highest potential is important for all users of the corridor, as well as those on alternative routes and in the economies and communities through which the A46 passes. Business as usual investment will over time remove bottlenecks and other barriers to growth, but potentially the scale of underlying growth in demand for travel will mean that overall conditions deteriorate further and the A46 remains a barrier to growth. Therefore, what is required to unlock this growth potential along the corridor is BAU+ investment which brings tangible and large-scale improvements in performance which enable this growth to materialise.

## 2.4 Building a stronger, more balanced economy

Historically the Midlands has lagged behind the UK in terms of productivity (GVA/head), as shown in Figure 2-2. The Government's Industrial Strategy recognises the importance of reducing the productivity balance between the north and south of the UK as well as the gap to our G7 peers.

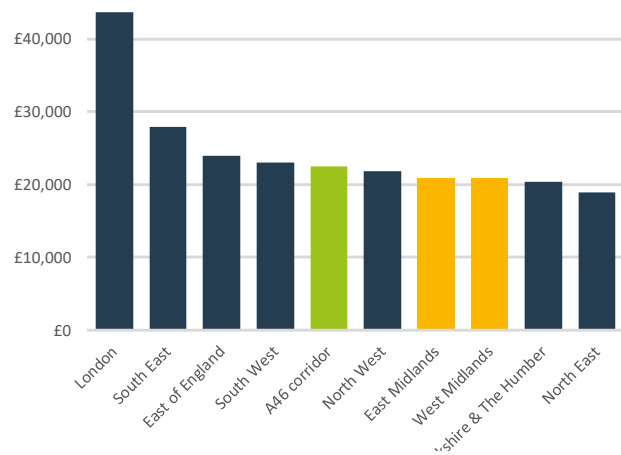
Closing this gap is a key aim of Midlands Engine. Productivity in the A46 corridor is already slightly above the Midlands average, due to clusters of sectors such as advanced manufacturing and agri-food. These include the battery technology sector in Warwickshire, car manufacturing, Leamington's 'Silicon Spa' and food production in Leicester. These sectors also have a high growth potential, meaning that the corridor has the potential to play an important role in closing the national and international productivity gaps; reducing the imbalance of economic prosperity between different parts of the UK.

Performance and growth in these 'SRN dependent' sectors is heavily dependent on the SRN, meaning that an effective A46, with the capacity to accommodate future growth, will be critical to achieving these aspirations. As well as enabling businesses to perform more efficiently and attract investment, an improved A46 which connects economic hubs within the Midlands to each other and the rest of the UK will also support a stronger economy and enable further clustering of high-performing businesses. This includes providing reliable landside connections to ports and airports.

An expressway standard A46 corridor between Tewkesbury and Leicester for example could enable average speeds of 60 mph. This would reduce journey times between the M5 J9 and M1 J21 by as much as 16 minutes and significantly reduce the variability of journey times by tackling pinch points and congestion.

Similarly, whilst the majority of the A46 between the M1 (J21A) and the A1 at Newark is already built to expressway standard, the congestion hotspots on this section, in particular on the Leicester Northern Bypass, at Hobby Horse Interchange and at the junction with the A1 at Newark mean that the route is not attractive as it could be for inter-urban movements. Congestion on the M1 is forecast to worsen in the future meaning the A46 could provide an increasingly attractive alternative for inter-urban journeys if the pinch points are addressed.

Figure 2-2: GVA/head by region (2015) Source: Office for National Statistics (ONS)



*"We experience daily delays along the A46 corridor, impacting on our 'delivery on time' targets, which in turn can drive inefficient routing, as the planners will plan to arrive on time but are unable to fill the vehicle due to driving time lost through delays"*

Nisa Retail, Lincolnshire

Investment in the A46 will also support urban networks to function more effectively by widening labour pools and increasing economic density, and reducing business costs. Where the A46 currently serves both a local and more strategic function (such as around Leicester and Coventry), improved performance on the A46 itself could enable local road networks to function more effectively by ensuring that strategic traffic is using the SRN, and that the SRN does not cause severance effects.



Access to skilled labour is seen as an issue across the A46 corridor. In more peripheral areas such as Greater Lincolnshire, poorer connectivity makes commuting difficult and therefore, attracting labour from other areas is challenging. The A46 can play a key role in expanding the labour markets of the urban areas along the corridor. In high growth areas around Warwick, Coventry and Leicester the A46 is becoming increasingly important for local traffic and for accessing jobs in city centres and key Midlands Connect growth sites. Further, as

population and housing spreads across a wider area people are using the A46 to commute longer distances to access jobs. This is a key issue for the A46 as it needs to serve the needs of both longer distance traffic and more local traffic.

A significant number of key growth sites are located along the corridor. The largest tend to be in the central section (Warwick-Leicester) but smaller-scale growth is potentially transformational in other parts of the corridor too. At present, this growth is expected despite, rather than because of, the A46 because of the generally good connectivity to/from the Midlands. This is a corridor in which businesses want to locate, but current performance of the A46, as well as access to skilled labour, is a deterrent to investment. In fact, the A46 has been identified by many stakeholders as a potential brake on growth which must be overcome. Poor performance of the corridor is also impacting locational investment decisions as well as operational performance and profitability; for example, delay-affected access to the M5 at Ashchurch and the M69 at Hinckley is believed to be inhibiting investment.

The A46 could also unlock growth in more peripheral areas in sectors which are more dependent on good connectivity but which may previously not have located there, e.g. wind turbine production in Lincolnshire. Whilst other locations may still have better connectivity, peripheral areas may have other locational advantages.

## 2.5 Enhancing our global competitiveness

At 22%, the share of production in the A46 corridor which is exported is significantly above the UK average of 15%. This reflects the importance of advanced manufacturing, aerospace and agri-food sectors in particular. To build and maintain successful international links to suppliers and markets, businesses are dependent on high quality, low-cost, reliable and frictionless 'landside' connections to international gateways. The A46 corridor provides these connections to East Midlands Airport, the UK's busiest for dedicated air cargo, from the Midlands and beyond to the North East and South West.

The corridor is also 'bookended' by the ports of Bristol and Humberside with the A46 itself acting as an important 'commodity corridor' linking our key manufacturing, agri-food and logistics sectors to ports. For example, in 2016, 190,000 motor vehicles were exported via the Port of Bristol and a further 250,000 via Immingham <sup>3</sup>.

The A46 has the potential to provide much greater quality of connectivity to these international gateways than it does at present and current performance is thought to act as a barrier to exporting. Investment in the A46 would reduce 'landside' costs (which make up an increasingly large share of total international transport costs) and increase trade flows. There is potential for significant journey time reductions, particularly between the M5 and M40 but also between the M1 and A1 corridors. Further, unreliability of journey times in the corridor deters use by vehicles involved in just-in-time delivery systems which could be addressed by resolution of key pinch points.

As a dominant importer and export area within the UK, the Midlands also has an important role in attracting overseas investment to the UK. As the Transport Investment Strategy notes, the quality of transport connections to ports and airports can determine whether businesses are able to effectively integrate their international operations and ultimately decide to invest here. Better accessibility to the Port of Bristol and Humber ports via the A46 will also help to sustain and grow the markets for these ports by attracting new business (some of which could be re-routed from other ports) especially in the Ro-Ro market.

## 2.6 Supporting the creation of new housing

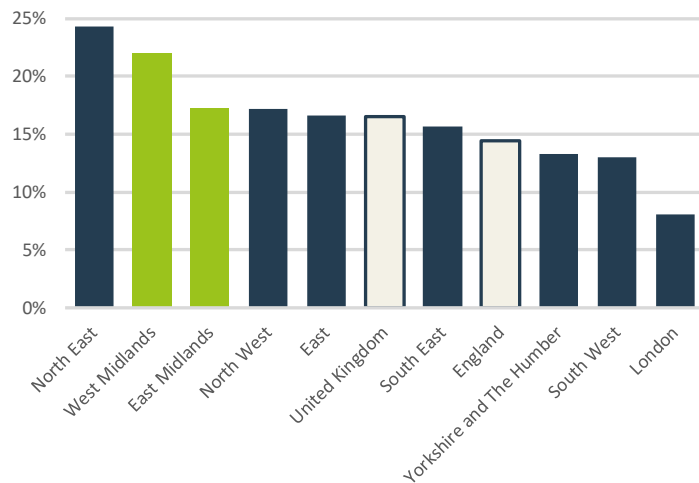
The local authorities in the A46 corridor are working hard to identify housing needs in their areas and to work with the private sector to redress the significant national shortfall in house building. More homes are needed, in the right places, to meet demand, keep housing prices in check and to keep pace with the anticipated growth in jobs in the corridor.

Official ONS projections are for the population of the A46 corridor to grow by 600,000 (over 10%) between 2018 and 2041; an increase which would require an additional 250,000 homes (approximately 11,000 per annum). This level of growth is above the English average, and higher than any other region outside of the south of England. However, within the region, authorities are planning for much higher growth than these projections suggest, reflecting the growing economy and attractiveness of the Midlands as a place to invest.

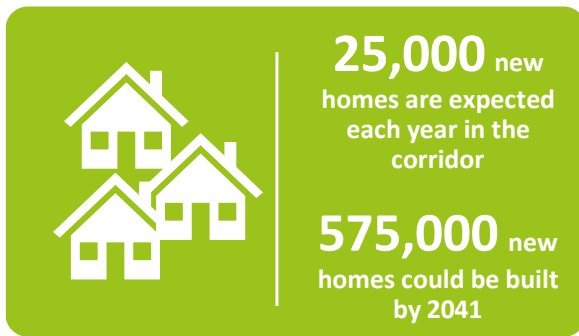
Collectively, the Local Plans of the 40 local planning authorities in the corridor aim to deliver around 25,000 new homes per year (typically to 2031). At this rate, 575,000 new homes could be built in the corridor by 2041. Leicester and Leicestershire alone have identified a need for over 95,000 new homes between 2011 and 2031 and a notional 90,000 between 2031 and 2050. These levels of growth would deliver significantly more housing than the ONS projections suggest and are more akin to growth rates in the South East of England.

The expected intensity of new housing development is greatest in the central section of the corridor, particularly near Warwick, Coventry, Rugby, Nuneaton and Leicester where several large housing developments are planned or in train, as well as around Lincoln. Locally significant housing growth is also planned at Evesham, Newark and Gainsborough.

*Figure 2-3: Value of exported goods and services as a proportion of total GVA, 2017*



<sup>3</sup> Source: DfT (2018) [Transport Infrastructure for our Global Future – A Study of England's Port Connectivity](#)



The A46 can play an important role in providing connectivity between new housing development, jobs and services, and providing the necessary capacity, as well as ensuring that the needs of existing residents are also catered for.

As set out in the Housing White Paper <sup>4</sup>, providing transport infrastructure is one of the 'keys to unlocking development' by providing the necessary capacity for travel and to connect homes to jobs. The scale of strategic housing need described above means that the

scale of investment in transport required to unlock it needs to be a step-change above current levels. Without these additional homes, in the right places, the number of jobs in the corridor, and the size of labour pools will be constrained. However, with investment, improved connectivity will expand labour pools, by bringing cheaper housing further from urban centres within viable commuting times. By enabling the right type of housing in the right locations (those connected to employment centres) businesses will have access to a wider pool of skilled labour.

Better connectivity will also help to address shortages of skilled labour in many parts of the corridor, for example the agri-food and manufacturing sectors in Lincolnshire and Worcestershire. Better connectivity between homes and jobs enabled by the A46 will help to reduce these skills shortages, especially in more peripheral areas.

Multi-modal approaches are required, but inevitably additional road capacity will be needed to unlock housing sites to meet long-term strategic housing needs. This is especially true in the high pressure central part of the corridor where high levels of congestion and lack of road capacity are already constraining housing growth. A better-performing A46 would also 'spread the load' of commuting journeys on the road network (such as the M40 and M1) by enabling a more diverse pattern of commuting.

## 2.7 Appraisal of the 'illustrative package'

### 2.7.1 Introduction

An 'illustrative package' of options has been modelled and appraised to give an indication of the potential costs and benefits of significant investment in the A46 corridor which brings most of the route to expressway standard.

The package as tested is shown in Figure 2-4. The Project Board selected these options on the basis that they represented the maximum likely level of investment in the corridor. The figure also shows the schemes assumed to be in the 'do minimum' scenario, i.e. those assumed to be in place before the illustrative package. It is this 'do minimum' that the package is compared against. The 'do minimum' scenario includes some schemes which are not yet committed but which the Project Board see as a necessary precursor to the illustrative package. These are:

- Binley and Walsgrave junction improvements east of Coventry;
- A5 Dodswell – Longshoot widening; and
- Newark Northern Bypass and junctions including A1, A46 and A17.

The key elements of the illustrative package are:

- offline bypasses of Ashchurch, Beckford and Evesham and other improvements to provide a high quality dual carriageway standard between the M5 and M40;
- junction improvements at Thickthorn, Stivichall and M6 J2;
- a new Leicester Eastern/Southern Bypass, including a link from M69 J2 and a new M1 J20A;
- junction improvements between the A1 and Lincoln to provide grade separation;
- a southern bypass of Lincoln, connecting to the under construction eastern bypass; and
- targeted improvements on the A15 north of Lincoln.

<sup>4</sup> HCLG (2017) [Fixing our Broken Housing Market](#)



*Strictly Embargoed until 0001 7<sup>th</sup> November 2018*

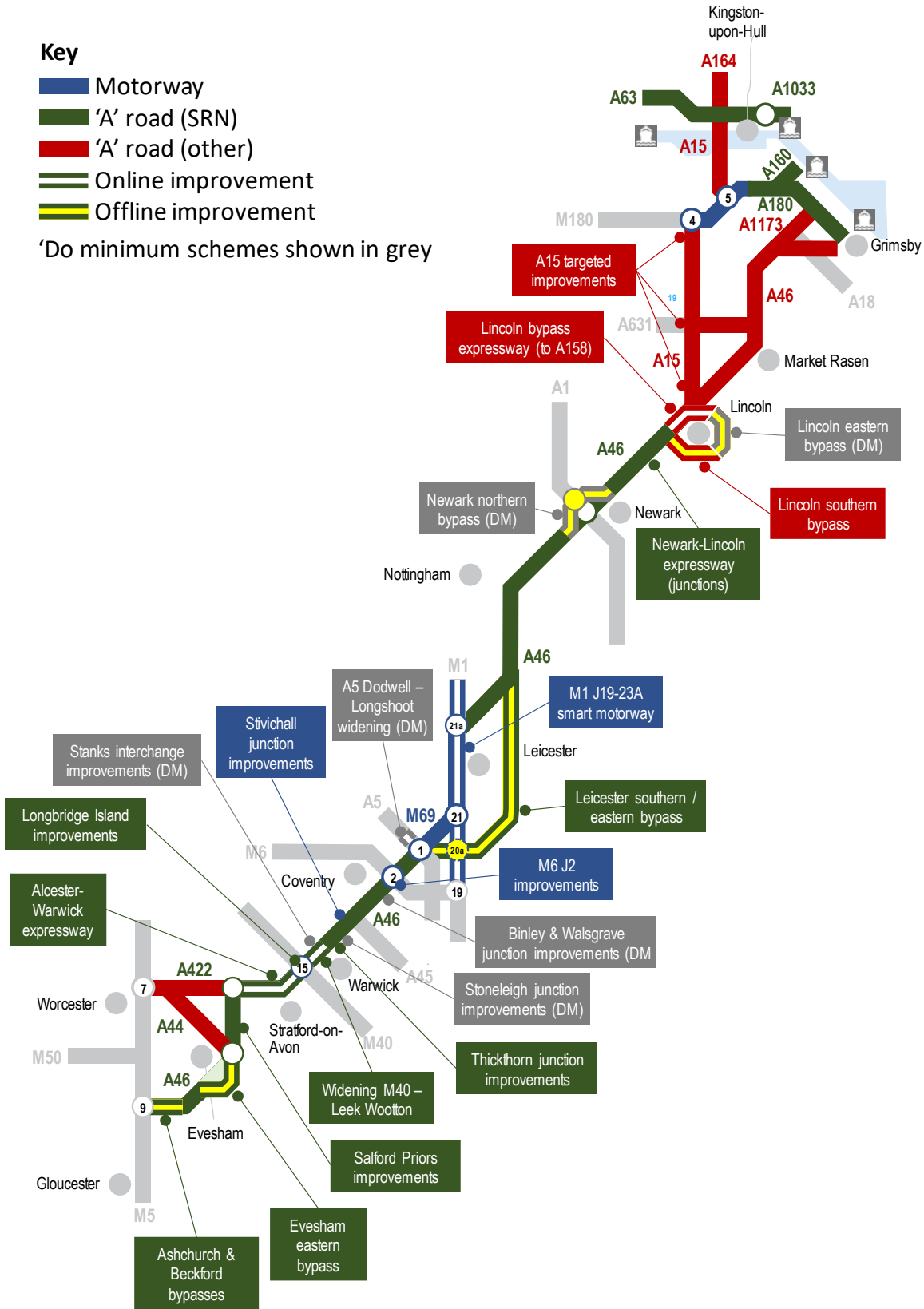
These components would be delivered in a phased programme over approximately 20 years (for the purposes of the appraisal scheme opening years are assumed to be 2031 to emphasise the benefits of an accelerated delivery programme).

Figure 2-4: 'Illustrative package'

**Key**

- Motorway
- 'A' road (SRN)
- 'A' road (other)
- Online improvement
- Offline improvement

'Do minimum schemes shown in grey



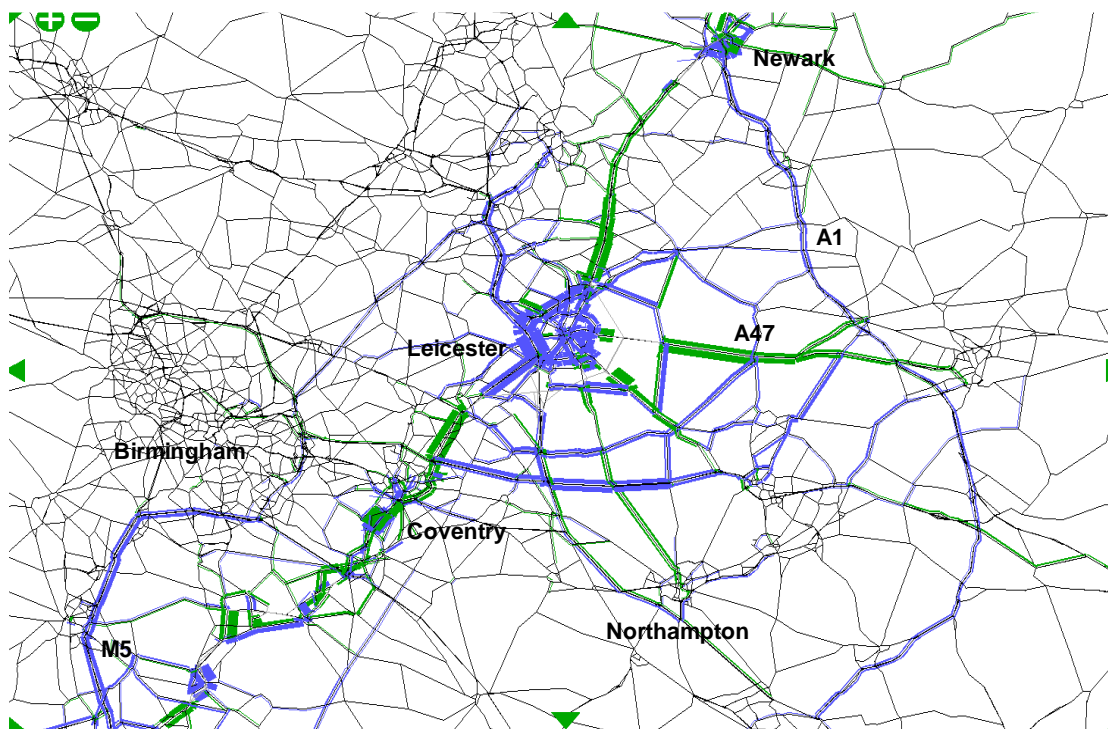
## 2.7.2 Traffic impacts

Figure 2-5 shows the forecast change in traffic flow between the 'do minimum' and illustrative package scenarios in the 2031 morning peak (average hour) for the central part of the corridor. No additional travel demand has been included, meaning the effects shown are due purely to re-routing of trips. The improved A46 corridor in the illustrative package has the effect of drawing traffic from other routes. This includes re-routing of traffic:

- from the M5/M42/M6 between the M5 and M40 corridors;
- from the M42/A42, A14/A43, and A4304/A427 (north of the A14) between the M40 and M1 corridors; and
- from the A1 corridor south of Newark (as the M1/A46 route becomes more attractive).

These impacts are supportive of the strategic case for investment, particularly the national objective of providing a reliable alternative to other parts of the SRN, notably the Birmingham Motorway Box; and the sub-regional objectives of improving connectivity between the economic hubs and to/from the rest of the UK, including international gateways.

*Figure 2-5: Impact of A46 illustrative Package on traffic flow, average morning peak hour 2031*



Blue bars indicate a reduction in traffic, green bars represent an increase in traffic compared to the 'do-minimum'

Other notable effects are:

- increases in traffic along much of the corridor as it becomes more attractive (for example around Stratford-upon-Avon and Coventry, on the M69 and between Leicester and Newark);
- significant reductions in traffic on the M1 and Leicester Western Bypass as a result of the Leicester South Eastern Bypass;
- increased traffic on the A47 between the Leicester South Eastern Bypass and the A1 at Peterborough;
- re-routing of traffic to/from Nottingham from the M1/A453 to the A46; and
- localised re-routing around Lincoln reflecting completion of ring road.

These re-routing effects are forecast to lead to reductions in delays on those routes from which traffic has been reduced, most notably the M5 (J9-J4A), M42 (M5 to M40), M6 (Coventry to M1), M1 (J121-21A), A14 (M1/M6 to Kettering) and the A46 Leicester Western Bypass. Reduced delays at junctions are also forecast to be particularly high in the Leicester, Newark and Lincoln areas. Where traffic volumes increase (such as around Coventry and on the A47 between Leicester and Peterborough) further investment may be required.

### 2.7.3 Economic appraisal summary

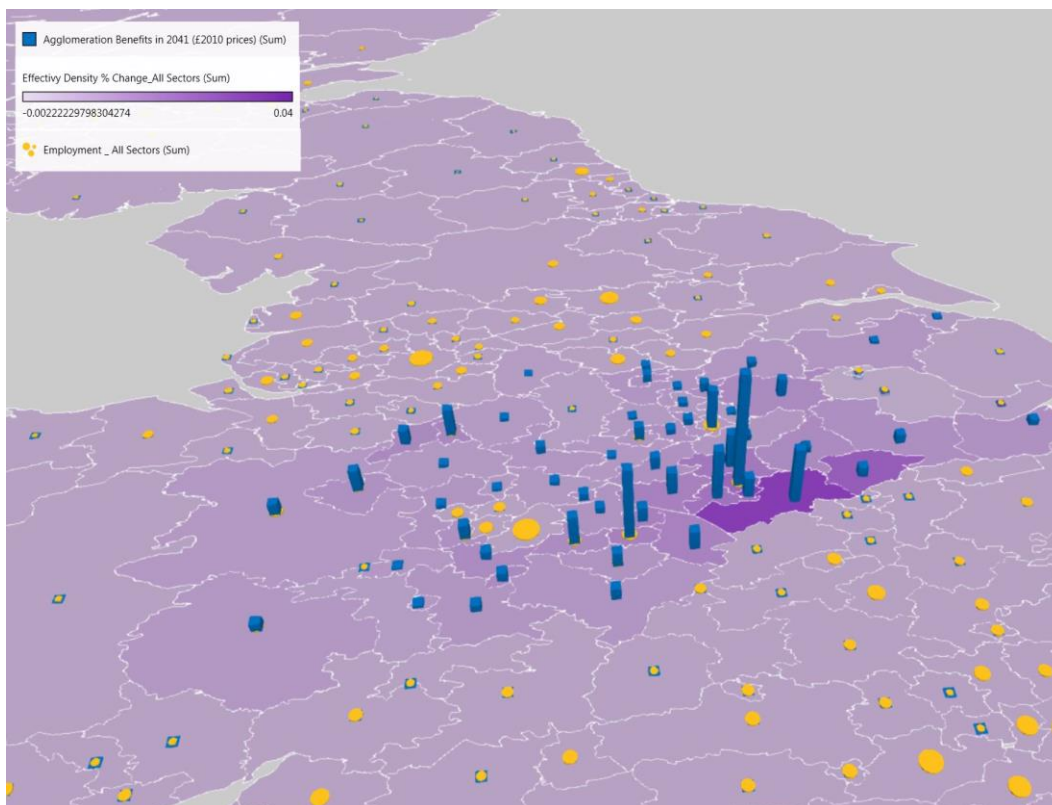
The illustrative package is estimated to generate £3.8 billion net present value (NPV) of traditional economic benefits (discounted to 2010 prices and values) over the 60-year appraisal period. Of these benefits, over £3.6 billion are travel time savings, the remainder being vehicle operating cost savings.

This initial appraisal does not include benefits arising from reduced variability of journey times as a result of less recurring congestion. Given that poor reliability is a key issue particularly in the southern half of the corridor, these benefits could be significant. The appraisal does not include quantified accident benefits.

The illustrative package is forecast to generate additional 'wider economic benefits' arising from static agglomeration impacts whereby improved connectivity between businesses results in improved productivity. These benefits are forecast to be £120 million per annum in 2031 rising to £420 million per annum in 2041. Figure 2-6 shows the distribution of these benefits, and the changes in effective employment density forecast to arise from the illustrative package. The zones with high forecast agglomeration therefore tend to be those forecast to experience high increases in the Effective Density (e.g. Harborough area), or have large quantum of employment (e.g. Leicester).

The discounted NPV over 60 years of the wider economic benefits is £3.3 billion. Additional benefits to the 'real economy', for example those relating to absolute growth in the number of jobs, have not been estimated at this time. The approach to estimation of WEBs, and a fuller description of the results, is provided in Appendix B.

*Figure 2-6: Agglomeration benefits of illustrative package and change in effective densities*



### 3. Priority sections for investment

#### 3.1 Introduction

This chapter describes the strategic case for investment for different sections of the corridor. By identifying where the case for investment is strongest against each of the agreed outcome objectives, the locations which are the priorities for investment have been identified.

##### 3.1.1 Priority locations for investment

Table 3-1 below sets out which areas or sections are the priority areas for investment based on how well they support the outcome objectives for the A46 study. Linked to the overarching rationale for investment in the corridor detailed above a selection of more detailed evidence is included. An evidence source is also provided to ensure the recommendation is linked to findings from the study or from other relevant commissions.

Table 3-1: Identification of priority locations for investment

Spatial level	Outcome objective	Location(s) demonstrating the strongest strategic case for this objective	Key points
National	Providing a viable alternative to the SRN	M5 (Ashchurch) – M6 (Coventry)	<p>The Birmingham motorway box is underperforming and strategic alternatives are required (Source: Long-Term Midlands Motorway Hub Study).</p> <p>There is potential for improved agglomeration across industry sectors such as automotive and aerospace which requires better links between the South-West and the Midlands.</p> <p>Achieving the Conditional Outputs in this section could see a 28% (13 minute) reduction on a weekday journey at 9am.</p> <p>Journey times between M5 J9 (Tewkesbury) and M1 J21 (Leicester) are comparable in the peak, and 7 minutes shorter via the A46 than via the M5/M42/M6, but only 10% of trips use the A46 due to poor reliability.</p> <p>Interviews with businesses and freight industry has verified that businesses do not view the A46 as a viable route due to unreliability of the corridor.</p>
		M40 (Warwick) – M1 (Leicester)	<p>Inrix O/D data show that the A46 is used by vehicles to access the M40 (for south coast ports) from the Leicester area and beyond to the North-East.</p> <p>Tackling hotspots at Leicester and Coventry could help to facilitate greater use of the M40 and assist congestion on the M1.</p>
		M1 (Leicester) – A1 (Newark)	<p>Inrix O/D data analysis shows this section is already being used by strategic east-west traffic but is constrained by poor performance in the Leicester area including Hobby Horse and Leicester Western Bypass</p> <p>The route has the potential to support travel to/from the Nottingham area which could relieve the M1 and the A52 in Nottingham.</p>

Spatial level	Outcome objective	Location(s) demonstrating the strongest strategic case for this objective	Key points
	Minimise greenhouse gas emissions from traffic	Whole A46 corridor including A15	Strategic highway investment may result in a mode shift where improved traffic flow makes driving relatively more attractive than public transport, destinations change where higher road speeds allow drivers to choose more distant destinations than before, or more trips where higher road speeds mean drivers make additional trips. Consequently, investment may generate traffic in the medium to long-term and result in an absolute increase in Greenhouse Gas (GHG) emissions. This will need to be monitored and evaluated with each scheme on the corridor and give recognition to the role of new technologies as they emerge.
Sub-regional	Inter- hub connectivity (journey times and reliability)	Warwick – Coventry – Leicester – Nottingham	<p>There is less economic interaction than would be expected between cities the size of Coventry, Leicester and Nottingham.</p> <p>Investment would support agglomeration between these centres and complement SRN-dependent industries such as advanced manufacturing. It would also improve access to labour markets in these centres, and Birmingham.</p> <p>Analysis also shows the importance of agglomeration benefits to also support growth around Coventry.</p> <p>The presence of multiple bottlenecks at Coventry, Leicester and Newark, and high traffic flow, means this area has the highest level of aggregate delay in the corridor.</p> <p>Is an important area for the agri-food sector and for distribution of products and access to markets.</p>
	Connections to the UK and international gateways (journey times and reliability)	Whole A46 corridor including A15	<p>Important role of ‘commodity corridors’ linking key industrial sectors to ports. E.g. Bristol exported 190,000 vehicles whilst Immingham exported 250,000 vehicles in 2016 which highlights the role both ports play for the automotive cluster (Source: The DfT Study ‘Transport Infrastructure for our Global Future – A Study of England’s Port Connectivity’)</p> <p>22% of goods and services are exported from the A46 corridor. A large exporter driven by internationally significant sectors including aerospace and automotive.</p> <p>Initial report analysis and business interviews has highlighted that advanced manufacturing clusters in the central part of the corridor need efficient access to the ports to export their goods.</p> <p>48% of food in the UK was imported in 2015 whilst UK food and drink exports were around £20.1 billion in 2016. Ports support the sector in a number of ways including roll-on roll-off (Ro-Ro) ferry services providing swift links to continental Europe for imports</p>

Spatial level	Outcome objective	Location(s) demonstrating the strongest strategic case for this objective	Key points
			<p>of fresh fruit and vegetables which in turn are transported to distribution hubs such as those located in the East Midlands.</p> <p>Likewise, food produced in Worcestershire and Lincolnshire needs swift and efficient access to the ports for exporting produce. This will become increasingly important post-Brexit.</p> <p>Improved access and journey times to/from the Humber ports is critical for growth in these ports and for productivity gains in sectors involved in importing and exporting goods and services.</p>
	Strategic employment growth sites	Warwick - Coventry - M1 (Leicester)	<p>This section plays a key role connecting a series of Midlands Connect Strategic Growth sites including UK Central (including Birmingham Airport and the HS2 Birmingham Interchange Station), Tournament Fields (Warwick), Ansty Park, Friargate, Whitley Business Park, Whitley South (Coventry) Horiba-MIRA and the Leicester Urban Area. Total of over 175k jobs.</p> <p>Connectivity to the Midland's airports is a key factor for the high number of exporting industries and businesses located around this section, critical for trade and investment. (Exporting activities are particularly important to economies of Derby, Coventry and Hull).</p> <p>UK Central, HS2 Interchange station and Birmingham Airport will act as an international growth hub driving economic growth across the UK.</p>
		Newark & Nottinghamshire	<p>The Newark and wider Nottinghamshire area contains a series of Midlands Connect Growth Sites including Newark Futures and A46 Corridor Sites. Total of circa 4,500 jobs</p>
		Lincoln	<p>The Lincoln area contains a series of Midlands Connect Growth Sites including Hemswell Cliff, Lincoln Science and Innovation Park and Teal Park - North Hykeham. Over 4000 jobs to be created across these sites.</p> <p>This is an important area for the agri-food sector and for distribution of products and access to markets. Lincolnshire is also an important location for freight and distribution as well as food production.</p> <p>Improved connectivity will make more peripheral (cheaper) land/premises more accessible and therefore viable - supporting profitability and helping to re-balance the economy.</p>
		Coventry - Leicester	<p>Up to 100,000 new homes in Leicestershire by 2031 and notionally a further 90,000 by 2050 (Source: Leicester and Leicestershire draft Strategic Growth Plan).</p>

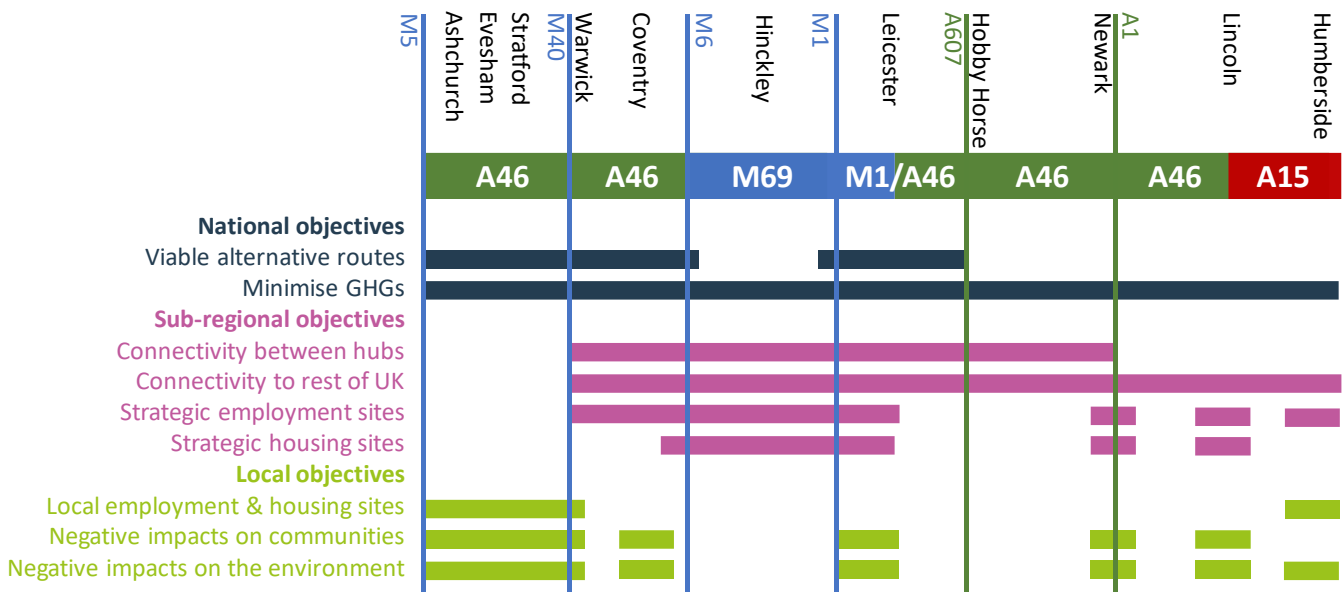
Spatial level	Outcome objective	Location(s) demonstrating the strongest strategic case for this objective	Key points
	Strategic housing growth sites		<p>Additional capacity is required to realise the expected housing growth in the greater Leicester area.</p> <p>This section also includes plans for strategic housing sites east of Hinckley and a range of sites across Coventry including Keresley SUE and long-term ambitions to deliver housing growth to the south and east of the city.</p>
		Newark & Nottinghamshire	<p>The Newark and wider Nottinghamshire/Nottingham city area contains a series of strategic housing sites including Newark Futures, A46 Corridor Sites and locations to the East of Nottingham including Gamston and Waterside. A total of 16,500 homes planned for delivery.</p>
		Lincoln	<p>Inrix analysis has highlighted that Lincoln suffers from speed and reliability issues.</p> <p>Plans for housing and employment growth at Lincoln including the four proposed Sustainable Urban Extensions could be constrained without intervention. A total of 13,167 dwellings are proposed for the Lincoln Urban area within the Central Lincolnshire Local Plan.</p>
Local	Local growth sites	Ashchurch	<p>Inrix analysis has highlighted that Ashchurch suffers from speed and reliability issues.</p> <p>Plans for housing and employment growth at M5 J9 could be constrained without intervention.</p> <p>Business interviews have highlighted the importance of good connectivity to the SRN to ensure the swift movement of goods and services.</p> <p>This area experiences a mixture of both strategic and local traffic which constrains the movement of both requirements.</p>
		Evesham	<p>INRIX analysis has highlighted that Evesham suffers from speed and reliability issues caused by the multiple roundabouts on the Evesham bypass.</p> <p>Evesham is an important location for freight and distribution as well as food production.</p> <p>Plans for housing and employment growth at Vale Park could be constrained without intervention.</p> <p>Business interviews have highlighted the importance of good connectivity to the SRN to ensure the swift movement of goods and services.</p> <p>This area experiences a mixture of both strategic and local traffic which constrains the movement of both requirements.</p>
		Stratford	<p>Plans for housing and employment growth at Stratford and Long Marston could be constrained without intervention.</p>

Spatial level	Outcome objective	Location(s) demonstrating the strongest strategic case for this objective	Key points
			Inrix analysis has highlighted that Evesham suffers from speed and reliability issues caused by the roundabouts near Stratford.
		Warwick	Plans for housing and employment growth at The Asps, Harbury Lane and Thickethorn could be constrained without intervention.  Delays in this area are mainly on the roundabouts at the grade separated junctions at the interchange with the A46 which can queue back onto the main A46 carriageway
		Humber Ports	Plans for housing and employment growth in the Humber area including Hull, Lincolnshire Lakes (Scunthorpe), ABLE Marine Park and Grimsby could be constrained without intervention.
	Community Impacts	Ashchurch – Stratford, Newark and Lincoln	Interventions would help to minimise the negative impacts of the road corridor on communities in each of these areas by improving safety, reducing noise and severance whilst also helping local communities to access local services by reducing conflict with strategic traffic.
	Environmental Impacts	Stratford, Coventry, Leicester, Lincoln	Air Quality Management Areas are located at each of these locations and therefore any increases in vehicle emissions would need to be managed and mitigated as a consequence of any intervention being progressed.

All sources this study unless shown.

Figure 3-1 shows diagrammatically these locations. This supports initial assertions that the role and function of the corridor is complicated and serves multiple needs and requirements across the spatial spectrum from national to local level.

Figure 3-1: Priority locations for investment



Based on this analysis, the priority areas for investment and the rationale for this conclusion are summarised in Figure 3-1 below:

Table 3-1: Key areas of focus for the A46 Corridor

Location	Rationale for investment
Ashchurch	<ul style="list-style-type: none"> <li>Housing and job creation around Ashchurch area and M5 J9 is likely to be constrained without investment</li> <li>Existing alignment is constrained by frontages and existing communities</li> <li>Inrix analysis and business interviews has highlighted that delays and reliability need to be tackled in this section to provide a viable alternative route to M5/M42/M6 and support better South West – Midlands connectivity.</li> </ul>
Evesham	<ul style="list-style-type: none"> <li>Housing and job creation around Evesham area including Vale Park is likely to be constrained without investment</li> <li>Upgrading the existing alignment is constrained by frontages, rail and river bridges whilst the roundabouts on the existing Evesham bypass present multiple challenges to journey speed and reliability</li> <li>Inrix analysis and business interviews has highlighted that delays and reliability need to be tackled in this section to provide a viable alternative route to M5/M42/M6 and support better South West – Midlands connectivity.</li> </ul>
Stratford	<ul style="list-style-type: none"> <li>Housing and job creation around Stratford area is likely to be constrained without investment including Long Marston.</li> <li>Existing alignment is constrained by proximity to rail alignment into Stratford.</li> <li>Inrix analysis and business interviews has highlighted that delays and reliability need to be tackled in this section to provide a viable alternative route to M5/M42/M6 and support better South West – Midlands connectivity.</li> </ul>

Location	Rationale for investment
Coventry	<ul style="list-style-type: none"> <li>Substantial housing and job creation expected around Coventry and Warwick area including Whitley Business Park, UK Central, Tournament Fields and the National Battery Centre.</li> <li>Existing traffic flow is some of the highest in the corridor with the Volume:Capacity Ratio (VCR) exceeding 85% at the Binley and Walsgrave junctions . Additional investment in the corridor could trigger the need for further investment to accommodate additional demand.</li> <li>Inrix data has highlighted the importance of tackling congestion and delay at Binley and Walsgrave to support strategic growth in this section</li> </ul>
Leicester	<ul style="list-style-type: none"> <li>Substantial housing and job creation expected in the Leicester and Leicestershire area as detailed in the draft Strategic Growth Plan.</li> <li>The Leicester area has the highest traffic flow in the corridor with the section between the M1 and Hobby Horse exceeding 85% VCR.</li> <li>The Inrix analysis has highlighted that the Leicester area has four of the top 10 pinchpoints in the corridor including the M69/M1 interchange, M1 J21-21A, Leicester Western bypass and Hobby Horse interchange.</li> </ul>
Newark	<ul style="list-style-type: none"> <li>Housing and job creation around Newark area is likely to be constrained without investment including Newark Futures.</li> <li>Need to improve and strengthen links between Lincoln, Newark and Leicester to grow labour markets and increase agglomeration.</li> <li>Inrix data has highlighted the importance of tackling congestion at Newark as this is second worst performing hotspot in the corridor.</li> <li>Existing alignment is constrained by proximity to East Coast Main Line, River Trent and A1.</li> </ul>
Lincoln	<ul style="list-style-type: none"> <li>Plans for housing and employment growth at Lincoln including the four proposed Sustainable Urban Extensions could be constrained without intervention.</li> <li>The Lincoln bypass has a VCR which exceeds 85% due to the single carriageway standard, at grade junctions and relatively high traffic volumes driven not just by the A46 corridor but demand across the wider Lincolnshire area.</li> <li>Improving access from the Greater Lincolnshire area to the Humber Ports and the A1 is an important driver for key industries in the area such as agriculture, logistics and advanced manufacturing</li> </ul>

## 4. Recommendations for next steps

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### 4.1 Introduction

This chapter sets out recommendations for future A46 Studies and associated Midlands Connect activities which could accompany further study work. It should be noted that this does not refer to delivery priorities as the timescales for these and the case for delivery will be dependent on a range of wider considerations than those detailed in this report or covered by this study.

In agreeing the priorities for future work, the following decision areas need to be considered:

- the need to tackle current delay and issues of reliability on the A46 to support short term and longer-term growth;
- option deliverability including engineering and perceived political constraints;
- future ambitions for growth and the Strategic Case for investment – this includes an understanding of the housing and employment opportunities in each part of the corridor and the level of jobs expected to be created in SRN dependent sectors;
- planned investment;
- funding opportunities– need to align future work with opportunities for funding from developers, Highways England, LEPs and Local Authorities; and
- environmental constraints e.g. Air Quality Management Areas (AQMAs).

### 4.2 Priorities for A46 Studies

The section below sets out the recommended priorities for future A46 studies and associated Midlands Connect activity which would enable the A46 Corridor Strategy to be progressed. The second phase of the A46 study has a finite amount of resource. Therefore, the priorities for action detailed below (in order of need) are based on where the greatest requirement for Midlands Connect intervention is needed to help mobilise scheme development and secure the progression of schemes and solutions to the challenges of the A46.

Following the activities described below Midlands Connect intends to draw the findings together to determine an overall investment plan for the corridor and priorities for investment.

The Five Stage Business Case model requires the completion of the Financial, Management and Commercial Case. This business case model is more usually applied to a single scheme or programme, rather than a package of interventions. The intervention is therefore typically at a more advanced level of development than is the case for the components of the illustrative strategy. The next stages of the study will therefore need to consider the development of these three elements of the business case model whilst also recognising key interfaces with the strategic highway scheme development and funding process managed by Highways England. Issues to consider across the corridor include:

- links with the Major Road Network (MRN) development process and other emerging funding opportunities – this is of particular importance to the A15 section of the corridor (north of Lincoln) which has been identified as a potential MRN route;
- Highways England's RIS process and Project Control Framework – scheme development timelines will need to develop and integrate with the RIS process and ensure that individual options are developed in line with the PCF process to ensure funding is secured;
- development of the commercial case to set out scheme commercial viability;
- development of the financial case to show that the scheme is affordable; and
- development of the management case to describing how the investment will be delivered.

Specific points related to individual sections of the corridor recommended for development progression are detailed below. Figure 4-1 below sets out an indicative development and delivery programme based on the illustrative strategy to highlight how the proposed next steps link into the Highways England planning and delivery process for RIS.

#### 4.2.1 Tewkesbury (M5 J9) – Warwick (M40 J15)

This section has the greatest number of challenges to overcome in order to achieve the Midlands Connect Conditional Outputs. Delivering a range of interventions at locations such as Ashchurch, Evesham and Stratford could help to see a 28% (13 minute) reduction in journey time on a weekday journey at 9am. This would help to strengthen the clustering and agglomeration effect for key industries such as automotive and aerospace which have strong connections with both the South West and Midlands. In addition to this strategic impact, investment in this section would help to support and unlock employment and housing opportunities at locations such as M5 J9 at Ashchurch, Vale Park at Evesham and the Stratford area. In delivering any solutions going forward balancing both strategic and local movements will be a key consideration.

Enhancing this section has strong political support, including from the A46 Partnership, and the wider economic narrative for improving this section has been advanced as part of the A46 Strategy development process. Business engagement has also highlighted that demand amongst businesses to locate to the area is strong but any further decline in journey times and reliability could make business reconsider. Delivering a strong Benefit Cost Ratio (BCR) for options in this section based on traditional time savings is a challenge given the current level of demand and traffic flow in the corridor. The need to grow and strengthen the strategic case for investment including the wider economic benefits will be imperative to securing the level of investment needed in this section.

Further work is now required to develop further the nature of the proposed improvements in this section, and their business case. Further work should:

- develop a clear view of the medium and long-term ambitions for jobs and housing growth based on close collaboration with the local planning authorities and LEPs;
- undertake further business research to establish the extent congestion and reliability issues could influence their business investment decisions;
- using the above and other additional evidence to develop further the strategic case for investing in this section;
- ensure all stakeholders have been identified and engaged, and all relevant study outputs and evidence has been collated;
- engage with Highways England to understand the work which has begun on investigating options for improvements on the A46 at Ashchurch and between Alcester and Stratford;
- undertake more detailed investigation of design options and routing for improvements at Ashchurch, Beckford and Evesham, and other required interventions, in collaboration with the local authorities and Highways England;
- develop a preferred package of investment for this section, reflecting the Highways England work and outcome of the Housing Infrastructure Fund (HIF) bidding process;
- develop a five-case business case for the preferred package, including a strong narrative about transformational impacts on the economy and wider benefits;
- assessment of dynamic WEBS to understand impact of improvements and associated economic benefits further; and
- develop a prioritised investment plan including approach to funding and financing (the latter building on initial work being undertaken by Midlands Connect).

#### 4.2.2 Leicester area

The draft Leicester and Leicestershire Strategic Growth Plan<sup>5</sup> sets out a clear role for the A46 corridor in helping to realise the level of housing and employment growth forecast in the short, medium and long term. Tackling the congestion hotspots in this area would represent a significant step forward in realising the strong strategic case for investment and ultimately helping to facilitate better connections between the Midlands, South West and North-East.

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<sup>5</sup> The plan, prepared by the nine local authorities in the area and the Leicester and Leicestershire Enterprise Partnership, sets housing and employment growth levels to 2050

A number of options are available in order to address these issues including a proposed southern/eastern bypass, M1 Smart Motorway, upgrading Leicester Western bypass and Hobby Horse interchange at Syston. Whilst each of the options have their various merits the next stage of work would need to develop a clear position on the inter-relationship between the options and the best combination to deliver the national, sub-regional and local objectives of the A46 corridor and the Leicester/Leicestershire area.

Further work is now required to develop a clear strategy and investment plan for the Leicester area. This work should:

- engage with Highways England to understand the work which has begun on investigating options for improvements to Hobby Horse interchange, and progress on the M1 J19-23A Smart Motorway scheme (including J21 and J20A issues);
- building on work already undertaken by Leicestershire CC, and paying regard to the findings of this study and HE's ongoing work, develop a delivery strategy of local, sub-regional and national objectives for the A46 corridor in this area (based on incremental and decremental modelling and testing of options for the southern/eastern bypass, Western bypass upgrade, Hobby horse upgrade and M1 smart motorway (including M1 J21));
- undertake more detailed investigation of design options and routing for the preferred strategy in collaboration with Highways England;
- develop a five-case business case for the preferred package, including a strong narrative about transformational impacts at a sub-regional/national level as well as locally;
- develop a prioritised investment plan including approach to funding and financing (the latter building on initial work being undertaken by Midlands Connect).

#### 4.2.3 Lincoln area

The A46 corridor study has highlighted the constraint Lincoln bypass places not only on the A46 corridor but also the wider Lincolnshire area including access to the Lincolnshire coast which is integral to the tourism sector in the area. The strategic case for investment in the Lincoln area including the completion of the Eastern bypass and establishing the case and funding for the Southern bypass is predicated on the area's ambitions for growth and the delivery of housing and employment opportunities linked to both of these schemes.

Whilst the evidence suggests the majority of strategic traffic in this section uses the M1/M18/M180 corridor to access the Humber Ports, the work to date has highlighted the importance of supporting Greater Lincolnshire business links in sectors such as logistics, advanced manufacturing and food production so that opportunities in the Humber (including the ports) and Scunthorpe area are available and accessible to the wider Lincolnshire area. Integral to this link will be the future role of the A15. Whilst the Illustrative Strategy has included targeted improvements to the A15 it has been noted that the route forms part of the proposed Major Road Network (MRN) and could therefore play a greater role going forward and look to attract further investment. This could ultimately lead to the route achieving expressway standard in the longer term should demand and the case grow.

Further work is now required to agree an investment strategy for the greater Lincoln area, recognising the role of the A46 and other roads in supporting local and sub-regional economies. This work should:

- develop a clear view of the medium and long-term ambitions for jobs and housing growth in Lincolnshire and south Humberside based on close collaboration with the local planning authorities and the Greater Lincolnshire LEP;
- ensure all stakeholders have been identified and engaged, and all relevant study outputs and evidence has been collated (better representation from the Humberside area would be beneficial);
- undertake further business research to establish the extent congestion and reliability issues could influence their business investment decisions (this could include discussions with potential developers);
- consider further the future of the Humberside ports and how the potential role of the A46/A15 corridor in this future, particularly in the context of supporting the Lincolnshire economy;
- using the above and other additional evidence, further the strategic case for investing in the network around Lincoln and between Lincoln and Humberside (at local and sub-regional level);

- building on work already undertaken by Lincolnshire CC (e.g. on costal highways), and paying regard to the findings of this study and the Midlands Connect MRN proposals, develop a delivery strategy of local and sub-regional objectives for the A46/A15 corridor in this area (based on incremental and decremental modelling and testing of options for the northern and southern bypasses and A15 improvements);
- undertake more detailed investigation of design options and routings for the preferred strategy;
- develop a five-case business case for the preferred package, including a strong narrative about transformational impacts at a sub-regional level as well as locally; and
- develop a prioritised investment plan including approach to funding and financing (the latter building on initial work being undertaken by Midlands Connect).

#### 4.2.4 Newark area

The A46 study has highlighted the growth potential for the Newark area and level of constraint which is currently evident due to the congestion caused at Newark. Overcoming this hotspot will make a significant contribution in locking in the benefits of previous upgrades to the A46 in this section and help to provide an effective link between the M1 and A1 (in conjunction with solutions at Leicester). Tackling congestion here will also help to strengthen links from the Lincoln area to Newark and beyond and go some way in helping to overcome the challenges of peripherality experienced in this area and to the north-east.

The issues caused by congestion has been recognised by Highways England which is currently developing a scheme in the Newark area for possible delivery in RIS 2 (subject to appropriate work on establishing Value for Money (VfM)). However, there are a series of challenges which need to be overcome including engineering constraints associated with the East Coast Main Line, River Trent and A1. Whilst it has been assumed within the Illustrative Strategy that the scheme at Newark will be progressed and therefore included in the Do-Minimum there is a risk that an optimum solution is not found. Therefore, it is recommended that Midlands Connect and partners should:

- maintain political momentum for delivery of Newark bypass in RIS2;
- ensure all interested stakeholders are identified and their support secured;
- engage with Highways England to enhance the strategic case, focussing on benefits outside the immediate vicinity of the scheme (e.g. the role of the junction in providing a gateway to Lincoln, and the importance of the junction as part of a much more strategically important A46 corridor).

#### 4.2.5 Coventry, Warwick and Leamington Spa area

The strategic case for investment in the Coventry, Warwick and Leamington Spa area is strong given the level of growth which is forecast to take place in the area, the arrival of HS2 and the level of demand which is already prevalent in this section. The Inrix analysis has highlighted the importance of tackling the congestion hotspots at Binley and Walsgrave which are being developed by Highways England in RIS1 and optimised for delivery in RIS2. The A46 Partnership has also highlighted the importance of this investment taking place along with the completion of various junction upgrades at Stoneleigh, Thickthorn and Stanks which should aid traffic flow on the roundabouts at these locations and prevent queueing back onto the main A46 carriageway in these locations. Given the level of development of schemes in this area it is recommended that Midlands Connect keep abreast of Highways England's work in delivering Binley and Walsgrave. The evolution of scheme progress in the sections to the south and north of Coventry should also be monitored. This could result in additional traffic flow in this section should an increase in demand for the corridor as a whole occur. Should this arise the case for accelerating further development work may be needed.

Therefore, it is recommended that Midlands Connect, and its partners:

- maintain political momentum for delivery of RIS schemes on the Coventry Eastern bypass (Walsgrave and Binley junction improvements);
- support Highways England in making the case for these schemes by contributing to the strategic case for investment based on local, sub-regional and national objectives (including the case for accelerating investment);
- ensure all interested stakeholders are identified and their support secured;



*Strictly Embargoed until 0001 7<sup>th</sup> November 2018*

- maintain close contact with Highways England to keep abreast of developments in the corridor;
- ensure that the potential impacts in this area of investment elsewhere in the A46 corridor (as identified in the other studies described above), are fully understood;
- consider further improvements in this section of the A46 corridor based on the above, and as part of a corridor-wide prioritised investment programme.

## Appendix A: Stakeholders

Table A-1: Stakeholder organisations participating in this study

Local Enterprise Partnerships	Businesses and industry groups
Gloucestershire LEP	Stoneleigh Park Estate
Leicester and Leicestershire LEP	FCC Environment
Greater Lincolnshire LEP	AB Ports
Humber LEP	Nisa Retail
Local authorities	Vehicle Manufacturer Coventry
Gloucestershire County Council	Prima Fruits UK
Tewkesbury Borough Council	Road Haulage Association (RHA)
Worcestershire County Council	Freight Transport Association (FTA)
Wychavon District Council	Chartered Institute of Logistics and Transport (CILT)
Warwickshire County Council	Ashchurch Business Centre
Stratford District Council	Third Party Logistics Provider Leicestershire (anonymous)
Coventry City Council	Grimsby Shipyard Services
Leicestershire County Council	Karn Dean Design Flooring
Leicester City Council	Ansty Park
Rutland County Council	Retail Outlet Warwickshire (anonymous)
Nottinghamshire County Council	Total UK Limited
Nottingham City Council	
Lincolnshire County Council	
North Lincolnshire Council	
North East Lincolnshire Council	

## Appendix B: Wider economic benefits calculation

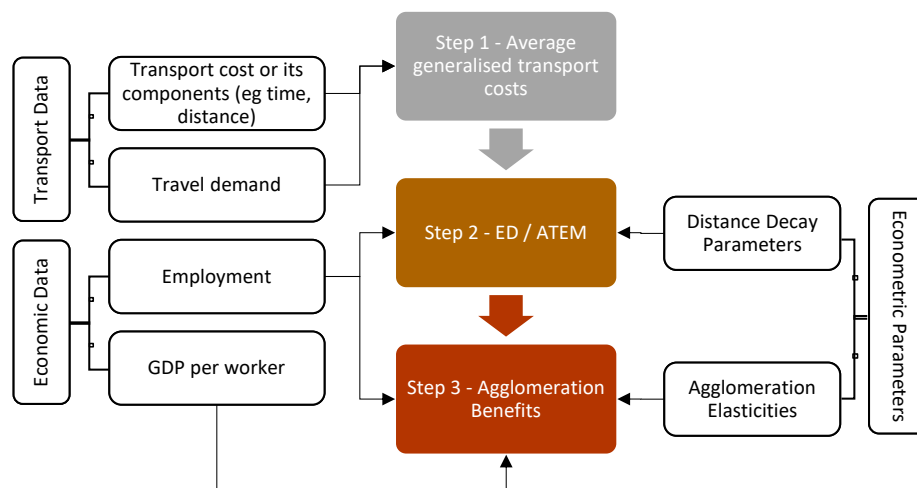
### Introduction

This appendix presents the estimated agglomeration benefits for the Illustrative Strategy, and describes how those benefits were derived. The forecast results are tabulated and also visualised in order to provide better information on the spatial distribution of the estimated agglomeration benefits, with cross reference to the characteristics of individual geographical areas where appropriate.

Agglomeration is the concentration of economic activity over an area. The concept of agglomeration economies describes the benefits that arise from the proximity of firms and people in cities and industrial clusters. There is sufficient macroeconomic evidence based on international or regional comparisons over time, which shows a clear association between transport infrastructure investment and economic performance.

### Approach to deriving benefits

The technical approach established follows the guidance in the WebTAG Unit A2.1 Wider Impacts. A Wider Economic Benefits (WEBs) model was developed following the steps illustrated below to derive the annual agglomeration impacts as a result of a transport intervention.



### Economic data and parameters

The WEBs model used for agglomeration impacts assessment for the package was developed from Work Package 1. The model is developed following the latest guidance in WebTAG. Sources for main economic parameters used in this model to derive the agglomeration impacts are:

- Employment – Cambridge Econometrics
- GDP per Worker – WebTAG
- Distance decay parameters – WebTAG
- Agglomeration elasticity values – WebTAG

### Transport model data

In addition to the aforementioned economic parameters, the WEBs model has a representation of baseline rail and highway transport costs, and requires input of changes in transport costs in the ‘with scheme’ scenario to forecast the corresponding agglomeration impacts.

For highway options tests, rail travel costs have been assumed to remain unchanged. Generalised cost skims for business and commuting trips from the Midlands Regional Transport Model (MRTM) have been used to derive transport cost changes as a result of the scheme. The cost skims have been weighted across the modelled time periods (AM, IP, PM) to produce a daily cost.

It was understood that the actual opening year for the proposed intervention is 2031.

**Zoning system conversion**

The MRTM zoning system on which the cost and demand data were based was converted to align with their counterpart in the WEBS model. The WEBS model zone system comprises 256 zones covering the whole Great Britain. Within Midlands, the WEBS zoning system is largely based on Local Authority Districts boundaries, as shown in Figure E-1.

**Wider economic benefits forecast**

Table E-1 shows the total forecast agglomeration benefits resulting from the illustrative strategy for the two forecast years (2031 and 2041) and over the 60-year appraisal period (discounted). Over the appraisal period, the strategy could deliver over £3.3 billion of wider economic benefits.

To reduce the impact of model noise, the transport model inputs have been masked using the masking definitions of the conventional user benefits appraisal. Adopting a conservative approach, further masking has been applied to exclude trips from or to Birmingham, Wolverhampton, Walsall and Sandwell zones.

*Table E-1: Total agglomeration benefits (2010 prices)*

Year	Agglomeration benefits (millions)
2031 (annual)	£64 million
2041 (annual)	£194 million
Appraisal period (discounted to 2010)	£3,336million

Tables E-2 and E-3 include the top 10 zones with the highest forecast agglomeration benefits for 2031 and 2041 respectively. The amount of benefits for each zone is determined by the forecast changes in the GDP per worker as well as the quantum of employment present in this zone. Changes in the GDP per worker are derived from changes in the Access to Economic Mass (ATEM)<sup>6</sup> of individual zones as the transport costs are reduced as a result of the intervention.

*Table E-2: Zones with highest agglomeration benefits in 2031 (2010 prices)*

Zone	Agglomeration benefits in 2031 (millions)
Leicester	£11.6
Harborough	£8.3
Blaby	£5.5
Charnwood	£3.9
Coventry	£3.6
Nottingham	£3.6
Oadby and Wigston	£2.4
Hinckley and Bosworth	£2.3
Stoke-on-Trent	£2.3
Rutland	£1.8

<sup>6</sup> ATEM is also called Effective Density (ED) in WebTAG

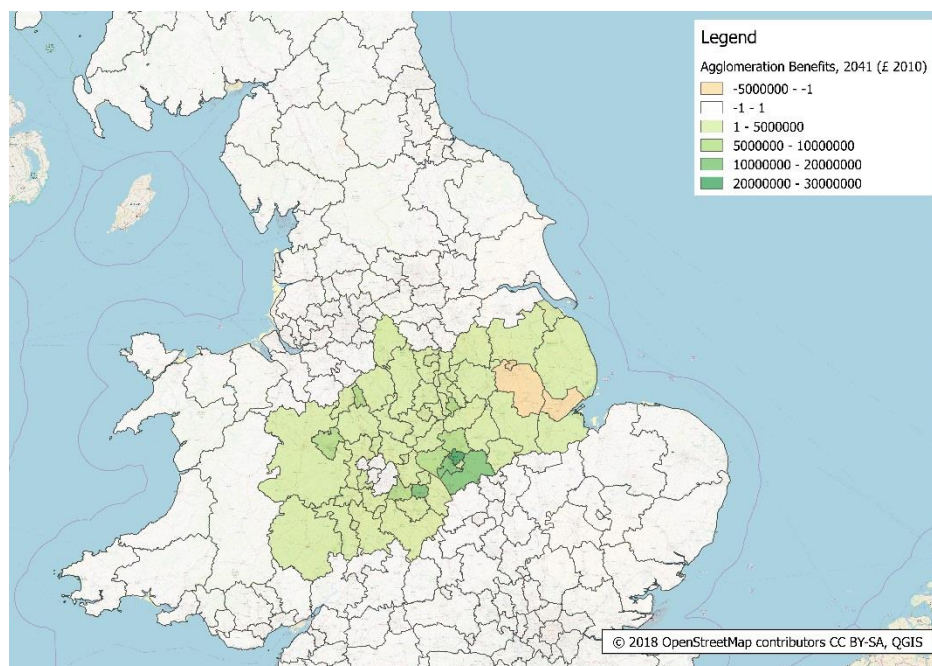
Table E-3: Zones with highest agglomeration benefits in 2041 (2010 prices)

Zone	Agglomeration benefits in 2041 (millions)
Leicester	£27.4
Coventry	£17.3
Harborough	£13.3
Blaby	£12.3
Nottingham	£9.8
Charnwood	£8.5
Solihull	£7.0
Stoke-on-Trent	£6.7
Hinckley and Bosworth	£5.5
Telford and Wrekin	£5.3

The spatial distribution of forecast agglomeration benefits in 2041 across the Midlands Connect area is illustrated in Figure E-1. The local authority areas of North and North-East Lincolnshire is within the buffer zone of the MRTM so have been excluded from this plot. As detailed above, in adopting a conservative approach, further masking has been applied to exclude trips from or to Birmingham, Wolverhampton, Walsall and Sandwell zones which leaves this area blank. It is estimated that as further work evolves some additional benefits could be obtained to reflect the effect an upgraded A46 between Tewkesbury and Coventry could have on the M42/M6 to the south of Birmingham. In general, the highest quantum of agglomeration benefits is observed in close proximity to the A46 corridor particularly the areas of Solihull, Coventry, Leicester and Nottingham which reflects the size and scale of the economies in these areas and the benefits improved connectivity can bring.

The presence of Stoke-on-Trent and Telford within the top 10 beneficiaries is a function of the model which diffuses travel time benefits across the modelled area and therefore the presence of travel time gains in unexpected areas within the WEBS assessment. The conservative approach to masking has helped to manage this for most areas experiencing model noise.

Figure E-1: Spatial distribution of agglomeration benefits, 2041



In Figure E-2, the agglomeration benefits are shown alongside the change in Effective Density (ED) - also known as Access to Economic Mass (ATEM), and the total employment of all sectors (i.e. construction, consumer services, manufacturing and producer services). ED reflects the accessibility of businesses to each other and the labour market to these businesses. A positive relative change of the ED indicates an improvement of the zone’s accessibility (transport connectivity) as a result of the illustrative strategy. A change in the ED is a key driver of the agglomeration impact; as is the level of the zone’s employment (per sector). As Figure E-2 shows, the zones with high forecast agglomeration therefore tend to be those forecast to experience high increases in the ED (e.g. Harborough area), or have large quantum of employment (e.g. Leicester).

*Figure E-2: Agglomeration benefits (masked), change in effective density and employment*

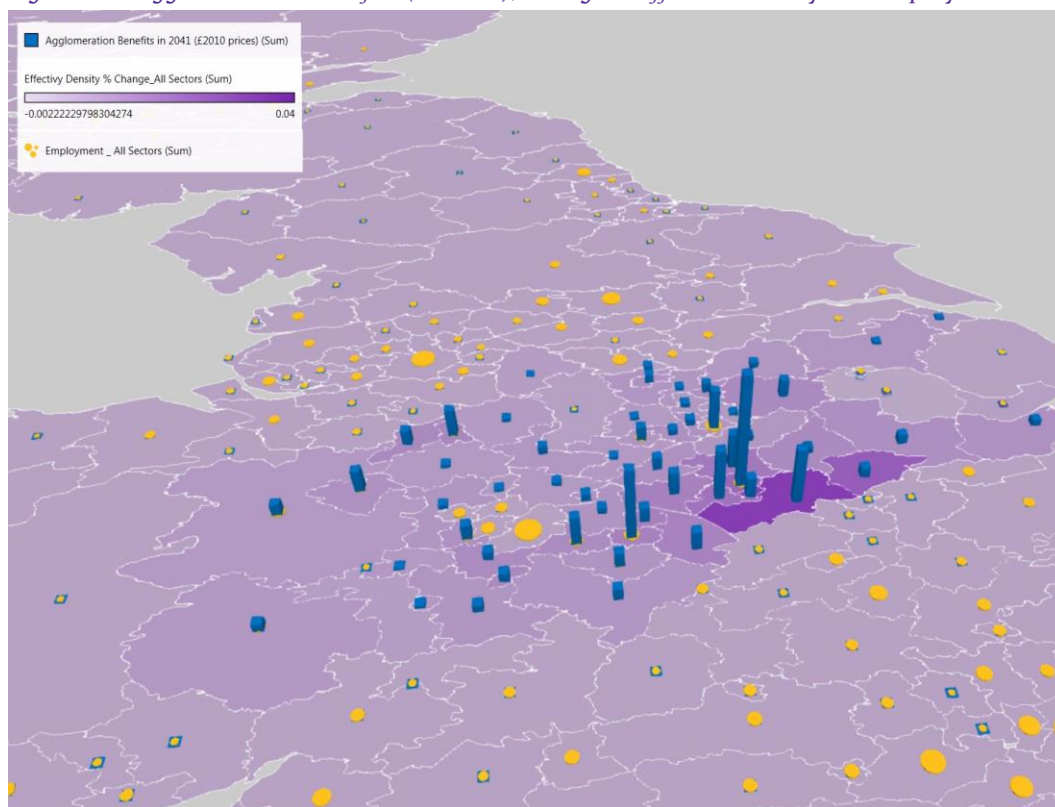
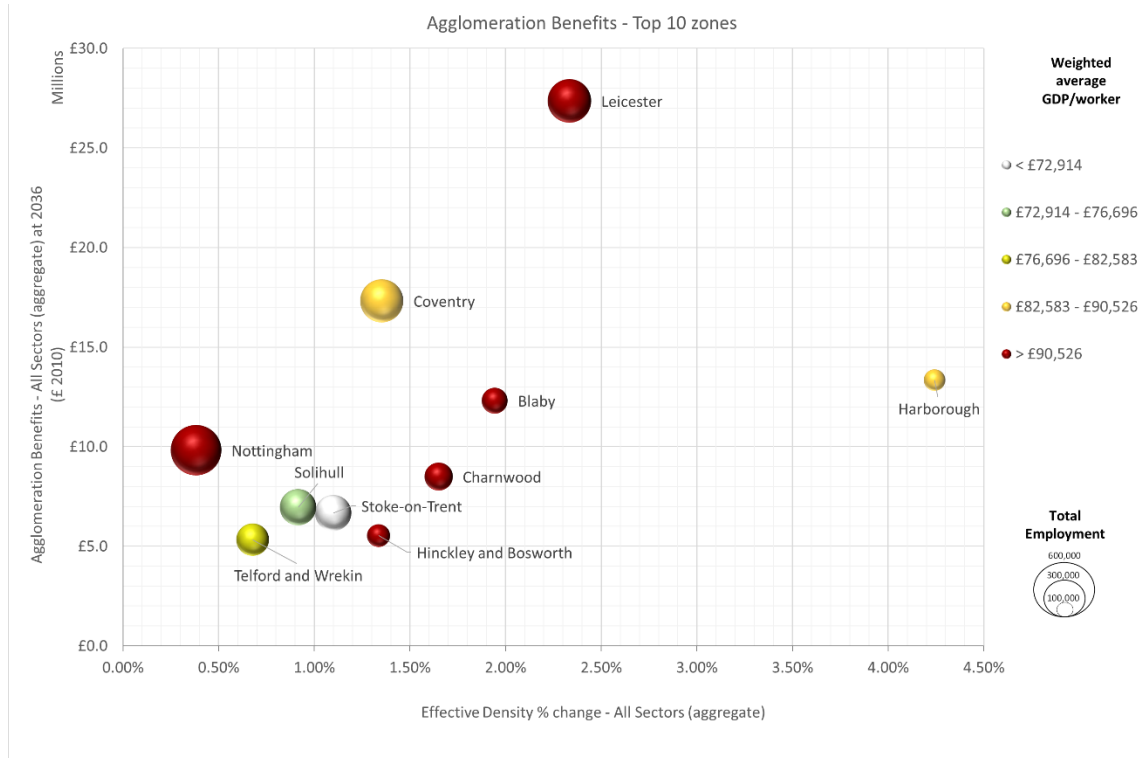


Figure E-4 illustrates the relationship between agglomeration benefits and ED for the ten zones with the highest forecast agglomeration benefits. The results are cross-referenced to the average GDP per worker and the employment of each zone. The chart shows that effective density increases drive agglomeration benefits, but the magnitude of these benefits also depends on each zone’s employment and productivity (GDP per worker).

Figure E-4: Top 10 areas within Midlands Connect area in terms of Agglomeration Benefits



## **Appendix C: Preliminary Environmental Risk Assessment (PERA)**

**Purpose:** To identify the initial environmental constraints, risks and opportunities for a project to support the option selection process.

The assessment of environmental risk is intended primarily to establish if a project will encounter barriers to delivery in respect to scope, programme and budget. It is therefore different from the assessment of environmental impacts and effects. The identification of opportunities for environmental benefits at an early stage will help to inform the design of the project. The Preliminary Environmental Risk Assessment (PERA) should include an appreciation of any policy risks and opportunities.

Part 1: Project and site description

<p>1.1 Project Description</p>	<p>The A46 Corridor Study involves examining the current and long-term problems and opportunities for the A46 corridor from junction 9 of the M5 to the Humber ports, with emphasis on the existing and potential contribution the road could make to supporting economic growth. It focusses on providing an integrated and prioritised set of interventions which could address the problems and challenges facing the road and also potentially unlock land for future development, enabling greater agglomeration and supporting growth sectors of the economy. It is thought that investment in the A46 could have a key role in unlocking and enabling economic growth by:</p> <ul style="list-style-type: none"> <li>• improving connectivity and reducing journey times;</li> <li>• reducing the variability of journey times;</li> <li>• providing additional capacity to enable growth in jobs and homes;</li> <li>• improving links to international gateways; and</li> <li>• raising the resilience of the network.</li> </ul> <p>The study has identified a package of interventions with the objective of providing a comprehensive solution encompassing the SRN and major route network/junctions, or links to other parts of the network as reported in the Options Assessment report produced in April 2018.</p> <p>This PERA addresses those ‘do-something’ interventions selected for the illustrative strategy - see Appendix 1. Other interventions on the A46 corridor have also been identified and are already being pursued through other routes (e.g. Highways England’s RIS 1 and RIS 2 schemes). However, this PERA does not address these ‘do-minimum’ interventions.</p> <p>The corridor has been divided into 5 sections and the environmental risks associated with the selected interventions for each of those sections are addressed in turn in Part 2 below.</p>
<p>1.2 Project length &amp; area (ha) (if known)</p>	<p>The A46 corridor under consideration in this study runs approximately 250 kilometres from Junction 9 of the M5, through the Midlands, to the Humber ports. The corridor has been divided into 5 sections:</p> <ul style="list-style-type: none"> <li>• Section 1: M5 J9 (Tewkesbury) to M40 J15 (Warwick) - 52 km</li> <li>• Section 2: M40 J15 to M1 J21 (Leicester) - 50 km</li> <li>• Section 3: M1 J21 to Syston (Hobby Horse interchange) - 17 km</li> <li>• Section 4: Syston to Newark (A1) - 51 km</li> <li>• Section 5: Newark to Humber Ports - 82 km</li> </ul>
<p>1.3 Description of site location and surrounding area including key environmental features</p>	<p>The majority of the route passes through rural mixed-use farmland, bypassing the larger settlements of Evesham, Stratford-upon-Avon, Warwick, Coventry, Leicester, Newark and Lincoln. There are many significant environmental constraints at several locations including, in Section 1, the Cotswolds Area of Outstanding Natural Beauty (AONB) and notable tracts of Ancient Woodland. AQMA’s have been declared in Stratford, Coventry, Leicester and Lincoln and noise important areas (nIA’s)</p>



are prevalent along the length of the route. The Humber Estuary is a SSSI, SPA and SAC and there are numerous other SSSI's within 5km of the route. The route crosses national flood zone 3 in numerous

places with flood risk being a potential issue especially around Evesham, Warwick, Leicester and throughout the north of the corridor from Newark to the Humber Estuary.

**Part 2: Environmental / Policy Baseline Summary**

Note: See environmental constraints plan in Appendix 1.

**2.1 Air Quality & Greenhouse Gases**

National & Highways England policy

Policy Document	Comment
<b>NPPF</b>	<ul style="list-style-type: none"> <li>The presence of Air Quality Management Areas (AQMA) will need to be taken into account.</li> <li>The potential cumulative impacts on air quality from individual sites will need to be identified.</li> <li>Any new development in AQMA needs to be consistent with the local air quality action plan.</li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>The presence of AQMA or Limit Values will need to be taken into account.</li> <li>Any changes that may result in a need for a new AQMA or a change in the size of an existing AQMA, or bring about changes to exceedances of the Limit Values will need to be identified.</li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>Zero breaches of air quality regulations and major reduction in carbon emissions across the network</li> </ul>
<b>National Plan for Nitrogen Dioxide – 26/07/17</b>	<ul style="list-style-type: none"> <li>'The UK plan for tackling roadside nitrogen dioxide concentrations' sets out how the UK intends to comply with the EU Ambient Air Quality directive 'in the shortest possible time'. This specifically addresses roads likely to be causing non-compliance in 2021, which are in Birmingham and Coventry in the study area.</li> <li>Developments which threaten compliance are likely to be unacceptable.</li> </ul>
<b>HE Air Quality Strategy</b>	<ul style="list-style-type: none"> <li>This strategy sets out Highways England's contribution to support Defra and DfT as they work to improve air quality in the UK and deliver nitrogen dioxide compliance at the roadside in the shortest time possible.</li> </ul>
<b>Highways England Licence</b>	<ul style="list-style-type: none"> <li>The Licence holder should:                             <ul style="list-style-type: none"> <li>Calculate and consider the carbon impact of road projects and factor carbon into design decisions, and seek to minimise carbon emissions and other greenhouse gases from its operations;</li> <li>Take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices.</li> </ul> </li> </ul>

Physical Environment

Section 1

There are no AQMAs intersected by the current alignment although it runs alongside those at Stratford and Coventry and is close to those in Tewkesbury and Evesham.

The proposed off-line Evesham Eastern Bypass will not intersect any AQMAs however a potential route could pass close to numerous sensitive air receptors

notably residential properties and community facilities located in Badsey, Aldington, Offenham and Harvington.

The existing route passes close to numerous sensitive air quality receptors including the residential properties and community facilities at Ashchurch, Sedgeberrow, Evesham, Bidford-on-Avon.

Section 2

The current alignment intersects the AQMAs in Coventry and the M1 corridor in Enderby. The alignment also runs alongside AQMAs in Warwick, Royal Leamington Spa, Kenilworth and Leicester and passes close to numerous sensitive air quality receptors, most notably the residential properties and community facilities at Woodlands Park, Leek Wootton, Castle End, Bramcote and Burbage.

The proposed on-line dualling upgrades and junction improvements around the south and east of Coventry will further intersect the Coventry AQMA.

Section 3

The potential alignment of the off-line section of the Leicester Southern and Eastern Bypass will not intersect any AQMAs. The off-line section could however come close to areas which have numerous sensitive air quality receptors most notably residential properties and community facilities present in Oadby, Bushby and Syston.

Section 4

No significant environmental constraints in this section.

Section 5

The current alignment from Newark to Hykeham does not intersect with or come within close proximity to any AQMAs. The alignment does, however, pass close to numerous sensitive air quality receptors including residential properties and community facilities at Newark, Winthorpe, Witham St Hughs and Hykeham.

The alignment of the existing Lincoln western bypass intersects the Hele Road AQMA which is situated around the heavily urban area of Lincoln.

The proposed off-line Lincoln Southern Bypass could come close to the Hele Road AQMA which is located around the centre of Lincoln.

The improvements to the M180 J4 will be in close proximity to an AQMA situated around Scunthorpe.

2.2 Cultural Heritage

National & Highways England policy

Policy Document	Comment
<b>NPPF</b>	<ul style="list-style-type: none"> <li>Any heritage assets, historic environments and conservation areas must be conserved within the development.</li> </ul>

<b>NNNPS</b>	<ul style="list-style-type: none"> <li>Any likely significant heritage impacts of the proposed project must be identified.</li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>Enhance the setting and condition of cultural heritage and historic features in the Company's ownership.</li> <li>Enhance the setting and condition of cultural heritage and historic features in proximity to the Strategic Road Network.</li> </ul>

Physical Environment

Section 1

There are a number of cultural heritage assets within this section of the A46 corridor route corridor including:

- A group of Grade I listed buildings and a scheduled monument located at Sedgeberrow;
- Scheduled monuments to the south and southwest and a registered battlefield to the north of Evesham;
- A group of scheduled monuments located around Alcester which the existing route passes close to; and
- A scheduled monument located in Offenham which any potential off-line Evesham Eastern Bypass could come very close to.

The proposed on-line improvements from Alcester to Stratford would bring the A46 infrastructure closer to several listed buildings which are located close to the existing highway.

For any potential off-line Evesham Eastern Bypass there is high potential to encounter unknown archaeological features.

Section 2

Cultural heritage assets within this section of the A46 corridor include:

- A group of listed buildings and scheduled monuments located to the south of M40 J15 and scheduled monuments and registered parks located in Warwick, most notably Warwick Castle;
- Several listed buildings, scheduled monuments and registered parks located around Kenilworth;
- Coventry: Coombe Abbey grade II\* registered park, scheduled monument and listed buildings to the east of the A46 and SE of M6 junction 2;
- Various listed buildings and scheduled monuments around the area of Wolvey; and
- The NW corner of M1 J21 has a scheduled monument present;

The proposed on-line upgrades between Warwick and Kenilworth and along the south and east of Coventry will bring the highway closer to listed buildings and the works may encounter unknown archaeological features.

Section 3

It is expected that any potential alignment of the off-line section of the Leicester Southern and Eastern Bypass could pass close to a number of cultural heritage assets including:

- Several scheduled monuments and listed buildings located in Whetstone;

- Several scheduled monuments and listed buildings located in Scraftoft;
- Several scheduled monuments and listed buildings located in Wigston; and
- Several listed buildings located in Queniborough.

Section 4

No significant environmental constraints in this section. The route does however run directly adjacent to a scheduled monument located in East Bridgford and several scheduled monuments and a registered battle located in Elston.

Section 5

The Lincoln western bypass is located close to several scheduled monuments and listed buildings.

A potential off-line Lincoln Southern Bypass could pass close to a grade I listed building located in South Hykeham;

The on-line improvements to the Junction 4 of the M180 will be in close proximity to a grade I listed building located in Scawby.

2.3 Landscape

National & Highways England policy

Policy Document	Comment
<b>NPPF</b>	<ul style="list-style-type: none"> <li>• The local area's landscape character and sensitivity to development will need to be taken into account.</li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>• Any likely significant landscape and visual features within or adjacent to the scheme boundary must be identified.</li> <li>• The scheme construction phase, the completed development and its operation must be considered with regard to landscape components and landscape character (including historic landscape characterisation).</li> <li>• Surrounding views and visual amenity must be taken into account.</li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>• Mitigation of existing landscape problems on the network, especially in protected areas.</li> <li>• Enhancing landscape quality through new schemes.</li> </ul>
<b>Highways England Licence</b>	<ul style="list-style-type: none"> <li>• The Licence holder must seek advice from the Design Panel:               <ul style="list-style-type: none"> <li>– On the design of road improvement schemes, where these are in sensitive locations or expected to have a substantial impact on the surrounding landscape.</li> </ul> </li> </ul>

Physical Environment

Section 1

At the southern end of the route the A46 passes through the Cotswolds Area of Outstanding Natural Beauty between Beckford and Ashton-under-Hill. This is a key constraint to major improvements and off-line measures in this section. Issues of significant visual impacts may also arise where the potential off-line road corridors run close to large numbers of potentially sensitive receptors, most notably on the edge of Evesham. Visual impacts may also arise from the on-line improvement works where the existing road runs close to

large numbers of potentially sensitive receptors, most notably Exhall and Temple Grafton.

Section 2

This section does not pass through any Areas of Outstanding Natural Beauty. Visual impacts may however arise from the on-line improvement works where the existing road runs close to large numbers of potentially sensitive receptors most notably on the eastern edge of Coventry at Walsgrave on Sowe and Brinklow. There may further visual impacts from the on-line improvement works at areas of historical importance such as Warwick Castle and Kenilworth Castle, which the existing route passes.

Section 3

This section of the route does not pass through any Areas of Outstanding Natural Beauty. Issues of significant visual impacts may arise where the proposals run close to large numbers of potentially sensitive receptors most notably in Leicester, Sharnford and Broughton Astley.

Section 4

No significant environmental constraints in this section.

Section 5

The proposals in this section of the route does not pass through any Areas of Outstanding Natural Beauty. Issues of significant visual impacts may arise where any potential new off-line road corridors run close to large numbers of potentially sensitive receptors most notably in South Hykeham, Aubourn and Waddington. Further visual impacts may arise where on-line works pass close to large numbers of potentially sensitive receptors most notably Whisby and Riseholme.

2.4 Nature Conservation / Biodiversity

National & Highways England policy

Policy Document	Comment
<b>NPPF</b>	<ul style="list-style-type: none"> <li>The natural and local environment must be enhanced by:               <ul style="list-style-type: none"> <li>Providing net gains in biodiversity where possible, including by establishing coherent ecological networks that are more resilient to current and future pressures.</li> </ul> </li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>Internationally, nationally and locally designated sites of ecological conservation importance (including those outside England), protected species and habitats and other species identified as being of principal importance for the conservation of biodiversity will need to be considered.</li> <li>Biodiversity interest must be conserved.</li> <li>Mitigation and consideration of reasonable alternatives/ appropriate compensation measures will be required.</li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>Net gain in biodiversity from the Company's activities</li> <li>Increasing the number of SSSIs in good or recovering condition.</li> <li>Interventions to support Nature Improvement Areas.</li> </ul>

Physical Environment

Section 1

There are a number of areas of Ancient Woodland, most notably south of Arrow and between Alcester and Stratford.

There are 2 Special Areas of Conservation (SAC) within 5km of the A46 (Bredon Hills and Dixton Wood). These are both designated for their Violet Click Beetle Interest. The Wye Valley & Forest of Dean SAC is the closest SAC designated for bat interest but is 30km from M5 J9 which is the closet point of the scheme. The proposed online improvements would bring the A46 infrastructure slightly closer to Aston Grove and Withycombe SSSI and would intersect several areas of Ancient Woodland between Alcester and Stratford.

Any potential off-line Evesham Eastern Bypass could come within 1km of Windmill Hill (SSSI), designated for its presence of calcareous grassland.

In addition, as the route passes through open countryside there is high potential for the presence of many protected species; reptiles, badgers, great crested newts, bats etc.

### Section 2

Several areas of ancient woodland are present within the study area most notably around Kenilworth, Bubbenhall, Budbrooke and the SW and to the east of Coventry.

The existing A46/ M69 route runs through, alongside or is in close proximity of several SSSIs. Herald Way Marsh SSSI in Willenhall is designated because of various habitats being present. Combe Pool SSSI in Binley is designated because of its presence of breeding birds and Burbage Wood and Aston Firs SSSI is designated because of its presence of woodland. The proposed on-line improvements may result in the highway intersecting Guy's Cliffe SSSI and Coomb Pool SSSI.

There is one SAC within the vicinity of the A46/ M69. Ensor's Pool SAC is located to the south of Nuneaton and is designated because of the presence of White-clawed Crayfish.

In addition, as the route passes through open countryside there is high potential for the presence of many protected species; reptiles, badgers, great crested newts, bats etc.

### Section 3

A potential off-line Leicester Bypass at the M69 J2 could intersect Burbage Wood and Aston Firs SSSI and two areas of Ancient Woodland.

The bypass could also bring the route closer to Narborough Bog SSSI, designated for its areas of wet woodland and meadow. It could also intersect the Kilby-Foxton Canal SSSI which is designated because of its fluvial fauna interests. This would be a key constraint to the off-line proposal.

In addition, as the route passes through open countryside there is high potential for the presence of many protected species; reptiles, badgers, great crested newts, bats etc.

Section 4

The existing A46 runs directly parallel to Twenty Acre Piece SSSI which is located in Six Hills.

Section 5

The on-line improvements to the existing highway corridor on the western side of the Lincoln Bypass is close to multiple areas of Ancient Woodland located to the north, north west and west of the study area. There are also several areas of Ancient Woodland located to the north of the proposed improvements at Junction 4 of the M180.

The on-line western side of the Lincoln Bypass is situated close to Swanholme Lakes SSSI which is designated for its presence of invertebrates. This section of the highway is also close to Wisbey Park, a Local Nature Reserve. There are also multiple SSSI sites located to the north east and west of the M180 J4 improvements notably Twigmoor SSSI which is designated for its presence for heathland, grassland and wetlands.

In addition, as the route passes through open countryside there is high potential for the presence of many protected species; reptiles, badgers, great crested newts, bats etc.

2.5 Noise & Vibration

National & Highways England policy

Policy Document	Comment
<b>NPPF</b>	<ul style="list-style-type: none"> <li>Noise pollution levels will need to be considered within the development.</li> <li>Noise and significant adverse impacts on health and quality of life as a result of new development will need to be managed.</li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>Noise management practices will need to be adhered to. Similar considerations apply to vibration.</li> <li>The use of landscaping, bunds or noise barriers to reduce noise transmission should be considered in the design phase.</li> </ul>
<b>Noise Policy Statement for England</b>	<ul style="list-style-type: none"> <li>The three aims of the NPSE will need to be considered during scheme assessment and design. These are to:               <ol style="list-style-type: none"> <li>avoid significant adverse impacts on health and quality of life;</li> <li>mitigate and minimise adverse impacts on health and quality of life; and</li> <li>where possible, contribute to the improvement of health and quality of life.</li> </ol> </li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>Low noise surfacing on road links that would not be resurfaced due to age or condition, where benefit to the local community can be demonstrated.</li> <li>Provision of noise mitigation to those properties exposed to the highest noise levels.</li> <li>KPI Mitigating at least 1,150 Noise Important Areas by the end of the first Road Period as identified through the Defra Noise Action Plan</li> </ul>

Physical Environment

Section 1

The A46 route passes close to numerous sensitive noise receptors and a number of Noise Important Areas have been identified along the existing route especially between the M5 and Evesham, between Alcester and Stratford. The

proposed on-line improvement works between Alcester and the M40 J15 would likely affect the existing Noise Important Areas identified here.

Section 2

The A46 route passes close to numerous sensitive noise receptors and a number of Noise Important Areas have been identified along the existing route especially around the M40 J15, Warwick, Baginton, Tollbar End, M6 J2 – Shilton and around the M1, J21.

Section 3

Any potential off-line Leicester Southern and Eastern Bypass could pass close to several noise important areas located on the A6 Leicester Road. Numerous Noise Important Areas have been identified along the existing route especially around Thorpe Astley and Thurstaston.

Section 4

There are number of nIA's along the route notably those located in Syston, Widmerpool and Saxondale.

Section 5

The existing on-line corridor at Riseholme passes through a Noise Important Area.

Any potential off-line Lincoln Southern Bypass could pass close to several noise sensitive receptors such as those found in Hykeham.

2.6 Road Drainage & the Water Environment

National & Highways England policy

Policy Document	Comment
<b>NPPF</b>	<ul style="list-style-type: none"> <li>Flood risk must be appropriately managed, including the identification of safe access and escape routes where required.</li> <li>Sustainable drainage systems must be considered in design.</li> <li>The flow and quantity of surface and groundwater must be taken into account.</li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>Steps must be taken to avoid, limit and reduce the risk of flooding to the proposed infrastructure and others.</li> <li>Water pollution must be effectively managed and mitigated against.</li> <li>Activities that discharge to the water environment are subject to pollution control.</li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>Reducing flood risk to communities adjacent to the network and improving network resilience to flooding.</li> <li>Delivering water quality improvements (drainage and runoff) through use of Sustainable Drainage Systems.</li> </ul>

Physical Environment

Section 1

There are numerous watercourses and flood zones along the existing A46 corridor. Ashchurch Interchange is located in a flood plain (zone 3 – high risk) meaning there is a likely risk that the junction will flood. At Ashchurch there is Tirl Brook, and there is potential for works to encroach into the flood plain (zone 3 – high risk). At Ashton-under-Hill the A46 crosses the River Isbourne

and there are tributaries of Carrant Brook, as well as a flood zone 3. There is a tributary of the River Avon at Salford Priors, which is also in a flood zone 3.

The grade separated junction at Alcester is within the flood plain (zone 3) of the River Arrow. The Longbridge Island Upgrade (M40 J15) is situated within flood plain (zone 2 and zone 3) as the existing highway crosses over Longbridge Brook and Horse Brook.

Any potential off-line Evesham Eastern Bypass could intersect the River Avon and its surrounding tributaries three times which include various flood plains (zone 2 and zone 3) situated to the east and NE of Evesham.

#### Section 2

At the M40 J15 and around Warwick and Kenilworth, the route passes over and comes very close to the River Avon and its tributaries, within flood zone 3. There are also flood zones 3 from the River Sowe and its tributaries at Junction and the M6 J2. Further flood zone 3 is present where the route passes over the River Anker and its tributaries at Shelford and at Thurlaston where the route passes over tributaries of the River Soar.

The route runs past a groundwater protection zone in Woodloes Park, north Warwick and intersects groundwater protection zones at King's Hill and to the north of Kenilworth.

The land around the A46 at Stoneleigh is within a groundwater protection zone and the route also crosses both the River Avon and River Sowe near Stoneleigh.

#### Section 3

Any potential off-line Leicester Southern and Eastern Bypass could intersect numerous flood plains. It is expected that the bypass will intersect Whetstone Brook, a tributary of the River Soar (flood zone 2 and 3), the River Sence and several of its tributaries in Kilby (flood zone 2 and 3) and two brooks near Keyham and Beeby (flood zone 3). The proposed highway will also have to cross two flood plains around Queniborough (flood zone 3) and the River Wreake at Ratcliffe (flood zone 3).

#### Section 4

The majority of the existing route is situated outside of the flood zone. The northern end of the route is, however, situated in flood plain (zone 3), which begins to the south of Newark, before it crosses the River Trent.

#### Section 5

The on-line dualling on the northern section of the existing Lincoln bypass is located within flood zone 2 and 3 and a groundwater Source Protection Zone. The roundabout upgrade at the junction of the A46 and B1182 is located within a flood plain (zone 3).

Any potential off-line Lincoln Southern Bypass could intersect a large section of the River Witham floodplain and various drains in South Hykeham. The bypass will also intersect a zone 2 and 3 Source Protection Zone.

2.7 Population and Human Health

National & Highways England policy

Policy Document	Comments
<b>NPPF</b>	<ul style="list-style-type: none"> <li>The scheme needs to achieve a safe and accessible development, containing clear pedestrian routes, and high quality public space, which encourages the active and continual use of public areas.</li> <li>The scheme must maintain connections between people and places and integrate new development into the natural, built and historic environment.</li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>The scheme must aim to join up communities and link them effectively to each other.</li> <li>The scheme is expected to use reasonable endeavours to address the needs of cyclists and pedestrians in the design phase.</li> <li>The development should consider correcting historic problems.</li> </ul>
<b>RIS</b>	<ul style="list-style-type: none"> <li>Will give greater consideration to the needs of walkers, cyclists and local communities along with the aesthetic appearance of the network.</li> <li>Joining our communities and linking effectively to each other.</li> <li>The network must be easier to get over, under or around to ensure that roads do not divide communities, and that the associated health and wellbeing benefits of walking and cycling are felt as widely as possible.</li> <li>The Company will try to make best use of the existing route; and where the alignment changes, use this as an opportunity to reduce the impact of the road on surrounding communities.</li> </ul>
<b>Highways England Licence</b>	The scheme should seek to improve the well-being of road users and communities affected by the network and take reasonable account of the views of local communities.

Physical Environment

Section 1

The existing A46 is in close proximity to numerous communities and the proposed Evesham Eastern Bypass would bring the road corridor close to other communities which are not currently directly impacted by the existing A46. The on-line improvements between Alcester and the M40 J15 will bring the A46 route closer to communities in Alcester, Billesley, Bishopton and Snitterfield.

There are numerous public rights of way and recreational paths within close proximity to the A46. The southern section of the route, within the AONB, is an important recreational area as is the River Avon particularly within Evesham, Bidford and Stratford-upon-Avon – the latter being a major international tourist destination.

Section 2

The on-line route passes very close to several scheduled monuments, such as Warwick Castle and Kenilworth Castle, which have historical significance and are also important recreational areas. The route passes over or close to several rivers which are used for various recreational purposes. The proposed on-line

improvements to the south of the M6 J2 would also bring the route very close to Coventry and Warwickshire Hospital.

Section 3

Any potential off-line Leicester Bypass could result in adverse impacts to public facilities. The proposed route would intersect several public rights of way and will come close to numerous scheduled monuments. It will affect villages such as Sapcote, Primethorpe and Broughton Astley.

Section 4

This section of the route does not run adjacent to or intersect any major centres population.

Section 5

The on-line dualling upgrades to the western Lincoln bypass are within close proximity to sensitive receptors. The existing corridor is directly adjacent to The Natural World Centre (located at Wisby Park Local Nature Reserve), a local tourist destination, and Hykeham Sailing Club.

2.8 Geology, Soils & Materials

National & Highways England policy

Policy Document	Comments
<b>NPPF</b>	<ul style="list-style-type: none"> <li>Valued landscapes, geological conservation interests and soils must be protected and enhanced within the scheme.</li> <li>Soil pollution must be taken into account.</li> <li>Local character and history, and the identity of local surroundings and materials, should be considered in the design phase.</li> <li>So far as practicable, the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, should be considered.</li> </ul>
<b>NNNPS</b>	<ul style="list-style-type: none"> <li>Internationally, nationally and locally designated sites of geological conservation importance will need to be considered and conserved.</li> <li>Mitigation and consideration of reasonable alternatives will be required.</li> <li>Soil quality and any necessary mitigation measures must be identified.</li> </ul>

Physical Environment

Section 1

The Broom Railways Cutting SSSI, designated for its geological interest, is located less than 500m from the on-line section of the A46 from Salford Priors to Alcester.

There is a licensed landfill site immediately adjacent to the A46 just north of Salford Priors and there are numerous historic landfill sites in close proximity to the existing road corridor, especially just north of Evesham.

Any potential off-line Evesham Eastern Bypass could intersect or come close to several historic landfills located in Offenham.

Much of the land use within the route corridor is for agriculture.

Section 2

High Close Farm, Snitterfield SSSI, Guy’s Cliffe SSSI and Enderby Warren Quarry SSSI are all designated because of their geological interest and are located within the immediate vicinity of the existing M46/ M69 route.

Several licensed landfill sites are located within 500m of the existing route. Landfill sites are present in Milverton, Baginton, Thurlaston and Enderby. There are also several historical landfill sites located around the M40 J15, close to Warwick Parkway railway station, Blackdown, Baginton, Binley and Huncote. There is a historic landfill located south of the M69 J2, the dualling proposed in this area may therefore intersect this archaeological feature.

Section 3

Any potential off-line Leicester Bypass could intersect a historic landfill to the immediate west of the new junction proposed along the M1 and would come within 500m of numerous historic landfills situated in Kilby, Stoughton and several around Syston.

Much of the land use within the route corridor is for agriculture or urban development.

Section 4

No significant environmental constraints in this section.

Section 5

The on-line western Lincoln bypass is situated directly adjacent and close to permitted landfill sites located close to the junction of the A46 and Moor Lane. This section of the highway is also close to several historic landfills located close to the junction of the A46 and Whisby Road. The on-line northern Lincoln bypass is located close to several historical landfills.

The A158/ A15 roundabout on the northern Lincoln bypass is situated close to Greetwell Hollow Quarry SSSI which is designated for its geological interest.

The proposed on-line improvements to Junction 4 of the M180 is situated close to four SSSI sites which are designated because of their soil or geological interest.

2.9 Design

Highways England policy

Policy Document	Comments
<b>Highways England Licence</b>	<ul style="list-style-type: none"> <li>• Give due regard to relevant principles and guidance on good design to ensure that the development of the road network takes account of the geographical, environmental and socio-economic context.</li> <li>• Seek advice from the Design Panel on the design of road improvement schemes where these are in sensitive locations or expected to have a substantial impact on the surrounding landscape.</li> <li>• Give due regard to the particular observations of the Design Panel on specific road schemes</li> </ul>

### Physical Environment

*Local factors that could pose risks or offer opportunities for good design.*

#### Section 1

There are significant environmental and community constraints at several locations along the potential route corridor.

At the southern end of the route the A46 passes through the Cotswolds Area of Outstanding Natural Beauty between Beckford and Ashton-under-Hill. This is a key constraint to major improvements and off-line measures in this section. Several new river and canal crossings, a railway crossing and at least 3 grade separated junctions will be required associated with any potential off-line sections – the Evesham Eastern Bypass would require three river crossings.

#### Section 2

There are significant environmental and community constraints at several locations along the potential route corridor.

The route passes close to several SSSI sites around the M40 J15 and Warwick and to the East of Coventry and around Hinckley. The route also passes close to several areas of ancient woodland, notably to the east of Coventry, around Hinckley and to the west of the M69 J2. Several scheduled monuments notably Warwick Castle and Kenilworth Castle are also within the close vicinity of the route meaning that some of the existing infrastructure is located within or around sensitive areas.

#### Section 3

There are significant environmental and community constraints at several locations along the potential route corridor.

Any potential off-line Leicester Bypass could come close to several scheduled monuments which are of historical importance. The proposal will also intersect with Kilby- Foxton Canal SSSI designated for its presence of fluvial fauna. The bypass would require the construction of 19 new structures and would cross the Rivers Sence and Wreake.

#### Section 4

No significant environmental constraints in this section.

#### Section 5

There are significant environmental and community constraints at several locations along the potential route corridor.

The on-line improvements to the western Lincoln bypass runs directly adjacent/ over several lakes and a tourist destination.

Any potential off-line Lincoln Southern Bypass could run close to multiple scheduled monuments. The proposed route will also cross open countryside which could result in adverse impacts to areas such as Waddington. The routes will require the construction of two new roundabouts and will cross the River Witham.

**Part 3: Preliminary Risk Assessment**

Include policy and local environment ratings with clear explanation/justification for ratings

	Policy conflicts & environmental risks / opportunities	RAG rating
	<p><i>For each topic area, a concise summary of the key issues should be provided and a RAG rating (for policy &amp; physical constraints) allocated based on the above guidance. For each policy conflict / environmental constraint identified, the risk on program and budget should be identified. In addition, opportunities where a project can provide benefits from the existing baseline scenario should be identified.</i></p> <p><i>As a guide, the RAG ratings should be attributed as follows;</i></p> <ul style="list-style-type: none"> <li><i>• Red: policy conflicts and / or environmental constraints that cannot be addressed using established and readily deliverable design solutions or mitigation thereby posing a threat to project delivery;</i></li> <li><i>• Amber: policy conflicts and / or environmental constraints that, whilst potentially significant, can likely be resolved / mitigated with potential implications for program and budget; and</i></li> <li><i>• Green: policy compliant and / or environmental constraints that can likely be resolved / mitigated within program and budget.</i></li> </ul>	
<p>3.1 Air Quality &amp; Greenhouse Gases</p>	<p><u>National &amp; Highways England policy</u></p> <p>The aim of the A46 improvements is to address current and long-term congestion problems with an emphasis on the contribution the road could make to supporting economic growth and potentially unlock land for future development.</p> <p>Interventions which increase traffic flows within any of the AQMA's in the route corridor could lead to adverse impacts, which it may not be possible to mitigate.</p> <p>However, assuming the national plan to tackle roadside nitrogen dioxide concentrations is effective by the early-2020's, the risk of a scheme opening in 2031 affecting compliance with this air quality policies is small.</p>	<p>Amber</p>

Policy conflicts & environmental risks / opportunities	RAG rating	
	<p><u>Physical Environment</u></p> <p>Detailed design of any potential alignment of off-line interventions provides an opportunity to maximise the separation distance between new road sections and sensitive air quality receptors. However, it is likely that there will still be dwellings within 200m of any potential new alignments which may be adversely affected and there is also potential for adverse effects at receptors adjacent to online interventions.</p> <p>There are no potential off-line bypass routes in Section 2 which means that no new sensitive receptors will be exposed to air pollutants. The existing route does however come close to and intersects the Coventry AQMA between the junction of the A46 and A45 and the M6 J2. The proposed junction improvement works and</p> <p>on-line dualling in this section will therefore result in an increase in vehicle numbers which is likely to adversely impact this AQMA as mitigation measures may not be possible. In other areas where junction improvements are proposed, no AQMAs are present however sensitive receptors may be adversely affected by the increased traffic.</p> <p>The impact of introducing traffic close to new receptors or increasing flows on the existing route alignment is likely to result in more losers than winners in air quality terms. Overall, therefore, the scheme may bring about increases in exposure to air pollutants. However, the scale of these adverse impacts may not be significant, based on HE guidance. More detailed air quality assessment would be required to confirm.</p> <p>The increase in traffic overall will lead to an increase in GHG emissions.</p>	Amber
3.2 Cultural Heritage	<p><u>National &amp; Highways England policy</u></p> <p>Environmental assessment will identify potential effects and the measures required to conserve cultural heritage assets. It is anticipated that mitigation measures and any potential enhancement could be incorporated into project budgets and programmes, if these are planned appropriately as the project progresses but there is a likelihood that not all assets could be avoided.</p>	Amber

	Policy conflicts & environmental risks / opportunities	RAG rating
	<p><u>Physical Environment</u> Detailed design will need to look at potential for avoidance of cultural heritage assets within the potential route corridors. However, given the number of listed buildings and other heritage assets, the likelihood of being able to avoid all impacts, especially in the vicinity of the off-line aspects of the route, is considered to be low.</p>	Amber
3.3 Landscape	<p><u>National &amp; Highways England policy</u> Landscape policy will be considered as part of the environmental assessment and the development of the design and associated mitigation measures will ensure impacts on the local areas landscape character will be taken into account. The risk of policy non-compliance will therefore be managed.</p>	Green
	<p><u>Physical Environment</u> It is likely that there will be effects on the local landscape character, especially at the southern end of the route where the A46 crosses the Cotswolds AONB, although the existing A46 does already impact this area.</p> <p>For the potential off-line bypass sections of the route there is widespread potential for adverse visual impacts which could be challenging to mitigate in places. For example, the Evesham Eastern Bypass runs directly through open countryside and will result in greater adverse landscape character and visual impacts than on-line interventions.</p> <p>In Section 3, any potential off-line Leicester Bypass could result in adverse landscape character impacts because a new highway would need to pass through open countryside.</p> <p>The on-line dualling along the western Lincoln bypass may result in adverse character and visual impacts as the area is a tourist destination and the surrounding lakes are used for recreation.</p> <p>Any potential off-line Lincoln southern and eastern bypass could cause adverse landscape character impacts as the route would bring highway infrastructure into a greenfield area. Significant environmental mitigation is therefore likely to be required.</p>	Amber
3.4 Nature Conservation / Biodiversity	<p><u>National &amp; Highways England policy</u> Nature conservation policy will be considered as part of the environmental assessment and mitigation measures to</p>	Green

	Policy conflicts & environmental risks / opportunities	RAG rating
	<p>provide net biodiversity gain will be promoted therefore the risk of policy non-compliance will be managed.</p> <p><u>Physical Environment</u>            In Section 1, although there are a number of designated sites and tracts of Ancient Woodland in close proximity to the route they are mostly within those parts of the route which are already dualled or could be bypassed by any potential off-line sections.</p> <p>It is considered unlikely that the scheme would have any adverse impacts on the Bredon Hills and Dixton Wood SACs although a HRA screening should be undertaken. The Wye Valley &amp; Forest of Dean SAC is designated for its bat interest and as such impacts within 30km should be assessed. However, at its very closest point this SAC is @30km from the starting point of the scheme (M5 J9) and as such no adverse impacts are anticipated. A notable site designated for its scientific interest is the River Humber which is a SAC, SPA and SSSI. None of the interventions proposed are within the vicinity of the Humber however and as such, it is not considered that a Habitats Regulation Assessment would be required.</p> <p>In Section 2, the existing corridor runs past several SSSI sites and areas of Ancient Woodland. The on-line dualling proposed between Warwick and Kenilworth and the junction upgrade at Kenilworth is likely to have an adverse effect on Ancient Woodland in these areas. Although much of this has already been intersected by the A46, further losses may prove difficult to mitigate. The proposed on-line dualling south of the M6 Junction 2 will impact upon Coomb Pool SSSI which is likely to prove difficult to mitigate.</p> <p>In Section 3, the existing corridor runs past several SSSI sites and areas of Ancient Woodland however many of these are in areas where no planned works are proposed. Any potential off-line Leicester bypass could intersect Burbage Wood and Aston Firs SSSI and two areas of Ancient Woodland. It could also intersect the Kilby-Foxton Canal SSSI. This could prove difficult to mitigate.</p>	<p>Amber</p>
<p>3.5 Noise &amp; Vibration</p>	<p><u>National &amp; Highways England policy</u>            The A46 interventions would be expected to be designed such that they meet the first aim of the NPSE, which is to “avoid significant adverse impacts on health and quality of</p>	

	Policy conflicts & environmental risks / opportunities	RAG rating
	<p>life". In policy terms significant impact is set at the levels where an nIA is defined, so by meeting the first aim of the NPSE there will be no new nIA's created. The second and third aims of the NPSE would also need to be considered. This would be undertaken through scheme design and/or the provision of specific noise mitigation. It is considered that these aims of the NPSE can be achieved through standard noise mitigation measures.</p> <p><u>Physical Environment</u> Noise issues will be most significant where online improvements or new road construction will take place within approximately 500m of significant numbers of sensitive receptors, such as residential properties and community facilities.</p> <p>The introduction of a new road into areas that may currently experience a low level of noise is likely to cause significant environmental impacts, especially at night - the proposed Evesham bypass, Leicester bypass and Lincoln southern bypass would bring new road corridors close to large numbers of potentially sensitive noise receptors. The requirement for significant noise mitigation measures e.g. barriers or low noise surfacing may be quite substantial in such locations.</p>	<p>Green</p> <p>Amber</p>
<p>3.6 Road Drainage &amp; the Water Environment</p>	<p><u>National &amp; Highways England policy</u> Flooding/water policy will be addressed through the environmental assessment and appropriate mitigation included within the scheme design. As such, the risk of policy non-compliance will be managed.</p> <p><u>Physical Environment</u> There is potential for the scheme to impact upon several watercourses and flood zones. It is anticipated that any impacts can be mitigated through established and readily deliverable best practice design and construction methods although for interventions such as the Evesham, Leicester and Lincoln bypasses which cross substantial tracts of land within flood zone 3 and require numerous river crossings the level of required mitigation could be substantial</p> <p>In Section 5, there is a high potential for the proposed works to impact upon various flood plains notably those in Waddington. Impacts are expected to be negligible however as best practice mitigation, design and construction methods will be employed.</p>	<p>Green</p> <p>Amber</p>

	Policy conflicts & environmental risks / opportunities	RAG rating
	The increase in hard surface area is likely to affect surface water drainage and flood risk but it is anticipated that this can be mitigated by attenuation and management of discharge flows.	
3.7 Population and Human Health	<p><u>National &amp; Highways England policy</u></p> <p>It is considered that potential off-line interventions in particular could potentially be in conflict with the Population and Human Health policies and would be challenging to resolve through readily deliverable design solutions or mitigation.</p>	Amber
	<p><u>Physical Environment</u></p> <p>The potential introduction of any new off-line sections of road and the improvements to the on-line sections could have a significant impact on the numerous local communities within close proximity of the potential route with land loss, severance, visual, noise and air quality impacts. It is also likely that there will be some severance and/or diversion of PROWs.</p> <p>The new bypasses may prove beneficial for local traffic if strategic route journey times are reduced and local roads are avoided. This could help sensitive receptors in Leicester through reductions in congestion.</p>	Amber
	<p><u>National &amp; Highways England policy</u></p> <p>Geology, soils and materials policies will be considered as part of the environmental assessment and therefore the risk of policy non-compliance will be managed.</p>	Green
3.8 Geology, Soils & Materials	<p><u>Physical Environment</u></p> <p>It is considered that potential impacts can likely be resolved using established and readily deliverable design solutions or mitigation thereby not posing a threat to project program and budget.</p>	Green
	<p><u>Highways England policy</u></p> <p>The proposed interventions are likely to impact the surrounding landscape, especially at the southern end where the A46 crosses the Cotswold AONB, although the existing A46 does already impact this area. As such, advice will be sought from the Design Panel and due regard will be given to relevant principles and guidance on good design.</p>	Green
3.9 Design		

Policy conflicts & environmental risks / opportunities	RAG rating	
	<p><u>Physical Environment</u></p> <p>For any potential off-line interventions the introduction of new sections of road could have significant effects on the local landscape character.</p> <p>In Section 1, a number of major structures will be required which may require significant engineering works e.g. new river and railway crossings and a rail line crossing required for the Evesham bypass.</p> <p>Existing infrastructure and residential and industrial frontages close to the current A46 alignment is a significant constraint to potential on-line interventions in a number of places, especially between Ashchurch and Evesham.</p> <p>In Section 3, the Leicester bypass will require several structures which are very likely to require extensive engineering works. At least 19 new bridges will be required and 2 railway crossing will be required. The bypass will also need to cross the River Soar and the River Wreake.</p> <p>Any potential off-line southern and eastern bypass could result in significant adverse impacts and could change the local landscape character as much of any potential route is located in greenfield land. Potential off-line bypasses will require the construction of 6 new structures and will cross the railway twice and the River Witham twice. This will require extensive engineering works. Any potential off-line eastern bypass could also run close to Greetwell medieval village which is a sensitive receptor, resulting in a requirement for significant environmental mitigation.</p>	Amber

**Part 4: Summary**

4.1 (if applicable) Variance in risk/opportunities	-
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between project solutions	
4.2 Environmental Impact Assessment (EIA) likely to be required?	Yes
4.3 Is a Habitat Regulations Assessment likely to be required?	Yes
4.4 Difficulties encountered in obtaining environmental information and constraints in undertaking assessments	This document has been prepared on the basis of an indicative schemes only at this stage. More detailed alignment information for the potential off-line sections and details of the on-line improvements that would be needed is required for detailed assessment to be undertaken. Careful horizontal alignment of the potential off-line sections during detailed design could enable some potentially adverse impacts to be avoided.
4.5 Summary of National & Highways England environmental/ policy risks and opportunities	<p><u>Summary</u></p> <p>Compliance with air quality policy is dependent upon progress with the national plan to tackle roadside nitrogen dioxide concentrations. Assuming it is effective, the risk of policy conflict should, however, be small. There is potential for policy conflicts for cultural heritage as it is likely that it will not be possible to avoid significant impacts on some assets. Policy conflicts may likewise occur for Population and Human Health as the proposals may not be able to mitigate for some of the potential off-line interventions. Policy conflicts should, however, be able to be avoided for other topics through the use of established and readily deliverable design solutions and/or mitigation.</p> <p><u>Overall RAG Rating</u> Amber</p>
4.6 Summary of physical environment risk	<p><u>Summary</u></p> <p>The proposed interventions include both off-line and on-line improvements to the existing A46 between the M5 J9 and M180 J4 with the aim of providing a free flowing, 60mph minimum speed route to improve the contribution the road could make to supporting economic growth along the corridor.</p> <p>There are a number of significant environmental constraints at several locations along the route particularly between the M5 and Warwick where the existing route is mainly single carriageway.</p> <p>At the southern end, the A46 crosses the Cotswolds AONB which is a key constraint to major improvements and off-line measures in this section. The route overall passes in close proximity to numerous residential communities and a number of nIA's have been along the route, especially between the M5 and Evesham,</p>

between Alcester and Stratford, around Warwick/Royal Leamington Spa and around Leicester close to a potential off-line bypass. The potential off-line sections will also bring new road into close proximity to new sensitive noise and air quality receptors, especially to the west of Evesham, between Bidford and Broom and Wigston, Syston and Waddington.

The potential off-line sections will have to be considered with regard to flood risk mitigation. The potential off-line highway interventions in Evesham, Leicester and Lincoln are all within significant areas of flood zone 3. Although mitigation methods during the design phase should limit the level of flood risk there will be a significant increase in impermeable area.

The proximity to residential receptors and increase in traffic flows is likely to lead to localised air quality and noise impacts. However, the scale of these adverse impacts may not be significant, based on HE guidance. More detailed air quality and noise assessment would be required to confirm.

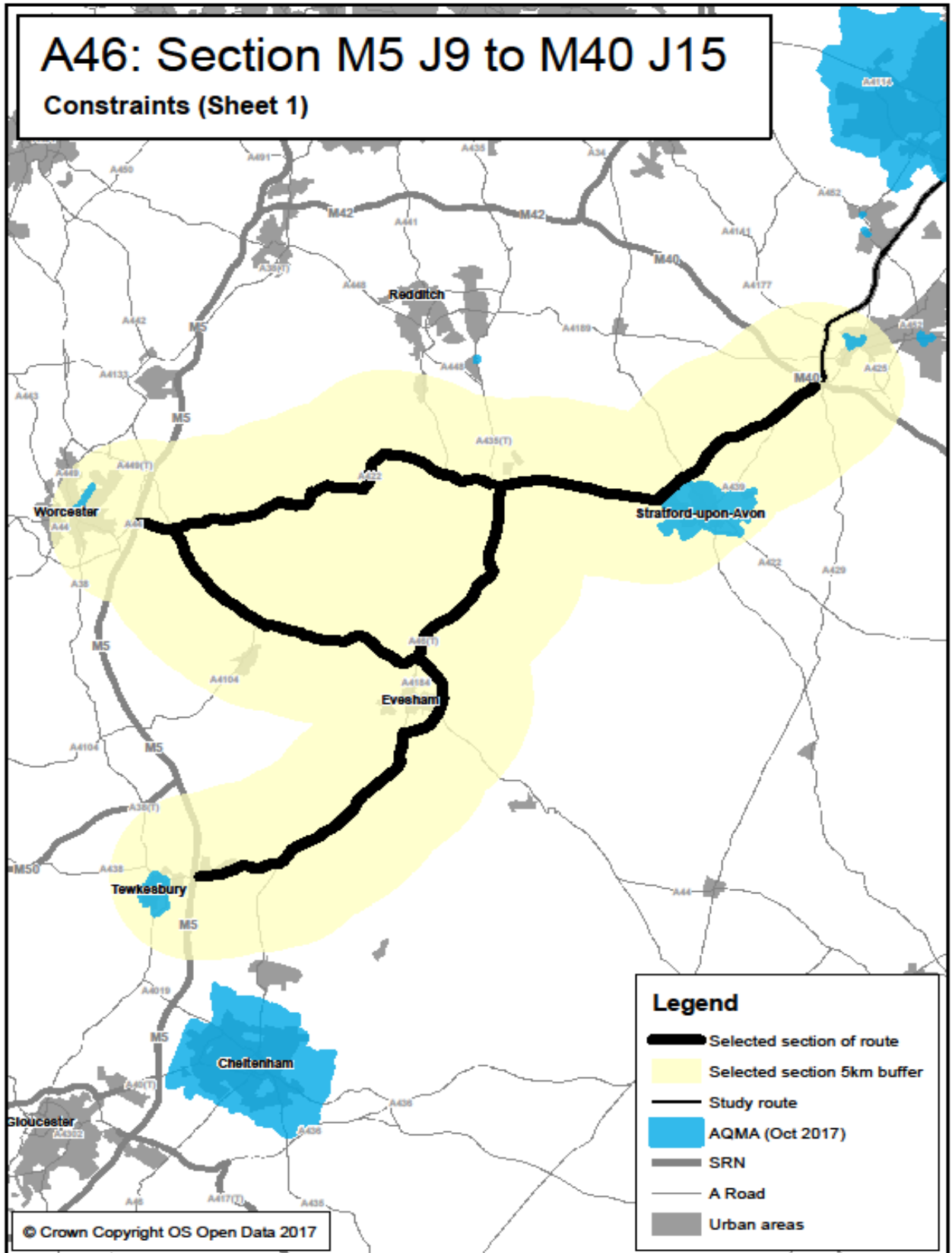
Any potential off-line sections in Evesham, Leicester and Lincoln could require extensive engineering works. Several rail and river crossings would be required and would require mitigation to reduce the impact to the local landscape character.

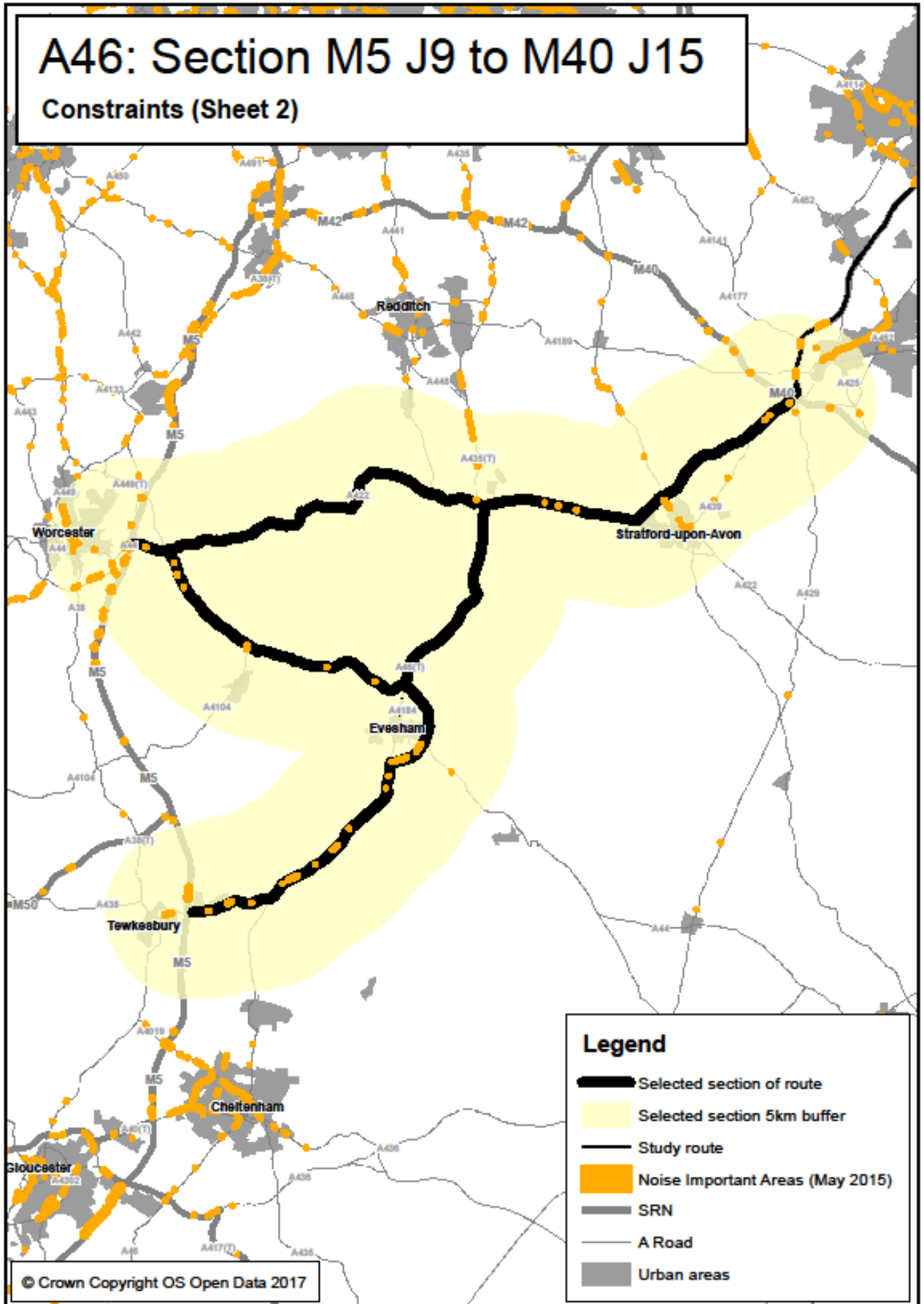
Overall RAG Rating

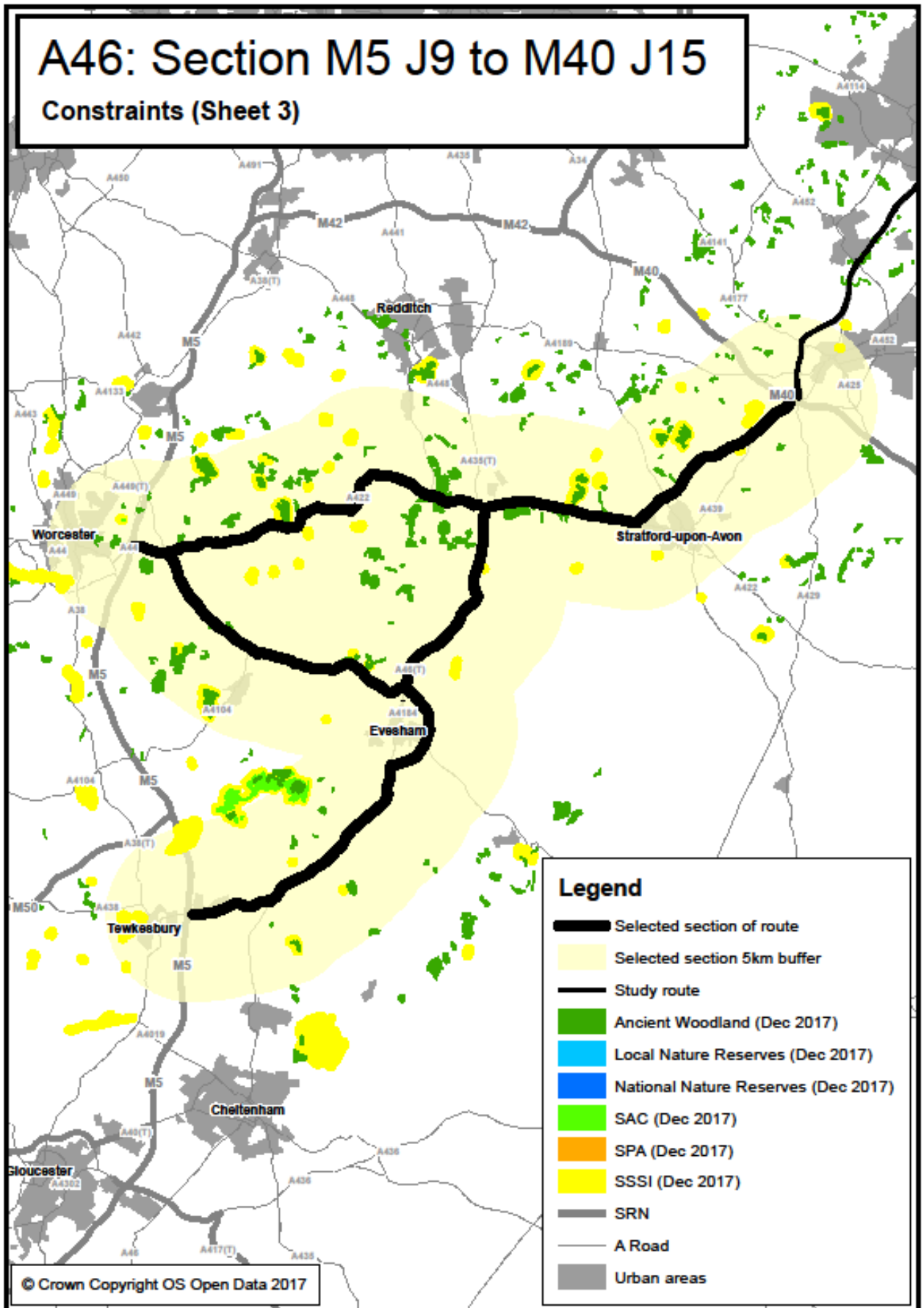
Amber

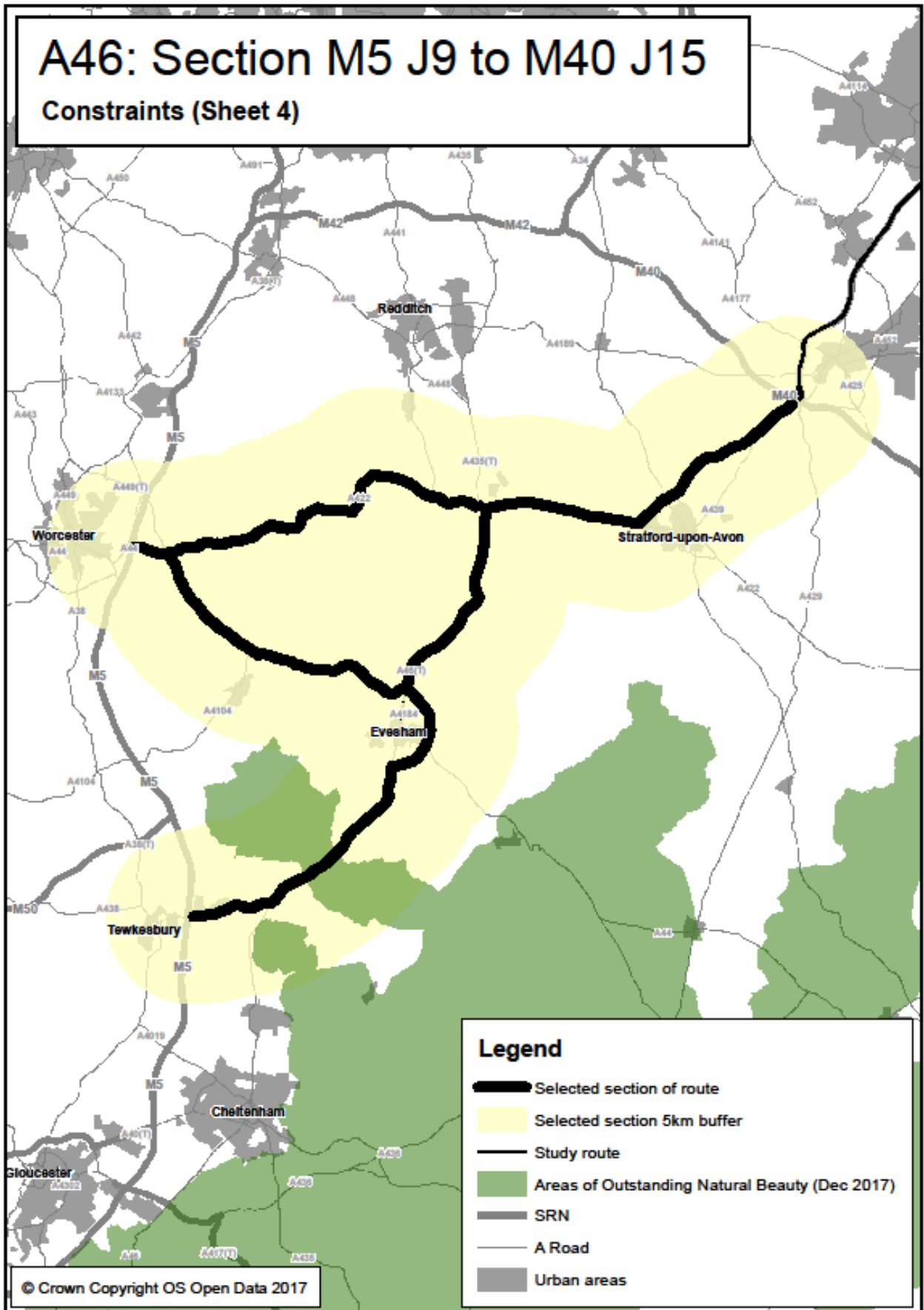
Appendix 1: Environmental Constraints Plans

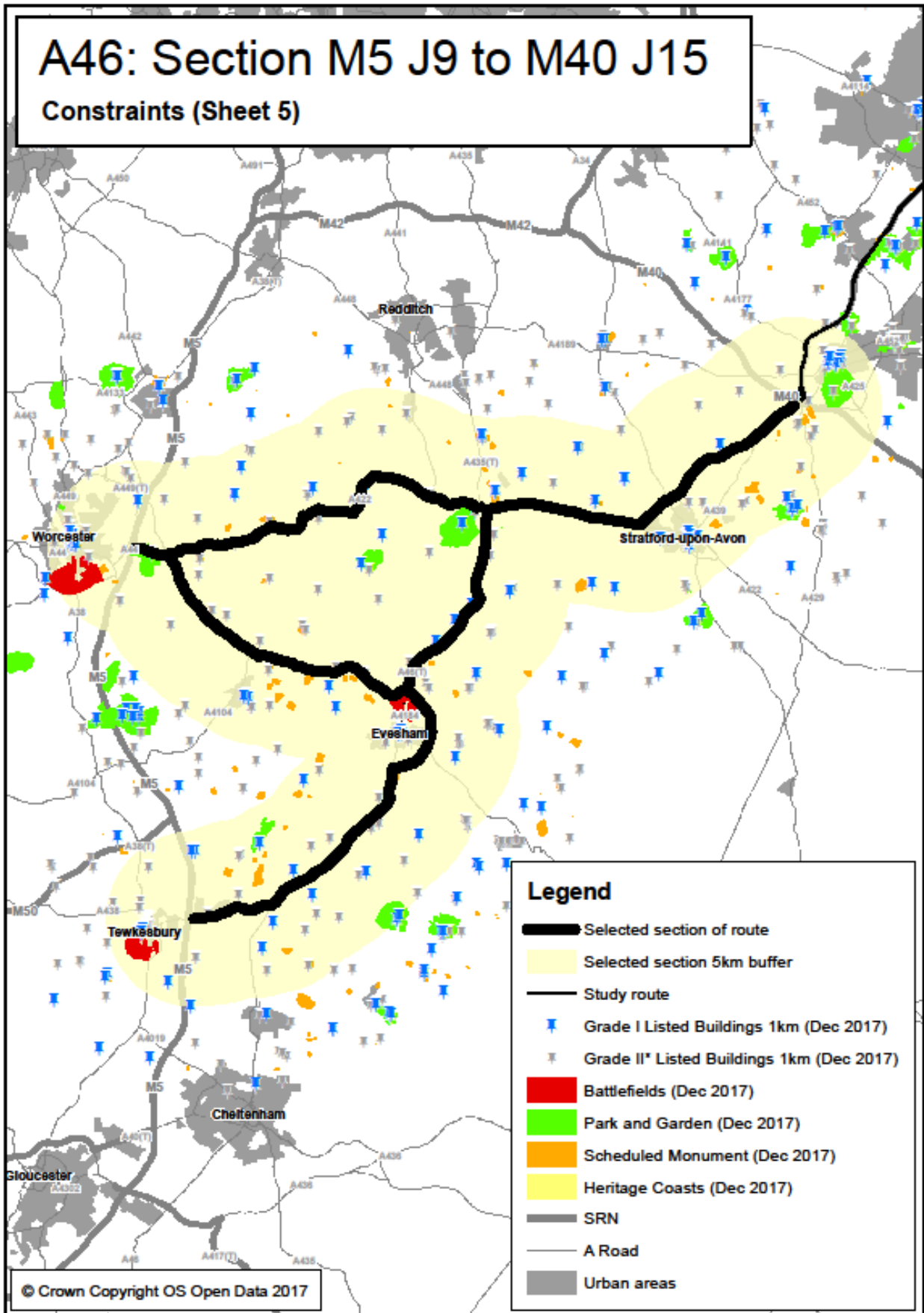
**Section 1: Tewkesbury - Warwick**

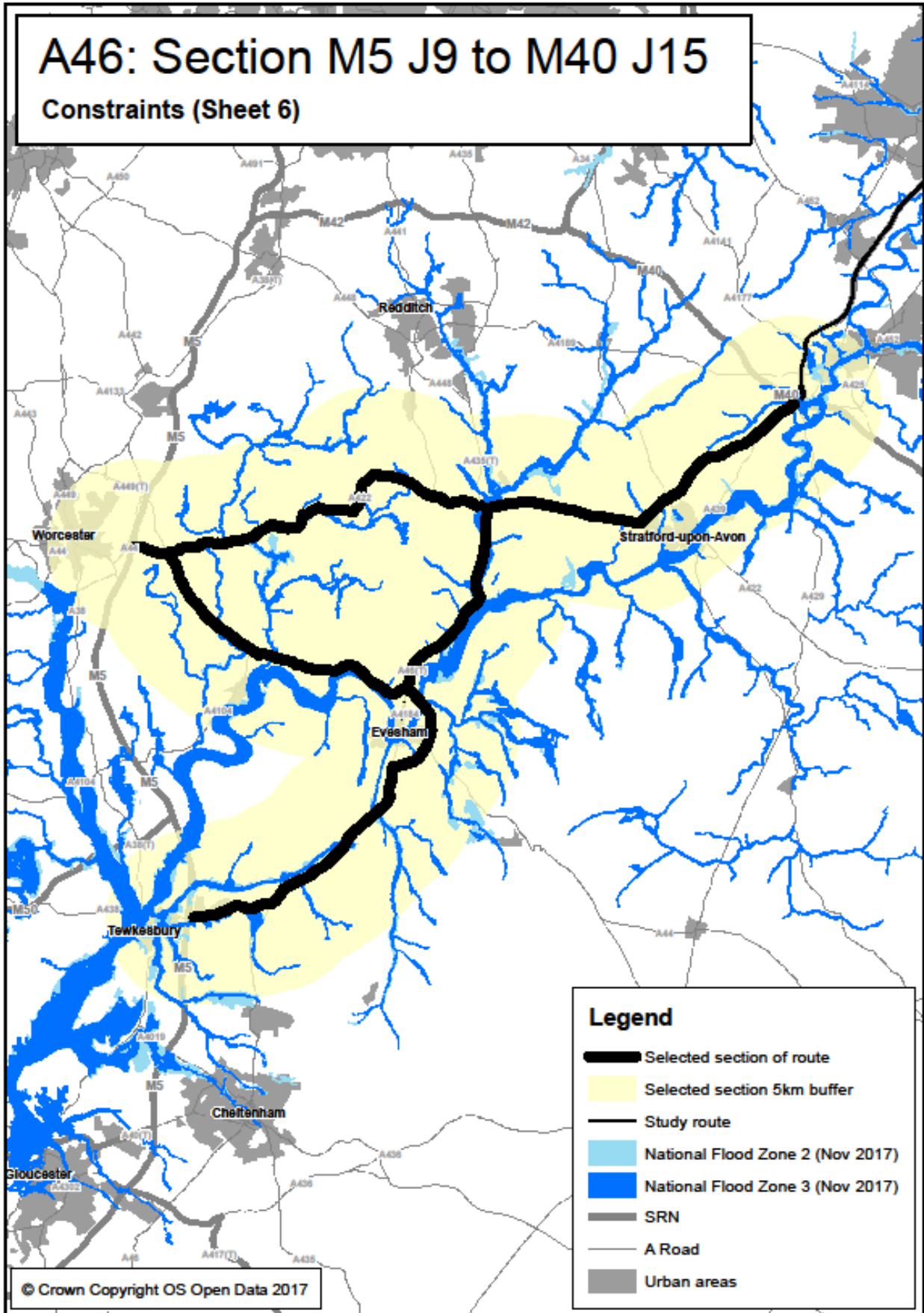






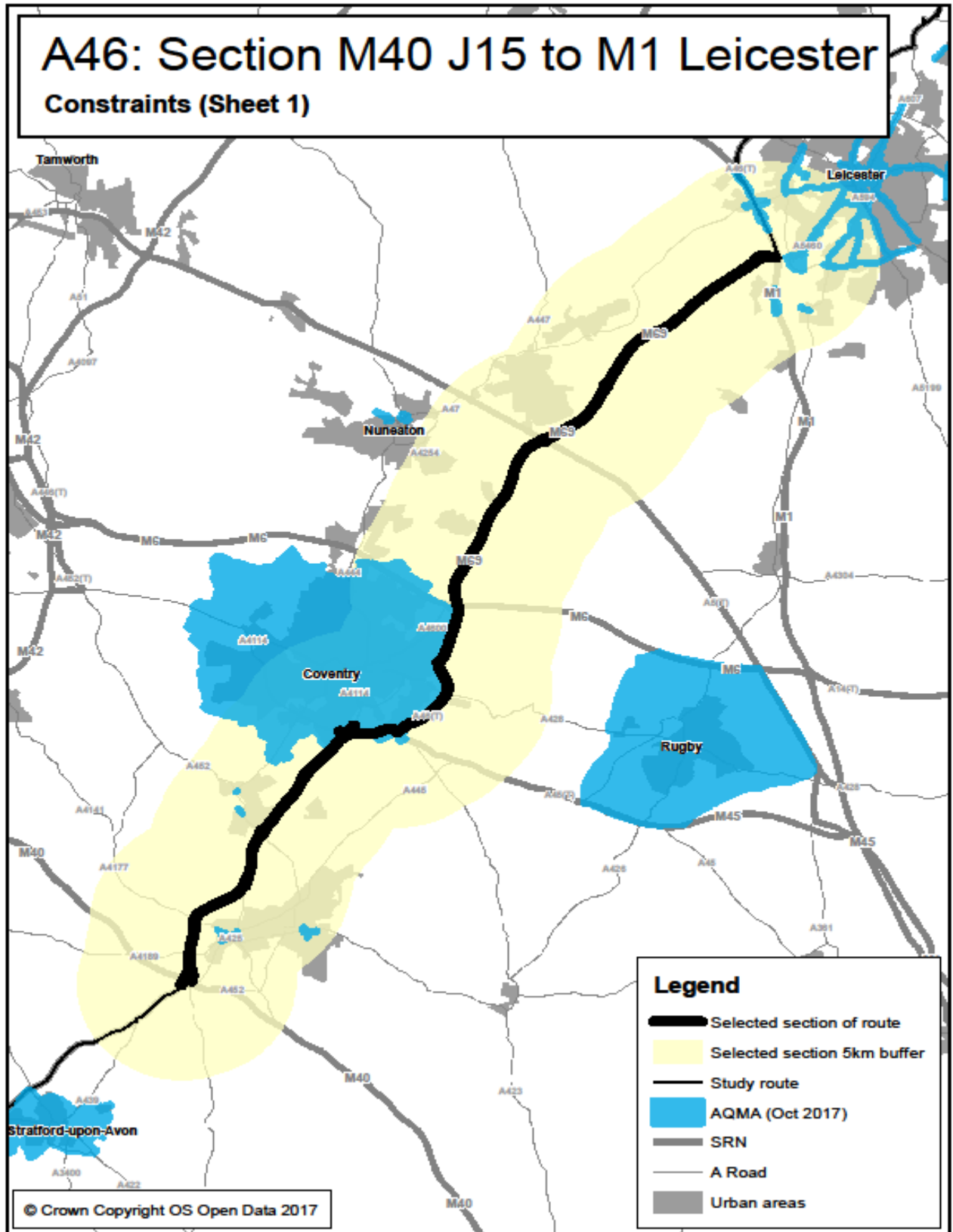




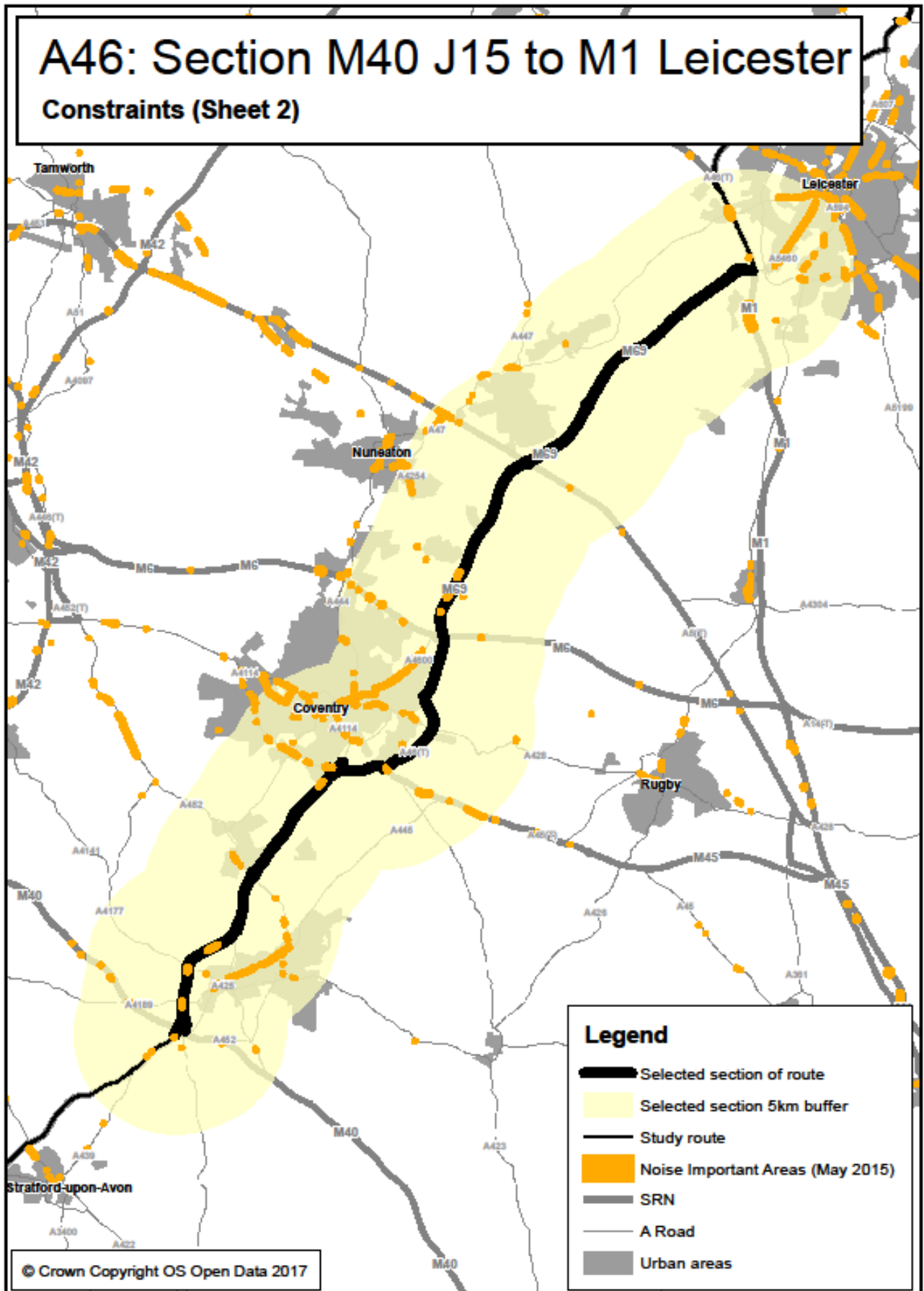




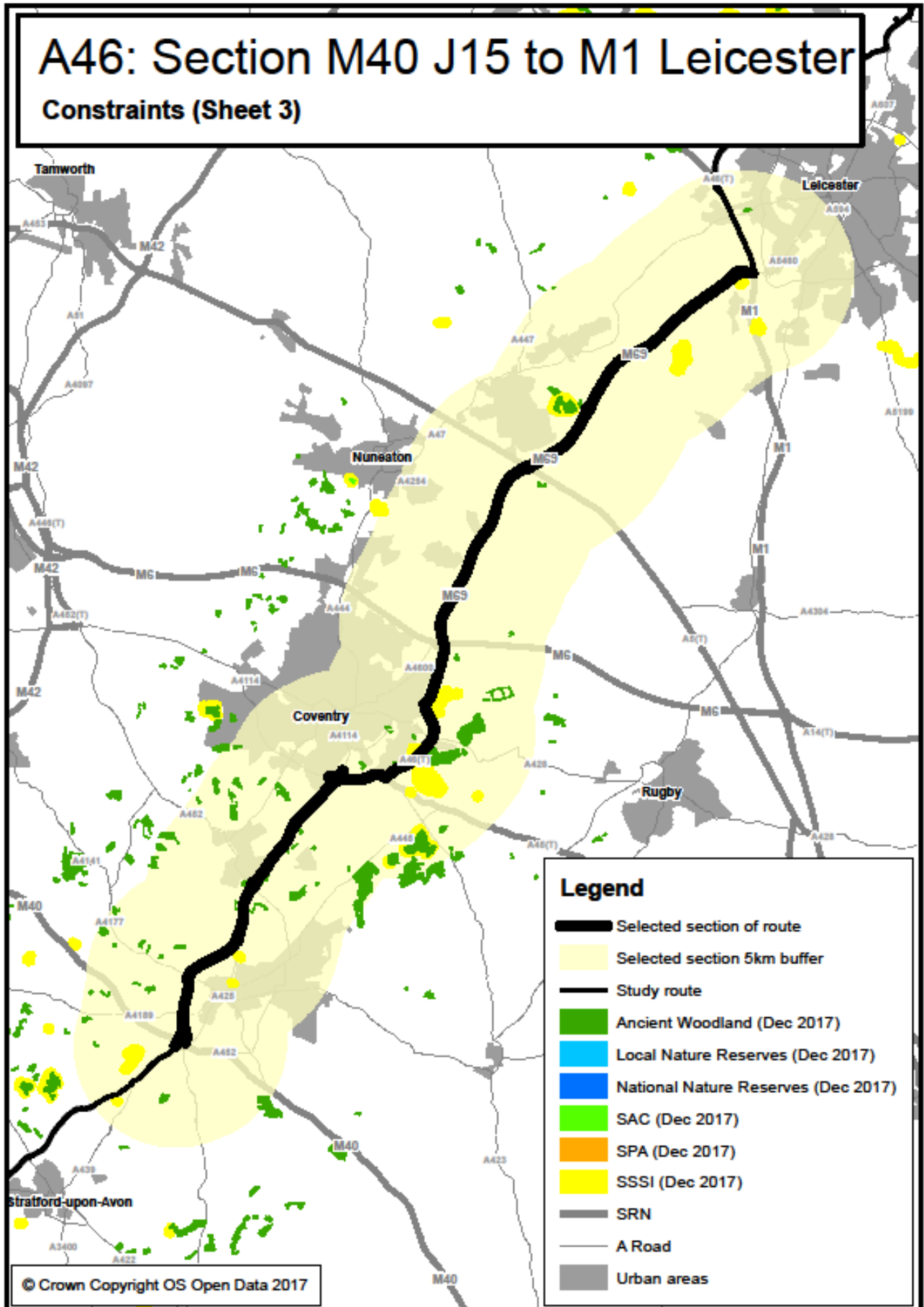
**Section 2: Warwick – Leicester**



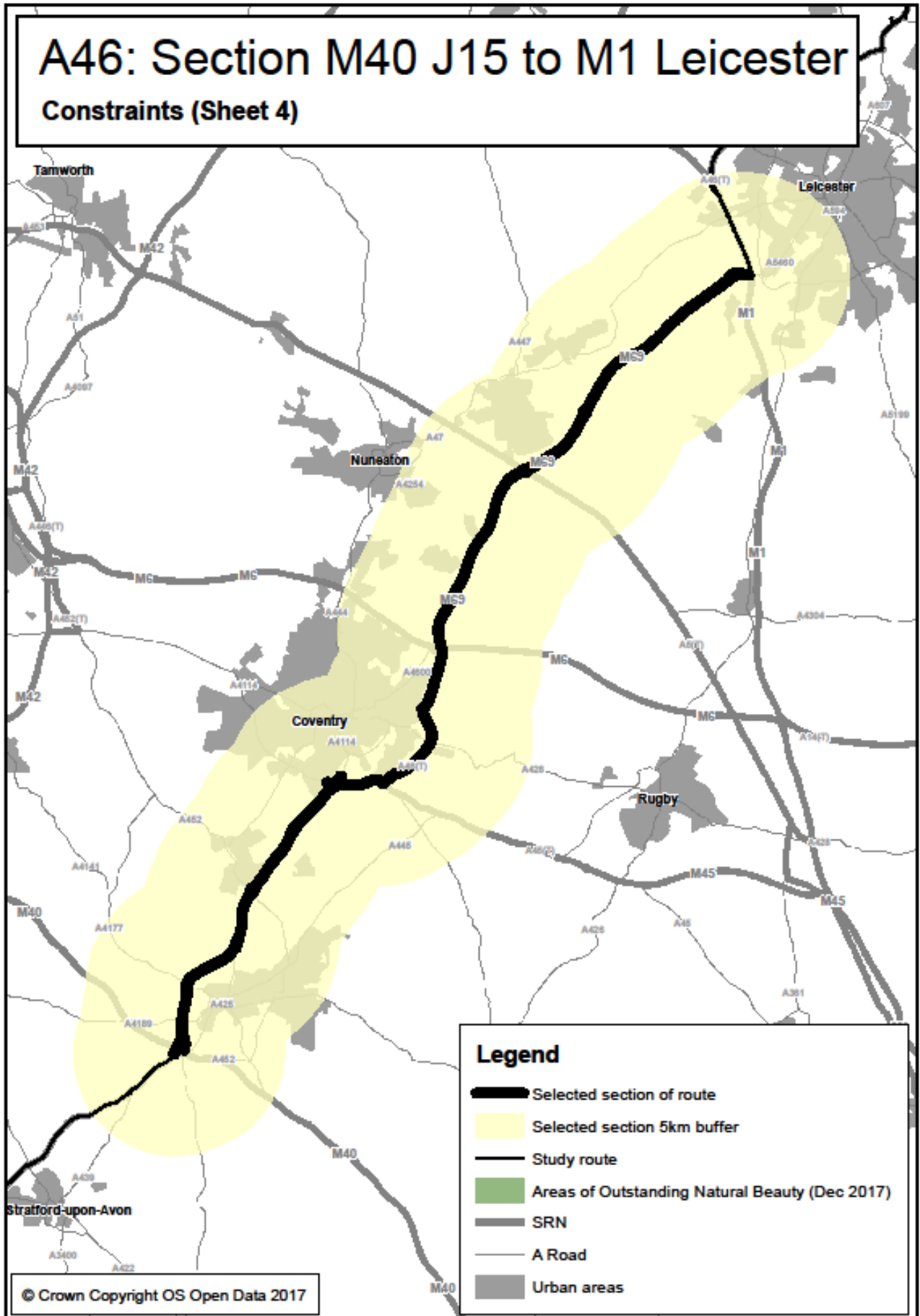


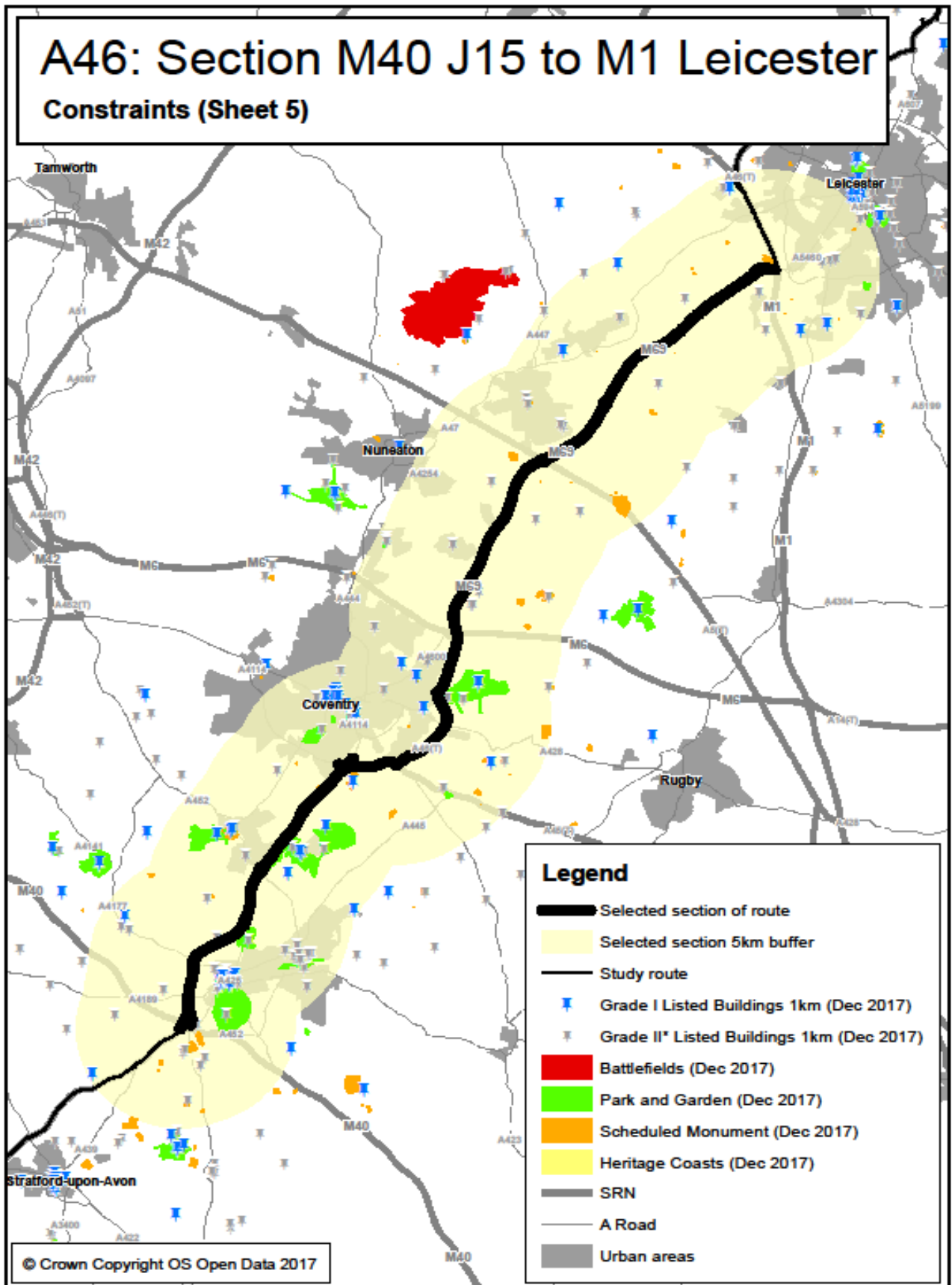




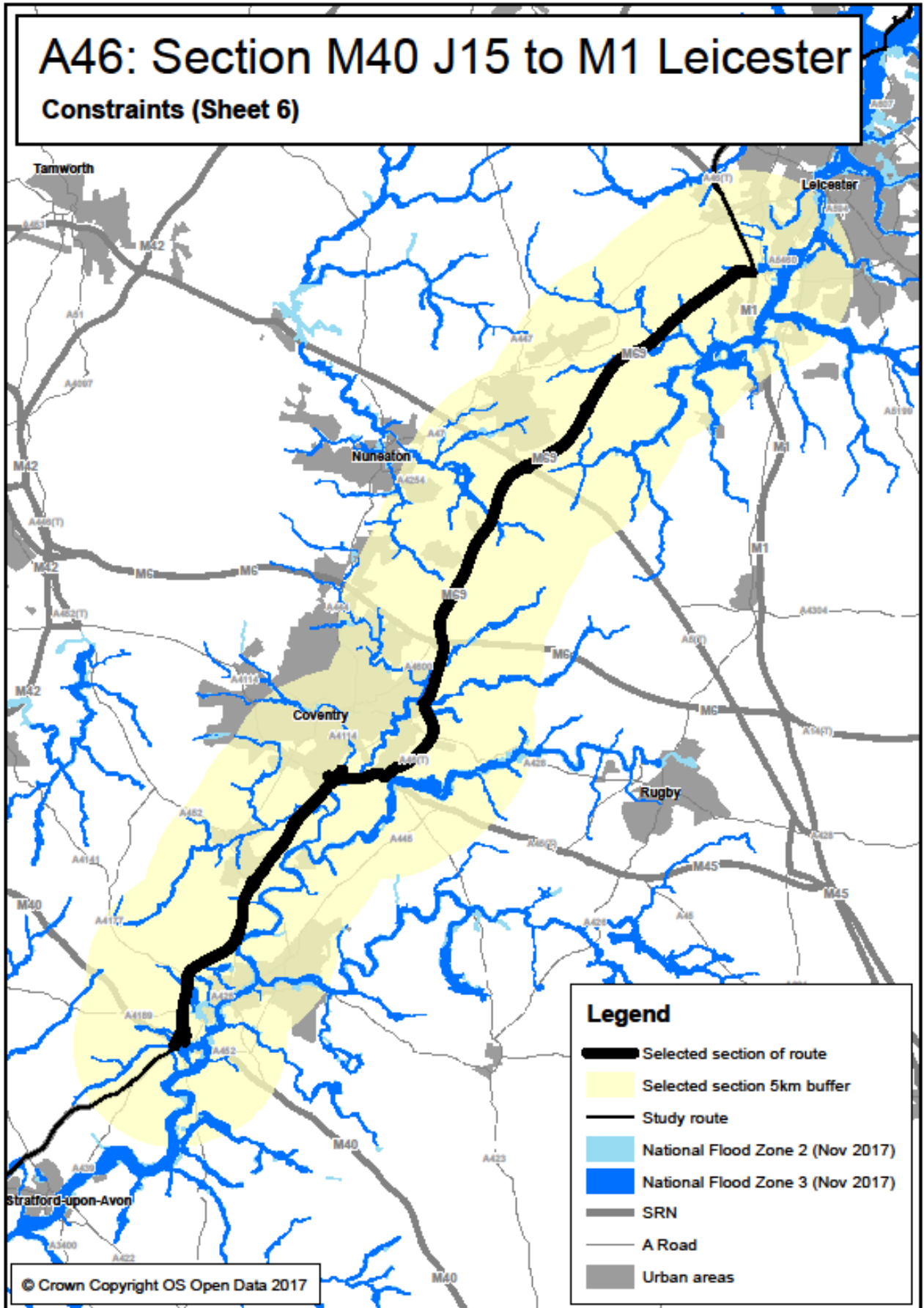






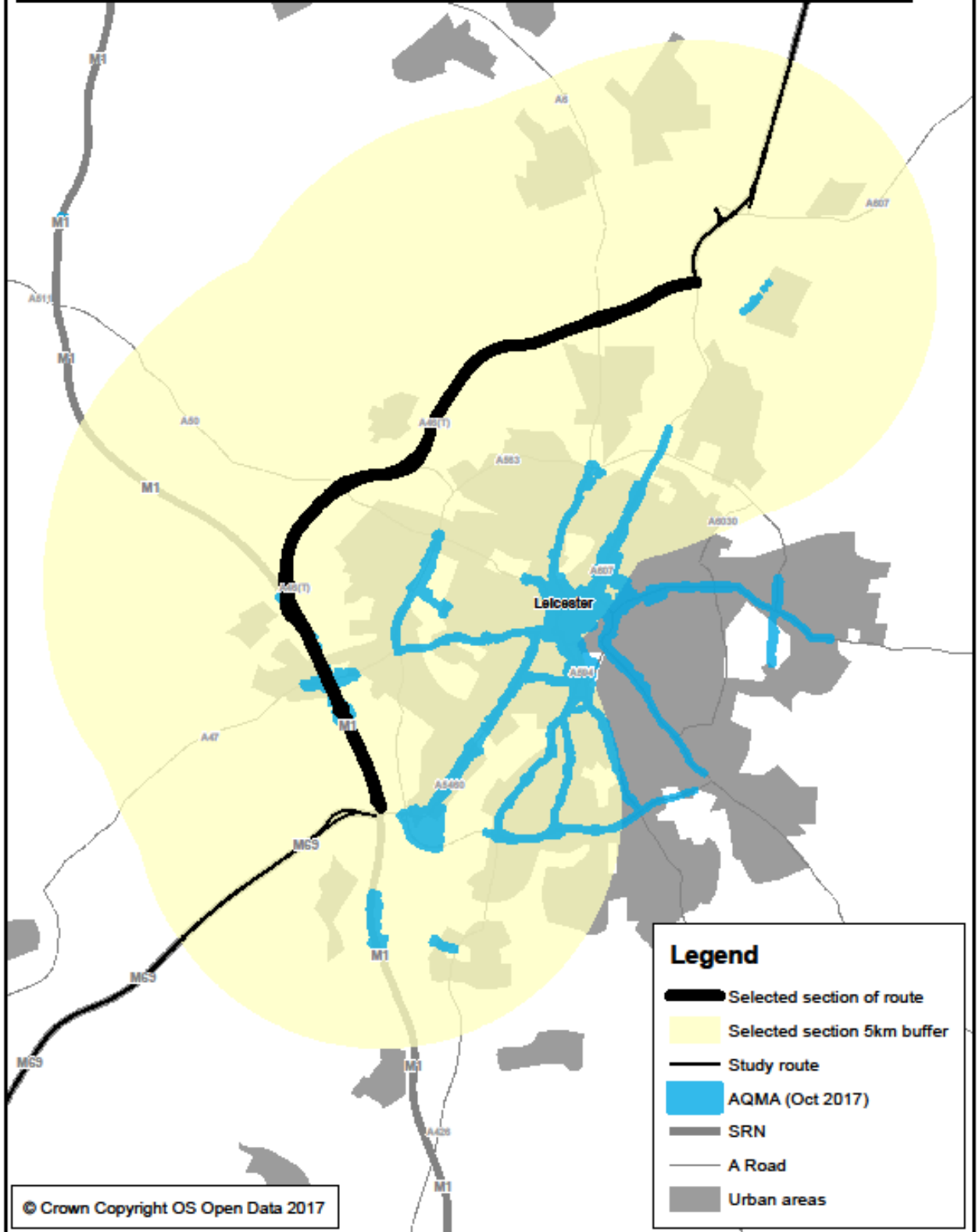




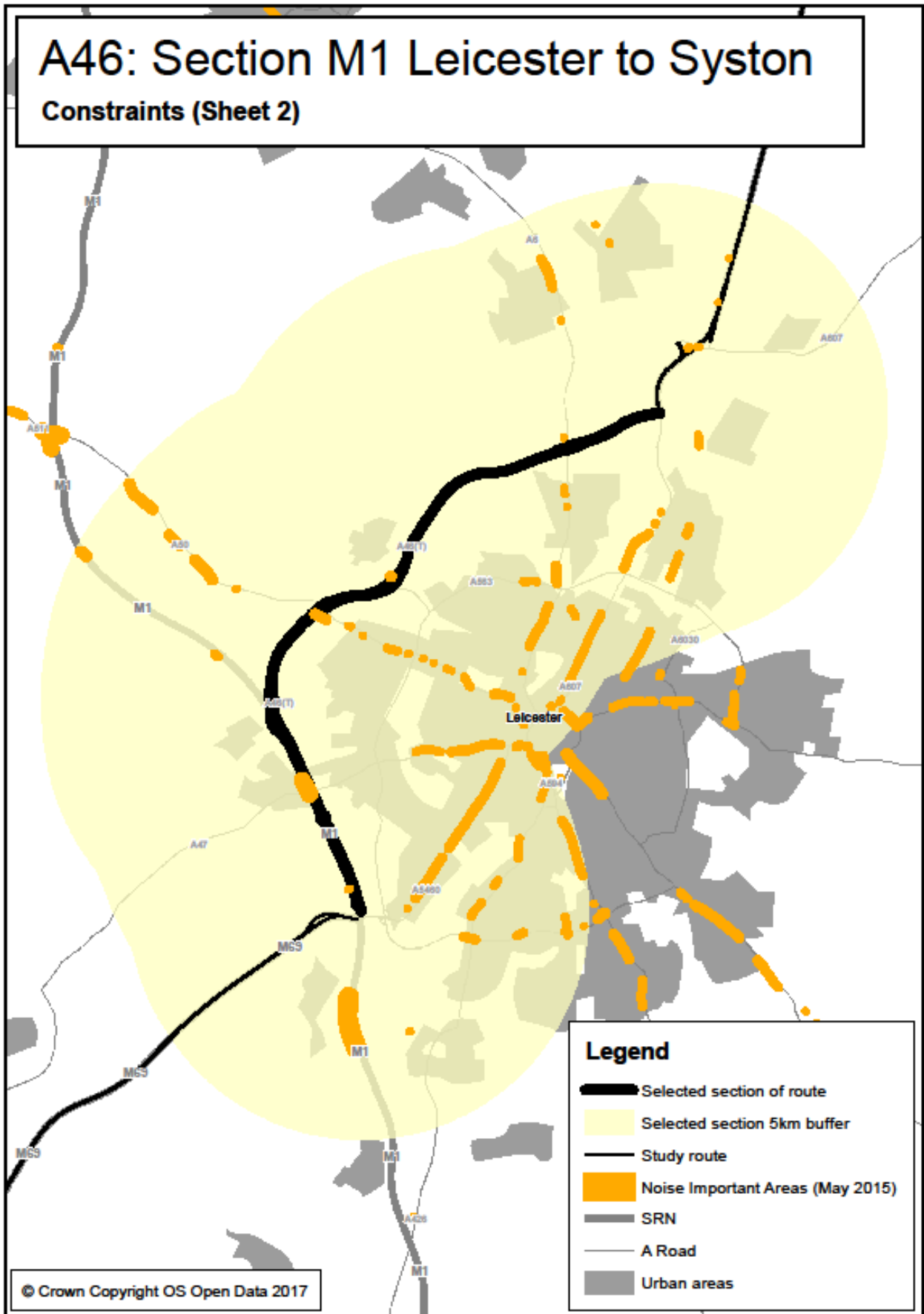


**Section 3: Leicester**

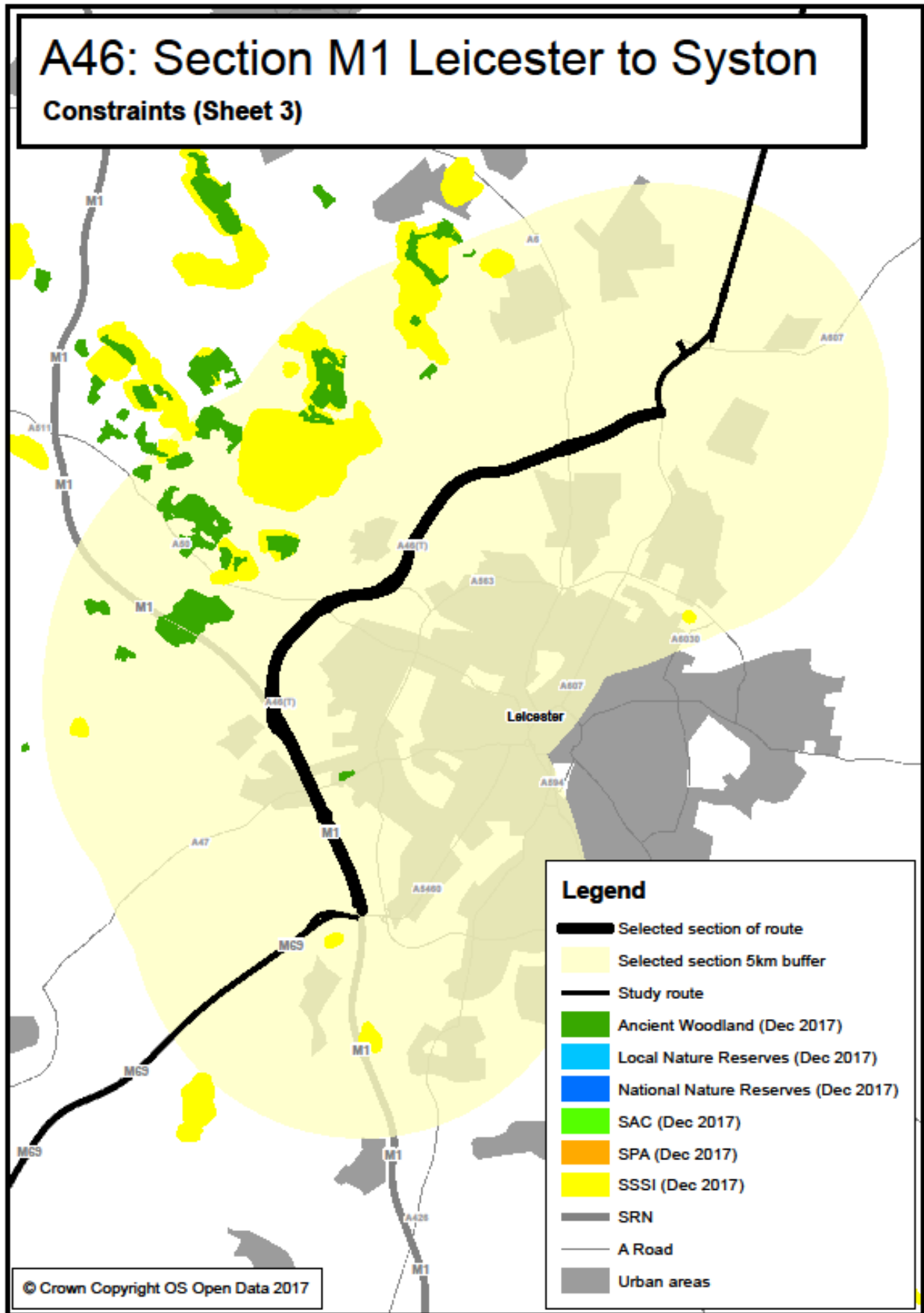
# A46: Section M1 Leicester to Syston Constraints (Sheet 1)





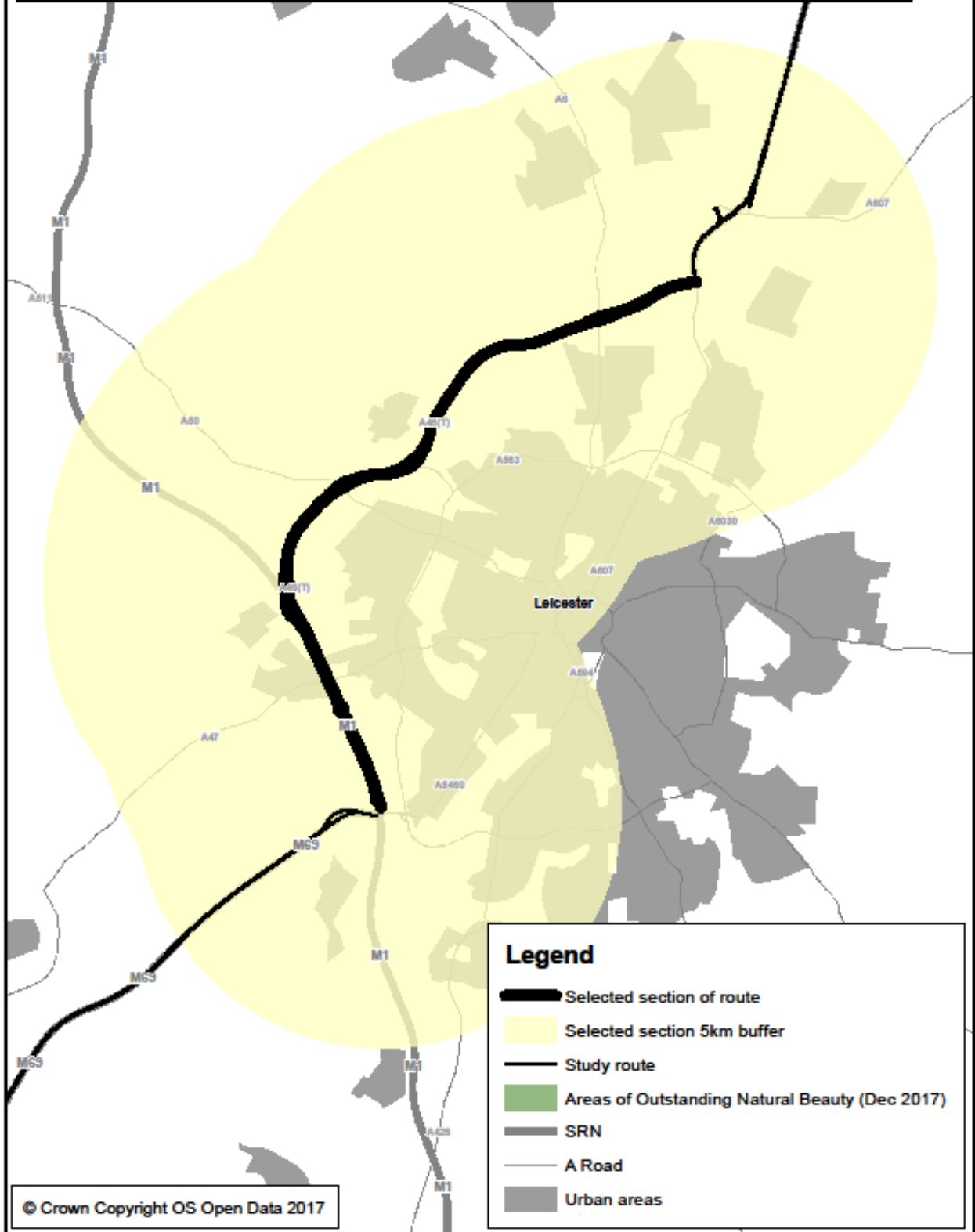




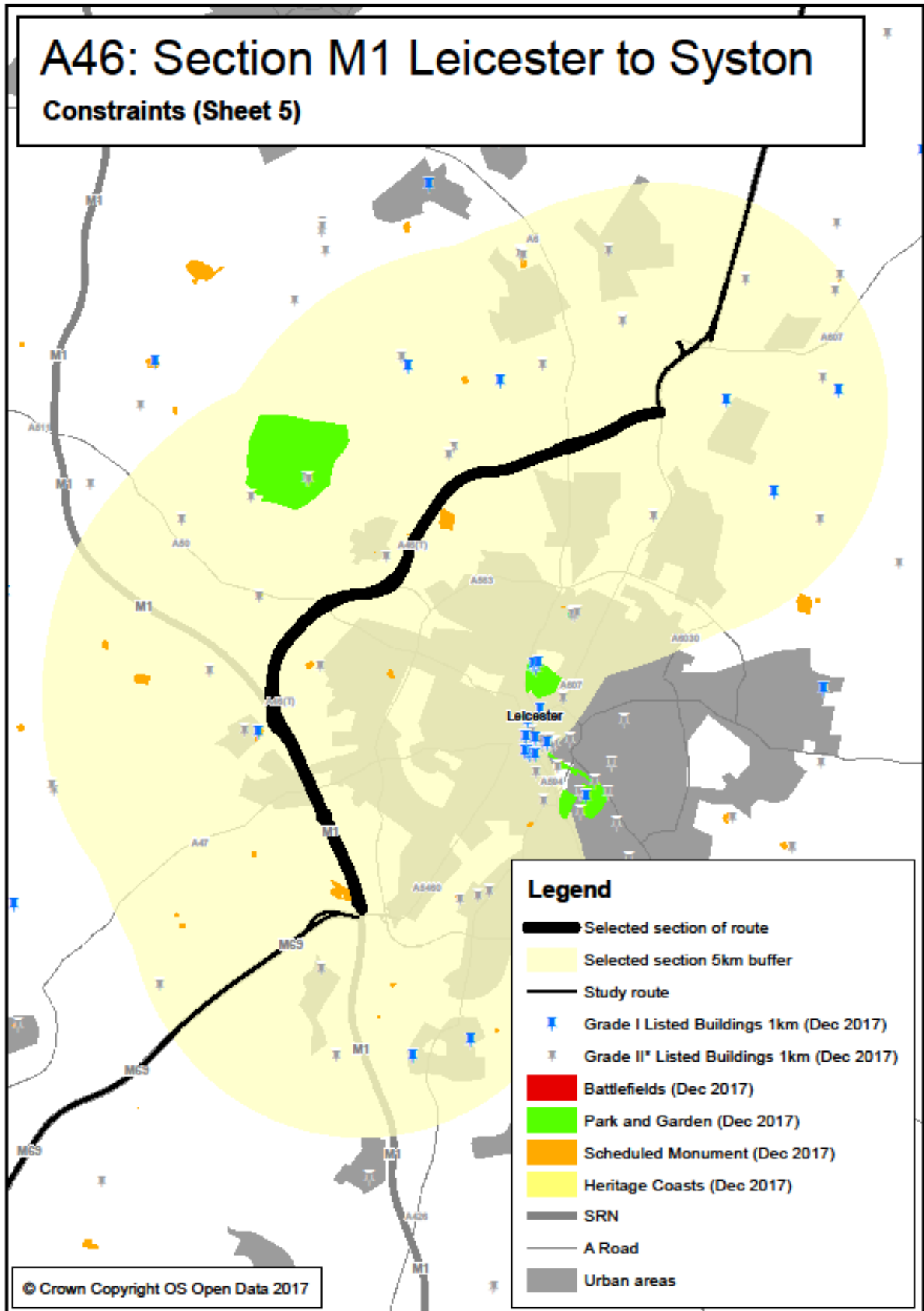




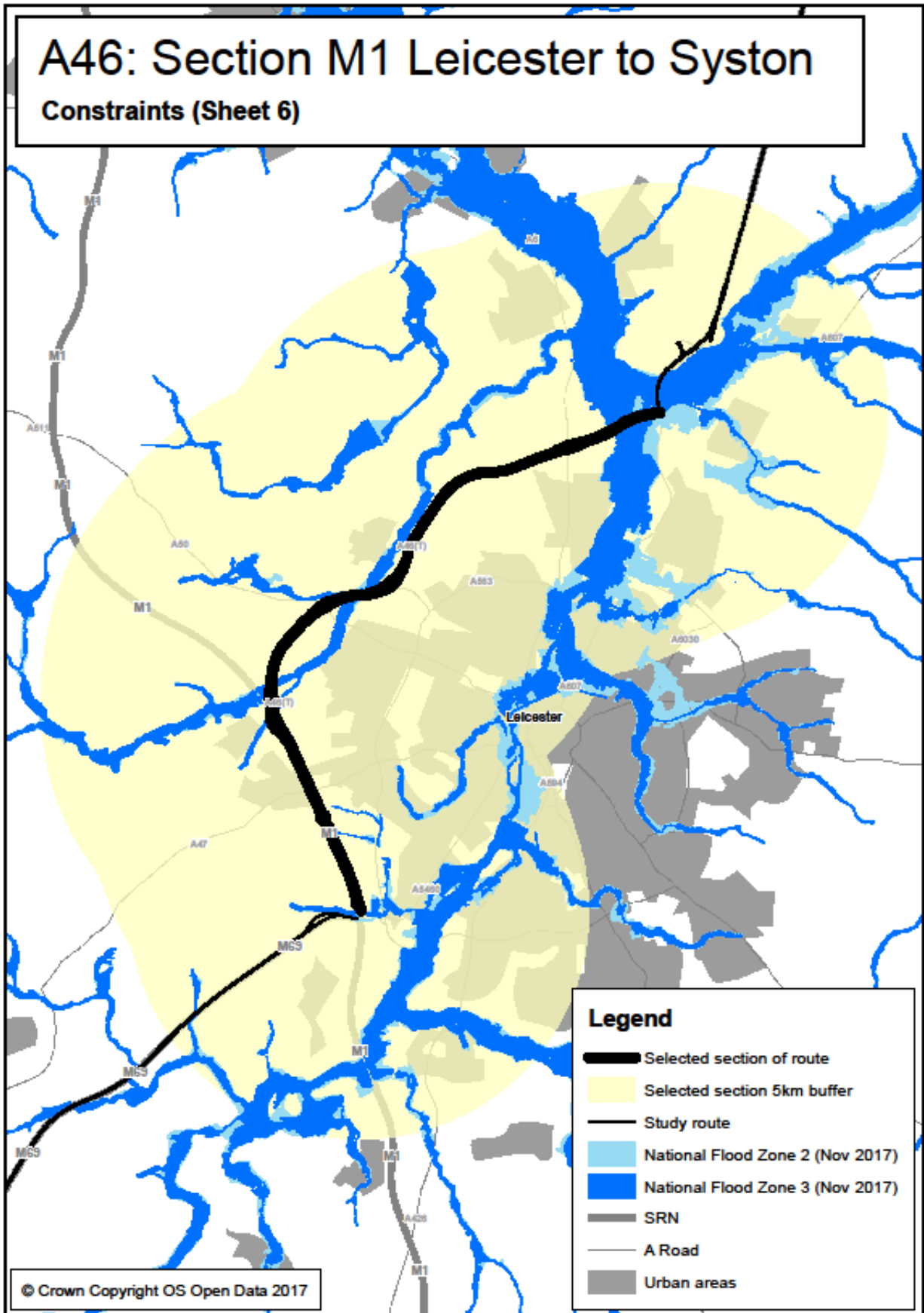
# A46: Section M1 Leicester to Syston Constraints (Sheet 4)



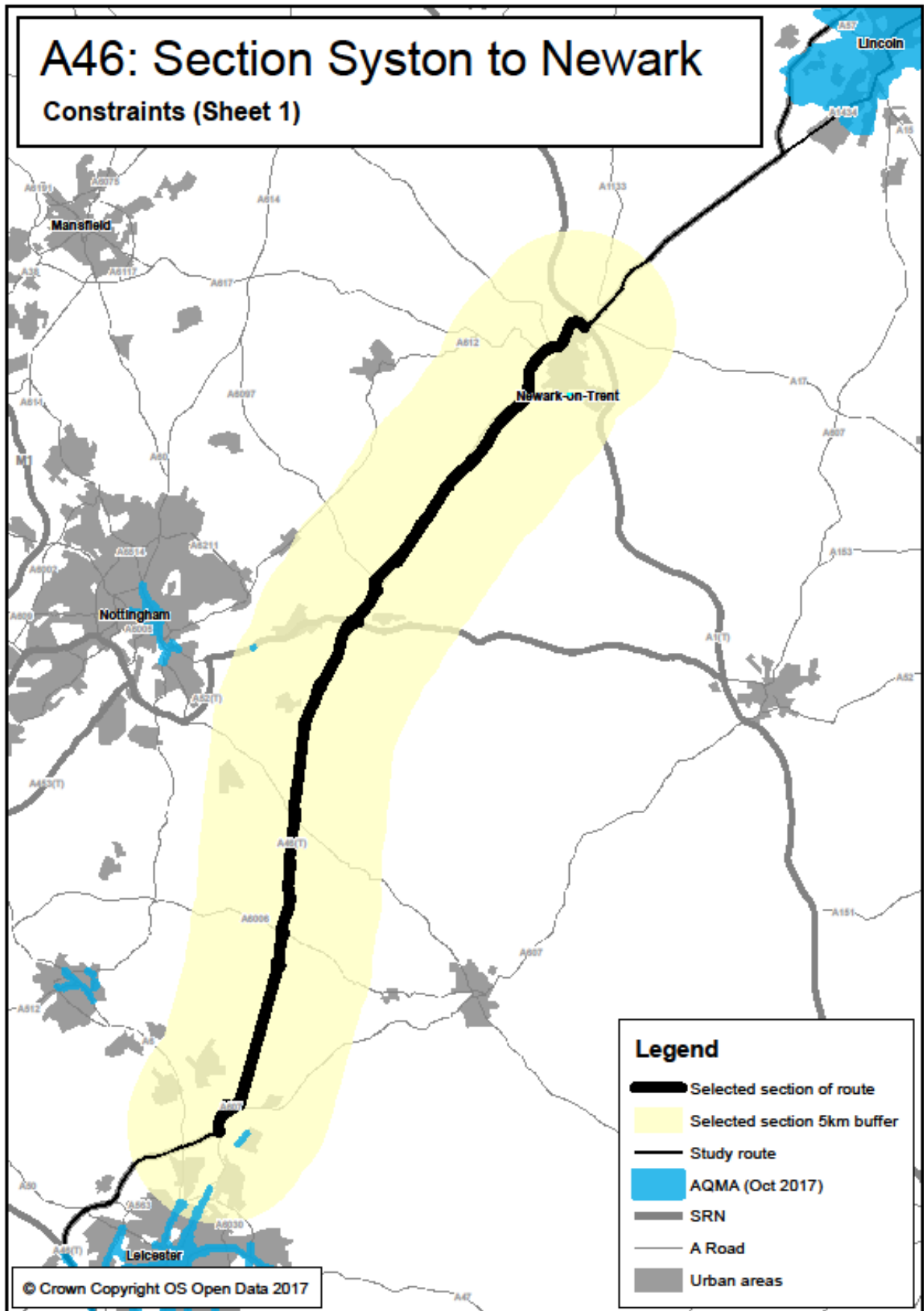


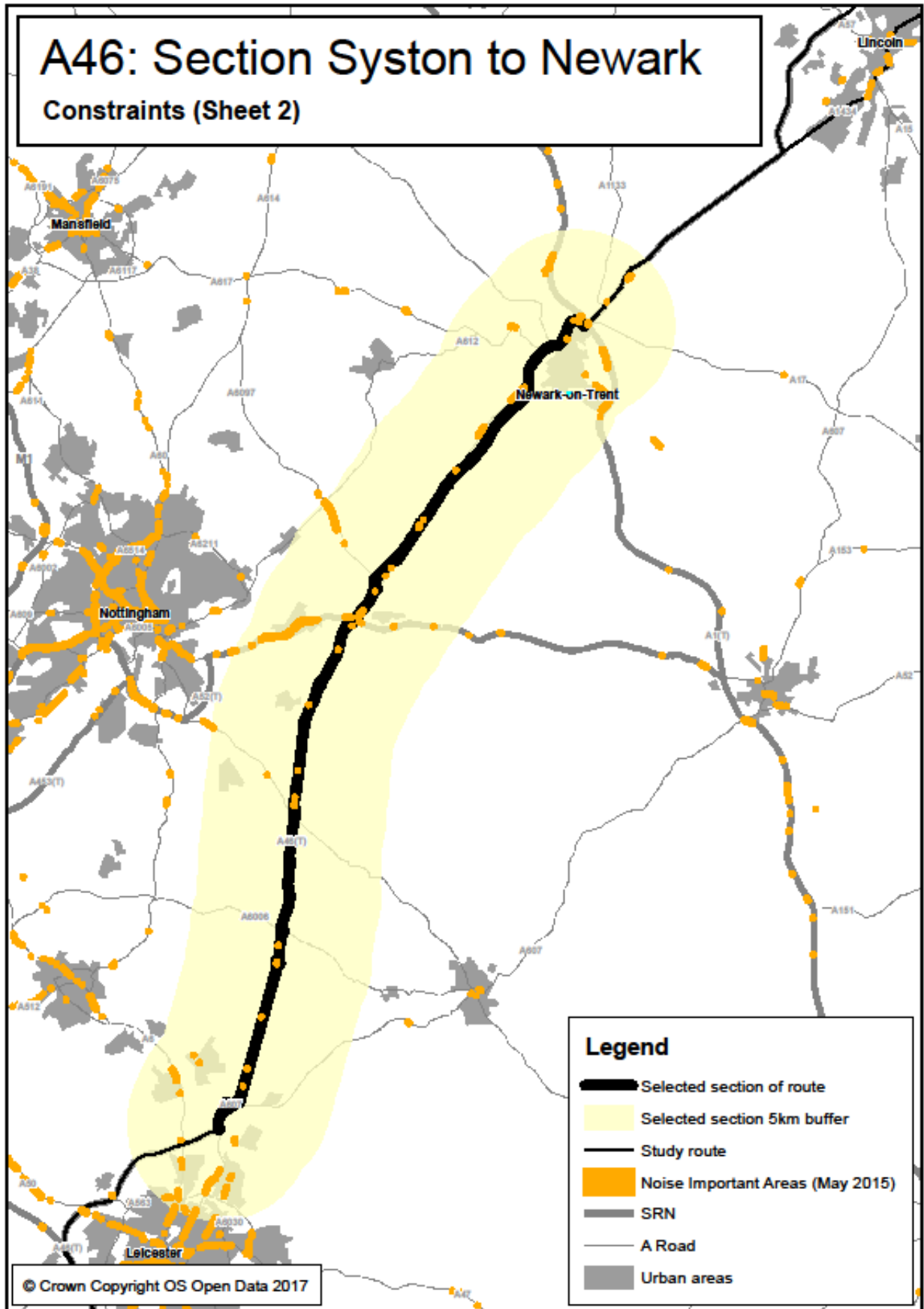


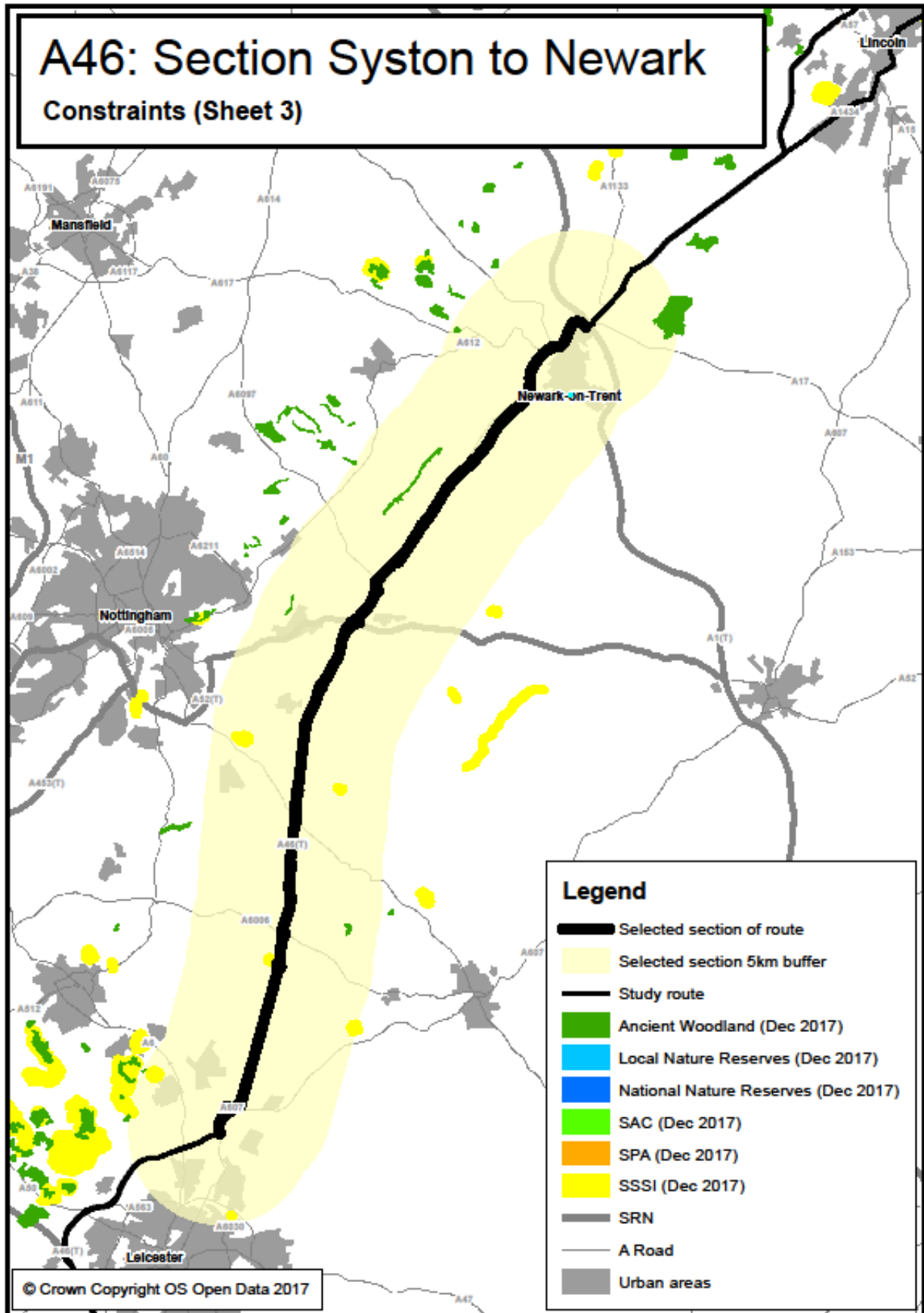


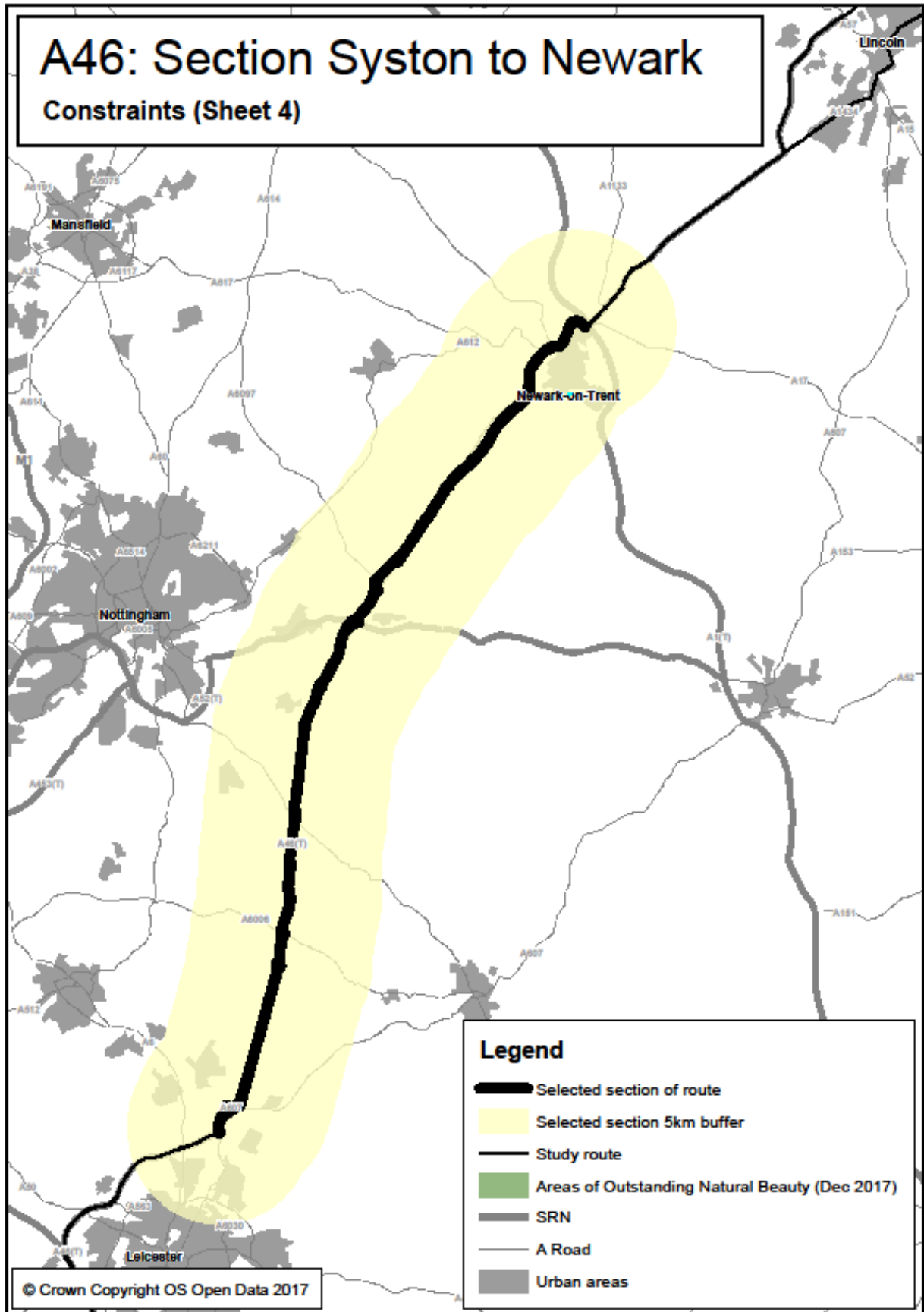


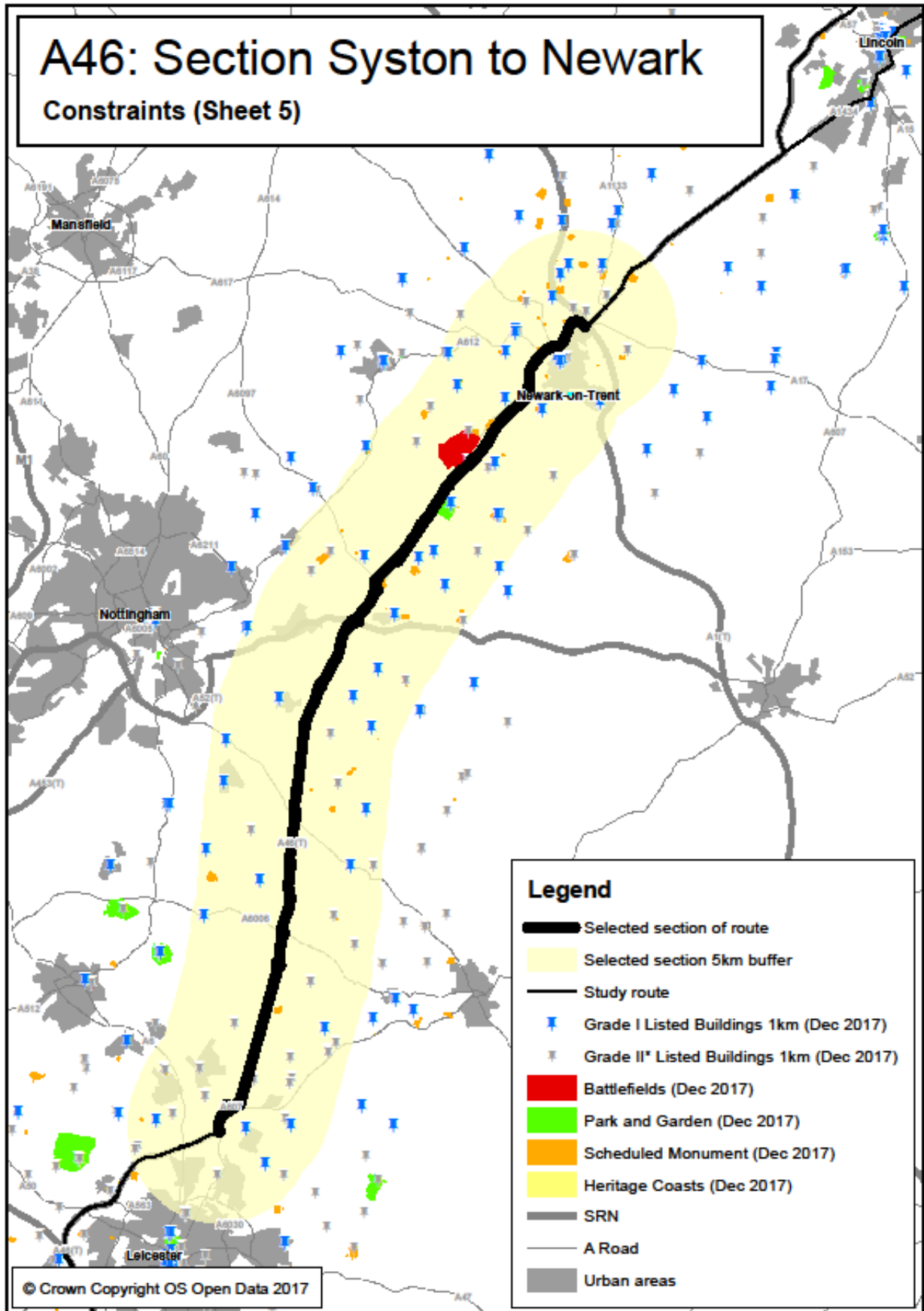
**Section 4: Syston – Newark**



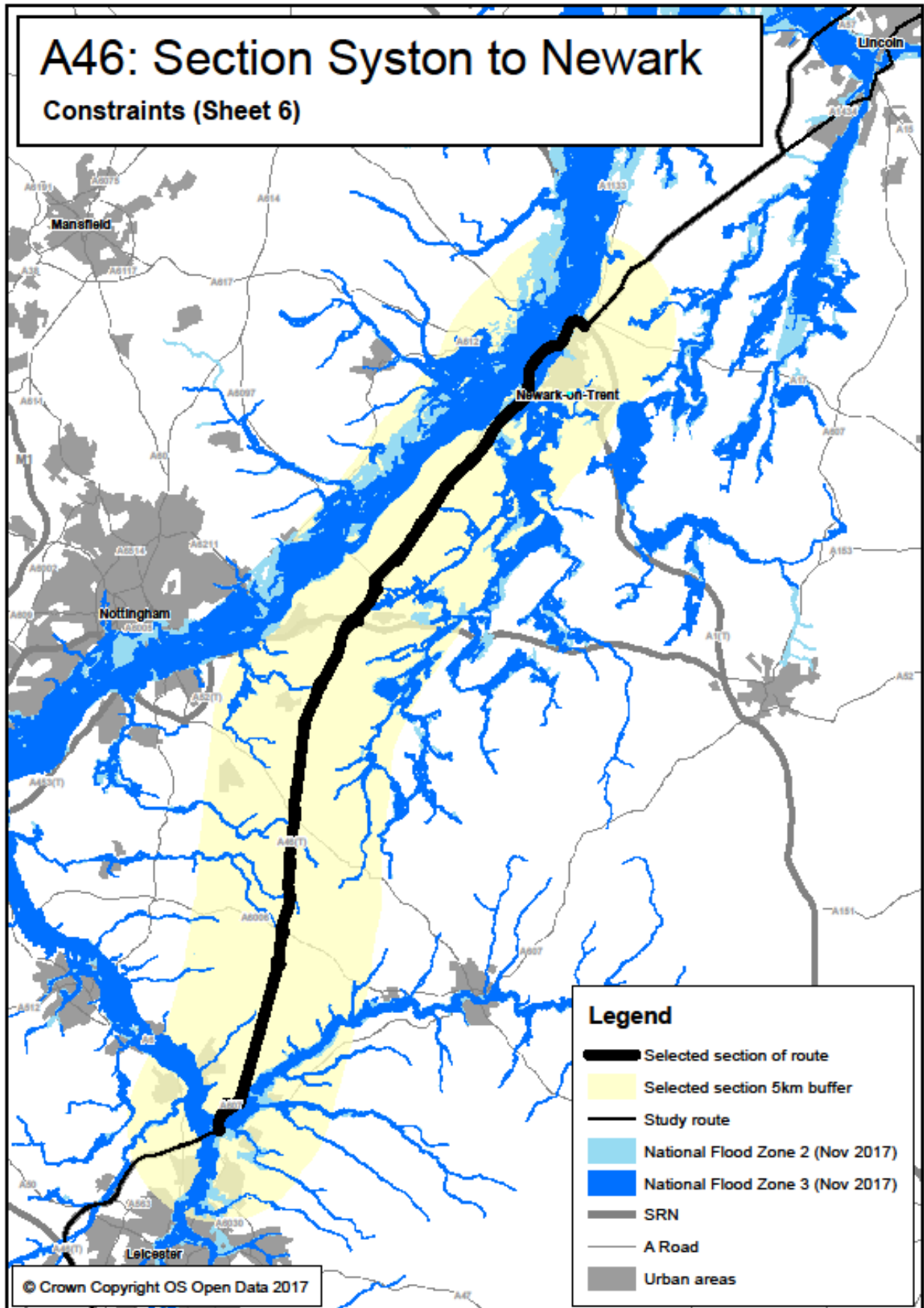




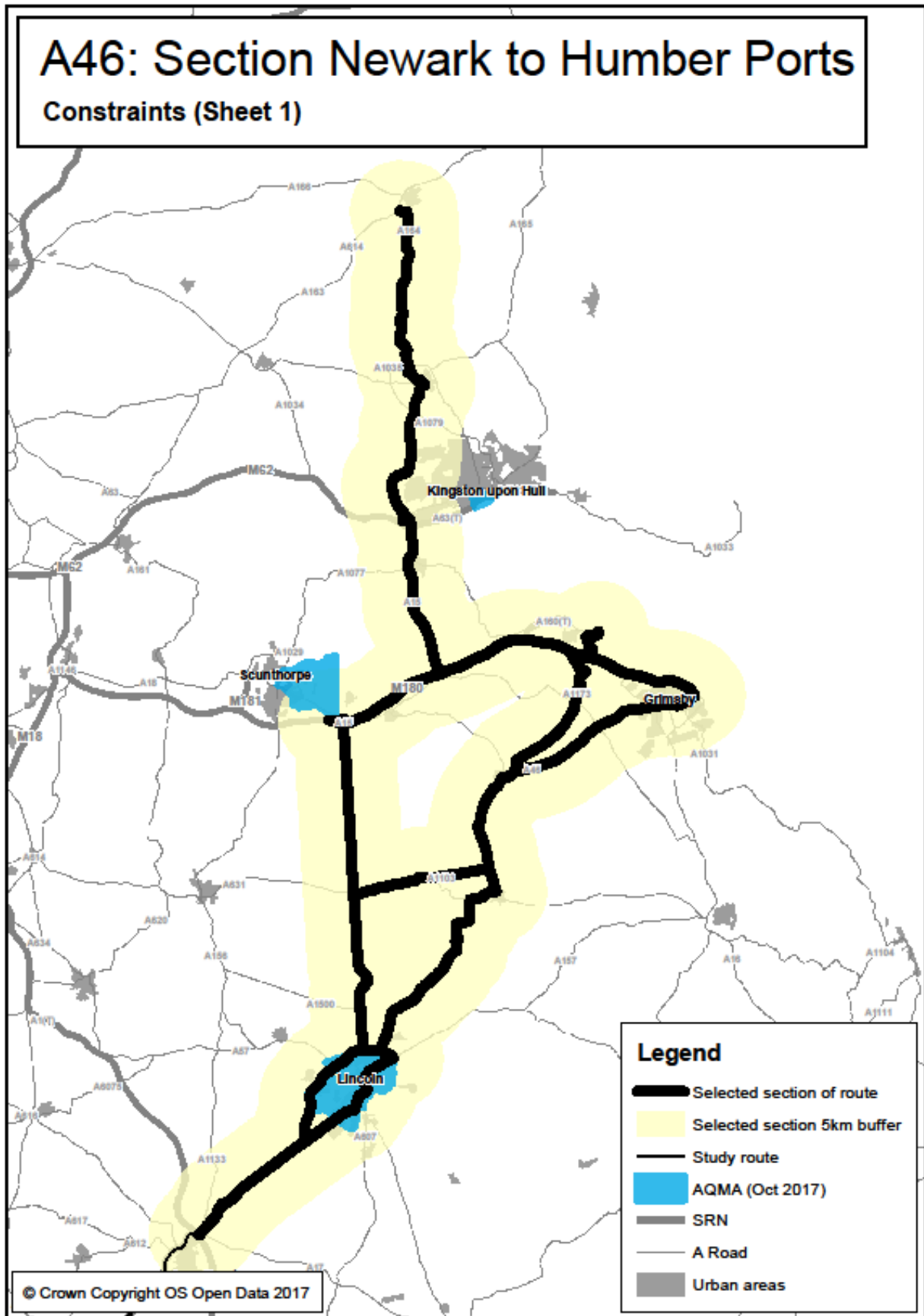






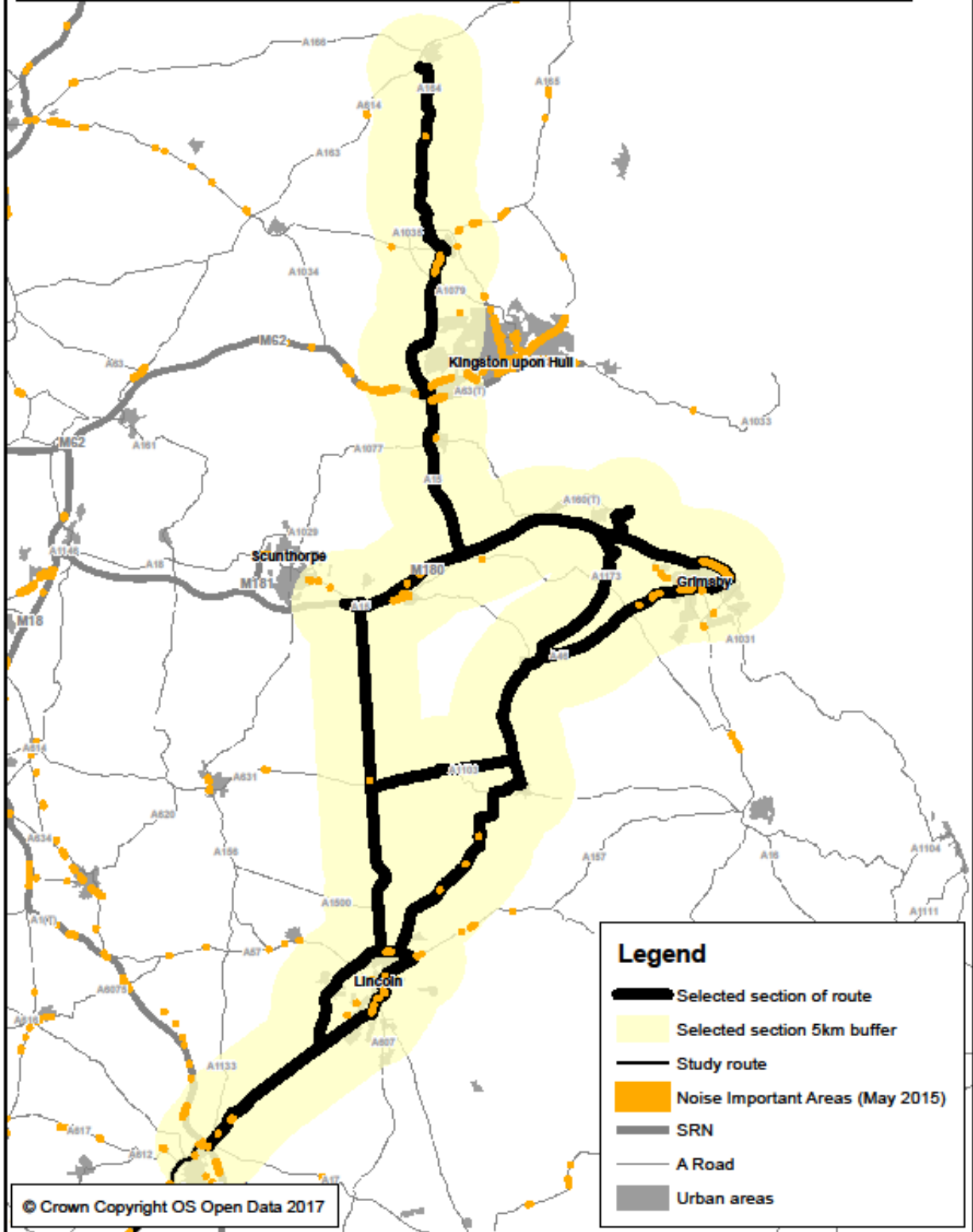


**Section 5: Newark – Humber**

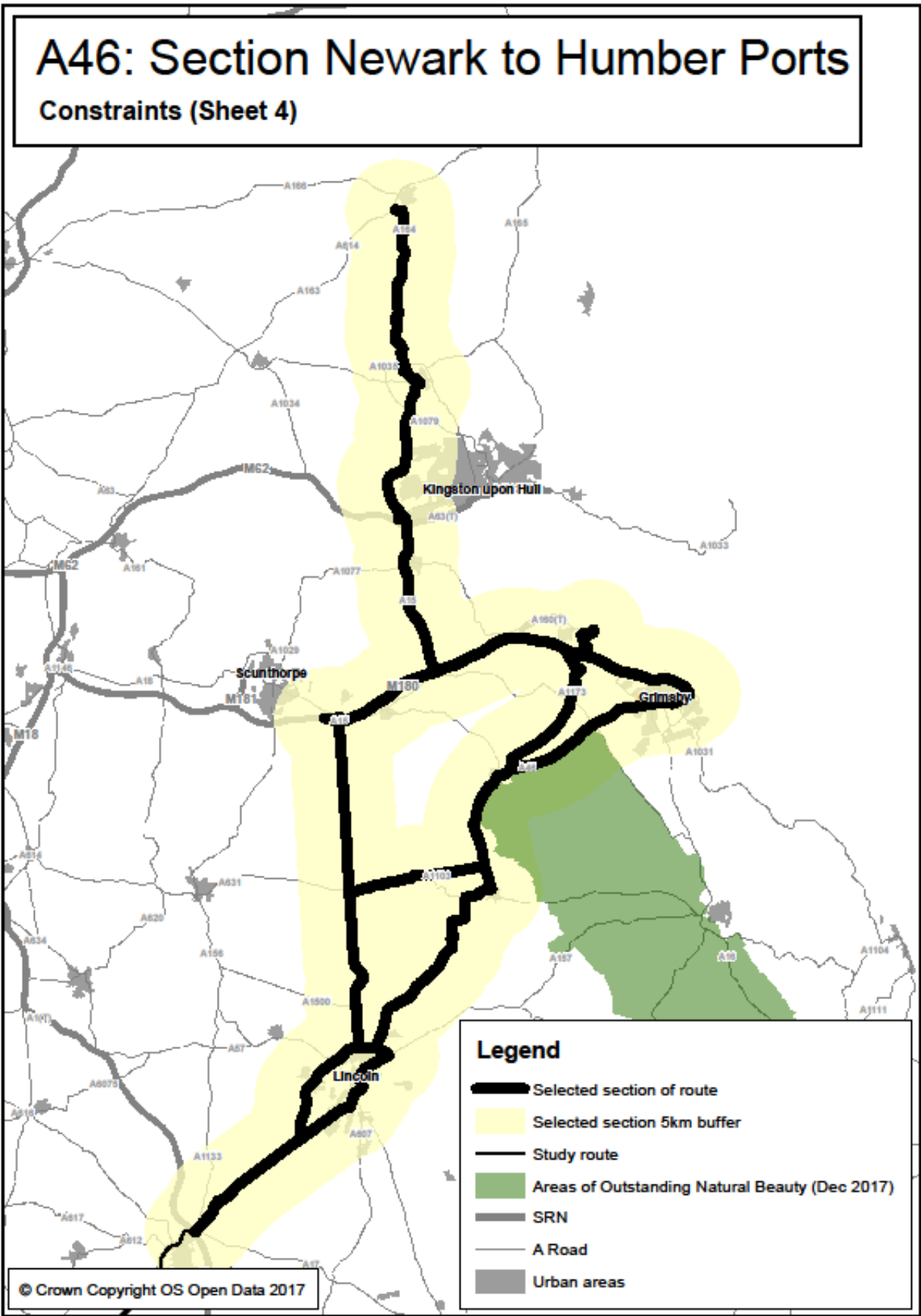


# A46: Section Newark to Humber Ports

## Constraints (Sheet 2)

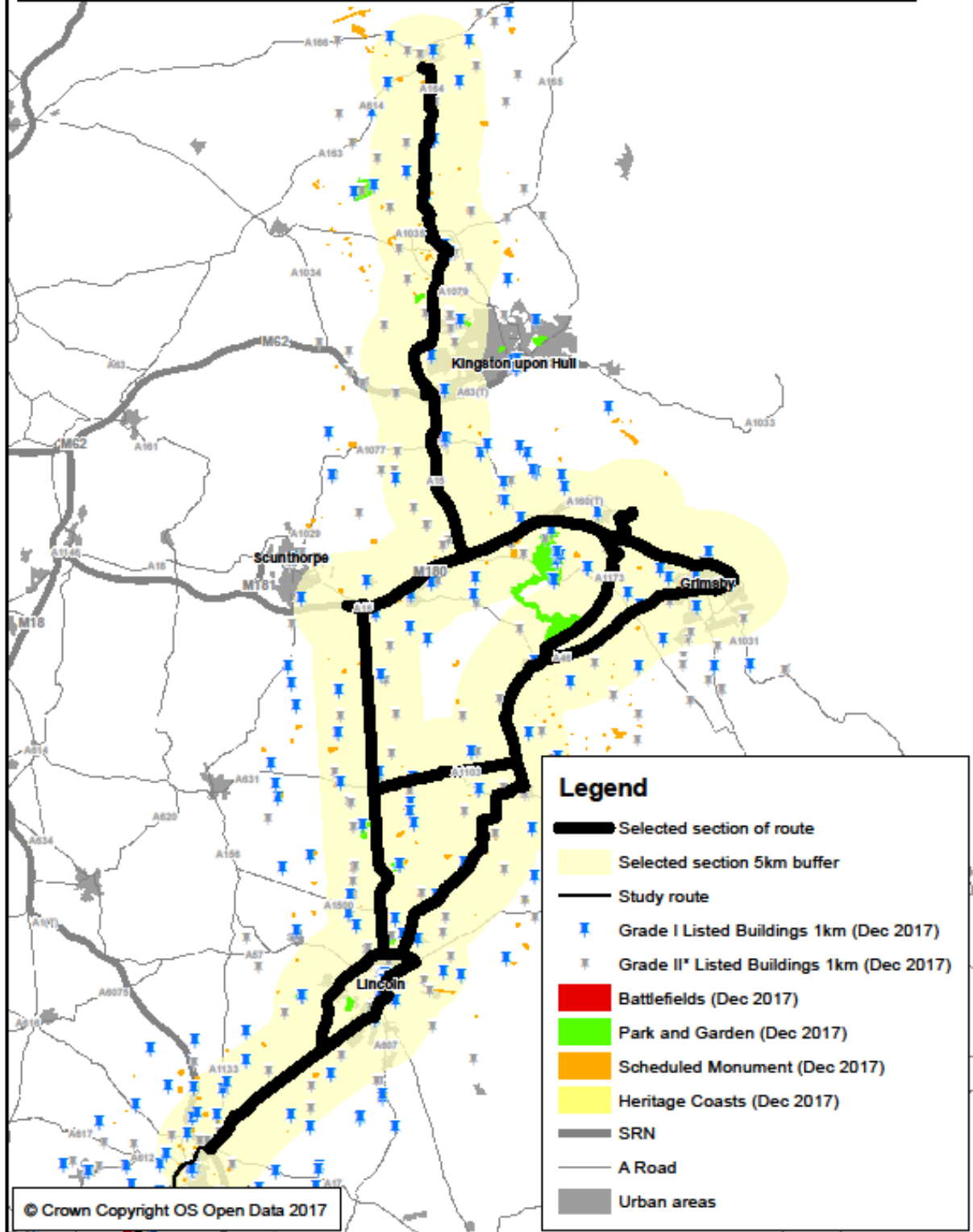






# A46: Section Newark to Humber Ports

## Constraints (Sheet 5)



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