

West Yorkshire Connectivity Plan

North Yorkshire to Leeds: Case for Change

November 2020

Mott MacDonald
Floor 3
1 Whitehall Riverside
Leeds LS1 4BN
United Kingdom

T +44 (0)113 394 6700
F +44 (0)113 394 6701
mottmac.com

West Yorkshire Connectivity Plan

North Yorkshire to Leeds: Case for Change

November 2020

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
1					
2					
3					
4					

Document reference: 401619 | 08 | D

Information class: Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Contents

1	Introduction	1
1.1	The role of this Case for Change	1
1.2	Background to the report	1
1.3	West Yorkshire's priorities for growth	2
1.4	Defining the scope and study area	3
1.5	North Yorkshire to Leeds: at a glance	4
	North Yorkshire to Leeds: socio-economic profile	6
	North Yorkshire to Leeds: connectivity highlights	7
2	Spatial context	8
2.1	Enabling Inclusive Growth	8
2.1.1	Deprivation	8
2.1.2	Isolated communities	9
2.1.3	Car ownership	10
2.2	Boosting Productivity	11
2.2.1	Employment characteristics	11
2.2.2	Household income	12
2.2.3	Growth areas	12
2.3	Tackling the Climate Emergency	14
2.3.1	Air quality and Carbon	14
2.4	Delivering 21st century transport	15
2.4.1	Active modes	15
2.4.2	Bus	15
2.4.3	Rail	16
2.4.4	Road	17
2.4.5	Patterns in transport demand	17
2.5	Summary	19
3	Corridor aspirations	20
3.1	Defining objectives	20
3.2	Core objectives	20
3.3	Corridor-specific aspirations	20
3.4	Measuring objectives	21
3.4.1	The appraisal process	21
4	Determining spatial priorities	23
4.1	Places to connect	23
4.2	Existing connectivity improvements	26
4.3	Connectivity concepts	28
4.4	Appraisal outcomes	31
4.5	Demand	33
5	Conclusion: The need for intervention in North Yorkshire to Leeds	35
5.1	Introduction	35
5.2	Connectivity Network	37
	Appendices	40
A.	Spatial context highlights across the regional priorities	41
B.	North Yorkshire to Leeds: Investment Case	46
B.1	Developing interventions	46
B.2	Interventions	48

1 Introduction

1.1 The role of this Case for Change

This Case for Change report for North Yorkshire to Leeds provides an important first step, and part of the evidence, for identifying a connectivity pipeline of future transport investments for this part of the region.

This report provides analysis of transport and socio-economic data, to identify an initial longlist of potential transport investments aimed at improving connectivity. The approach takes the view that transport should not be a barrier to people accessing jobs, to businesses choosing to invest here and to improving the health of our residents and visitors. Improvements in transport should be a catalyst for change across all these objectives.

This report's outputs will be integrated with other Case for Change reports, and other workstreams, including proposals to decarbonise transport, Urban Mass Transit market testing, Bus Network Reviews, Rail Capacity Study, Local Cycling and Walking Infrastructure Plans and a Future Mobility Strategy, to produce a connectivity plan and long term investment programme for the whole of West Yorkshire, to the 2040's.

1.2 Background to the report

The West Yorkshire Combined Authority has adopted a Transport Strategy to 2040. The strategy was a collaboration between the Combined Authority and the West Yorkshire partner councils of Bradford, Calderdale, Kirklees, Leeds and Wakefield and covers the geography of West Yorkshire but recognises the importance of the wider Leeds City Region, and that people and goods travel longer distances across administrative boundaries. The strategy provides a framework of high-level transport policies aimed at delivering a world-class, modern, integrated transport system, that will play a key role in transforming the region's economy and delivering inclusive, sustainable growth.

A daughter document, the Leeds City Region HS2 Growth Strategy, set out the strategic case for change for building on the once-in-a-generation opportunity provided by the arrival of High Speed 2 (HS2) and Northern Powerhouse Rail (NPR) in the region, to transform the City Region's economy. The benefits of HS2 and NPR cannot however drive inclusive growth alone; a range of factors are essential to create more and better jobs, with a highly skilled workforce to sustain them - and a lack of transport capacity and infrastructure at the City Region and local level will inhibit growth. The HS2 Growth Strategy identified corridors and communities which are in economic need of improved connectivity.

Significant investments in transport are planned through the West Yorkshire Transport Fund, Connecting Leeds and Transforming Cities Fund programmes, and by the rail industry, which will provide the early years of the connectivity pipeline. However, there remains insufficient capacity and resilience in our transport system, particularly to key employment centres, which will constrain business and labour market catchments, and the ability to train and develop the next generation, by restricting access to colleges and universities. The National Infrastructure Commission identified that this is affecting many places across the North of England and will increasingly inhibit economic development and living standards.

An important next step is to support the delivery of our strategies is to develop a plan and pipeline of longer-term investments, which address a full range of strategic and local connectivity needs.

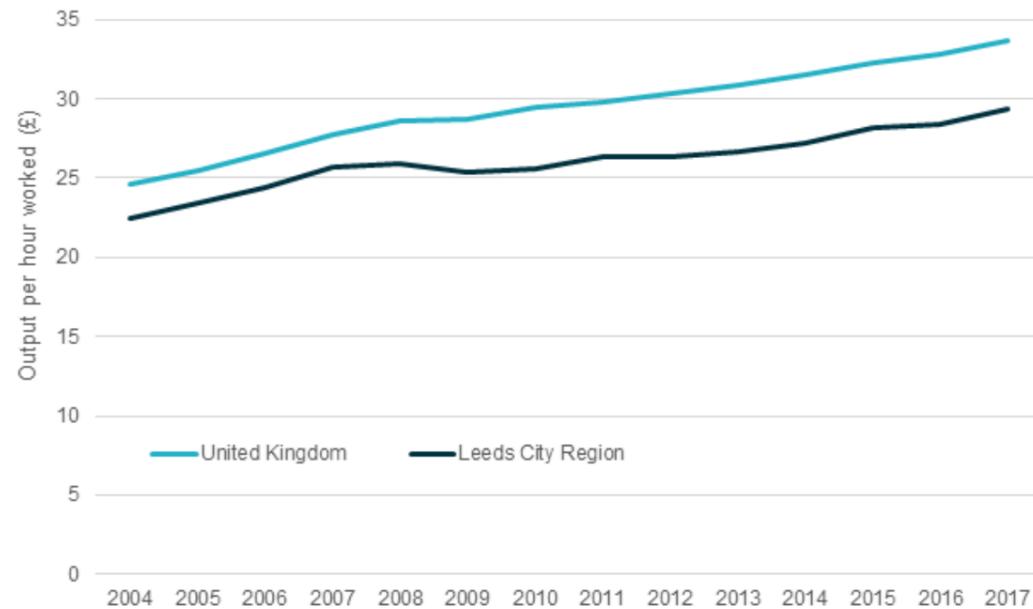
Ten Case for Change reports have been produced with the input of the partner councils, which study corridors covering the geography of West Yorkshire and including parts of the wider City Region, to provide detailed evidence of connectivity needs. These Case for Change reports should be read in conjunction with the Connectivity Plan Appraisal Handbook for further detail on background and methodology.



1.3 West Yorkshire's priorities for growth

The emerging Industrial Strategy for West Yorkshire highlights a significant and widening productivity and innovation deficit, as shown in Figure 1. Living standards across the City Region have stalled with several communities facing persistent poverty.

Figure 1: Illustration of productivity gap in West Yorkshire



Source: Office for National Statistics, 2019

The West Yorkshire Transport Strategy recognises that our transport network currently constrains opportunities for growth and is a key factor in shaping experiences of poverty. Our network does not sufficiently support sustainable travel as the obvious choice for many. In the wake of the declaration of a “climate emergency” by all West Yorkshire districts, there is a growing need to de-carbonise our transport network; as the transport sector contributes 41% of Leeds’s, 47% of Harrogate’s, 34% of Selby’s and 34% of York’s total CO₂ emissions¹. This needs immediate action as transport emissions are expected to grow, constraining West Yorkshire’s ability to meet overall emissions targets.

We have four priorities for the City Region aimed at addressing our key challenges. These are summarised in Table 1.

¹ UK local authority and regional carbon dioxide emissions national statistics: 2005-2016

Table 1: Leeds City Region’s four priorities for growth



Enabling Inclusive Growth – Ensuring that economic growth leads to opportunities for all who live and work in the region



Boosting Productivity – Helping businesses grow and bringing new investment into the region to drive economic growth and create jobs



Tackling the Climate Emergency - Growing our regional economy whilst cutting carbon dioxide emissions



Delivering 21st Century Transport - Creating efficient transport infrastructure that makes it easier to get to work, do business and connect with each other

Source: West Yorkshire Combined Authority

1.4 Defining the scope and study area

This section explains the process undertaken to define the corridor from the original scope to an economic area in which to focus the evidence base, develop key connectivity concepts and interventions.

The Leeds City Region HS2 Growth Strategy identifies a network of communities and corridors that will benefit from inclusive growth. Table 2 shows a list of the corridors and the corresponding reports with their approximate extents illustrated in Figure 2. All the Case for Change corridors are shown in Figure 3 with the North Yorkshire to Leeds corridor highlighted in red.

Table 2: Reporting index

Ref.	Report Name	Original corridor name
1	Airport, Airedale and Wharfedale: Case for Change	Strengthening high value assets in the North West of Leeds, the University of Leeds, Kirkstall Forge and the airport
1		Skipton to Leeds
1		Stimulating development from the city centre into North Bradford towards Shipley, Saltaire and the airport
2	Calder Valley and Bradford: Case for Change	The Calder Valley and Bradford
3	West Kirklees to Calderdale: Case for Change	Huddersfield to Brighouse
3		South West Kirklees (including Slaithwaite) to Brighouse
3		Huddersfield – Halifax
3		Halifax to Brighouse
4	Leeds – Bradford: Case for Change	Leeds Bradford cross connectivity
4		South Bradford and North Kirklees – Bradford
5	Leeds – Huddersfield: Case for Change	Dewsbury / Huddersfield to the HS2 Hub
6	East Kirklees to Wakefield: Case for Change	Dewsbury to Wakefield
6		East Kirklees (including Denby Dale) to Wakefield
6		Five Towns to Wakefield
7	South and East Leeds: Case for Change	Extending the South Bank opportunity to the south of Leeds
7		Accelerating inclusive growth in the East of Leeds towards St James' Hospital and the East Leeds extension
8	North Yorkshire to Leeds: Case for Change	Harrogate to the HS2 Hub
8		York to Leeds
8		Selby to the HS2 Hub
9	Five Towns to Leeds: Case for Change	Five Towns to Leeds
10	Barnsley and Wakefield to Leeds: Case for Change	Barnsley and Wakefield to Leeds

Ref.	Report Name	Original corridor name
10		North Barnsley to Barnsley

Source: Mott MacDonald

The corridor is a mixture of rural, suburban and free-standing urban centres; located on the border of North and West Yorkshire. It covers the area roughly bounded by Leeds, York, Selby and Harrogate and includes the towns of Wetherby and Tadcaster. It also includes the northern and eastern parts of Leeds, including Chapel Allerton, Roundhay and Seacroft. The defined economic area is shown in the next chapter.

The study area has been defined in consultation with officer representatives from Leeds, North Yorkshire and York (these will now be referred to as the partners). An initial workshop helped to identify and confirm the key “problems and opportunities” for the study area. An example of the outputs from this is shown in Figure 4.

The findings were then used to define both the extent of the corridor or economic area, the main elements of the accompanying “story map” (which summarises the key issues and opportunities in the spatial context, and sits behind the Case for Change as the data repository and analysis tool) and to develop a set of corridor-specific aspirations.

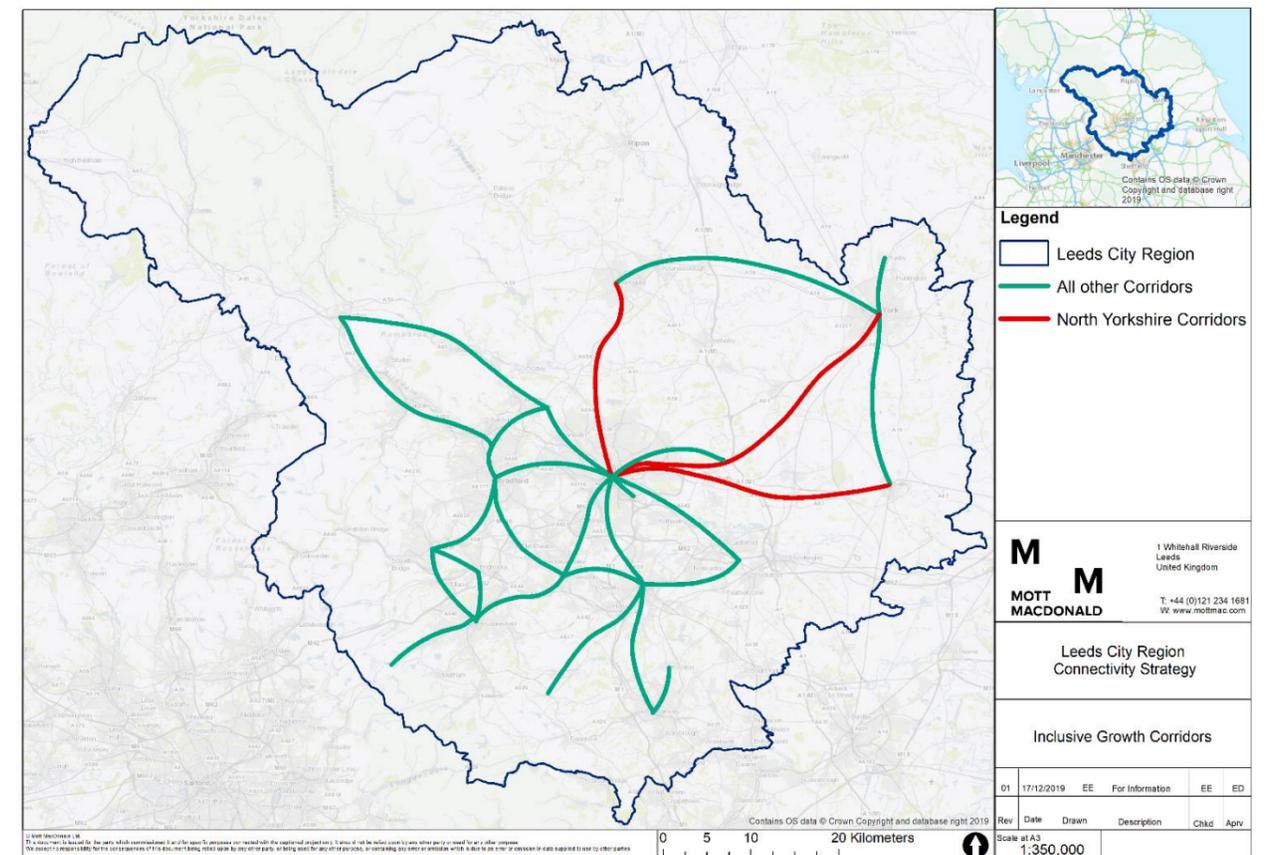
1.5 North Yorkshire to Leeds: at a glance

The following two pages provide some highlights for this study area – these cover the key socio-economic features of the geography as well as the connectivity challenges it faces and conclude with prioritised investment proposals to meet these challenges. The 2-page summary is designed as a double sided “lift out” of the key issues and conclusions. Further detail to underpin these summary points is provided in subsequent Chapters.

Figure 2: West Yorkshire Connectivity Plan: Reporting Map

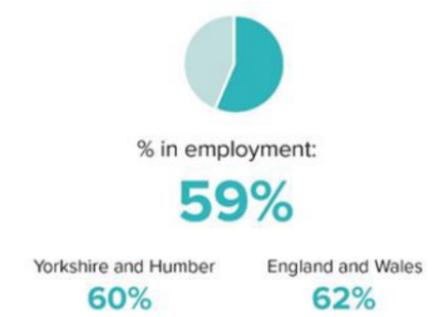
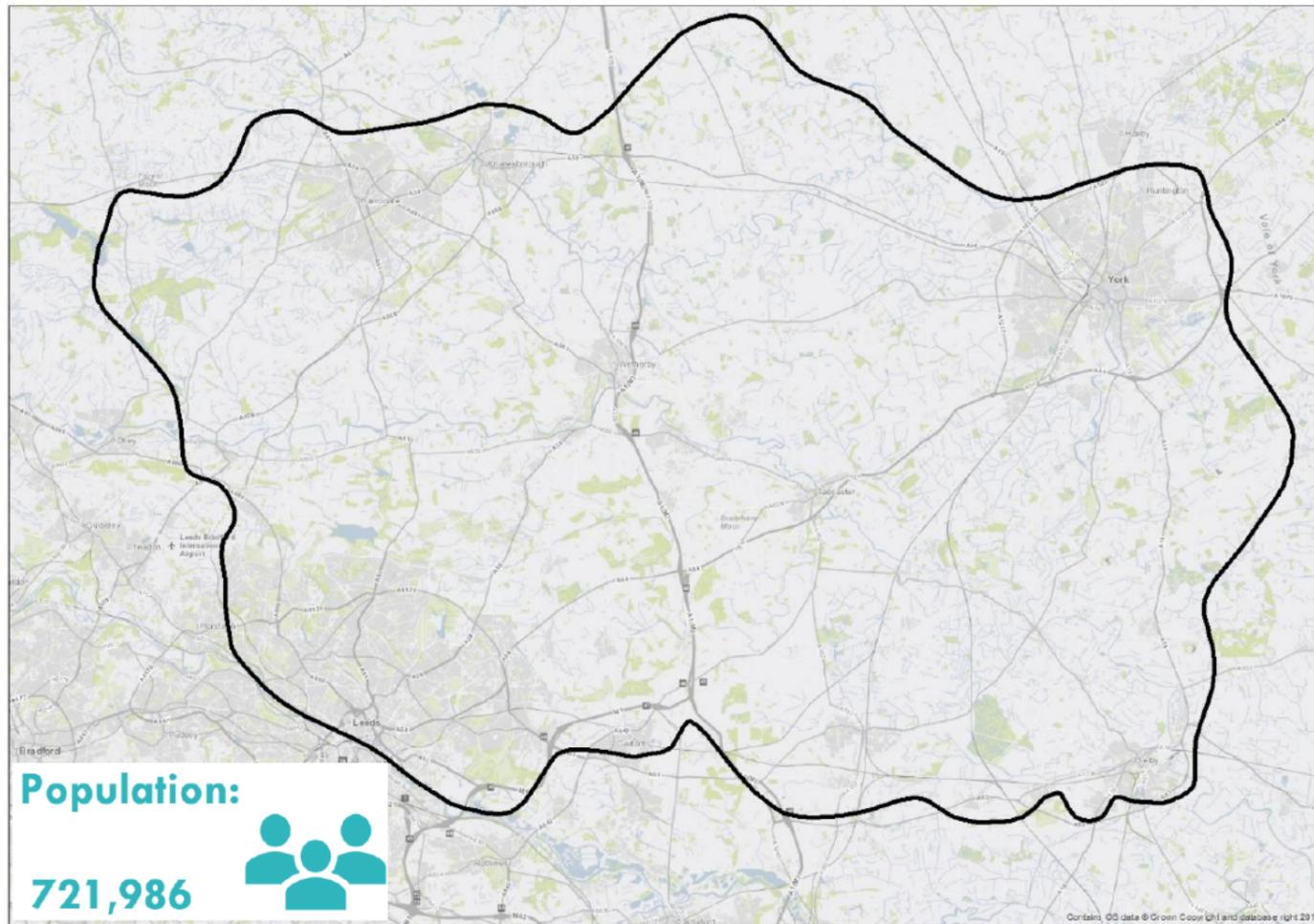


Figure 3: West Yorkshire Connectivity Plan: Corridor Map



North Yorkshire to Leeds: socio-economic profile

This corridor covers the movements between North Yorkshire and Leeds. Expanding clockwise from the western extent of Pool-in-Wharfedale around to South Milford, this corridor is a mix of rural and urban landscapes including the economic centres of Harrogate, York and Selby. Average household income in the corridor (£40,209) is greater than the average for Yorkshire and the Humber. Employment levels in the corridor (59%) reflect regional and national averages. There is a considerable planned housing growth with large developments proposed throughout Leeds, and in proposed new settlements at Flaxby and Hammerton.



Places with challenges for:



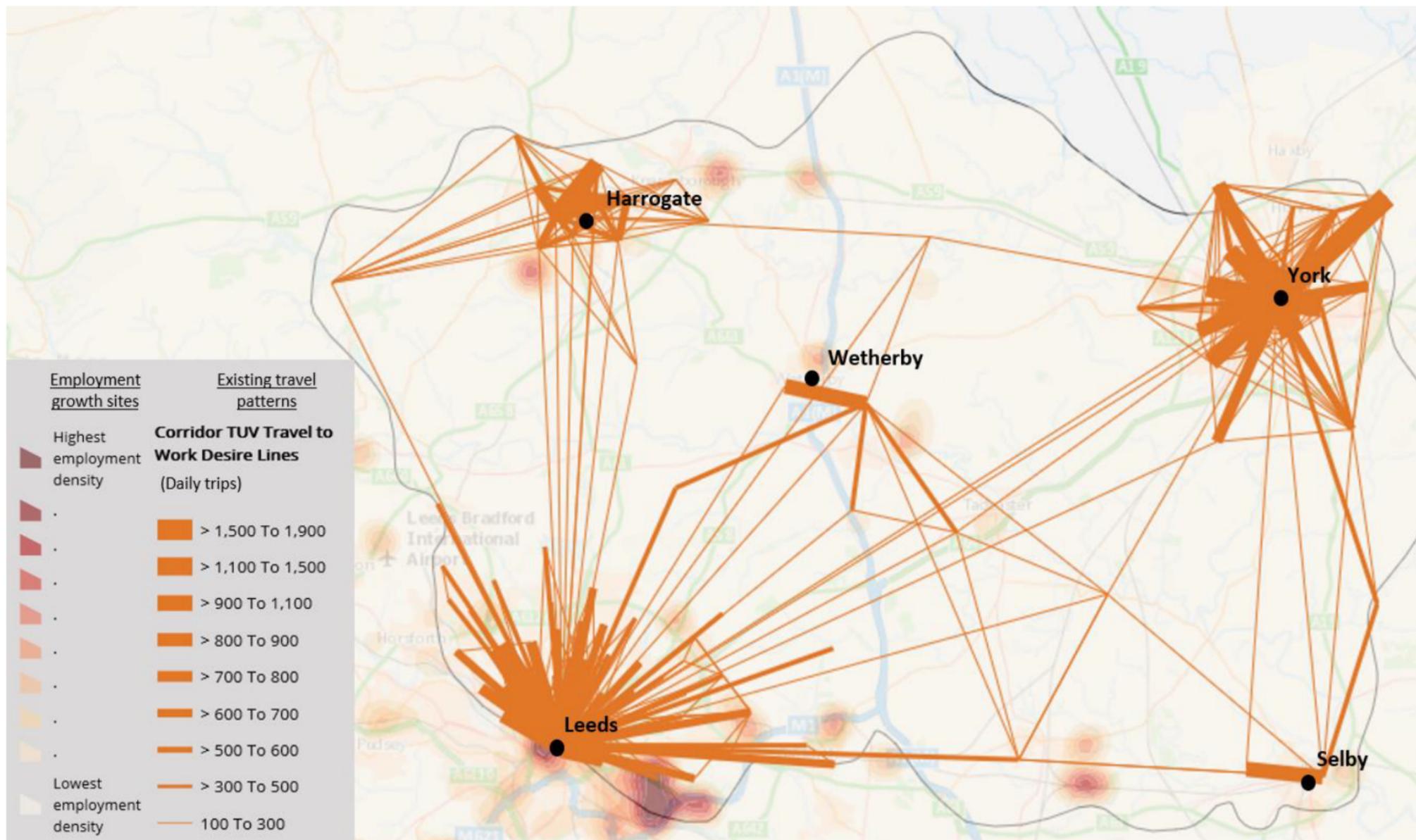
Places with opportunities for:



North Yorkshire to Leeds: connectivity highlights

People in communities within the corridor, including in Seacroft, parts of Alwoodley and central Selby experience low employment and skills prospects, low household income, and low car ownership. Seacroft is within the top 10% and Alwoodley and central Selby top 20% of most deprived communities in the UK.

Many job opportunities, often in wholesale and retail trade and storage and distribution, rely on car access and are poorly served by other modes. To improve the prospects of these communities, and to boost productivity, they must be better connected to suitable employment opportunities by a range of transport options.



Key connectivity challenges:

- 98,331 people in the corridor live within an isolated community, approximately 13% of the population. Improving access to employment destinations will help to **boost productivity**
- Central Selby is in the top 10% deprived areas for education in England. Micklefield and Seacroft are in the top 20%. Improving connectivity to education opportunities will ultimately help people to find better employment, helping to ensure **inclusive growth**
- Addressing poor levels of bus service in communities such as Thorp Arch and Sherburn in Elmet will help to deliver a **21st century transport system**
- High levels of peak-time traffic and associated congestion particularly on the roads in and out of, and around, Leeds and York, including the A64, A1237, A58, A61 and A6120 must be addressed to **tackle the climate emergency**

Investment is required in improved connectivity, particularly for trips to employment and education opportunities, including those at Sherburn in Elmet, western Harrogate, Thorpe Park, and in Leeds, York and Harrogate centres. Schemes that will best address these connectivity challenges will be taken forward into a West Yorkshire pipeline of interventions to deliver inclusive and clean growth.

2 Spatial context

This chapter sets out the key spatial challenges for each of our four regional priorities in the corridor. It presents the key outputs from the “story map” for this corridor; this is a web-based Geographical Information System (GIS) data repository and analysis tool, which summarises the key issues and opportunities in the spatial context and sits behind the Case for Change. The story map was developed from a wide range of spatial datasets and the resulting narrative was shared with and shaped by feedback from key stakeholders on top issues, opportunities and local priorities. These are presented alongside the major priorities for the City Region.

Please refer to Chapter 6 of the Appraisal Handbook for a summary of the datasets which form part of the evidence base for the “story map” that supports the development of the Case for Change.

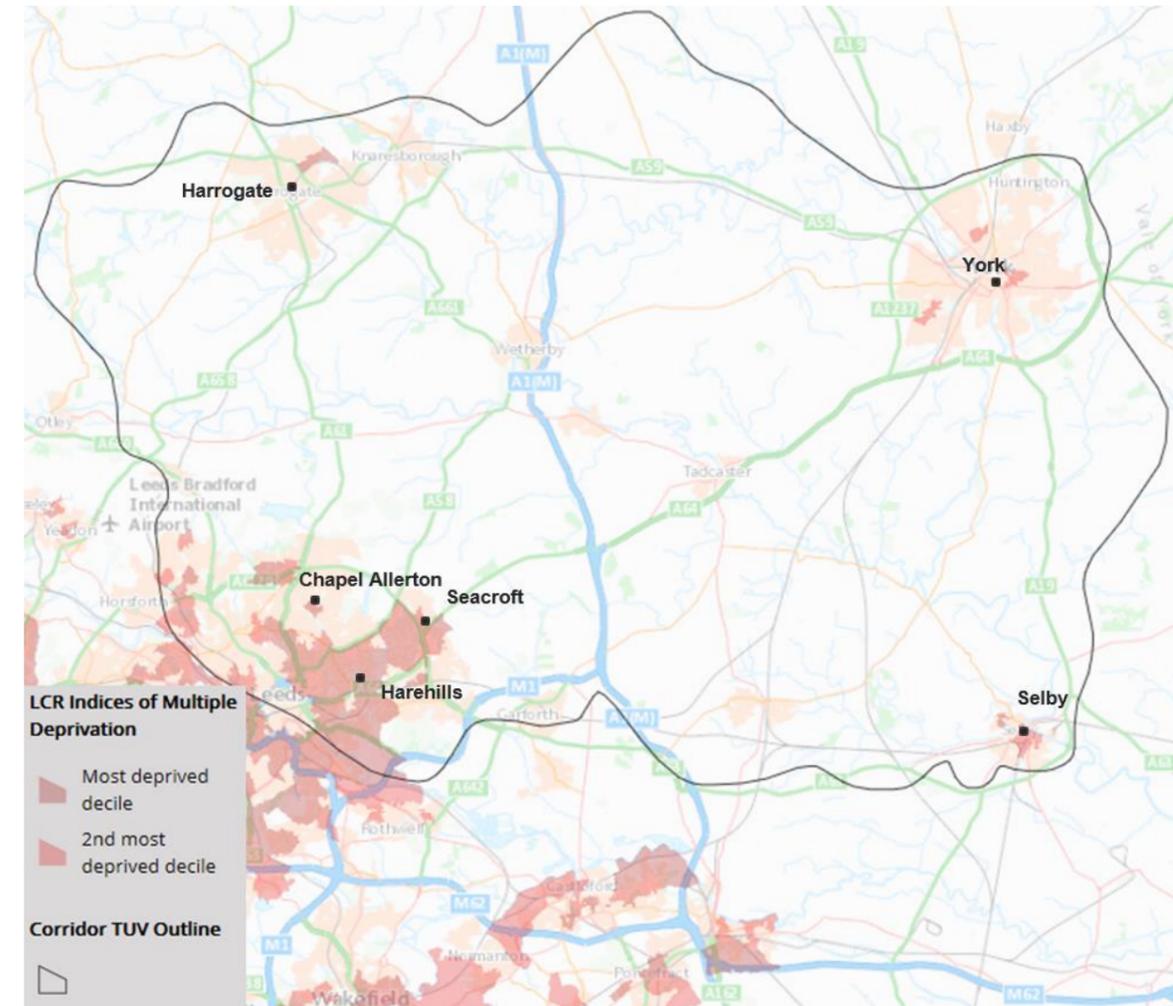
2.1 Enabling Inclusive Growth

2.1.1 Deprivation

Figure 5 shows areas that are within the top two deciles of the indices of multiple deprivation. Deciles are calculated by ranking the 32,844 Lower Super Output Areas (LSOA) in England from most deprived to least deprived and dividing them into 10 equal groups. LSOAs in decile 1 fall within the 10% most deprived LSOAs nationally, whilst LSOAs in decile 10 fall within the 10% least deprived of LSOAs nationally². The index of multiple deprivation is an overall relative measure of deprivation constructed by combining seven domains of deprivation according to their respective weights.³ These include:

- Income Deprivation
- Employment Deprivation
- Education, Skills and Training Deprivation
- Health Deprivation and Disability
- Crime
- Barriers to Housing and Services
- Living Environment Deprivation

Figure 5: Areas of high deprivation



Source: Mott MacDonald

Most of the deprived areas within the corridor are in areas within north-east Leeds, including Seacroft. Smaller pockets of deprivation are also seen in Bilton in the north-east of Harrogate, central Selby and parts of York such as Clifton. These are associated with poor levels of health and economic activity.

Central Selby is in the top 10% deprived areas for education in England. Micklefield and Seacroft are in the top 20%. Seacroft is also in the top 10% deprived areas for health in England and parts of Alwoodley is in the top 20%. **People in these areas are more likely to suffer from poor connectivity and fewer opportunities to access jobs and education and many will rely on convenient and reliable transport; connecting these areas is vital to enabling inclusive growth⁴.**

² English Indices of Deprivation 2015 – Department for Communities and Local Government

³ ibid

⁴ Tackling transport-related barriers to employment in low-income neighbourhoods (2018) accessed via: <https://www.jrf.org.uk/report/tackling-transport-related-barriers-employment-low-income-neighbourhoods>

2.1.2 Isolated communities

Isolated communities have high levels of deprivation (are within the top 20% most deprived in England) and can access a lower than average number of employment destinations. Residents find that job opportunities are difficult to access because of public transport journey times, reliability (perceived as well as actual) and affordability⁵.

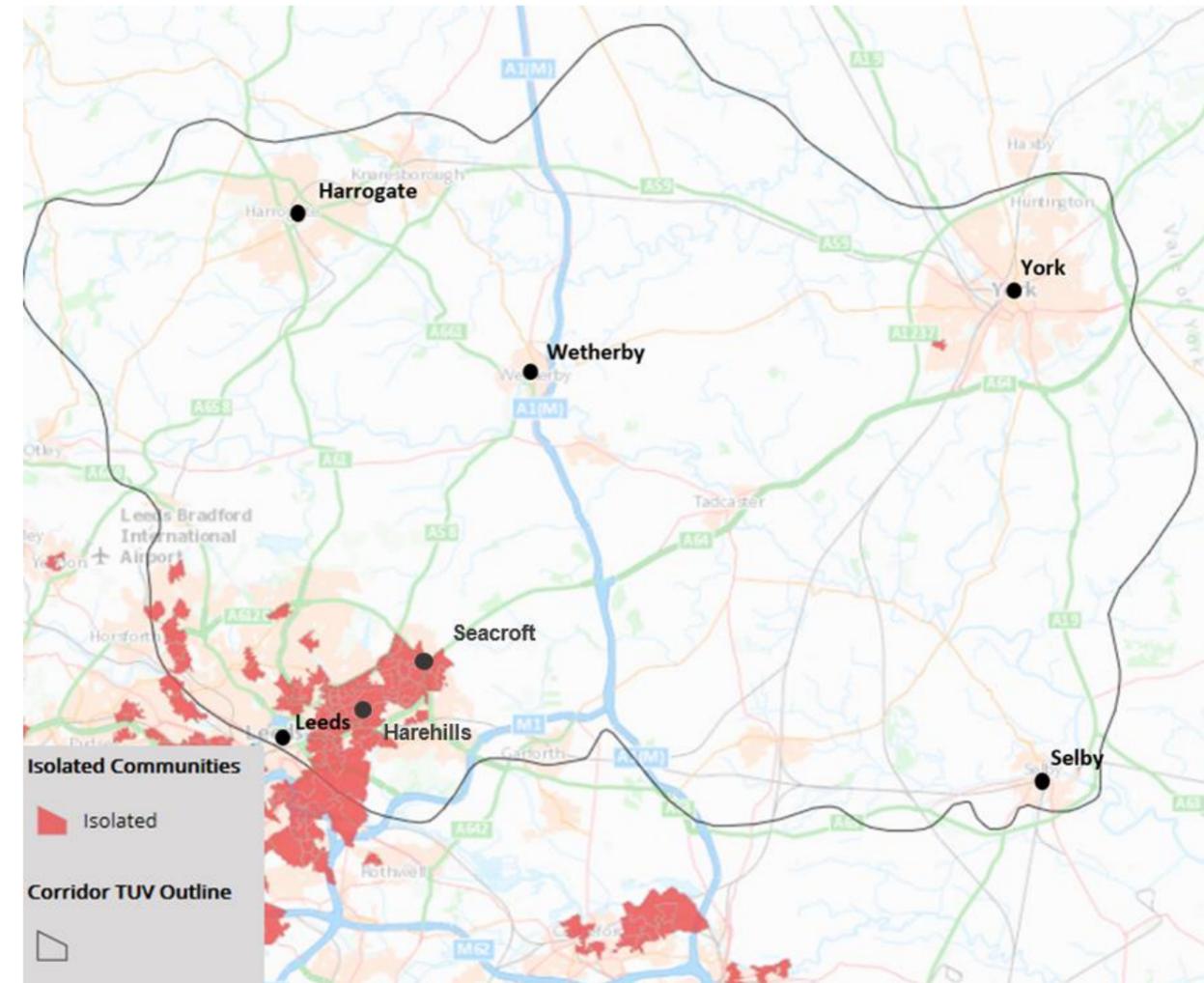
This uses the approach adopted for the Joseph Rowntree Foundation for “*Tackling transport related barriers to employment in low-income neighbourhoods*” – Census data (distance travelled to work, and the average number of destinations people can reach for journeys to work across the Leeds City Region).

Areas that are defined as “isolated communities” in this corridor are concentrated in the north east of Leeds including Seacroft and Harehills and along the south western edge of the corridor around Hawksworth (see Figure 6). Despite the proximity of Seacroft and Harehills to the centre of Leeds, issues with public transport reliability and affordability combined with the nature of low-wage and insecure work limits access to job opportunities for these communities.

Around 98,331 people in the corridor live within an isolated community, approximately 13% of the corridor.

Improving connectivity in these areas is fundamental to enabling inclusive growth. People within these communities are unable to access many destinations for work, meaning many people have limited access to job opportunities. Many people in isolated communities also rely on affordable, convenient and reliable transport to access education and job opportunities. Ensuring that these areas are well connected by public transport to access employment and education is fundamental to achieving inclusive growth⁶. The concentration of isolated communities in the south western part of the corridor is striking, with much of the area being relatively wealthy with good access to a range of opportunities. Partners have also highlighted that there are some self-contained communities where residents work and live within one place, including for example Wetherby.

Figure 6: Isolated communities



Source: Mott MacDonald

⁵ Tackling transport-related barriers to employment in low-income neighbourhoods (2018) accessed via: <https://www.irf.org.uk/report/tackling-transport-related-barriers-employment-low-income-neighbourhoods>

⁶ Tackling transport-related barriers to employment in low-income neighbourhoods (2018) accessed via: <https://www.irf.org.uk/report/tackling-transport-related-barriers-employment-low-income-neighbourhoods>

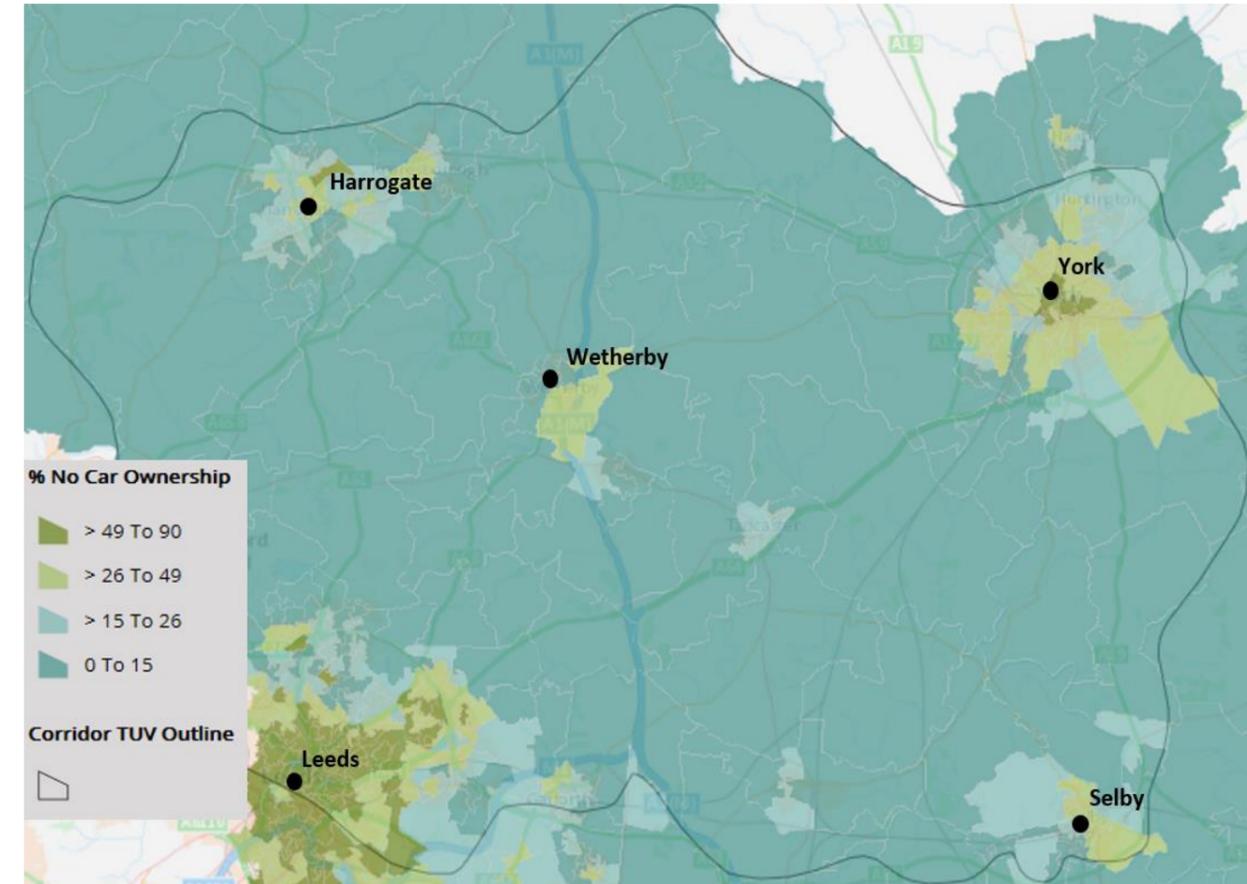
2.1.3 Car ownership

Due to much of the corridor area being rural and comparatively affluent, car ownership in most places is high, shown in Figure 7. However, in the central and north-eastern areas of Leeds, as well as in the centres of Harrogate, York and Selby, car ownership is much lower. This restricts access to learning and employment opportunities that exist outside of immediate communities. Access to opportunities is further compounded for people living in isolated communities such as those in the north-eastern areas of Leeds. Whilst public transport options might exist residents are constrained by reliability and affordability⁷.

Partners have highlighted that many warehousing sites are in out-of-town locations and poorly accessible by any modes other than private car (e.g. Sherburn in Elmet). These sites also employ workers on different shift patterns, meaning that many sites with a public transport connection are poorly served outside of traditional peak times.

Ensuring that key employment areas are connected by good public transport links in both peak and off-peak periods will enable people to access employment opportunities without private vehicle ownership. A high-quality integrated transport system will also encourage people to choose to travel by public transport rather than car which is key to meeting carbon reduction targets.

Figure 7: % No car ownership



Source: Mott MacDonald

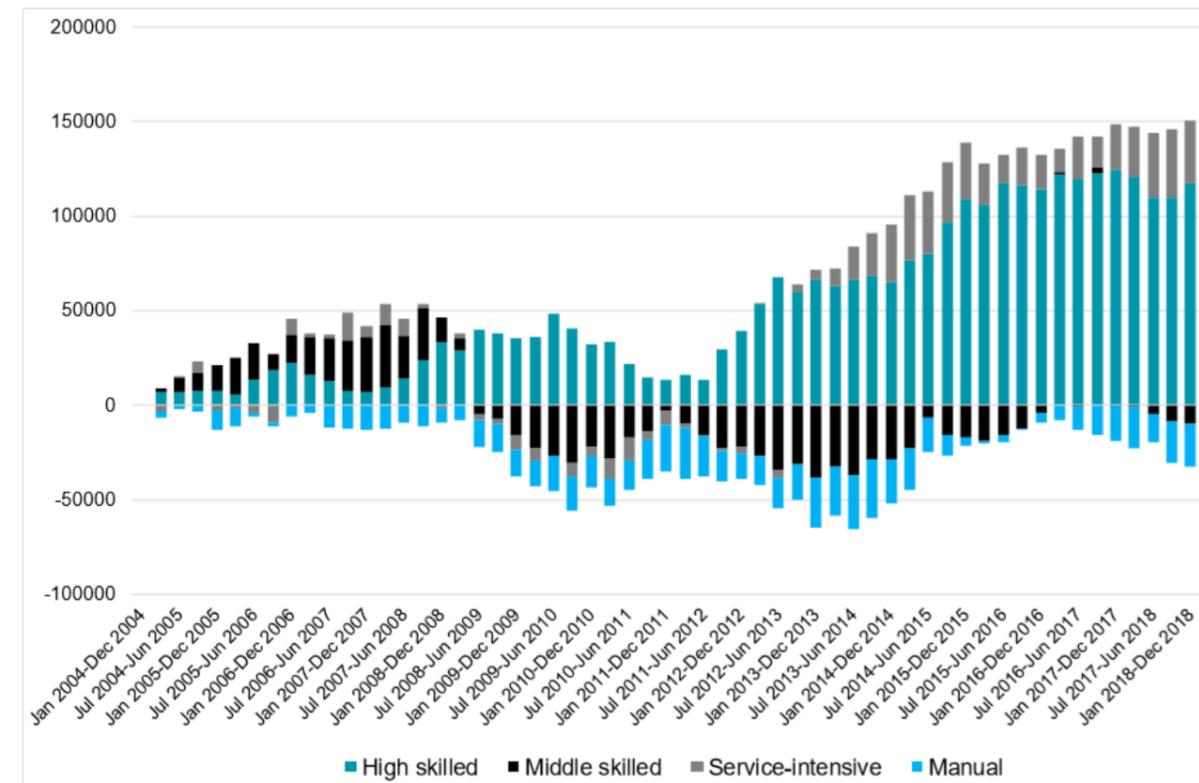
⁷ Tackling transport-related barriers to employment in low-income neighbourhoods (2018) accessed via: <https://www.irf.org.uk/report/tackling-transport-related-barriers-employment-low-income-neighbourhoods>

2.2 Boosting Productivity

2.2.1 Employment characteristics

The emerging Industrial Strategy for West Yorkshire highlights an increase in highly skilled employment in the City Region (see Figure 8). In this corridor, it impacts on highly skilled workers in the finance, insurance and engineering industries who commute into central Leeds. This impacts commuting flows as these workers often commute further and travel more. Having an effective and reliable transport system is therefore paramount to maximise productivity in the region.

Figure 8: Occupational contribution to cumulative employment growth



Source: West Yorkshire Industrial Strategy

The North Yorkshire to Leeds corridor has some distinct employment characteristics and strengths.



Total jobs in the corridor:

Over
412,090



% in employment:

59%

Yorkshire and Humber **60%** England and Wales **62%**

In terms of the number of employees, the financial and insurance activities sector employs 23,954 people, just over 1.5 times the national average⁸. The electricity, gas, steam and air conditioning supply sector has twice the national average, employing 3,671 people. Wholesale and retail trade employs the highest number of people, 62,688. This sector operates shift patterns outside of the traditional timetables and schedules of current public transport routes.

The emerging Industrial Strategy highlights employment growth patterns in the corridor; in 2015-2017 Selby and York saw faster employment growth than the national average (2.6%), with Selby's employment growth double the rate of the UK. In contrast, Harrogate had zero growth over the same period. However, Harrogate has an above average job density, along with Leeds, whereas Selby has a below UK average job density. The percentage of vacancies which are difficult to fill due to poor public transport links in the Leeds City Region is 13%, compared to the UK average of 11%. In North and East Yorkshire and the City of York, this figure rises to 19%.

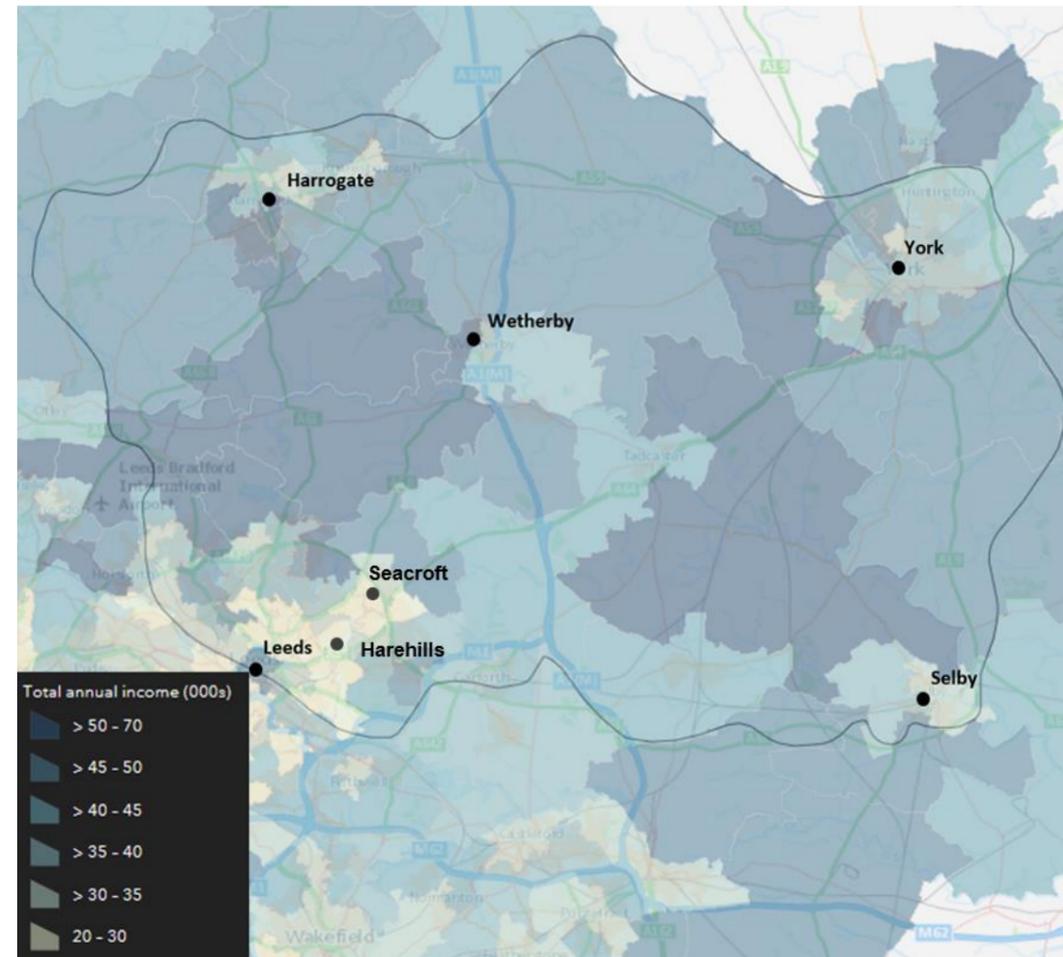
Connectivity to job opportunities is fundamental to boosting productivity.

⁸ Business Register and Employment Survey: open access (2017)

2.2.2 Household income

Average total annual household income in the corridor (£40,209) is just lower than the average for England and Wales (£41,642) but higher than the average for Yorkshire and Humber (£36,526). It is particularly low in areas within north east Leeds such as in Seacroft (£27,200), in eastern Harrogate (£33,100) and pockets of York including Clifton (£33,600) and Chapelfields (£33,700) (shown in Figure 9). The gross value added per head (GVA) for Leeds is 8% higher than the UK average, while York's GVA is 92% of the UK average and North Yorkshire is around 80%⁹. This general measure of prosperity shows the need for better connections in the area to create opportunities to help enhance the economy and bring it up to national levels.

Figure 9: Total annual household income



Source: Mott MacDonald

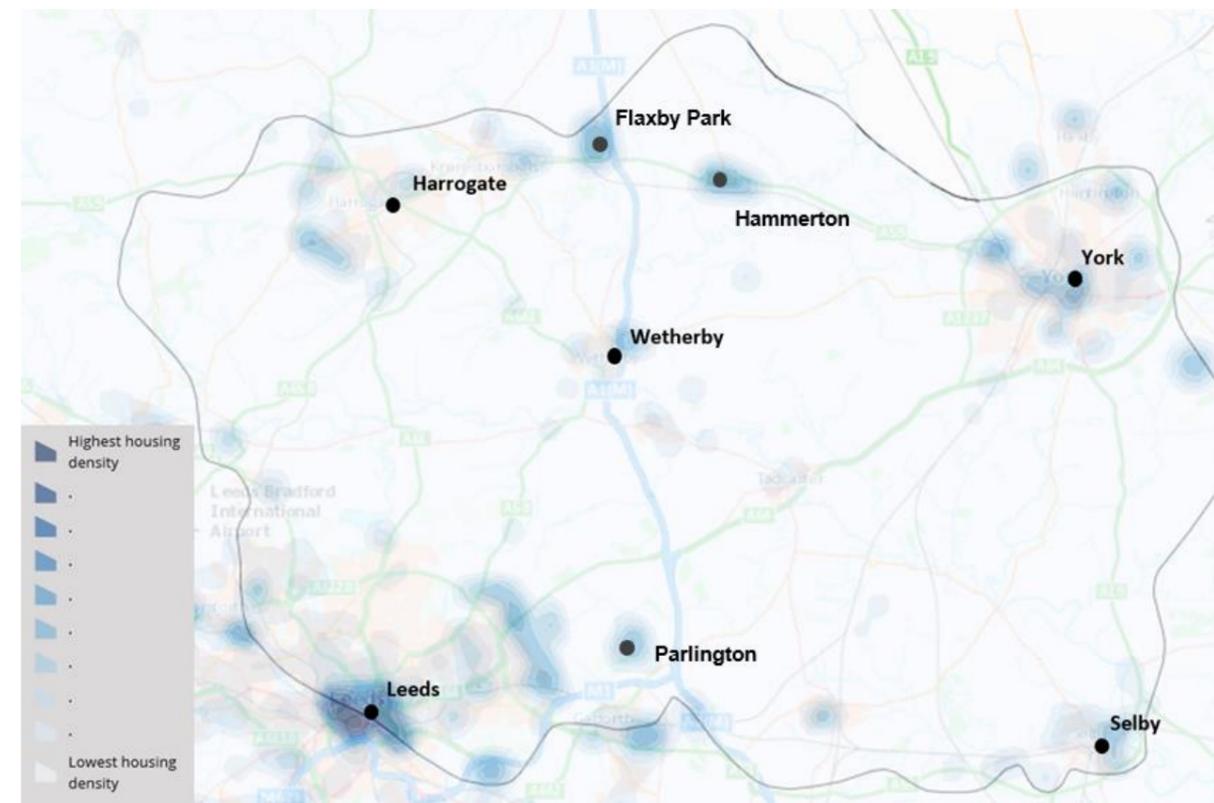
Connecting areas of deprivation and low annual household income is important to provide opportunities for people to access education and employment and in enabling inclusive growth throughout the corridor.

⁹ Appendix A: TCF Evidence Baseline Report – West Yorkshire Combined Authority September 2019

2.2.3 Growth areas

Figure 10 shows a heatmap of housing growth sites in the North Yorkshire to Leeds corridor. Major housing developments are proposed at Flaxby Park (2,750 dwellings) to the east of Knaresborough and adjacent to the A1(M), and the site of a potential new Park and Ride station; at Hammerton (3,000 dwellings) to the east of the A1(M); and in Harrogate (2,000 dwellings). There is also a major mixed-use development at York Central consisting of leisure, retail, office space and a hotel. This brownfield site is in the heart of York, adjacent to the current urban centre. Development proposals at Parlington (52ha employment land) to the north of Garforth near J47 of the M1, include a new Garden Village (approximately 800 new dwellings) to support the growth of Leeds¹⁰.

Figure 10: Housing growth sites heatmap



Source: Mott MacDonald

¹⁰ Parlington Draft Masterplan Report – July 2018

Figure 11 shows a heatmap of employment growth zones in the corridor. The Local Plans and draft Local Plans within the corridor identify several strategic sites. These include the Olympia Park site in Selby¹¹, as well as sites in York including the Elvington airfield and the University of York Campus East¹².

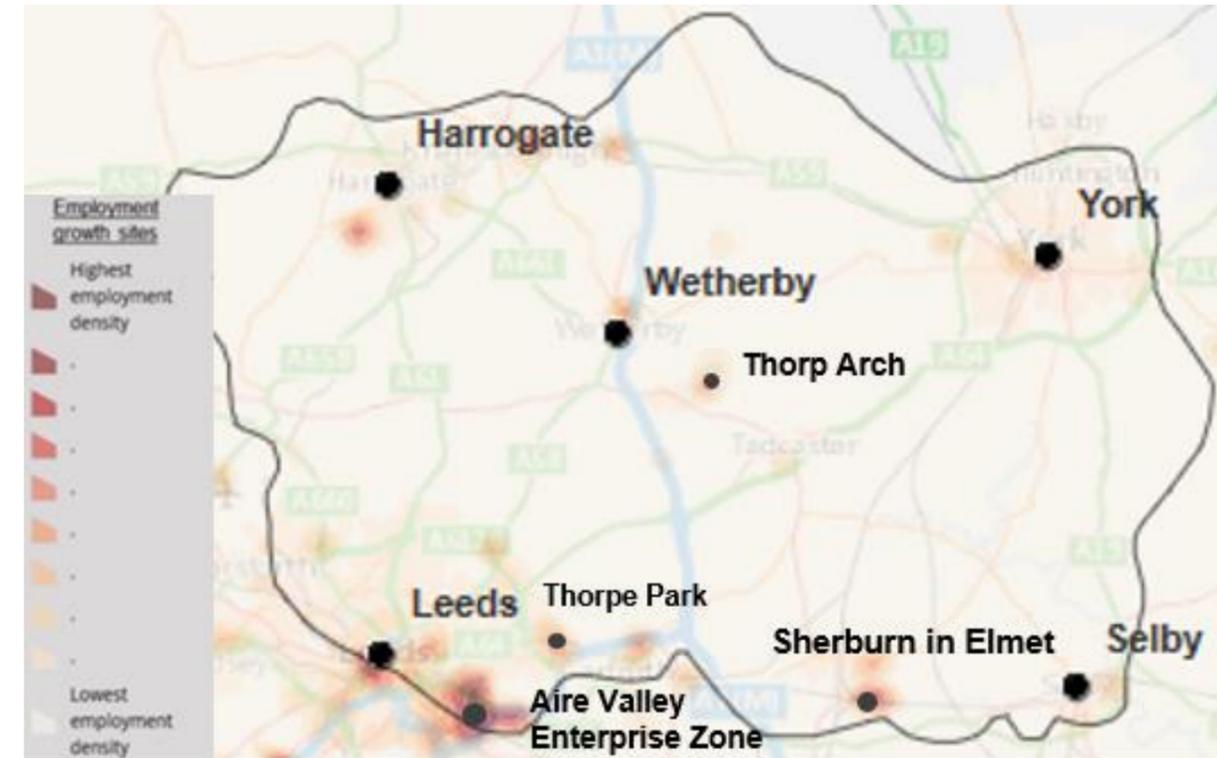
The employment growth zone in central Leeds has a high concentration of opportunities for office employment, which would increase existing commuter flows into Leeds from Harrogate, York and Selby. One of the most important developments is Leeds South Bank, with approximately 30ha of employment land. The Aire Valley Enterprise Zone including the Urban Eco Settlement (1800 dwellings) and approximately 100ha of new employment land, overlaps with the Five Towns to Leeds corridor. Partners also highlighted opportunities at the large employment sites in Sherburn in Elmet (100ha). Most future large employment sites at these developments are B2 (general industrial) and B8 (storage and distribution), indicating growth in these sectors of employment.

Elsewhere there are growth opportunities at York Central (82ha) and West Harrogate (50ha). Other important areas of growth include the mixed-use development at Thorp Arch (20ha) between Wetherby and Tadcaster and Thorpe Park (34ha) on junction 46 of the M1.

To maximise the economic potential that these bring, their connectivity requirements must be considered carefully, and in the context of the existing socio-economic issues. West Yorkshire's emerging Industrial Strategy identifies that over the past five years business base growth in Leeds (25%) and Selby (20%) has occurred faster than the UK (19%)¹³. However, growth in Harrogate (12%) and York (10%) has been slower. This emphasises the need for good transport options across the corridor to connect businesses to potential employees and custom.

Further housing growth (particularly with some of it being focused in locations adjacent to the A1(M)), and employment growth, emphasises the need to improve public transport connectivity to these areas, both from existing communities and new housing growth sites, to enable access to employment opportunities for everyone.

Figure 11: Employment growth sites heatmap



Source: Mott MacDonald

¹¹ Selby District Core Strategy Plan – 22nd October 2013

¹² City of York Local Plan - Initial Draft Local Plan Consultation (with proposed modifications) – June 2019

¹³ ibid

2.3 Tackling the Climate Emergency

2.3.1 Carbon emissions

The West Yorkshire Transport Strategy recognises that our transport network currently constrains opportunities for growth and is a key factor in shaping experiences of poverty, but also that our networks do not sufficiently support sustainable travel as the obvious choice for many.

This is reflected in the evidence that the transport sector is the largest emitter of damaging carbon dioxide in the region, with transport contributing 4.9 MtCO₂e/year (millions of tonnes of carbon emissions per year). Transport sector emissions are dominated by emissions from road transport with 4.4 MtCO₂e/year being from road transport¹⁴, representing roughly 40% of total CO₂ emissions in West Yorkshire (11.1 MtCO₂e/year)¹⁵. Road transport emissions are dominated by emissions from private cars, vans and lorries - with conventional petrol and diesel internal combustion engines the dominant technology across all vehicle types.

In June 2019 the Combined Authority, in line with all the West Yorkshire partner councils and most Leeds City Region local authorities, formally declared a Climate Emergency. This declaration signals the Combined Authority and partner councils' ambition for the region to become net zero-carbon by 2038, with significant progress being made by 2030. The 2038 target was determined following work by the Tyndall Centre for Climate Change Research, which was commissioned to create a science-based carbon budget for the Leeds City Region that is consistent with the objectives of the UN Paris Agreement on Climate Change (Paris Agreement) and the Intergovernmental Panel on Climate Change (IPCC)¹⁶.

The Combined Authority published, in July 2020, the findings of a Carbon Emissions Reduction Pathways (CERP) study¹⁷. This report, produced for the Leeds City Region and York and North Yorkshire local enterprise partnerships, is the first step in identifying the actions needed to create a net zero carbon economy.

While three pathways have been identified through the CERP work, there are several common actions identified in all the pathways, including a series of measures on transport. These modelled pathways all recognise the need for further modal shift to achieve the scale of reduction in carbon emissions from transport required to meet the ambitious net zero target and timeline.

Transport is therefore a critical sector for carbon emissions reduction across West Yorkshire requiring ambitious action that goes beyond current national policy and targets. The CERP asserts that this will require a significant shift in behaviour change and the fast adoption of low carbon technology.

At the time of publication, no further specific evidence on carbon emissions was available (pending release of West Yorkshire Combined Authority Emissions Reduction Pathway study and other work on carbon emissions), however **these influences, once understood, will be critical in understanding and prioritising connectivity requirements in future.**

2.3.2 Air quality

Partners across West Yorkshire, including the Combined Authority, the five district councils, and Public Health England, have developed the West Yorkshire Low Emissions Strategy (2016). The focus of the strategy is "tackling transport emissions as pollution from transport causes most local air quality problems".

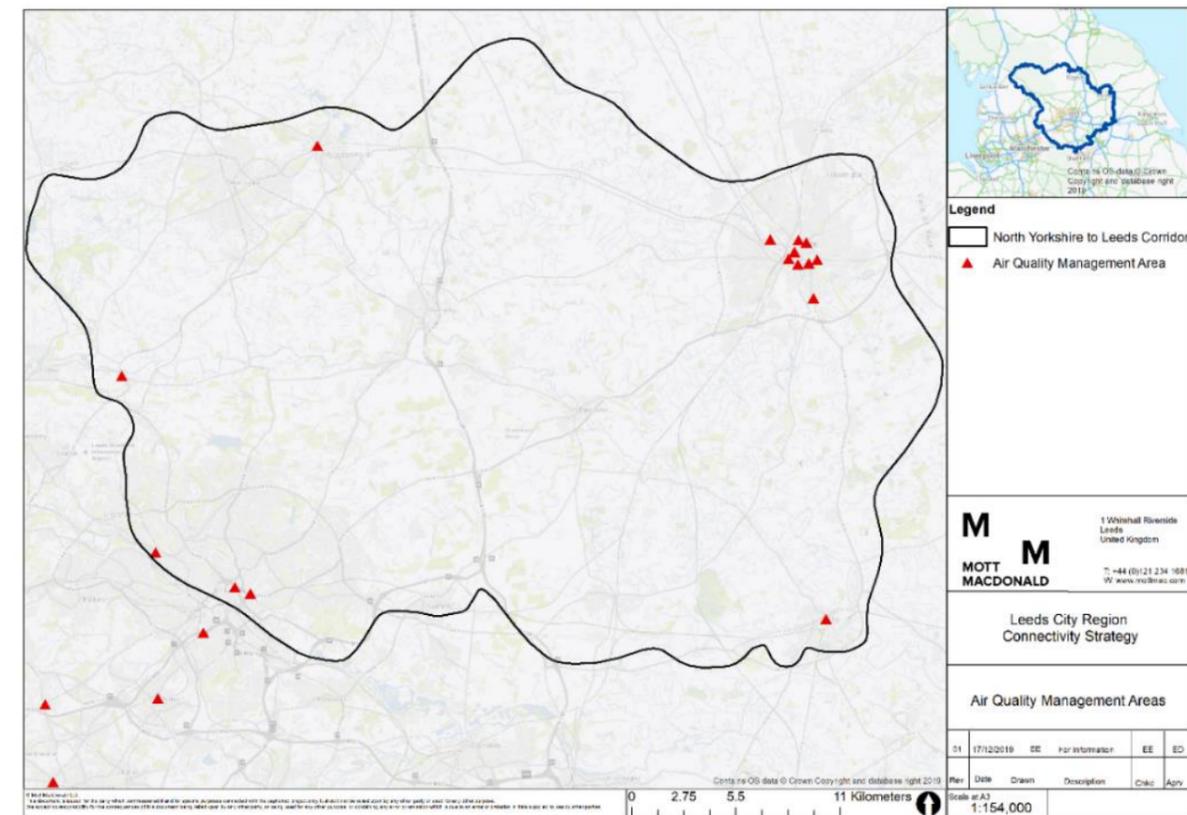
The strategy highlights that health effects associated with exposure to air pollution are significant; more deaths are caused by air pollution than preventable liver or respiratory disease. In West Yorkshire in 2013, 5.1% of all deaths (1 in 20 deaths) were caused by exposure to particulate air pollution with up to 6% in some local authority areas. Traffic in our urban centres and on busy roads results in levels of air pollution which have a significant impact on the health of the population, with those having underlying health conditions being most at risk. There are two pollutants of greatest concern: nitrogen dioxide (NO₂) and particulate matter (PM_n) which

have an adverse impact on health and mainly result from emissions from traffic, particularly exhaust emissions from older diesel vehicles.

Nitrogen dioxide and particulate matter, together with other air pollutants, have been set an upper air quality limit value that the general population should not be exposed to that is legally binding in UK law. Since 1997 each local authority has been carrying out review and assessment of air quality in its area, and where it is found likely that national air quality objectives will not be achieved, an air quality management area must be declared¹⁸.

There are several small Air Quality Management Areas (AQMAs) within the corridor (see Figure 12). A group of AQMAs covers the main road network in and around York, while a much smaller AQMA is in place at Bond End junction west of Knaresborough town centre. Partners highlighted air quality problems at Pool-in-Wharfedale, influenced by topography constraints and congestion issues. The impact of developments at Knaresborough, Thorp Arch and Thorpe Park will also need to be considered. Air quality has also been highlighted as an issue in Leeds with the proposed introduction of a Leeds Clean Air Zone (CAZ) covering the city centre and outwards to Roundhay and Cross Gates. **Facilitating sustainable modes of transport will reduce car use, enabling a consequent reduction in traffic congestion and the associated emissions that cause air pollution and poor air quality.**

Figure 12: Air Quality Management Areas (AQMA)



Source: Mott MacDonald

¹⁴ West Yorkshire Combined Authority, 2020. West Yorkshire Carbon Emission Reduction Pathways Key Findings Report. Available at: <https://westyorkshire.moderngov.co.uk/documents/s16572/Item%2011%20-%20Appendix%201.pdf>

¹⁵ ibid

¹⁶ ibid

¹⁷ ibid

¹⁸ Department for Environment Food & Rural Affairs at <https://uk-air.defra.gov.uk/aqma/> accessed in October 2020

2.4 Delivering 21st century transport

2.4.1 Active modes

The ability for people to cycle and walk more safely, and more often, has a significant role to play in the wider strategic transport network in West Yorkshire and the wider Leeds City Region.

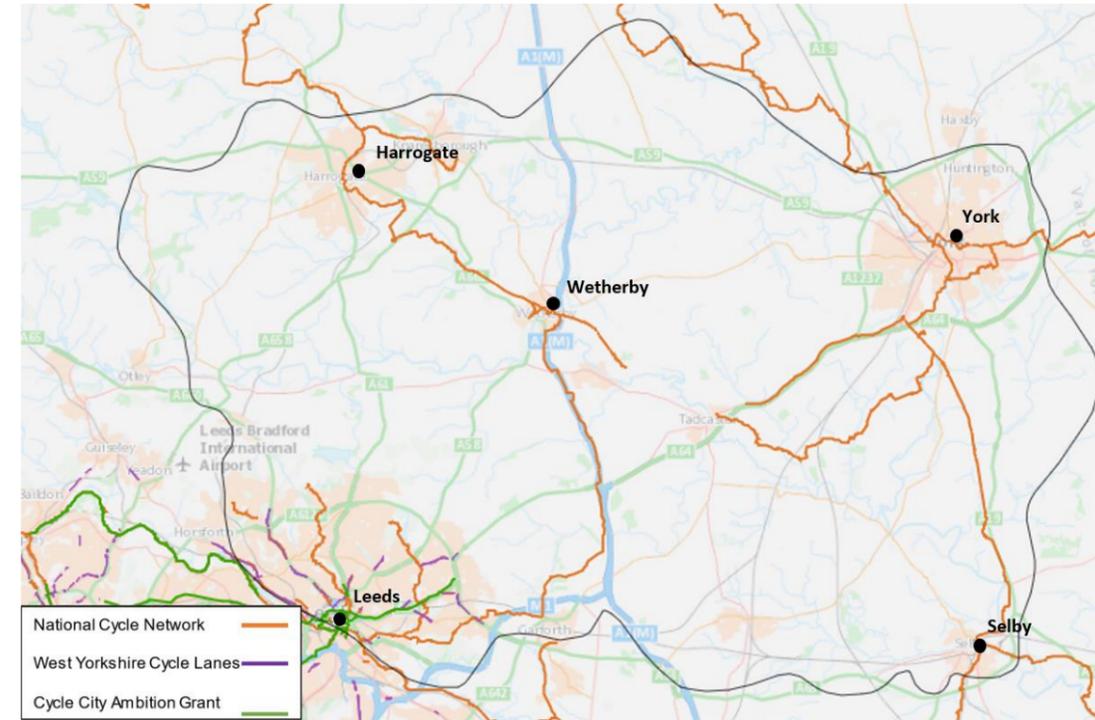
The quality of the active travel network varies within this corridor.

Figure 13 identifies the National Cycle Network (NCN) providing some good connections on routes from Harrogate to Wetherby, around York and between York and Selby and York and Tadcaster. However, there is an absence of on-highway provision throughout the corridor and further gaps to the off-highway network along the southern extent of the corridor around South Milford and Garforth and along the western extent around Pool-in-Wharfedale.

The gap in infrastructure along the A64 is a barrier for both people travelling by bike and on foot. There has been recent improvement to the more urban areas of east Leeds, with the delivery of the Cycle Superhighway (CS2) and provision around the East Leeds Orbital Road and Outer Orbital Road being delivered by the Connecting Leeds programme. The gap in provision towards York means that active travel from Leeds' hinterland will be limited. The A64 also creates a significant severance for communities, urban and rural, for people wishing to travel by foot, with an absence of safe crossing points, and high traffic speeds experienced by people.

The geography and topography lend itself to a propensity for people to travel more by bike and by foot, but high quality infrastructure will be needed to see a significant increase in these journeys. Investment in infrastructure will improve connectivity to current and future employment and education opportunities within the corridor, particularly in areas that are presently only accessible by private car.

Figure 13: Cycle network



Source: Mott MacDonald

2.4.2 Bus

Bus service varies throughout the corridor. The number 36 bus service between Ripon, Harrogate and Leeds is regarded as a reliable service with good quality and frequency (every 20 minutes from Ripon, every 10 minutes between Leeds and Harrogate). However, in other directions northwards from the A6120 Ring Road, towards Wetherby, communities have one bus per hour (or less) in off-peak times. For the purposes of this study, bus service data was not collected for the North Yorkshire area.

There are several large warehousing, industry and distribution centres, such as those around Sherburn in Elmet in the corridor. Many of these sites have employees working different shift patterns and are not served by frequent bus services outside of peak hours. Partners have raised concerns that these employers are not able to recruit appropriate people due to the poor bus service and insufficient connections to South Milford station. Partners also mentioned issues for people commuting from the Five Towns into these employment areas in the south east of the corridor.

Partners have identified that bus service provision is inconsistent in the North Yorkshire section of the corridor. Some urban areas have frequent connections, such as between Wetherby and Harrogate and York and Selby. Additionally, there are regular services into Leeds from both Wetherby and Tadcaster. However, connections from Wetherby that are not into Leeds are limited, such as travelling between Wetherby and Tadcaster or towards York. Opportunities at Thorp Arch are not well connected to communities throughout the corridor, with only one bus per hour during peak times. As a result of the poor bus service and absence of rail service (see Section 2.4.3), people in the north-east of the corridor are forced into high levels of car ownership or become isolated.

2.4.3 Rail

The current passenger rail network (see Figure 14) consists of:

- The Harrogate line: Leeds to Harrogate via Headingley and Horsforth, continuing via Knaresborough to York
- The main East Leeds line from Leeds via Garforth to York and points north, and to Selby and Hull
- The York – Pontefract – Sheffield (Dearne Valley) line
- The York – Selby – Hull route
- The York – Doncaster East Coast mainline runs to along the southern fringe of the corridor

Service levels are variable. The Harrogate line sees up to 4 trains per hour in the peak between Leeds and Harrogate, plus recently introduced trains to London every other hour, but these high service levels are not at present sustained at off-peak times, nor in the evenings nor on Sundays. Knaresborough – York at present operates only hourly, though an infrastructure scheme is being progressed to allow this to be doubled. Fast train frequencies on the Leeds – York line are very high (which places a significant challenge on reliability and line capacity), but local services are compromised in terms of frequency, stopping patterns, timetabling clockfaces and reliability¹⁹. Services on the York – Selby – Hull line have been improved in frequency terms in recent years but remain below long-term targets. In general, the perception of the quality of the diesel trains operating local and regional services is poor²⁰. The Dearne Valley route from York to Sheffield via Pontefract and Rotherham continues, despite strong partner support, to operate at only a skeleton level of two or three trains per day. A new station is to be constructed at Thorpe Park on the East Leeds line, though the congestion of the line has made identifying the appropriate stopping pattern of trains to serve it a challenge.

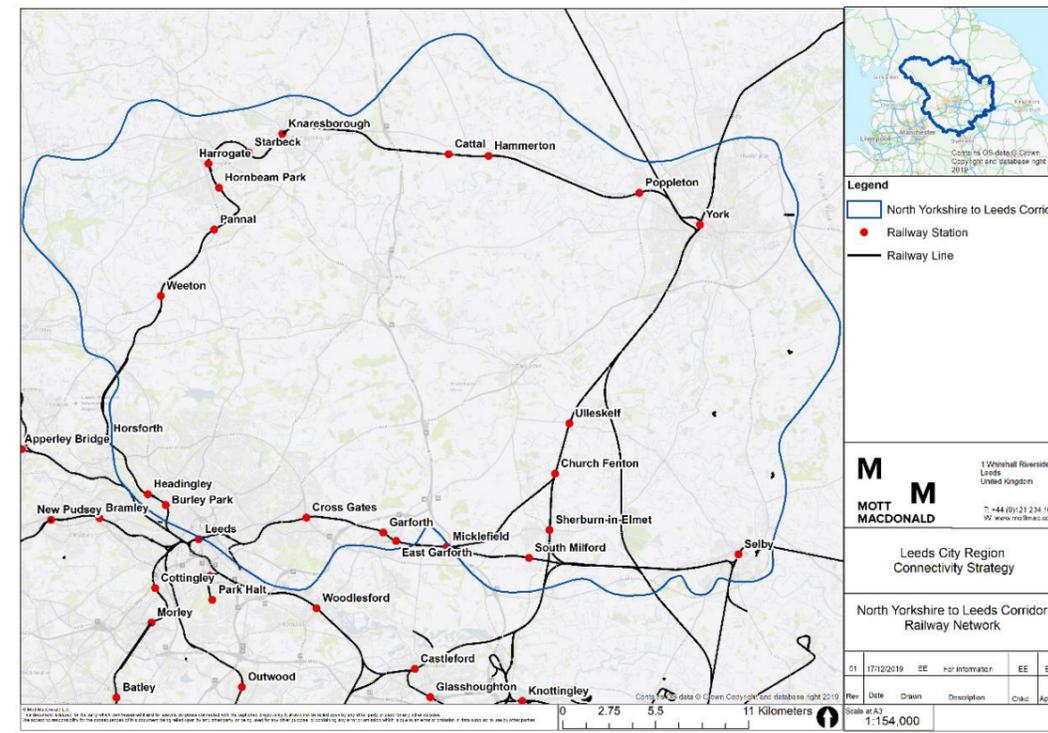
Other than on the East Coast mainline itself, freight is significant only on the Dearne Valley line, and operates at times on the East Leeds line, though partners have highlighted that congestion makes this challenging.

Challenges for rail services in the study area at present include severe peak crowding²¹, especially on local services out of Leeds towards Harrogate, York and Selby; limited network capacity to operate additional trains; variable station facilities and accessibility²²; inadequate station car-parking facilities; some poor access between stations and the communities they serve; and limited integration both between rail services and with buses. In addition, all lines in the study area, other than the East Coast Mainline between York and Doncaster, are at present wholly reliant on diesel traction.

Significant parts of the study area are not at present connected to the rail network, particularly in the north and north-east Leeds areas, such as Chapel Allerton, Scott Hall and Seacroft, despite these areas being densely populated. Wetherby and Tadcaster also have no rail service. These communities rely on the A58 and the A64 respectively for access into Leeds which adds to congestion and inhibits connectivity. Other network gaps highlighted by partners include the town of Otley (historically connected both to the Harrogate and Wharfedale lines), plus the lack of a rail link to Leeds – Bradford Airport (though a parkway station on the Harrogate line is planned).

While this report makes recommendations that are directly or indirectly relevant to rail, most rail content will be picked up separately in WYCA's Rail Strategy work. That Rail Strategy sits alongside these Case for Change reports, informed by them and informing them, and this report should be read in conjunction with the WYCA Rail Strategy.

Figure 14: Current rail network



Source: Mott MacDonald

¹⁹ Office of Rail and Road Passenger Rail Performance

²⁰ National Rail Passenger Service ratings, partner (plus stakeholder, user and political) feedback.

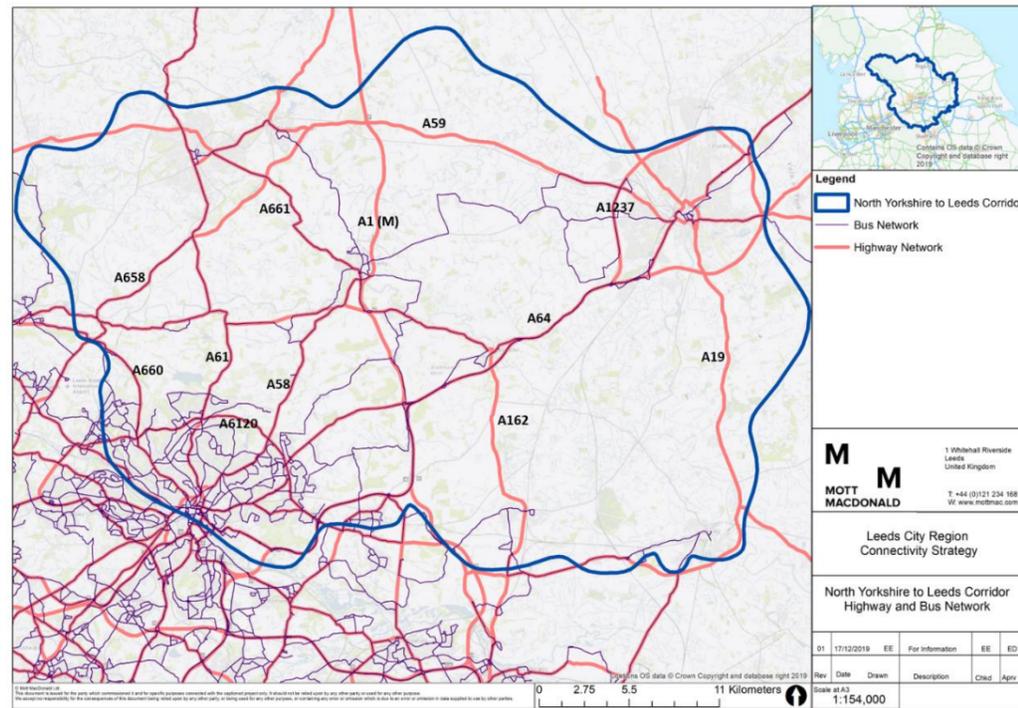
²¹ WYCA passenger counts and surveys

²² National Rail Passenger Service ratings, partner (plus stakeholder, user and political) feedback.

2.4.4 Road

Figure 15 presents the road and bus networks throughout the corridor. The strategic road network includes the M1 and the A1(M). Leeds is connected to Harrogate by the A61, Wetherby by the A58, York by the A64 and Selby by the A63. York is connected to Harrogate by the A59 and Selby by the A19 while the A661 connects Harrogate and Wetherby.

Figure 15: Current bus and highway network (A roads and motorway network)



Source: Mott MacDonald

2.4.4.1 Highway network performance

Figure 16 shows the speed difference (kmph) on the highway network between the peak and off-peak. There is a large reduction in peak speeds in and out of, and around, Leeds and York, with connectivity along the A19 to Selby and along the A59 to Flaxby impaired. There are also peak speed reductions on Leeds Ring Road, the A64 around Tadcaster, on the A659 between Harewood and the A1 (M), on the A658 Harrogate Road and along the M1 between the A1 (M) and Thorpe Park.

Partners highlighted congestion issues to the west of Harrogate and in central Harrogate which are exacerbated in the afternoon peak by tourism and leisure trips. Congestion problems are particularly serious along the A61, which causes severance and disruption to the smaller communities either side of the road, as well as a 30 – 50 kmph speed reduction at peak times on the A661 into Harrogate. The A1237 around York suffers from similar congestion issues.

Overall, the data suggests that congestion affects several interurban connector roads in the corridor, as well as the road network in major population centres. Introducing more opportunities to travel to these areas via public transport will help to tackle capacity constraints on the network and enable inclusive growth.

Figure 16: Highway network on-peak vs off-peak speed difference



Source: Trafficmaster

2.4.5 Patterns in transport demand

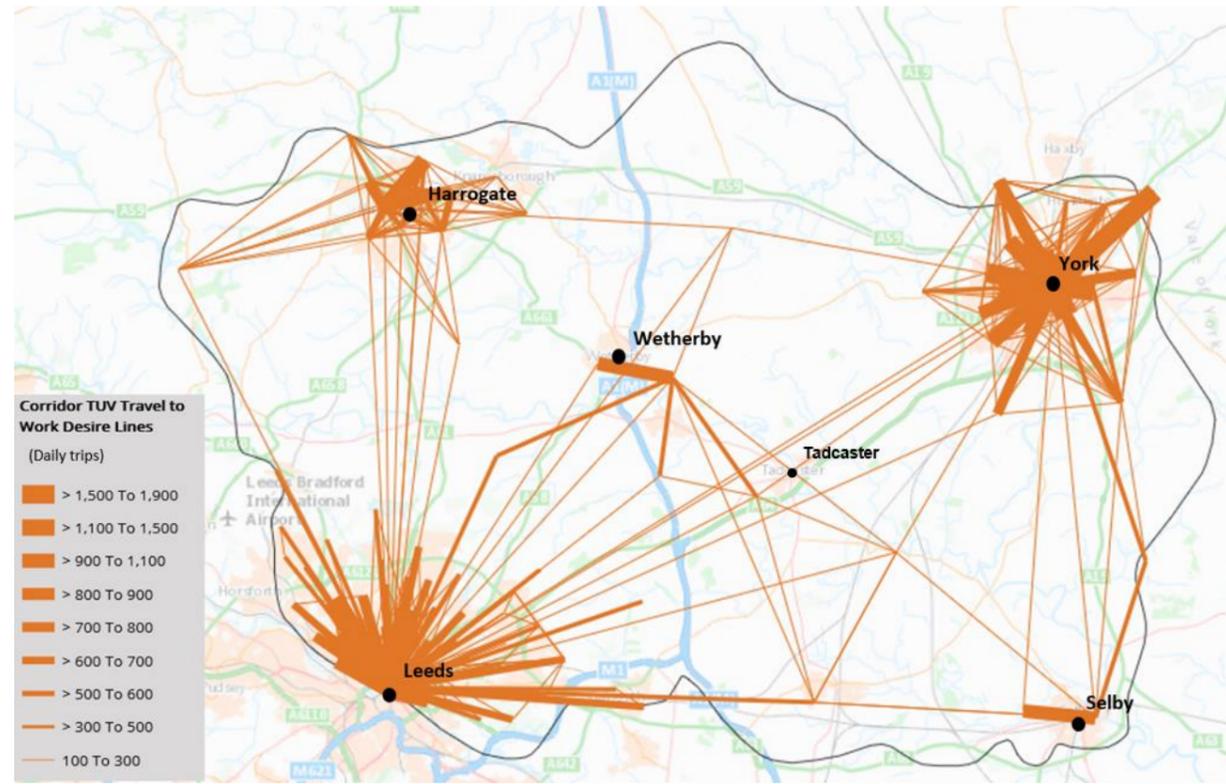
Figure 17 shows the key movements in the area (in the form of journey to work desire lines – person daily trips to work, Census 2011). These are contained within the urban centres as well as a pull into Leeds from Harrogate, Wetherby and York. Selby has a greater flow to and from York than Leeds.

There is also notable travel between Wetherby and Thorp Arch. Most employment opportunities in Wetherby are served by residents, resulting in short journeys to work, of 10km or less, and significant self-containment of the settlement in respect of employment. In contrast, Harrogate exhibits large daily commuting flows in and out of the area due to an imbalance in job opportunities and housing prices, with many residents commuting out to Leeds, York and London. Tadcaster provides a range of jobs, especially in the brewing sector. Commuters travel between Tadcaster, and Leeds and York in both directions.

Figure 18 and Figure 19 show new housing and employment sites and the current travel to work patterns. Housing growth is focused in Flaxby Park (2,750 dwellings), east of Knaresborough and adjacent to the A1(M), Hammerton (3,000 dwellings) to the east of the A1(M) and Harrogate (2,000 dwellings). Key employment growth sites include the Aire Valley Enterprise Zone (100ha), Sherburn in Elmet (100ha), York Central (82ha), West Harrogate (50ha) and Thorp Arch (20ha). These sites are likely to have a significant effect on travel patterns; it is crucial to connect these places with a range of travel choices to ensure inclusive growth.

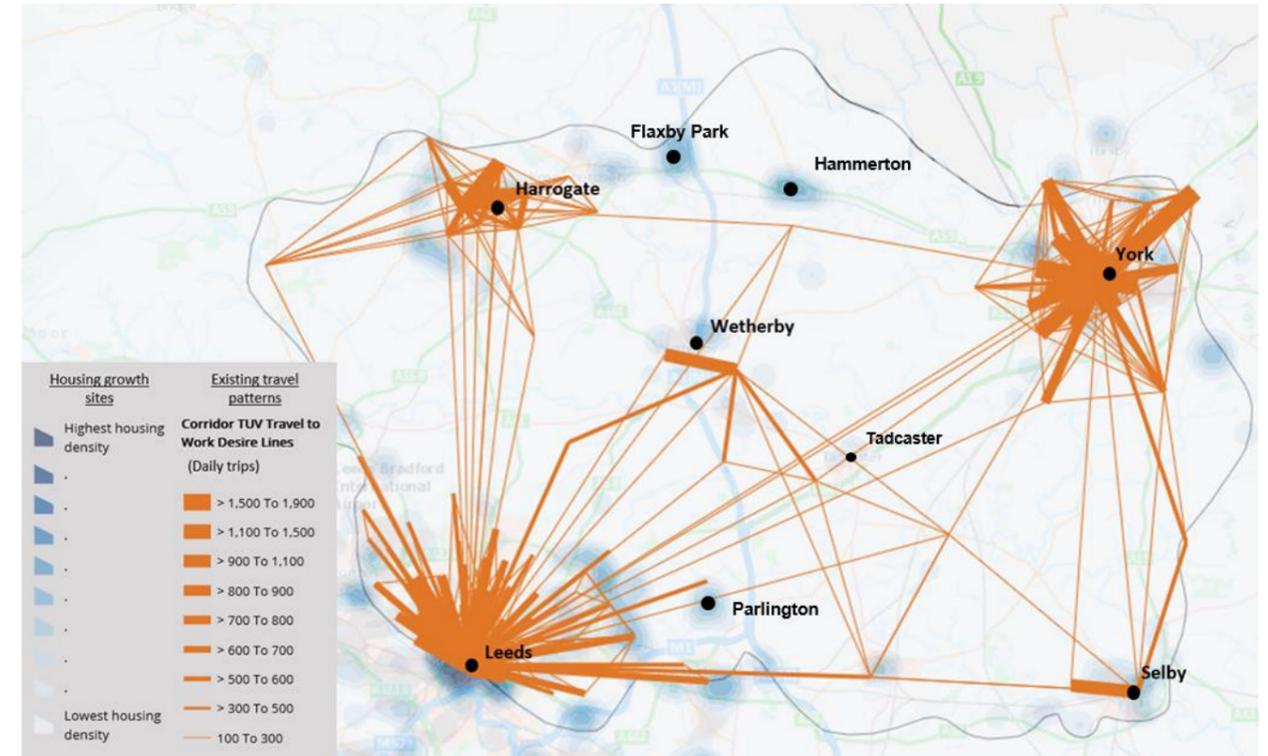
These graphics indicate that there is value in improving connectivity in this area, in order to broaden these limited travel horizons and ensure its current and future residents and employees benefit from the growth opportunities that will become available. They also illustrate the potential for travel patterns to change, where demand is likely to increase, and where investment needs to be made in order to connect people to these new growth sites. This is explained in further detail in Chapter 4.

Figure 17: Journey to work desire lines



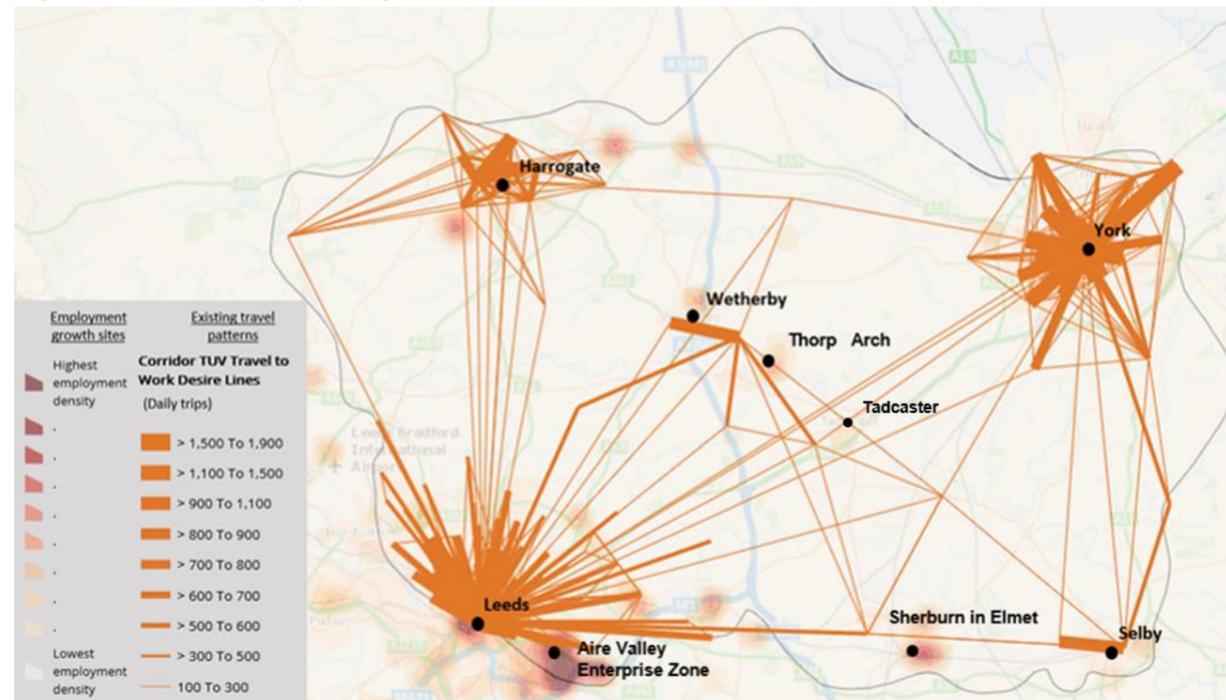
Source: Mott Macdonald

Figure 18: Future housing growth and current travel to work desire lines



Source: Mott Macdonald

Figure 19: Future employment growth and current travel to work desire lines



Source: Mott Macdonald

2.5 Summary

To enable **inclusive growth**, improved connectivity is needed to provide better access to work for people in communities within the corridor, including in Seacroft, parts of Alwoodley and central Selby. These communities are characterised by low employment and skills prospects, low household income (up to 35% below national average) and low car ownership, with several areas being within the 10% of most deprived communities in the UK.

Employment prospects in the south east of the corridor are focused on the wholesale and retail trade and storage and distribution sectors. Many of these prospects rely heavily on car access, and yet, there are several communities that lie within the corridor including central Leeds and York which are characterised by low car ownership (more than 50% of households do not own a car). The financial and insurance activities sector also plays an important role, particularly in the centre of Leeds.

There is therefore a disconnect between jobs located in places that have poor access for people without a car and communities with low car ownership. To improve the prospects of these communities, and to **boost productivity**, employment opportunities must be better connected to communities of the greatest economic need. Furthermore, increasing connectivity to highly skilled job opportunities through sustainable and reliable options will help drive and support commuting flows into Leeds, York and Harrogate.

There is also a skills gap. Central Selby is in the top 10%, Micklefield and Seacroft in the top 20% deprived areas for education in England. Improving connectivity to education opportunities will help close this skills gap and help people to find better employment, contributing to opportunities for everyone in the area. Improving productivity through better connectivity to employment and skills will also help improve broader economic indicators.

Several areas suffer from poor air quality, particularly in the urban areas of Leeds and York. To help **tackle the climate emergency** and achieve carbon emission targets, congestion and traffic levels on the strategic links into and around these centres must be addressed. Options for travel that has lower carbon emissions must be improved, both through cleaner public transport options and an expanded active travel network.

The Connectivity Plan for this area will focus upon **delivering 21st century transport** that connects the places of greatest economic need to employment and skills opportunities through greener modes of transport. Ensuring cleaner, greener modes are used will contribute to achieving a zero-carbon economy in the City Region.

The focus should be on:

- Strategic trips connecting key housing and employment hubs, such as Thorp Arch and Thorpe Park.
- Strategic trips from key transport and employment hubs towards opportunities in Leeds, York and Harrogate
- Localised trips connecting employment opportunities, especially along and across the border of North and West Yorkshire and towards the Five Towns, including in the north-east of Leeds and around Sherburn and Selby

Four summary maps have been created to summarise the spatial context highlights for each of the regional priorities. These are show in **Appendix A**.

3 Corridor aspirations

This section outlines the processes through which the corridor aspirations have been defined, and how they link to the evidence base and local policy.

Please refer to Chapters 4 and 8 of the Appraisal Handbook for details of how the West Yorkshire Connectivity Plan core objectives have been derived from key policy drivers and how they and corridor-specific aspirations are used in the development of the Case for Change.

3.1 Defining objectives

The core objectives have been derived from strategic visions and ambitions from policy and have been agreed with the West Yorkshire Combined Authority. They ensure that the West Yorkshire Connectivity Plan supports the delivery of the long-term vision for the Leeds City Region – as identified in the LCR HS2 Growth Strategy – as well as the priorities and ambitions outlined in the Strategic Economic Plan (SEP), the LCR HS2 Connectivity Strategy, and the West Yorkshire Transport Strategy 2040. These objectives are applicable to all inclusive growth corridors.

Corridor-specific aspirations have been developed from the key issues, opportunities and priorities identified in the workshop with local officer representatives. These objectives ensure that the interventions developed align with the priorities of Leeds City Region and its districts. Each intervention is assessed against both the core objectives and corridor-specific aspirations to ensure the best possible fit.

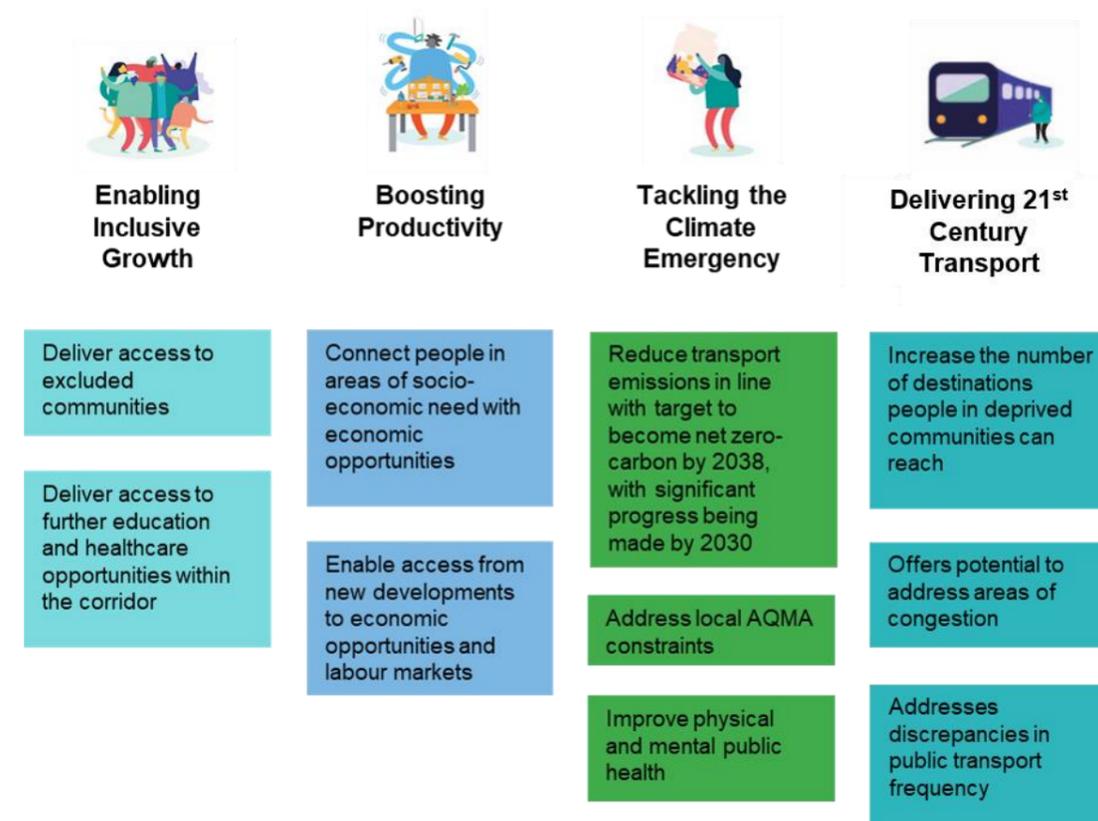
3.2 Core objectives

The West Yorkshire Connectivity Plan core objectives are aligned to the City Region's core priorities, as illustrated below:

The West Yorkshire Connectivity Plan Core Objectives are to:

- Connect people in areas of socio-economic need with economic opportunities
- Enable access from new developments to economic opportunities and labour markets
- Deliver access to further education and healthcare opportunities within the corridor
- Deliver access to excluded communities
- Increase the number of destinations people in deprived communities can reach
- Offer potential to address areas of congestion
- Address discrepancies in public transport frequency
- Reduce transport emissions in line with target to become net zero-carbon by 2038, with significant progress being made by 2030
- Address local AQMA constraints
- Improve physical and mental public health

Figure 20: Alignment of the West Yorkshire Connectivity Plan core objectives to the City Region's core priorities



3.3 Corridor-specific aspirations

Drawing on the key issues and opportunities identified from the evidence base, corridor-specific aspirations have been agreed for the North Yorkshire to Leeds, in consultation with stakeholders from Leeds, Harrogate, York and Selby districts.

The North Yorkshire to Leeds Aspirations are to:

- Reduce car use
- Ensure more deprived communities are connected to current and future job opportunities
- Improve connectivity to new housing and employment sites
- Address public transport frequency outside the peak hour
- Improve perception of access and increase travel horizons
- Improve public transport connectivity and access
- Address capacity issues on the rail network

These all align to current local policy documentation such as the North Yorkshire Local Transport Plan (2016 – 2046), the West Yorkshire Transport Strategy 2040 and the Interim Leeds Transport Strategy (2016).

3.4 Measuring objectives

3.4.1 The appraisal process

The core objectives and corridor-specific aspirations provide the foundation of the West Yorkshire Connectivity Plan options appraisal process, alongside spatial analysis. Interventions are assessed against a set of criteria aligned with the objectives, and the spatial evidence base in a Geographical Information System (GIS) – such as whether the intervention connects to areas of deprivation and employment, housing and education sites. A description of the data that underpins this is detailed in Chapter 7 of the Appraisal Handbook.

The outputs are then fed into the Mott MacDonald’s Investment Sifting & Evaluation Tool or “INSET” – this is a WebTAG-compliant decision support process, based on multi-criteria analysis. It enables interventions to be assessed and “sifted” against specially defined and flexible parameters which determine how well the interventions meet the objectives and corridor-specific aspirations.

INSET is like the Department for Transport (DfT) Early Assessment and Sifting Tool (EAST) but has been built to surpass its capabilities – such as the ability to assess interventions across a full range of themes, including economic, social and environmental indicators, depending on local circumstances, and to reflect on multiple future scenarios.

The appraisal is classified into four assessment themes, all linked to the core policy priorities. These are used to classify the core objectives and have specific scoring criteria – as shown in Table 3. The assessment themes also enable policy makers and scheme promoters to sift interventions that will meet specific policy drivers (e.g. economic growth, social, transport, environmental) enabling them to quickly respond to different funding opportunities as they come forward. Interventions can be assessed individually relative to other Business Case factors such as deliverability.

Table 3: Key themes for multi-criteria assessment

Core objective	Assessment theme	Scoring notes
<ul style="list-style-type: none"> Deliver access to further education and healthcare opportunities within the corridor Deliver access to excluded communities 	<p>Enabling Inclusive Growth</p> 	Based on the number of Equality, Diversity and Inclusion hotspots the intervention connects to as well as health and education sites. This theme helps to address the need to connect people including those in excluded communities to education and health facilities which links to the key objectives in the HS2 Connectivity Strategy.
<ul style="list-style-type: none"> Connect people in areas of socio-economic need with economic opportunities Enable access from new developments to economic opportunities and labour markets 	<p>Boosting Productivity</p> 	Based on the number of housing and employment growth sites the intervention connects to, as well as the affected population for deprivation, low car ownership and the total number of jobs. This helps to identify interventions that best help to improve inclusive growth by connecting people to jobs who are living in areas of deprivation and low car ownership.
<ul style="list-style-type: none"> Reduce transport emissions in line with target to become net zero-carbon by 2038, with significant progress being made by 2030 Address local AQMA constraint Improve physical and mental public health 	<p>Tackling the Climate Emergency</p> 	<p>At the time of assessment, no quantifiable evidence on carbon emissions was available (pending release of West Yorkshire Combined Authority Emissions Reduction Pathway study and other work on carbon emissions) – therefore, based on the broad understanding that significant modal shift alongside fast adoption of low carbon technology will be required, it is assumed that all schemes would inherently contribute to the decarbonisation agenda, unless they are road schemes.</p> <p>As a proxy, scoring was influenced by how many Air Quality Management Areas (where it can be reasonably assumed there will be action to tackle emissions from transport) and touchpoints with the National Cycle Network (which may positively influence mode shift to cleaner modes) the intervention connects to, as well as their performance against the Healthy Streets^{TM23} principles (again, an influence on positive mode shift to cleaner modes).</p>
<ul style="list-style-type: none"> Increase the number of destinations people in deprived communities can reach Offers potential to address areas of congestion Addresses discrepancies in public transport frequency 	<p>Delivering 21st century transport</p> 	Based on how well the intervention connects areas with low levels of existing travel identified as isolated communities as well as areas with a large speed difference between peak and off-peak periods on the highway network and those with poor levels of bus service. As these are transportation schemes, a high number of interventions scored well for this theme.

Source: Mott MacDonald

The multi-criteria analysis is done in three “sifts”. These are summarised below and the sub-criteria and scoring approach for each is available in Chapter 8 of the Appraisal Handbook.

Sift 1: Early sift. This is based on the potential for the intervention to address the Core Objectives – it is simply scored using a Yes / No outcome against a series of sub-criteria, linked to the spatial data in GIS. On its own, the early sift can be used to rule out interventions at a very high-level; i.e. if it does not address one or more of the four themes or policy priorities or does not meet a criterion or combination of criteria.

²³ Pedestrians from all walks of life; Easy to cross; Shade and shelter; Places to stop and rest; Not too noisy; People choose to walk, Cycle and use public transport; People feel safe; Things to see and do; People feel relaxed; Clean air.

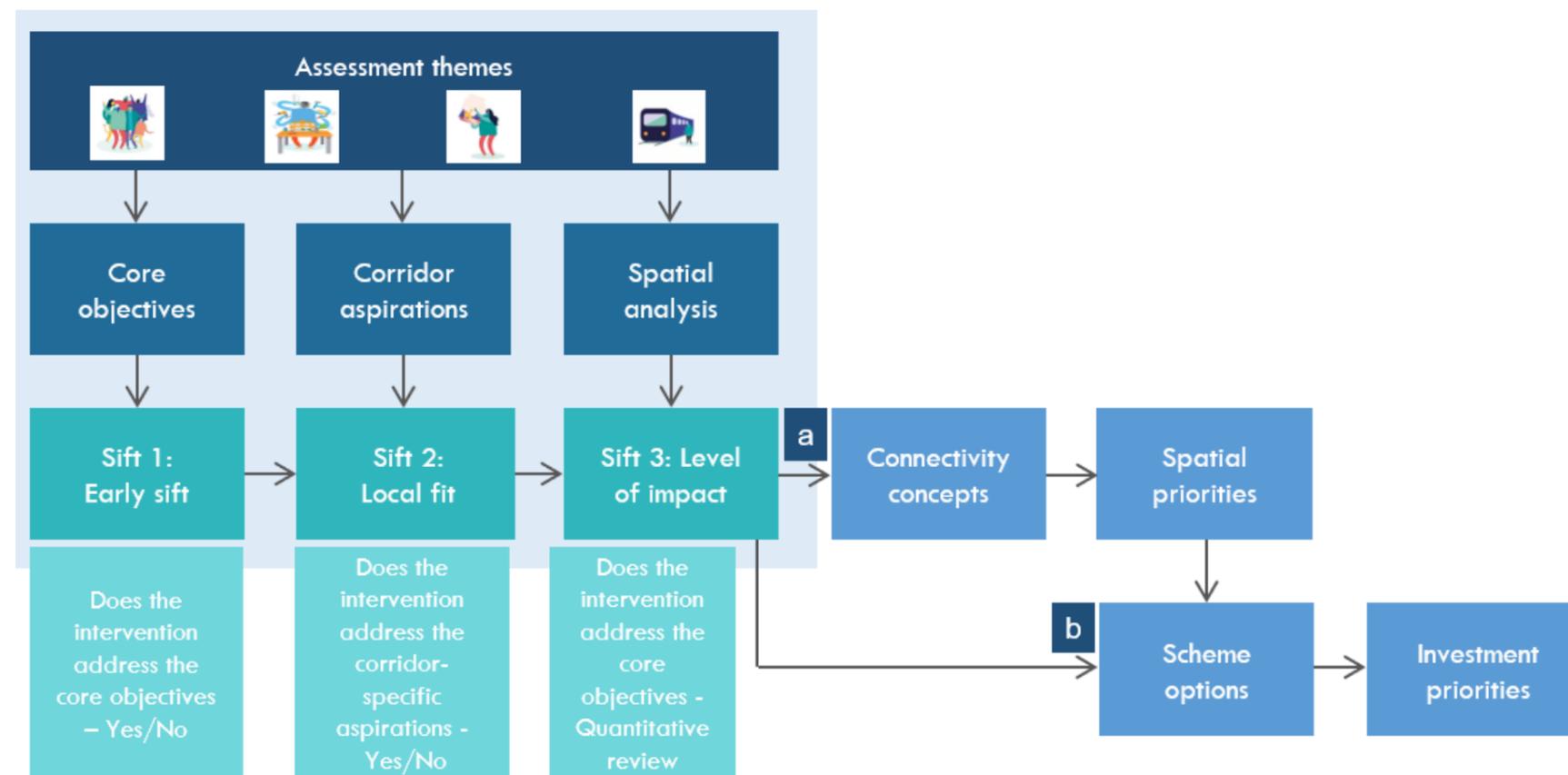
Sift 2: Local fit. This is based on the potential for the intervention to address the corridor-specific aspirations – again, it is simply scored using a Yes / No assessment by determining whether an intervention meets a certain criterion (or combination of criteria) and/or whether it is above or below a certain threshold for a given objective.

Sift 3: Level of impact. Like the first sift, this is based on the potential for the intervention to address the Core Objectives identified; however, the third sift has a *quantitative* element, drawing on the spatial evidence from the datasets in GIS. It also introduces a degree of standardisation to mitigate against the scale of intervention, and ensure schemes are tested fairly in terms of their level of impact relative to their size and spatial scale.

The key outcomes from the appraisal are two-fold – (a) a set of spatial priorities determined from several “connectivity concepts” (mode agnostic connections between key places – described further in Chapter 4), and (b) investment priorities determined from several interventions.

The diagram below summarises the appraisal process:

Figure 21: Appraisal process



Source: Mott MacDonald

The core appraisal adopted for North Yorkshire to Leeds assumes that all assessment themes have equal weighting or importance. However, the application of the appraisal process is very flexible and can be used to adapt to different requirements (e.g. a change in funding or policy environment). Different weightings can be applied to the four assessment themes. For example, the user can “switch-off”, “switch-on” or change

the weighting that is applied for the assessment themes and criteria to perform sensitivity tests or to simply enable interventions to be filtered for their suitability for future funding streams – such as how they score against specific policy levers, and their readiness or timescales for delivery (e.g. Transforming Cities). Corridor specific objectives can also be “switched-off” to enable a more Leeds City Region focused list of priorities. The appraisal process can also be used to better understand the relative strength or weakness of different interventions and can highlight opportunities to “repackage” schemes for future funding streams.

Please refer to Chapters 8, 9 and 10 of the Appraisal Handbook for the detailed workings of option appraisal process and its outcomes.

4 Determining spatial priorities

In determining spatial priorities, the evidence base and stakeholder workshops enable identification of key places to connect and resulting connectivity requirements for the corridor's economic area. From this, "connectivity concepts" are defined. At this stage, connectivity concepts do not relate to a specific transport mode or a specific route alignment. However, they do enable a strategic appraisal of whether there is merit in connecting people and places, as well as helping to define spatial priorities within the area. Connectivity concepts will allow further exploration of alignments, transport modes and specific interventions should they meet a series of key objectives.

4.1 Places to connect

Table 4 shows the key places to connect that have been identified, reflecting the inputs of partners and supported by the evidence base.

Key sections of the evidence base that have informed the identification of these places include:

- Section 2.1.1: Deprivation
- Section 2.1.2: Isolated Communities
- Section 2.2.1: Employment Characteristics
- Section 2.2.2: Household Income
- Section 2.2.3: Growth Areas
- Section 2.4.2: Bus
- Section 2.4.3: Rail

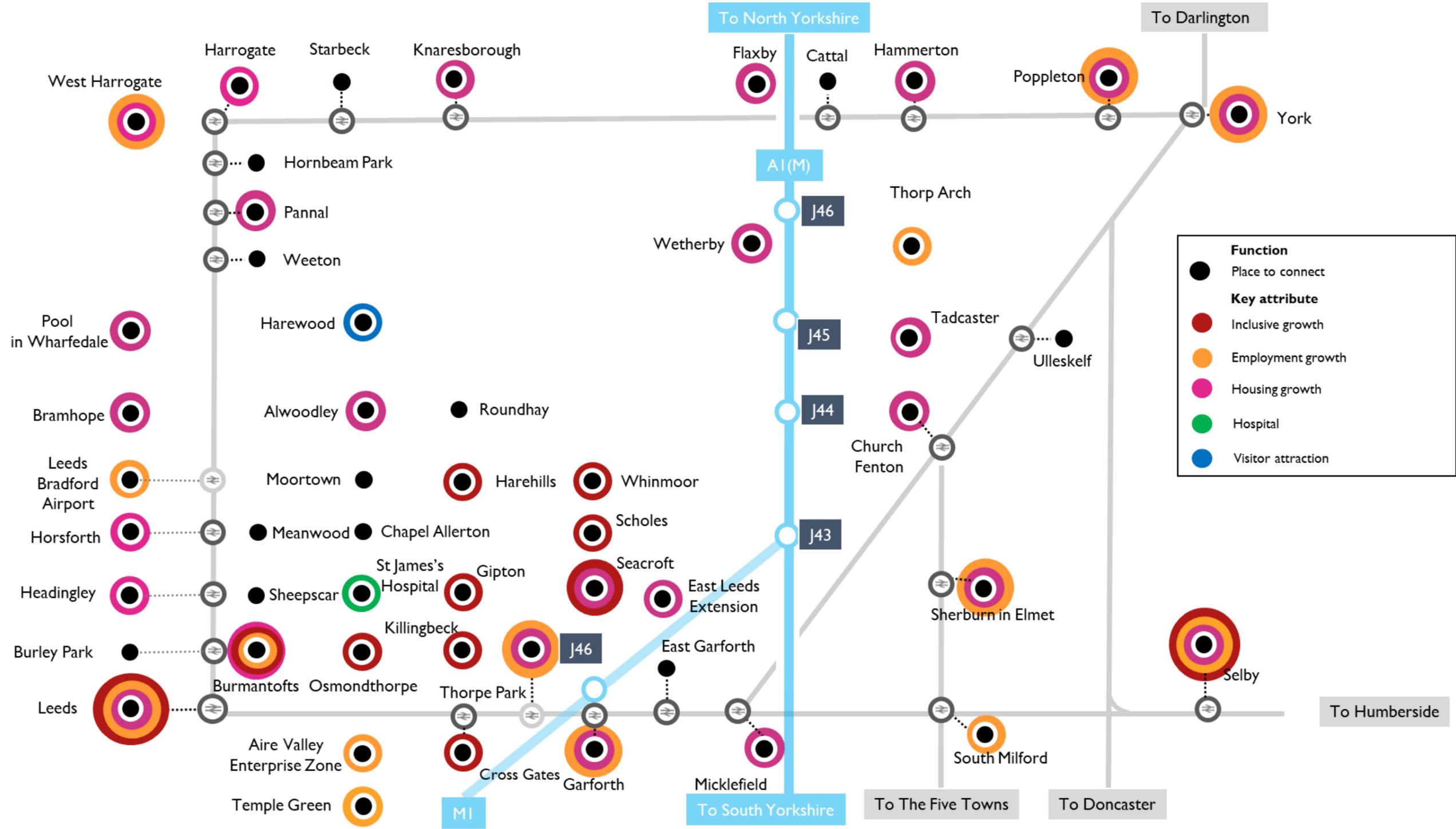
The principal characteristic influencing the selection of each place to connect is also shown. Places include key settlements, transport hubs, housing and employment growth zones. These were identified on the "story map" for the North Yorkshire to Leeds corridor and are shown in Figure 22. There are low travel horizons within Leeds, Wetherby, Selby and beyond, therefore improving connectivity between these places is fundamental to improving travel horizons throughout the corridor.

Table 4: Key places to connect

Key place	Characteristic	Scale / justification
Aire Valley Enterprise Zone	Large Housing and Employment Growth	Approximately 100ha of new employment land allocated
Alwoodley	Housing growth	Commuter settlement on the north edge of Leeds with potential Park and Ride and an existing educational site (Grammar School) as well as 290 proposed dwellings.
Bramhope	Housing growth	A settlement with commuter flows into Leeds with around 370 new dwellings proposed
Burley Park	Train station	Suburb with train station
Burmantofts	Inclusive growth with Employment and Housing Growth	Deprived area with poor public transport accessibility. Typically, low income and low house prices in the area. Housing growth / Employment growth is planned north of the A64.
Cattal	Rail station	Small dispersed settlement with rail station
Chapel Allerton	Bus network	Key suburb on Leeds bus network
Church Fenton	Housing growth	A large village with a rail station and 170 dwellings proposed
Cross Gates	Inclusive growth	IMD Among the 10% most deprived neighbourhoods in England. Also, rail station in the East Leeds area.
East Garforth	Train station	Commuter settlement with rail station
East Leeds Extension	Housing growth	5,000 new homes will be created by 2028 on 233 hectares of undeveloped land and a new major road will be constructed (the East Leeds Orbital Road).
Flaxby	Housing growth	Current disused golf course located close to Junction 47 of the A1(M) and the Harrogate – York rail line. Developer plans to create 2,750 homes, and potential new Park and Ride station being investigated
Garforth	Housing growth and employment growth	Large commuter town with two rail stations with housing and employment zones.
Gipton	Inclusive growth	Deprived area with typically low income, low house prices and low qualifications.
Hammerton	Housing growth	Large village with rail station allocated as a housing growth zone in Harrogate Draft Local Plan
Harehills	Inclusive growth	Among the 10% most deprived neighbourhoods in England
Harewood	Visitor attraction	Harewood House is a major tourist attraction and trip generator
Harrogate	Principal town and housing growth	Historic principal town with rail stations, with major visitor, hospitality and conference sectors and almost 2,000 dwellings allocated in the Draft Local Plan
Headingley	Housing growth	Approximately 150 new dwellings proposed
Hornbeam Park	Train station	Suburb with train station
Horsforth	Housing growth	Around 200 new dwellings allocated
Killingbeck	Inclusive growth	Among the 10% most deprived neighbourhoods in England
Knaresborough	Housing growth	Key settlement with commuters into Leeds and visitor attractions, as well as around 700 dwellings allocated in the Harrogate Draft Local Plan
Leeds	Housing growth/employment growth/inclusive growth	Key hub for HS2 and core city in the region. Substantial housing and employment development sites, including South Bank. Some areas of deprivation
Leeds Bradford Airport	Employment growth	Approximately 58.6ha of new employment land allocated
Meanwood	Bus network	Key suburb on Leeds bus network
Micklefield	Housing growth	Commuter settlement situated on junction of rail lines to Leeds, York and Hull, approximately 661 new dwellings proposed.
Moortown	Bus network	Key suburb on Leeds bus network
Osmondthorpe	Inclusive growth	Among the 10% most deprived neighbourhoods in England
Pannal	Housing growth	Has a rail station on commuter line into Leeds, with mixed-use development on the site of Pannal Business Park and the allocation of around 350 dwellings in the Harrogate Draft Local Plan
Pool-in-Wharfedale	Housing growth	Approximately 540 new dwellings proposed

Key place	Characteristic	Scale / justification
Poppleton	Housing and employment growth	Commuter settlement and housing growth on the edge of York with rail station and Park and Ride facility. Adjacent to employment growth zone at York Business Park
Roundhay	Bus network	Key suburb on Leeds bus network
Seacroft	Inclusive growth and housing growth	Neighbourhood in eastern Leeds which is classed as isolated and within top decile for deprivation in England. Also includes hospital and some housing growth. Top 10% most deprived areas for health in England and top 20% deprived areas for education in England
Scholes	Inclusive growth	Among the 10% most deprived neighbourhoods in England
Selby	Housing growth/employment growth/inclusive growth	Key settlement at junction of lines to Leeds, London and Hull with notable employment and housing growth and industries. Central Se by is in top 20% most deprived in England
Sheepscar	Bus network	Key suburb on Leeds bus network
Sherburn in Elmet	Housing and employment growth	Approximately 100ha of new employment land and 880 dwellings allocated for development
South Milford	Employment growth	Settlement with train station and some industry, and a 70ha employment site nearby
Starbeck	Train station	Suburb with train station
St. James's Hospital	Hospital	Key economic and social asset in Leeds and key health service within the corridor. It is a major trip attractor with poor connectivity to the city centre and other major hospital sites in Leeds.
Tadcaster	Housing growth	Key settlement with strong brewery industry and approximately 260 dwellings allocated
Temple Green	Park and Ride and employment growth	Site with Park and Ride for people travelling into Leeds from the east and nearby visitor attraction (Temple Newsam House). Employment growth zone approximately 70ha.
Thorp Arch	Employment growth	A large employment site with various industries, offices and retail and an employment growth zone. Close to future housing growth
Thorpe Park	Housing and employment growth	A large mixed-use development with committed and future housing and employment growth. Also plans for a new rail station and potential for multi-modal interchange and Park and Ride
Ulleskelf	Rail station	Key settlement with rail station roughly half-way between Leeds and York
Weeton	Rail station	Along with Huby, forms a semi-dispersed settlement around rail station on Leeds – Harrogate line
Wetherby	Housing growth	Large settlement with housing growth planned
West Harrogate	Housing and employment growth	Major housing growth zone on the western edge of Harrogate with approximately 50ha of employment land allocated.
Whinmoor	Inclusive growth	Among the 10% most deprived neighbourhoods in England
York	Sub-regional city and growth hub	Key city and important railway centre with large visitor economy, universities and industries. Some deprivation issues in parts of suburbs (e.g. Clifton, Walmgate Bar). 82ha of employment land allocated for development at York Central close to the centre and substantial housing growth.

Figure 22: Places to connect – key attributes



Source: Mott MacDonald

4.2 Existing connectivity improvements

There are several schemes scheduled for implementation within the corridor. Figure 23 presents a conceptual map showing the planned highway and active travel corridors and interventions as part of the West Yorkshire Plus Transport Fund (WYPTF) and “CityConnect” interventions funded by the Cycle City Ambition Grant (CCAG). These include several transport projects to improve connectivity on key routes as well as several proposals to enhance the appeal and access to rail, such as Leeds Station Gateway.

Figure 23 also shows the initial areas being included in the work to develop the Local Cycling and Walking Infrastructure Plan (LCWIP). LCWIP is a planning process and delivery is currently unfunded. LCWIP has identified north and east Leeds as an area which needs transport improvements and has provisionally designated two corridors for potential cycleway improvement: Regent Street to Chapel Allerton and Sheepscar Street South to Oakwood, with potential mixed strategic cycle route and cycle superhighway interventions. The area around Roundhay Road in Harehills Corner has been identified as a Core Walking Zone with scope for potential to improve the walking environment, public realm, and to deliver highway and footway interventions. A selection of West Yorkshire’s Transforming Cities Fund (TCF) schemes are also planned in the area.

Table 5 provides a description of each programme currently providing connectivity improvements throughout the corridor.

Table 5: Programmed investment

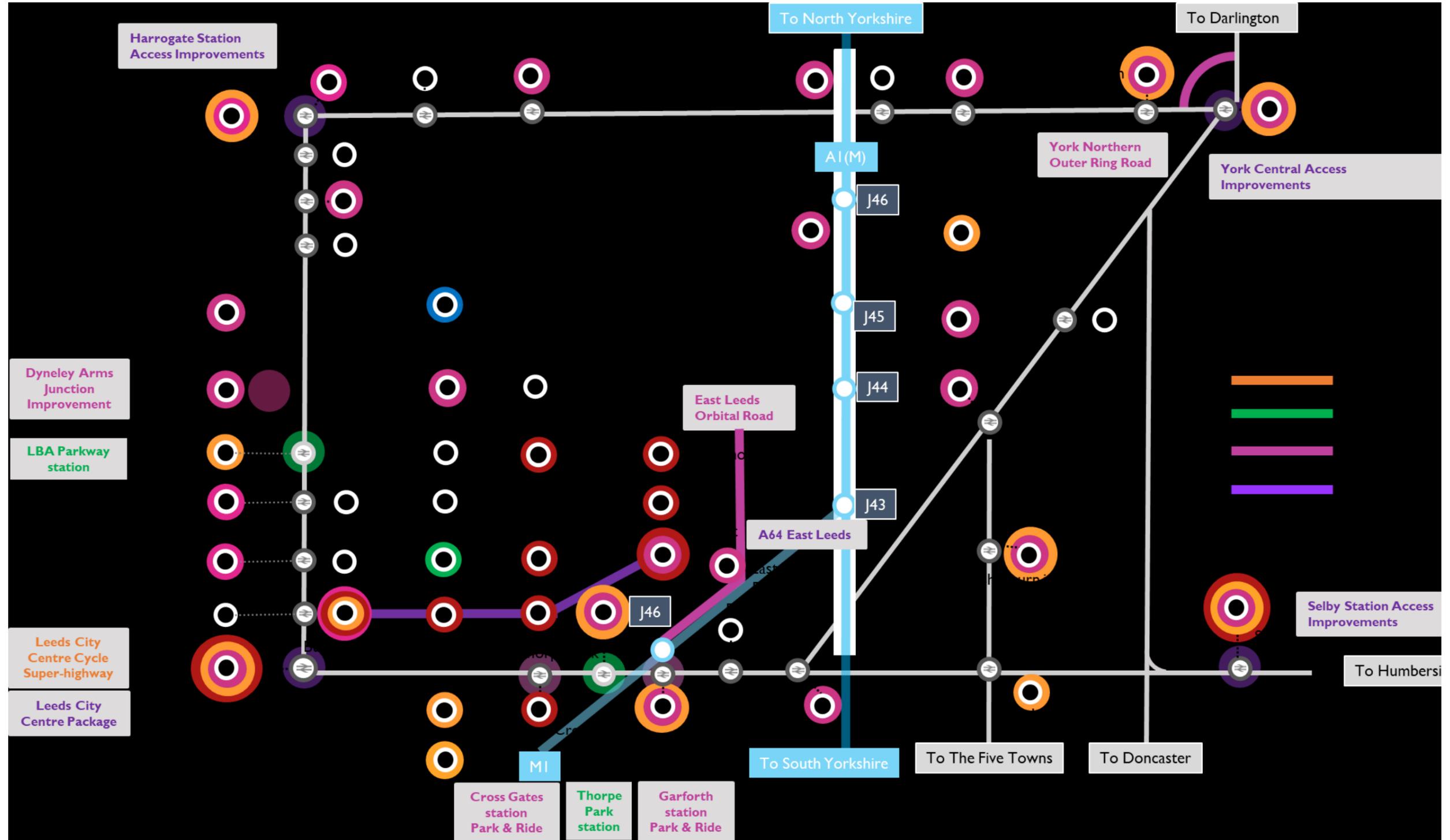
Programme	Scheme	Description
West Yorkshire Plus Transport Fund	Garforth rail station Park & Ride	Provision of 83 additional car parking spaces (approximately 140 existing), LED lighting, improvements to drainage and cycle parking. Completed in late December 2019
West Yorkshire Plus Transport Fund	Dyneley Arms junction improvement	Improvements to provide additional capacity for all users of the junction of the A660 Leeds Road and A658 Pool Bank New Road in Bramhope. According to the Business Case, the improvements are a short-term ‘Quick Win’ intervention to be completed by 2020, and with a long-term programme of improvements to follow
West Yorkshire Plus Transport Fund	York Northern Outer Ring Road	Scheme to convert A1237 York Outer Ring Road to Dual Two Lane All Purpose (D2AP) carriageway. Phase 1 (Wetherby Road junction) completed
West Yorkshire Plus Transport Fund	York Central Access Improvements	New ‘all modes’ highway access provided into York Central and improvements to station access, including fully-compliant access to the western side of the station to connect to new development. Station main access completion in 2021
West Yorkshire Plus Transport Fund	Leeds City Centre Package	Redevelopment of City Square gateway to the city, public realm improvements, reconfiguring Armley Gyratory, capacity improvements between Junctions 1-4 and 7 of the M621 (to be completed by 2022), and increasing travel to the city centre by sustainable modes by improving bus and cycle infrastructure
West Yorkshire Plus Transport Fund	Leeds Station Gateway Yorkshire Hub	Masterplan to integrate Leeds Station improvements with the new HS2 station and regeneration of Leeds South Bank. Currently in Outline Business Case stage
West Yorkshire Plus Transport Fund	East Leeds Orbital Route (ELOR)/ Outer Ring Road improvements	A new 7km dual carriageway linking the Outer Ring Road at Red Hall and Thorpe Park, and improvements to the Outer Ring Road. ELOR is to support the development of the East Leeds Extension, which is a major housing and employment growth zone, and to reduce congestion along the Outer Ring Road.
Cycle City Ambition Grant schemes	Leeds City Centre Cycle Superhighway	Segregated cycle routes through the centre of Leeds linking the existing Cycle City Connect routes 1 and 2.
Leeds Public Transport Investment Programme	Leeds Bradford Airport Parkway station	Potential new station 360m south of Bramhope Tunnel on the Leeds – Harrogate Line with parking facilities and connection to airport shuttle bus via a new link road. Underwent public consultation in February 2019 and remains part of revised airport access scheme to undergo public consultation in 2020
Transforming Cities Fund	A64 East Leeds	A bus rapid transit and Park & Ride solution from the East Leeds housing and employment growth zones to Leeds City Centre
Transforming Cities Fund	Active and Sustainable Travel in Harrogate	Active and Sustainable Interchange for Harrogate
Transforming Cities Fund	Selby Station Access	Supporting housing delivery through transforming the active and sustainable travel to Selby Gateway
Transforming Cities Fund	York Station Access	York Station and City Centre Access Package

Despite these already planned investments, there are further opportunities to better connect areas to the north and east of Leeds (such as Chapel Allerton and Seacroft), Selby and around York to employment opportunities in Sherburn, Wetherby and Harrogate, ensuring that a wide range of prospects are available to these neighbourhoods; both within Leeds, and in the surrounding area.

Similarly, there are opportunities to better connect communities in the central and southern areas of the corridor to local employment opportunities, as well as enhancing connectivity towards Leeds.

Source: WYCA, Leeds City Council, City of York Council

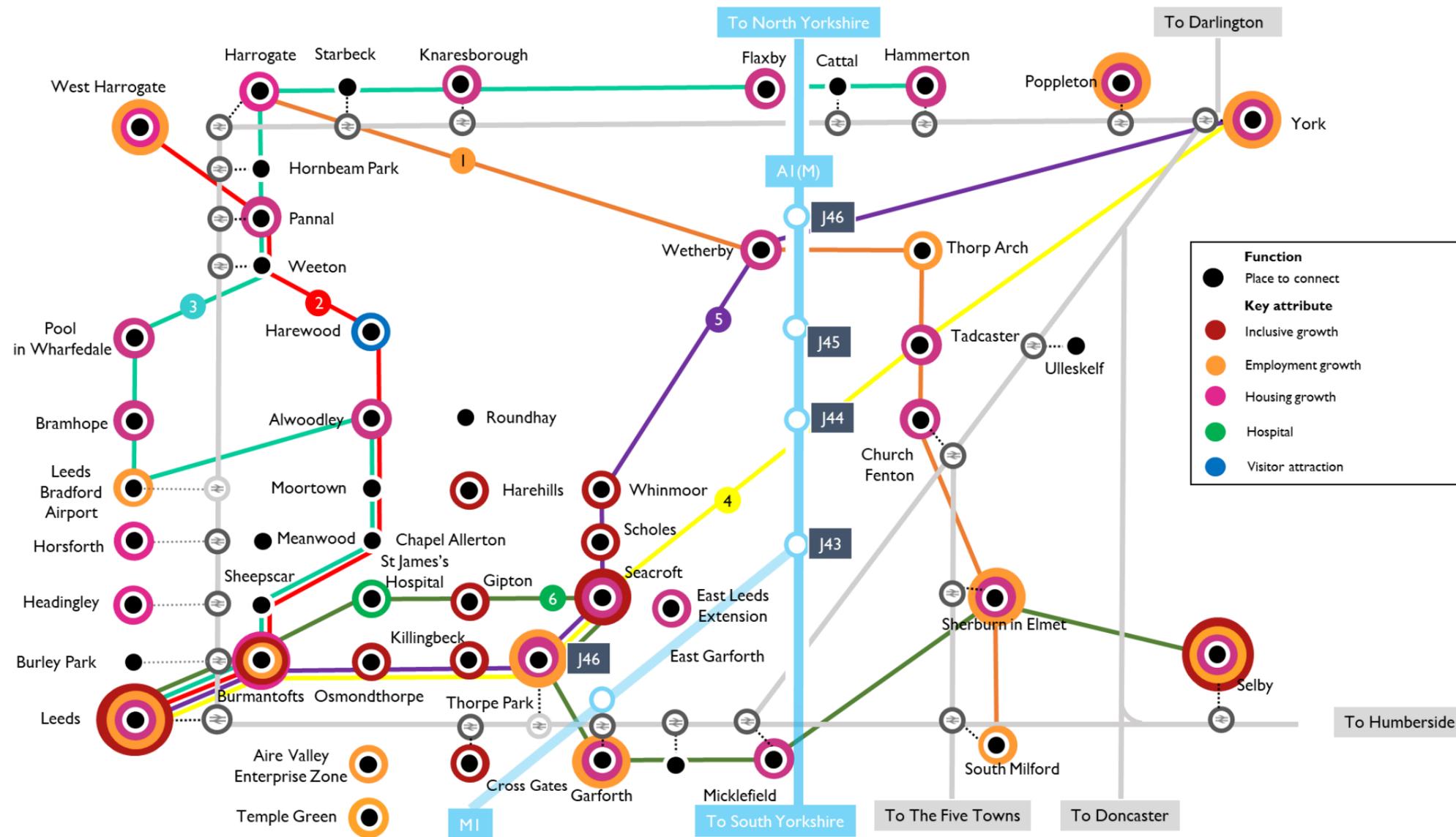
Figure 23: Programmed investment



4.3 Connectivity concepts

Based on the feedback from partners and the spatial analysis (which together provide an assessment of the current transport network and issues, future development plans and investment programmes), several “connectivity concepts” have been defined across the economic area, to demonstrate the need for improved connectivity between key places. At this stage, connectivity concepts do not relate to a specific transport mode or a specific route alignment. However, they do enable a strategic appraisal of whether there is merit in connecting people and places, as well as helping to define spatial priorities within the area. Some places not connected through the connectivity concept framework have been addressed in other strands of work such as the West Yorkshire Bus Network Review. Six connectivity concepts have been defined for the North Yorkshire to Leeds corridor. These are shown in Figure 24 with a brief narrative for each concept given overleaf.

Figure 24: Connectivity Concepts North Yorkshire to Leeds



Source: Mott MacDonald

1 - The Orange Concept (Harrogate to South Milford via Tadcaster/Five Towns)

Concept function	Provides <i>strategic</i> connectivity
-------------------------	--

Summary This concept provides a strategic connection across the corridor from Harrogate to South Milford. This includes providing connections between Wetherby, Thorp Arch and Tadcaster. This helps to provide connectivity for central, car dependent areas of the corridor to the employment opportunities at Thorp Arch.

Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport
<ul style="list-style-type: none"> Provides connectivity across rural communities in sparsely populated areas 	<ul style="list-style-type: none"> Connects key areas of housing and employment growth including Harrogate/West Harrogate, Wetherby, Thorp Arch and Sherburn in Elmet/South Milford 	<ul style="list-style-type: none"> Will include measures to connect gaps in the current national cycle network, e.g. Thorp Arch to Tadcaster 	<ul style="list-style-type: none"> Will enhance connectivity to rail stations at Harrogate, Church Fenton, Sherburn in Elmet and South Milford

Indicative mode Bus / active modes

2 – The Red Concept (West Harrogate to Leeds)

Concept function	Provides <i>strategic</i> connectivity
-------------------------	--

Summary This concept provides a strategic north to south connection between West Harrogate and Leeds. It provides connections for the housing growth sites in West Harrogate and the commuter communities in north Leeds, to the employment growth and opportunities in Leeds.

Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport
<ul style="list-style-type: none"> Connects deprived and isolated communities in north Leeds 	<ul style="list-style-type: none"> Improves connectivity between the housing growth area of West Harrogate and the employment growth areas in Leeds city centre/HS2 Hub 	<ul style="list-style-type: none"> Reinforces connectivity along the rail line and bus corridor between Leeds and Harrogate Builds on the bus and cycling interventions planned as part of LPTIP and LCWIP 	<ul style="list-style-type: none"> Improves connectivity along the rail corridor at stations at Pannal and Weeton, linking West Harrogate and Leeds

Indicative mode Bus Rapid Transit / Bus / Rail infrastructure

3 – The Turquoise Concept (Hammerton to Leeds via Knaresborough/LBA)

Concept function	Provides <i>strategic</i> connectivity
-------------------------	--

Summary This concept provides a strategic connection between North Yorkshire, Leeds Bradford Airport and Leeds. It connects rural communities such as Hammerton and Knaresborough with transport hubs and housing and employment sites.

Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport
<ul style="list-style-type: none"> Provides a strategic connection between Harrogate and Leeds, providing northwards connectivity beyond West Yorkshire. 	<ul style="list-style-type: none"> Improves connectivity to housing and employment growth areas including, Hammerton, Flaxby, Harrogate and Leeds city centre/HS2 Hub 	<ul style="list-style-type: none"> Improves connectivity on routes where congestion is an issue, especially around Pool Improves connectivity relieving AQMAs in Pool and Harrogate Reinforces connectivity along the rail and bus corridors between Hammerton, Ripon, Harrogate, LBA and Leeds 	<ul style="list-style-type: none"> Improves connectivity along the rail line between Hammerton and Leeds and between the communities it serves and LBA

Indicative mode Bus / Rail infrastructure

4 – The Yellow Concept (York to Leeds via Tadcaster)

Concept function	Provides <i>strategic</i> connectivity
-------------------------	--

Summary This concept provides a strategic connection crossing the North Yorkshire and West Yorkshire boundary, between York and Leeds. This includes providing opportunities for better connections from Tadcaster to York as well as employment opportunities surrounding Leeds at Thorpe Park.

Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport
<ul style="list-style-type: none"> Improves connectivity to healthcare facilities at Seacroft Connects deprived communities in north east Leeds with employment opportunities. 	<ul style="list-style-type: none"> Improves connectivity to areas of housing growth in eastern Leeds and employment growth areas including York Central and Thorpe Park 	<ul style="list-style-type: none"> Improves connectivity on routes where congestion is an issue, such as the M1 and the A64 Connects to City Connect cycle superhighway between Leeds and Seacroft Connects to several points in the national cycle network 	<ul style="list-style-type: none"> Provides connections to the rail stations at York and Leeds and the proposed station at Thorpe Park Also provides improvements to journey times on bus services between Leeds, Tadcaster and York

Indicative mode Bus / Bus Rapid Transit

5 – The Purple Concept (York to Leeds via Wetherby)

Concept function	Provides <i>strategic</i> connectivity
Summary	This concept provides a strategic connection crossing the North Yorkshire and West Yorkshire boundary, between York and Leeds via Wetherby. This includes providing opportunities for better connections from Wetherby to York and employment opportunities surrounding Leeds at Thorpe Park.

Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport
<ul style="list-style-type: none"> Improves connectivity to healthcare facilities at Seacroft Connects deprived communities in north east Leeds 	<ul style="list-style-type: none"> Improves connectivity to areas of housing growth in eastern Leeds and employment growth areas including York Central and Thorpe Park 	<ul style="list-style-type: none"> Improves connectivity on routes where congestion is an issue, such as the M1 and A58 Connects to City Connect cycle superhighway between Leeds and Seacroft Connects to several points in the national cycle network 	<ul style="list-style-type: none"> Provides connections to the rail stations at York and Leeds and the proposed station at Thorpe Park Also provides improvements to frequency and journey times on bus services between Leeds, Wetherby and York Resolves connectivity issues from Wetherby to both Leeds and York

Indicative mode Bus / Active travel

6 – The Green Concept (Selby to Leeds)

Concept function	Provides <i>strategic</i> connectivity
Summary	This concept provides a strategic eastern connection between Selby and Leeds. It connects areas of isolated and deprived communities in the east of Leeds with the employment growth zones of Thorpe Park and South Milford, which have struggled with recruitment due to poor transport links.

Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport
<ul style="list-style-type: none"> Connects deprived communities in eastern Leeds and Selby. 	<ul style="list-style-type: none"> Improves connectivity to key areas of employment opportunities in Leeds city centre, Thorpe Park and South Milford 	<ul style="list-style-type: none"> Will provide alternative, sustainable transport options, especially in areas around Sherburn in Elmet to help reduce car dependency 	<ul style="list-style-type: none"> Improves bus connectivity to and from South Milford Improves connectivity to Thorpe Park, Micklefield, Garforth, East Garforth and South Milford stations

Indicative mode Bus / Rail infrastructure

4.4 Appraisal outcomes

Our appraisal process (summarised in 3.4.1) has been applied to the 10 connectivity concepts to define spatial priorities in the North Yorkshire to Leeds corridor.

Each of the four assessment theme scores are averaged to provide an overall INSET score of between 0 and 1, where 1 represents a perfect correlation and anything else represents a degree of deviation from that perfect score. Typically, the total scheme scores lie somewhere between the two numbers with the following categories assigned:

Table 6: Scoring ranges

Scores	Ranges
Excellent	0.99 – 1.00
Good	0.75 – 0.99
Average	0.50 – 0.75
Fair	0.25 – 0.50
Low	<0.25

Source: Mott MacDonald

The outcome of the prioritisation for the connectivity concepts is summarised in Figure 25.

Although most concepts were classified as 'Good' overall, there is differentiation within the defined scoring range. Figure 25 highlights that the **Yellow**, **Green**, **Purple** and **Red** concepts demonstrate the best level of fit across all themes and sifts and all are above a scoring threshold of 0.8 and therefore have the potential to produce the greatest benefit for interventions.

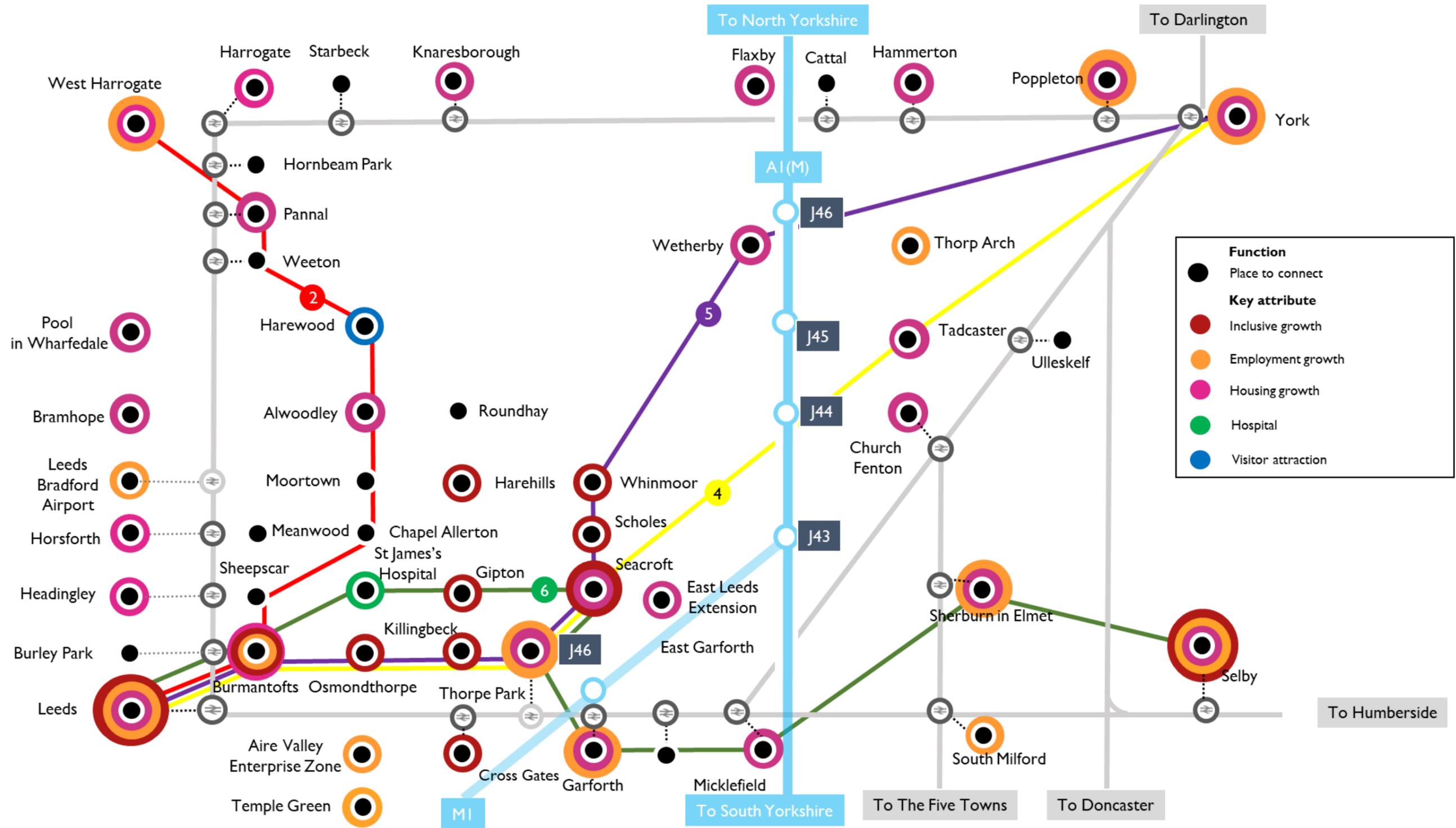
Figure 25: Appraisal outcomes for connectivity concepts – ranked

Rank	#	Connectivity concept	Sift 1: Early sift				Sift 1: Early sift Score	Sift 2: Local fit	Sift 3: Level of impact				Sift 3: Level of impact	Overall score
			Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport			Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport		
1	4	Yellow Route: York to Leeds	Excellent	Excellent	Excellent	Good	Good	Excellent	Fair	Good	Average	Good	Average	Good
2	6	Green Route: Selby to Leeds	Excellent	Excellent	Excellent	Average	Good	Excellent	Fair	Average	Good	Good	Average	Good
3	5	Purple Route: York to Leeds via Wetherby	Excellent	Excellent	Excellent	Average	Good	Excellent	Fair	Average	Average	Good	Average	Good
4	2	Red Route: Harrogate to Leeds	Excellent	Excellent	Excellent	Good	Good	Excellent	Fair	Average	Fair	Good	Fair	Good
5	3	Turquoise Route: Hammerton to Leeds via Knaresborough	Excellent	Excellent	Excellent	Good	Good	Excellent	Fair	Fair	Average	Average	Fair	Good
6	1	Orange Route: Harrogate to South Milford via Tadcaster	Fair	Excellent	Average	Average	Average	Excellent	Low	Fair	Average	Average	Fair	Average

Source: Mott MacDonald

Overall, the Yellow, Green, Purple and Red connectivity concepts have been identified as the spatial priorities as they are the highest scoring concepts that address connectivity requirements within the corridor. These are shown in Figure 26. Delivering improved connectivity along these connectivity concepts will help to increase travel horizons within North Yorkshire and beyond.

Figure 26: Prioritised connectivity concepts



Source: Mott MacDonald

4.5 Demand

An assessment has been undertaken using the Combined Authority’s Urban Dynamic Model (UDM) to estimate the total peak hour trip demand along each of the prioritised connectivity concepts. This presents 2033 forecasts of demand using established assumptions of the development landscape

A mode technology framework developed by the Combined Authority has then been used to identify what mode of transport might be appropriate based on having a suitable capacity per hour (see Table 7).

Please refer to Section 9.2.2 of the Appraisal Handbook for the detailed workings of demand estimation.

Table 7: Mode technology framework

Mode	Capacity per service	Typical capacity per hour	Potential role
Walking and Cycling	1	Greatest potential for shorter distance journeys, particularly across congested city centre/urban environments	
Demand Responsive Transport	5 - 12	800 – 1,500 passengers	Most suited to low demand areas or periods where a scheduled service would be inefficient with regard to cost and use
Standard Double Decker Bus	70 – 80	Less than 1,000 passengers	Flexible services which meet local accessibility needs – with very high density shopping patterns
Bus Rapid Transit	70 – 80	500 – 2,000 passengers	Limited stops outside of urban centres. Moves large volumes of people relatively short distances within an urban / city centre environment
Light Rail / Tram / Mass Transit	100 – 200	1,000 – 4,000 passengers	BRT is often typically implemented where there is less demand or as a precursor to Mass Transit
Suburban Heavy Rail	500 – 700	2,000 – 6,000 passengers	Move large volumes of people over longer distances (e.g. 10-30 miles) with limited stops
Inter urban / national Heavy Rail	500 - 1000	Up to 27,000 passengers	Centre to centre fast and direct services

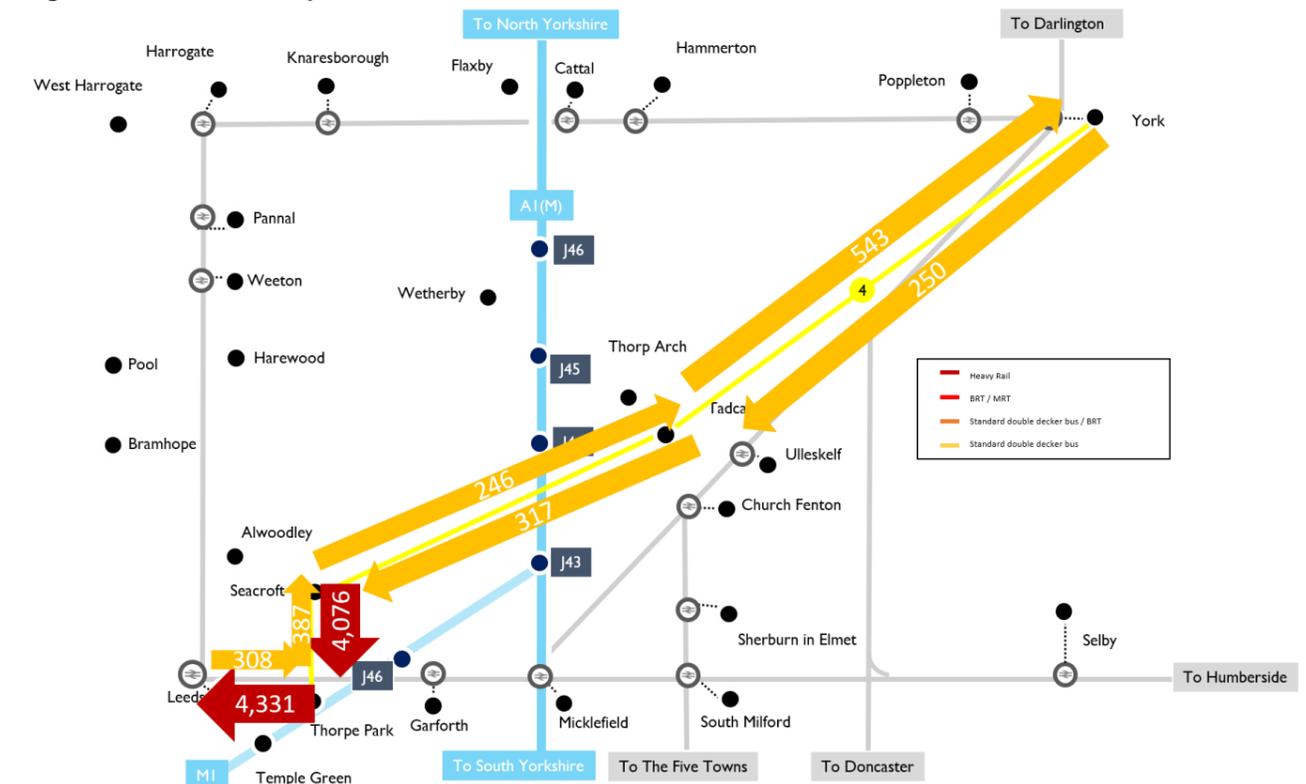
Source: West Yorkshire Combined Authority

The demand analysis provides indicative evidence towards what the highest capacity mode could be along the connectivity concepts. Other lower capacity modes also could be considered elsewhere in the hierarchy to provide a range of integrated transport services that could address these forecast levels of demand. The figures presented here illustrate

- Unconstrained demand that focuses on the potential of movement between places
- Aggregate flows between each place to connect within the connectivity concept
- Two-way flows to illustrate key attractors on the network
- Variations in demand between places to connect to demonstrate the range of services that could potentially be provided within each connectivity concept.

Figure 27 shows demand in 2033 along the highest scoring connectivity concept; Yellow. This provides a strategic connection between Leeds and York via Tadcaster. Between York and Seacroft demand indicates standard double decker bus service is likely to be suitable. Partners have highlighted the success of the 36 service between Harrogate and Leeds, and the City Zap that provides direct service from Leeds to York is of similar quality. Having a similar service with limited stops going via Tadcaster, would provide the connectivity identified in this concept from Leeds to York. From Seacroft to Leeds demand is much higher and suggests the potential for a mass transit solution. Seacroft is not currently on the rail network and therefore a mass rapid transit solution may be more appropriate.

Figure 27: Yellow concept – Demand 2033

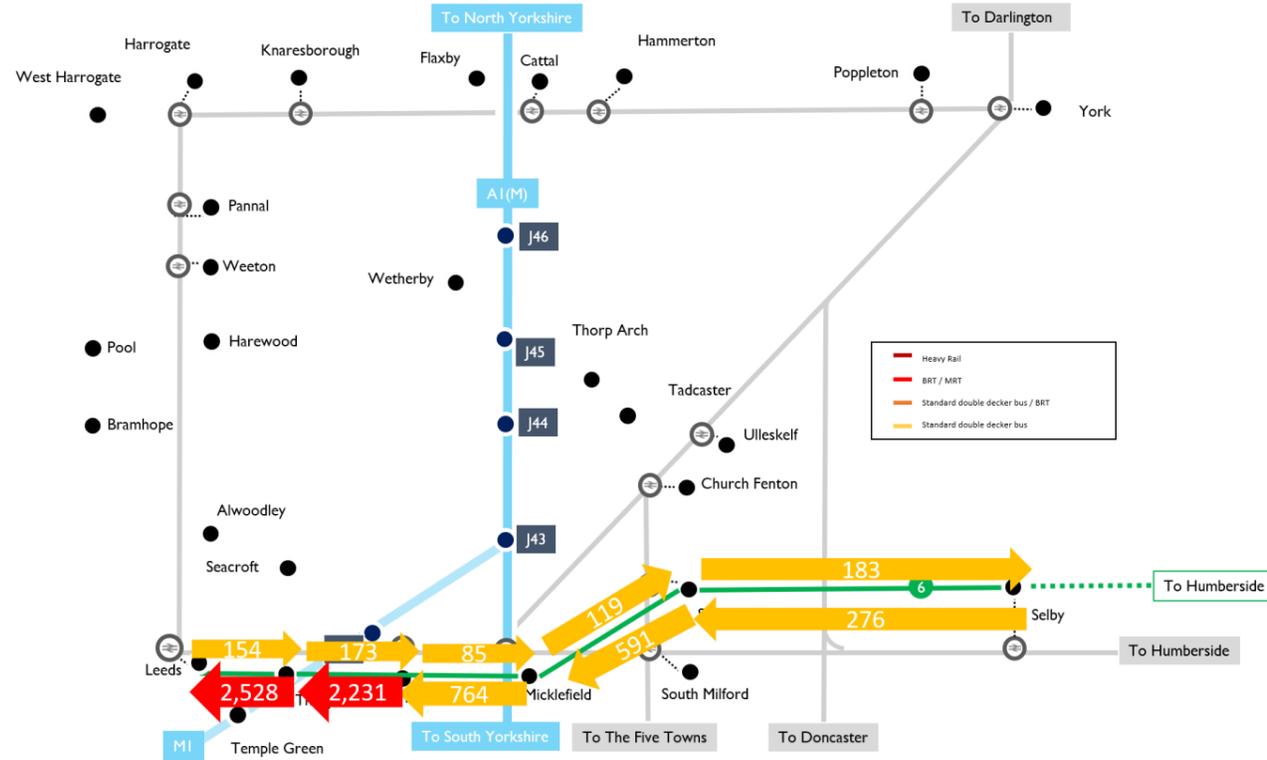


Source: Urban Dynamic Model (UDM)

Figure 28 shows demand between Leeds and Selby in 2033; the Green concept. Higher demands between Garforth and Leeds suggest examination of rail capacity to understand the potential for increased service is required to help support this identified demand. Demand is lower along the rest of the corridor with travel between Garforth and Selby likely to be satisfied by the current rail network.

Figure 29 shows 2033 demand between York and Leeds, via Wetherby; the Purple concept. Between Seacroft, Wetherby and York, demand is sufficiently low to indicate standard double decker bus service is likely to be suitable. Onwards from Seacroft into Leeds via Thorpe Park demand surges. With no rail infrastructure here, potential for a mass rapid transit of some description exists and is likely to be needed to satisfy the demand on this section of the concept.

Figure 28: Green concept- Demand 2033

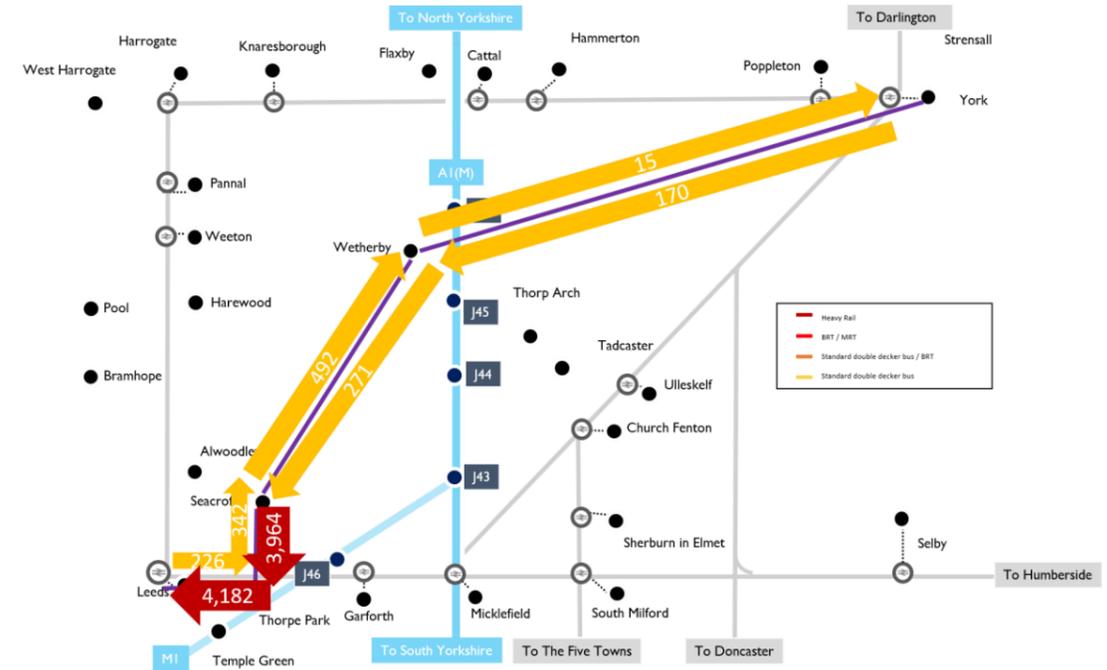


Source: Urban Dynamic Model (UDM)

Figure 30 shows demand along the western extent of the corridor along the Red concept, between west Harrogate and Leeds. Demand from Alwoodley to Leeds indicates the potential for a BRT / MRT service. This could be aided by active travel measures. Travelling northwards from Leeds to Harewood demand would be met by a standard doubled decker bus service. Similarly, demand is lower from west Harrogate to Leeds which is also likely to be satisfied by a standard double decker bus service. The number 36 service from Leeds to Ripon, via Harrogate was highlighted by partners as a good and popular way of getting from Harrogate to Leeds.

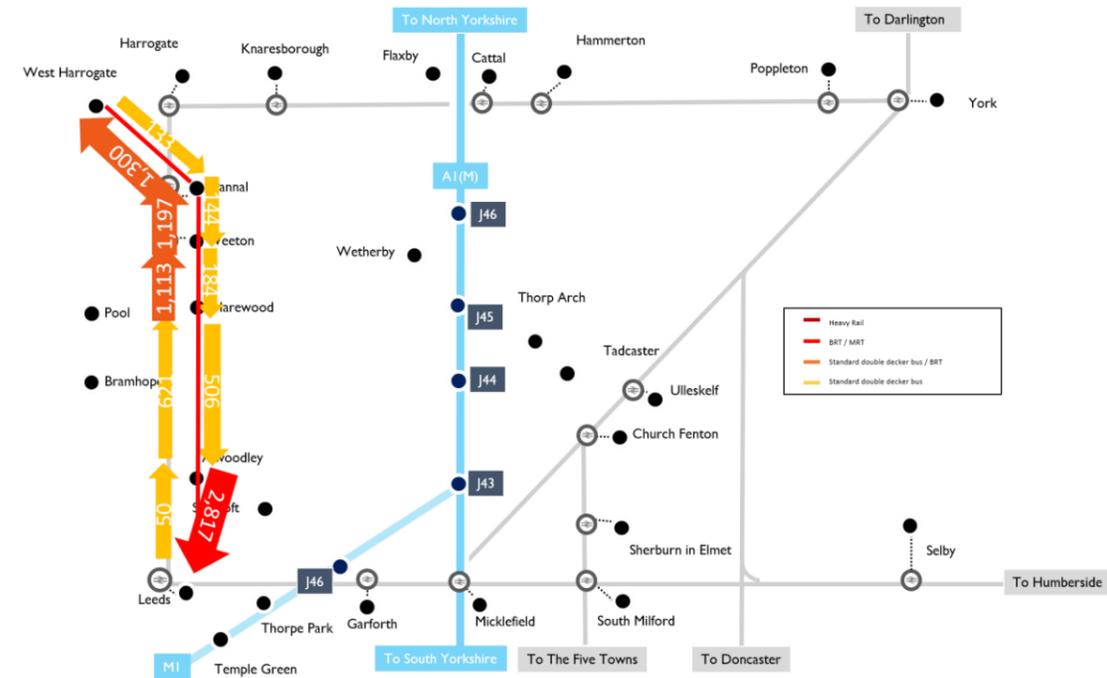
Evidence from other workstreams will inform how a multi-modal transport offer could be provided in these corridors, alongside the indicative high-capacity modes identified above.

Figure 29: Purple concept- Demand 2033



Source: Urban Dynamic Model (UDM)

Figure 30: Red concept- Demand 2033



Source: Urban Dynamic Model (UDM)

5 Conclusion: The need for intervention in North Yorkshire to Leeds

5.1 Introduction

This Case for Change presents the evidence and strategic narrative for investing in improved connectivity in the North Yorkshire to Leeds corridor.

Through evidence review, and engagement from district partners, key places to connect have been identified, and a complementary series of connectivity concepts have been developed to show where there is greatest need to improve connections between people and places in the corridor. These places to connect have been used to support evidence gathering in other workstreams and are shown in Figure 31.

An appraisal of each of the concepts provides evidence to demonstrate which connectivity concepts have the greatest potential to enable inclusive growth, boost productivity, tackle the climate emergency, and deliver a 21st century transport system. The connectivity concepts prioritised through this process provide connections across North Yorkshire, to include the three urban centres of Harrogate, York and Selby. All four of the prioritised concepts enhance connectivity to current local employment and service centres in Leeds city centre (including the Aire Valley Enterprise Zone – which is also a key growth site in the City Region). The concepts also connect isolated communities, such as Seacroft and Selby, to other employment opportunities and growth sites including Thorpe Park, Sherburn in Elmet, South Milford, West Harrogate and York. Wetherby and Tadcaster are also included in the prioritised concepts, enhancing these communities' access to employment opportunities at both York and Leeds.

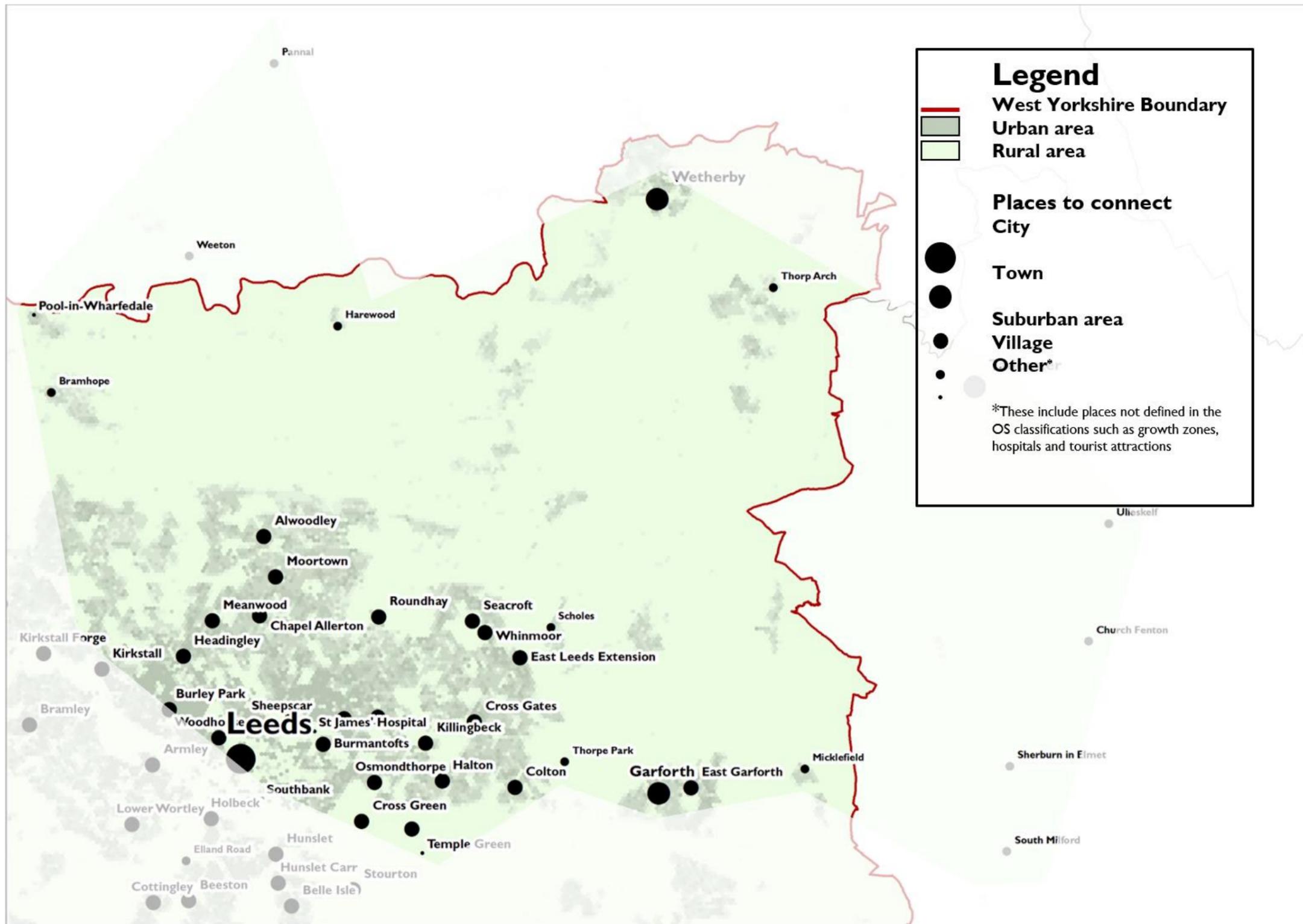
A high-level demand analysis has been also undertaken on these concepts to illustrate the potential for higher capacity modes of transport that might support improved connectivity between the key places to connect.

The Case for Change is one of several complementary sources that together, form a complex evidence base. Other evidence sources include:

- West Yorkshire Bus Network Review
- Leeds City Region Rail Vision and Capacity Study
- Leeds City Region Emissions Reduction Pathway
- West Yorkshire Walking and Cycling Strategy
- West Yorkshire Future Mobility Strategy
- West Yorkshire Urban Transit Study
- Ongoing engagement with district partners

The next sections describe some of the suggested network enhancements within this corridor and the rationale for their consideration.

Figure 31: Places to connect map



5.2 Connectivity Network

This Case for Change report therefore brings together several strands of evidence that have been evaluated and will ultimately inform the development of a package of interventions across several modes.

The emerging multi-modal network on which future interventions will focus provides a framework to address the key connectivity issues and opportunities that have been highlighted through this study and other strands of evidence. This network for North Yorkshire to Leeds is illustrated in Figure 32. This will link with networks developed in other Case for Change reports within the Connectivity Plan to provide a full multi-modal network for West Yorkshire

Figure 32: North Yorkshire to Leeds Connectivity Network

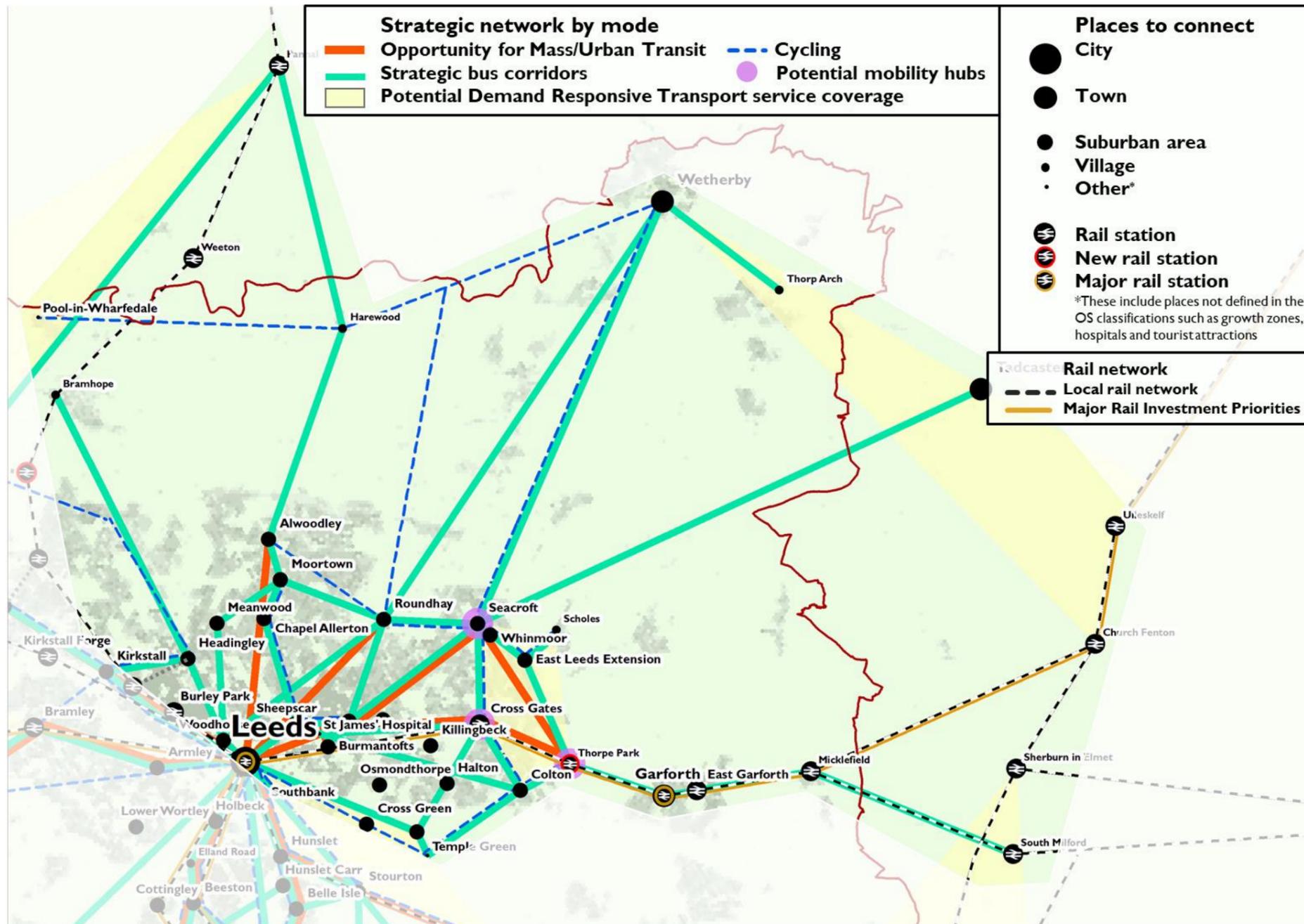
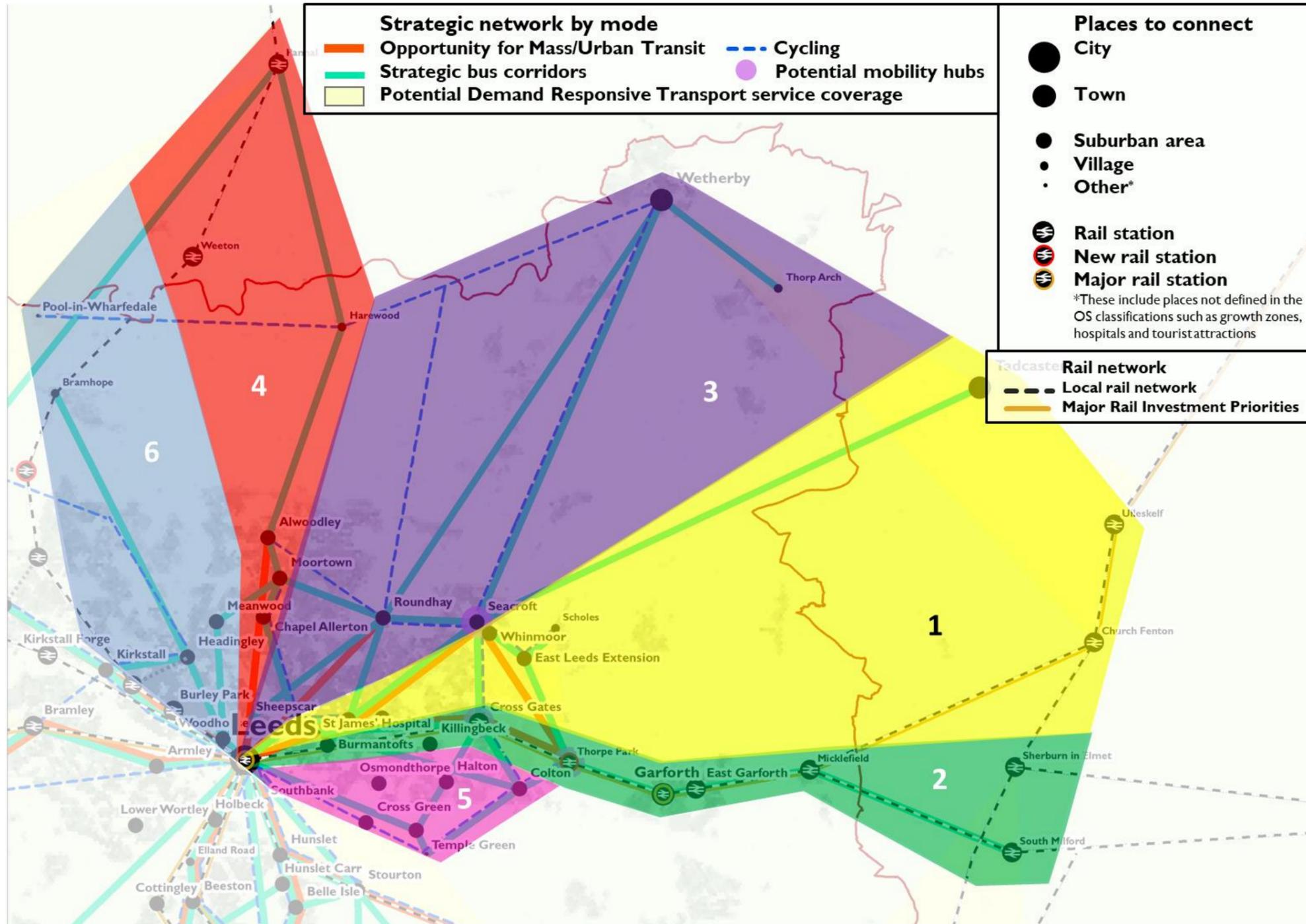


Figure 33 illustrates spatially how the various strands of evidence, including the prioritised connectivity concepts and subsequent demand analysis, provide a rationale for network interventions in the Calder Valley and Bradford. These strands of evidence are summarised alongside West Yorkshire’s four strategic priorities in Table 8.

Table 8: Evidence rationale for network interventions

Network Area	Description	Rationale				Evidence Base
		Enabling Inclusive Growth	Boosting Productivity	Tackling the Climate Emergency	Delivering 21 st Century Transport	
						
1	Yellow Connectivity Concept	Improves connectivity to healthcare facilities at Seacroft as well as connecting deprived communities in north east Leeds.	Improves connectivity to areas of housing growth in eastern Leeds and employment growth areas including York Central and Thorpe Park	Improves connectivity on routes where congestion is an issue, such as the M1 and the A64 as well as connecting to the City Connect cycle superhighway between Leeds and Seacroft.	Key corridor for boosting connectivity between Leeds and York, including the car dependent Tadcaster. Uses bus interventions to connect to the development at East Leeds Extension to avoid adding to the congestion issues in East Leeds.	North Yorkshire to Leeds Case for Change Report West Yorkshire Bus Network Review
2	Green Connectivity Concept	Connects deprived communities in eastern Leeds and Se by to opportunities in Leeds.	Improves connectivity to key areas of employment opportunities in Leeds city centre, Thorpe Park and South Milford.	Will provide alternative transport options to the car for communities, especially in rural southern North Yorkshire.	Some of this route could be served by mass transit, with bus linkages to communities east of Thorpe Park. Improves bus connectivity to and from South Milford whilst enhancing connectivity to the east Leeds train stations, including the proposed Thorpe Park rail station.	North Yorkshire to Leeds Case for Change Report South and East Leeds Case for Change Report Urban Transit Study
3	Purple Connectivity Concept	Improves connectivity to deprived communities in north east Leeds and healthcare facilities at Seacroft	Improves connectivity to areas of housing growth in eastern Leeds and employment growth areas including York Central and Thorpe Park	Improves connectivity on routes where congestion is an issue, such as the M1 and A58 as well as connecting to City Connect cycle superhighway between Leeds and Seacroft	Some of this route could be served by mass transit between Leeds and Seacroft. Also provides improvements to frequency and journey times on bus services between Leeds, Wetherby and York and resolves connectivity issues from Wetherby to both Leeds and York.	North Yorkshire to Leeds Case for Change Report South and East Leeds Case for Change Report Urban Transit Study West Yorkshire Bus Network Review
4	Red Connectivity Concept	Connects deprived and isolated communities in north Leeds	Improves connectivity between the housing growth area of West Harrogate and the employment growth areas in Leeds city centre/HS2 Hub	Reinforces connectivity along the rail line and bus corridor between Leeds and Harrogate. Also builds on the bus and cycling interventions planned as part of LPTIP and LCWIP	Key corridor for boosting rural bus connectivity. Potential park and ride interventions have also been identified to improve access to train stations and alleviate congestion into Leeds.	North Yorkshire to Leeds Case for Change Report
5	South East Leeds	Connects deprived communities in south Leeds.	Provides connectivity to development areas in the Aire Valley Enterprise Zone.	Improves connectivity on routes where congestion is an issue on the approaches to Leeds.	Enhances bus connectivity to communities in south east Leeds with limited access to the rail network.	South and East Leeds Case for Change Report Five Towns to Leeds Case for Change Report West Yorkshire Bus Network Review
6	North West Leeds	Some areas of deprivation and isolated communities to the east of Horsforth	Connects Leeds to LBA via several key communities and improves connections to employment growth sites.	Improves connectivity on routes where congestion is an issue	West Yorkshire Bus Network Review highlighted the importance of connecting these communities to the North West of Leeds with improved bus connections. There may also be demand for improved active travel measures along these routes.	Airport, Airedale and Wharfedale Case for Change Report West Yorkshire Bus Network Review

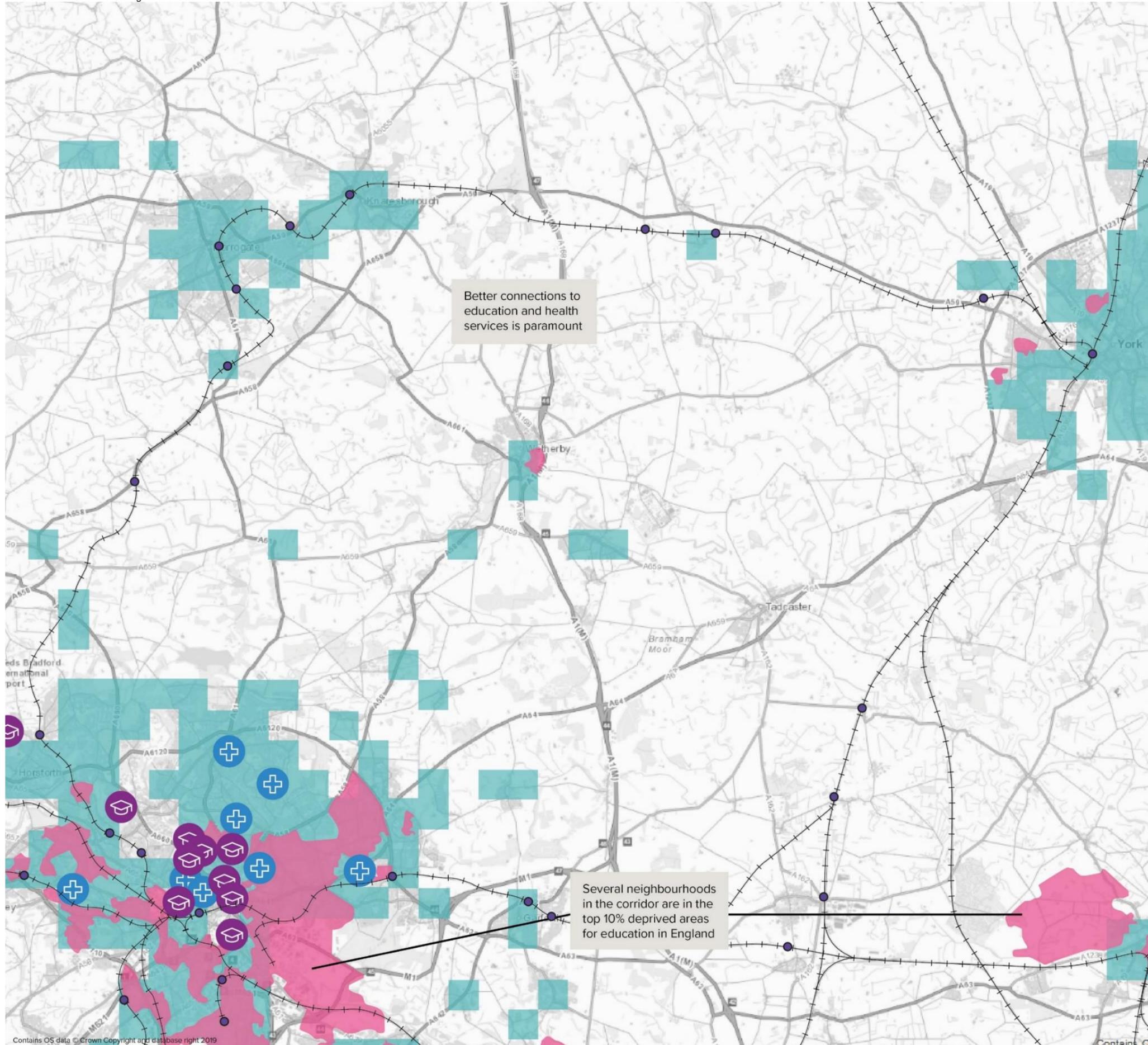
Figure 33: Evidence map for network interventions



Appendices

A.	Spatial context highlights across the regional priorities	41
B.	North Yorkshire to Leeds: Investment Case	46

A. Spatial context highlights across the regional priorities



Enabling inclusive growth

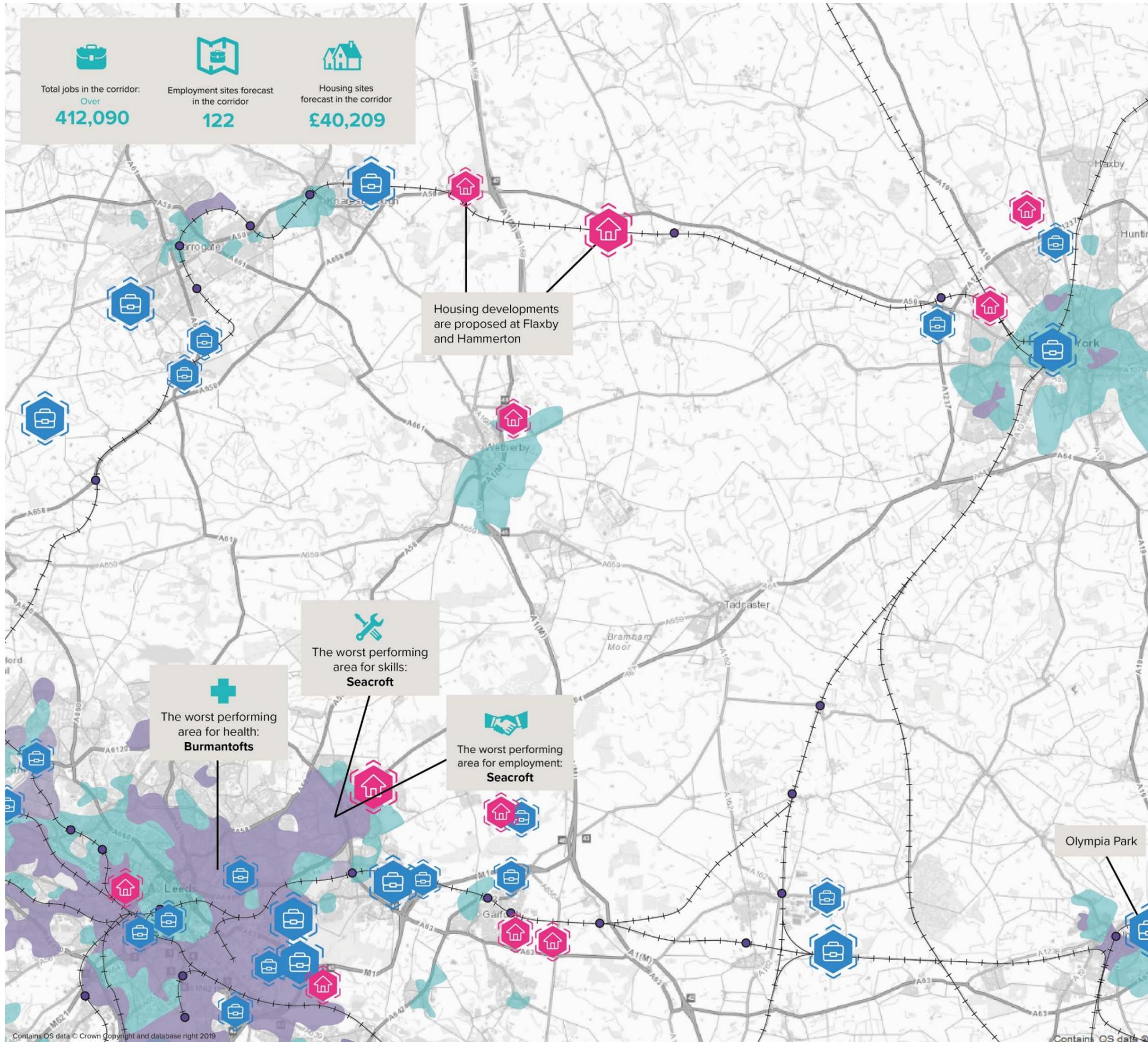
-  Rail line
-  Rail station
-  Hospitals
-  Higher education services
-  Top 10% deprived areas for education in England
-  Equality, Diversity and Inclusion (EDI) hotspots

These areas show high concentrations of population, people from "protected characteristic groups" (as defined by the Equality Act 2010, including age, disability, gender reassignment, marriage or civil partnership, pregnancy and maternity, race, religion or belief, sex, sexual orientation), and trip attractor destinations such as schools, hospitals, religious buildings and care homes.

This map shows the inclusivity indicators within the corridor, including education and health services and the spread of Equality, Diversity and Inclusion (EDI) hotspots.

Large rural areas of the corridor suffer from fewer opportunities to access health and education and many will rely on convenient and reliable public transport options to access new growth areas and services. There is a concentration of health and education services in Leeds, and whilst the data does not extend into North Yorkshire, stakeholders have highlighted that access to these opportunities in York and Harrogate is also important.

EDI hotspots are concentrated at Wetherby, and parts of north Leeds, Harrogate and York. Here there are many communities with protected characteristics and specific needs. Considerations of these must be made when improving transport services to ensure growth is felt by all, and does not discriminate or divide access between groups of people.



Boosting productivity

Future Growth Sites

- Housing
- Employment
- Rail line
- Rail station
- >26% no car ownership
- Top 20% most deprived in England and >26% no car ownership

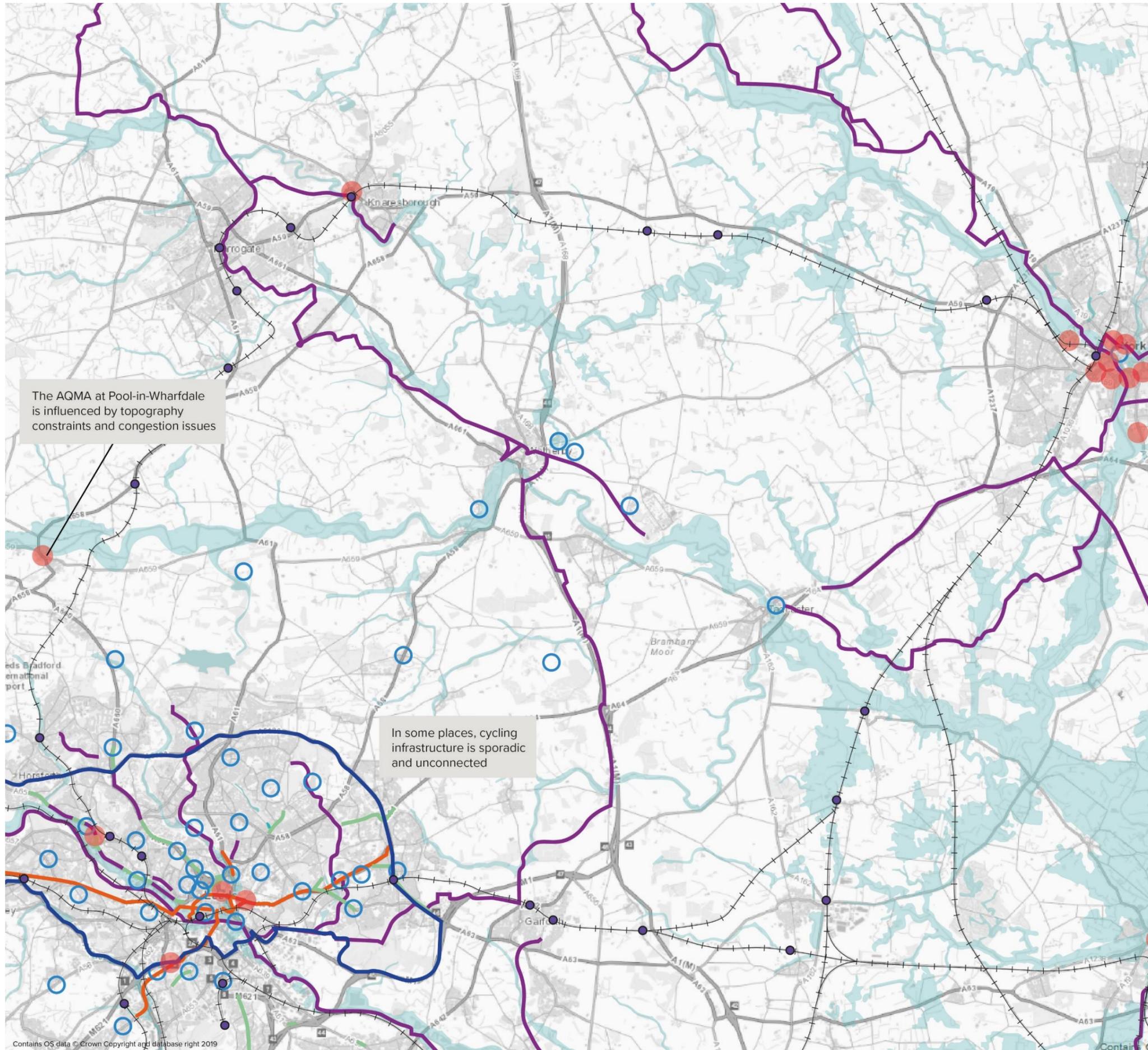
This map shows employment and housing growth opportunities and other economic characteristics to understand the corridor's productivity gap.

The corridor is subject to considerable growth plans. There are substantial housing developments planned, with notable developments along the northern extent of the corridor at Flaxby Park east of Knaresborough, as well as sites at Hammerton. Employment growth sites are seen throughout the urban areas, including the Aire Valley Enterprise Zone in Leeds, the Olympia Park at Selby and mixed-use developments around York. Providing access to such growth sites by public transport and active modes of travel will help to improve employment opportunities for those in deprived areas.

High levels of deprivation are mainly concentrated in the north eastern parts of Leeds, with some deprived communities in York and Selby. There are large areas where there is limited car availability, mainly concentrated in the north-eastern suburbs of Leeds. Therefore, ensuring these communities are connected to growth opportunities will be an important consideration in boosting productivity.

Contains OS data © Crown Copyright and database right 2019

Contains OS data ©



Tackling the climate emergency

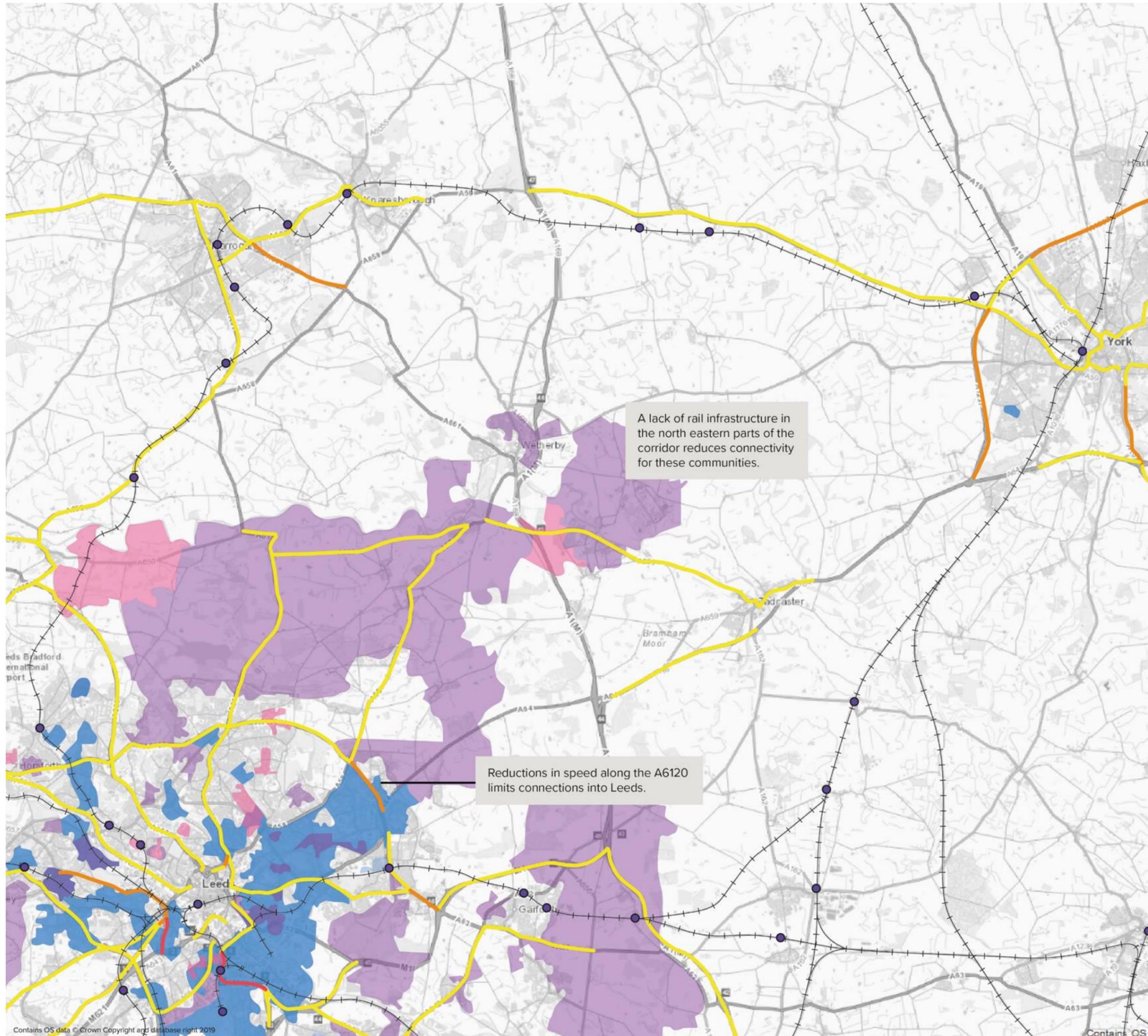
- ++ Rail line
- Rail station
- Clean Air Zone 2025
- National Cycle Network
- Cycle City Ambition Grant
- West Yorkshire National Cycle Lanes
- Points of interest
- Air Quality Management Area
- Flood Zone 3

These areas are assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), as set out in the National Planning Policy Guidance.

This map shows how the corridor currently stands in relation to delivering clean growth, particularly looking at the active travel network and the air quality management areas (AQMAs). The geography of the corridor means that some areas are of high flood vulnerability, which any interventions will need to take into consideration.

AQMAs are scattered in small pockets throughout the corridor with higher concentrations in York and Leeds centres. The geography of the corridor means that some areas are of high flood vulnerability, which any interventions will need to take into consideration.

The active travel network varies in consistency throughout the corridor. The national cycle network provides routes between the urban areas of Harrogate and Wetherby and York and Selby. There are gaps in the network at the southern extent of the corridor surrounding South Milford.



Delivering 21st century transport

- ++ Rail line
- Rail station
- Isolated communities
- These are areas where the distance travelled to work and the average number of destinations people can reach for journeys to work across the Leeds City Region, are lower than the national average. This is based on the approach adopted for the Joseph Rowntree Foundation for "Tackling transport related barriers to employment in low-income neighbourhoods".
- Bus service provision (in the morning peak)**
- Poor (1 bus per hour)
- Non-existent (0 buses per hour)
- Congestion: Speed reduction due to peak-time congestion**
- Over 30 kmph
- Between 20 – 29 kmph
- Between 10 – 19 kmph

This map shows the existing transport network including rail lines and stations, highway congestion performance and the bus service provision.

Bus service provision reduces northwards of the A6120 Ring Road, reducing connectivity between Leeds and Wetherby and Tadcaster (note: for the purposes of this study, bus service data was not collected for the North Yorkshire area. However, this could be revisited in a more area-specific study). There is congestion on key roads into Leeds and York and along the A661 into Harrogate.

The rail network struggles to provide connectivity for all areas of the corridor, with large gaps in the network surrounding Wetherby, Tadcaster and northern parts of Leeds. The service between Leeds and Harrogate struggles to meet capacity requirements during peak times when consisting of old rolling stock. Stakeholder feedback suggests that the Leeds-Harrogate train service is regularly over capacity during peak times.

B. North Yorkshire to Leeds: Investment Case

The highest scoring “connectivity concepts” represent the corridor’s spatial priorities. For this corridor these are the Yellow, Green, Purple and Red concepts as these were the best performing for connectivity in the area. These connectivity concepts are used as the framework for developing interventions that will address the Leeds City Region’s future connectivity requirements and improve travel horizons throughout the corridor.

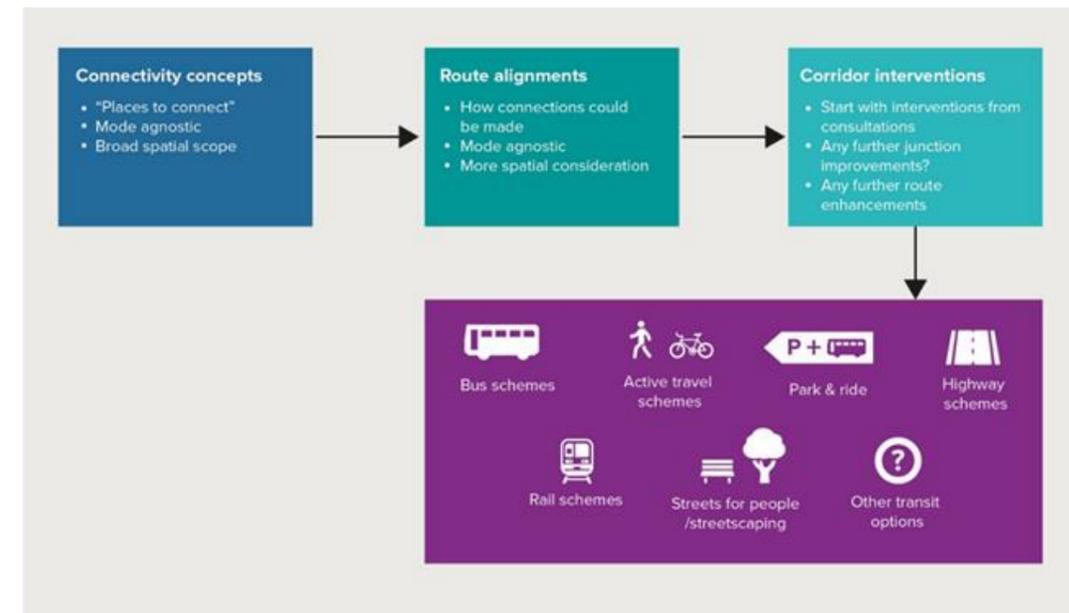
B.1 Developing interventions

Potential route alignments are identified as ways to provide the connections identified within the “connectivity concepts”. For example, potential route alignments could be road corridors, disused railway lines, canal towpaths, watercourses or public rights of way. The route alignments remain conceptual and mode agnostic, but as they are considered in further detail, can become more mode specific as interventions.

Interventions are identified from stakeholder feedback, consideration of previous feasibility studies, and a detailed desktop gap analysis. The latter looks at existing (current and disused) transport provision and networks and the current pipeline of works in the corridor²⁴ to identify new interventions that will provide the required connectivity opportunities for the future by giving greater breadth and opportunity to travel and increasing travel horizons. Scheme types include: active travel – walking and cycling (both on and off road), bus corridor treatment (bus priority measures and/or road space reallocation), bus service, masterplanning and “Streets for People”²⁵, Park & Ride, rail, highways, transit concepts (e.g. BRT, tram-train etc.).

The longlist excludes schemes that have been developed as part of other workstreams, although it is possible there will be some overlap if options have been identified independently in both this report and other specific studies (e.g. LCWIP). Some of these schemes have also been accelerated as part of West Yorkshire’s Transforming Cities Fund programme.

The following diagram summarises the process for developing interventions.



All interventions have been assigned a scheme type, a high-level deliverability and timescale attribute, as follows:

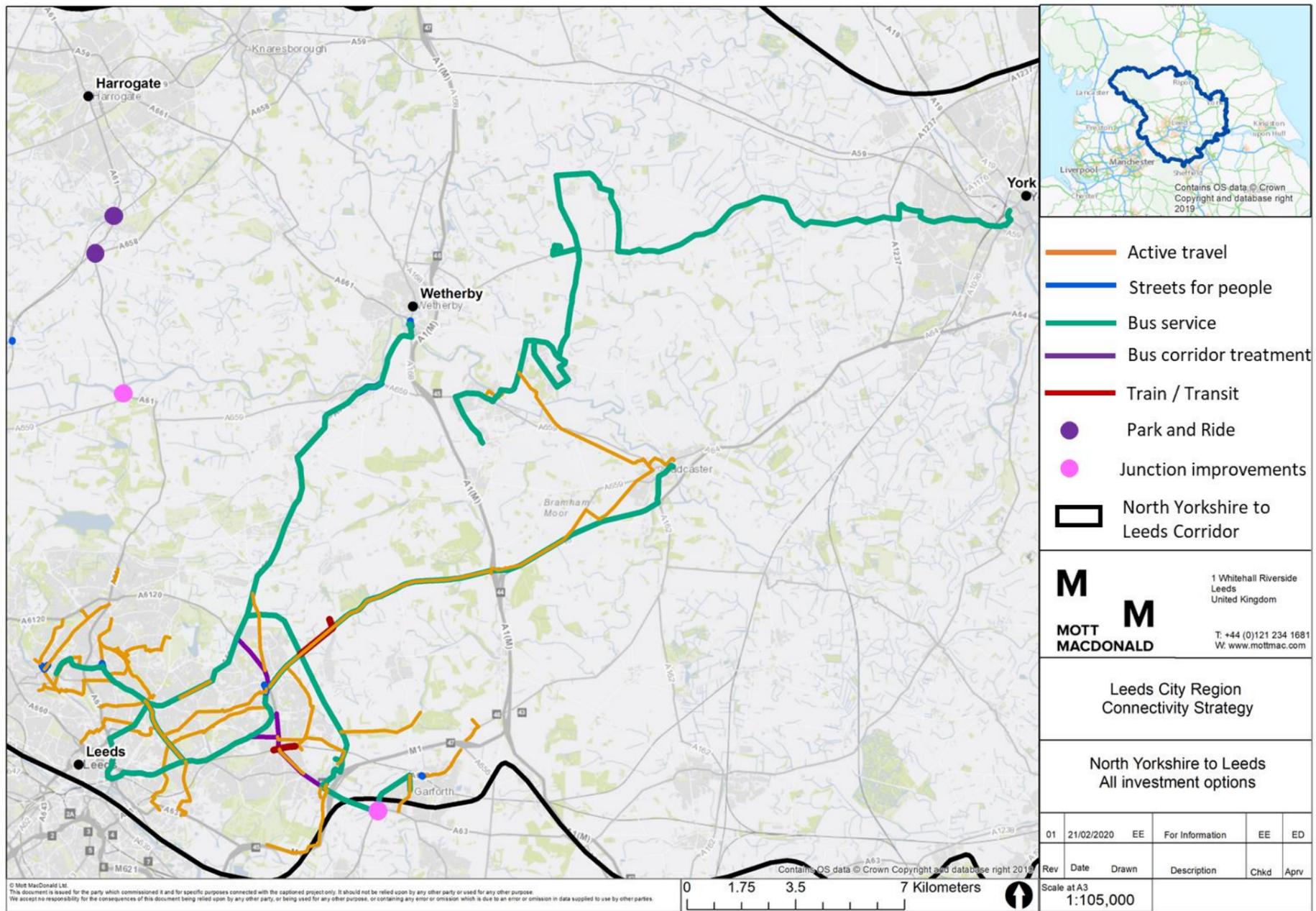
- Scheme types
 - Active travel (on and off-road walking and cycling)
 - Bus corridor treatment (bus priority measures and/or road space reallocation)
 - Bus service
 - Masterplanning / Streets for People - Improved urban realm and accessibility for pedestrians and cyclists
 - Park & Ride
 - Rail
 - Highways
 - Transit concepts (e.g. BRT, tram train etc.)
- Delivery timescales: short, medium, long term.
- Technical complexity: low, medium, high.
- Connectivity concept: identifies the connectivity concept each scheme aligns to

The result of the process above is a longlist of 56 interventions for the North Yorkshire to Leeds corridor. The alignments for these are mapped in Figure 35.

²⁴ e.g. West Yorkshire Transport Fund, Cycle City Ambition Grant, Leeds Public Transport Investment Programme and the West Yorkshire Local Cycling and Walking Investment Plan

²⁵ Streets for People is a West Yorkshire-led series of design principles that focuses on creating safe and healthy places that take into consideration a number of factors, including traffic management, reducing air pollution, creating places which help people to interact and encouraging sustainable methods of transport such as cycling, walking and public transportation.

Figure 35: North Yorkshire to Leeds corridor – alignments for all interventions in the long list



B.2 Interventions

The initial long-list of options for transport connectivity improvements has been produced by Mott MacDonald consultants. These proposals have been identified through high-level assessment of the evidence. Feasibility work will be required to develop deliverable schemes that best provide the connectivity required. The list has been collated with the long-list outputs of other Case for Change reports and the outputs of aligned workstreams such as the Leeds City Region Rail Vision and Capacity study and the Leeds City Region Emissions Reduction Pathway study to inform the West Yorkshire Connectivity Investment Plan and pipeline. The consolidated initial long-list can be found in Appendix 2 to the WY Connectivity Plan. Programme C - Options for delivery between 2026 – 2040.

