

Integrated Infrastructure Plan



Contents

Foreword	1
Executive Summary	3
1 Background	16
2 Defining Key Infrastructure Priorities	31
3 Delivering Key Infrastructure Priorities	77
4 Indicative Order of Magnitude Costs	97
5 Funding Options	99
6 A Successful Legacy	103
7 Annexes	104

Foreword



**Cllr Sir Steve
Houghton
CBE**

Chair of Sheffield City
Region
Combined Authority



Sir Nigel Knowles

Chair of Sheffield City
Region
Local Enterprise
Partnership

Sheffield City Region (SCR) has forged itself as one of the most successful Northern Economies in England with strong leadership, governance and investment programmes to support the City Region's growth.

Through strong partnership working between the public and private sector, the SCR has created over 4,000 jobs and 2,500 apprenticeships, upskilling 1,700 people and unlocking more than £200m of private sector investment since 2012. The City Region recognises the potential and opportunity to achieve much more by building on its current achievements.

We are, therefore, confident and committed to a bright future for the City Region. The SCR must continue to deliver an ambitious programme of integrated infrastructure investment to achieve the significant level of sustainable growth outlined in its Strategic Economic Plan which defines our ambition to increase economic output by £3.2bn, create 70,000 net additional jobs, 6,000 net new businesses and at least 70,000 new homes by 2025.

This Integrated Infrastructure Plan (IIP) is about creating the conditions for growth, to stimulate thriving markets and attractive investment propositions. To ensure this we have determined existing SCR infrastructure capacity, anticipated future demand and identified opportunities to support future economic growth.

The SCR already has particular comparative advantages, which provide market distinctiveness and create the right infrastructure conditions for business to flourish. These include our strategic, domestic and international transport connections, availability of affordable housing and commercial premises, and our telecommunications offer which includes pioneering ultrafast broadband at Enterprise Zones. Our current infrastructure investment plan is delivering £650m investment to 2020, creating transport capacity, revitalising our urban centres and supporting employment land development.

Coupled with our track record in innovation and infrastructure delivery, this Plan will facilitate a strong, productive and highly competitive economy, alongside our skills programme and support tools for business growth. It provides a platform to enhance the attractiveness of SCR as a place to live, work and visit.

Our investment will build on our existing market strengths and strong offer to provide SCR with an enhanced and efficient transport network, strong digital connectivity, defence against flooding, a sustainable cost effective energy supply, quality new homes and readily available commercial space. The Plan also complements the SCR Local Plans, which form key land use plans for SCR Local Authorities, setting site allocations and strategic policies.

We have successfully secured funding from Government in recent years which has afforded us greater control and powers. This provides us with the clarity and certainty we need to plan our future infrastructure provision, to attract investment and bring together public, private and institutional investment to enable infrastructure investments and growth.

At the heart of this Plan is the legacy of a true partnership approach which SCR has cemented during the development of this Plan with key public and private sector partners and stakeholders. Our mission is to continue this legacy into the delivery of integrated packages of investment to place the SCR at the heart of

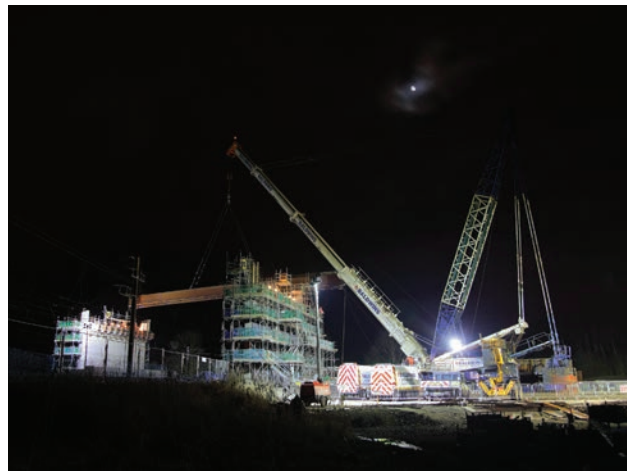
England's Northern Economy, and extend the SCR's national and global reach.

At a time when Government is focused heavily on The Northern Powerhouse, Transport for The North and the National Infrastructure Commission, recognition of the role that infrastructure plays in underpinning growth has never been greater.

The SCR is proud to be at the forefront of plans and investments to drive this agenda forward. As one of only five core City Region areas within the Northern Powerhouse we stand strategically, geographically and organisationally ready to deliver.



Chesterfield Waterside Development Proposals



Great Yorkshire Way, Doncaster



Factory 2050, Rotherham

Executive Summary

Context

The Sheffield City Region (SCR) Strategic Economic Plan (SEP) sets an ambitious target to increase GVA within the City Region by £3.1bn by 2025. Achieving this ambition will strengthen SCR's contribution to the national economy and its role within the Northern Powerhouse. To secure these outcomes we will deliver enhanced infrastructure, supporting an attractive environment for businesses and residents.

Infrastructure is key to unlocking and driving economic growth, fundamentally enabling our businesses to produce and increase productivity. The National Infrastructure Plan (2014) outlines that for every £1 spent on infrastructure construction £2.84 is generated in returns to the UK's economy. Infrastructure connects business to markets, supply chains and the labour force and connects people to jobs, training and leisure opportunities, physically and digitally. Infrastructure is a necessity of a connected and productive economic ecosystem. The Sheffield City Region Integrated Infrastructure Plan (SCR IIP) clearly articulates and evidences the diverse opportunities that our infrastructure investment will realise and sets out spatial requirements, linked to supporting the economic priority areas identified in the SEP. It provides a strategic context that will inform the commissioning of the future infrastructure pipeline.

This Plan sets out the SCR approach to infrastructure over the next decade. Our objectives are clear:

- To develop and deliver a comprehensive, integrated infrastructure network that attracts inward investment to the SCR.
- To maximise the benefit that SCR receives from transformational national projects such as Transport for the North, the National Infrastructure Commission and High Speed Rail.
- To focus on the priorities that create the best opportunities for economic growth, jobs and homes, creating attractive environments for businesses and residents.

The SCR IIP sets the strategic context upon which the future infrastructure pipeline will be developed. Whilst this document highlights the potential principles of prioritisation, it does not prioritise the infrastructure requirements. This will happen through the subsequent commissioning process.

Private and public sector scheme promoters will be invited to submit proposals based on alignment to the SCR IIP, though it should be noted that SCR IIP should be considered the funding route of last resort. Other funding

avenues should be explored including the established channels for each infrastructure type.

It should be noted that the LEP Priorities workshops of June and August 2016 identified a number of strategic spatial priorities:

- Growth of the Advanced Manufacturing Innovation District;
- Provide growth and enhance the role of Doncaster Sheffield Airport and the surrounding area;
- Maximise the benefits of HS2 in the Sheffield City Region;
- Stimulate growth and regeneration in Town and City Centres.

The SCR IIP will remain flexible to future LEP priorities.

Key Findings

The majority of growth in SCR is expected in **Growth Areas** and **Urban Centres**. We need infrastructure to support these areas.

Infrastructure investment opportunities have been identified totalling a possible **£28 billion**.

SCR has a number of key infrastructure strengths:

Capacity to grow: Our modelling indicates that SCR has quality land to achieve its growth ambition. This land is also comparatively affordable and in readily accessible locations.

Locational advantage: SCR is strategically located with North-South, East-West and global connectivity. Although quality and frequency of connections needs to be improved, SCR has significant potential, which is a comparative advantage, particularly in sectors like logistics.

Great place to live: Strong natural assets and a good cultural offer which will contribute to attracting and retaining talent in SCR, including the Peak District National Park.

A strong communications offer: Following the roll out of its broadband projects, SCR will have 99% superfast broadband coverage by 2017. Whilst seeking to plug any gaps, SCR should also seek to maximise this connectivity advantage.

The SCR IIP also identifies areas where SCR can capture new opportunities:

Accelerate housing delivery: Support growth through the delivery of appropriate housing including alongside new employment development within identified growth areas.

Enhance site viability: Provide enabling infrastructure to accelerate development where this supports delivery and viability.

Promote SCR as an international gateway: Strengthen the role of Doncaster Sheffield Airport and connections to it as well as supporting the cluster and agglomeration benefits from specialist aviation sectors.

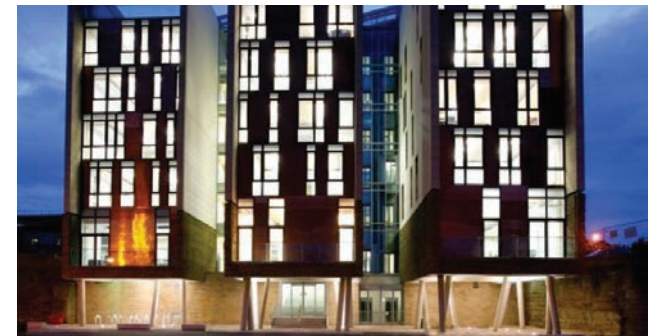
Improve connectivity to key regions: Align with, influence and invest to gain maximum benefit from major national connectivity programmes.

Develop a comprehensive mass transit network: Deliver a step-change transport offer that links SCR growth areas, urban centres and proposed HS2 hub in Sheffield City Centre, and promotes the use of sustainable modes.

Further develop and implement an energy strategy: Position SCR as a leader in low carbon, resilient energy. Develop an energy strategy for viable, resilient, clean energy.



Grey to Green, Sheffield



Digital Media Centre, Barnsley



Doncaster Sheffield Airport

The SCR IIP presents Spatial Packages for our Growth Areas setting out a package of desirable infrastructure outcomes to support the economic ambition. Example summaries are provided below:

Sheffield City Centre: Key challenges of congestion on arterial routes. Need to plug broadband gaps and tackle fluvial flooding risk. Infrastructure is required to support the Sheffield Retail Quarter. A waste capacity shortfall has also been identified in the City Centre. Maximising the benefits of the HS2 station by providing connectivity to the wider region will form a major investment proposition.

Advanced Manufacturing Innovation District: Provide high quality connections to address accessibility challenges in the area. Tackle delays on A630, A633, A57, A6178 and at M1 J34. Bring forward opportunities for energy generation and tackle flood risk along the Don Valley corridor. Connections into this area are an essential component of the HS2 connectivity package.

Airport Corridor: Capitalise on the opportunity presented by the airport by providing rail connectivity. Overcome a number of transport capacity constraints including Doncaster railway station. Provision of large industrial buildings is key to support the growth of aviation and engineering businesses. There is potential to enhance the role of the Airport through the provision of new infrastructure i.e. freight connections.

A61 Corridor & Chesterfield: Address transport capacity issues on the A61, A619 and A617. Provide infrastructure to support 'The Avenue' and 'Staveley Works' developments. Tackle flood risk that affects the railway station and 1,000 – 2,000 properties in the Chesterfield area.

Dearne Valley – Junction 36: Enhance the role of freight logistics in this key growth area. Provide connections through the Dearne Valley to the proposed Trans Pennine tunnel. Address the resilience risk that fluvial flooding poses to achieving strategic access to the M1.

DN7: Significant opportunity for growth in the low carbon sector through infrastructure provision (Carbon Capture). Flood defences required and transport connectivity enhancements (including rail station improvements and a link road) to support the major 'Unity' development.

Markham Vale: Building on the SCR Investment Fund (SCRIF) ¹ investment in enabling infrastructure, the Markham Vale area requires further investment to support viability of the former Coalite site.

The SCR IIP needs to be complemented by work in other 'ecosystem components' such as skills, business growth and improving places.

¹ SCR's principal fund for the delivery of capital infrastructure (including transport and housing) is SCRIF. This was secured through the Growth Deal and brings together public and private sector investment.

Places

Sheffield City Region has a population of 1.8m and a GVA of £30 billion. It is made up of a number of important places that perform differently but have complementary roles and all contribute to our overall economic and social offer. Our strongest potential for growth is in sectors that build on SCR's legacy of skills and intersect to form a distinctive, market-led and internationally competitive offer in the high productivity areas of advanced manufacturing/engineering/materials, healthcare technologies and creative & digital, supported by the higher education and logistics sectors. Bringing these sectors together, SCR sees its comparative advantage in its cross cutting ability to design, develop and distribute. In addition, SCR prioritises low carbon alongside financial, professional and business services.

The SCR is a cohesive economic area made up of nine local authority areas (Barnsley, Bassetlaw, Bolsover, Chesterfield, Derbyshire Dales, Doncaster, North East Derbyshire, Rotherham and Sheffield) and governed by the SCR Combined Authority (CA). The CA allows the SCR to speak with a single, consistent voice to the public, central government and national agencies to maximise investment.

In 2013, SCR commissioned an Independent Economic Review² of its economic performance during the last economic growth cycle as well as setting out some of the economic drivers and initiatives which could drive economic growth over the next twenty years.

The Independent Economic Review helped SCR to shape distinct 'Growth Areas', into which we will target sector specific growth (for instance exploiting the advanced manufacturing potential of the Lower Don Valley, and the logistics potential of Doncaster and the Dearne Valley). We also do not underestimate the growth potential of our urban centres, which are also considered as 'Growth Areas'.

The Growth Areas and Urban Centres form a key focus of the SCR IIP. The SCR IIP will evolve over time and therefore will account for the emergence of new important economic areas that may have not been previously considered as growth zones.

We recognise that different places in SCR perform different roles. A study by the Northern Way³ identified the SCR as being 'weakly mono-centric.' Sheffield is the core city and main driver of City Region growth, with Doncaster also playing an important role. The surrounding towns of Barnsley, Chesterfield and Rotherham make important contributions to the SCR economy. Recognising and building on the sectoral strengths of the SCR places, the Independent Economic Review included a recommendation to strengthen the role of the core city.

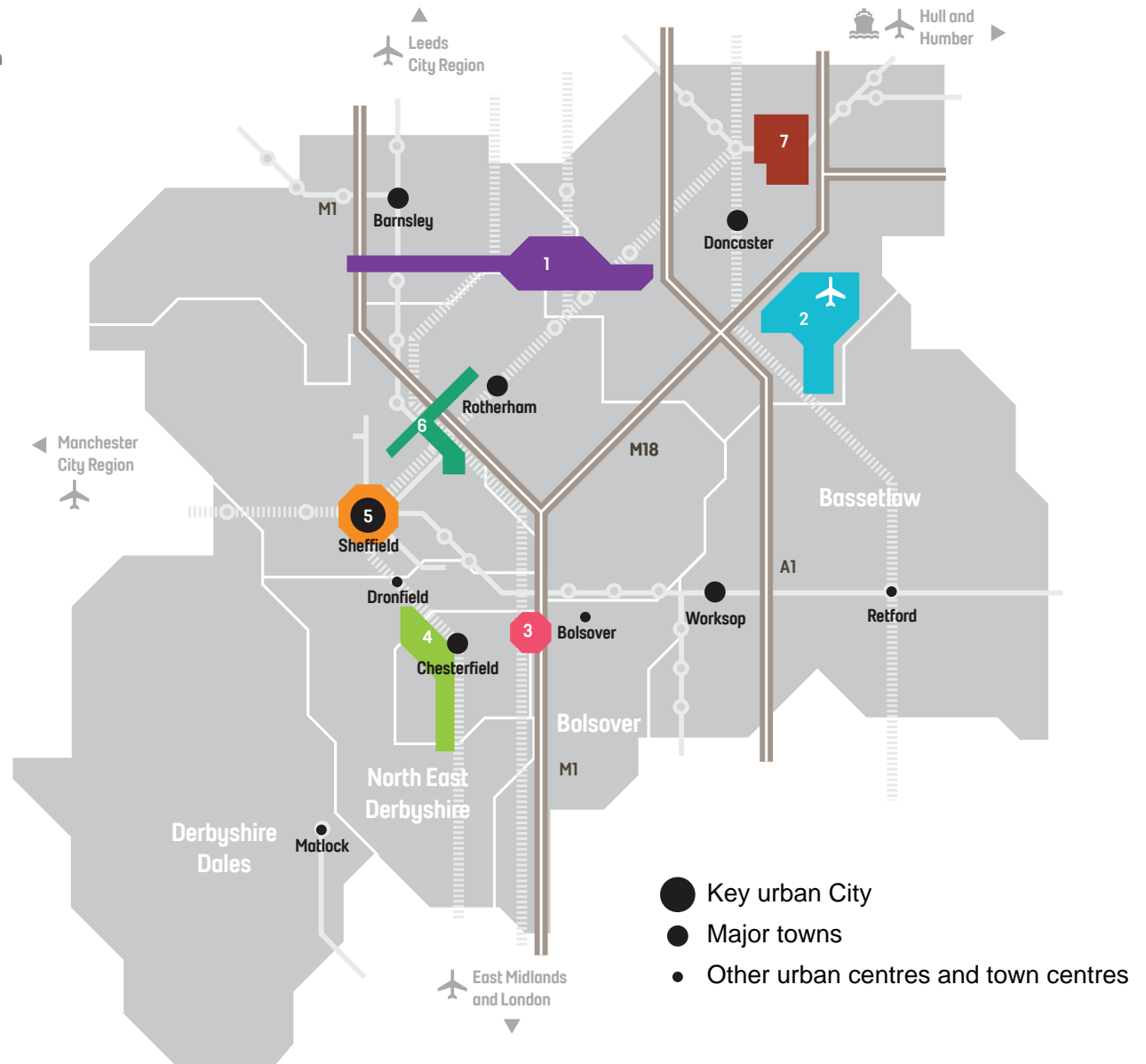
Sheffield is one of five core cities in the Northern Powerhouse, and strong intra-connections to the SCR and links to the wider Northern Powerhouse will be vital for the Sheffield City Region as a whole. SCR forms a key part of the Northern Powerhouse, a strong, cohesive economic area made up of Northern City Regions which already generates around £290 billion per year in economic output. Government has set out its objective to harness the potential of the North and through investment, particularly in connectivity, deliver an additional £44 billion to the North by rebalancing the UK economy.

² Independent Economic Review (SCR/Ekosgen, 2013)

³ Northern Way Report (The Northern Way, 2009)

Figure 1 The SEP focuses growth within seven Growth Areas along with existing Urban Centres. The Growth Areas are:

- 1 Dearne Valley and Junction 36
- 2 Doncaster Sheffield Airport corridor
- 3 Markham Vale
- 4 A61 Corridor
- 5 Sheffield City Centre
- 6 Advanced Manufacturing Innovation District
- 7 DN7 Initiative



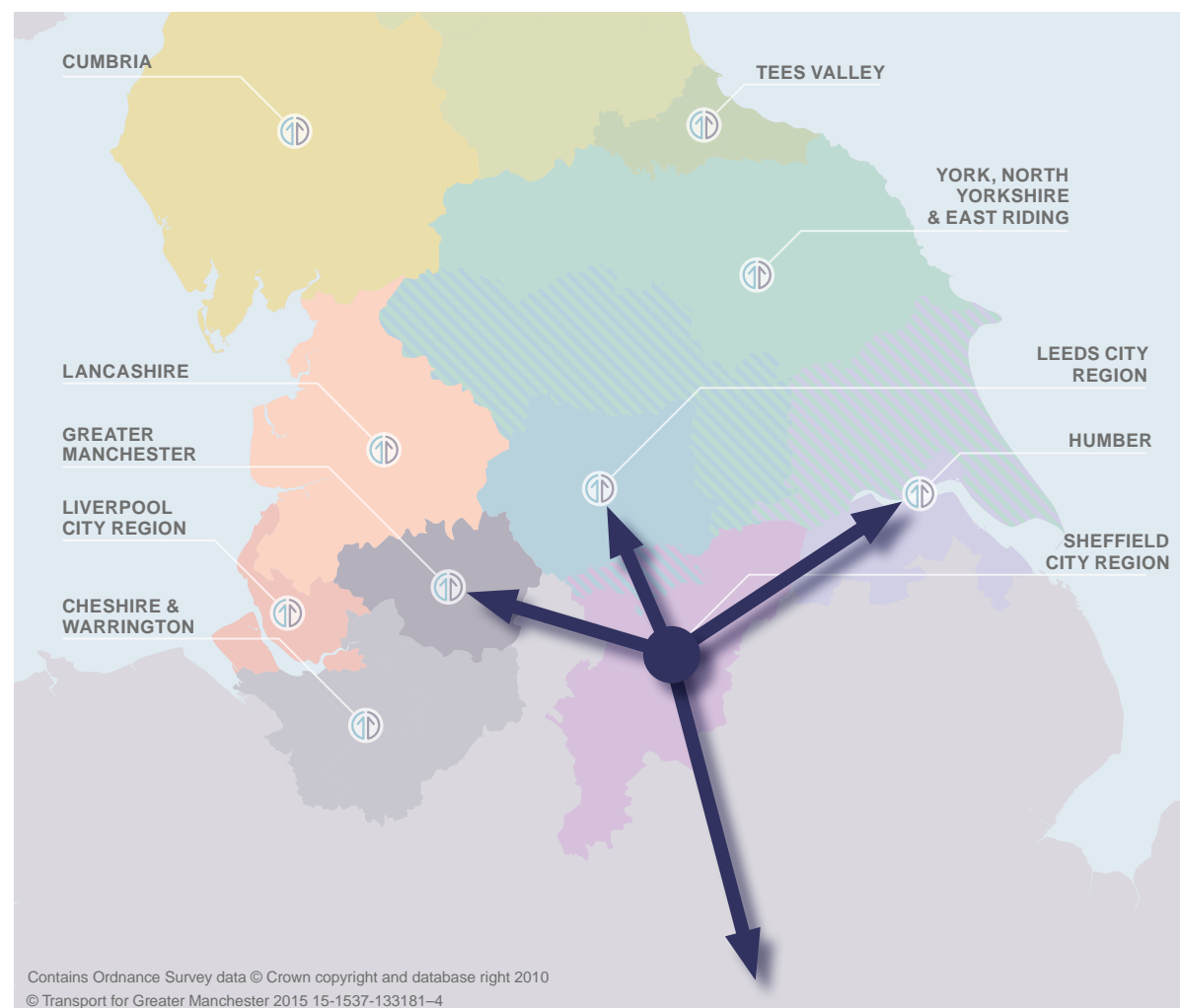


Figure 2 Inter-connectivity: SCR's Pan Northern and Wider Transport Connections

SCR IIP Objectives

This Plan was developed through extensive collaboration with the public and private sector, and guided by the SCR governance process.

The key audience for the Plan is as follows:

- Local Authority and private sector scheme promoters
- Central Government
- Key infrastructure stakeholders

The SCR recognises that infrastructure is key to its success and is already investing through SCRIF. The SCRIF, valued at over £650m, has the potential to support 24,000 jobs, to help unlock the land to deliver 13,000 homes and to generate £5bn in GVA.

Though important, the current SCRIF programme is only a part of our infrastructure journey. We know that further infrastructure investment is required to achieve our ambition and this needs to form part of a clear long term strategy with sequenced incremental priorities.

This Plan sets out a framework for commissioning the next phase of investment in the City Region's infrastructure. It identifies the capacity of existing SCR infrastructure networks and the investment required to deliver the anticipated growth in jobs and housing.

Integrated spatial packages of interventions are proposed to unlock the full potential of our key Growth Areas and Urban Centres.

SCR has taken an integrated approach to commissioning and delivering infrastructure. This means that the Plan:

- Focuses on multiple infrastructure types to enable a comprehensive understanding of SCR infrastructure challenges and opportunities.
- Proposes a single commissioning approach, linked to integrated funding sources that will drive delivery of schemes to maximise benefits to SCR.
- Sets out key infrastructure challenges by priority area, allowing for the development of integrated spatial infrastructure packages.
- Is integrated with wider cross-cutting issues including skills.

- Maximises the benefit of wider national agendas such as Transport for the North and the National Infrastructure Commission.

- Articulates the need to develop the SCR's wider Northern, national and international links.

The Plan focuses mainly on 'economic infrastructure' albeit the Plan is cognisant of wider social infrastructure needs. The scope of our infrastructure types are as follows:

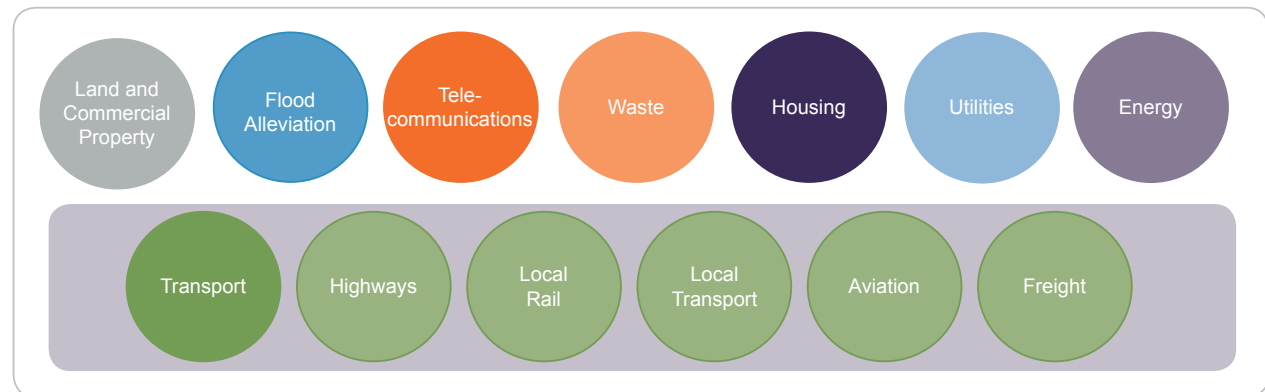


Figure 3 Economic Infrastructure Types

The Economic Ecosystem

Infrastructure forms an essential part of the SCR economic ecosystem and is the focus of this Plan. It should be noted that infrastructure is only part of the ecosystem. If SCR is to maximise its economic potential, we need to complement our infrastructure offer with investment in wider themes. This, however, will be the focus of separate documents. Figure 4 represents how infrastructure aligns with the wider ecosystem of skills, place and business growth.

Skills: ⁴ It is essential that SCR has the right skills and labour force to support existing and future businesses. SCR will also need sufficient labour in order to deliver on the planned investment in SCR. Nationally ⁵, across all sectors there is increasing competition for resources. This is already manifesting itself in skills shortages, driving increased costs and affordability pressures⁶. Locally, evidence from the current infrastructure programme (SCRIF) suggests rising costs and minor labour shortages in higher skilled roles.

4. More information can be found in the report at (Annex D) 'Analysis of the SCR Labour Market's capability to deliver the SCR infrastructure investment ambition' (SCR, 2016)

5. National Infrastructure Plan for Skills Report (UK Gov't, 2015)

6. Ibid

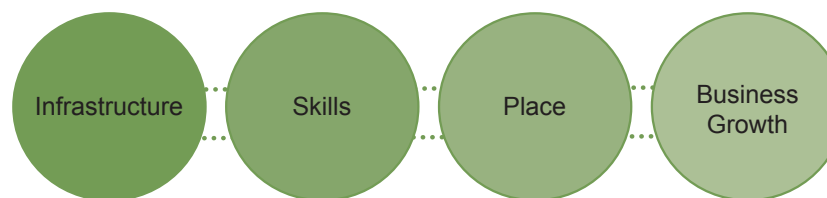


Figure 4 Economic Ecosystem

The City Region would benefit from developing an infrastructure pipeline analysis - this would take into consideration aggregated projected demand across conventional construction, housing and infrastructure.

Place: SCR's success is closely linked to its quality of life and sense of place. Our infrastructure must complement the SCR place offer, ensuring that our spaces are attractive, accessible and appealing. This Plan includes a narrative on the different places in the SCR and their relative roles in Section 1.9.

Business Growth: Infrastructure development, business growth, inward investment, export promotion and innovation are closely aligned. In parallel to the SCR IIP, SCR will invest in supporting existing and potential businesses to grow. We expect all infrastructure proposals to directly benefit businesses by making the

City Region a more attractive and productive place to do business. Our plans to stimulate coordinated delivery of housing and economic growth and create vibrant Urban Centres will make the SCR not only an attractive place to work, but also to live.

Innovation is at the heart of high performing economies. Universities and businesses are central to the innovation agenda and need connectivity to flourish and drive agglomeration. It is essential that the Sheffield City Region enables the creation of physical assets to support innovation; including through development of the Advanced Manufacturing Innovation District, creation of technology parks and sites that attract firms that can support greater specialisation. Such assets should be linked to an attractive, complementary residential offer to ensure high accessibility and create vibrant, productive environments.

A Strong Evidence Base

This Plan is supported by a comprehensive evidence base. This is set out in supporting detailed **Annexes**, including:

Annex A - SCR IIP Forecast, Land Use, Transport and Economy (FLUTE) Model

Report: The FLUTE model was used to test land and transport capacity to deliver the economic ambition, a key part of our evidence base.

Annex B - Evidence Review and Analysis:

A comprehensive collation of the infrastructure evidence available, including analysis by infrastructure type and consideration of international, national, regional and local plans and strategies.

Annex C - Analysis of Challenges & Opportunities for Growth: An articulation of the key challenges and opportunities by infrastructure type and spatial area.

Annex D - Analysis of the SCR labour market's capability to deliver the SCR Infrastructure ambition:

An analysis of the skills within the SCR and national labour market to understand the skills landscape and identify our skills capacity to deliver a comprehensive infrastructure programme.

Annex E - Funding Options Report: An analysis of the potential options for funding new infrastructure, developed in partnership with SCR Finance leads.

Annex F - Infrastructure Costs

Benchmarking: A high level cost benchmarking exercise which quantifies the potential level of investment required based on the outcomes set out in the SCR IIP.



National College for High Speed Rail, Doncaster



Peak Resort, Chesterfield

Defining and Delivering Priorities

We present priorities for SCR's capital investment in two **central pillars**:

- **Spatial Packages** – We have reviewed the integrated investment needs in our targeted growth locations which includes seven Growth Areas plus the key Urban Centres across SCR.
- **Network Plans** – Issues that affect whole networks and are likely to support growth in multiple locations, and include intra and inter connectivity issues. Network plans are likely to have the largest agglomeration benefits and to support the function of the whole economic geography; for example, a 21st Century Mass Transit Network:



Figure 5 Network Concept for an SCR Mass Transit Network

To inform our central pillars, we first undertook a **spatial capacity analysis** of the SCR looking at capacity, land use and transport. Secondly we took an assessment of our broader **infrastructure gap**.

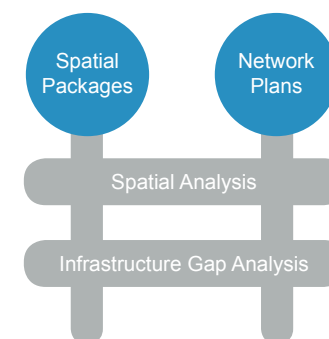


Figure 6 Pillars of the SCR IIP

The **Commissioning Approach** has been developed to create an up-front mechanism to ensure proposals are brought forward in a coordinated manner and consider integrating individual schemes as part of an overall investment. For the commissioning approach to be successful, it is essential that proposals are fairly and transparently evaluated to both ensure best value for money, but also to recognise and value the proposals which can make a demonstrable difference towards achieving the SEP objectives.

The emphasis of this Integrated Infrastructure Plan is on the agglomeration benefits that can be achieved by investing across the infrastructure spectrum in Growth Areas and investing in projects that will deliver demonstrable change and deliver the SCR's economic objectives.

The Commissioning Approach will not be a mechanism for evaluating and funding individual schemes. Instead it will evaluate integrated packages of infrastructure interventions, defined through a framework approach.

Through these frameworks infrastructure will be delivered which can create conditions for growth and support Growth Areas, Urban Centres, and the SCR's housing sites and strategic transport network. **It is deliberately not prescriptive, allowing promoters the freedom to identify other opportunities in addition to those contained in this Plan that will support the SCR's economic growth.**

Applications for funding will be invited, and should be coordinated and led by a Lead Promoter, supported by key stakeholders working together collaboratively to bring forward integrated packages of infrastructure interventions. This is to ensure that all potential interventions are captured and all partners coordinated.

The process builds on the existing SCR Assurance and Accountability Framework, with the commissioning stage providing the entry point to the programme. The purpose of this approach is to provide a framework from which an increasingly integrated approach can be taken. The first stage of this approach is to develop a package of schemes which together can overcome identified challenges

and maximise benefits. The system remains flexible to deal with individual schemes, but the selection criteria will favour more integrated packages of investment.

The key stages of the commissioning approach will be as follows:

Stage	Promoter Action
i) Expression of Interest (EOI)	Complete EOI Template
ii) Initial Sifting	Present package to Board
iii) Prioritisation & Programme Entry (Testing Tool)	Complete Project Mandate Testing Tool data input template
iv) Business Case Development	
a. Outline Business Case	Complete OBC Template
b. Full Business Case	Complete FBC Template
c. Funding Agreement	Complete Funding Agreement
v) Delivery	Complete Claim Returns
vi) Outcomes Evaluation & Monitoring	Undertake Evaluation

Building on Strong Foundations

Sheffield City Region has strong connections that form the foundations of a productive and diverse economy and we plan to exploit these opportunities through investment.

The City Region offers a good strategic location at the heart of the UK's motorway and rail network and benefits from its own international airport. The SCR plays a key role within the Northern Powerhouse and this is reflected in wider national connectivity proposals (including High Speed Rail and Transport for the North).

SCR has already been successful in attracting funding for and delivering transformational infrastructure investment linked to economic opportunity, with key examples including the improvements at White Rose Way and Great Yorkshire Way in Doncaster delivering £100m investment in strategic infrastructure linked to growth at the airport and 'iPort' logistics hub as well unlocking 1,200 homes.

The innovative Sheffield – Rotherham tram train trial, the first of its kind in the UK, will provide essential new public transport links between Sheffield and Rotherham and has attracted £58m investment.

Following the formal Rail North – Department for Transport partnership in 2015, Sheffield City Region has more influence over train service specifications on the Northern and TransPennine franchises.

Current Precedents and Future Drivers

Globally, there are a number of recognised key drivers and identified trends which influence infrastructure needs and shape methods of infrastructure delivery both now and in the future. These will impact SCR as well, and responding to them now will ensure that the infrastructure provided as a result of this Plan is resilient and responds to the needs of future generations.

Such trends include a growing and ageing population that is leading to smaller household sizes, a desire for 'inner city' living that provides ready access to employment, services and amenities, and a demand for improved alternatives to car travel. The trend toward urban living presents the opportunity to use infrastructure more effectively and reap the agglomeration and smart specialisation benefits that densification can present. Land use policies must respond to this.

Energy affordability, security of supply and climate change challenges must be addressed through decarbonisation of our energy supply, and this will ultimately occur at a local level. Green infrastructure, meanwhile, can offer a multitude of benefits, from reduced flood risk to improved air quality and encouraging more people to walk and cycle.

Innovative, disruptive technologies such as mobile internet and the Internet of Things are changing how we use and interact with infrastructure systems. There is scope to use technology to make better use of what we have now.

Devolved Power and Funding

Since 2014, SCR has entered into two Devolution Agreements with Government, the first unlocking funding to support infrastructure delivery and resulting in an infrastructure investment programme of £650m.

In October 2015 the SCR Devolution Heads of Terms Agreement set out the next steps in transfer of resources and powers to the City Region and will support further infrastructure delivery. It includes control of an additional £1bn Fund, increased powers over planning, a Housing Investment Fund, and greater powers over transport. This agreement puts SCR in a strong position to deliver on the ambitions set out in this Plan.

Our benchmarking cost analysis suggests that the full package of infrastructure outcomes identified could cost in excess of £28 billion.

Although the funding secured through devolution will make a significant contribution toward delivering this Plan, the SCR is looking beyond this and considering a range of additional financial and funding options that could support the delivery of infrastructure across SCR. These are set out in Annex E - Funding Options Report. Options are based on traditional and more innovative approaches, and informed by examples from elsewhere in the UK.

Legacy

At the heart of our Plan is the legacy created as part of our joint drafting and Commissioning Approach. We have worked collaboratively and collegiately across a range of public and private stakeholders and partners, including utilities, operators, investors, political leaders, planning, transport and economy experts who have all contributed a breadth of experience.

We will continue to achieve a successful legacy for the SCR by:

- **Achieving Infrastructure Delivery:** Apply the Commissioning Approach to deliver a step change in infrastructure provision across SCR.

- **Maintaining and Strengthening Stakeholder Relationships:** Build on the relationships and connections generated through this Plan to establish working groups and collaboratively deliver strategic infrastructure packages.
- **Communicate the Plan Content and Progress:** Develop a plan to communicate progress in delivering this Plan at regular milestones, including through Infrastructure Summits and events to attract investment from both the UK and overseas.
- **Ensure the Longevity of the Infrastructure Delivery Group:** Broaden the remit and terms of reference of this group to not only guide infrastructure planning, but to include stakeholders who can support infrastructure delivery.

- **Regularly Review this Plan:** Refresh the Plan at regular intervals to take account of external factors and influences, and progress made in its delivery.
- **Align with the wider economic ecosystem:** Review and iterate this Plan to respond to those of the other work streams focused on delivering economic growth across SCR.
- **Achieve Closer Spatial Integration:** Over time, work together to more closely align land use planning with infrastructure investment, to achieve greater efficiencies and adapt to emerging trends and drivers.

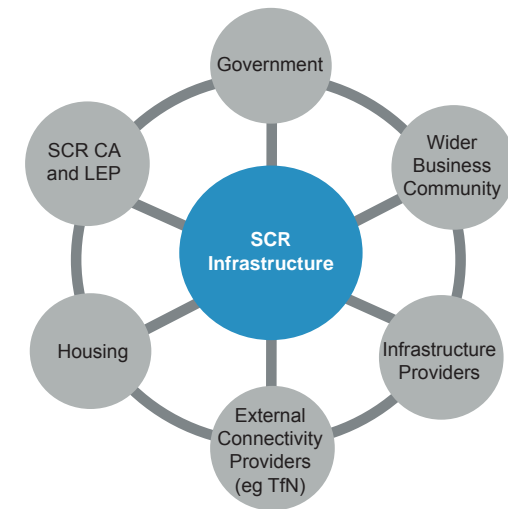


Figure 7
Partnership Legacy

1 Background

1.1 Approach to Delivering the SCR Integrated Infrastructure Plan

The SCR IIP has been developed by key public and private sector partners and stakeholders. This Plan provides a framework for commissioning future investment in the City Region's infrastructure. It identifies the existing infrastructure capacity, anticipated future demand and opportunities to support economic growth through investment. Aligned with the parallel SEP themes of skills development and business growth, it is designed to allow the SCR to create stronger markets. To drive inward investment and enable growth and development, this Plan proposes integrated spatial packages of infrastructure interventions that span across multiple sectors, to be delivered by stakeholders working in partnership.

A five step process has been taken to reach the final reporting stage of the SCR IIP which is as follows:

Stage 1 – Evidence Review and Analysis

This report identifies the projected infrastructure demand across SCR, the capacity of the existing infrastructure system across the sectors, followed by analysis of the impact of future demand resulting from forecast economic growth. See Annex B - Evidence Review and Analysis.

Stage 2 – Analysis of Challenges and Opportunities to Growth

Drawing on the conclusions from Stage 1 (existing and planned infrastructure projects and current delivery gaps), this report highlights where future infrastructure deficits are likely to arise based on planned levels of growth within

the SEP. See Annex C - Analysis of Challenges & Opportunities for Growth.

Stage 3 – Identify Infrastructure Requirements to accommodate growth

Two workshops were held with key public and private sector organisations across the SCR to present findings of the Evidence Review and Analysis of Challenges and Opportunities for Growth as well as gather feedback from key partners.

Stage 4 – Review of Funding Sources

This report identifies and discusses different funding sources and mechanisms that could be employed for the purpose of paying the construction and operating costs of infrastructure assets. See Annex E - Funding Options Report.

Stage 5 – Production of SCR Integrated Infrastructure Plan

The Plan sets out the following:

- The SCR IIP: Spatial packages & network analysis.
- The Commissioning Framework: sets out a top down approach to scheme prioritisation and delivery.

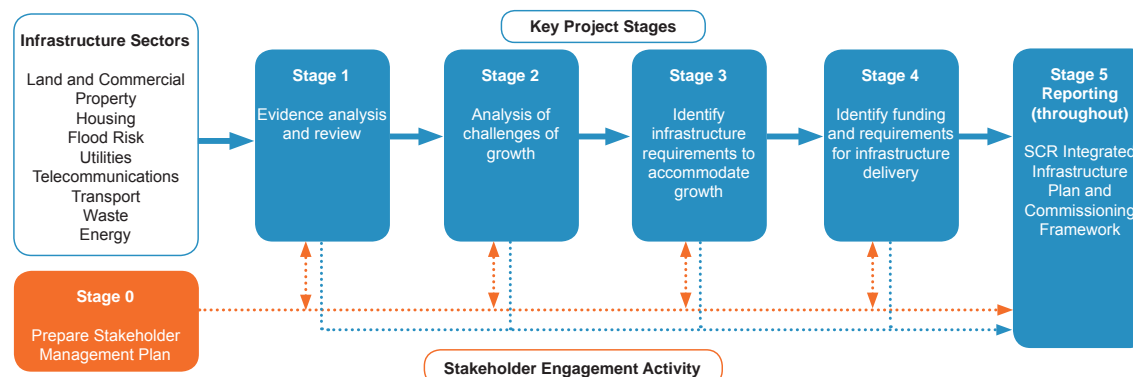


Figure 8 Five Step Process

1.2 Relationship to the Strategic Economic Plan Ambition

The Sheffield City Region (SCR) Strategic Economic Plan (SEP) sets an ambitious target; to increase Gross Value Added (GVA)⁷ within the City Region by £3.1bn by 2025. This increase in GVA will be achieved through improved productivity, the creation of 70,000 net additional jobs, 6,000 net new businesses and construction of between 70,000 and 100,000 new homes. The aim is to achieve a strong and sustainable economy in the City Region, creating opportunities and prosperity for its communities. In doing so, it will strengthen SCR's contribution to the national economy and will support actions to address the current economic deficit in the UK.

To create the conditions for achieving this growth, investment will be required in strategic infrastructure to unlock development sites, defend against flooding, ensure international connectivity for both passengers and freight, ensure digital connectivity, avoid congestion on the transport network, facilitate sustainable management of our waste and provide low carbon energy. Together these investments aim to deliver a more productive and resilient economy.

⁷ GVA is the total sum of goods and services produced within an area.

1.3 Economic Infrastructure

The Plan focuses on the following economic infrastructure types to enable an in-depth understanding of future SCR infrastructure challenges and opportunities:

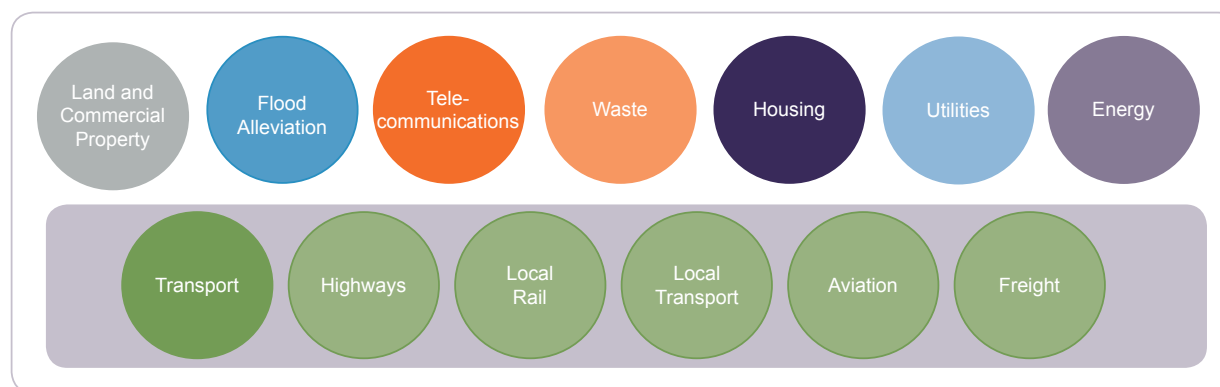
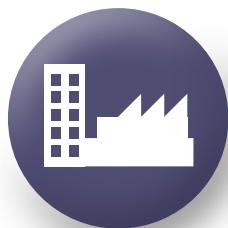
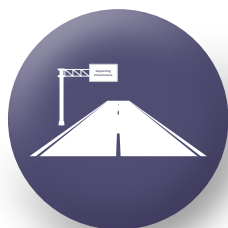


Figure 9 Economic Infrastructure Types



Land & Commercial Property infrastructure includes sites which contribute to the strategic growth objectives of the SEP, are located in priority Growth Areas or Urban Centres, or strategic allocations identified in Local Plans. Investment is key to supporting business in retaining staff, expanding or for attracting new business.



Transport infrastructure includes the primary road network, inter-regional and regional rail services, the tram network, high frequency bus services ('key bus routes'), Doncaster Sheffield Airport, Doncaster Rail Port (iPort), and any transport infrastructure necessary to facilitate delivery of strategic sites. Improved transport connectivity creates economic advantages and agglomeration.



Flood Alleviation infrastructure includes systems of flood defence assets which provide a standard of protection against river and/or tidal flooding.⁸ Defending against flooding is key to promoting continued investor confidence and restoring or unlocking development land for growth.

⁸ A minimum 1:75 years to land within Growth Areas or Urban Centres, or to more than 100 dwellings.

20,586 jobs

Potential of the SCR Enterprise Zone to 2025⁹

£5 bn

The additional GVA that could be added through schemes identified in the SCRIF.

£939 million

Economic benefit of Environment Agency's 6-year investment programme.¹⁰

⁹ DTZ – Accelerating Growth through Enterprise Zones, January 2016

¹⁰ Programme of Flood and Coastal Erosion Risk Management Investment Programme (2015 - 2021) (UK Gov't & Environment Agency, 2015)



Utilities infrastructure includes assets and/or network capacity which facilitates the primary transmission and main distribution of gas, electricity and water¹¹. Strategic water assets include those used for supply and waste water disposal. A stable, readily available electricity supply is critical to enabling development.



Telecommunications and Digital Connectivity infrastructure includes cable, telephone or internet connections. As well as increasing business productivity and competitiveness, faster broadband is increasingly a key determinant for where people wish to live.



Waste infrastructure includes management facilities processing around 250,000 tonnes of waste per year or more and other large facilities, such as 'energy from waste' and landfill. These technologies offer the opportunity to generate revenue from both waste processing and sale of energy.



Energy infrastructure includes assets and/or processes which facilitate the generation, capture and use of energy (including energy efficiency measures) and control the fuel options and resulting emissions, including carbon dioxide and other greenhouse gases. Energy investment can lower the cost of doing business.

¹¹ For gas this includes higher pressure pipelines and for electricity includes networks of 33kV and above.

1,800MVA

Peak electricity demand of SCR homes and businesses.

£270 million

Projected return on the Superfast South Yorkshire programme investment.¹²

60 MWth

The heat added to the District Heating Network by the Sheffield Recovery Facility.

£147m

Potential additional SCR GVA per annum from investment in low carbon energy generation, in addition up to 3,000 jobs.

¹² <http://www.superfastsouthyorkshire.co.uk/sfsy/where>

1.4 Governance

The diagram below sets out the governance process by which decisions on SCR IIP development were made.

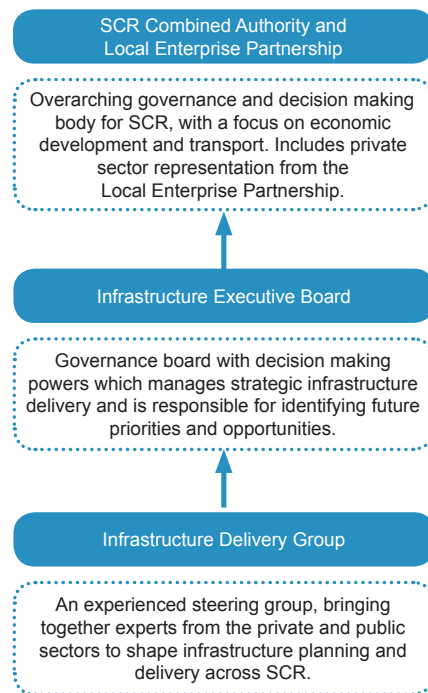


Figure 10 Plan Governance Process

Governance and collaboration is at the heart of our Plan, and our commissioning approach embodies this ethos to ensure a legacy of integrated infrastructure delivery.

1.5 An Integrated Approach to Infrastructure

An integrated approach to infrastructure investment is the only way in which growth and increased productivity can be truly enabled. This means a Plan that:

- Focuses on multiple infrastructure types to enable a comprehensive understanding of SCR infrastructure challenges and opportunities.
- Proposes a single commissioning approach, linked to integrated funding sources that will drive delivery of schemes to maximise benefits to SCR.
- Sets out key infrastructure challenges by priority area, allowing for the development of integrated spatial infrastructure packages.
- Is underpinned by SEP growth ambitions and spatial evidence (FLUTE).
- Is integral with wider cross-cutting issues including skills.
- Aligns with and seeks to maximise the benefit of wider national agendas such as Transport for the North, HS2, and the Northern Powerhouse.
- Aligns with and support delivery of Local Plans and strategies.

Integrated Approach to Infrastructure Investment

Through a programme-led approach to this investment, an infrastructure framework will be created where packages of investment will be required, bringing together multiple stakeholders and sectors to achieve a common objective. Integrated infrastructure also means measuring the benefits of different infrastructure packages in a cohesive way to understand potential for cross-over and linkages, and translating this approach into delivery on the ground. Through this smarter, integrated approach SCR can make faster progress at a lower cost, gaining a competitive edge and driving real change in our economy.

Integration with Wider Economic Ecosystem

To fulfil our economic potential, we need to take a wider and more integrated approach to infrastructure investment. This includes alignment with skills, business growth, and pan-northern and national agendas such as Transport for the North.

Concurrent investment in the wider economic ecosystem is critical to take advantage of the opportunities that infrastructure investment can unlock. Whether this be better access to jobs and training, better international connectivity, stable energy prices that encourage business to invest or development ready sites that allow companies to expand and locate in SCR. Equally, this integrated approach to investment will allow our infrastructure to be delivered through local workers and businesses.



Figure 11 Economic Ecosystem

The following paragraphs set out the SCR ambition to integrate with the wider economic ecosystem and a snapshot of the activity taking place within the City Region regarding skills and business growth.

Skills

To achieve the SEP ambition, SCR will be reliant on its ability to attract and retain the best employees. Those who drive economic growth through high value jobs and entrepreneurial zeal have increasing choice to work across multiple sectors, anywhere in the UK or overseas. It is critical that SCR is well-placed to capture these employees.

One way of capturing such employees is our approach to skills investment and ability to take advantage of national programmes such as High Speed Rail. The City Region recognises that investment in skills is required particularly in light of University fees increasing and ensuring that young people continue to have the opportunity to study.

Apprenticeship delivery is one key route that SCR is taking to address this issue. Government continues to support Apprenticeships across England with a commitment to create three

million Apprenticeships by 2020 which will be enshrined in law. The following programmes specify what the SCR is doing to support employment and business growth opportunities locally.

Skills Made Easy Programme

Under the Skills Made Easy (SME) programme, SCR aims to help small and medium sized companies across the City Region to get the high quality training of the type they need, in the place they need it and at the time that they need it. One of the key aims of the programme is to provide an additional 4,000 Apprenticeships between January 2013 and July 2016. It is anticipated the final figure will be between 2,875 and 3,375. The other main output is creating 2,000 opportunities (training interventions) for companies to upskill their existing employees, of which 1,000 will be funded by the programme. The total number of people assisted with skills to the end of November 2015 was 1,319.

National College for High Speed Rail

In the near future, Doncaster will be home to the National College for High Speed Rail which will train thousands of new engineers needed to deliver billions of pounds' worth of rail contracts

over the coming decades including the new High Speed 2 rail line¹³. This excellent Lakeside location will offer easy access to employers and will be located nearby to rail industry giants such as DB Schenker and Hitachi. This is a great opportunity for SCR to maximise on the benefits the College will bring including the ability to retain the skills generated.

Place

The employment and business growth opportunities that SCR can offer go some way to attracting and retaining talent. However, there also needs to be a wider differentiator, something more intangible, which hinges on the place that SCR is perceived to be. This means infrastructure which bolsters a strong identity, creates an appealing brand and supports a good quality of life through high quality housing stock, suitably located to support employment and growth opportunities, provide access to good schools, hospitals, parks, sporting and cultural venues, and foster a sense of community. Natural capital and social infrastructure should be further considered by SCR Partners to ensure these elements of competitive place-making are also integrated into future proposals, as part of a long-term approach to planning that is sufficiently expansive in scope.

¹³ <http://www.doncaster.gov.uk/services/business-investment/national-college-for-high-speed-rail>

A scaled approach will be important to articulate a sense of place and the quality of life SCR can offer. Some overarching approaches will provide the identity that SCR seeks to define at a national level. These should be combined with more localised approaches, and it will be down to scheme promoters to define and deliver these, be it particularly high profile and innovative projects, or creating a sense of place for key Growth Areas and strengthening the role of our Urban Centres.

Business Growth

Sheffield City Region has an ambitious plan to deliver the best business led Growth Hub in the country and improve the business support landscape so that every growing business in the SCR gets the support it needs to thrive¹⁴.

The RISE programme is an SCR business growth project focus on supporting SME's by helping them to access graduate talent as a way to upskill the workforce. Since its launch in April 2013, a number of outcomes have been delivered such as:

- Attracting over 3,000 graduate applications.
- Over £1m private sector salary match.
- 70% conversion rates to permanent employment (based on the first 100).

¹⁴ <http://sheffieldcityregion.org.uk/growth-hub/>

Although the programme ended in December 2015, SCR plans to invest approximately £150,000 over the next three years to fund RISE and continue to build on its current success.

Integrating with Pan-Northern & National Agendas

This Plan is being developed at a time when Government has pledged a commitment to rebalance the UK economy, close productivity gaps with the South East and London and establish the North as an economic powerhouse. Research shows that the Northern Powerhouse would deliver an additional £56.6 billion GVA per year to the UK economy by 2040¹⁵.

Whilst the Northern Powerhouse is an emerging proposition, it is underpinned by proposals for significant improvements to the transport network to integrate towns and cities across the North, allowing them to function as a single economy. Recognising the potential of this integration, strong inter-regional governance has emerged across the pan-Northern authorities, LEPs and City Regions.

This has culminated in the creation of a new pan-northern transport body – Transport for the North (TfN).

¹⁵ The Northern Transport Strategy: Spring 2016 Report (Transport for the North, 2016)

In its report ¹⁶ TfN outlines how both strategic changes to rail (Northern Powerhouse Rail), highways, freight and logistics and airport connectivity, in tandem with local connectivity enhancements, can support the delivery of a truly smart and integrated transport network for the North capable of driving major economic change.

Being responsive to external connectivity changes also means strong integration with the national high speed rail programme (High Speed 2) which includes a new station in SCR. In radically reducing journey times between SCR and London, HS2 has the potential to bring major economic opportunities associated with labour and consumer market expansion, supply-chain efficiencies and economic spin-offs arising out of the capital's high value and fast-growth industries.

This Plan sits within the context of a nationally prioritised agenda for improved infrastructure and connectivity, shaped by the National Infrastructure Plan along with key programmes such as High Speed 2, the Northern Powerhouse initiative and strategic proposals by Transport for the North.

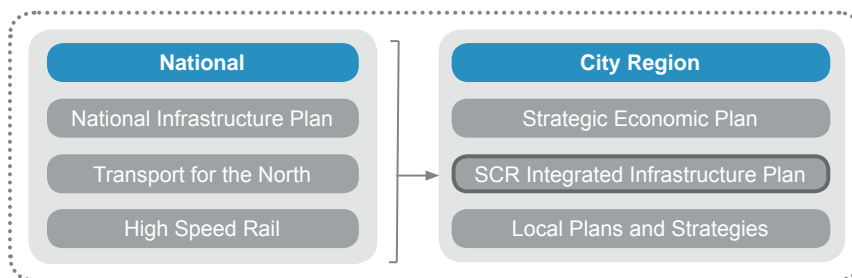


Figure 12 Relationship of National and SCR Plans & Programmes

¹⁶ One Agenda, One Economy, One North (Transport for the North, 2015)



Figure 13 Located at the heart of the country and part of the Northern Powerhouse, SCR comprises nine local authorities and has an ambitious 10-year plan for economic growth.

1.6 Plan Horizon

The infrastructure interventions proposed by this Plan are intended to create the conditions within which the economic growth targeted by the SEP can occur:

- The time horizon for the delivery of infrastructure interventions that will be commissioned through this Plan will go beyond 2025.
- FLUTE model projections apply up to 2025.
- The SEP targets will be delivered over 10 years between 2015 and 2025.

Review Points

To maintain the currency of this Plan, annual review points are proposed to respond to the following:

- Evaluation of the success of the current SCR Infrastructure Fund (SCRIF) programme.
- Evolving Local Plans and the proposed SCR Spatial Framework (refer to 2015 SCR Devolution Agreement)¹⁷.
- Stakeholder investment programmes.
- Clarity on Northern Powerhouse Rail and TransPennine tunnel.

- Develop detail of SCR HS2 station infrastructure and connectivity requirements
- Parallel Devolution Deal investment plan.

Stakeholder Investment Programmes

As well as investment by SCR Partners and scheme promoters over the next decade and beyond, other stakeholders have parallel programmes. These should be aligned with this Plan to meet the infrastructure demand of SCR in the most efficient and effective way, and respond to the projected spatial distribution of growth in employment and housing (set out in Section 2).

While this is a non-statutory Plan, this should not inhibit integration of investment programmes and where possible the sharing of resources and investment. The 2015 SCR Devolution Agreement proposes the creation of a Spatial Framework, offering scope for future iterations of this Plan to have a statutory status.

Longer Term Initiatives & Drivers

Beyond 2025, there are key pan-Northern and national investments including Transport for the North schemes (e.g. Northern Powerhouse Rail), and High Speed 2. Their scale means that planning for them has already begun.

To maximise the benefits that these projects can bring to SCR, our interaction with them

should be defined in advance, with particular focus on the regeneration benefits that new and improved transport hubs can bring, and the connectivity enhancements that can drive increased productivity and opportunities for SCR businesses and residents. There is opportunity to deliver early infrastructure investment through this Plan which serves a dual purpose, for instance targeting redevelopment around future station locations, and investing in transport improvements which not only offer improved connectivity to stations, but come with the dual benefit of enhancing wider connectivity across SCR.

There are other national challenges that also will impact on the City Region, e.g. increased risk of flooding through climate change. Whilst legislative milestone dates are some way off, we must be cognisant of these in the investments we make now, in order to achieve these goals and ensure a sustainable future for the next generations.

Future Planning

Large scale infrastructure delivery takes time to plan and implement, and the benefits are not always immediate. This is why this Plan is taking a long term approach to infrastructure planning across SCR whilst supporting the delivery of the SEP targets up to 2025.

¹⁷ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/466616/Sheffield_devolution_deal_October_2015_with_signatures.pdf

1.7 Building on Strong Foundations

The SCR Combined Authority was created in 2014, with the aim of coordinating and rationalising decision making at SCR level, putting in place the governance arrangements that will allow the City Region to deliver on its Growth Plan commitments, and attract further investment in the future through greater devolution of powers and funding.

In June 2014 the SCR secured £320m in funding from Government to invest in infrastructure, skills and business support to achieve the economic growth to which it aspires. This funding has been used to leverage private sector, Local Authority and other third party contributions, having a multiplying effect and yielding an overall infrastructure investment programme valued at approximately £650m. It is coordinated through the SCR Infrastructure Fund, with schemes prioritised through the Single Assessment Framework to ensure that funding is allocated to the projects that do the most to support economic growth and employment.

Subsequent additional funding and powers were secured through a second £30m growth deal in January 2015. This was followed in October 2015 by a third SCR Devolution Deal which sets out the next steps in transfer of resources and powers to the City Region and will support further infrastructure delivery. It includes:

- Control of an additional £30 million per year for 30 years to boost growth.
- The power to create a spatial framework to coordinate and manage planning across SCR, along with the ability to create Mayoral Development Corporations and Supplementary Planning Documents.
- Scope to speed up housing delivery through creation of a Housing Investment Fund.
- Greater powers over transport including control of a consolidated local transport budget, the ability to franchise bus services, deliver integrated smart ticketing and maintain and manage the key stretches of SCR's road network.

This Plan builds on current activity, continuing the proven approach to commissioning of infrastructure schemes, and ensuring there is a pipeline of infrastructure investment opportunities that will enable economic growth across SCR. It brings a greater level of integration and area-wide focus to the commissioning process, which combined with greater certainty and control of funding will avoid delay to future infrastructure delivery.



Above: Lifting in new bridge beams above the East Coast Main Line as part of the Great Yorkshire Way scheme. This £56m project was funded through the SCRIF programme with support from the private sector and Local Authority resources. The new link to the M18 motorway achieves multiple objectives through an integrated solution; improving connectivity to Doncaster Sheffield Airport, enabling access to housing and commercial employment sites, and unlocking the logistics hub at Doncaster iPort. Image courtesy of Doncaster Metropolitan Borough Council.

1.8 Current Precedents and Future Drivers

Globally, there are a number of recognised key drivers and identified trends which influence infrastructure needs and shape methods of infrastructure delivery both now and in the future. Some of these drivers and trends are outlined below.

Changing Demographics

The UK is facing two critical demographic challenges.

The global population is ageing, and in the UK alone the population aged over 65 is expected to increase by 12% (1.1 million) by 2020. This will drive the demand for smaller household size, and improved mobility i.e. access to services and public transport. At the opposite end of the demographic spectrum sits the 'Millennial Generation' whose infrastructure needs are driven by a focus on technology, a desire for 'inner city' living and reduced car ownership. While in 1995, some 43% of 17- to 20-year-olds held a full driving licence that has fallen to just 31%.¹⁸

These changes have implications for mobility, in particular requirements to improve access to employment opportunities and skills training, with suitable solutions evidently not being confined to improving ease of car travel.

Agglomeration and Urban Densification

There is a global trend towards people choosing to live in cities, with 54% of the world's population now living in urban areas; a figure which is expected to increase to 66% by 2050¹⁹. In England and Wales 55% of the total population currently reside in cities.

By increasing the density of our Urban Centres, particularly within the SCR core city, reintroducing streets, squares and landscape coupled with introduction of a substantial quantum of new housing within, above and adjacent to the retail and commercial core, planners and developers can tackle the housing crisis whilst also bringing about the resurgence of the high street.²⁰ All this can be built on the back of existing rail, road, power and communication infrastructure, utilising existing under-developed and brownfield land.

In addition to land use policies which support densification, there is a need for 'smarter' and better integrated infrastructure solutions which respond to these challenges and improve resilience and offer efficiencies through innovation.

Energy Security and Decarbonisation

In the face of growing populations and increasing levels of resource consumption there is pressure on nations and authorities to improve their energy security, whilst also considering carbon reduction and stabilising the cost of energy for their citizens. In other words, addressing the energy trilemma.

The dependency on gas as part of the UK energy mix, including for heating our homes and offices, means we will rely on fossil fuels for some time yet. However, there remains opportunity to move to a lower carbon energy base including a mix of renewables, nuclear, biomass, and carbon capture and storage as an interim measure. In developing energy infrastructure, linking with other infrastructure types to gain efficiencies has proved successful, e.g. obtaining energy from waste.

Whilst this is a global challenge, the solutions can often be local. There is an opportunity to offer greater security and stability over energy supply for local homes and businesses, as well as developing a skill base that can support developing countries in addressing their decarbonisation challenges in the future.

¹⁸ The cost of driving is keeping young people off the road (The Guardian, 2014) <http://www.theguardian.com/money/blog/2014/sep/16/cost-driving-young-people-off-road>

¹⁹ World Urbanisation Prospectus (United Nations, 2014)

²⁰ A2 Cities (Arup, 2014)

Disruptive Technologies

The iPhone was only introduced in 2007, and look how quickly smart phones have changed lifestyles since. A disruptive technology, it would have been hard to foresee the rapid societal change it heralded, and how reliant upon them we have become. Presenting opportunities for increased productivity and improved service delivery, mobile internet is projected to yield between \$3.7trillion and \$10.8 trillion of global economic benefit by 2025.²¹

As part of the Internet of Things, it offers advantages in terms of improved mobility, better control of energy usage in our homes and businesses, and improved sensing and control of a whole range of factors, from the performance of infrastructure systems, to that of our own bodies. The design of new infrastructure platforms needs to respond to this, with scope to retrofit smart technology to existing infrastructure, rather than building new.

Other technologies, such as 3D printing, autonomous vehicles and advanced robotics pose both an opportunity and threat. There are obvious advantages in terms of productivity and advanced manufacturing, but a risk of declining employment among sectors such as

manufacturing, logistics and business support. We must adapt to this, and move to a higher value and knowledge based economy.

Valuing Green Infrastructure

Global research shows that green infrastructure can deliver significant social, economic and environmental benefits. It engenders a better quality of life, improves our resilience to climate change, and fosters more convenient and sustainable forms of mobility such as cycling and walking.

An improvement project (2014) for wildlife and flooding at Kilnhurst Ings ²² along the River Don (Rotherham) aims to create an attractive space that holds water during flooding, support a range of important wildlife and enhance the recreational experience for local residents. By taking in the floodplains of Sheffield and Rotherham, flooding will be reduced in Urban Centres by encouraging wetland habitats. Green infrastructure is also being introduced elsewhere in the country.

In London, the installation of a green wall at Edgware Road underground station has been shown to supply warming benefits to the building.

The wall also acts as a physical filter for pollution when the fine particles (known as PM10s) are trapped on the surface of leaves.²³

In the future, the value of green infrastructure is likely to see it considered alongside ‘traditional’ infrastructure sectors such as energy, transport, water and waste. As an example of this, the London Infrastructure Plan 2050 includes a section dedicated to green infrastructure. Opportunities should be sought for integration of green infrastructure as part of wider interventions.

Infrastructure Lifecycle & Asset Management

With a ‘typical’ lifecycle of around 120 years, infrastructure is inherently a long-term investment. The UK has a legacy of ageing infrastructure assets, and there is a need to understand the condition of these, preventatively maintain them, and upgrade them where necessary.

The resilience of our infrastructure systems, and their vulnerability to changing environments, has been visibly exposed in recent years. In 2007, a near breach of the Ulley Reservoir

²¹ Disruptive technologies: Advances that will transform life, business, and the global economy (McKinsey, 2013)

²² This project was led by the Sheffield and Rotherham Wildlife Trust with funding from the WREN's Biodiversity Action Fund and the Environment Agency

²³ Cities Alive – Rethinking Green Infrastructure (Arup, 2014)

dam threatened infrastructure assets including the M1 motorway, electricity substations and gas supply for Sheffield, whilst landslips have impacted the Sheffield to Cleethorpes Line and Midland Mainline over the past three years.

When considering future infrastructure schemes it is important to consider what is there now, how it can be better utilised, and how it can be designed it to be resilient and adaptable in the future. A good example of this is the Grey to Green project currently underway in Sheffield, which is seeing spare road capacity reclaimed for retrofit of green infrastructure including sustainable drainage infrastructure, supporting regeneration of the city centre and reducing flood risk.

It will also be important to consider the whole life cost and benefit of the planned infrastructure, with better value often being derived from an increased up-front capital investment that reduces the future revenue burden. More expenditure on looking after existing assets, rather than building new, will be a crucial factor.

Smart Specialisation

In an increasingly competitive global economy, economic regions must focus on their inherent strengths in order to boost innovation and achieve economic growth and prosperity.

Whilst previous investment has been widely spread across countries and geographies (particularly the EU), there is a growing acknowledgement that this is not as effective as it could be, becoming too diluted to deliver the benefits that were intended.

Instead, the aim is to concentrate investment in particular areas on a sector specific basis, e.g. digital, low carbon, bio-tech, etc. In aligning this approach with the concept of clustering, an increase in knowledge spill-overs among businesses and innovators is encouraged, and thus the generation of a collective pool of knowledge that results in higher productivity, more innovation and an increase in the competitiveness of firms.²⁴

Infrastructure can play a key role in supporting this clustering, whether it be bringing organisations closer in time through transport investment, permitting sharing of knowledge and ideas through ultrafast broadband connections, or bringing organisations physically closer by unlocking development and supporting densification.

The challenge for SCR is to identify the implications of these drivers and trends for the City Region and to frame its infrastructure response accordingly when developing and designing infrastructure interventions – whether it be new infrastructure, managing our existing assets, or developing technology platforms to maximise what we already have (e.g. Smart Mobility). Where planned for SCR, these interventions should build on best practice examples from elsewhere.

The SCR is making a number of advances in smart specialisation, for example, the Advanced Manufacturing Research Centre (AMRC) has established a cluster of industry -focused manufacturing R&D centres and supporting facilities. This collaboration is between the University of Sheffield and aerospace giant Boeing which works alongside companies to identify, research and resolve advanced manufacturing problems for aerospace and other high value manufacturing sectors.²⁵

²⁴ Innovation-driven Growth in Regions: The Role of Smart Specialisation (OECD, 2013)

²⁵ <https://ec.europa.eu/programmes/horizon2020/en/news/smart-specialisation-building-europes-strengths>

1.9 Role of Places in Sheffield City Region

Sheffield City Region is made up of a number of important places that perform different but complementary roles and all contribute to our overall economic and social offer. A study by the Northern Way identified the SCR as being 'weakly monocentric.' Sheffield is the core city and main driver of City Region growth, although Doncaster and Chesterfield are also important sources of economic growth within the city region. Recognising and building on the sectoral strengths of the SCR places, the Independent Economic Review included a recommendation to strengthen the role of the core city. The role of places in SCR is summarised briefly below:

1.9.1 Urban Areas

Sheffield: The 4th largest city in England, Sheffield is the economic engine room that drives growth across SCR and is where over a third of future jobs growth is forecast to occur. The city, and in particular the city centre, is a major centre of creative and digital industries, financial and professional service sectors and advanced engineering with a wide variety of culture and retail facilities.

Barnsley: A 21st Century Market Town focusing on improving skills with strong economic links to both SCR and the Leeds City Region.

Barnsley has a growing economy; creating an M1 economic corridor, thriving town centre and outstanding cultural heritage.

Bolsover: A rural area with the need and ability to accommodate significant economic growth in key settlements taking advantage of access to the M1 to create sustainable communities.

Chesterfield: An employment centre with a high-quality urban core and opportunities for further potential growth along the A61 and in the Staveley area.

Doncaster: A high-quality urban centre, with attractive retail opportunities, excellent rail links and strategically located to support its strong role in logistics and freight. Also benefits from Doncaster Sheffield Airport which provides an important international gateway.

Retford: Benefits from access to the national railway network and strong economic links to Nottingham, Lincoln and Newark.

Rotherham: Developing strengths in new economic sectors, as part of SCR's wider regeneration agenda. Home of the globally competitive Advanced Manufacturing Park.

Worksop: A town developing a diverse economic base, with a number of key visitor attractions such as Clumber Park and Sherwood Forest.

1.9.2 Growth Areas

Dearne Valley: A key employment area that is located within three SCR Local Authorities and forms part of the SCR Enterprise Zone. The area has undergone recent major transformation, providing jobs - particularly in logistics and distribution through key employers such as ASOS and Aldi.

Doncaster Sheffield Airport (DSA): Provides an international gateway and attracts aero related employment and training. DSA is recognised as a catalyst for business development, inward investment and job creation with regard to logistics, engineering and associated aviation activities. The area includes an Enterprise Zone site and the iPort, a major strategic rail freight hub and employment site.

Markham Vale: An area recently developed in collaboration with the D2N2 LEP and a key component of SCR's Enterprise Zone – establishing it as a major employment hub.

A61 Corridor: The A61 links a number of major mixed-use development sites with significant regeneration and job creating potential.

Sheffield City Centre: SCR's core city and the largest hub for Knowledge, Creative and Digital Industries, Leisure, Higher Education, Culture and Financial and Professional

Services sectors. A key growth area where a significant proportion of new growth is forecast, strengthening the role of the city centre as the economic engine of SCR.

Advanced Manufacturing Innovation District (AMID): Global centre of excellence in metals and materials manufacturing, processing and research with the Sheffield Business Park (SBP) and Advanced Manufacturing Park (AMP) forming one combined campus at its nucleus. The AMID has attracted leading anchor companies including Rolls-Royce and Boeing as well as developing indigenous businesses with world-class capabilities. SCR aim to take this success to another level and establish Europe's largest research led advanced manufacturing cluster, complemented by a vibrant leisure and retail offer.

DN7: This mixed-use growth corridor will include a cluster of green businesses (including research and development opportunities) and hi-tech companies with new direct access to ports and the motorway network. Using low carbon technologies, it will contribute to UK power needs and become one of the most advanced energy parks in the SCR with impact across the wider northern economy.

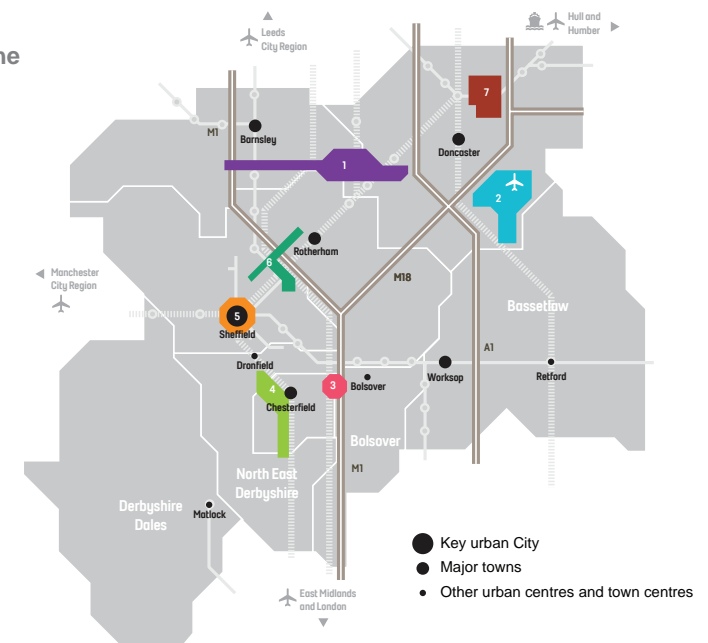
1.9.3 Rural Assets

North East Derbyshire: Rural area with the population concentrated in four towns, with the A61 forming a key area for growth.

Derbyshire Dales: An employment location with thriving small businesses, especially in manufacturing and the Peak District National Park (an important tourist attraction within the SCR).

Figure 14: The SEP focuses growth within seven Growth Areas along with existing Urban Centres. The Growth Areas are:

- 1 Dearne Valley and Junction 36
- 2 Doncaster Sheffield Airport corridor
- 3 Markham Vale
- 4 A61 Corridor,
- 5 Sheffield City Centre
- 6 Advanced Manufacturing Innovation District
- 7 DN7 Initiative



2 Defining Key Infrastructure Priorities

2.1 Evidence Based Analysis

This Plan is underpinned by an evidence base including analysis of the existing capacity of infrastructure networks across SCR, the demand that forecast economic growth will place on these networks, and the resultant infrastructure deficit that will need to be addressed. In some cases, there are also specific opportunities that can be realised through integrated investment in infrastructure.

Based on this analysis, spatial packages have been developed for each SCR Growth Area and Urban Centre that present integrated packages of interventions that will support SCR in creating the conditions for economic growth (refer Section 2.4). Where particular interventions have been identified outside Growth Areas and Urban Centres, these are presented in a network format.

2.2 Modelling Headlines (FLUTE)

- FLUTE forecasts changes in land use and transport over time.
- SCR utilised FLUTE to support SCR Integrated Infrastructure Plan (SCR IIP) development. We have forecast change between the Strategic Economic Plan (SEP) timescales: 2014 – 2024.
- FLUTE takes a demand input and models that scenario based on land availability, site attractiveness/viability, and transport accessibility.
- SCR Local Authorities (LAs) provided input data on the land that is likely to be available for development within the SEP timescales.
- The SEP quantum of growth (70,000 jobs) was input to FLUTE. Ekosgen work, prepared with and agreed by Local Authorities, provided a sectoral and spatial breakdown of the 70,000 jobs as a starting point.

Spatial Modelling

Land use: David Simmonds and Aecom utilised FLUTE to assess the availability of land to support 70,000 new jobs and 70,000 – 100,000 new houses by 2024²⁶. FLUTE assigned uptake of new employment and housing land based on the availability, attractiveness, transport accessibility and viability of sites provided by SCR Local Authorities. The modelling suggests that SCR has sufficient suitable land to achieve its growth ambition, though intervention is necessary to increase its attractiveness and productivity. Growth is predominantly forecast in the SEP Growth Areas and Urban Centres. The FLUTE model is not a replacement or competing evidence to Local Plans.

Transport: The FLUTE modelling included an assessment of the transport impacts resulting from growth, including a catalogue of the 20 worst affected corridors in terms of increased delay. The modelling indicates that without intervention, growth in SCR would result in significantly more congestion, which would limit SCR attractiveness and productivity.

²⁶ FLUTE is not a spatial plan. The test allows us to consider how a pre-defined level of growth might disperse based on what we know about the Local Plans and the SCR transport network. FLUTE is not an assessment of objective need.

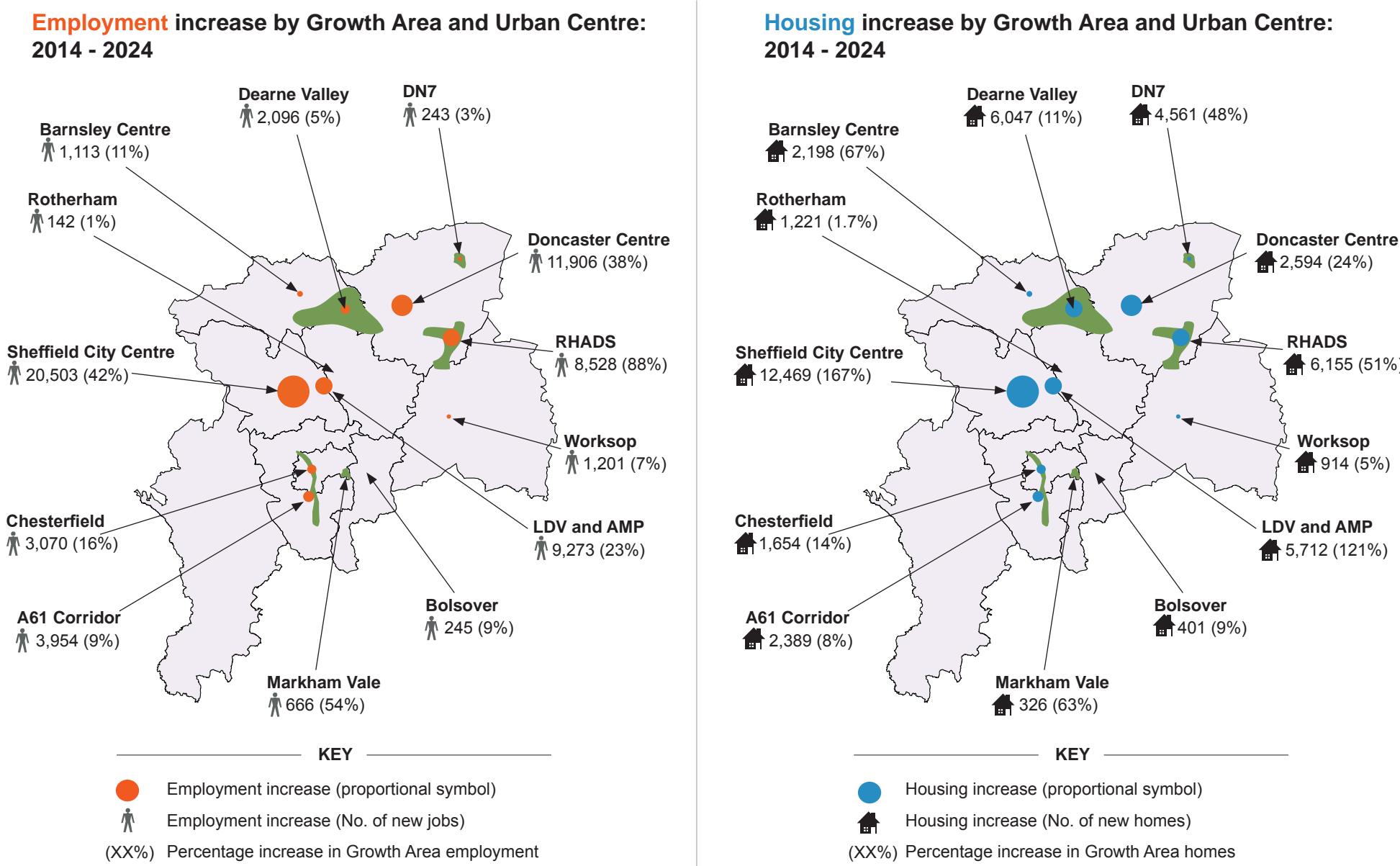


Figure 15 Forecast employment and housing increases by Growth Area and Urban Centre 2014-24

Local Authority Area	Employment		Homes	
	Change	%	Change	%
Sheffield	29,269	11	19,627	8
Rotherham	8,939	8	12,937	12
Doncaster	19,734	15	20,687	16
Barnsley	7,016	8	15,243	15
Chesterfield	6,604	13	3,525	7
N.E. Derbyshire	-1,440	-5	2,057	5
Bolsover	5,852	20	2,669	8
Bassetlaw	5,147	9	6,976	14
Derbyshire Dales	1,627	5	3,596	11
SCR Total	82,748	10	87,317	11

Table 1 FLUTE Growth by Local Authority Area
(2014 – 2024)

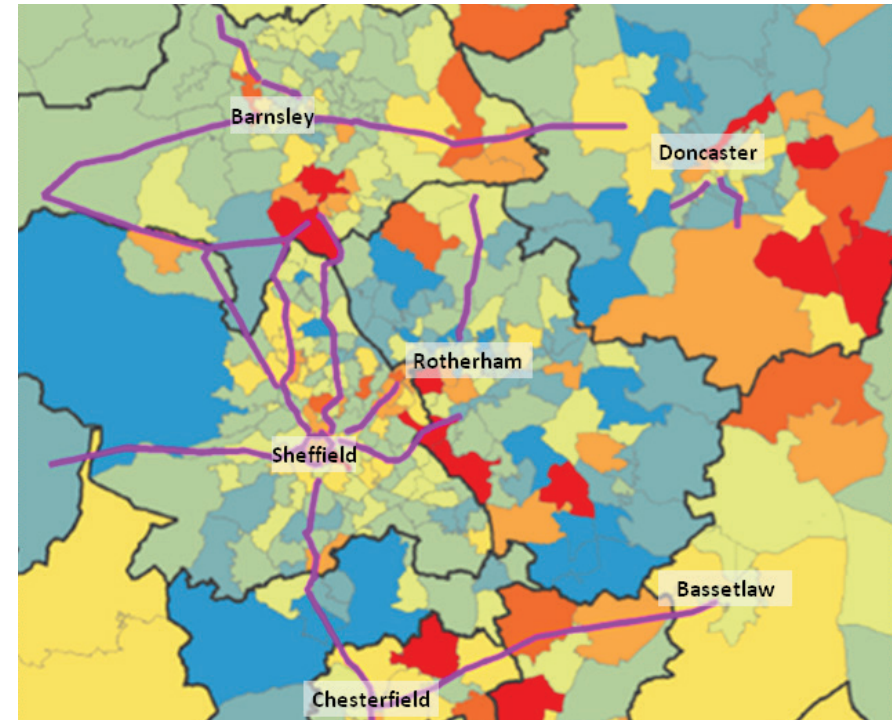
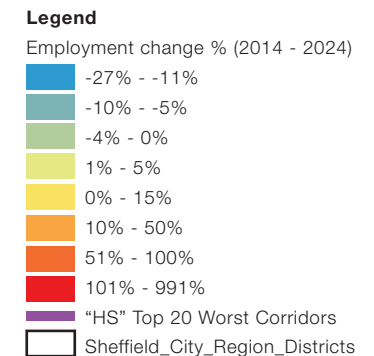


Figure 16 The 20 worst corridors of
congestion increase in SCR



2.3 Infrastructure Network Analysis

Land and Commercial Property: SCR has affordable and ample land and our ambition is to pursue a planned framework led approach to key our Growth Areas. As we have the land capacity to grow, the City Region will seek to ensure that land is more viable, productive, and attractive through the provision of enabling infrastructure. We also need to encourage the bringing forward of new commercial units to the market to address under-supply so that we are investor ready and have a healthy proportion of properties ready to be occupied. Alongside this, SCR has the opportunity to sell its strong cultural offer and this will help to attract and retain a skilled workforce.

Flood Alleviation: SCR will seek to secure flood defence funding to protect existing built form and brownfield sites from current and future flood risk. This funding could be secured through encouraging national investment in flood alleviation infrastructure alongside private and public investment at both a strategic and a more localised level. Better SCR flood alleviation programmes will also enable future development and business growth in future Growth Areas and Urban Centres. In order to achieve this, we need to support a less reactive approach to flood risk through land use planning.

Telecommunications: SCR is investing in its digital connectivity offer and South Yorkshire is pioneering ultrafast broadband at Enterprise Zones and strategic business parks. However, the take-up of superfast broadband currently falls below the national average and we must exceed this by setting ourselves a target of 60%. SCR will also seek to deliver ultrafast broadband to key commercial areas and integrate infrastructure with the Internet of Things.

Waste: Three authorities within the SCR have produced a Joint Waste Plan which provides a detailed planning strategy for waste management facilities over the next decade. SCR must build on these efforts and seek to achieve involvement and alignment with other authorities across the City Region. Emerging EU legislation on the circular economy means that SCR will seek to move up the waste hierarchy, pursue opportunities for exporting waste processing services and integrate with electricity and heat generation. Furthermore, the scope to increase energy recovery from waste both from the SCR and neighbouring LEP areas provides an opportunity to provide heat for homes and businesses- we will seek to maximise on these prospects.

Housing: SCR has a number of strong assets including the affordability and value of its housing stock coupled with an excellent cultural offer and access to the countryside. The Region is therefore in a unique position to capitalise on these capabilities. In order to achieve this ambition, SCR will seek to deliver a step change in the rate of house building and create a quality housing offer that supports inward investment and retains local talent.

Utilities: With planned intervention, SCR appears to have the electricity, gas and water network capacity to support future needs. SCR will seek to work closely with utility providers, however, to ensure the planned capacity sufficiently reflects SEP growth forecasts.

Transport: The SCR vision for a 21st Century mass transit network is to provide fast and frequent mass transit connections between our key places. This would be supported by smart ticketing and innovative urban mobility solutions. Our evidence suggests that without intervention, increased congestion resulting from growth could impede the economic potential of the City Region. SCR will seek to address this through the interventions set out in the spatial packages. To further complement this, we will work with external partners such as HS2, TfN and DSA to ensure that the City Region is well connected, not just locally but nationally and internationally.

Energy: SCR has an ambition to create and implement a Low Carbon Energy Strategy for the City Region, integrated with waste and utilities. In order to achieve this goal, SCR will seek to reduce its reliance on fossil fuels, boosting investor confidence by providing greater stability over energy costs. With approximately a 12,000 jobs target set within the low carbon sector, SCR will seek to invest in this area by considering ways to move towards a circular economy. By supporting national objectives on Climate Change, SCR can ultimately achieve greater security over our energy supply.

2.3.1 Land & Commercial Property

The SCR will seek to ensure that land is more viable, productive, and attractive through the provision of enabling infrastructure. We also need to encourage speculative build so that we are investor ready and have a healthy proportion of properties ready to be occupied. Alongside this, SCR has the opportunity to sell its strong cultural offer and this will help to attract and retain a skilled workforce.

Land and Commercial Property is a key driver of growth in the City Region. Put simply, if SCR has attractive sites available, then it is more likely to attract investment. An 'attractive site' needs to be connected in every sense to enable its productive use. Evidence indicates that more than three million sqm of commercial floorspace (B1, B2 and B8)²⁷ has been built in the City Region over the last 10 years (2004/05 – 2014/15). Delivery has been enhanced by the designation of the SCR Enterprise Zone which offers businesses and investors incentives at key sites. The Enterprise Zone is focussed upon advanced manufacturing and technology, and since its launch in 2012 has attracted 18 new companies to the Region.

²⁷ B1 Business: Offices, Research and Development of Products, Processes and Light Industry, B2 General Industrial: Industrial Process other than one falling within Class B11, B8 Storage and Distribution: This class includes open air storage.

The following presents the main land and commercial property challenges and opportunities to growth.

Land & Commercial Property Challenges

- The lack of up to date **strategic plans** or planning frameworks for many of the SCR Growth Areas.
- Site **constraints** may hinder the delivery of allocated or potentially suitable sites. Potential valuation gaps.
- Need to secure **higher development values** and create **more demand**.
- A shortage of construction skills and suitably qualified labour exists, hindering the delivery of new development at the SEP scale and timescales. This is a national issue.

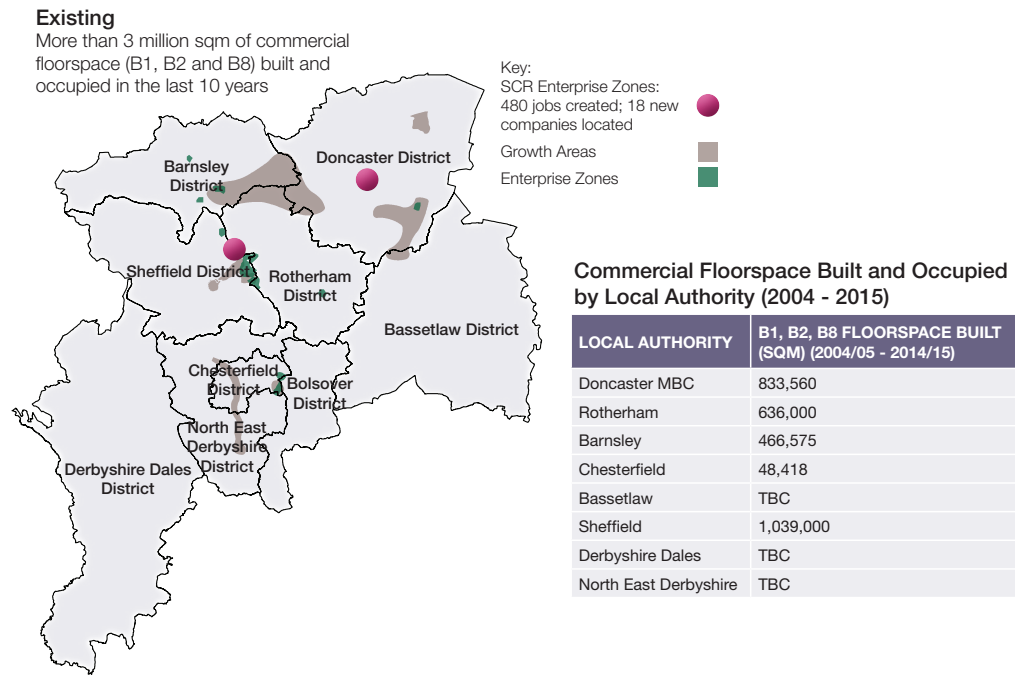
Land & Commercial Property Opportunities

- Work with respective local authorities and potential developers to adopt **planning frameworks / masterplans** for identified Growth Areas.
- Unlock stalled development sites within Growth Areas by delivering '**enabling**' **infrastructure** to pay for off-site costs.

- Encourage the bringing forward of new commercial units to the market to address under-supply within SCR by apportioning market risk onto local authorities to 'kick-start' development of sites.
- Utilise a **recyclable fund** to support commercial development on brownfield sites (potentially JESSICA).
- Encourage more frequent and **better public transport access** to large employment sites on the strategic transport network.
- Opportunities for **cross-boundary collaboration** with neighbouring LEPs and authorities to assist with delivery of strategic development sites.
- Create stronger linkages between objectives for commercial property delivery and **increase the skilled labour force** that can deliver this development.
- Consider '**temporary uses**' for stalled sites or currently under-developed sites, generating activity and revenue which strengthens their value and avoids an adverse market perception.
- Improve mass transit links to key sites to move away from car-led development and to reduce the burden on the principal road network.

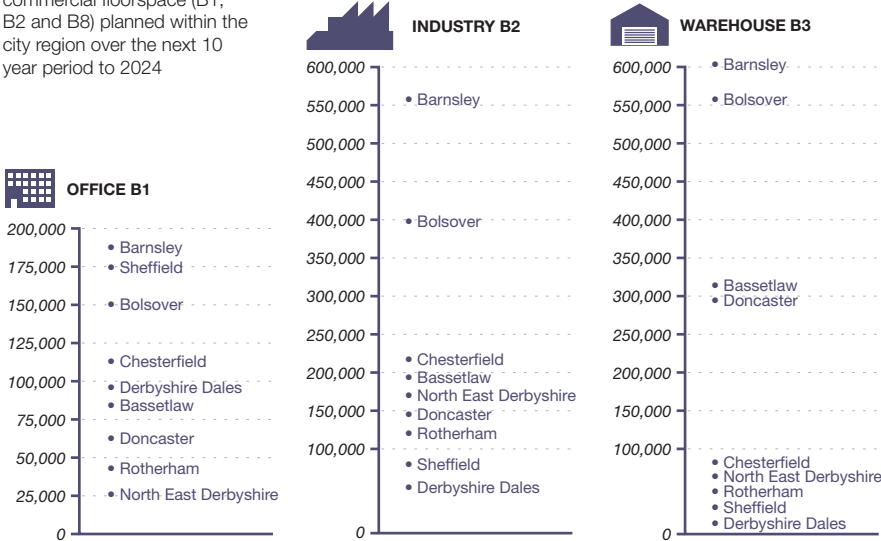
Land and Commercial Property

SCR COMMERCIAL BUILD OUT



Planned

More than 5 million sqm of commercial floorspace (B1, B2 and B8) planned within the city region over the next 10 year period to 2024



GROWTH OPPORTUNITIES

Identify opportunities for improving availability of suitable, developable land

Improve availability of commercial property which is ready to occupy

Consider energy networks and other energy infrastructure requirements to support delivery of employment land

Alignment between locations of employment and housing land

Ensure supporting infrastructure is in place to make sites more attractive to investors and ensure delivery is viable

Support national agendas and proposed mechanisms for enabling development

Opportunities for further devolution

2.3.2 Housing

Housing is a national priority, and the needs of a growing economy and a growing housing market go hand in hand. SCR will seek to deliver a step change in the rate of house building and create a quality housing offer that supports inward investment and retains local talent. The creation of a Housing Investment Fund will go some way to supporting this housing growth. Significant new employers need to know that quality housing, with necessary supporting amenities, will be delivered in locations that can integrate with planned employment developments

The Government is committed to delivering more homes, through schemes such as Help to Buy, and the “Starter Homes” initiative which aims to deliver 200,000 new homes for first time buyers under 40 by 2020²⁸. As well as housing

sector being a GVA contributor in its own right²⁹, a quality housing offer is essential to attracting and retaining a skills base that supports inward investment, as well as meeting existing and future community needs and retention of SCR talent – in effect, encouraging people to live and work in the area.

Providing high quality new homes in the right place has a key role to play in the economic growth and place competitiveness of the City Region. The SCR Independent Economic Review (IER) identified that affordability and value of the housing stock (coupled with cultural offer and access to countryside) is seen as an existing strength of the City Region. We need to build on this, not least by building new housing, with supporting amenities and other social infrastructure, close to and/or within key growth areas.

Whilst land has been identified across the City Region for residential development, the ability of the existing land allocations to deliver expediently can be limited by issues related to market attractiveness, landowner expectations, infrastructure requirements, the capacity of the housebuilding sector, and the availability of affordable finance for both house builders and purchasers.

SCR should facilitate the strategic development of those sites that can deliver accelerated housing growth. It should be noted that this land is not all on a level footing in terms of its position in the planning process (i.e. benefitting from an allocation or a consent) or its readiness to build on (i.e. landowner / developer ability to start development). The land is also of differing scales; smaller sites which may be able to deliver quickly once started and large strategic sites which will take several years to build out.

Housing Challenges

- There is a need to understand what is preventing **stalled sites** with planning permission starting on site and how viable development could be progressed. Connectivity of the housing stock within the city region to employment opportunities, particularly via sustainable modes, is often a key factor in respect of market attractiveness. SCR should therefore promote and support

²⁸ The 2015 Autumn Statement included £2.3 billion to house builders to provide 20% discount on new homes

²⁹ The CBI estimates that every £1 spent on construction projects yields a total of £2.84 expenditure in the wider economy. It is estimated that approximately £4,700 per annum per household spending on local convenience and comparison goods can be attributed to residents in new housing. Over the lifetime of the SEP, a similar amount would generate at least £400 million for the SCR economy).

integration of employment and housing growth, with supporting amenity uses, to create sustainable living and working communities.

- The IER suggested that **perceptions** remain a barrier and that the positive aspects of the quality of life in the City Region are not promoted as much as elsewhere.

Housing Opportunities

- **Identify and eliminate site constraints on suitable housing sites.** Many of the key locations for housing development in the Sheffield City Region are brownfield sites, with associated costs of land remediation and essential infrastructure requirements, all of which impact on scheme viability and prevent schemes from moving into delivery.
- **Unlock stalled development sites within growth areas and Urban Centres** by delivering 'enabling' infrastructure (e.g. transport access to sites; drainage; addressing a range of viability challenges etc.), whilst further encouraging greater alignment and connectivity via sustainable transport modes between housing and employment growth.

- **Developing bespoke SCR investments** - as part of the journey towards greater devolution, the SCR has secured a commitment from Government to develop a range of bespoke interventions (via co-design and co-investment) which will allow the SCR to build the developer and investor confidence that is required to bring a pipeline of sites through more quickly.
- There remains an aspiration for the SCR to be able to shape (and ultimately hold) national funding, enabling it to be allocated more flexibly based on locally set criteria and over a longer timeframe in a way which matches local market opportunities and encourages a greater range of developers to engage with a more appropriate range of products.
- **Developing a SCR Housing Delivery Programme** – a programme approach to build on the work already undertaken to identify the pipeline of sites that can deliver in 2015/16 to 2020/21 to ensure a strong early start and contribute to the achievement of 7,000 to 10,000 dwellings per annum within five years.

The main opportunities for Housing Growth are indicated in the diagram opposite and the table overleaf.

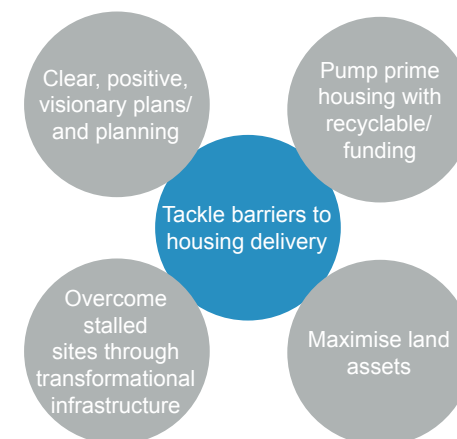
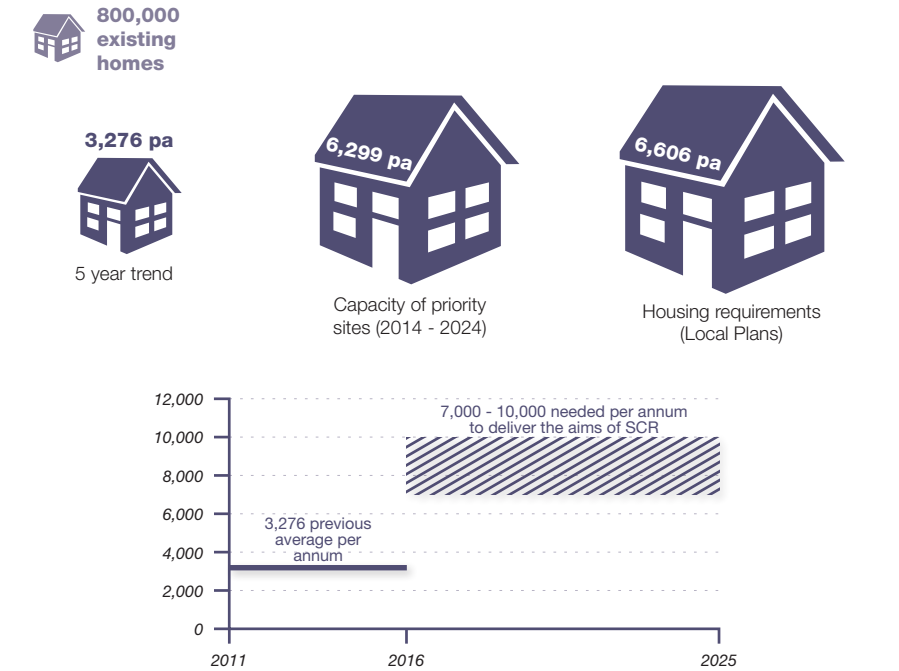


Figure 17 Opportunities for tackling barriers to housing delivery

Clear, positive, visionary plans	<ul style="list-style-type: none"> - Instil a positive visionary approach to plan making to provide long term vision, whilst instilling a can-do open for business attitude 'from now' - Develop a Spatial Framework expediently which identifies strategic areas for future housing delivery, aligned with the ambitions of the Growth Areas and Urban Centres and informed by the SCR IIP. This should include strategic opportunities for housing as an integrated element of Growth Areas. - Identify sites / areas which would benefit from application of accelerated planning tools (Compulsory Purchase Orders, Local Development Orders / Mayoral Development Corporations and Supplementary Planning Documents)
Pump prime housing with recyclable funding	<ul style="list-style-type: none"> - Establish a grant-primed revolving fund, such as the Manchester Housing Investment Fund, to provide funding on a low interest rate loan basis and cognisant of state aid rules. Evaluate requests for financing to ensure that a) propositions support wider SEP objectives (such as support to construction skills development, and addressing urban mobility) and b) the sites are in the right locations for supporting growth of the economy. - Revolving fund should draw in additional funding from other places potentially including New Homes Bonus, Housing Revenue Account, CIL and other sources with the specific intention of boosting the delivery of new homes. - Provide gap funding, where a loan alone will not be sufficient. SCR to work with Government to identify a means to establish such a fund.
Overcome stalled sites where there is high potential and strategic alignment through transformational infrastructure investment	<ul style="list-style-type: none"> - Identify sites where local authorities could establish a partnership model with multiple landowners and act as lead infrastructure provider, recovering costs through capital receipt from future land sales and/or developer profit. - Explore scope for institutional investment in infrastructure (e.g. through an InfraCo model), and develop credible propositions for this. This would involve, for instance, the provision of roads, utilities, energy, sustainable drainage and telecommunications infrastructure across a development site by one provider, who secures a return from a developer with the sale of plots and units, and through service charges from residents. Investigate whether public sector guarantees may be able to support this (subject to State Aid regulations). - Establish strong relationships with and intelligence about developers across the City Region, understanding their constraints, needs etc. and using that to improve the alignment of the pipeline and products so we are maximising the potential delivery capacity. - Group smaller sites into portfolios, and coordinate infrastructure provision and financing.
Maximise land assets	<ul style="list-style-type: none"> - Work with the HCA, the Joint Assets Board and with the One Public Estate Programme to identify a pipeline of priority schemes and maximise value from public land assets, and utilise the HCA frameworks to bring in expertise and move these sites forward in both planning and real infrastructure terms, increasing investor confidence and fast-tracking housing starts.

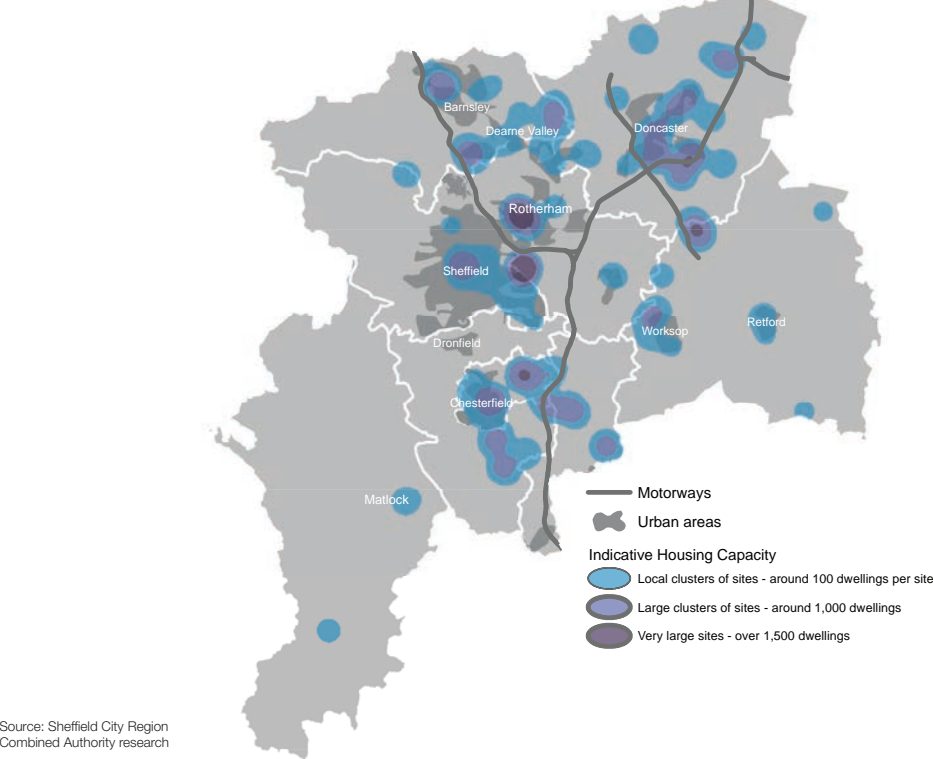
Housing

CURRENT HOUSING ISSUES SUMMARY (DWELLINGS PER ANNUM)



Source: Sheffield City Region Combined Authority research

PRIORITY HOUSING SITES ACROSS SCR



Source: Sheffield City Region Combined Authority research

KEY CONSTRAINTS

Shortage of skilled labour to deliver the housing needed at the scale and within the timeframe proposed.

Unbalanced viability throughout the region due in part to the City Region's industrial heritage.

Most priority sites require large scale housing development, thus may be limited to major house builders.

EXPECTED FUTURE CONSTRAINTS

Shortage of unconstrained sites means that to achieve the housing requirements in the local plans, complex sites requiring technical and financial advice and funding support will need to be considered.

Current land use allocations likely to cause disparity between where people live and work. This will cause a burden on infrastructure and make the housing less appealing.

OPPORTUNITIES

Unlock constrained development sites through the delivery of infrastructure.

Provide greater certainty to potential investors and developers through increased planning certainty, including the adoption of clearer planning guidance for key Growth Areas and development zones.

Establish a Housing Investment Fund to address viability issues and maximise the opportunities to accelerate housing growth across the SCR.

2.3.3 Flood Risk Alleviation

SCR will help secure match/partnership funding where appropriate to protect existing built form and brownfield sites from current and future flood risk. This funding could be secured through encouraging national investment in flood alleviation infrastructure alongside private and public investment at both a strategic and a more localised level. Better SCR flood alleviation programmes will also enable future development and business growth in future Growth Areas and Urban Centres. In order to achieve this, we need to support a less reactive approach to flood risk through land use planning.

The number of households and level of infrastructure currently at risk of flooding within SCR means that there is an identified need to encourage national investment in flood alleviation infrastructure alongside private and public investment at both a strategic and a more localised level, for example, in the form of sustainable urban drainage (SUDs). Flooding and flood management interlinks with all infrastructure provision within this Plan.

Flood Risk Challenges

- A number of Growth Areas and Urban Centres within the City Region are at **risk of flooding** due to the scale of development or topography within the catchment and resultant rate of runoff. Examples include DN7, A61,

Dearne Valley, Rotherham and Doncaster Urban Centres, Advanced Manufacturing Innovation District, and Sheffield City Centre.

- Key **infrastructure assets**, such as Chesterfield and Sheffield Railway Stations, are at risk of flooding.
- There is uncertainty whether schemes within the Government's **Long Term Investment Plan** will be delivered.
- The Partnership Funding model now relies on **sufficient external contributions** being secured to supplement Central Government spending.

Flood Risk Opportunities

- Opportunity to **integrate** flood alleviation schemes, SUDs and water management in key areas, which could present opportunities to realise regeneration benefits of blue and green infrastructure.
- Realisation of **Government Long-Term Strategic Flood Schemes** would unlock City Centre locations, and alleviate the economic and social cost of flooding.
- Implement **development control measures** across all Growth Areas at risk, including the requirement to undertake Flood Risk Assessments and provide SUDs. This should

avoid increased flood risk arising from new development. There may be potential to expand the scope of systems to address wider flood risk issues within the catchment.

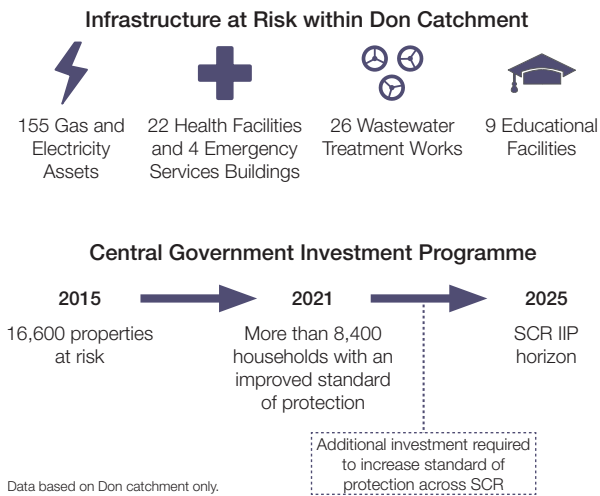
- **Locate development** within areas of lowest flood risk.
- Implement **Flood Alleviation Schemes** which could unlock brownfield land for development.
- Seek means of **incrementally tackling flood risk at source**, and in doing so strengthen the attractiveness of SCR through green and blue infrastructure provision.
- Seek greater **alignment between key stakeholders** to bring forward schemes (Local Authorities, EA, Developers, Water and Sewerage Companies).
- Assess whether **large-scale catchments**, for example across The Dearne and Don, could become the focus for collaborative and comprehensive investment in flood risk mitigation.
- Explore options for **alternative approaches** to provision of flood defences to accelerate delivery, e.g. PFI type arrangements.

Flood Risk

TYPES OF FLOOD RISK

	FLUVIAL	SURFACE WATER FLOODING	GROUND WATER	COASTAL
BARNSELY	High Risk: Substantial Areas within the Dearne Valley and M1	High Risk 40% of properties at risk	Moderate Risk: Kingstone, Kingwell, the Millhouses area of Hoyland and Upperwood area of Darfield	No risk
BASSETLAW	High Risk: River Rytton affects Worksop	Moderate Risk	Low Risk	No risk
BOLSOVER	High Risk: Areas surrounding A617 and M1 area	Moderate - High Risk: East of Bolsover at risk from surface water flooding	Moderate - High Risk: East of Bolsover	No risk
CHESTERFIELD	High Risk: A617 and Chesterfield Waterside area	Potential for High Risk	Low Moderate Risk	No risk
DONCASTER	High Risk	High Risk	Low Risk	High Risk
DERBYSHIRE DALES	High Risk: Matlock Area affected	Moderate Risk: Surrounding Cromford and Wirksworth	Low Risk	No risk
NORTH EAST DERBYSHIRE	High Risk: Areas surrounding Renishaw and Eckington	Potential for High Risk	Low Moderate Risk	No risk
SHEFFIELD	High Risk: Substantial Areas of the City Centre and strategic routes	Low - Moderate Risk: Due to topography, but surface water compounds fluvial flooding	Low Risk	No risk
ROTHERHAM	High Risk: Significant parts of the town centre	High Risk	Low Risk	No risk

INFRASTRUCTURE AT RISK IN DON CATCHMENT



PLANNED FLOOD ALLEVIATION SCHEMES ACROSS SCR*

“Opportunity to integrate blue and green infrastructure within the city centre.”



*SCR IIP assessment considers schemes which improve standard of protection for more than 100 dwellings.

2.3.4 Utilities

With planned intervention, SCR appears to have the electricity, gas and water network capacity to support future needs. However, SCR will seek to work closely with utility providers to ensure the planned capacity sufficiently reflects SEP growth forecasts.

Utility providers forecast future demand and capacity requirements based on projected population growth, usage trends and Local Plans. Utility providers will need to review these plans and update accordingly to reflect the SCR growth SEP ambition.

Utility Challenges

- **Electricity:** Existing capacity is generally adequate at the strategic assessment level. However, based on assessment of forecast demand information available from the Distribution Network Operators, it is likely that some 33kV substations will need upgrading to accommodate growth. Some gaps in the 11kV network are projected in Sheffield, and addressing these deficiencies will be important to sustain future development in the city centre. National Grid plans to refurbish the old 275kV underground circuits and associated sub-stations in Sheffield, which will enhance network resilience. Businesses at the AMP have raised concerns that electricity supply is limiting the pace at which development can occur.

- **Gas Infrastructure:** Evidence indicates that there is no strategic shortfall in the capacity of the existing gas network to accommodate future growth. There are no known planned strategic upgrades to increase capacity within the City Region.
- **Water Supply:** A review of documents produced by Water Companies supplying SCR shows that they appear to have the infrastructure capacity to meet the current levels of development, as set out in statutory plans (e.g. Local Plans). Major capacity shortfalls are not envisaged although in certain instances there will be a need for minor reinforcement works and network extensions to support new development.
- **Wastewater:** Approximately 50% of Yorkshire Water wastewater treatment works within SCR are forecast to have a growth in population over 5% by 2025, triggering a need for review of their capacity and potential upgrade works. Yorkshire Water plan to invest at least £23m in the renovation of existing sewers and the creation of new treatment capacity in the current AMP6 investment period. Significant infrastructure improvements are likely to be necessary along the Staveley and Rother Valley Corridor, in response to its Area Action Plan. Severn Trent Water has identified that Clowne, Mansfield Bath Lane and Scarcliffe

wastewater treatment works are currently operating at capacity. Whilst the company does not envisage any problems in providing additional treatment capacity, a review of the projected growth in population within the catchments served should be undertaken and upgrades implemented to avoid presenting a constraint to growth.

Utility Opportunities

- The spare capacity available in the SCR electricity and gas networks offers a key advantage to inward investors by reducing the capital cost of their schemes, as the need for network reinforcement can potentially be avoided. This is of particular benefit to power intensive users in sectors such as manufacturing and IT.

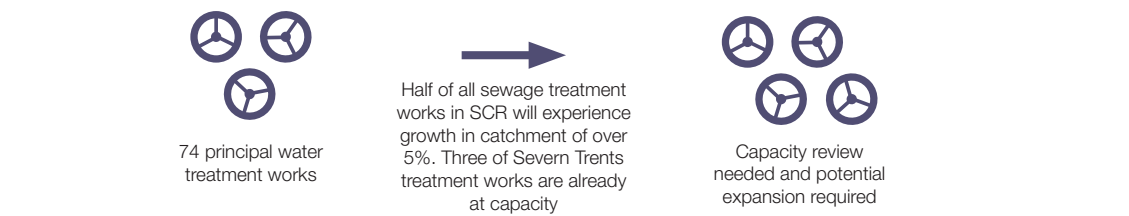
As a legacy of this Plan, there is an opportunity for utility companies to review their planned capacity provision in light of the SEP growth forecasts, to ensure that utility network capacity continues to be available to support growth.

Strategic Utility Network Capacity

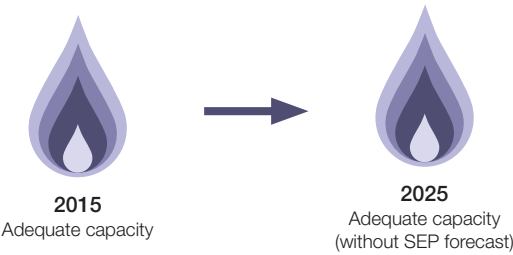
WATER SUPPLY* (YORKSHIRE WATER)



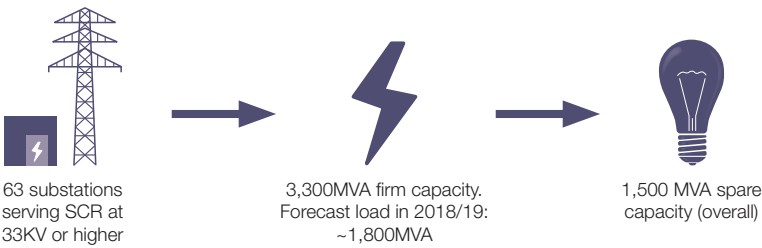
WASTE WATER



GAS



ELECTRICITY



Localised Shortfalls:

	POTENTIAL 33KV UPGRADES NEEDED
BASSETLAW	Woodbeck and Tuxford
NORTH EAST DERBYSHIRE	Biwater, Grassmoor and Wessington
	POTENTIAL 11KV UPGRADES NEEDED (SPECIFIC TO SHEFFIELD)
SHEFFIELD	Claywheels Lane and Wheatacre Road. Ellin Street and Stanley Street to provide City Centre support

*Comparable data unavailable for Anglian Water and Severn Trent.

2.3.5 Telecommunications

SCR is investing in its digital connectivity offer and South Yorkshire is pioneering ultrafast broadband at Enterprise Zones and strategic business parks. However, the take-up of superfast broadband currently falls below the national average and we must exceed this by setting ourselves a target of 60%. SCR will also seek to deliver ultrafast broadband to key commercial areas and integrate infrastructure with the Internet of Things.

Improvements in digital connectivity continue to support a vibrant and growing digital economy within the UK³⁰. Whilst coverage in the Sheffield City Region is high, the take up of superfast broadband is currently below the national average and there is a requirement to better promote the currently under-utilised availability. There are currently three BDUK programmes within the SCR:

- **Superfast South Yorkshire (SFSY):** Aims to deliver superfast broadband speed coverage to 98.9% of South Yorkshire by the end of 2019.
- **Digital Derbyshire (DD):** Aims to deliver superfast broadband to 98% of homes and businesses by the end of 2018.

³⁰ The HM Treasury Digital Communications Strategy (2015) identified that future investment in superfast broadband infrastructure will increase GVA by £6.3 billion and creating a net increase of 20,000 jobs in the UK by 2024.

- **Better Broadband for Nottinghamshire:** Aims to deliver superfast broadband to 98% of businesses and residents by 2018.

South Yorkshire is also pioneering **ultrafast broadband** at Enterprise Zones and strategic business parks, providing businesses access to speeds in excess of 100Mbps. 4G mobile communications capable of superfast speeds will reach 98% of the SCR by the end of 2017. 4G+ and 5G will follow. It will be important to examine ways in which the introduction of 5G can be facilitated.

Telecommunications Challenges

- The availability of superfast/ultrafast connections will not gain ubiquitous coverage across the SCR, this may be prohibitive to business growth of those businesses in Sheffield City Centre or rural areas which are left behind.
- There is already significant coverage of superfast broadband, which with the three programmes is set to increase. A significant area of challenge is in raising the awareness of the business benefits of adopting new technology






Telecommunications Opportunities

- Explore the need for more ultrafast broadband for economic sites, where there is a commercial appetite, economic interest and demand for ultrafast.

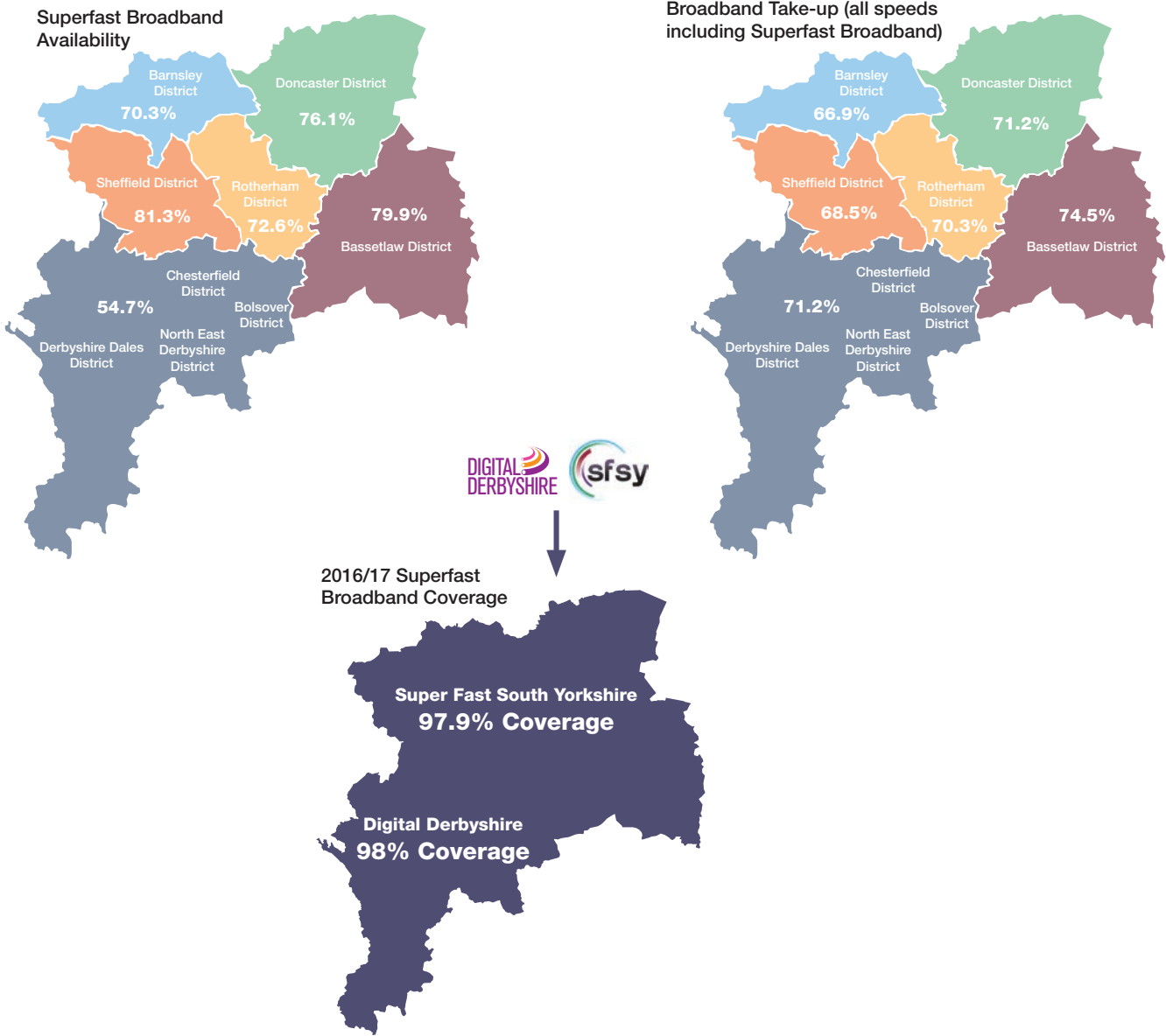
- For SCR to exceed the national target for **superfast broadband take up** of 50%. By setting a target of 60% and building in the support and resources across the SCR the economic benefits will be greater, and with targeted demand stimulation over a period of time, will be realised sooner.
- Promote the reuse of Digital Region Limited programme infrastructure with commercial suppliers.
- The advance of mobile internet and improved broadband connections offers opportunity for the growth of the Internet of Things.
- The move toward a digital economy and cloud computing means that demand for data centres is expected to grow.
- There exists an opportunity to integrate telecommunications links with other major infrastructure investment programmes, lowering implementation costs.
- The SCR Devolution Deal highlights that Government will support the SCR in supplying superfast broadband to the last 5% of homes and businesses. This is of particular relevance to rural areas, where there is a noticeable disparity with broadband speeds in urbanised areas.

Telecommunications

BROADBAND SPEED COMPARISON

-  Standard Broadband Up to 8Mbps
-  High speed Broadband Up to 24Mbps
-  Superfast Broadband Up to 80Mbps
-  Ultrafast Broadband From 80Mbps to +100Mbps
-  Hyperfast Broadband From 500Mbps to 1Gbps

SUPERFAST BROADBAND IN SCR



2.3.6 Transport

The SCR vision for a 21st Century mass transit network is to provide fast and frequent mass transit connections between our key places. This would be supported by smart ticketing and innovative urban mobility solutions. However, our evidence suggests that without intervention, increased congestion resulting from growth could impede the economic potential of the City Region. SCR will seek to address this through the interventions set out in the spatial packages. To further complement this, we will work with external partners such as HS2 and TfN to ensure that the City Region is well connected, not just locally but nationally.

Transport infrastructure plays a key role in supporting the economic growth of the City Region. It provides the means by which residents can access employment, education, retail and leisure opportunities, as well as providing the mechanism for businesses to transport goods and services. SCR evidence suggests that without intervention, increased congestion resulting from growth could significantly restrict the productivity of the region³¹.

Our Transport Plans must complement wider programmes such as Transport for the North (TfN) and HS2. The SCR IIP focus is on the interventions required to enhance intra-SCR connectivity so that SCR benefits from the wider investment. SCR is to refresh its Transport Strategy to set out the key strategic interventions that will best respond to the challenges set out in the SCR IIP.

Wider Connectivity

- SCR is well connected nationally and internationally but it is recognised that these connections need to be improved if SCR is to fully realise its potential as a key contributor to the Northern Powerhouse economy. Key external links will predominantly be delivered in partnership with external partners such as TfN, DSA and HS2.
- **Doncaster Sheffield Airport:** SCR's International Airport is growing, but in addition to improved land-side multi-modal connectivity outlined by TfN, there is potential to improve airside facilities to enhance the Airport's role, including to support increased freight opportunity.

- **High Speed Rail:** HS2 will better connect SCR to other key cities in the UK, providing much needed rail capacity and significantly improving journey times. It is essential that the HS2 station is well connected to the wider City Region, to maximise its economic benefits.
- **Transport for the North:** TfN was established to provide a step change in northern economic performance by better connecting northern city regions. TfN is tasked with delivering improvements across road, rail, air, freight and (smart) ticketing. Challenges that TfN will address include:
 - Conditional output of 30-minute journey times and improved frequency between the core city centres of Leeds, Manchester and Sheffield.
 - Enhanced Trans-Pennine connections by road and rail (potentially including a new highway tunnel and essential intra-regional connections to it, and rail electrification).
 - Enhanced connectivity between SCR logistics centres and the Humber and Liverpool Ports supported by a Northern Freight Strategy.

³¹ Using WebTAG values it is estimated that, without intervention, the cost of additional forecast delay could total approximately £41.6 billion of lost productivity over 60 years (FLUTE forecast Scenario 2).

- Enhanced multi modal transport links to Doncaster Sheffield and Manchester Airports.
- Improvements to local strategic connectivity to increase the overall economic impact of the investment.
- **Midland Mainline (MML):** Network Rail plans to electrify the MML in 2024, with potential to continue this programme from Sheffield to Leeds, providing more efficient, reliable and sustainable rail journeys.
- **East Coast Mainline (ECML):** To fully capitalise on Doncaster and Retford's location on the ECML, capacity improvements are required.
- **Smart Motorways:** Optimisation of strategic highway capacity is being delivered by Highways England through Smart Motorways.

Intra SCR Connectivity

The SCR is geographically well located for business and benefits from strong road and rail connections at the macro level – due to our key strategic location on the M1, M18 and A1, with major rail connections and an international airport. The delivery of our SCR IIP will ensure that we get the best use of these assets and strengthen our partnerships and collaborative planning with the national agencies that manage

these networks to support SCR productivity and ensure that we market this strength to potential inward investors.

SCR recognises that in order to maximise its growth and fully realise its potential it requires a 21st Century Mass Transit Network supported by smart, integrated ticketing and innovative urban mobility solutions.

This mass transit network would provide the high quality mass transit options necessary to link our urban centres and growth areas with their markets and labour force.

Strategic Transport Interventions

Sections of the transport network that are forecast to experience increased delay due to an increase in movements (resulting from increased employment) have been identified. This includes delay both on key corridors, and at certain junctions.

The solutions to this increased delay may not necessarily be focused on the existing infrastructure, and there are likely to be smart ways to respond to these challenges.

These may include, for example, improving public transport provision, encouraging smart mobility, or providing additional capacity elsewhere on the network to allow for the redistribution of movements away from the congested area.

We have identified interventions that, if made in an integrated way, would have a transformational impact on SCR and the North as a whole, supporting the Northern Powerhouse and opening up new labour markets and opportunities for SCR residents and businesses. It is anticipated that the majority of these initiatives will be delivered by partner organisations such as Transport for the North, HS2 Ltd, Highways England and Network Rail, with support from SCR.

2.3.6.1 Highways

Highways Challenges

- **Congestion:** The FLUTE model identifies those corridors forecast to experience greatest increase in delay – these are significant and tackling congestion increases will require transformational investment. Key junction capacity challenges already exist in a number of areas, particularly Junctions 28 & 33-35 on the M1 and A1(M) Doncaster to Darrington.
- SCR must tackle the **forecast increase** in congestion resulting from growth whilst also tackling **existing capacity challenges**.



Figure 18: SCR Connectivity Vision

Our vision for a 21st Century mass transit network is to provide fast and frequent mass transit connections between our key places. This would be supported by smart ticketing and innovative urban mobility solutions.

Highways Opportunities

- The spatial packages identify areas where intervention is required to address highway delay resulting from growth. The majority of the delay is forecast on routes linking key SCR growth areas, particularly on the arterial routes into Sheffield City Centre.
- **Sustainable Modes:** Shifting toward more sustainable transport modes, such as walking, cycling, public transport and new models for car ownership, will be a key part of SCR responding to, and embracing, future drivers and disruptive technologies, and is a key opportunity to achieve a competitive edge.
- **Overcoming local connectivity/viability challenges (all modes):** There are sites in SCR with great growth potential that face local connectivity issues. In some cases, providing the necessary transport infrastructure through individual planning agreements, to provide resilient and sustainable connections, would create prohibitive site viability gaps. SCR will support developers in delivering highway infrastructure and public transport connectivity where there is a clear cumulative financial case, GVA benefit and Local Plan alignment and where investment in transport infrastructure will act as a catalyst and enabler of growth.

2.3.6.2 Local Rail

Rail Challenges

- The greatest expected rise in passengers will be at **Sheffield Station**, where additional train service capacity is constrained post-2019. Doncaster Station also experiences capacity constraints, which impact local services and the East Coast Main Line (ECML).
- **Over-crowding:** constraints exist between Sheffield and Leeds via Swinton, Dronfield and Chesterfield via Midland Mainline, and via Hope Valley.
- Rotherham lacks a **mainline rail connection**, whilst Worksop and Retford suffer from infrequent services, including those to Sheffield.
- There is a need to ensure **effective access from Urban Centres** to the improved rail network (including Northern Powerhouse Rail hubs).
- Services on the **Sheffield – Barnsley – Leeds corridor** are expected to experience **capacity constraints by 2023**.
- **Doncaster Sheffield Airport does not benefit from a rail connection**, hindering access to the airport and wider growth.

Rail Opportunities

- There are further opportunities to **increase the capacity of Sheffield station and improve access to Rotherham**.
- **A rail station at Doncaster Sheffield Airport** would enhance access to both the Growth Area and the airport.
- **Improvements to the Leeds – Barnsley – Sheffield route** would support housing and employment growth on this key corridor.
- There are opportunities to **improve rail access to DN7** through its proposed Transport Hub.
- **A smarter approach to fares, ticketing and information**, as proposed by TfN, would remove barriers to rail travel.
- An increase in **Park & Ride provision** would encourage more rail travel and help reduce delay on the highway network.

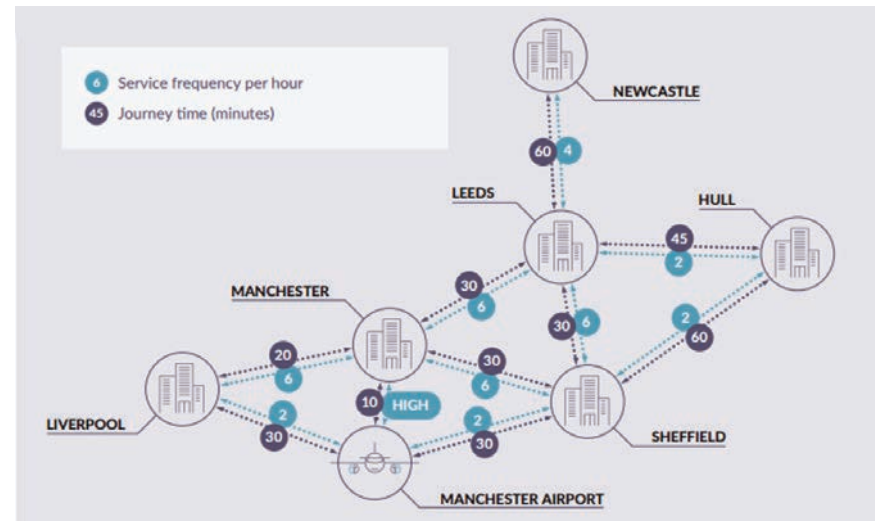


Figure 19³²: Northern Powerhouse vision for Rail Network - Frequencies and Journey Times

³² The Northern Transport Strategy: Spring 2016 Report (Transport for the North, 2016)

2.3.6.3 Bus

Bus Challenges

- The traditional subsidised funding model is under threat and there is a need to grow patronage through improved quality and accessibility of services.
- The lack of a high frequency service from Barnsley to Doncaster inhibits connectivity to The Dearne, whilst services to Waverley and the AMP are limited, along with those to Doncaster Sheffield Airport.
- There is a need for greater integration between other modes, better punctuality of services and smarter ticketing and information.
- The limited network extent and infrequency of bus services in rural areas presents a challenge, with few alternatives available to those who do not have access to a car.

Bus Opportunities

- Opportunities to retain and grow bus patronage: through smart ticketing, better information and improved punctuality through technology and infrastructure improvements. Adoption of electric buses and provision of supporting infrastructure offers the ability to reduce operating costs, increase patronage and reduce air quality impacts.

- Opportunities for franchising: through its devolution deal, SCR has secured the option of moving towards a bus franchising model, enabled through the Buses Bill. SCR must now consider whether there is a strong business case and if so, what infrastructure would be required to enable its introduction.
- Improving bus services between Growth Areas, Urban Centres and other residential areas could offer a relatively low cost way to increase patronage and demand for investment in mass transit solutions, e.g. BRT and light rail.

2.3.6.4 Walking and Cycling

SCR is to deliver a step change in the walking and cycling offer, ensuring that the infrastructure is in place for walkers/cyclists to safely, reliably and comfortably undertake end-to-end journeys. We need to ensure that sustainable travel interventions are integrated with other infrastructure propositions to maximise their benefit and deliver economies of scale. The South Yorkshire Cycling Action Plan sets out the South Yorkshire ambition to achieve a modal split of 10% by cycling by 2025, i.e. a quadrupling of current levels.

2.3.6.5 Tram

Tram Challenges

- Overcrowding on the Supertram is increasing at peak times and ongoing asset maintenance presents a funding challenge.
- The tram network does not serve key Growth Areas, e.g. Waverley and the AMP. There is significant scope for network extension.
- There is a need for infrastructure renewal and replacement on the existing Supertram network in advance of franchise renewal in 2024.

Tram Opportunities

- Innovative Mass Transit Connections: SCR will be home to the first UK trial of tram train technology. This presents the opportunity for effective, affordable mass transit connectivity. SCR will capitalise on the potential that this new mode offers as part of its approach to delivering a 21st Century mass transit network.
- The existing Supertram network is well used, with high levels of satisfaction and SCR will explore the opportunities to expand on this offer as well as the wider application of tram-train in SCR.