

MAYOR **DAN JARVIS**

SHEFFIELD CITY REGION



ROADS IMPLEMENTATION PLAN

Sheffield
City Region

FOREWORD



My Vision is that

We will build a transport system that works for everyone, connecting people to the places they want to go within the Sheffield City Region as well as nationally and internationally.

This is an important time for the Sheffield City Region. With a programme of national, regional and local transport investment planned, it is important that we have a clear plan to join up this investment to ensure we build a transport system that is fit for the 21st century.

SCR to complete once remainder of Plan is ratified

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FOREWORD

SCR ROADS IMPLEMENTATION PLAN

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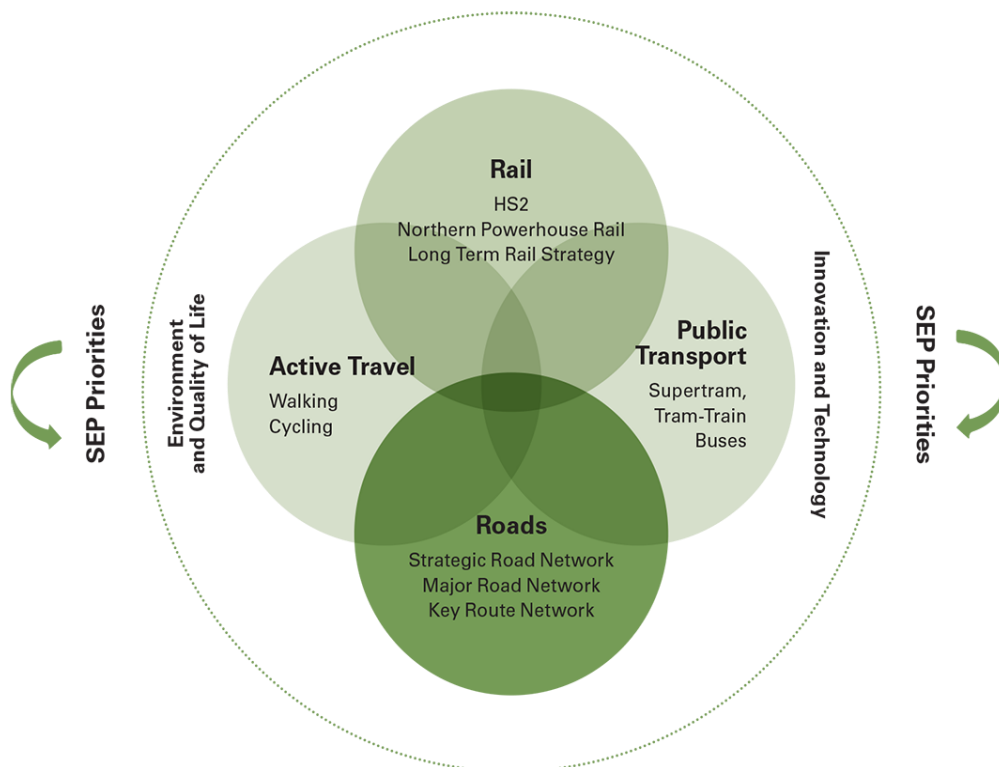
PURPOSE OF THE PLAN

The Sheffield City Region (SCR) Transport Strategy sets out how we intend to better connect our major urban and economic centres to enable the better flow of people, goods, businesses and ideas across the City Region, as well as promoting our rural and visitor economies. By doing so we will help create jobs, secure new investment and grow our economy.

The Strategy is underpinned by three goals:

- 1 Residents and businesses connected to economic opportunity
- 2 A cleaner and greener Sheffield City Region
- 3 Safe, reliable and accessible transport network

The Strategy also envisages a series of implementation plans, some of which the SCR will lead, some of which we will contribute to and some of which we will seek to influence. The Strategy envisages four key programmes, as shown below.



This is the Roads Implementation Plan within the Transport Strategy.

The underlying theme of the Roads Implementation Plan is that how we use roads needs to change if we are to address issues such as congestion and air quality, contribute to our net-zero targets and create a better public and active travel network as part of the SCR's whole transport network. Pedestrians, cyclists, bus passengers, freight operators and others all use our roads, but it is cars that dominate at the moment. Considering how and what we invest in on our road network to improve the range of options for road users, so that solely using a car is no longer seen as the best option for a journey, will allow us to generate change through positive alternatives rather than simply making the current options less attractive, thereby improving choice and opportunity for everyone.

The response to the recent COVID-19 pandemic has shown how re-allocating our road space can encourage people to use more sustainable modes of transport. As we move into the recovery phase, we need to 'lock in' these benefits and recognise that how we use and allocate our road space in the future needs to respond to changing demands and the climate emergency that has been declared across the SCR. Our transport system can be transformed as part of a green recovery programme, improving our environment and our health, creating jobs and tackling social exclusion.



The Plan aims to redress the balance that existed previously amongst road users, to develop a network that allows public transport services to operate efficiently and create space for active travel. It aims to take the lessons that we have learnt from the COVID-19 pandemic to create a more flexible and adaptable network that can support our economic, social and environmental aspirations, recognising that almost all journeys start and finish on our roads, whichever mode people may use.

The ways in which we have changed how and when our roads are used during recent months means that an appropriate balance needs to be struck between the need for new infrastructure and making better use of the existing network. Some new infrastructure will be needed, but overall demand for travel may not be as was predicted before, and so we need to plan for changes in hourly, daily, monthly and annual demand, as well as securing the reduction in car use that we will need to meet our net-zero targets.

We also need to commit to some core principles when investing in our road network, such as if we invest in roads to address congestion, air quality or to unlock economic growth, then we should seek first to design in measures which positively promote alternative options to the private car and include retrofitting to enhance green infrastructure as standard. The highest level of design and mitigation must be applied in all cases to ensure stronger protection for the landscape and heritage assets from road infrastructure, not severing communities or wildlife habitats, whilst incorporating environmental design principles within the design of new or upgraded facilities can help improve flood protection and reduce emissions.

To reflect these challenges, and to redress the balance amongst the users of our road network, our Plan will focus on:

- Making best use of our existing roads, before building new ones
- Considering how we use the road space available for all users, not just for cars
- Redesigning roads to join up better with local transport
- Delivering carbon emissions reductions and improved air quality and biodiversity

When there are competing demands for road space, our decisions need to reflect the lessons we have learned in recent months and the focus set out above, particularly the wider objectives around promoting public and sustainable transport, which is also in line with the sustainability theme in our Strategic Economic Plan (SEP).

Investment in our road network can and should support the delivery of additional benefits such as digital infrastructure and provide the facilities to enable the transition to electric and low carbon vehicles whilst the use of new surfacing techniques can reduce the impact of road traffic noise. Increasing use of technology can help make more efficient use of our existing road space whilst allowing us to respond to some of the future changes in demand and positively influence which mode of transport people use.

The road network is vital to the performance of some of the UK's and the North's leading sectors, such as logistics and freight, retail and wholesale, construction and manufacturing. We all rely on a well-functioning road network to access jobs, goods and services and the reduction in demand caused by the COVID-19 pandemic has shown how a reliable and resilient network can provide us with essential goods and services. The importance of the road network to the economy and economic growth is well understood – this is why there will need to be investment in our road network in the future.



But such investment must be planned in a considered way, with significant interventions focused on improving inter-urban trips, unlocking growth potential and providing access to key public transport nodes to encourage onward journeys by public transport. Interventions on our road network to support more local trips will inevitably focus on public transport and active travel, building on the recent temporary measures and securing a lasting change in how our roads are planned and used. Future investment should not be just about new tarmac – it has much wider benefits for everyday life and will play a key role in achieving the objectives of the SCR's Transport Strategy and the SEP.

Achieving what we want to see from our road network starts with a clear understanding of that network and an agreed plan. However, even though most users see roads as one network, the planning, operation and maintenance of the road network in the UK is separated between the strategic road network (SRN) – these are roads owned and managed by Highways England and consists of England's motorways and major A roads – and the rest of the network, owned and managed by local highway authorities.

There is also a lack of local influence over the SRN, even though these roads are often vital to how a location functions and how residents, workers and visitors move around. Incidents and congestion on the SRN lead to knock-on effects on the operation of local roads, roads on which our core bus services often operate, with the adverse impacts being felt over a much wider area and affecting more people.

Without a co-ordinated plan for roads across the SCR, there is a risk that the current disconnect in the planning and operation may grow even further, undermining our aims for a repurposed and resilient road network to support our ambitions and not recognising the role that local roads play for a whole range of journeys and users.

Within the City Region, the recently agreed Devolution Deal provides the Mayor an opportunity to collaboratively manage a Key Route Network (KRN) for the City Region. Whilst Local Authorities currently work together on cross boundary issues, developing a KRN for the SCR could enable a more integrated approach to the management of our road network and could address the challenge of fragmented thinking at present.

The KRN could be used to plan and identify investment priorities in the future, all linked to a new set of objectives for our road network which embed the new way in which we will approach the use of our road space from the start. This plan will therefore set out what the City Region KRN is and what investment is needed on our road network in a co-ordinated way to realise the Mayor's Vision for Transport and to help deliver a transport system that works for everyone.

BACKGROUND

Existing Road Network and Challenges

The major roads within the SCR and the surrounding area are shown below.

(Final map to be designed by SCR – temporary map below)



The principal north-south strategic routes through South Yorkshire and the wider SCR are the M1 and the A1/A1(M), connected by the M18, whilst the A616/A628 provides a link across to the Greater Manchester City Region, connecting into the A57/M67. Important city regional routes include the A61, A57, A616, A628, A629, A6195, A630, A18, A19, A635, A633, A638, A637, A6182 and the A631.

As noted previously, the planning, operation and maintenance of the road network in the UK is separated between the following three tiers of road that dates back from the 1960s:

- The SRN – although it accounts for only 2% of roads in England, the SRN carries a third of all road traffic and two thirds of freight traffic

- The primary route network (PRN) – this network is constructed from a series of locations (primary destinations) selected by the Department for Transport, which are then linked by roads (primary routes) selected by the local highway authority, who is then responsible for the maintenance and operation of the PRN; outside of national parks, few places in England are more than ten miles from a primary route
- A local road network – this covers all other roads not in either of the categories above.

The different designations and the funding, planning and operational circumstances that apply to each tier often leads to fragmented thinking. The lack of local influence over both the SRN and PRN in the designation of routes (in the case of the former) and destinations (in the case of the latter), exacerbates this situation.



Recognising that the SRN only accounts for about 2% of the total road network across the North of England, recent work by Transport for the North (TfN) defined a new Major Road Network (MRN) for the North, based on routes that join a series of agreed important economic centres, these include all ports and airports and designated Enterprise Zones across the North. This approach is a much more economically-focused method that is intended to be a 'live' network, responding to changes in demand as growth takes place, and which covers about 7% of the total road network in the North (including the SRN).

In late 2018, the Government published its own MRN proposals across England which drew on the work of TfN to set out a tier of roads managed by local highway authorities that would be able to access funding for longer term improvements and maintenance through the National Roads Fund from 2020 onwards. The routes within the DfT's MRN are shown below.

(Final map to be designed by SCR – temporary extract from DfT map below)

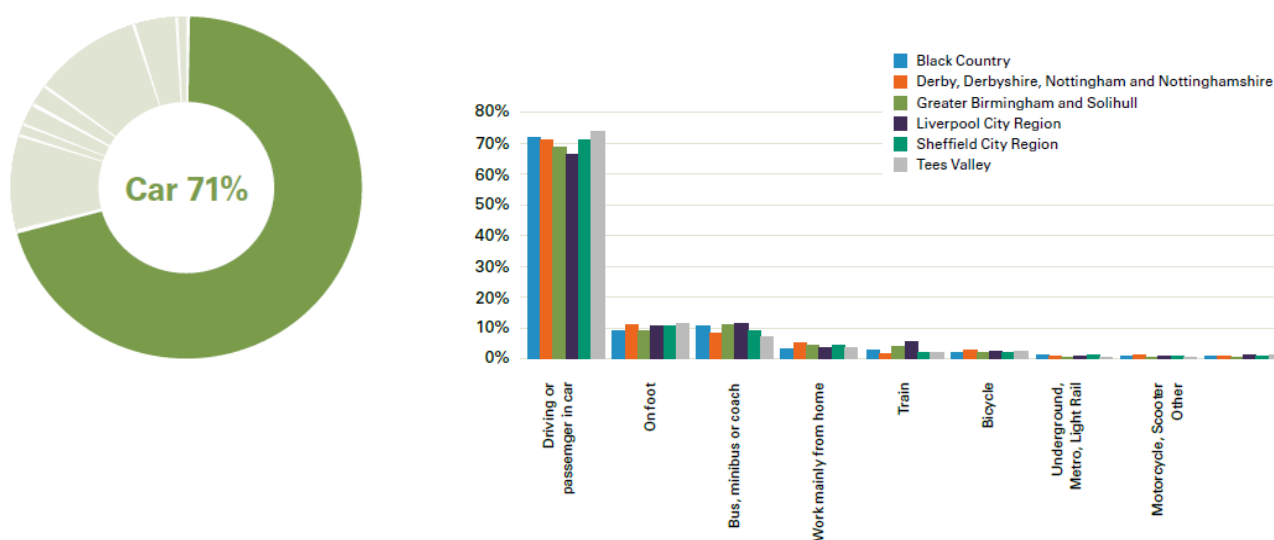


Whilst it is disappointing that not all of the routes within the MRN initially developed by TfN are included, it is a welcome recognition from DfT of the role that these roads play and the need to identify a sustained funding stream for them.

The challenge is to develop a pipeline of evidenced interventions on our road network to understand what proportion of this new funding stream would be necessary to help achieve the objectives of this Plan. How we develop this pipeline of interventions is important – it must reflect the needs of the SCR, the existing challenges and the future opportunities, rather than simply adopting a series of road improvements that could simply encourage a further growth in traffic, with all of the negative consequences that this would entail.

NETWORK USAGE

At present, the SCR has a higher car mode share than a number of other comparable Local Enterprise Partnership (LEP) areas. At the last Census in 2011, 71% of City Region residents travelled to work by car, a trend that increased since 2001 and which is contrary to the general UK trend of decreasing car use.

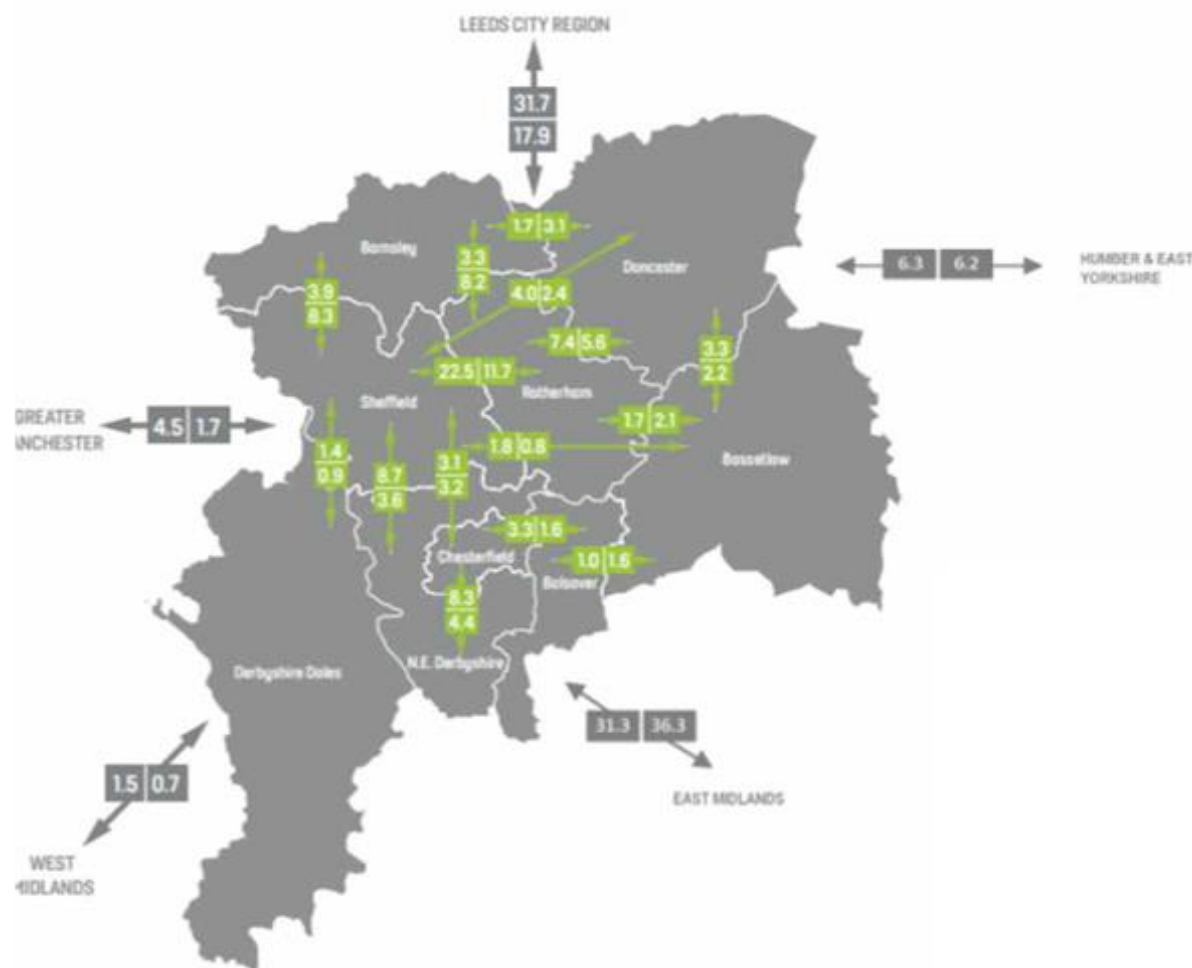


This reliance on car travel has adverse implications on the economy and quality of life, through congestion cost, worsening air quality, increasing carbon emissions and rising obesity levels (due to lack of walking and cycling). A Cabinet Office report has estimated that motorised road transport costs English urban areas between £38 to £49 billion a year, as a result of excess delays, accidents, physical inactivity, air pollution, greenhouse gas emissions and noise.

Nationally, road use as a result of the COVID-19 pandemic dropped significantly in March and April 2020, with typical daily levels of car use being only 32% of the equivalent daily levels in February 2020, and this trend was seen in traffic levels across the SCR's road network. By the end of July 2020, national car use was at 90% of the levels in February, underlining the need to act quickly to 'lock in' some of the benefits of reduced car demand that was seen.

Most of the SCR's residents (85.3%) commute within the City Region boundaries, often using the SRN, and the number of short trips undertaken by car in the SCR is high. Almost 40% of journeys to work measuring only 1km are taken by car, meaning there is a significant opportunity for the City Region to cut pollution and increase physical activity by shifting some of these short journeys to public transport and active travel modes on a permanent basis.

The current commuter flows within SCR are shown below, illustrating the particularly high commuting levels between Rotherham and Sheffield and the polycentric composition of our City Region.



The ambitious growth proposals within the SEP seek to increase the number of job opportunities within the SCR itself, and so we would expect the number of trips within the City Region boundaries to remain high as a proportion of the overall number of trips. This does suggest targeted investment in new road infrastructure will be needed to enhance access to our key economic hubs for as many people as possible, but, as stated previously, how any new road space is allocated will be important to secure an overall reduction in car use in order to meet the SCR's net-zero targets.

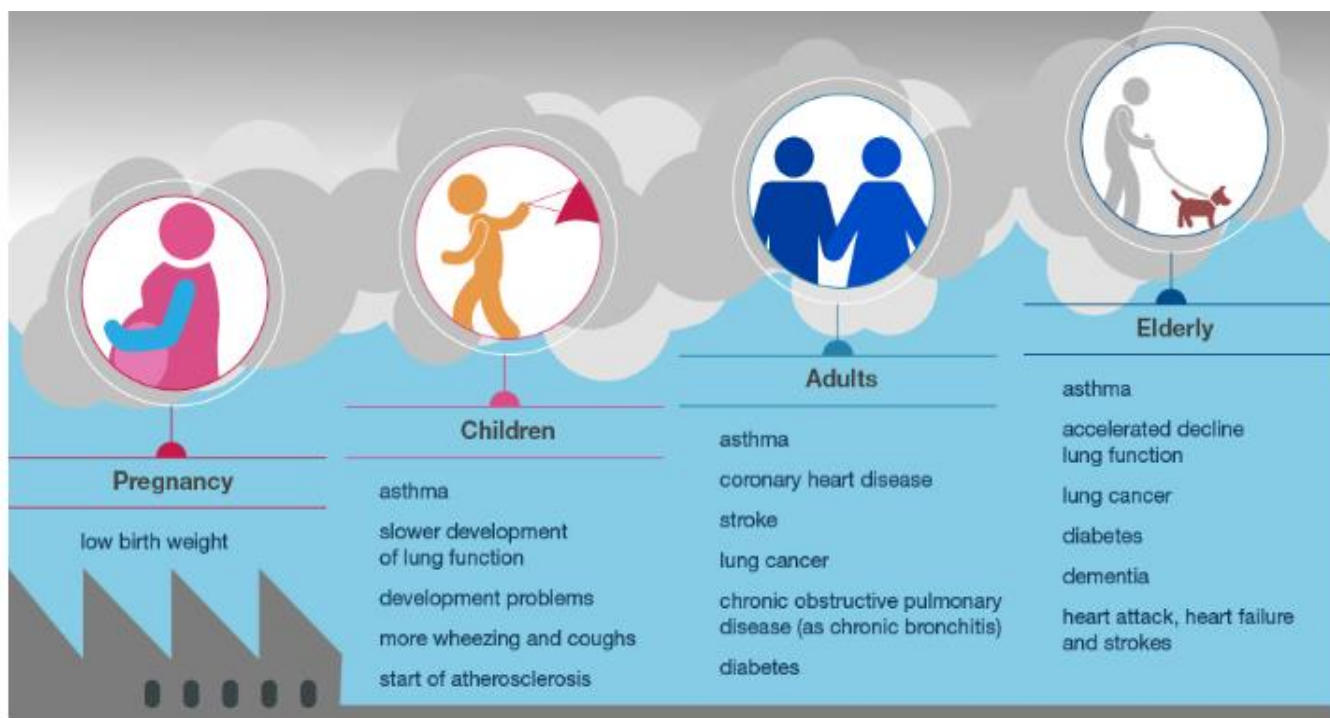
We will need to review our forecasts for future demand once the impacts of the COVID-19 pandemic on travel behaviour is better known. For example, there may be more working from home in the future, reducing overall demand on the road network, particularly at peak times. There may also be more variation in demand, by time of day or day of week, meaning that some previous assumptions of future demand, and the resulting need to intervene, should be revisited.

Therefore, an appropriate balance needs to be struck between the need for any new infrastructure and making better use of the existing network. In 2019, 72% of respondents to the National Travel Survey expressed concern about damage to the countryside as a result of road building¹. Recognising that infrastructure alone is not enough to achieve our wider policy ambitions, we also need to consider the interventions required to promote public transport and to make active travel the natural choice for short journeys, learning from the environmental and social benefits that we have seen from reduced car use in recent months.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810908/national-travel-attitudes-study-2019-wave-1.pdf

ENVIRONMENT

Air pollution is a major public health risk and the detrimental effects of air pollution occur across our lifetime, even before we are born, as shown below. Babies and young children are particularly vulnerable as are older people, those with heart or lung disease and people who live in areas of high pollution, are also disproportionately affected. Road transport (especially diesel vehicles) is the single biggest contributor to poor air quality and is responsible for some 80% of roadside nitrogen dioxide (NO₂) concentrations. Furthermore, many people do not realise air pollution levels in a car can be many times higher than those outside of the vehicle.

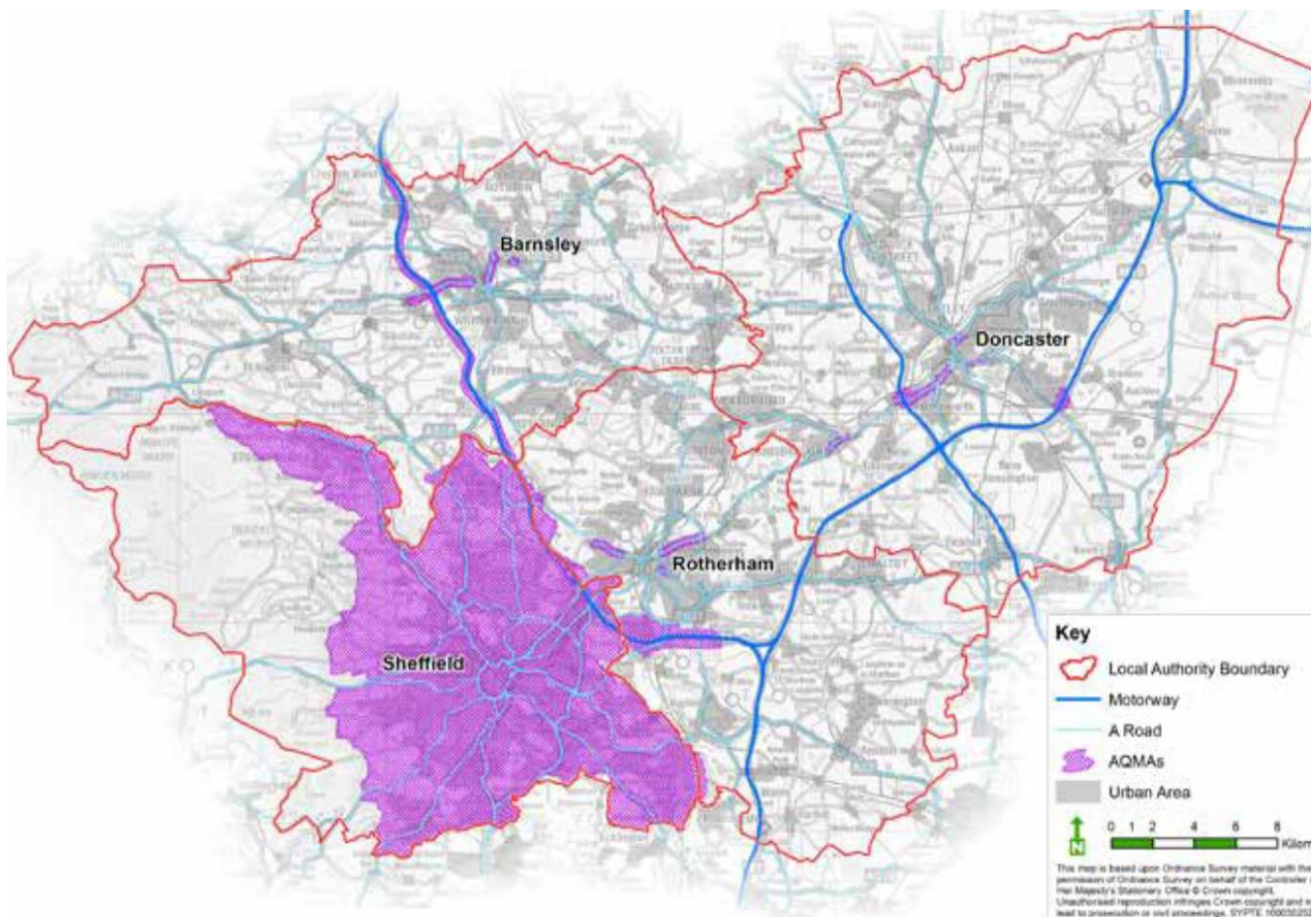


The SCR faces significant air quality issues, with 28 Air Quality Management Areas (AQMAs) declared for NO₂ across the City Region, including 6 in Barnsley, 7 in Doncaster and 8 in Rotherham and 1 covering the entire urban area of Sheffield, as shown overleaf. A climate emergency has also been declared across the SCR.

The UK has been in breach of the legal limits for NO₂ levels since January 2010. Both Sheffield City Council (SCC) and Rotherham Metropolitan Borough Council (RMBC) need to bring NO₂ emissions within legal limits as quickly as possible.

To enable this a range of options have been considered with the preferred solution to introduce a 'Category C' Clean Air Zone (CAZ) within the Sheffield City boundary. This means that buses, taxis, vans and lorries that do not meet necessary emissions standards will have to pay to drive in and around the zone. The zone will discourage the use of high polluting vehicles from the City Centre and encourage upgrades to cleaner, low or no emission vehicles. The impact of the zone will be much broader than the City Centre and it should reduce pollution across our neighbourhoods and communities.

The CAZ will cover the Inner Ring Road and the City Centre, including Park Square and the A61/Parkway junction. The proposed zone is not final and may be subject to minor changes through feedback from the current consultation process.



In Rotherham, modelling undertaken through the CAZ feasibility study has taken account of future traffic growth in conjunction with assumptions in social behaviour to provide an informed understanding of where the exceedances will still be present in January 2021. The sites identified and the proposed actions at each are:

- Rotherham section of the Sheffield Parkway (A630) – reduction of the existing speed limit to 50mph, associated with committed scheme to widen this route
- Rawmarsh Hill (A633), Rawmarsh – a proposal for some buses to relocate from the A633 to Barbers Avenue with improvements to Dale Road and Barbers Avenue to support this measure
- Fitzwilliam Road (A630), Eastwood – proposals to improve traffic flow on the A630
- Wortley Road and Upper Wortley Road, Kimberworth and Thorpe Hesley (A629) – a restriction on HGVs on the northbound carriageway of the A629.

There are also overall improvements proposed to the Rotherham bus fleet.

RMBC and SCC are seeking Government funding through a CAZ Full Business Case to deliver on these proposals.

SCC is working towards Sheffield becoming a zero-carbon city in short order to make their full contribution to the Paris Climate Change agreements and a dedicated piece of analysis has been produced by the Tyndall Centre for Climate Change Research that establishes a carbon 'budget' for the City.

The report recommends that, for Sheffield to make its fair contribution to global climate goals, the City must not exceed a 'budget' of 16 million tonnes of carbon emissions over the next 80 years. At current rates of energy consumption, Sheffield would use this entire budget in less than six years. To meet this budget

requires annual reductions in CO₂ emissions of 14% per annum – broadly equivalent to becoming nominally ‘carbon neutral’ by 2038.

As a sector, transport has been reducing its carbon emissions, at the least across the City Region, therefore presenting an opportunity to make savings within carbon budgets, by cutting emissions from road transport and switching to low carbon/clean fuels and also reducing the need to travel.

In 2019, the National Travel Attitude Survey reported that 76% of respondents agreed that people should reduce car use for the sake of the environment however, 43% agreed that they were willing to reduce the amount they use the car to reduce climate changeⁱ. Locally, petrol and diesel cars contribute around 21% of South Yorkshire’s total CO₂ emissions, however a battery electric vehicle (EV) emits (during a full functional life) half the amount of CO₂ compared to a conventional reference vehicle.

One of the barriers to greater uptake of EVs is access to charging facilities and the associated ‘range anxiety’ of the distance that can be driven in between charges. In June 2017 there were 12,821 charging points in the UK, up from around 1,500 in 2011, but only 2.9% of the UK charging points were in the Yorkshire and Humber region. Greater provision of EV infrastructure will be required to support the transition to a low carbon transport network.

SAFETY

Safety for all road users must remain of paramount importance. In financial terms, the average cost of a Road Traffic Accident is £90,424², with the cost of a fatal accident being £2,130,922, but this is insignificant compared to the distress and grief suffered by the victims, their families and friends, so there are gains to be made by reducing accidents both in terms of costs to society and minimising disruption on the road network.

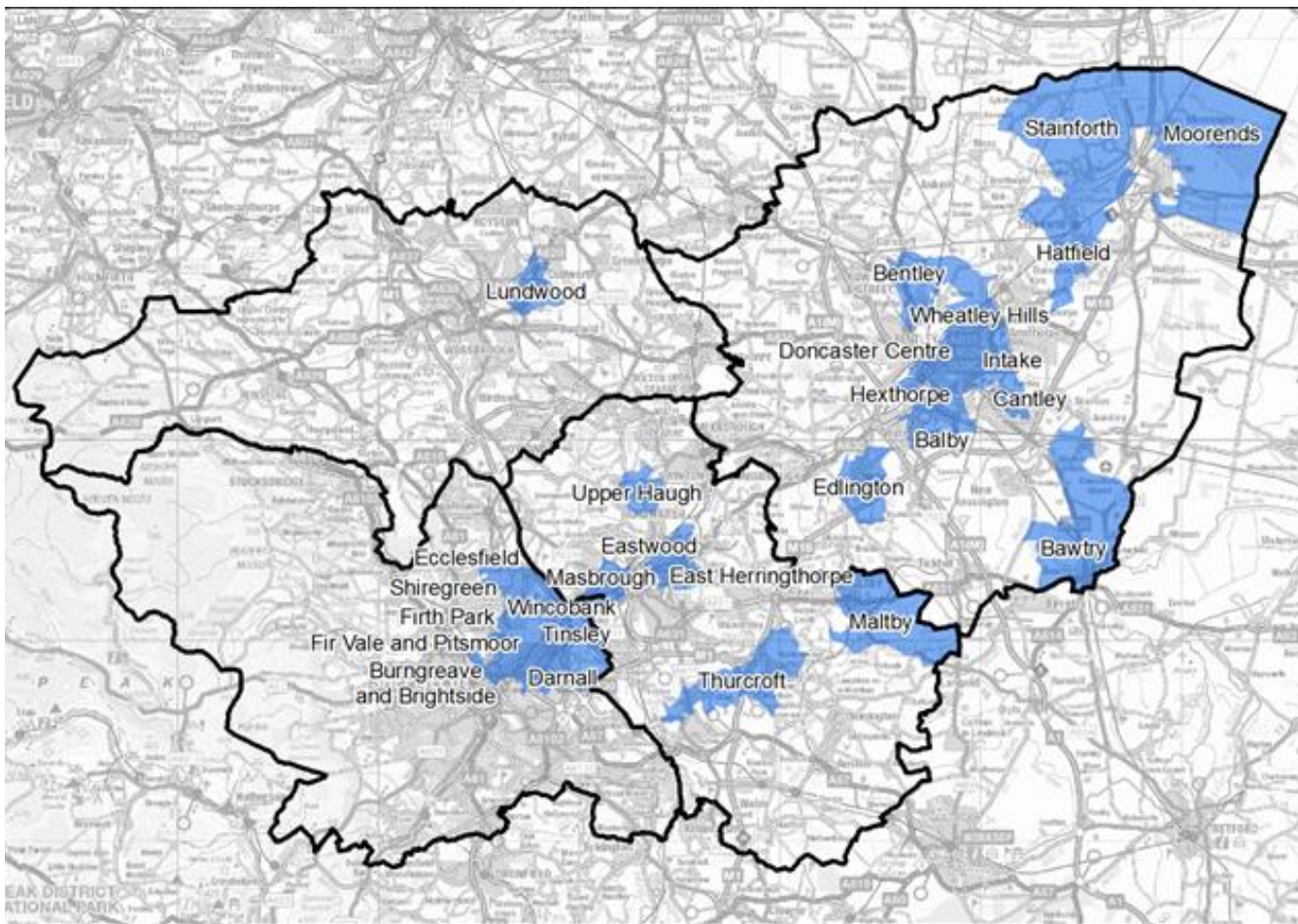
The geographical locations of where collisions occur and where those involved reside, shows that people living in deprived areas of South Yorkshire are more at risk of being injured on our roads. Analysis of all South Yorkshire casualty data suggests that 25.4% of casualties reside in the top 10% most deprived areas, as shown overleaf, with only 3.3% of casualties living in the top 10% least deprived areas. Many of the SCR’s principals roads run through, or close to, areas of existing deprivation.

The SCR’s Safety Road Partnership promotes the principles of the ‘3 Es’ in relation to road safety solutions – namely Education of road users, Enforcement of legal principles affecting use of the highway and Engineering solutions to rectify the contributory failure of the highway asset. When designing engineering interventions to tackle safety issues and promote safer travel the approach needs to reflect the needs of different groups and prioritise groups that are most at risk.

Existing high risk groups, for example young drivers, young motorcyclists and children, will remain a priority group for investment and casualty data will continue to be analysed to identify any emerging high risk groups.

Improving road safety contributes to economic growth by reducing the number of collisions and their associated costs, for example, health care costs, congestion and delay caused by collisions damage to property and vehicles and lost economic output from deaths and injuries. By prioritising our delivery of road safety interventions in the areas with the highest casualty rates, our work also contributes towards reducing health inequalities. In addition, the take-up of more active forms of transport such as walking and cycling (which is affected by people’s perception of the safety of these modes) can increase physical activity with the resultant benefits for an individual’s health and reduced reliance on the health care system.

² STATS19, Transport Analysis Guidance (2017)



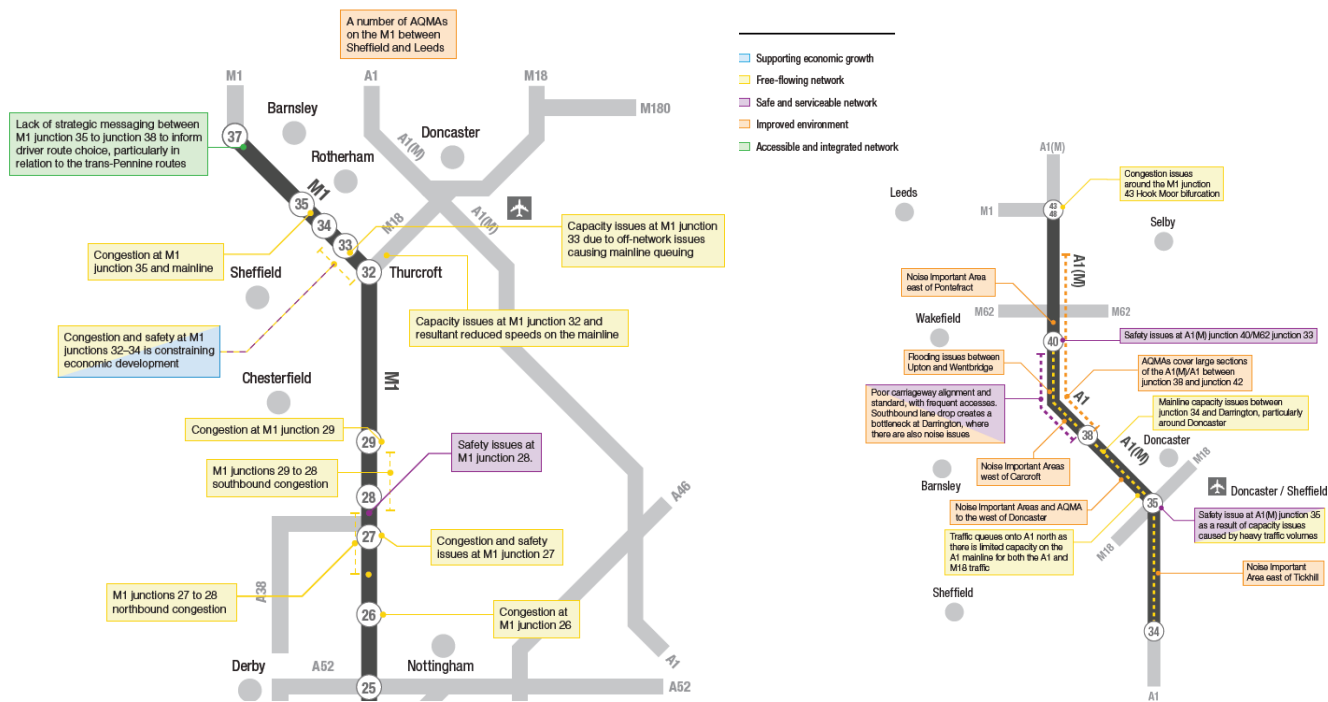
OPERATION

Highways England produce a series of Route Strategies across the network to help guide future investment – the relevant Route Strategies set out some of the existing challenges on the SRN within the SCR as follows:

- Congestion and safety on the M1 between Junctions 32 and 34 which is constraining economic development
- Mainline capacity issues on the A1(M)/A1 between Junction 34 and Darrington, particularly around Doncaster
- The 'gap' in the smart motorway network between Junctions 35a and 39 on the M1, particularly around Barnsley
- Safety issues at A1(M) Junction 35 as a result of capacity issues caused by heavy traffic volumes
- A number of AQMAs designated across the SCR.

These challenges have led to work already underway by Highways England to identify future interventions on the A1(M)/A1 around Doncaster and northwards to the interchange with the M62, as well as along the M1 for much of the section from Junction 33 northwards to Junction 39, the latter of which includes considering options to provide additional connectivity to Barnsley.

Many of the operational issues highlighted on the SRN illustrate the practical interaction of the SRN and the local road network and how most drivers do not distinguish between the different designations as part of their everyday journeys. This means that a co-ordinated approach is needed to the planning and management of the road network within the SCR.



For example, the SCR Innovation Corridor was identified, prioritised locally and submitted to the Department for Transport as one of three Large Local Major Schemes in the SCR, required to assist the City Region achieve its economic ambitions. The SCR vision is to create the UK's largest research led Advanced Manufacturing cluster at AMID along the spine of the M1.

A significant constraint on achieving these aims is the capacity of the highway network in the area, particularly between, and at, Junctions 33 and 34 of the M1. Extensive use of the motorway for local trips to access housing and employment, both of which are growing, compounds the issue. The AMID area also suffers from a lack of good public transport connectivity, which increases reliance on car trips. The need for strategic interventions has been demonstrated in several local and regional studies.

The Innovation Corridor scheme, co-ordinated with other schemes in the area such as the A630 Parkway widening and projects within the Transforming Cities Fund programme, will provide a stronger link between the Sheffield and Rotherham economies improving mobility between those key centres and the rapidly emerging economic growth sites at AMID. The scheme will cement the benefits of recent national and regional investment in highway infrastructure, such as smart motorways.

Average speeds across Yorkshire and the Humber reduced by 1.8% between 2017 and 2018 however, within South Yorkshire, traffic speeds have slowed by 2.3%, showing that traffic speeds are slower here than across the region as a whole. Sheffield experienced the greatest reduction in traffic speeds, averaging 2.9% between 2017 and 2018 with the A6101 and the A6187 both showing a 10.1% reduction in traffic speeds over the same period. The average increase in delays across the road network as a whole in England was up 0.9% with journeys taking an average of 2.7 seconds longer (per vehicle mile) than in 2015³.

The overall journey delay figure across South Yorkshire shows a 3.2% increase over the last year with journeys taking an average of 2.5 seconds longer (per vehicle mile) than in 2015. Barnsley and Doncaster incurred the greatest increase in delays (5.9% and 5.5% respectively), with journeys in Rotherham experiencing a 2% decrease in delays over the last year, although in general, journey times in Rotherham are still 27% longer in the AM peak and 14% longer in the PM peak than the same trips made in the off peak.

³ <https://www.gov.uk/government/statistical-data-sets/average-speed-delay-and-reliability-of-travel-times-cgn>

In Barnsley, there are a number of locations where congestion is experienced throughout the day on key corridors, including the A61 Wakefield Road (the main access route to the north of the Borough which links to Wakefield), A633 Grange Lane, A633 Wombwell Lane (which accesses the largest retail area within the Borough), A628 Dodworth Road (linking the town centre to Junction 37 of the M1), the A635 (the main access route to and from Junction 37 of A1(M) which facilitates national access to the significant developments in the Dearne Valley) and at the junction of A635/A633/B6100 (Stairfoot Roundabout).

In the Doncaster area, there are a number of roads where localised levels of congestion are experienced. This includes the A19 through Bentley, the A630 at Conisbrough and at Warmsworth, the A18/Thorne Road/Sandall Park/Wheatley Hall Road/Westmoor Link area and the A635 through Marr and Hickleton, which has seen significant traffic growth as the route provides a connection to the A1(M) from the Dearne Valley developments.

In Rotherham several locations, routes and junctions experience delay during parts of the day compared to free flow conditions. These include the A57 around South Anston (with the growth of employment and housing in the Worksop area further increasing the impact on the existing pinch points), A6123 Aldwarke Lane, A630 Rotherham Ring Road (particularly Ickles Roundabout), A631 West Bawtry Road towards Rotherway, Manvers Way (with existing congestion impacting on the growth potential of the employment and housing in the Dearne Valley), the A633 corridor (which forms the main north-south route between Rotherham and the Dearne Valley priority growth zone) and the A6178 towards Sheffield.

Significant congestion between Rotherham and Sheffield throughout the day also occurs along the A630 Parkway with peak hour delay severely impeding the economic attractiveness of the region, whilst also constraining links to the SRN. The travel to work relationship between Rotherham and Sheffield accounts for 40% of the movements across Junction 33 of the M1, which impacts on the effectiveness of the A630 as a strategic link across the City Region. Other corridors in Sheffield that experience regular congestion include the A61, A57, A6178 as well as the Inner Ring Road.

Congestion has a particularly significant adverse impact on the bus network. Increases in journey times reduce the attractiveness of the bus as a viable option and also affect individuals' perceptions of accessibility to opportunities. Variability in journey times make journey planning problematic as confidence is reduced that people will be able to reach a destination at a specific time. In order to maintain frequency bus operators have to provide additional vehicles on congested routes which undermines the financial viability of services and stops the resource being deployed elsewhere.

For example, a recent study undertaken by Mott Macdonald and First highlights several corridors on which their services experience significant delay in Sheffield – several identified 'hotspots' shown below, which have informed the development of future public transport improvement priorities around the City Centre and in the Meadowhall area.



Information shown below provided by Prospective, also on behalf of First, indicates morning peak hour passenger weighted delays across Doncaster, Rotherham and Sheffield due to congestion. The reliability and punctuality of bus services in Barnsley both show downward trends over the past two years, and the increasing delays on those routes used by the main bus services will increase further without interventions given the growth plans of the SCR, further undermining the attractiveness of public transport.



If the plans for significant economic growth within the City Region are to be realised, then it is forecast that there will be up to half a million extra trips per day across our transport network and if recent trends continue, many of these journeys would be made by car – this is not a sustainable situation.

Notwithstanding the previous caveat about the need to understand how future forecasts will be affected due to the COVID-19 pandemic, the roads that were forecast to see the greatest increase in congestion without future intervention are the main routes within the SCR that connect our key centres and hubs, many of which are our high frequency public transport corridors. This reinforces the need to take a more fundamental look at how we allocate our road space in the future to support our economic and social ambition, but also to meet our environmental obligations.

RESILIENCE

The lack of resilience of the SCR's road network also limits our growth at present. The Trans-Pennine Routes Feasibility Study identified that the existing trans-Pennine road routes between our City Region and the Greater Manchester City Region – principally the A616 and the A628 – experience a closure every 11 days on average, with two-thirds of these being longer than two hours. 77% of these closures are

the result of either road traffic collisions or bad weather⁴. This limited road connectivity restricts existing business and opportunities for increasing economic activity. In addition, our highway design must consider the changing weather patterns we are experiencing, to provide suitable drainage that would enable routes to remain operational.

The road network in Barnsley is sensitive to incidents, events and levels of congestion on the M1 – because the A635 and A628 provide a direct east-west link across the City Region, incidents on the A1(M) and the M1 south of Barnsley regularly result in increased congestion on this corridor as traffic attempt to short-cut back onto the SRN. This has a significant knock-on effect on the local road network and levels of accessibility in the area.

During the floods of 2007, there was only one location that maintained connectivity across the River Dearne which was the Dearne Valley Parkway at Darfield, to the east of the Borough – to the west of Barnsley significant congestion occurred as traffic attempted to access the SRN. Consequently, there is a need to provide further resilient river crossings, with the main inter-urban connection being the heavily used B6423 Dearne Hall Road. The bridge at this location has significant issues, with problems ranging from the existing structural containment being weak, the bridge itself is listed and the river approaches have an immediate 90 degree bend which creates scour problems. The operational use of the existing bridge means that the available carriageway is too narrow to sustain two way traffic due to the parapets not offering acceptable structural containment, resulting in traffic being restricted to single lane, with a priority system in operation over the bridge deck.

Doncaster is also particularly sensitive to incidents, events and levels of congestion on the A1(M) and problems at and between Junctions 2 and 3 of the M18 have a significant knock-on effect on the local road network and levels of accessibility in the area around iPort and Doncaster Sheffield Airport.

Parts of the principal road network in Rotherham can suffer a lack of resilience, particularly for links between Rotherham and the north of the Borough. Increasingly, flooding results in emergency road closures at short notice, resulting in significant damage and disruption, most recently during the floods of November 2019. Increased incidence of intense rainfall events resulting from climate change are anticipated to aggravate these issues into the future.

Whilst Rotherham's location provides excellent links to the SRN, when incidents occur on the SRN, the local road network is relied upon for alternative routes bringing significant challenges to what can be an already congested areas, particularly in peak periods. These incidents cause significant delay and issues for local traffic affecting business and services – as they are unplanned, the ability to adapt and manage the network to account for extra traffic needs to be planned and automated through intelligent traffic control and information, for example variable message signs (VMS) and traffic signal control strategies.

The capacity of the M1 between Junctions 32 and 35A, even with the recent smart motorway improvements, the susceptibility of M1 Tinsley Viaduct to closure to high sided vehicles and the capacity issues with interface between local road network and Junction 34 of the M1 are all of significant concern in Sheffield. The impact of snow and ice on the road network (including where issues on minor roads impact on major roads) particularly in high and/or hilly parts of Sheffield can also cause issues and it is likely there will be increased disruption owing to increasing severity and likelihood of extreme weather and consequential impact (including land slippage), owing to climate change.

Extreme weather (be it snow or heavy rain) has a major impact on the bus network as roads become unpassable resulting in services being cancelled or rerouted, often at short notice. The impacts of congestion (whether resulting from incidents, planned events or sheer volume of traffic) on the City Centre, also result in severe issues for the reliable operation of public transport.

FREIGHT

Goods move freely between regions of the UK, however some regions 'export' more goods than they 'import' in domestic road freight. Yorkshire and the Humber, along with East Anglia and the East Midlands,

⁴ Trans-Pennine Tunnel Study Stage 3 Report (DfT, February 2015)

are the largest exporting regions in the UK, with almost 32 million more tonnes of goods leaving these regions than entering them.

Road freight is the dominant mode by which goods are transported. It is inherently less expensive to handle goods by road by comparison with rail freight, it is free at the point of access, not restricted to a timetable, and there are lower handling charges. Road freight contributes around £11 billion to the UK economy and is particularly important in the SCR as, in percentage terms, the highest levels of forecast employment growth in the City Region are expected to occur in transport and logistics. This builds on the SCR's strong multi-modal freight distribution sector, based in Doncaster, iPort, and the Dearne Valley.

Freight operators indicate that network management, resilience and highway maintenance are priorities for them. With 66% of all road freight movements within Yorkshire and Humber impacting on SCR, road freight is essential but can also result in issues in both rural and urban areas, including the suitability of routes for freight vehicles, community severance and pollution.

As road is likely to remain the dominant carrier of freight in the UK in the foreseeable future, we need support further growth of the logistics sector by improving the reliability, resilience, integration and speed of our freight connections for road, rail and water-borne freight also improving access to the Humber Ports from SCR.

However, careful planning is needed to ensure goods can still be delivered while minimising the impact of freight traffic on local communities together with better driving standards that can help mitigate these adverse impacts.

The top ten challenges with the existing road network in the SCR are as follows:

1. The different designations and the funding, planning and operational circumstances that apply to the existing road network often leads to fragmented thinking – there is no clear joined up local and national plan.
2. Most of the SCR's residents currently commute within the City Region boundaries and the number of short trips undertaken by car in the SCR is high and we would expect the number of trips within the City Region to remain high as a proportion of the overall number of trips as a result of the SCR's growth proposals, but how any new or improved road space is allocated will be important to secure an overall reduction in car use in order to meet the SCR's net-zero targets.
3. The SCR faces significant air quality issues, with 28 AQMAs declared for NO₂ across the City Region, whilst road transport accounts for a quarter of the region's carbon emissions, with 42% of those emissions associated with traffic on A roads.
4. Whilst our roads are getting safer, people living in deprived areas of South Yorkshire, are still more at risk of being injured on our roads, with 25.4% of casualties reside in the top 10% most deprived areas – young drivers, young motorcyclists and children are most at risk at the moment.
5. Congestion and safety issues on the M1 between Junctions 32 and 34 and on the two-lane section of the A1(M)/A1 between Junction 34 and Darrington are constraining economic development, with significant use of the motorway for local trips to access housing and employment compounding these issues.
6. Major roads such as the A635, A19, A61, A633, A630, A631 and A6195 provide the important links to the SCR's growth locations, but journeys are taking longer than five years ago, which will stifle the attractiveness of these sites for public and private transport.
7. Network delays have a significant adverse impact on the bus network, as increases in journey times reduce the attractiveness of the bus as a viable option and also affect individuals' perceptions of accessibility to opportunities.
8. There is a lack of resilience in the SCR's road network, for example existing trans-Pennine road routes between the SCR and the Greater Manchester City Region (such as the A616 and the A628) experience a closure every 11 days on average, with two-thirds of these being longer than two hours.
9. Whilst technological improvements, including electric vehicles, can help address some of the existing operational and environmental problems, greater provision of charging infrastructure will be required to support the transition to a low carbon transport network and there is a 'gap' in the smart motorway network between Junctions 35a and 39 of the M1 adjacent to Barnsley.
10. Whilst freight operators indicate that network management, resilience and highway maintenance are priorities for them, road freight can result in issues in both rural and urban areas, including the suitability of routes for freight vehicles, community severance and pollution.

Future Road Network Opportunities and Needs

The SCR wants to increase the number of jobs, particularly high value jobs, in our City Region and the number of people in full time employment. GVA in SCR remains low in relation to our peers and the wider UK and we know that to reach our potential, we need to develop integrated transport connections and improve access on four geographical scales:

- Within our City Region
- To other centres in the North
- To locations in the UK beyond the North, such as London
- To our international markets.

As noted previously, the focus of this Plan will be the improvements necessary for the inter-urban connections within the SCR, taking forward the Mayor's Vision for Transport but also identifying where road-based improvements will help unlock specific sites for growth. The Mayor's Ambition for improved journey times across the City Region outlines an aspirational journey time of 30 minutes between regional hubs and a resilient and efficient road network will play a significant role in meeting these targets for all users.

The economic focus of the MRN offers an opportunity to increase inter and intra-regional connectivity to provide access to jobs, skills and education opportunities for everyone in the SCR through improving access to markets and supply chains for our businesses.

We also want to improve inter-regional connectivity, particularly east-west connections and connectivity across the North, as well as the rest of the UK, which will widen our labour market so people can live and work in different city regions.

We see vital connectivity schemes such as Northern Powerhouse Rail (NPR), HS2 and trans-Pennine road improvements as a key means of improving resilience and increasing commuter flows between our City Region and other parts of the UK, particularly in the light of the closures experienced between the SCR and Greater Manchester, as a result of road traffic collisions or due to bad weather. For longer distance journeys, SCR would like to see rail become the preferred mode of transport, but we also recognise that roads will play a role in providing access to our rail stations for onward travel.

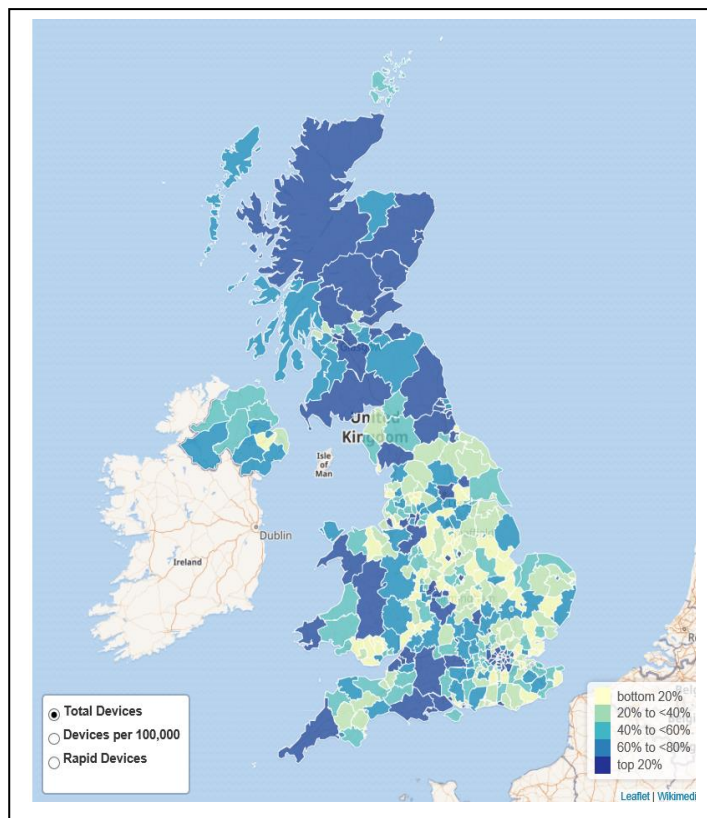


Access to national and international markets is essential in our ever-increasing global economy and we will seek to embrace both new and proven technologies that will improve this. We have recently opened the second phase of the Great Yorkshire Way to improve road access to Doncaster Sheffield Airport (DSA), and are working with Peel Airports and Doncaster Council to develop a proposal for a rail link and station to serve the Airport, in order to expand its rail catchment significantly.

To improve air quality and reduce our carbon emissions, we need to reduce the number of vehicles on our roads and clean up those which use SCR's road network – we accept that roads will always be part of the solution to our future transport needs, but where cars are used, our aim is for them to be less polluting.

To support and accelerate the uptake of low and zero emission vehicles, SCR is seeking ways of expanding our network of vehicle charging points in a co-ordinated way, to ensure full coverage across the City Region. There has been a steady increase in the number of registered electric vehicles (EVs), which is something we would like to accelerate, however we are still behind many other areas in the UK⁵.

A plan is being developed to identify how the SCR can grow the provision of EV charging locations, including a review of where the power network needs strengthening and undertaking an assessment of the best delivery model to speed up the transition to low carbon vehicles in the SCR.



In parallel with our policy to improve air quality, we will work to ensure that appropriate refuelling infrastructure is available on our road network, to enable both private and freight vehicles to adopt clean fuel alternatives. Encouraging the freight vehicles using our roads to be electric, hydrogen or hybrid can help address the higher level of pollutants resulting from freight and deliveries. Anti-idling campaigns will also be important to cut the emissions from stationary vehicles, as well as working to reduce the number of delivery vehicles in our town and city centres and/or for the first/last mile.

Modern digital technology when used to its full capability, can maximise the efficient operation of roads and public transport. We need to harness information and communications technology to help to get the most out of the road network for all modes, by smoothing vehicle flows and enabling public transport priority. The SCR will support investment in information and communications technology, including traffic signal timings where they can help smooth vehicle flows to reduce pollutants, provision of bus priority, urban traffic management and control (UTMC) and the use of smart parking technology.

The SCR has recently commissioned a review of future mobility services across the City Region to help develop this Plan, reflecting that technology is constantly advancing and this is driving an unprecedented pace of change that will impact our cities, environment and way of life. The review identifies that the opening up of data has significant potential for the development of new services and concludes with a series of five 'key moves' and a number of more detailed recommendations over the short, medium and long term. A number of the short and medium term recommendations are relevant to this Plan, such as:

- Explore and trial the use of hydrogen as an alternative fuel for freight at key regional hubs in Doncaster and Barnsley
- Encourage data sharing between Highways England and local authority's systems to better integrate data relating to traffic flows, congestion and collisions and provide integrated journey and routing information
- Investigate mobility pricing, with charges for vehicles based on occupancy
- Develop the future mobility capability of the SCR's technology and logistics sectors by trialling autonomous goods vehicles and truck platooning on the SRN and MRN.

⁵ <http://maps.dft.gov.uk/ev-charging-map/>

Objectives of the Roads Implementation Plan

The Campaign for Better Transport identifies three priorities for improving road networks – a focus on the roads we have rather than building new ones, redesigning roads to join up better with local transport, walking and cycling, and delivering carbon emissions reductions and improved air quality and biodiversity. SCR adopts these principles that recognise the role of our road network described earlier in this Plan.

Building on these principles and drawing on the current challenges identified, the key objectives of this Plan are:

- Increasing the resilience and performance of the existing network, responding to changes in demand
- Investing in infrastructure that unlocks sites through the provision of new links or the enhancement of current access arrangements
- Enhancing the priority given to public transport services that use the road network and developing better links to public transport hubs
- Providing space for active travel and delivering high quality infrastructure that rebalances the use of our roads
- Reducing harmful emissions by managing traffic conditions in a pro-active way and embedding environmental design principles in all future investment
- Improving safety on the network for all users.

These objectives will be used to ensure alignment of future interventions with the policies of the Transport Strategy and Mayor's Vision for Transport, interventions that will be targeted across the road network, but the focus of this Plan will be an important part of that network.

At the start of this Plan, the concept of a KRN for the City Region was introduced – this would enable a more integrated and collaborative approach to the planning and management of our road network and be used to plan and identify investment priorities, based on the objectives set out above.

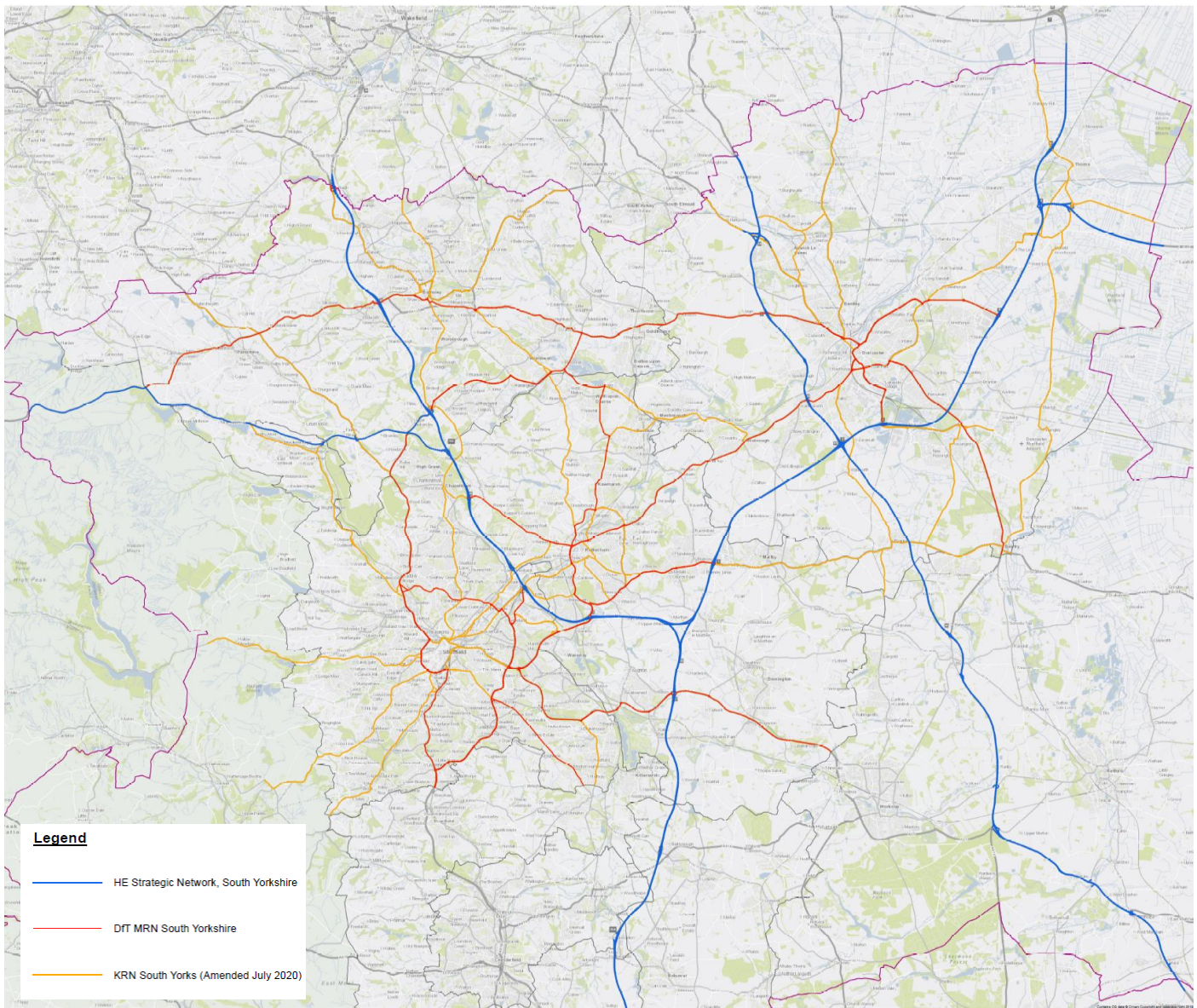
We have defined an initial KRN for the City Region as shown overleaf, comprising those roads within the SCR that we consider vital to deliver the SCR's Transport Strategy and which reflect the objectives of this Plan. The initial criteria used to define the additional routes within the KRN are:

- Access to regional hubs – roads that connect the key economic centres defined in the Mayor's Vision for Transport
- Access to key public transport hubs – roads that provide direct access to public transport hubs, interchanges or park and ride sites
- Access to Local Growth Areas – roads that provide direct access to any of the growth areas identified in the SEP that are not identified as regional hubs
- Access to non-SCR growth areas – any road which provides direct access to neighbouring areas of proposed economic activity

We consider that these initial criteria reflect the important role that our road network plays in supporting the economic recovery of the SCR.

However, we also recognise the role that our road network will play in supporting public transport services and reducing car use. Therefore, we have also included those roads with an inbound frequency of 6 or more buses per hour (except in any identified growth area identified in the SEP, such as Dearne Valley where either direction is considered) – these are, and will remain, our principal public transport corridors.

To this network, we have then added the SRN and the MRN as defined by others to recognise the importance of these national and pan-regional connections to, and within, the SCR and to ensure that there is one network, as well as any road which provides direct access to the SRN or MRN. Finally, the KRN includes any road serving the purpose of a SRN emergency diversion.



We believe that working at a strategic SCR level to create a reliable, efficient and resilient KRN would have the following benefits:

- Support the delivery of the SCR Transport Strategy, promoting economic growth through coordinated multimodal investment in the road network
- Benefits for all road users, strengthening the ability to develop, maintain and collaboratively manage an integrated high performing road network that is safer, reliable and meets the needs of all road users
- Allocate space for public transport and active travel through more efficient operation of the existing network
- Provide better scope for aligning and integrating capital programmes whilst maximising new funding opportunities
- Provide a more consistent approach to the maintenance and management standards to improve the experience for all road users
- Help the future policy decisions to complement the SEP
- Facilitate the ability to align policy decisions to meet the varied needs of the different users of the road network through the creation of a consistent approach to delivery

- Enhance the ability for the SCR to engage with regional bodies on strategic pan-Northern highways issues, such as Highways England, TfN and the private sector (businesses and user groups)
- Offer improved levels of economies of scale through the ability to procure over a larger geography and provide the ability to realise efficiencies through the amalgamation of delivery arrangements and contracts.

TfN has developed a series of pan-Northern conditional outputs against which the performance of its MRN will be monitored as the data becomes available. These include:

- Journey reliability – where 90% of journeys on the MRN should not be delayed by more than 15 minutes for a 60 minute travel time
- Network efficiency – aiming to optimise the efficient flow of passengers and goods on the MRN and through the improved flow of traffic, and support for new technologies to reduce emissions of pollutants and greenhouse gases
- Network resilience – aiming to reduce the number of incidences of closure of MRN routes leading to severe journey delay
- Journey quality – improving the customer experience of using the MRN, including the quality and availability of travel information.

We will be working with TfN to agree the exact details of these conditional outputs and using them to agree a series of metrics across the MRN within the City Region and how these can be applied to the agreed KRN across the SCR in the future.

It is also vital that the interventions set out in this Plan link back to the delivery of the three goals and nine key policies within the SCR Transport Strategy, as shown below.

Transport Strategy Goals	Transport Strategy Policies
Residents and businesses connected to economic opportunity	<ol style="list-style-type: none"> 1. Improve the existing transport network to enhance access to jobs, markets, skills and supply chains adopting technology solutions to support this 2. Enhance productivity by making our transport system faster, more reliable and more resilient, considering the role of new technologies to achieve this 3. Invest in integrated packages of infrastructure to unlock future economic growth and support Local Plans, including new housing provision
A cleaner and greener Sheffield City Region	<ol style="list-style-type: none"> 4. Improve air quality across our City Region to meet legal thresholds, supporting improved health and activity for all, especially in designated AQMAs and CAZs 5. Lead the way towards a low carbon transport network, including a zero-carbon public transport network 6. Work in tandem with the planning and development community to create attractive places
Safe, reliable and accessible transport network	<ol style="list-style-type: none"> 7. Ensure people feel safe when they travel and invest in our streets to make them more attractive places 8. Enhance our multi-modal transport system which encourages sustainable travel choices and is embedded in the assessment of transport requirements for new development, particularly for active travel 9. Ensure our transport network offers sustainable and inclusive access for all to local services, employment opportunities and our green and recreational spaces

Improvements to the road network will have wide reaching benefits across the SCR however links to policies 1, 2 and 5 are particularly significant.

We want to improve our existing road network to ensure that access to jobs, markets, skills and supply chains is improved for all SCR residents. Improvements to our intra-regional connectivity are key given that

most of SCR's residents commute within the City Region boundaries, and we expect this proportion to remain high. Investment in information and communications technology by partners will be important, to get the most out of the road network for all modes, making the most of the existing network before considering new infrastructure. Adopting technology solutions such as UTMC will help to support this approach.

Transport improvements can enhance productivity by making travel to and from work as well as travel for work, quicker and efficient so more time can be spent working. Harnessing new technologies will enable more efficient use of existing road space and reduce the adverse impacts of incidents across the network, whilst enhancing bus priority will support the reliable operation of our public transport network. Although not necessarily on our road network, it is important that appropriate projects that facilitate flood alleviation are also brought forward, as this will help to improve the resilience of our road network, an increasingly important issue given the recent flooding incidents in Doncaster and Rotherham.

DELIVERING THE PLAN

The key component of the Roads Implementation Plan is what we intend to do to deliver upon our objectives. The three maps in this section show, in turn:

- Interventions that are either committed for delivery, or which we need to see delivered, in the next five years
- Interventions for which we aim to complete business cases in the next five years, with the aim of these interventions being delivered from the mid-2020s onwards
- Interventions for which we will do more investigation work and develop options for, in the next five years, such that these interventions could be delivered from the late 2020s onwards.

In line with our adopted principles, SCR's focus is on making the most of the roads that we have rather than building new ones – this is illustrated by the limited number of interventions for delivery from the late 2020s onwards.

Delivery in the Next Five Years

Over the next five years, we will work to ensure **delivery** of the required improvements to our road network aligned with economic and housing plans and/or to address specific problems on our existing network. This includes the completion of committed schemes on the SRN including:

- M1 Junction 33 improvements and A630 Parkway widening
- Transpennine upgrade programme – A616/A61 Westwood roundabout improvements,

as well as local investments, such as at A630 College Road Roundabout in Rotherham, and the roads-based interventions included within our Transforming Cities Fund package aimed at providing public transport priority and supporting active travel modes.

Other schemes on the SRN identified for the next five years include:

- Sheffield City Region Innovation Corridor
- Hollingworth – Tintwistle Bypass.

Our MRN proposals include a scheme at Shalesmoor Gateway, linked to housing growth in Sheffield, alongside improvements to some of the junctions on the Inner Ring Road in Sheffield and a new connection at Junction 5 of the M18/M180 from the Unity development area in Doncaster.

The highest level of design and mitigation must be applied to any of our future investment in roads to ensure stronger protection for the landscape and heritage assets from road infrastructure, whilst incorporating the most up-to-date environmental design principles. The relationship between routes on the KRN and other place-based interventions across the SCR needs to be recognised and understood – for example, local centres need effective access by a range of modes to thrive, but the car cannot be allowed to dominate such centres.

Business Cases in the Next Five Years

In the next five years, we will work to **complete business cases and undertake further design work** on several interventions so that these can be delivered in the latter part of the 2020s as our economic growth ambitions start to move at pace.

On the SRN, interventions being actively developed by Highways England include:

- A1/A1(M) Doncaster (including the upgrade of the final section between Redhouse and Darrington to motorway standard)

- M1 Junctions 35A to 39 smart motorway,

whilst other interventions related to our growth plans to develop proposals for include:

- M18 Junctions 2 to 5 (and improvements at M18 Junction 2)
- M1 Junction 37.

We will work with TfN to improve Southern Pennines east – west connectivity to the proposed new NPR station at Barnsley Dearne Valley station (potentially including new/upgraded route around the North of Barnsley and Doncaster Districts or along the A6195/A635 corridor, A1 to A19 and A19 to M18 links and A1 to M1 link in South Wakefield, comprising A1 to HS2 link from Redhouse and M1 to HS2 link). An early component of this work will be the development of a specific business case for improvements to the A635 around Marr and Hickleton, with the possible future extension of the Bolton upon Dearne bypass to facilitate more efficient use of connecting the Manvers and Cortonwood areas to the A1(M).

We will also work with Highways England and TfN to develop the Trans Pennine Tunnel and wider connectivity package of improvements, including a potential M1 to M18 link.

On the MRN, we will develop forward business cases for:

- A57 South Anston improvements
- Further improvements to the Inner Ring Road in Sheffield
- A631 junction improvements and route treatments (Worrygoose, Brecks and Wickersley)
- Ickles Roundabout.

These latter interventions are also aimed at addressing identified constraints to future growth.

We will also develop plans across the KRN to improve public transport connectivity (including key public transport hubs) and to promote active travel modes. We will also develop a plan for enhanced EV charging provision across the City Region.

Further Investigation Work in the Next Five Years

In the next five years, we will work to **develop options** for those interventions required to ensure that the SCR is ready to make the most of longer term economic investment across our road network and to ensure that the network is resilient to future changes.

Such interventions could include:

- New multi-modal connection from the M18 to Doncaster Sheffield Airport
- New M1 Junction 37a
- “Smarter MRN” technology proposals
- Rotherham Northern Access Route
- Dearne Hall Road River Bridge
- A628 Bridge End (at Penistone)
- Stairfoot Roundabout (A633 Grange Lane approach).

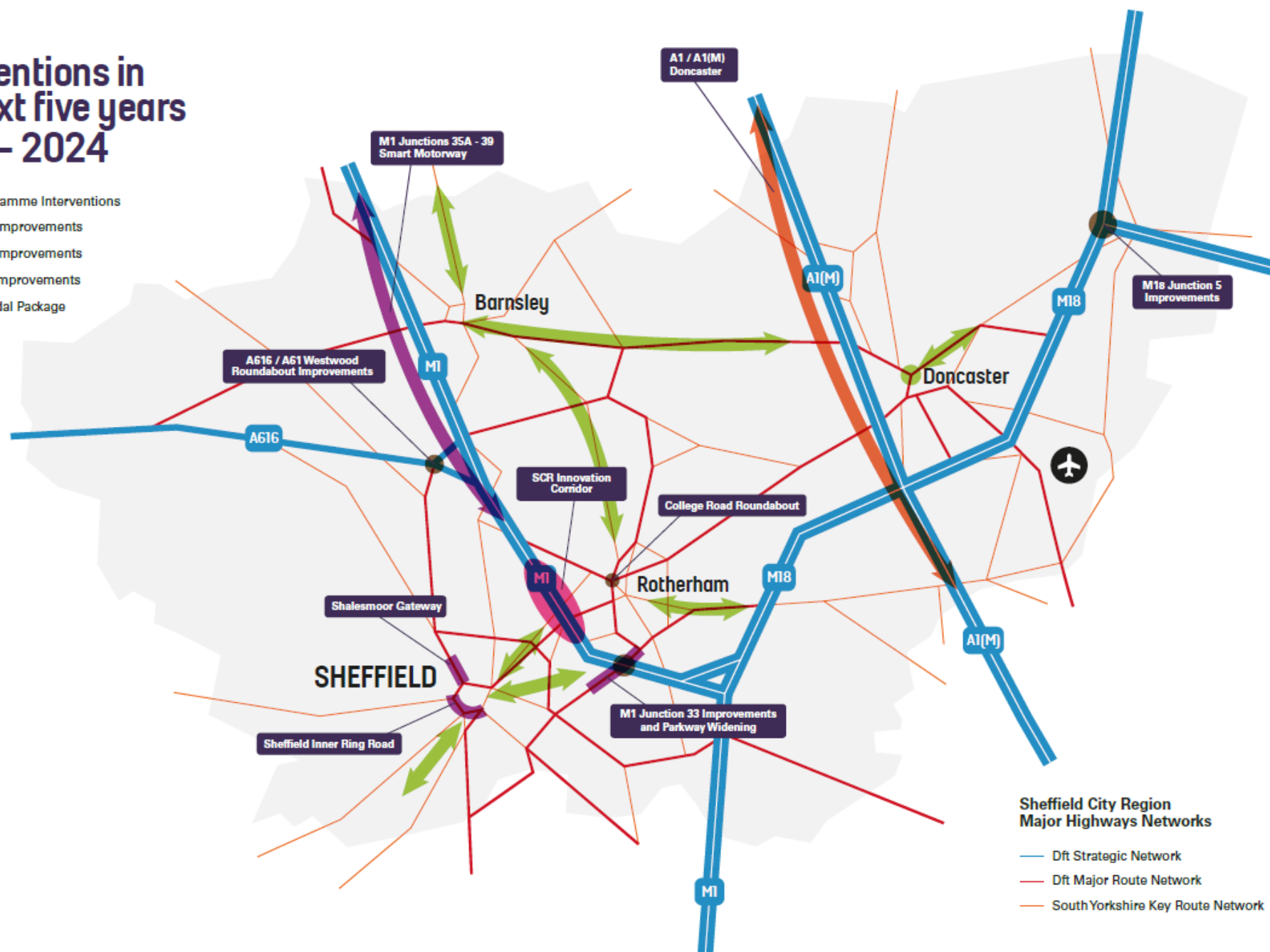
This further investigation, along with the development of business cases set out above, will need to be undertaken with a mind to wider SCR policy positions, notably those around the climate emergency and the promotion of public transport and active travel, which may reduce the need for such interventions as traffic levels are reduced and/or future demand changes. We will focus on upgrading the existing KRN to develop public transport and active travel interventions on our key corridors.

The next six pages are three, double page spread maps that will show the specific interventions within the SCR or of direct benefit to the SCR based upon the three categories outlined above

MAP 1

Interventions in the next five years 2019 – 2024

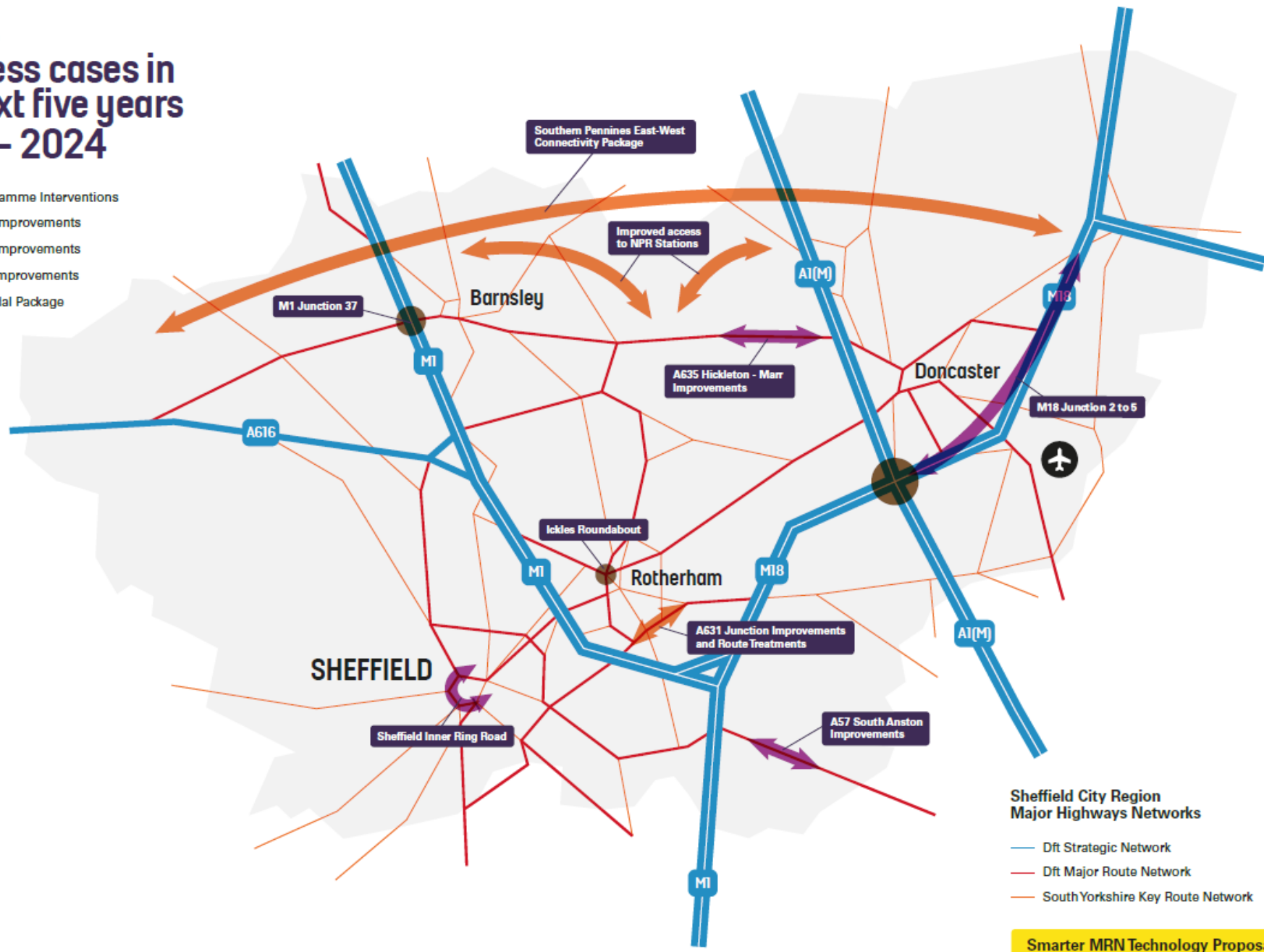
- TCF Programme Interventions
- Junction Improvements
- Capacity Improvements
- Corridor Improvements
- Multi-Modal Package



MAP 2

Business cases in the next five years 2019 – 2024

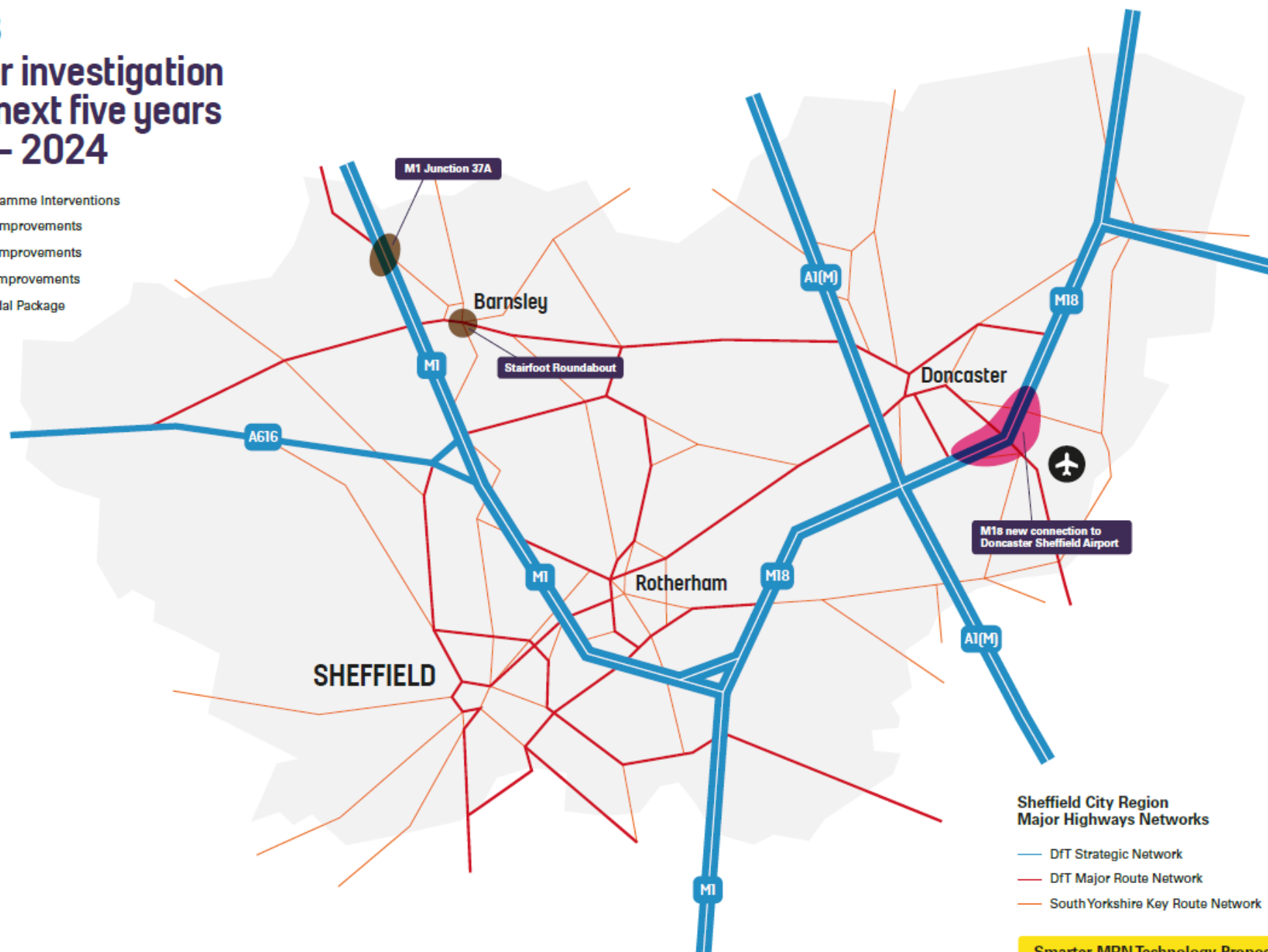
- TCF Programme Interventions
- Junction Improvements
- Capacity Improvements
- Corridor Improvements
- Multi-Modal Package



MAP 3

Further investigation in the next five years 2019 – 2024

- TCF Programme Interventions
- Junction Improvements
- Capacity Improvements
- Corridor Improvements
- Multi-Modal Package



Sheffield City Region
Major Highways Networks

- DfT Strategic Network
- DfT Major Route Network
- South Yorkshire Key Route Network

Smarter MRN Technology Proposals

Harnessing the Potential of Technology

Technology is constantly advancing, and this is driving an unprecedented pace of change that will impact the fabric, environment and way of life across the whole of the SCR. Yet it is important to understand that technology is just an enabler – it also needs resources (people and funding) and processes to operate, maintain, continually improve and deliver the outcomes desired. Key to the success of this Plan will be to harness the potential of technology to enhance the management and operation of our road network to ensure that we make the most of the existing assets and any new infrastructure.



Defining the KRN is a starting point in a development programme that can sit alongside this Plan using technology to enhance the SCR's whole transport network, not simply roads, although the road network is where the greatest benefits can be delivered in the short term. Instead of the separate systems that exist at present, a combined UTM system for the whole of the SCR, potentially developed in collaboration with Highways England's Regional Control Centres, can lay the foundations for planning and managing our road network as users see it – as one whole.

Such a combined UTM system could be cloud-based, allowing the SCR Partners to operate more efficiently, reducing cost and complexity, whilst bringing freedom, agility and integration to the real time management of our transport network(s). Access to real time information collected from across the whole of the KRN will enable immediate use through linked, automated network management strategies or manual interventions, and would allow regular monitoring and reporting on the performance of our network. One part of this pro-active network management could include enhanced strategic management of key bus corridors within the KRN to develop more reliable public transport links between key growth areas and employment zones.

Access to real time information from across the KRN presents opportunities to deliver centralised traffic and travel information to everyone across the SCR – daily bulletins, roadworks information, incident alerts, variable message signs and information about alternative options, on web-based and social media platforms. This puts the user at the heart of the new system, providing open data for future app development.

A co-ordinated approach through UTM would minimise the impact of planned events on the KRN with the potential to disrupt traffic flows, through the development of a range of event network strategies across the SCR, developing a KRN 'toolkit' for planned events. It would also minimise disruption from unplanned events as they occur and help return the KRN to its planned steady state operation as soon as possible. Staff familiar with incident management experience are able to make manual interventions if required.

Data collected across the KRN by a combined UTM system can be used to populate and maintain our transport models to inform the assessment of improvements to the KRN and support future funding bids. Our models can be used to develop and test new management strategies before their introduction on site, and some of our existing models also allow real time adjustment of traffic management strategies in response to live KRN incidents.

This approach could provide the facility for centralised resources for integrated and coordinated management and operation of the KRN, incorporating the SCR Local Authorities, SYPTE, Highways England, public transport operators, travel media, highway maintenance providers and the emergency services, delivering significant benefits in respect of improved communication and responsiveness to operation of the KRN.

Such a centralised resource provides one central point of contact for all operational KRN enquiries. Through familiarity with day to day operation of the KRN, staff will also be able to identify and quantify

those parts of the network requiring regular interventions, analysing data from the KRN to identify pinch points and hotspots.

One of the early opportunities for a combined UTM system would be in how the SCR addresses its current air quality issues across our road network – this is an area of work that Sheffield had previously developed initial solutions for through its Sheffield SENSE bid to Innovate UK in 2015.

SCC recognises that it faces challenges with air quality and traffic congestion, particularly around the Inner Ring Road. With the help of partners Sheffield is collecting and managing real time data on air quality, with the intention is to use real time traffic and air quality data to implement intelligent traffic management strategies that have previously been solely driven either by information about traffic congestion or the punctuality of public transport vehicles.

The Council is already sharing traffic data from its UTM platform, with one of its partners, Sheffield University, through the Urban Flows Observatory project. The Urban Flows Observatory seeks to understand how the physical (energy and material resources) metabolism of cities can be measured, understood and utilised effectively. Mobile and fixed sensors have been deployed around Sheffield to improve the understanding of the City's use of resources.



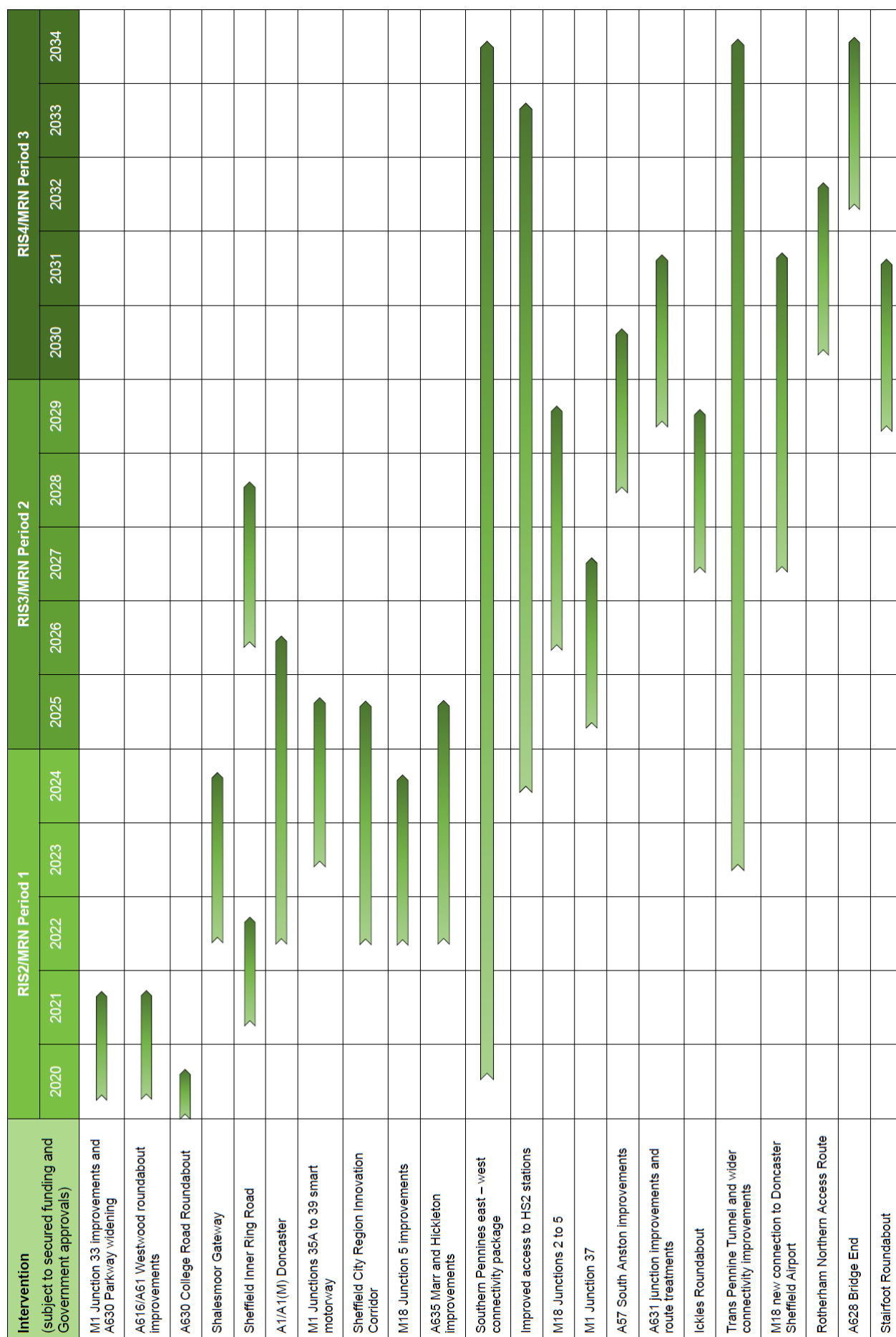
SCC currently has access to a number of legacy air quality sensors belonging to itself and partner organisations and a number of traffic flow sensors (mainly based on automatic number plate recognition) across the City, however the nature of the data generated is not enough to provide the City with enough density of data to currently develop effective intelligent mobility management strategies. Through the Urban Flows Observatory, SCC is seeking to increase the volume of data available on air quality, data which can then be analysed and models developed which can then be fed back into the platform for use in helping shape future management strategies to improve air quality in the City.

Sheffield already has a city-wide microsimulation traffic model that includes data from over 530 traffic signal sites, and is updated on a frequent basis in order to retain validity for scheme testing. The model is also used in-house for traffic management strategy development and implementation. With enriched data inputs, it is envisaged that this traffic model will be utilised for real-time mobility modelling in the future. The real-time model will assist as an operational tool to monitor the impact of emissions, with the live data collected then being adaptively used to automatically adjust traffic equipment and systems to manage emissions levels on a pro-active basis.

Through better network intelligence, it will be able to provide a mobility network which is more reflective of the current movement patterns across the SCR, encouraging multi-modal shifting by giving residents more data to make intelligent decisions about their mobility plans. The open nature of the future platform will empower citizens to take control of strategies developed to tackle air quality. Just as communities now organise their own traffic calming schemes, residents in poor air quality areas would be empowered through more localised visualised data to organise their own campaigns to improve air quality locally. For example, in areas where standing traffic is common, communities could encourage drivers to turn their engines off (or enable stop start) to minimise emissions.

Our future development programme for UTM and emerging technology will look to optimise transport networks and their systems to provide efficient movement of goods and people, provide choice and support economic development in a way that considers impacts on the environment and the residents, workers and visitors within the SCR. As well as delivering quick wins over the next few years, such as the air quality strategies described above, we will also establish research and trial projects to be delivered in the medium to longer term so that by a positive legacy for our road network will have been delivered, maximising the potential of technology.

Roads Implementation Plan Timeline



MEASURING SUCCESS

The Transport Strategy states that any interventions brought forward will be judged against the three goals set out previously and the success criteria that flow from them, as shown below.

Goal	Success Criteria (by 2040)
Residents and businesses connected to economic opportunity	a) Contribute towards increasing GVA in SCR through increasing the number of economically active people living within 30 minutes of key employment locations and universities by public transport b) Better frequency of rail service between Sheffield and Manchester/Leeds - at least four fast trains per hour, with a target 30 minute journey time to/from both and a local rail network that meets the agreed minimum standards
A cleaner and greener Sheffield City Region	c) Increase productivity through reducing delays on our transport network d) Increase trips by 18% bus, 100% rail, 47% tram, 21% walking and 350% cycling and manage the increase in private car/van/goods trips to 8% e) 95% public opinion that our local transport choices feel safe f) Reduction in reported casualties of 4% per year
Safe, reliable and accessible transport network	g) Eliminate AQMAs in our City Region and comply with legal thresholds to achieve compliance in the shortest possible time h) Reduce tailpipe carbon emissions in line with targets for the UK and have a zero-carbon public transport network by 2040

This Plan aims to improve conditions for growth, help to create and attract businesses, improve access to talent and a wider range of employment opportunities. SCR businesses will be able to draw on a wider labour pool when recruiting, leading to more efficient matching of labour demand and supply, and SCR residents' access to employment opportunities in labour markets will become more accessible.

But our focus on how we see the development of our road network in the future, taking account of the fact that roads serve public and sustainable transport modes rather than just cars and simply concentrating on addressing current congestion issues, will allow us to support this growth in a way that aligns with the natural capital approach in the SEP.

Supporting such inclusive growth, connecting people with jobs, raising awareness of the range of opportunities that will be created in the transport sector with the planned investment and enhancing their skills to access these opportunities, is a core part of the SCR's economic plans. Commuting data shows that the SCR struggles to attract workers from outside the area, making the local skills base even more crucial to business and economic success and ensuring inclusive growth.

There is a need to engage and inform the future workforce, ensuring young people and those who advise them, plus adults who may be interested in a career change, have access to an impartial system which provides up-to-date and engaging information about future work opportunities (in STEM and non-STEM related sectors) and the pathways to employment.

Delivering the interventions included within this Plan will move us towards the achievement of the aspirational journey times set out in the Mayor's Vision for Transport and the standards being developed for TfN's MRN.

Investment in the SCR's road network will be supported by the planned investment in public transport and active travel infrastructure through our Transforming Cities Fund programme, giving people across the SCR have a real choice to use the road network as part of their everyday travel requirements, resulting in improved air quality and health.

By 2026 there will be up to half a million extra journeys on our road and rail network every day. There is a need for a clear joined up local and national plan for our roads that focus on the roads that we have rather than building new ones, recognising the climate emergency that has been declared

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