THE OVERHEATED ARC

Part 2 -
Sustainable alternatives

A report by Smart Growth UK
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http://www.smartgrowthuk.org

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Smart Growth UK

Smart Growth UK is an informal coalition of organisations and individuals who want to promote the Smart Growth approach to planning, transportation and communities. Smart Growth is an international movement dedicated to more sustainable approaches to these issues.

In the UK it is based around a set of principles agreed by the organisations that support the Smart Growth UK coalition in 2013:-

- Urban areas work best when they are compact, with densities appropriate to local circumstances but generally significantly higher than low-density suburbia and avoiding high-rise. In addition to higher density, layouts are needed that prioritize walking, cycling and public transport so that they become the norm.
- We need to reduce our dependence on private motor vehicles by improving public transport, rail-based where possible, and concentrating development in urban areas.
- We should protect the countryside, farmland, natural beauty, open space, soil and biodiversity, avoiding urban sprawl and out-of-town development.
- We should protect and promote local distinctiveness and character and our heritage, respecting and making best use of historic buildings, street forms and settlement patterns.
- We should prioritize regeneration in urban areas and regions where it is needed, emphasising brownfield-first and promoting town centres with a healthy mix of facilities.
- Civic involvement and local economic activity improve the health of communities.

Executive Summary

Chapter 1 We urgently need to rebalance our economy, yet regional divisions highlighted by the UK2070 Commission are set to be exacerbated by the Oxford-Cambridge Arc project which would increase Government support to a prosperous area of southern and eastern England.

Part 1 of this report looked at the Arc's shaky foundations and the damage it would do; this second part looks at possible sustainable alternatives. No-one promoting the Arc project appears to have asked whether the arc concept is a good one and, if it is, what is the right place to apply it. Least consulted of all were the communities involved. This report looks at the arc concept through a Smart Growth lens and asks if there are areas of England where it might be implemented beneficially, without all the damage.

Chapter 2 The original Arc proposal derived from the belief that the area has outstanding universities and research institutions, knowledge-intensive businesses, a skilled workforce and historic cities. We have identified four further important qualities areas would need if the arc concept were to be applied sustainably:-

- availability of brownfield development land,;
- no acute housing shortage;
- high-quality public transport;
- a genuine need for economic regeneration.

Chapter 3 The Arc is a failure on all four of our new criteria. Nearly all the development would be on farmland, including England's most productive soils. It would fail to protect the countryside, food production, natural beauty, open space, soil, biodiversity or natural capital in general. It includes substantial parts of three AONBs and three green belts.

While parts of the Arc's five counties are short of housing and infrastructure, especially around Oxford and Cambridge, much of this overheating is thanks to dubious claims about the two cities' unique qualities. It represents a serious failure of strategic planning.

Most of the high-quality public transport in the Arc is radial mainlines from London. None of its towns and cities have light rail and none is planned. The only substantial planned new local rail link is the long mooted Oxford-Cambridge line revival, yet more than a dozen closed lines, whose reopening might demonstrate some interest in sustainability, are ignored.

The big claim made for the Arc – that it has uniquely high productivity – is largely without foundation. There are islands of significantly high productivity, but mostly it simply lies around, or a little above, the national average. The same is true of its prosperity and household incomes and it has little or none of the serious deprivation that would justify intervention.

Chapter 4 We have selected an initial list of five "arcs of sustainable development" in England which demonstrate the four original Arc qualities and our four sustainability tests too.

Alternatives could certainly be designated, perhaps covering larger areas of the country, like the five-county Arc itself. They could also be designated in the UK beyond the borders of England. If the stipulation that arcs should have multiple universities were dropped, a larger number of areas could be chosen.

Chapter 5 A **Wolverhampton-Coventry Arc** is a far better candidate for "growth corridor" status. A multi-university arc indicates a Wolverhampton-Birmingham-Coventry Arc, though other parts of the West Midlands might be included. It would fulfil the Government's criteria and scores strongly on our four sustainability qualities. It would address economic need and offers locations for sustainable development.

Chapter 6 An extensive potential arc lies in North East England. Anchoring it to universities would necessitate a **Newcastle-Sunderland-Middlesbrough Arc**, though it would benefit from the proximity of Durham University. It might usefully extend into south-east Northumberland and the western parts of Teesside if the universities criterion were relaxed. This arc also scores strongly on our four sustainability criteria.

Chapter 7 More tightly defined than the first two, the third arc we have identified lies between **Nottingham and Derby**. It scores strongly on all four Arc criteria and all four of our sustainability criteria.

Chapter 8 Greater Manchester, with its vibrant commercial, cultural and academic life, is an obvious candidate for an arc. Strict adherence to the universities criterion dictates a **Manchester-Salford-Bolton Arc** which scores extremely well on both the four Arc criteria and our four criteria of sustainability.

Chapter 9 West Yorkshire's geography complicates identifying an arc for the county but the multiple universities criterion makes a **Leeds-Bradford-Huddersfield Arc** the obvious choice, scoring well on all eight criteria. But adhering rigidly to the multiple universities criterion rigidly could exclude other suitable areas.

Chapter 10 If the arc concept is a sound one, there is no reason at all why it should not be applied in Northern Ireland, Scotland and Wales.

Chapter 11 Exaggerated claims about the Arc's supposed high productivity and unique suitability for accelerated development persist, despite the unsustainable nature of the proposals. But we believe that, *if* the arc concept is a sound one, there are better places for its application. There are many places through much of the UK where it could be applied; we chose five clear candidates which meet the Arc's own criteria and the (non-exhaustive list of) four sustainability qualities. There are, assuredly, others. Those we have chosen are all more in need of investment and resources, well placed to take advantage of them and well equipped to accommodate them.

We therefore recommend that planning for the Oxford-Cambridge Arc be terminated and the resources devoted to examining the growth potential of areas that both need that growth and which could accommodate it sustainably.

A place for sustainable growth [*Smart Growth UK*]

A place for sustainable growth of a different kind [*Stella Stafford*]

1. Introduction

We urgently need to rebalance our economy. As a nation, we are badly divided geographically into have-regions and have-not-regions. This uncomfortable truth was confirmed by the UK2070 Commission, set up to examine these inequalities, in its recent first report[1]. It concluded there are deep-rooted inequalities across the UK and there is none of the long-term thinking and spatial economic planning that are needed to tackle them. The Commission said the regional inequalities which blight economic performance and life chances may become significantly worse unless drastic action is taken.

"Whilst London and the South East of England confront increasing pressures on living costs and resources as they soak up most of the UK's job growth and productivity, our report argues that many people and businesses outside of these areas are likely to miss out on the benefits of growth," said the Commission.

This report is the second part of our examination of the so-called "Oxford-Cambridge Arc". The Arc proposals are a clear example of Government action likely to make regional inequalities worse by accelerating concentration of investment and support in the wider south-eastern part of England. In this second part we will examine the basis of the Arc concept and look at whether there are other parts of England, and maybe beyond, where the concept might be beneficially applied without doing the harm the Arc proposals would cause.

In Part 1 we looked at the weak foundations of the "Oxford-Cambridge Arc" (which we will refer to simply as "the Arc"). That report examined the shaky foundations on which the Arc (and its associated Cambridge-Newbury Expressway) was launched, how it was adopted by Whitehall (the Treasury in particular, which ensured its progress) and how this support essentially guaranteed the backing of the National Infrastructure Commission, Highways England, other Government departments, local enterprise partnerships and most of the local authorities involved.

The whole process has been remarkable for its lack of meaningful public consultation throughout, even with those most at risk. Nor has there been any strategic environmental assessment, despite the scale of the proposals.

Yet the Arc, now grown far beyond the original Oxford-Cambridge Corridor to five whole counties plus Peterborough, lacks any real unifying economic or political feature. Its urban centres are relatively small and separated by huge areas of open country.

For the most part it is relatively prosperous, unlike many other parts of the UK which are crying out for attention and investment. Contrary to its PR spin, however, the Arc's overall productivity is only slightly above the national average and it is short of housing and infrastructure as a result of continued government support for growth there.

It is spectacularly unsuitable in environmental terms; it is short of water, it has high-standard countryside and it makes a huge contribution to the food supplies of a nation already unable to feed itself.

No-one, at any stage in this three-year process, seems to have stopped and asked:-

1. if the Arc as formulated was a good idea; and
2. if so, whether it was being developed in the right place.

We take no view here on whether the arc concept is worth pursuing but, *if* it is (and only if it is), then this second part of the report asks whether, *if* the Arc concept is a sound one, it might be beneficially located in other parts of England. We will examine the present Arc proposal through the lens of the Smart Growth approach and we will try to identify possible candidates where the concept might be beneficially applied without the harm the Arc would cause and so obtain some benefit from the huge level of scarce public resources already poured in.

2. What qualities would a sustainable "arc" possess?

Part 1 of this report mostly examined the shortcomings of the Arc proposal and the undemocratic way it was evolved. Smart Growth is, however, an essentially positive approach which aims to promote more sustainable ways of developing and travelling. So this second part of the report aims to see if the concept could be applied sustainably in other parts of the country.

The specific qualities which prompted identification of the Arc are apparently:-

1. outstanding universities and research institutions;
2. knowledge-intensive businesses;
3. a skilled workforce;
4. historic cities.

These can, of course, be important assets for rapid economic growth in any area or region. But the overheated Arc is by no means the only part of the UK where such qualities are found and there are additional local factors which, if present, could secure the Arc's desired ends without causing its massive damage to the environment. The four further factors we have concentrated on are:-

5. availability of brownfield development land;
6. no acute shortage of housing;
7. high-quality public transport;
8. a need for economic regeneration.

This is not to say these are the only sustainability factors we need to test the Arc against, far from it. Availability of water, quality of landscape and biodiversity are three vitally important factors, but our resources are limited and we have done what we can within them (multi-million pound research and public relations budgets being the preserve of the development industry and its supporters in Whitehall). These other factors will need urgent examination, however, especially given the growing water crisis in the eastern counties.

Before proceeding with the current Arc project, it is essential that we should ask whether such a development should take place in the five counties proposed when there are so many other areas which, while sharing its qualities, have other features that would facilitate large-scale development in a sustainable fashion and which have a much greater need for the development.

3. The Oxford-Cambridge Arc – a failure of strategic planning

The obvious first "arc" to which we should apply all our eight criteria is the five-county Oxford-Cambridge Arc itself. Unsurprisingly, given that it was criteria 1-4 that led to its designation, some areas within it score well, though even on its own criteria, others score less well. But judged against our sustainability criteria 5-8, it scores really badly.

For the most part the development would be highly dispersed low-density greenfield sprawl, the antithesis of sustainable development. It would be seriously dependent on the motor car and the Expressway which forms its spine would begin the process of creating an "Outer M25", further cranking up the country's dependency on road transport. It would fail to respect the countryside, farmland, natural beauty, open space, soil, biodiversity or natural capital. It would suck further economic activity out of regions that desperately need it toward an area parts of which are already severely overheated, thereby undermining regeneration, brownfield reclamation and town centres nationally. It has been a spectacular failure in terms of community involvement.

Part of the Arc is called "England's Economic Heartland", though it is difficult to see why this should be the case when compared with, say, the City of London or other major cities. But the danger of designating anywhere as *the* economic heartland is that it simply downgrades everywhere else. In the same way, basing it around the academic superiority of just two universities downgrades the quality of all the rest of the UK's academic institutions. All this is spectacularly unwise at a time of economic uncertainty.

The Arc concept was developed around the idea that agglomeration of the knowledge economy would improve its growth. But the "five counties plus" iteration of the Arc is far too large, low-density and dispersed to achieve this even with the huge amount of development proposed. Its main effect could be to create a lot more long-distance commuting into London. The Expressway's main function would be as the first stage of the "Outer M25".

The Arc's development under the auspices of the NIC was implicitly based around criteria 1-4. We believe that applying these four alone has enabled the Government to pursue this destructive plan, as explored in Part 1 of this report. But suppose we apply our sustainability criteria 5-8 to the Arc?

5. Brownfield and Greenfield The vast majority of the Arc's potential housing and development sites are greenfield. One of the key criticisms levelled against it is that those who created the Arc simply specified a boundary and never even bothered to consider whether the land within it was suitable for development. Yet it includes large areas of three AONBs and the green belts around Cambridge, Oxford and Luton. An overwhelming majority of it is undeveloped farmland, most of it high quality, and there are significant areas of woodland and other high quality natural environment.

Top-quality agricultural land is the Arc's default development location [*Stella Stafford*]

6. Housing The Arc's proponents are united in their assessment that the area is desperately short of housing and this in borne out in some parts of it by very high house prices. The average house price is £310,927 in Bedfordshire, £424,751 in Buckinghamshire, £309,705 in Cambridgeshire, £257,631 in Northamptonshire and £416,940 in Oxfordshire (all figures from Rightmove).

Few would disagree that parts of the Arc are significantly short of both market and social housing. However, taking it as a whole, the problem is not especially more serious than in the rest of southern England. The Government's 2019 document on its ambitions for the Arc[2] pointed out that nationally the ratio of median house price to median income (the standard measure of housing affordability) has risen from five times in 2000 to around eight times in 2016. In the Arc as a whole, the document's Chart 3 showed, that has risen to around ten times.

But it did concede that: "the affordability ratio is particularly high in Oxford (12.34) and Cambridge (13.35)" which suggests that, in the rest of the Arc, the ratio is near, or at, the national average. But more importantly, the accelerated employment growth in those two cities, actively encouraged by central government, has been achieved only at the cost of very high house prices and overloaded infrastructure. The Arc's promoters, however, fail to recognise that this is not an argument for unsustainable levels of house building, but a powerful argument against pursuing further growth in those places. The economies of both Oxford and Cambridge have been allowed to become seriously overheated for at least 20 years, running well ahead of the

provision of housing and infrastructure such growth ought to necessitate if it is to happen sustainably.

This is not a planning success; it is a very serious planning failure. Growth which is seriously needed elsewhere has been allowed to concentrate in small areas totally unfit to accommodate it, on the basis of dubious claims that Cambridge and Oxford have unique economic advantages which could not be found elsewhere and a desire among well-placed alumni of the two ancient universities to favour them.

7. Public Transport

What high-quality public transport the Arc possesses is mostly radial heavy-rail routes, supplemented by local bus routes heavily concentrated in towns. Although rail commuter routes to London from its relatively small and well-separated towns are mostly of good quality, local heavy rail services are few and there are many towns which lack such a service altogether.

None of the Arc's towns have current light rail and proposals for Cambridge and Oxford have been repeatedly rejected. An imaginative and practical scheme for Cambridge was put forward by Cambridge Connect and it received support from the Combined Authority to help it contribute to the mass transit study completed early in 2018. Following the study, however, the Cambridgeshire & Peterborough Combined Authority decided[3] to go ahead with bus options. The only major scheme to improve rail-based communications is the long-standing proposal to reopen the closed sections of the Cambridge-Oxford line, including the demolished section between Bedford and Cambridge, parts of which have been built on.

Arc promoters show little interest in reviving its many closed railways [*Stella Stafford*]

Part 1 of the Smart Growth UK report[4], published in February, showed there are at least 14 other closed railway alignments within the Arc which could, and should, be reopened if its promoters are at all serious about sustainable transport. Yet there are only proposals for two very short lengths. No interest is currently being shown in light rail, despite its very obvious energy consumption advantage over buses.

8. Regeneration

Most of the Arc lies in the more prosperous parts of the UK and it includes no area of acute deprivation. The *English Indices of Deprivation 2015*[5] show that, of the districts in the Arc, only Bedford, Luton, Milton Keynes and Northampton are even in the bottom 50 percentile of the Index of Multiple Deprivation for the most deprived neighbourhoods.

In its ranking of the *most* deprived LEP areas, the only Arc LEP just in the top half is Northamptonshire, the 18th most deprived LEP area out of 39. South East Midlands is ranked 26th, Greater Cambridge and Greater Peterborough 29th, Oxfordshire 35th and Buckinghamshire Thames Valley 38th out of 39.

The Arc in a Regional Context

The Government's ambition document for the "Oxford-Cambridge Arc", published as part of the 2019 Spring Statement[6] with a joint declaration extracted from its local partners, demonstrated quite clearly why the Arc would further distort the country's already hopelessly unbalanced national economy.

The report offered a diagram showing the productivity of the various local authority areas in the Arc which merely served to demonstrate that it is not uniform across the area; in South and East Northamptonshire it is little more than half what it is in Milton Keynes and Chiltern. But it said that productivity in the Arc as a whole: "is around 2.55% higher than the UK average". As plainly no-one would be impressed by such a marginal figure, it went on: "More significantly, the *growth* of GVA per head has been significantly greater in the Arc between 1997 and 2015 than for England and Wales as a whole (by 28.2 percentage points)".

Growth of 28.2% of 2.55% suggested that productivity across the Arc as a whole was unlikely to reach the sort of claims made for it, including that it has the second highest productivity in the UK after London, in the foreseeable future. And even if it were outstripping the rest of the UK, that is surely a reason for investing in the rest of the country.

Productivity, of course, is only one aspect of prosperity, but the idea that the Arc has a stronger economy and so should enjoy accelerated investment to increase its disparity with the rest of the nation has been a feature of the literature about it since the start. The new document continues the theme.

"The Arc's economy also appears to be more resilient than the national average, with 2.5 percentage point growth in GVA per head between 2009 and 2010, compared to 1.3 percentage points in London and 1.7 percentage points in England and Wales as a whole," it says. "However, GVA and productivity are not uniform across the Arc. Milton Keynes has the highest productivity per worker, almost 45% higher than the national average outside of London, whilst productivity in around half of the Arc's constituent local authority areas is below the UK average."

In other words, parts of the Arc have high productivity, and so have less need for the additional investment, while other parts of the Arc have below-average productivity, like some less prosperous parts of the UK which deserve additional support. This completely undermines the argument that the Arc deserves additional support because of its uniquely high productivity; overall its productivity is slightly above average. Its proponents are trying to have it both ways.

Changes in gross value added (GVA) per head by region were summarised last year in a *Briefing Paper*[7] by the House of Commons Library. Assessing the Arc's need for economic help is complicated by the fact it occupies parts of three standard regions. Two of these, the South East and East of England have seen high growth; over the 2010-16 period, the East grew by 13% and the South East by 12%, outstripped only by London (22%) and the West Midlands (15%). This compares with 9% in the South West, 8% in Northern Ireland and the North West, 7% in Yorkshire and Humberside and just 4% in the North East.

The picture is heavily distorted by London, which in 2016 enjoyed GVA per head at 177% of the national average. The South East has the second highest at 109% of the national average, East of England comes fourth at 91% and only the East Midlands (which includes Northamptonshire and Peterborough) is in the bottom half at 80%.

But, of course, there can be substantial variation in GVA per head across a region. The paper included a spreadsheet[8] showing workplace-based GVA per head by local area in 2016. Most local areas in the Arc score well.

Workplace Based Gross Value Added Per Head by Local Area 2016

Milton Keynes	46,780
Oxfordshire	33,337
Buckinghamshire	30,106
Cambridgeshire	28,077
Peterborough	27,595
West Northamptonshire	26,033
Luton	24,339
Bedford	23,895
North Northamptonshire	20,379
Central Bedfordshire	20,338

[*Source: House of Commons Library*]

Only Milton Keynes featured in the UK top 10, giving the lie to those who argue the Arc has such high productivity it should be a centre for investment. On the other hand its economy is mostly a bit above average, showing it needs no special economic assistance. Compare the top and bottom 10 NUTS3 areas.

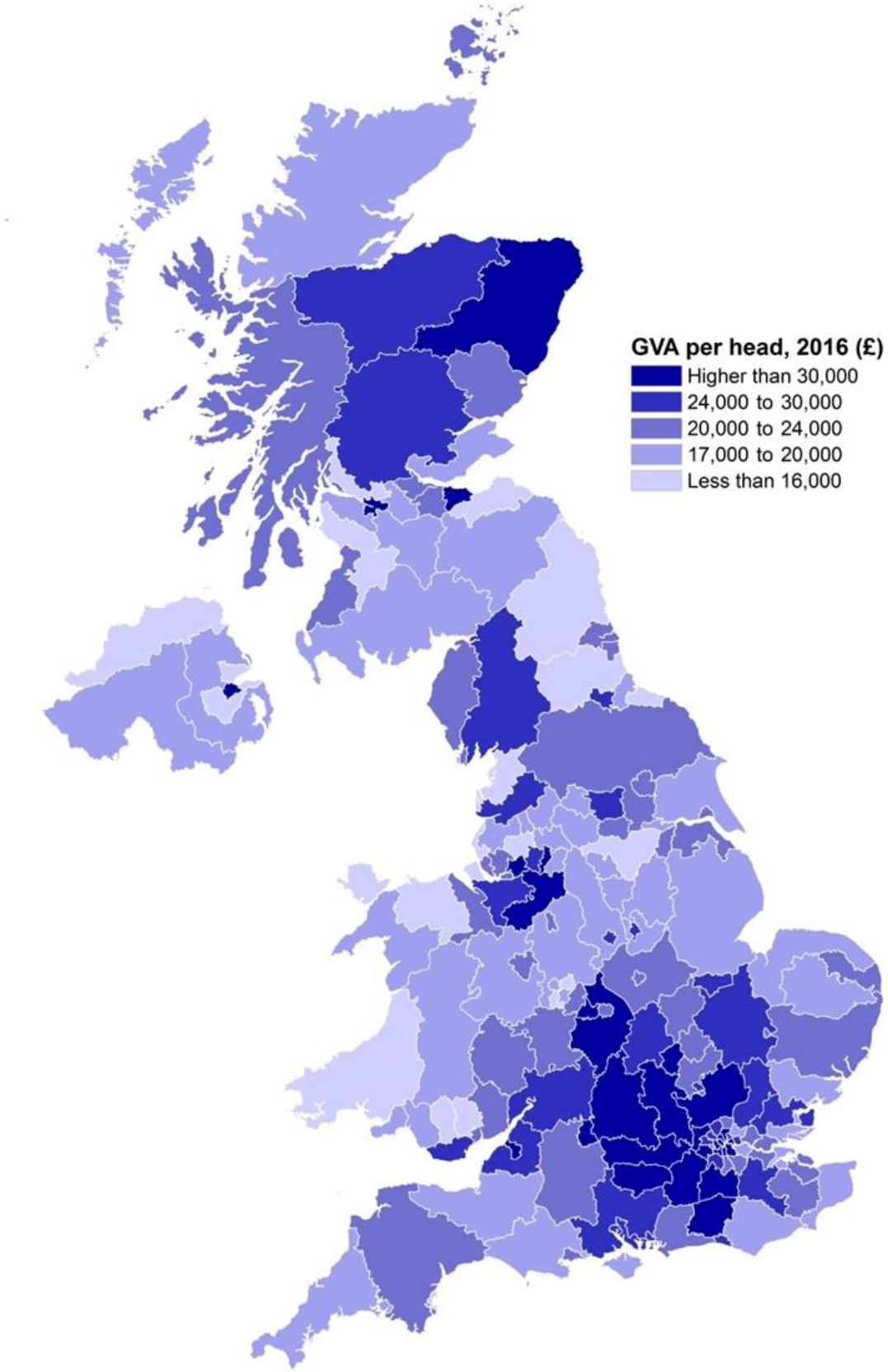
Workplace Based Gross Value Added Per Head by Local Area 2016

Camden and City of London	318,673
Westminster	238,506
Tower Hamlets	91,378
Kensington & C/Hammersmith & Fulham	68,675
Haringey and Islington	46,880
Milton Keynes	46,780
Hounslow/Richmond upon Thames	43,463
Berkshire	41,685
City of Edinburgh	39,321
Belfast	35,791
Northumberland	16,140
Lancaster and Wyre	16,083
Sefton	15,730
Dudley	15,597
North of Northern Ireland	15,488
East Ayrshire and North Ayrshire mainland	15,376
Wirral	15,237
Torbay	14,888
Gwent valleys	14,759
Isle of Anglesey	13,655

[*Source: House of Commons Library*]

In productivity terms, in fact, there is nothing special about the Arc at all. It is mostly a bit above average, and therefore less need of economic help, but its productivity is not so impressive that it could form an exceptional basis for strongly accelerated growth. In fact the lack of uniformity across the Arc shows once again that it is an entirely artificial construct with no basis in reality.

GVA per Head, 2016



Productivity across the Arc varies, but overall is not particularly high

[*Source: House of Commons Library*]

As noted above, however, productivity is only one aspect of economic health. The Gross Disposable Household Income per head statistics, however, paint a similar picture.

Gross Disposable Household Income per Head, 2016

Buckinghamshire	24,270
Oxfordshire	23,675
Cambridgeshire	21,322
Central Bedfordshire	20,719
Bedford	20,136
West Northamptonshire	20,062
Milton Keynes	20,039
North Northamptonshire	18,315
Peterborough	16,563
Luton	14,889

[*Source: Office for National Statistics*]

Once again, comparing them with the top and bottom 10 shows there is neither strong economic health nor intense deprivation in the Arc. Most income figures in the Arc's NUTS3 areas are clustered around, or a little above, the English national average of £19,878.

Gross Disposable Household Income per Head, 2016

Kensington & C/Hammersmith & Fulham	58,816
Westminster	50,910
Camden/City of London	45,225
Wandsworth	37,288
Hounslow/Richmond upon Thames	31,505
West Surrey	28,467
Haringey & Islington	28,188
Barnet	27,455
East Surrey	27,263
Bromley	27,169
Stoke-on-Trent	14,075
Derry City/Strabane	14,036

Wolverhampton	13,926
Walsall	13,791
Kingston upon Hull	13,380
Manchester	13,184
Sandwell	13,164
Leicester	12,848
Blackburn with Darwen	12,450
Nottingham	12,232

[*Source: Office for National Statistics*]

So while the Arc has small areas of high productivity, around Cambridge, Milton Keynes and Oxford and around the M4, overall it is nothing special. Equally, most of its prosperity is fairly typical of South East England and the East of England outside London, though again there are pockets which are less prosperous. But not only does it fail to demonstrate any particular importance for investment in productivity terms, nor any particular reason for special help in economic terms, neither does it demonstrate any particular reason for being regarded as separate from the rest of the country.

There is nothing at all special about the Arc but, reflecting as it mostly does, the relative prosperity of the south and east of England compared with the rest of the UK, there is plainly a very strong case to reallocate the big investments planned for it to the parts of the UK that need it. Constantly backing winners will just exacerbate regional differences, with all the ill-effects that inevitably follow.

4. Alternative arcs

In designating sustainable alternative arcs it will be necessary to specify that candidates meet our four sustainability criteria, as well as the four Arc criteria. For instance, it would be necessary to state quite explicitly that not all the areas within their boundaries are suitable for development and to affirm very strongly that a range of Smart Growth considerations, including brownfield-first and good access to rail-based public transport and services, must apply. There is no reason defining them should be difficult; green belts have been carefully defined too.

Informal discussions among Smart Growth UK supporters have yielded a tentative list of areas in England which have the four qualities the Arc is alleged to have, but which also have the four sustainability criteria we identified in Section 2 above.

The list is certainly not exhaustive, nor are those chosen necessarily the most suitable. But all those included do meet our extended criteria to a greater or lesser extent and, while they are not necessarily the most appropriate places for an "arc of sustainable development", they clearly offer better alternatives to the Arc. The five are presented in this report as a basis for discussion, in no order of preference, are:-

- Wolverhampton-Birmingham-Coventry;
- Newcastle-Sunderland-Teesside;
- Derby-Nottingham;
- Manchester-Salford-Bolton-Preston;
- Leeds-Bradford-Huddersfield.

Indeed, now the Treasury has expanded the Arc to cover five whole counties plus add-ons, it might be possible to consider even larger-scale alternative arcs. One which has been suggested is Liverpool-Manchester and there are others but, because of their size and the resources available to us, we have not been able to consider these in detail.

The "Oxford-Cambridge Arc" is a construct of the UK government, but involves planning and transport policies which, in the parts of the UK outside England, are locally determined by the devolved administrations. The possibility of arcs outside England is considered in Section 8 below. We have principally concentrated on alternative arcs in England, but there is no reason why the concept should not be applied in the rest of the UK. Some possible arcs which have been suggested are:-

- Paisley-Glasgow;
- Cardiff-Pontypridd;
- Bridgend-Swansea.

Were larger-scale arcs to be considered beyond the borders of England, Edinburgh-Glasgow also presents itself as a possibility.

Edinburgh [*Allan Dare*]

Meanwhile, if the NIC's four basic criteria are relaxed slightly, a large number of potential arcs with good public transport and brownfield land supplies, no significant shortage of housing and a need for regeneration could be identified. The requirement for multiple universities is particularly restrictive but we have stuck with it as a means of comparison with the Oxford-Cambridge Arc, although it demonstrates once again the narrowness of thinking which led to the designation of the Arc.

It would be unfair to say central government is unaware of the investment needs and economic potential of the rest of the country and it has its Northern Powerhouse and Midlands Engine initiatives, as well as a number of growth deals. All are receiving levels of investment, but the problem is that attention and resources are being diverted to the wholly unsuitable Arc, at a time when the needs of much of the rest of the country have seldom been so stark.

5. Wolverhampton-Birmingham-Coventry

The Wolverhampton-Coventry Arc is a far better candidate for "growth corridor" status than Cambridge-Newbury as it would fulfil the Government's criteria and our additional ones, it would address economic need and it offers suitable locations for sustainable development.

Applying all the eight criteria above:-

1. Universities and Research Institutions This Arc is home to Aston, Birmingham, Birmingham City, Coventry, Newman, Warwick and Wolverhampton Universities and has as many Russell Group universities (two) as the Arc. They "consistently rank highly in national and international assessments of research quality, and… are amongst the country's most successful institutions in securing competitive research funding, with particular strengths in the broad areas of engineering and physical science and the biosciences"[9]. One was rated in the Research Excellence Framework (REF) in the top 20 for the power and/or quality of its research in no less than 33 of the 36 REF Units of Assessment. The universities hold active research funding from UK research councils of around £550m, about 6.5% of the English total.

Aston University had 78% of its research outputs rated world leading (4*) or internationally recognised (3*) in the 2014 Research Excellence Framework. Warwick University also strengthened its already strong position in the 2014 REF.

2. Knowledge-Intensive Industries The three West Midlands LEPs worked with the West Midlands Combined Authority and Birmingham Science City to produce a supplementary report[10] to the Midlands Engine Science & Innovation Audit, itself part of the national science and innovation audits. It covered the Wolverhampton-Coventry Arc we are considering here, together with a wider West Midland area but, as it says, although science and technology employment is distributed widely, "there are particular concentrations in Birmingham, Coventry and Wolverhampton city centres, in Edgbaston (with a particular focus on life sciences), the area surrounding Birmingham Airport…" It also references the automotive sector around Gaydon and computer software in Warwick and Leamington which are outside our area of consideration.

"The research landscape across our area is multi-faceted, spanning the full 'technology readiness level' spectrum, from basic and experimental research, through to applied and collaborative R&D, and on to commercial implementation," says the *Innovation Audit*. "Our area includes world-class universities (with Birmingham and Warwick both ranked in the Top 100 globally), innovative and nationally significant research and technology organisations and major private sector R&D establishments that are internationally connected and globally significant."

The significance of this corridor as a key area of knowledge-based economic growth is already recognised in part by central government with the designation of the Black Country as an enterprise zone in the local authority areas of Dudley, Sandwell, Walsall and Wolverhampton and the Birmingham Enterprise Zone.

"The Black Country Enterprise Zone is described as the most successful nationally, and has already generated £1.5bn of investment," says the Government's Enterprise Zones website. "The Black Country Enterprise Zone comprises a portfolio of sites in Wolverhampton, Dudley and Walsall. There are a number of opportunities for investors at the helm of the region's industrial heartland."

Like other enterprise zones, the Black Country's is based around a series of development sites offered tax breaks and Government support for business development. Five major sites are already available for development and three further sites in Walsall are described as "longer term opportunities".

"The Black Country has seen a significant increase in foreign and domestic investment over the last few years and was recognised as one of the top five cost-effective regions in the UK by the *fDi Magazine* in 2016/17," says the website. "From manufacturing to transport infrastructure, education to culture, this area is rich with resources and is open to development. The Black Country Enterprise Zone is described as the most successful nationally, and has already generated £1.5bn of investment."

The Birmingham EZ is based around 26 sites in the City and aims to create 40,000 jobs over its lifespan, adding £2.8bn to the local economy.

"The Enterprise Zone is playing a leading role in the redevelopment of Birmingham city centre, with work to begin shortly on the £450m redevelopment of Paradise Circus, as well as the expansion of the Midland Metro to Broad Street, in addition to a host of business and skills support packages," says the Enterprise Zone website. "Activity is gathering pace, with eight sites already under construction, transforming the cities centre with new spaces and offices. The Zone will also be a gateway to the proposed HS2 rail terminal at Curzon Street."

Coventry does not have an enterprise zone designated but is a major industrial city and also home to two internationally famous universities – Warwick and Coventry. The city is separated from the rest of the West Midlands conurbation by an area of green belt which it would be important to protect, but there is no reason why the whole of the "Arc" from Wolverhampton to Coventry should not be considered as a knowledge-based growth corridor.

The Black Country LEP has identified five priority areas with the potential for transformational growth: advanced manufacturing including food and drink, transport technologies including aerospace, construction including building technologies, environmental technologies and business services. Greater Birmingham and Solihull LEP wants to build on the area's strengths in advanced manufacturing and transport technologies, digital and creative industries, the cultural sector, medical and life sciences, and environmental technologies. Coventry and Warwickshire LEP says its area is already recognised as a globally important hub in developing low-carbon technologies and the advanced manufacturing and engineering sector.

"Our area has long been recognised as the heart of the UK's manufacturing and engineering sectors – a position we confidently retain, alongside an increasingly diversified economy," said *A Science & Innovation Audit for the West Midlands*[11].

3. Workforce The three West Midlands LEP areas support around 350,000 employees in science and technology, consistent with the national average, and with concentrations in Birmingham, Coventry and Wolverhampton city centres and Edgbaston.

Despite the region's strength in science and technology, however, it is recognised that 40 years of deindustrialization have left productivity below the national average[12]. The West Midlands Combined Authority has established a Productivity and Skills Commission to identify the causes and address the issues which include skills deficits, too few people in employment and the quantum and quality of the business base. That said, there is plainly a pool of potential employees which the Oxford-Cambridge Arc is plainly chronically short of and likely to remain so for the foreseeable future. The authorities in the West Midlands are focused on leveraging the critical mass of world-class science and innovation assets the county enjoys.

4. Historic Cities Coventry has been one of the most important cities in England since the early Middle Ages. Its history goes back to Saxon times and it grew rapidly in the Middle Ages on the back of weaving and dyeing wool, becoming a city in 1345. Later, silk weaving and watch making became important and later bicycle making. Extensive friaries were closed at the Reformation but the large parish church became a cathedral in 1919. Since early in the 20th century motor manufacturing became important. The city was heavily damaged by bombing in 1940 and 1941 and extensive rebuilding took place after World War II. The decline of the motor industry has hit the city, but it remains an important manufacturing centre with two universities and a population around 300,000.

Birmingham too has a long history and was at the centre of Britain's industrial revolution in the 18th and 19th centuries. It was also founded in Saxon times and became known in the Middle Ages for its wool industry, metal working and leather. From the 16th century it grew rapidly and gradually metal working came to dominate thanks to local iron ore and coal. By the beginning of the 19th century its population was 73,000 and it was one of the bigger towns in the country. Metal working, together with jewellery and engineering, powered its massive growth in the 19th century and it became a pioneer in addressing the social, health and environmental problems caused by industrialization. It became an important communications centre and by the end of the 19th century its population was 630,000. In the 20th century the city continued its industrial growth and pioneered initiatives such as council housing. Like all industrial towns, it suffered significant economic reverses in the late 20th century and service industries became more important. Removal of the Inner Ring Road has allowed the city centre to expand and, as England's "Second City", the population now exceeds one million.

Wolverhampton is an altogether newer city, being so designated in 2000. However, the town itself has a long history dating back to Saxon times. It also grew in the Middle Ages as a market town and a centre of the wool trade. Much of the town was destroyed by fire in 1590 and another big fire damaged the town in 1696. During the industrial revolution it became a centre of the coal and steel industries, lock making and, later, manufacture of cars and motorcycles. Today there is still a significant presence of engineering, including aeronautics. The local higher education facilities became the University of Wolverhampton in 1992. Today its population is around a quarter of a million.

5. Brownfield and Greenfield

The West Midlands has one of the biggest asset bases of brownfield land in the country. An analysis of English local authorities' brownfield registers by the National Housing Federation in 2018[13] showed the whole West Midlands standard region had 1,992 brownfield sites covering 2,691ha and the West Midlands Combined Authority 1,307 sites covering 1,373ha. In the local authority areas covering our proposed Wolverhampton-Coventry Arc, Wolverhampton had 482 sites (249ha), Walsall 111 (65ha), Sandwell 251 (451ha), Birmingham 384 (394ha), Solihull 51 (149ha) and no figures was given for Coventry. The Federation estimates the four council areas of Birmingham, Sandwell, Solihull and Walsall could accommodate 43,000 homes, though this does not include Coventry or Wolverhampton. The figures also exclude the 28 sites totalling 66ha in Dudley, which, while not directly on a Wolverhampton-Coventry Arc, could be included if we adopt the loose definition of the Arc (towns like Aylesbury, Northampton and Banbury are nowhere near "the Oxford-Cambridge corridor", but have been included in the Arc).

With all our brownfield arcs, it will be important to specify densities for new housing that are significantly higher than the "garden suburb" approach which all too often squanders our scarce building land. Opportunities for densification of existing development should also be taken where they secure local support.

The West Midlands county does, however, also have an extensive green belt and it would be important to specify not only where Arc-type development policies should apply, but also where they should *not* apply (a key failure of the Arc). A strong brownfield-first policy should be imposed and greenfield land of any kind only released for development when absolutely unavoidable.

6. Housing

Virtually everywhere in the country has some kind of unmet housing need, most acutely for social housing, and the West Midlands is no exception. That said, however, it is plain there is far less pressure on market housing than in the south of England, and the areas around Oxford and Cambridge in particular.

Prima facie evidence of this lies in the designation by the Government, in 2002, of Birmingham and Sandwell as one of nine "Housing Market Renewal Pathfinders". These were explicitly intended to "renew failing housing markets and reconnect them to regional markets", "encourage people to live and work in these areas" and "improve neighbourhoods". They were areas where house prices had not risen in line with national trends (increasing the wealth of their owners) and, in a few cases, were suffering from abandonment. Although some money was spent on improvements, the programme began demolishing thousands of homes, mostly sustainably built Victorian terraces, in an effort to force up local house prices. The programme ran into huge opposition from both residents' and conservation groups and was eventually abandoned altogether in 2011.

The programme had Treasury support and ran at the same time as its early efforts to boost house building in the mistaken belief this would even out the ups and downs of the UK economy, as claimed in the Barker Reviews. Eventually the Treasury switched to simply building huge numbers of houses in virtually all English local authorities, from 2012. But the fact that Birmingham and Sandwell were ever included in Pathfinders shows that parts of the West Midlands were, relatively at least, well supplied with housing.

The Government agreed a bespoke housing package with the West Midlands Combined Authority (WMCA) in March 2018 which commits the local authorities to ensuring 215,000 homes are built by 2030-31, a 25% increase in delivery rates. Local plans will be amended accordingly. In return the Government has agreed to a Land Fund of up to £100m to acquire and derisk land in priority areas including the Walsall-Wolverhampton corridor where 8,000 homes could be built. It also agreed to take forward a Housing Infrastructure Fund bid for areas including the Commonwealth Games site at Perry Bar to the next phase of the bidding process. The WMCA has set up a Land Commission to identify ways of delivering more developable land for housing and employment.

Unlike the Oxford-Cambridge Arc, market housing in the West Midlands remains relatively low-cost. The overall average house price in the West Midlands county is £207,118. The average price in Wolverhampton is £185,060, in Bilston £136,738, in Wednesbury £142,053, in West Bromwich £149,392, in Smethwick £176,792, in Birmingham £202,721 and in Coventry £201,853.

7. Public Transport

Here the Wolverhampton-Coventry Arc is particularly blessed, in a way the Cambridge-Newbury Arc is cursed. The West Midlands has a good network of modern heavy-rail suburban services, a fine, fast-growing, light rail system and a dense network of bus services.

Public transport services in the West Midlands enjoy a high degree of integration. The West Midlands Combined Authority set up Transport for the West Midlands to co-ordinate investment and create an integrated, safe and secure network. Network West Midlands connects all public transport and its logo appears at railway stations, Metro stops and bus stations and stops. As well as the main line routes which include the West Coast routes, the North-East-South-West route and cross-country routes, there is an extensive network of local heavy rail services, much of it electrified. HS2 will provide high-speed services to the capital and the north of England from the new station at Curzon Street.

Around £1.3bn is being invested in extensions to the existing West Midlands Metro light rail system which currently links Wolverhampton with New Street Station via Bilston, Wednesbury and West Bromwich.

The Westside extension will operate via Grand Central to Hagley Road in Edgbaston. The Eastside Extension will run from Bull Street, via the new HS2 station at Curzon Street to a terminus at Digbeth, serving the Eastside regeneration. It is intended to extend this for a further 17km to Solihull via the Airport and NEC.

A new line is planned in Wolverhampton linking to the station. There are also plans for an 11km line from Wednesbury to Brierley Hill via Dudley.

Almost 30km of extensions are underway on the Midland Metro [*Smart Growth UK*]

The conurbation also enjoys a dense network of bus services linking all parts.

8. Regeneration

Like all of Britain's traditional industrial areas, the West Midlands suffered serious economic damage in the final quarter of the 20th century. Parts of the conurbation are prosperous, others less so.

The *English Indices of Deprivation 2015*[14] rated Birmingham as sixth worst among the 20 local authority districts with the highest proportion of their neighbourhoods in the most deprived 10% of neighbourhoods nationally on the Index of Multiple Deprivation. Greater Birmingham and Solihull also scored third worst, the Black country sixth worst and Coventry and Warwickshire the 16th worst in the proportion of neighbourhoods in each local enterprise partnership that are in the most deprived 10% of areas nationally according to the same Index.

The *Indices* showed Birmingham is the district with the eighth highest proportion of the population living in income deprived households nationally, Sandwell the tenth, Wolverhampton the 12th and Walsall the 18th. Wolverhampton was 10th worst for employment deprivation and Sandwell the 17th worst. Wolverhampton was 12th worst for income deprivation affecting children, with Birmingham 15th and Sandwell 18th. Birmingham was 14th worst for income deprivation affecting older people.

Conclusion

The West Midlands is a suitable place for an "arc" in the ways the five counties are not. It meets the four Arc criteria and also scores strongly on the four sustainability criteria we have specified. If the multiple university criterion is deemed essential, then an arc from Wolverhampton through Birmingham to Coventry would fit the bill, but other parts of the county could beneficially be included.

6. Newcastle-Sunderland-Teesside

An extensive potential arc lies in what was one of the cradles of the Industrial Revolution and which remains central to the nation's industrial base, stretching from Newcastle, via Gateshead, Sunderland, a string of towns in County Durham and Hartlepool to Teesside. This arc could, if the close tie to universities were slightly relaxed, also be potentially extended north-east of Newcastle into the former coalfield which also has plenty of potential for brownfield growth. Nearby is the ancient city of Durham with its famous university. As with all sustainable arcs, it would need careful definition to avoid becoming yet another excuse for urban sprawl, but the area is rich in brownfield land and knowledge-intensive education and industry.

1. Universities and Research Institutions

The Newcastle-Teesside Arc is home to four universities: Newcastle, Northumbria, Sunderland and Teesside, with the ancient and widely respected University of Durham close by. Durham and Newcastle are members of the Russell Group. Durham also has its Queen's Campus in Stockton-on Tees.

North East England is home to one of only three genetics research centres in the UK aimed at engendering fundamental improvements in human health. The Institute for Ageing and Health plays host to the UK's largest interdisciplinary research group in the field of ageing and age-related illnesses. NEPAF (the North East Proteome Analysis Facility) is a commercially-based analytical and research facility that supports academic researchers and professional companies through the provision of regionally-based world-class expertise in protein analysis and characterisation. The Institute for Cell and Molecular Biosciences at Newcastle University is a world-leading centre of excellence in biosciences. The Institute forms the focus of basic cellular and molecular biology at the University, integrating world-class research in prokaryotic and eukaryotic biology.

Supporting offshore work, there is the National Offshore Renewable Energy Catapult Testing Facility and the National Centre for Subsea and Offshore Engineering.

Newcastle University has had a long-standing partnership with Newcastle upon Tyne City Council which aims to maximize the region's scientific potential, raise awareness of its expertise globally, and aid inward investment to scientific businesses. The University and Council joined Legal and General in creating the new 10ha Newcastle Science Central development in the city designed to attract scientific and technological organisations and built on the site of a former brewery.

Rebranded as Newcastle Helix, Science Central will have 11 buildings and 450 homes. The major buildings include the Biosphere (with commercial laboratory space, offices and support services), the Core which will house knowledge-based, research-led businesses, the UK National Innovation Centre for Ageing, the National Innovation Centre for Data, the Key dedicated to structural and materials engineering research and Newcastle University's Business School and Urban Sciences Building.

Newcastle University was ranked 16th in the UK for research power in the 2014 Research Excellence Framework. Areas including dentistry, biological sciences, civil engineering and mathematics were rated world leading (4*) or internationally excellent (3*). Northumbria University achieved the biggest rise in research power from 2008 to 2014 in the UK and entered the top 50, both quality and quantity having risen sharply.

Northumbria University [*Smart Growth UK*]

The 2014 REF results for Durham University (although slightly outside our area) showed that almost 80% of its outputs were rated world leading (4*) or internationally excellent (3*). All 22 of its units of assessment contained 4* research.

2. Knowledge-Intensive Industries

North East England was one of the main cradles of the industrial revolution and industry is still well represented today, specialising in advanced manufacturing, life sciences, IT, energy and business services and most of this is concentrated within the area we have identified as an arc.

Within manufacturing, there are more than 240 companies in the automotive sector, generating over £1.1bn in sales and exporting more than £6.5bn annually. Companies include Nissan, Komatsu, Caterpillar, Erwin Hymer and Cummins. Companies involved in electric vehicles include Hyperdrive Innovation, Borg Warner and Avid Technology, backed by the Transport Operations Research Group at Newcastle University. The rail sector is also well represented by firms like Hitachi Rail, DB Schenker and Thermacore Europe.

Life sciences in the arc are represented by firms like Aesica and Piramal Healthcare and there are sites for investors at Newcastle Helix, NETPark and the International Centre for Life. Newcastle University ranks in the world top 100 for life science research and more than a quarter of the

students at the five universities in this arc study life sciences, the highest proportion in England. The region is developing a particular skills base in stem cell and genetic research, pharmaceuticals, medical devices and assistive technology and drug discovery and biomarkers. Altogether, around 55 medical and technology companies in the region share a turnover of £98m.

Newcastle Helix takes shape [*Smart Growth UK*]

This arc, and Teesside in particular, has long been a centre of the chemicals industries and these complement the pharmaceutical and life science based industries to the north. Chemistry-using industries include chemicals, fine & speciality, petrochemicals, polymers and composites, pharmaceuticals, biotechnology, bioresources, biofuels and renewable energy and low carbon materials. There are more than 1,400 companies directly involved or in the supply chain of these industries, generating £26bn of annual sales. The sector exports £12bn each year – making this region the only net exporting region in the UK.

The IT industry is well represented and its software cluster is the second fastest growing in the UK, and the fastest outside London. There are over 50 specialist gaming companies based in the region and there is a cluster of immersive technology companies. NETPark in Sedgefield includes a space incubator funded by the UK Space Agency which operates with the North East Satellite Applications Centre of Excellence.

Within the energy sector, there are a number of companies operating including North Sea plant and decommissioning work. There is huge potential for offshore wind energy work, with 400ha of riverside development land at 30 sites and 7km of quay next to deep water.

There is also a Financial, Professional and Business Services cluster of 19,000 companies in the region including Santander, Concentrix, KPMG, P&G and HP, the majority of it within our proposed arc.

3. Workforce

North East England has a workforce of 1.2m, the majority of whom live in the Newcastle-Teesside Arc.

The Financial, Professional and Business Services sector employs around 132,000 staff and over 43,000 are studying such subjects at the region's universities and colleges, again, mostly in this arc. Legal, financial and insurance services companies have more than 145 contact centres employing 40,000 people for global companies including Barclays, EE, EDF Energy, Santander and Virgin. The chemical-using industries together in the region employ around 190,000 people.

4. Historic Cities

Newcastle upon Tyne can trace its history back to Roman times, when it marked one end of Hadrian's Wall, and it has been continuously occupied since that time thanks to its position as the lowest bridging point on the River Tyne. It was during Norman times that it began to expand with the building of a "new castle", rebuilt in the 12th century. It saw repeated conflict with Scotland during the Middle Ages but its importance as a port on the Tyne ensured its growth, with goods including locally mined coal. By the mid-16th century it had a population of 10,000 and, despite damage in the Civil War, the coal trade continued its centuries of expansion. Industry began to grow from the 17th century and the coming of the railways, ship building and engineering made it one of Britain's pre-eminent industrial cities in the 19th century. The city gained new bridges and expanded rapidly, as did neighbouring Gateshead on the south bank. The post-war period marked an era of industrial decline, with the disappearance of ship building, coal and much of the engineering industries but the city gained its University in 1963 and the Polytechnic became Northumbria University in 1992.

Sunderland's origins lie in a fishing village in the early Middle Ages and it gained a charter as a town in 1154. In the 14th century it began to be involved in ship building and salt manufacture, while glass making began in the 17th century. The 18th century saw its expansion as a port, and ship building and glass and rope manufacture expanded. In the 19th century it expanded into a major industrial town with huge importance both for coal mining and coal shipping. As with other industrial towns, the post-war period brought a period of economic decline, but Sunderland Polytechnic was founded in 1969 and made a university in 1992, the same year in which Sunderland was granted city status. Today's population is 275,000 and the city is home to the Nissan factory.

Durham's history stretches back to the 10th century AD when the body of St Cuthbert was moved here to protect it from Viking raids. The "hill on an island" quickly became a centre of pilgrimage and was defensible, resisting attacks by the Scots twice in the 11th century. In 1072 a Norman fort was built here and later a Benedictine Priory, followed by a cathedral. The Bishop of Durham was granted special powers in 1091 and so began generations of "prince bishops" with wide powers. With a navigable river and a bridge over the Wear the city grew rapidly, surviving the Reformation and conflict during the Civil War. By 1800 the city had a population of 7,500 and industries soon sprung up. Durham University was founded in 1832 and the railway came in 1844. The population today is 43,000.

5. Brownfield and Greenfield A Newcastle-Teesside Arc would need to be defined carefully to avoid encouraging expansion across the significant areas of farmland in County Durham and beyond, thus differentiating it from the Treasury's growth corridor which is predicated on using farmland for building.

Industrial decline has, however, left plenty of brownfield land for development. The NHF Briefing on brownfield land in England shows its extent. Newcastle upon Tyne had 101 sites covering 144ha, Gateshead 108 sites (226ha), South Tyneside 24 (30ha), Sunderland 61 (170ha), Hartlepool 23 (54ha), Middlesbrough 50 (60ha), Stockton-on-Tees 14 (774ha) and Darlington 16 (57ha). It is more difficult to estimate how many of County Durham's 29 sites occupying 91ha are in our putative arc, but it is likely to be substantial. Together the Federation estimates that seven of the eight district authorities could accommodate 24,428 brownfield homes, plus an unquantified number in Stockton-on-Tees and Durham.

The potential arc also includes a great deal of high-quality countryside and it would be important to protect this. Although much of County Durham was left scarred by the coal mining industry, a great deal of work by the local authorities has reclaimed much of this land for green end uses and this legacy is a precious one. Designated areas include the North East Green Belt which protects areas around Newcastle, Gateshead and Sunderland from urban sprawl. The City of Durham also has one of England's smaller green belts. Significant parts of County Durham, even in the former coalfield in the east and parts of Teesside are still rural and it would be important to define any arc carefully to protect this. Happily the area has a good supply of brownfield land to support development of appropriate densities.

6. Housing Like Manchester and Sandwell, in 2002 the Government designated Newcastle and Gateshead as one of its nine "Housing Market Renewal Pathfinders". Here again, in a misguided attempt to force up house prices, hundreds of sustainable terraced homes were demolished before the futility of the programme was admitted. But as in Greater Manchester, it illustrates there was no overwhelming shortage of housing in relation to most of the rest of the country.

In a survey of empty homes by insurer Admiral[15], Gateshead was rated as having the fifth highest proportion of homes empty for more than 10 years in England – 1.8 in every thousand.

Unlike the Oxford-Cambridge Arc, market housing in the North East remains relatively low-cost. The overall average house price in the region is £164,557. Average prices in Tyne & Wear are £162,490 and in County Durham £139,406. The areas of most interest for an arc are mostly below the average: the average price of a home was £195,185 in Newcastle, £146,113 in Gateshead, £169,215 in Hebburn and £124,555 in Jarrow. In Boldon it is £166,649, in Sunderland £141,724, Houghton-le-Spring £150,101 and Washington £156,028. In Seaham the average is £128,791, Peterlee £93,917, Wingate £101,429, Trimdon Station £89,364, Hartlepool £138,248, Billingham £184,242, Stockton-on-Tees £133,505 and Middlesbrough £134,724 (all figures from Rightmove). It's a very far cry from the £300,000-500,000 averages in the Oxford-Cambridge Arc.

7. Public Transport Main line rail links are anchored by the East Coast Main Line, which passes through Darlington, Durham and Newcastle and the secondary main line passing through

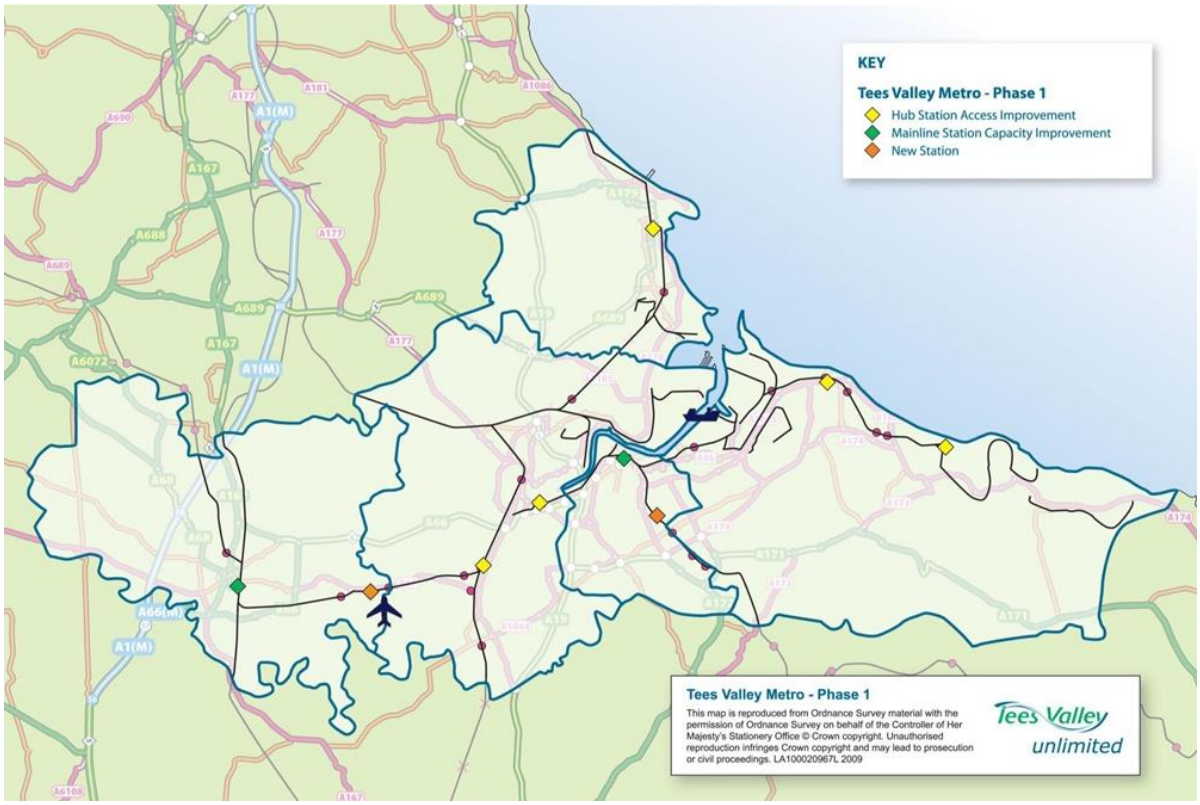
Stockton, Hartlepool and Sunderland, with links to north and south. Middlesbrough also has a main line link.

The Metro has been at the heart of Tyneside life since the 1980s [*Smart Growth UK*]

The Tyne & Wear Metro is the largest rapid transit system in the UK outside London, with over 60 stations serving Newcastle, Gateshead, Sunderland and north and south Tyneside.

There is no shortage of proposals to extend it, including a new link from Sunderland to Gateshead via Washington, a link northwards to Seaton Carew, Blyth and Ashington and an imaginative plan to take over the mothballed Leamside railway to provide a link south to the city of Durham and potentially wider destinations in the county and Teesside.

There have been a number of attempts to apply the metro concept for Teesside which would appear highly suitable for development of a rail-based local passenger transit system. The most recent idea was a Tees Valley Metro whose initial system would have used sections of the Tees Valley, Esk Valley and Durham Coast lines with some new stations and later addition of tram-trains and some street running. It was supported by five local authorities and it was planned to complete the £80m first phase by 2014 and the second £140m by 2018. In the end, funding was not forthcoming.



Tees Valley Metro – Phase 1 [*Tees Valley Joint Strategy Unit, 2009*]

8. Regeneration National deindustrialization in the final quarter of the 20th century hit a region which was strongly dependent on the long declining coal, steel and ship building industries extremely hard. Parts of the conurbations are prosperous, others less so.

The *English Indices of Deprivation 2015*[16] rated Middlesbrough and Hartlepool among the 20 local authority districts with the highest proportion of their neighbourhoods in the most deprived 10% of neighbourhoods nationally on the Index of Multiple Deprivation, with Middlesbrough topping the list with 48.8% of its neighbourhoods so blighted and Hartlepool ranked number 10. Newcastle-upon Tyne rated 30th and Redcar and Cleveland 33rd.

Tees Valley scored second worst in the proportion of neighbourhoods in each local enterprise partnership that are in the most deprived 10% of areas nationally according to the same Index. North Eastern was 10th worst out of 39.

The *Indices* showed Middlesbrough is the district with the second highest proportion of the population living in income deprived households nationally (26.8%), Hartlepool the eleventh and South Tyneside the 15th. Middlesbrough was 3rd worst for employment deprivation, Hartlepool the 4th, South Tyneside the 7th, Redcar and Cleveland the 12th and Sunderland the 13th worst.

Conclusion The sweep of land between south-east Northumberland and Teesside is another suitable place for an "arc". It meets all four Arc criteria and also scores strongly on the four sustainability criteria we have specified. Once again, if the multiple university criterion is deemed essential, then an arc from Newcastle to Middlesbrough would be appropriate, but relaxing it could see this extended to south-east Northumberland and other parts of Teesside.

7. Derby-Nottingham

Another potential arc lies in the East Midlands, anchored by the ancient cities of Nottingham and Derby and including the two local authority areas that lie between them, Broxtowe and Erewash. The area has a long and proud industrial history and continues to play a major role in the nation's industrial base.

1. Universities and Research Institutions

A Derby-Nottingham Arc is the base for three universities: Derby, Nottingham and Nottingham Trent, one of which is a member of the Russell Group. The highly respected Loughborough University is close by. The University of Derby is recognised as a top-20 University for teaching quality and has recently been awarded a TEF Gold rating.

On the basis of the 2014 Research Excellence Framework, the University of Nottingham was rated as having the eighth highest research power in the UK. The REF rated 55% of Nottingham Trent University's research as world leading (4*) or internationally excellent (3*).

Nottingham Trent University [*Allan Dare*]

The Advanced Manufacturing Research Centre agreed in March 2018 to establish a 5,000m² innovation facility at Infinity Park in Derby. It will be an extension of the i-Hub. The University of Derby Science Park will sit beside Rolls Royce's HQ.

2. Knowledge-Intensive Industries

The importance of the Derby-Nottingham area in knowledge-based business development terms is already recognised by central government. The Nottingham Enterprise Zone was designated in 2012 and now includes three sites, the 113ha Alliance Boots site in Beeston, Beeston Business Park and Nottingham Science Park. It later became the Nottingham and Derby Enterprise Zone and includes the 100ha Infinity Park site in Derby. US web domain registrar Go Daddy has recently taken a 10-year lease on space there.

The Derbyshire and Nottinghamshire local enterprise partnership, D2N2, is pursuing growth particularly in areas like transport equipment, medicine and bioscience, construction, food and drink and low carbon goods and services.

In a sectoral analysis for D2N2 in 2017[17], SQW noted that a number of sectors are particularly specialized in its area, both in GVA and employment terms, though some are above average in GVA and some others in jobs. The knowledge economy scores well in GVA terms, including the air transport, motor vehicles, other professional services, chemicals, printing and recording and electrical equipment sectors. Other sectors scoring well on high absolute productivity, though less strong than sector benchmarks, include pharmaceuticals and other transport equipment.

"There are ten sectors where the D2N2 area is specialised in GVA terms and has high productivity compared to the UK economy average," said the analysis. "This includes transport manufacturing (motor vehicles and other transport equipment), equipment manufacturing (electrical, machinery), other manufacturing (printing and recording, chemicals, non-metallic mineral), as well as water, sewerage and waste, motor vehicles trade, and other professional services. Seven of these sectors are also specialised in employment terms."

The analysis predicted strong GVA growth in 10 sectors with high absolute productivity: printing & recording, chemicals, non-metallic mineral products, electrical equipment, machinery, motor vehicles, other transport equipment, water, sewerage and waste, motor vehicles and other professional services.

Derby alone has attracted over £4bn of investment in 10 years and has recently been growing at 2.3% annually and expects to have the fastest growth of any East Midlands city over the next decade. Rolls Royce has its global HQs for civil aerospace and nuclear there and has announced a £150m investment in test bed facilities for large civil aero engines and is also investing in its submarine engine facilities. Toyota Motor Manufacturing is also located on the edge of the city.

Derby is also the centre of UK rail engineering, both on the manufacturing side but also for research and consultancy. It is home to one of the world's largest clusters of rail companies including Bombardier which has recently installed a 250m long test facility.

Queens Medical Centre is well connected

Much is made in the Arc promotional material of the biomedical facilities around Cambridge (perhaps in part thanks to their links to the University) but biomedical research occurs in many parts of the country. Derby Royal Hospital is the national lead centre for hand surgery while Queens Medical Centre in Nottingham is internationally recognised for various specialisms. Derbyshire and Nottinghamshire have, in fact, the third largest cluster of medical technologies in the UK.

3. Workforce

A report on skills for D2N2 in 2017 noted that 62% of vacancies throughout its area can be classed as technical vacancies, compared to 60% nationally. 40% of job vacancies are in Nottingham, 28% in Derby, 2% in Erewash and 1% in Broxtowe. It identified skill shortages in some areas and made recommendations for reprioritizing technical skills provision.

Some 12% of Derby's workforce is employed in hi-tech functions, four times the national average. It has 45,000 people employed in engineering and manufacturing.

4. Historic Cities

Nottingham can trace its history to the 6th century AD and it soon grew in importance as the first fordable point on the River Trent which is also navigable here. It was one of five towns to be given burgh status by the Danes and the first Trent bridge was built in the 10th century. The Normans built a castle here and the town grew rapidly through the Middle Ages. It became important for the manufacture of ceramics, hosiery and lace and grew rapidly through the 18th and 19th centuries. Later industries included tobacco, bicycles and pharmaceuticals.

The history of Derby stretches back even further, to Roman times, when it was called Deventio. The Saxons settled here and it had a population of 1,200 by 874AD. Later it was also one of five towns to be given burgh status by the Danes and it grew in importance through the Middle Ages. Its industry grew apace from the late 18th century, with railway engineering, ceramics and textiles gaining particular importance. It acquired city status in 1977 and the University was founded in 1992.

5. Brownfield and Greenfield

As with any tract of land in the United Kingdom, the area between Nottingham and Derby includes substantial countryside, although the area is well supplied with brownfield sites. Much of the land within Broxtowe and Erewash (and part of the adjoining land in South Derbyshire) is designated as part of the Nottingham and Derby Green Belt. Any designation of an arc would, therefore, as ever need to stipulate brownfield-first policies and robust protection of greenfield land.

There is very substantial brownfield land within and around the towns between Nottingham and Derby which is in great need of regeneration and which could accommodate significant growth.

The National Housing Federation briefing on brownfield land shows Derby had 47 sites covering 44 ha, Erewash 39 sites (80ha), Broxtowe 23 sites (172ha) and Nottingham 198 sites (295ha). The Federation estimated that, together, they could accommodate 18,344 homes.

6. Housing Nottingham City Council was recognised as outstanding strategic local authority of the year in the 2017 *Inside Housing* and Chartered Institute of Housing Awards which recognised the breadth of its approach. Its current housing strategy, *Quality Homes for All*[18], sets out its vision for all Nottingham citizens to have access to good quality housing, with an emphasis on housing and health.

Derby City Council's housing strategy[19] recognises that: "Investment in new housing can also be a key driver for economic growth and regeneration." It says ensuring housing is of sufficient supply, suitable quality and properly managed are therefore key priorities in the city – qualities which have not all been pursued in balancing economic growth with housing in the Arc in recent decades.

Broxtowe's strategy[20] notes large variation in the price of market homes (73.2% of the borough's homes), with proximity and connectivity to Nottingham adding a premium. "Toton, Chilwell and Beeston will all benefit from better connectivity with the opening of the Nottingham Express Transit tram," it says. Despite the differences, market housing remains affordable. "Effective regeneration requires a multi-faceted approach," it says. "To achieve this, housing initiatives must be linked with initiatives around economic growth, jobs, education and training, social inclusion and health."

"We want to manage an increase in the supply of housing to ensure local needs are met, and to provide access to affordable and decent new homes," says Erewash's Housing Strategy[21]. "Where possible, these will be on 'brownfield sites'." The Council's economic development strategy aims to raise economic performance and runs alongside housing policy.

Unlike the Oxford-Cambridge Arc, the price of market housing in this part of the East Midlands remains relatively low. The overall average house price in Derbyshire is £204,974 and in Nottinghamshire £196,876 compared to £303,931 in Cambridgeshire, £305,153 in Bedfordshire, £465,607 in Hertfordshire, £406,921 in Oxfordshire and £419,535 in Buckinghamshire. Average prices in Nottingham are £198,301, Derby £198,406, Beeston £223,174, Long Eaton £178,238 and Ilkeston £152,007 (all figures from Rightmove).

7. Public Transport The Nottingham-Derby area has significant heavy rail infrastructure both for passengers and freight. Both Nottingham and Derby enjoy inter-city links to the north and south and regional rail links east and west, although the continuing failure to electrify the Midland Mainline beyond Market Harborough remains a source of frustration. A mainline links the two cities and local rail services radiate in several directions.

Nottingham also has the successful Nottingham Express Transit light rail system which has lines north to Hucknall and Phoenix Park, west to Toton Lane and south to Clifton. Extension of the system through Kimberley and Watnall to Eastwood, and possibly to Langley Mill and the HS2 station at Toton, is strongly supported by many local politicians. It has also been suggested that it should be further extended to Staveley and Derby.

Nottingham Express Transit [*Allan Dare*]

8. Regeneration The decline of traditional industries including coal mining and steel making damaged the local economy in the final quarter of the 20th century. Parts of the conurbations are prosperous, others less so.

The *Indices* showed Nottingham is the district with the fourteenth highest proportion of the population living in income deprived households nationally (22.5%). Nottingham had also the fourth highest proportion of children in income deprivation (34.5%) and the 18th highest proportion of older people (25.9%).

Conclusion More tightly defined than the two previous arcs in the West Midlands and North East England, the Nottingham-Derby Arc again represents another suitable place for an "arc". It meets all four Arc criteria and also scores strongly on the four sustainability criteria.

8. Manchester-Salford-Bolton

Greater Manchester, with its world-leading universities, rich history and vibrant cultural life is another obvious location for an arc. Tying it to the multiple universities criterion would define it as a Manchester-Salford-Bolton Arc. Relaxing that could see other parts of the County of Greater Manchester profitably included.

1. Universities and Research Institutions

The area between Manchester and Bolton is home to four universities: Bolton, Manchester, Manchester Metropolitan and Salford. The University of Manchester, formed in 2004 from a merger between the Victoria University of Manchester and the University of Manchester Institute of Science and Technology, is the largest single-site university in the UK and a member of the Russell Group. In the 2014 REF, 83% of its research was judged "world-leading" (4*) or "internationally excellent" (3*) and it had one of the broadest submissions of any UK university, with research evaluated in 35 disciplines.

It has an internationally significant research profile over a wide range of subjects. Disciplines in which it was recognised as excellent include:-

- Aeronautical, Mechanical, Chemical and Manufacturing Engineering.
- Allied Health Professions, Dentistry, Nursing and Pharmacy.
- Anthropology and Development Studies.
- Biological Sciences.
- Business and Management Studies.
- Computer Science and Informatics.
- Electrical and Electronic Engineering/Materials.
- Modern Languages and Linguistics.
- Physics.
- Sociology.

On the basis of the 2014 Research Excellence Framework, the University of Manchester was rated as having the fifth highest research power in the UK. 83% of its research was rated world leading (4*) or internationally excellent (3*). The Times Higher Education University Impact Ratings judged the University to be third in the world on societal impact.

The REF rated 65% of Manchester Metropolitan University's research world leading (4*) or internationally excellent (3*) and it was rated 53 out of 154 for research power. It was the top "new" university for health research and 12th out of 94 UK universities for the subject overall.

2. Knowledge-Intensive Industries

A 2015 paper[22] on urban growth in the UK argued that Greater Manchester had been broadly successful in managing the transition to a post-industrial knowledge-intensive economy, despite the failure by successive governments to stimulate and support growth in the UK's major urban areas. "It has been able to capitalise on the positive agglomeration effects emanating from its size, density and diversity to reinvent itself and unlock this growth potential," wrote the authors. "There is much that other cities could learn from Greater Manchester in this regard." They put the blame for shortcomings on the UK's highly centralized political and economic structures which "have left cities without the

policy levers and revenue raising abilities that most other globally leading cities have been able to deploy to drive growth".

Despite these handicaps, the authors argued that Greater Manchester has shown considerable resilience and is now better positioned for recovery. They say that, since the 1990s, the county has experienced a post-industrial revolution that has seen it become increasingly attractive to inward investment in the knowledge-based service sector. They cite the concentration of assets that underpin its role as a service centre for the north of England, its high level of connectivity and the strong metropolitan locational preferences of knowledge-based sectors which underpinned expansion. "Greater Manchester's pragmatic approach of working with the grain of national policy, and consistently delivering Government objectives, meant that it has been able to secure significant public investment over this period and, crucially, also leverage in private investment on the back on this," they wrote.

The authors cite the opening of Media City UK, development of Airport City Enterprise Zone and creation of a new Graphene Hub at the University of Manchester of examples of how growth ambitions have been realised. This has been supported by the development of city-wide governance. In 2009 the *Manchester Independent Economic Review*[23] (*MIER*), an 18-month research programme into its economic strengths (the biggest urban study undertaken in the UK) identified and articulated what was needed to sustain economic growth. This concluded that: "Greater Manchester's economic strength, scale and governance mean that it is the best-placed conurbation outside London to increase its long-term growth rate, and therefore critical to raising overall economic growth in the north and the UK as a whole. What is holding it back, largely, is poor Government policy support", an interesting reflection on the Government's obsession with the Oxford-Cambridge Arc.

MIER resulted in the Association of Greater Manchester Authorities' *Stronger Together - Greater Manchester Strategy 2013* and eventually to the Greater Manchester Combined Authority (GMCA) strategy *Our People, Our Place*. The 2013 document set a target for 2020 to become "one of Europe's premier city regions, synonymous with creativity, culture, sport and the exploitation of a world-class knowledge base". It aimed to develop Greater Manchester as a low-carbon hub, to create delivery of a pipeline of investable low-carbon projects, to help business to deliver energy and resource-efficient opportunities, to support low-carbon goods and services sectors, to implement the University of Manchester's Ecocities work, to develop skilled workforces etc..

In February 2019, an independent panel published the results[24] of a review of the current and potential states of Greater Manchester's economy to mark the 10th anniversary of *MIER*. The *Greater Manchester Independent Prosperity Review* concluded that the county has world-class strengths in advanced materials and health innovation and is one of the best performing city regions for business start-ups. But it said work is needed to reduce social disparities, boost wages and improve productivity.

The *Review* noted some key strengths including widely distributed advanced manufacturing which employs 55,000 people and is the county's most productive sector (£72,000 GVA per employee), digital and creative industries which employ 54,000 and business, financial and professional services employing 225,000.

The *Review* was an honest look at the potential strengths and weaknesses of the Greater Manchester economy, including the knowledge-intensive sectors. Its candour is in stark contrast to much of what has been published about the economic potential of the Oxford-Cambridge Arc. It will underpin a local industrial strategy for Greater Manchester.

The revised draft of the *Greater Manchester Strategic Framework* makes quite clear, however, that knowledge-intensive business is at the heart of the county's ambition. Its Policy GM-P1 proposes facilitating the development of high-value clusters in prime sectors such as:-

- advanced manufacturing;
- business, finance and professional services;
- digital;
- health innovation;
- logistics.

The Policy also notes that local assets also include a high concentration and range of research assets and a large pool of graduates.

[*Greater Manchester Combined Authority*]

Finally, in June 2019, the *Local Industrial Strategy*[25] was published. It sets out an ambition for Greater Manchester to be a global leader on health and care innovation, to make the city region one of the world's leading regions for innovative firms to experiment with, develop and adopt advanced materials (backed by creation of a "Graphene City" and an "Advanced Materials City"), to build a leading European digital city region and to capitalize on the area's research assets and large low-carbon goods and services sector to achieve carbon-neutral living by 2038.

"Greater Manchester has many strengths: from the dynamic city centre, to the creative cluster around the Quays and the concentration of research excellence on the Oxford Road Corridor, to the industrial hubs in Trafford Park, Wigan, Rochdale and Bolton, and vibrant town centres across the city-region," it says.

3. Workforce

The *Greater Manchester Independent Prosperity Review* notes that Greater Manchester has the largest labour market outside South East England. It recovered from the recession with 71% of its working age population in employment by 2017, with unemployment at 6% the lowest since 2007. The share of high-skilled occupations has increased from 39% to 42% over the past decade, although it is still below the UK figure. But the growth in high-skilled roles has also been accompanied by a decline in mid-skilled roles and low pay remains a problem. Skill levels also lag behind the national average.

"Weak employer skills investment and concerns over the quality and relevance of publicly-funded training delivery are commonly cited as key reasons why skills gaps and shortages persist in local economies such as GM," notes the *Review*. "58% of all course starts in further education (colleges and training providers) in GM are at Level 2 or below. In part this reflects the poor prior attainment of many young people (who leave school without key qualifications) and adults. It arguably also reflects the nature of employer demand, with much of the GM economy remaining in the 'low skills equilibrium' identified by the *MIER* reviewers. For adults, this pattern may also reflect Department for Education funding eligibility rules, with loans replacing public funds for much provision at Level 3 and above."

The *Review* concluded there is potential to make Greater Manchester's workforce more productive by tackling poor health, "atypical forms of employment" but noted that labour demand is growing fastest in higher skilled jobs.

The revised draft *Greater Manchester Strategic Framework* reflects these concerns, noting economic disparities which have been exacerbated by recession and austerity. "Greater Manchester is also not fully realising the possibilities of its key assets, for example with the outstanding research base having much greater potential to support business activity and growth," it says[26].

The *Local Industrial Strategy* promises to ensure the education, skills and employment system allows everyone to reach their potential and employers have access to the skills required to deliver the *Strategy*.

"Greater Manchester has one of the largest and most diverse populations in the UK. It is home to nearly three million people, including more than 100,000 students, and there are over seven million people within an hour's travel time," says the *Strategy*. "The city region's universities have strong and improving graduate retention rates, and it has one of the most linguistically diverse

populations in the world, with over 200 languages spoken. One-in six residents come from a black and minority ethnic background and the city-region has the UK's third largest LGBT+ community after London and Brighton. This access to skilled labour, cultural diversity and inclusivity is an inherent strength and provides a foundation for future growth, generating new ideas and making the city-region a magnet for new talent and investment."

4. Historic Cities The necessity or advantages of an arc including ancient cities is, perhaps, one of the more contentious. While many towns in the Manchester-Bolton area have ancient origins and proud histories, it cannot be claimed either of them achieved city status in ancient times. They do, however, have history aplenty.

Manchester did not achieve city status until 1853, but its history stretches back to establishment of the Roman fort of Mancunium around 79AD. It grew into a town in the Middle Ages, with the settlement of Flemish weavers in the 14th century pointing to its future in textiles. Cotton began to be used in the 17th century and eventually overtook wool in importance. In the 18th century the Irwell and Mersey were made navigable and the Bridgwater Canal opened in 1761.

But the explosive growth to the huge city we know today began around the beginning of the 19th century with the opening of cotton mills. By 1835 it was dubbed the "greatest industrial city in the world" and the cotton industry was joined by engineering and chemicals, supported by the growth of canals and railways.

As well as the growth of capitalism, Manchester's history was also important for the left, including the Peterloo massacre of 1819 and Engels' work in the 1840s on poverty.

The number of cotton mills peaked around the time city status was granted but the city also became a financial centre and, as late as 1913, nearly two-thirds of the world's cotton was still processed in the region. Textiles declined sharply following the Slump and the decline continued into the late 20th century. The 1980s saw the closure of the port on the Manchester Ship Canal and the opening of the first lines of Manchester Metrolink. In recent times regeneration initiatives have achieved considerable success and although Greater Manchester County Council had been abolished in 1986, today there is a new combined authority.

The other city within this arc is Salford which became a city as recently as 1926. Its history, however, is a long one and it has ancient and Roman origins. The Hundred of Salford was created as Salfordshire in the 12th century and received a charter as a free borough in the 13th. The town continued to grow and that growth accelerated after the industrial revolution. Salford Docks on the Manchester Ship Canal were opened in 1894.

Industrial decline in the 20th century hit Salford as hard as any and the Docks closed in 1984. Since then they have, however, been extensively renovated as Salford Quays where 10,000 people now work, including Media City UK and the Lowry Centre.

5. Brownfield and Greenfield The issue of brownfield development and greenfield protection is currently the subject of keen debate as a result of development of the *Greater Manchester Strategic Framework* (*GMSF*).

The area does contain a very substantial legacy of brownfield land. The National Housing Federation briefing on brownfield land[27] shows Manchester has 324 sites covering 357ha, Salford 211 sites (176ha) and Bolton 149 sites (214ha). The Federation estimates that, together, the three local authority areas could accommodate 72,279 homes. The Regional Spatial Strategy in the 2000s set brownfield targets of between 85% and 95% for the various local authorities, and these were successfully achieved[28].

The initial proposal for the *GMSF*, however, set a brownfield target of 70% and proposed building 227,000 homes, creating 200,000 jobs and destroying 4,900ha of green belt land. The Government promised a land fund up to £50m to support land remediation.

Following widespread objections, the revised draft *GMSF* published in January 2019 reduced the green belt losses by 50% and adopted a "brownfield-preference" approach.

"The truth is I would have liked to go further and get closer to the aim of 'no net loss' of green belt," said Greater Manchester mayor Andy Burnham in a speech[29]. "That was under active consideration but effectively made impossible by the Government's insistence on us using the old population and housing figures, which are significantly higher than the most recent ONS projections. It was decided that our plan would be at considerable risk if it diverged from the methodology and the greatest risk of all to our green belt is to have no plan in place. So it is right to push ahead, to keep high ambitions for growth in jobs and homes but, by focusing on higher-density development and town centres, we can do so while still protecting more precious green space."

But, as objectors have pointed out, this is far weaker than brownfield-first.

"National planning policy does not support a 'brownfield-first' approach, as local authorities are required to be able to produce a five-year supply of housing sites which are available and deliverable for example," says the revised draft[30]. "If we cannot demonstrate that our brownfield land is available and deliverable (and this is something which most of our districts currently struggle with) then we are required to identify other land which is – this may be protected open land or green belt. We are adopting a 'brownfield-preference' approach – we will do all we can to make sure that our brownfield sites come forward in the early part of the plan period, however to do this we need to press Government for support to remediate contaminated land, to provide funding for infrastructure and to support alternative modes of housing delivery."

The revised draft proposals reduced the housing target from 227,000 to 201,000 homes (54,530 in Manchester, 32,680 in Salford and 13,800 in Bolton) and jobs but they still attracted criticism for being economically over-ambitious and for an unnecessary rate of release of greenfield land. It proposed designating 69 new parcels of green belt.

Despite this, however, the Government reacted angrily to any reduction in the housing targets it wished to impose on Greater Manchester. In March 2018, the Ministry of Housing, Communities & Local Government (MHCLG) had allocated £68m to support for infrastructure to assist house building on brownfield land and smaller sites. But in March 2019, the funding was withdrawn as MHCLG wanted to use the 2014 household formation numbers to underpin the

housing targets it imposed, while the GMCA wanted to use 2016 figures which would have reduced it and removed justification for so much destruction of green belt land.

But even the GMCA draft *Framework* would involve widespread destruction of greenfield, green belt land, though rather less than the Government is demanding.

Although the draft *Framework* has been promoted as Smart Growth in action, this is only partly the case. One problem is that it has a distinctly patchy approach to development densities. "Development will need to be undertaken at an appropriate density and with suitable provision for green infrastructure. Securing higher densities in the most accessible locations will help to maximise the ability of people to travel by walking, cycling and public transport, and reduce reliance on the car," it said. The logic to this is that density would be allowed at inappropriate densities at places which are only reachable by car.

The draft *Framework* perpetuates the myth that higher density homes means flats. "Smaller households are forecast to account for over half of the growth in households. It is anticipated that this will further strengthen the demand in apartments, particularly given cost pressures and the increased reliance on private rented accommodation. However, some single and couple households will want or need to live in larger dwellings, for example to facilitate home-working or accommodate visiting relatives. There is scope to increase the number of families living in apartments, especially if higher density neighbourhoods can be made more inclusive for all age groups," it said. Yet Greater Manchester is the location for the country's most famous fictional street of high-density houses. *Coronation Street* may have been half demolished, but it still retains some of the byelaw homes whose appropriate densities and tight communities were such a feature of the county in times past.

The problem is that the *Framework* only says: "Increasing the average density of new housing developments in the most accessible locations is an important part of the overall strategy for Greater Manchester." This begs the questions of whether housing should ever be provided at sites which are inaccessible to public transport and whether, if it is, it should be provided at wasteful development densities.

While it proposes sustainable densities at some types of location, it proposes a default 35 dwellings per hectare for developments 400-800m from a "designated centre", 400-800m from the Leigh Guided Busway and all other areas not in one of the designated locations. This is a very low density for any conurbation and would allow land squandering on the grand scale, quite at odds with the *Framework*'s objectives of: "assisting the protection of greenfield and green belt land".

6. Housing

Like Birmingham/Sandwell and Newcastle/Gateshead, Manchester and Salford were two of the nine areas designated in 2002 under the "Housing Market Renewals Pathfinder" programme. Hundreds of homes were demolished in a bizarre attempt to force prices up. But once again, it demonstrates that, relatively speaking, the area is not one of acute housing shortage.

The draft *Greater Manchester Strategic Framework*, however, sets out some very mixed messages on housing provision. "Increasing the supply of affordable homes is an essential component of the

overall strategy," it says, before stating that one key aim is increasing the supply of unaffordable homes.

"A key aim of the *GMSF* is to boost the supply of new homes, in some areas this will help to diversify local housing markets that are often dominated by low-cost housing, bring more money into local economies, and deliver more mixed and inclusive communities," it says. "It will also help to increase the options for skilled workers looking to move into or within Greater Manchester. Focusing a significant proportion of housing growth in the northern areas will assist in this, supported by selectively releasing green belt sites to deliver a diverse mix of values and tenures that includes affordable homes as well as some higher value housing, (relative to prevailing values in the local area), within a high quality environment."

So releasing green belt land, at fairly low densities and locations remote from public transport, is seen as a way of diversifying the class mix, even apparently at the expense of affordability and sustainability. Yet the *Framework* also admits: "Around three-quarters of the population increase is projected to be aged 65 and over, with less than one-tenth aged under 18. Indeed, those aged 65 and over are projected to account for all population growth in five of the individual districts in Greater Manchester". And it admits too that: "Smaller households are forecast to account for over half of the growth in households."

In contrast to the Oxford-Cambridge Arc, market housing in this part of North West England remains relatively low priced. The overall average house price in Greater Manchester is £200,409. In the City of Manchester it is £203,203, in the City of Salford £172,197 and in Bolton it is just £163,354 (all figures from Rightmove).

7. Public Transport

Greater Manchester enjoys a relatively dense network of sustainable public transport. Good long-distance heavy rail connections and suburban lines complement the Metrolink light rail system. The draft *Framework* foresees an increase in walking and cycling and says that, if its overall vision is to be achieved, there will have to be an increase in the use of public transport.

Metrolink [*Allan Dare*]

Given the extraordinary success of Metrolink in underpinning the *Framework*'s objectives which include, by 2040, half of all daily trips being made on foot, by bike or by public transport, it is perhaps surprising it eschews much in the way of further light rail expansion, apart from some tram-train proposals on heavy rail lines.

"One of the main factors driving public transport is population density," says the draft *Framework*. "The more people that live in an area the more frequent, economic and accessible public transport becomes. As such, the policies elsewhere in this plan encourage concentrated regeneration and development that will increase the attraction and availability of public transport." Which makes it all the more surprising it is prepared to sanction large areas of relatively low-density 35dph housing, much of it in locations remote from public transport.

Despite this, however, much of Greater Manchester is a highly public transport accessible place, in stark contrast to the Oxford-Cambridge Arc where rail-based public transport is mostly restricted to a few heavy rail radial routes from London.

8. Regeneration Like most areas which depended on heavy industry, the decline of industries like cotton hit Greater Manchester hard. Some parts of the county are prosperous, others much less so.

The Greater Manchester Independent Prosperity Review[31] was commissioned to provide a fresh assessment of the current state and potential of its economy. The *Reviewers' Report* was published in March 2019 and concluded that labour productivity remains below the national average and suffered a shock during the financial crisis. It noted a hitherto little mentioned link between health inequality and productivity.

"Research by the Northern Health Science Alliance demonstrates the impact of tackling health inequalities across the North of England," it says. "It finds that up to 30% of the productivity gap with the UK average could be reduced by raising participation in the workforce through addressing ill health; while decreasing rates of ill health by 1.2% and mortality rates by 0.7% would reduce the gap in productivity between Greater Manchester and the rest of England by 10%."

It noted deficiencies too in the infrastructure compared with more prosperous regions.

The *English Indices of Deprivation 2015*[32] rated Manchester and Salford as two of the 20 local authority districts with the highest proportion of their neighbourhoods in the most deprived 10% of neighbourhoods nationally on the Index of Multiple Deprivation. Greater Manchester also scored fifth worst in the proportion of neighbourhoods in each local enterprise partnership that are in the most deprived 10% of areas nationally, according to the same Index.

The *Indices* showed that Manchester is the district with the seventh highest proportion of the population living in income deprived households nationally. Manchester also ranks fifth worst local authority district in income deprivation affecting children and fourth worst in income deprivation affecting older people.

Conclusion Much of the county of Greater Manchester would meet the original arc criteria and our four sustainability criteria and, if the multiple universities criterion is considered essential, then a Manchester-Salford-Bolton arc would fit the bill extremely well.

9. Leeds-Bradford-Huddersfield

Of the English areas we are looking at, West Yorkshire is perhaps one where geography poses difficulties in designating any meaningful type of "arc". Linking it to the multiple universities criterion necessitates the arc being Leeds-Bradford-Huddersfield. But the shape of the county, whose urban area is an approximately circular tapestry of towns and cities with open land between them, demonstrates some limitations of the arc concept. The proposed arc would exclude, for example, the ancient city of Wakefield and major towns like Castleford. Nevertheless, for the purposes of comparative arcs based around universities, we have stuck to the Leeds-Bradford-Huddersfield Arc, which would at least include Halifax and Dewsbury. But the long shadow cast by the universities of Oxford and Cambridge is evident.

1. Universities and Research Institutions

The Leeds-Bradford-Huddersfield arc is home to six universities: Bradford, Huddersfield, Leeds, Leeds Arts, Leeds Beckett and Leeds Trinity.

The University of Leeds is a member of the Russell Group and was rated in the top 100 world universities in the QS World University Rankings 2019. It is part of the Worldwide Universities Network comprising 23 research-intensive institutions. The Research Excellence Framework 2014 rated the University in the UK top 10 for research power. It has over 35,000 full-time students and has created over 100 spin-out companies since 1995. On the basis of the 2014 Research Excellence Framework, the University of Leeds was rated as having the tenth highest research power in the UK; over 80% of its research was rated either world leading (4*) or internationally excellent (3*).

West Yorkshire Combined Authority has set up a research programme with the University of Leeds Institute for Transport Studies designed to provide the Combined Authority with research into societal and technological developments that it can use to make better transport investment decisions around future demand for transport services

The University of Bradford has three research themes: advanced healthcare, innovative engineering and sustainable societies. The University has the following research centres and institutes:-

- Digital Health Enterprise Zone;
- Centre for Skin Sciences;
- Centre for Pharmaceutical Engineering Science;
- Advanced Materials Engineering Centre;
- Polymer Micro and Nano Technology Centre;
- Institute of Cancer Therapeutics;
- Centre for Chemical and Biological Analysis;
- Science Bridges China;
- Advanced Materials Engineering Centre;
- Automotive Research Centre;
- Computing Enterprise Centre;
- Centre for Pharmaceutical Engineering Science;

- Centre for Polymer Micro & Nano Technology;
- Centre for Sustainable Environments;
- Centre for Visual Computing;
- Cyber Security Interdisciplinary Centre;
- Centre for African Studies.

The University of Bradford was ranked 49th in research power in the UK in the 2014 Research Excellence Framework, up from 62nd in the previous assessment in 2008. The University of Huddersfield rose from 97th to 68th over the same period.

Between them, around half of the nine Leeds City Region universities' 39,000 graduates each year have degrees in science, technology, and maths.

2. Knowledge-Intensive Industries

The Leeds City Region covers the whole of West Yorkshire and York and claims to be the largest city region economy outside London. For arc purposes, however, here we are trying to narrow the focus down to approximately the areas of Leeds, Bradford, Calderdale and Kirklees.

The *Leeds City Region Strategic Economic Plan 2016-2036*[33] identifies Leeds as the core city within the region, home to a quarter of its population and to a major financial and professional services sector with concentrations of globally significant manufacturing, healthcare and digital technology companies. The West Yorkshire LEP describes it as the leading professional services hub outside London. Bradford has above average concentrations of production businesses concentrated in manufacturing, energy and utilities and has a Digital Health Enterprise Zone. Calderdale is a centre for financial services and manufacturing and Kirklees has strengths in engineering, textiles and creative industries.

The *Economic Plan* says sectors with potential for growth are innovative manufacturing, financial and professional services, health and life sciences, low carbon and environmental industries, digital and creative and food and drink. Most of these are what is generally reckoned to be the "knowledge-intensive" sector.

The LEP says the City Region has 20 of the fastest growing tech companies in northern England and Leeds is home to Screen Yorkshire, Channel 4's new HQ, Sky's Digital & Technology Services Campus, which employs 650 members of staff focused on software and hardware development, IT and business consultancy BJSS and telecoms company AQL. Bradford is home to Exa Networks. Several major banks are based in the area and Leeds also accommodates Britain's fastest growing legal sector. Four out of five NHS national offices are based in the city and it is home to some of the world's largest healthcare data platforms. The City Region has the largest concentration of medical device companies in the UK and 7,300 manufacturing and engineering businesses, employing 144,000 people. The UK national measurement institution, the National Physical Laboratory, has a location in Huddersfield.

Leeds City Region LEP is now seeking input from businesses, other organisations and individuals to help shape its industrial strategy.

3. Workforce

The City Region as a whole has a workforce of 1.4m and it claims to be the largest city region economy outside London.

There has been substantial job growth in the City Region, although this has been concentrated in high and low income jobs, with a "hollowing out" identified in middle income jobs. "There are fewer middle level jobs in the kind of manufacturing and service companies that have previously been at the heart of the UK economy," says the *Economic Plan*. "The result is a lack of job progression opportunities for many who are either entering the job market for the first time or seeking to improve their skills and earnings. Many others are denied a role in the economy that their education and skills would merit."

The *Plan* therefore urges ensuring skills are in place to enable people to secure higher level roles, given the forecasts for rising demand at this level. It therefore demands a focus on both middle range and higher level skills and says this would enable the City Region to close the gap on the national average.

4. Historic Cities

This potential arc is home to two historic cities: Leeds and Bradford and several large historic towns. The ancient city of Wakefield is nearby.

Wakefield, in fact, has had city status the longest, but its history stretches back to the early Middle Ages. It appears in the *Domesday Book* and its first surviving borough charter dates from 1190. It had a bridge across the Calder from 1342 and became a substantial market, cloth finishing and merchanting town. In later centuries spinning and weaving became important and coal, worked in the area since Roman times, grew to major importance. River and waterway traffic grew in the 18th century and it later became a centre for railway and road links. It became a municipal borough in 1848, a city in 1888, the centre of a diocese in 1889. It became the county town of West Riding County Council in the same year and of West Yorkshire County Council in 1974.

Leeds was next to secure city status, in 1893, but its history again is a long one. It too appears in the *Domesday Book* and became a market town in the 13th century. Growth of the woollen industry saw it expand rapidly from the 16th century to the 20th, by which time it was one of the largest cities in the north of England. Other industries began to spring up in the 18th century as the Rivers Aire and Calder were made navigable and were joined by the Leeds and Liverpool Canal in 1816. Rail connections in the 19th century also saw the city become a centre for engineering industries and for the linen industry. The city's boundaries grew in 1974 to take in 10 other boroughs and urban districts. The University of Leeds dates from 1904 while Leeds Polytechnic, founded in 1970, became Leeds Metropolitan University in 1992.

The third city to be so designated, Bradford, gained its charter in 1897 but once again its history stretches back to the Middle Ages and it also appears in the *Domesday Book*. The medieval market town became a centre for leather tanning and wool and these industries fuelled its growth in the centuries that followed. Like other towns and cities in Yorkshire, wool was the main driver of its rapid growth in the Industrial Revolution. The city's boundaries expanded to take in Allerton, Idle and Eccleshill in the 19th century. Decline of the woollen industry in the 20th century was partially offset by other industries like engineering. Bradford University opened in 1966.

The metropolitan core of West Yorkshire, where our proposed arc lies, is also home to several other very substantial towns. Many of the large towns in the area bounded by Wakefield, Leeds, Bradford, Halifax, Huddersfield and Dewsbury have long and honourable histories but all suffered from the economic decline of the late 20th century.

5. Brownfield and Greenfield This area has substantial brownfield opportunities but also, however, also includes substantial greenfield land. Most of the greenfield land in West Yorkshire is designated as part of the South & West Yorkshire Green Belt and it will be important to protect this. There have been keen and protracted debates over green belt releases put forward as a result of central government housing land planning rules. The unsustainability of much of what has resulted is plain.

Nevertheless, the area also contains a very substantial legacy of brownfield land. The National Housing Federation briefing on brownfield land[34] shows Leeds has 360 sites covering 782ha, Bradford 212 sites (182ha), Wakefield 143 sites (237ha), Kirklees 97 sites (147ha) and Calderdale 44 sites (11ha). The Federation estimated that, together, they could accommodate 44,804 homes.

6. Housing A report in the *Telegraph & Argus* in August 2019[35] noted research by insurer Admiral which showed that Bradford has no less than 4,090 empty homes, the highest in the region. It also has the highest number in Yorkshire that have been empty for more than 10 years – 202. Their market value is estimated to be £175m. The research showed that Leeds has 2,788 and Kirklees 2,144.

It estimated that 19 in every 1,000 homes in Bradford has been empty for at least six months and 16 in Calderdale.

Market housing in this part of West Yorkshire remains relatively low-cost, especially in contrast to the Oxford-Cambridge Arc. The overall average house price in West Yorkshire is £185,845. In Leeds is £196,222, in Bradford £134,474, in Pudsey £181,385, in Halifax £134,027, in Brighouse £168,451 and in Huddersfield £171,935 (all figures from Rightmove).

7. Public Transport West Yorkshire has a good rail network, although it is not as good as it might be thanks to the county's topography, 19th century railway company rivalries and Beeching-era closures which left obvious gaps in the network such as the Spen Valley (Liversedge, Heckmondwike and Cleckheaton) and the northern and north-eastern suburbs of Leeds including Yeadon and Otley etc.. There are also good networks of bus services.

The obvious absentee is light-rail. Leeds once had a huge and modern tramway which closed in 1960. There was a strong attempt to create a new light-rail network on which advanced works had already started when it fell foul of the Treasury's attack on sustainable transport schemes in 2005. Leeds City Council responded with a trolleybus scheme which was the subject of a Major Scheme Business Case to the DfT in 2009. Following a public inquiry, this scheme was scrapped in 2016. The Government offered the Council the £173m it had allocated for the trolleybus scheme in compensation to pay for alternatives. Coupled with money the Council had earmarked, this could have meant £250m was available to begin a light-rail network, but the money was spent on other projects. As a result Leeds remains the largest conurbation in western Europe with no rapid transit.

There have been proposals for a comprehensive suburban rail/metro/tram network for the whole of West Yorkshire, treating it as a polycentric conurbation of two million people and not a set of mostly relatively small cities defined by borough boundaries.

Whether that could ever happen or not, there is plainly a major opportunity for light-rail systems in Leeds (where much of the preliminary work has already been done), Bradford and Huddersfield. These would form a comprehensive metro with heavy rail and buses, giving increased connectivity to our putative arc.

8. Regeneration The county of West Yorkshire was once part of the country's industrial powerhouse, with particular strengths in textiles and engineering. But, as with all the UK's traditional industrial areas, decline in the latter part of the 20th century hit it hard, leaving some areas relatively prosperous, others less so.

The *English Indices of Deprivation 2015*[36] rated Bradford as one of the 20 local authority districts with the highest proportion of their neighbourhoods in the most deprived 10% of neighbourhoods nationally on the Index of Multiple Deprivation. Leeds City Region also scored ninth worst in the proportion of neighbourhoods in each local enterprise partnership that are in the most deprived 10% of areas nationally according to the same Index.

Conclusion Of the five English areas we looked at as possible arcs, West Yorkshire proved the hardest to define, thanks in part to its complex geography. But if the multiple universities criterion is applied, it would have to be Leeds-Bradford-Calderdale-Kirklees. As with the other four regions, there is plainly both a need and a potential for accelerated economic growth based on the area's natural and human economic assets.

10. Arcs beyond England

As noted in Section 2 above and Part 1 of this report, the so-called Oxford-Cambridge Arc is a construct of the UK government, involving planning and transport policies which it administers in England but which are locally determined by the devolved administrations. We have, therefore principally concentrated on alternative arcs in England, but there is no reason why the concept should not be applied in the rest of the UK. Some possible arcs (tied to the multiple universities criterion) which have been suggested are:-

- Paisley-Glasgow;
- Cardiff-Pontypridd;
- Bridgend-Swansea.

Were larger-scale arcs to be considered beyond the borders of England, then Edinburgh-Glasgow would also present itself as a possibility. Arcs which straddle borders like Bristol-Cardiff have also been suggested. And once again, if the criterion that the area contains a spread of universities is removed, the potential becomes much wider.

11. Conclusions

The joint declaration between Government and local partners on their ambitions for the Arc[37] said that it is: "a globally significant place and has the potential to become even greater". Although inflated claims about its supposedly unique productivity have become less shrill of late in response to actual data, it is still the focus of intense activity and investment planning in central government, local enterprise partnerships and most of the local authorities involved. The property industry is swarming round the area; at one stage recently it was organising around one conference a month on investment opportunities in the Arc.

But as this report and its predecessor[38] demonstrate, the Oxford-Cambridge Arc has no particular claim to be a suitable place to pursue unique levels of government investment and growth. Adding four important sustainability criteria based on the Smart Growth approach to those underpinning the Arc, it is clear there are better places to apply the arc concept - in the five areas we chose to look at in some detail, in other parts of England or beyond, and on a larger or smaller scale.

We are not entirely convinced the *multiple* universities criterion laid down by the Government is strictly necessary, though we have pursued it for comparative purposes. As explored in Part 1 of this report, it may be a legacy of the undue influence the ancient universities in Cambridge and Oxford continue to exercise in Westminster, Whitehall and our quangos. This downgrades the high quality research and development done at many other UK universities and deters inward investment from areas which need it most.

With more resources we could certainly have added other sustainability criteria. An obviously topical one is the shortage of water in the eastern counties and Chilterns. This is not simply the result of a drought period, it is the result of climate change and past overdevelopment of an area unable to supply the water needs of large-scale development. It is clear the Arc is highly unsuitable for accelerated development compared to alternatives in terms of availability of water supplies, landscape and vulnerability of biodiversity.

Our five areas all need investment at levels which the Arc does not. They could sustain the level of growth sought without its huge increase in carbon emissions, soil sealing, traffic congestion, biodiversity damage, loss of agricultural production and water supply problems. They have the research base, the workforce, the housing, the infrastructure, the public transport and the brownfield sites to accommodate it sustainably. And they need the growth.

As the UK2070 Commission said[39]: "The uncomfortable reality is that despite the Government initiatives that have been taken, the economic disparities, particularly between London and the wider south-east and the rest of the UK have grown". It concluded that a new national narrative is required. We agree. This report is intended to point the way to a new chapter in that narrative.

We therefore recommend that planning for the Oxford-Cambridge Arc be terminated and the resources devoted to examining the growth potential of areas that both need that growth and which could accommodate it sustainably.

References

[1] UK2070 Commission: *Fairer and Stronger – Rebalancing the UK Economy* [Sheffield: The UK2070 Commission, May 2019] https://drive.google.com/file/d/1GBGQ0n8sQu8Jixb4nyBAA13GDmPn7Ov3/view

[2] *The Oxford-Cambridge Arc – Government Ambition and Joint Declaration Between Government and Local Partners* [London: Ministry of Housing Communities & Local Government, March 2019] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/799993/OxCam_Arc_Ambition.pdf

[3] Cambridgeshire & Peterborough Combined Authority press release *Cambridge autonomous metro moves one step further* [Huntingdon: Cambridgeshire & Peterborough Combined Authority, January 2018] https://www.cambridgeshirepeterborough-ca.gov.uk/news/cambridge-autonomous-metro-could-move-one-step-further/

[4] *The Overheated Arc – A Critical Analysis of the Cambridge-Milton Keynes-Oxford-Newbury "Growth Corridor" Part 1* [Smart Growth UK, February 2019] http://www.smartgrowthuk.org/resources/downloads/Arc_Report_1.pdf

[5] *The English Indices of Deprivation 2015* [London: Department for Communities and Local Government, September 2015] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

[6] *The Oxford-Cambridge Arc - Government Ambition and Joint Declaration between Government and Local Partners* [London: Ministry of Housing, Communities and Local Government, March 2019] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785869/Oxford_to_Cambridge_Arc_-_government_ambition_and_joint_declaration.pdf

[7] *Regional and Local Economic Growth Statistics – Briefing Paper Number 05795* [London: House of Commons Library, September 2018] https://researchbriefings.files.parliament.uk/documents/SN05795/SN05795.pdf

[8] *Workplace Based Gross Value Added per head (£) by Local Area* [London: House of Commons Library, September 2018] http://researchbriefings.files.parliament.uk/documents/SN05795/snep-05795local-table.xlsx

[9] *A Science & Innovation Audit for the West Midlands* [Birmingham: Birmingham Science City, Birmingham & Solihull LEP, Black Country LEP, Coventry & Warwickshire LEP and West Midlands Combined Authority, June 2017] https://gbslep.co.uk/wp-content/uploads/2017/09/West-Midlands-SIA-Full-Report.pdf

[10] *A Science & Innovation Audit for the West Midlands* [Birmingham: Birmingham Science City, Birmingham & Solihull LEP, Black Country LEP, Coventry & Warwickshire LEP and West Midlands Combined Authority, June 2017] https://gbslep.co.uk/wp-content/uploads/2017/09/West-Midlands-SIA-Full-Report.pdf

[11] *A Science & Innovation Audit for the West Midlands* [Birmingham: Birmingham Science City, Birmingham & Solihull LEP, Black Country LEP, Coventry & Warwickshire LEP and West Midlands Combined Authority, June 2017] https://gbslep.co.uk/wp-content/uploads/2017/09/West-Midlands-SIA-Full-Report.pdf

[12] *A Science & Innovation Audit for the West Midlands* [Birmingham: Birmingham Science City, Birmingham & Solihull LEP, Black Country LEP, Coventry & Warwickshire LEP and West Midlands Combined Authority, June 2017] https://gbslep.co.uk/wp-content/uploads/2017/09/West-Midlands-SIA-Full-Report.pdf

[13] *National Housing Federation Briefing: Mapping Brownfield Land in England* [London: National Housing Federation, October 2018] http://s3-eu-west-1.amazonaws.com/pub.housing.org.uk/Mapping_Brownfield_sites_in_England_-_briefing.pdf

[14] *The English Indices of Deprivation 2015* [London: Department for Communities and Local Government, September 2015] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

[15] Home Alone [Admiral, August 2019] https://www.admiral.com/multicover-insurance/home-alone

[16] *The English Indices of Deprivation 2015* [London: Department for Communities and Local Government, September 2015] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

[17] SQW: *Informing the D2N2 SEP Refresh – Draft Final Sectoral Analysis Report* [Nottingham: D2N2, September 2017] http://www.d2n2lep.org/write/Documents/Research%20Reports/D2N2_Final_Draft_Sectoral_Analysis_Report.pdf

[18] Nottingham City Council: *Quality Homes for All – Nottingham's Housing Strategy 2018-2021* [Nottingham: Nottingham City Council, 2018] http://documents.nottinghamcity.gov.uk/download/6659

[19] Derby City Council: *Housing Strategy 2015-2019* [Derby: Derby City Council, 2015] https://www.derby.gov.uk/media/derbycitycouncil/contentassets/documents/strategies/DerbyCityCouncil-Derby-City-Housing-Strategy-2015-2019.pdf

[20] Broxtowe Borough Council: *Housing Strategy 2015-2020* [Beeston: Broxtowe Borough Council, 2015] https://www.broxtowe.gov.uk/media/4139/broxtowe-housing-strategy-2015-2020.pdf

[21] Erewash Borough Council: *Erewash Housing Strategy 2011-2016* [Ilkeston: Erewash Borough Council, January 2011] https://www.erewash.gov.uk/media/files/Housing/Housing_Strategy/Erewash_Housing_Strategy_2011-2016_tcm20-158836.pdf

[22] Mike Emmerich, John Holden and Raquel Rios: *Urban Growth in the UK: A Mancunian Call to Action* [*New Economy*, 2015] http://neweconomymanchester.com/publications/urban-growth-in-the-uk-a-mancunian-call-to-action

[23] Manchester Independent Economic Review Commission : *Manchester Independent Economic Review* [Manchester: Manchester Independent Economic Review Commission, 2009] http://manchester-review.org.uk/index.html

[24] Diane Coyle, Stephanie Flanders, Ed Glaeser, Mariana Mazzucato, Henry Overman and Darra Singh: *Greater Manchester Independent Prosperity Review* [Manchester: Greater Manchester Combined Authority, February 2019] https://www.greatermanchester-ca.gov.uk/what-we-do/economy/greater-manchester-independent-prosperity-review/

[25] BEIS: *Greater Manchester Local Industrial Strategy* [London: Department for Business, Energy and Industrial Strategy, June 2019] https://www.greatermanchester-ca.gov.uk/media/2132/gm-local-industrial-strategy-web.pdf

[26] *Greater Manchester's Plan for Homes, Jobs and the Environment* [Manchester: Greater Manchester Combined Authority, January 2019] https://www.greatermanchester-ca.gov.uk/media/1710/gm_plan_for_homes_jobs_and_the_environment_1101-web.pdf

[27] *National Housing Federation Briefing: Mapping Brownfield Land in England* [London: National Housing Federation, October 2018] http://s3-eu-west-1.amazonaws.com/pub.housing.org.uk/Mapping_Brownfield_sites_in_England_-_briefing.pdf

[28] *CPRE to Challenge the Scale of Growth Planned for Greater Manchester and Associated Green Belt Loss* [Preston: CPRE Lancashire Press Release, October 2018] http://www.cprelancashire.org.uk/resources/press-releases/item/2393-cpre-to-challenge-the-scale-of-growth-planned-for-greater-manchester-and-associated-green-belt-loss

[29] Andy Burnham [Speech, 7 January 2019] https://www.greatermanchester-ca.gov.uk/media/1690/speech-text_the-future-of-greater-manchester-final-7-1-19.pdf

[30] *Greater Manchester's Plan for Homes, Jobs and the Environment – Overview* [Manchester: Greater Manchester Combined Authority, January 2019] https://www.greatermanchester-ca.gov.uk/what-we-do/housing/greater-manchester-spatial-framework/gmsf-overview/

[31] Greater Manchester Independent Prosperity Review: *Reviewers' Report* [Manchester: Greater Manchester Independent Prosperity Review, March 2019] https://www.greatermanchester-ca.gov.uk/media/1826/gmis_reviewersreport_final_digital.pdf

[32] *The English Indices of Deprivation 2015* [London: Department for Communities and Local Government, September 2015] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

[33] *Leeds City Region Strategic Economic Plan 2016-2036* [Leeds: West Yorkshire Combined Authority and Leeds City Region LEP, 2016] https://www.westyorks-ca.gov.uk/media/1110/strategic-economic-plan.pdf

[34] *National Housing Federation Briefing: Mapping Brownfield Land in England* [London: National Housing Federation, October 2018] http://s3-eu-west-1.amazonaws.com/pub.housing.org.uk/Mapping_Brownfield_sites_in_England_-_briefing.pdf

[35] Jo Winrow: *19 in Every 1,000 Homes in Bradford are Empty, New Figures Reveal* [Bradford: *Telegraph & Argus*, 12 August 2019] https://www.thetelegraphandargus.co.uk/news/17831685.19-every-1-000-homes-bradford-empty-new-figures-reveal/?ref=twtrec

[36] *The English Indices of Deprivation 2015* [London: Department for Communities and Local Government, September 2015] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

[37] *The Oxford-Cambridge Arc – Government Ambition and Joint Declaration Between Government and Local Partners* [London: Ministry of Housing Communities & Local Government, March 2019] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/799993/OxCam_Arc_Ambition.pdf

[38] *The Overheated Arc – A Critical Analysis of the Cambridge-Milton Keynes-Oxford-Newbury "Growth Corridor" Part 1* [Smart Growth UK, February 2019] http://www.smartgrowthuk.org/resources/downloads/Arc_Report_1.pdf

[39] UK2070 Commission: *Fairer and Stronger – Rebalancing the UK Economy* [Sheffield: UK2070 Commission, May 2019] https://drive.google.com/file/d/1DaPlONpLXwxS1lE2kLu3aQVkOQEmFLwB/view

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