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A MAP FOR ENGLAND

SPATIAL EXPRESSION OF GOVERNMENT POLICIES AND PROGRAMMES

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Final Report to
The Royal Town Planning Institute



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FOREWORD

Few disciplines have attracted as much speculation and as many myths as planning has in recent months. I am therefore delighted to introduce a piece of solid research on the subject, presenting sound evidence from a research institution of the highest standing.

This research produced by the Centre for Urban Policy Studies at the University of Manchester shows that individual government departments now have more than 100 major maps for England relating to policies and programmes on the economy, transport, communications, housing and the environment.

The study examines a broad range of existing government policies and programmes and how they relate to each other. These findings and a compendium of policies in map form can be viewed at: www.mapforengland.co.uk

To reach their conclusions, the researchers examined government web sites, individual policy documents and large numbers of reports to find policies and programmes that have a strong 'spatial' aspect to them: policies which potentially have a different impact in different parts of the country. It was a major task in itself to pull together almost 100 policy maps.

In about one third of these documents the implications for different places are made explicit but in fully two thirds they are not.

By overlaying a number of these maps and diagrams together, the researchers demonstrated that some policies and programmes, when considered against each other in relation to different parts of the country, may have unintended consequences.

The study also sheds light on the implications of the various different policies and programmes in England and the impact they can have for governing Wales and Scotland.

This has been a complex task requiring sophisticated equipment and it has been selective. The challenge now is how communities, business and local and national government can more comprehensively approach this subject, which is vital to good debate and decision making, in an easy, transparent and accessible manner.



Colin Haylock
RTPI President

Section 1 INTRODUCTION

Research objectives

This study sets out to map the policies and programmes of Government Departments, their agencies and non-departmental public bodies that have an explicit spatial expression to inform the discussion of spatial planning issues and priorities. It is a follow-up study to previous work carried out by the University of Manchester to establish the need for a fully integrated national spatial planning framework for the UK (Wong et al, 2000) and to examine the UK's spatial structure and trends of change by analysing the connectivity and interaction of areas (Wong et al, 2006).

The 2000 report was about establishing the policy needs and the 2006 study set out the spatial context and structure for a national spatial framework; whereas this latest study aims to bring the two together by examining the interplay between policy needs and spatial contexts via mapping the government's policy and programme delivery.

This study has four key components:

- To appraise government policies and programmes (including government departments and their agencies and NDPBs) with an explicit spatial expression and/or spatial consequences.

- To perform thematic mapping, based on the economic, social and environmental priorities set out in NPPF, of government policies and programmes that have an explicit spatial expression and/or consequences.
- To identify patterns of spatial synergies and conflicts arising from existing government policies and programmes and to present these spatial synergies and conflicts into 'diagrammatic mapping'.
- To highlight key issues and further research work required to fully address the need of providing a spatial framework to support the development of NPPF and the delivery of the Localism Act.

Policy context

Following the 2004 Planning and Compulsory Purchase Act, the planning system in England was transformed from 'landuse' to 'spatial'. Spatial planning encapsulates a broader meaning than the pure landuse type of planning by emphasising critical thinking about space and places as the basis for intervention. In 2010, the Coalition government announced the wholesale revocation of Regional Strategies and introduced the Localism Bill which emphasised a fundamental shift from the previous top-down, and target-driven approach of spatial planning to an open source, local oriented style (using neighbourhood plans as a pro-growth mechanism).

While the gravity shift to a more localised approach provides opportunities for developing more contextualised planning, this

can only be achieved if a clear and well articulated national planning framework can provide the parameters for local planning authorities to deliver their planning policies. The National Planning Policy Framework (NPPF) was finally published for consultation in the summer of 2011 and has attracted much debate within and beyond the planning community. One of the main criticisms of the NPPF is its lack of a 'spatial' dimension. This begs the question of how local planning can perform the coordination and management role of sustainable development when there is a lack of an overarching spatial framework to join up different sectoral policies.

Despite the fact that the draft NPPF is an 'aspatial' document, it is clear that government policies and programmes do have spatial implications. In some instances these spatial implications are more explicit, such as in the case of the high speed rail network proposal and other projects set out in the National Infrastructure Plan. Other mainstream government policies (e.g. on supply-side measures for tackling non-employment, on investment in flood risk prevention projects etc.) also have implications for the spatial distribution of economic activity and opportunity. These differential spatial operating contexts and potential outcomes are particularly important to inform local authorities if they are preparing local strategies and spatial plans to deliver the objectives of sustainable growth.

Moreover, administrative boundaries at regional and local levels do not define functional entities. Economic, social and

spatial processes do not stop at an administrative boundary. Rather, there are 'spillover effects' reflecting inter-area linkages. This is perhaps most clear in the case of London, the South East and East of England regions, where three regions are influenced by the role of London as a 'World City' and where a key policy area, the Thames Gateway, straddles regional boundaries. Elsewhere, there are also important functional (commuting and migration) links, for example, between parts of Derbyshire (in the East Midlands) and Sheffield (in Yorkshire and the Humber), and southern Milton Keynes. Certain sub-regions, such as High Peak and northern Cheshire, have strong linkages with the Greater Manchester Local Enterprise Partnership. Relevant information with regard to these spatial functional connections will help to inform local authorities to develop more robust growth strategies by taking account of issues such as strategic housing market areas and flood risk planning.

Methodology

A systematic methodological framework (see Figure 1.1) has been developed to guide the work tasks of the project. The 4 key tasks involve:

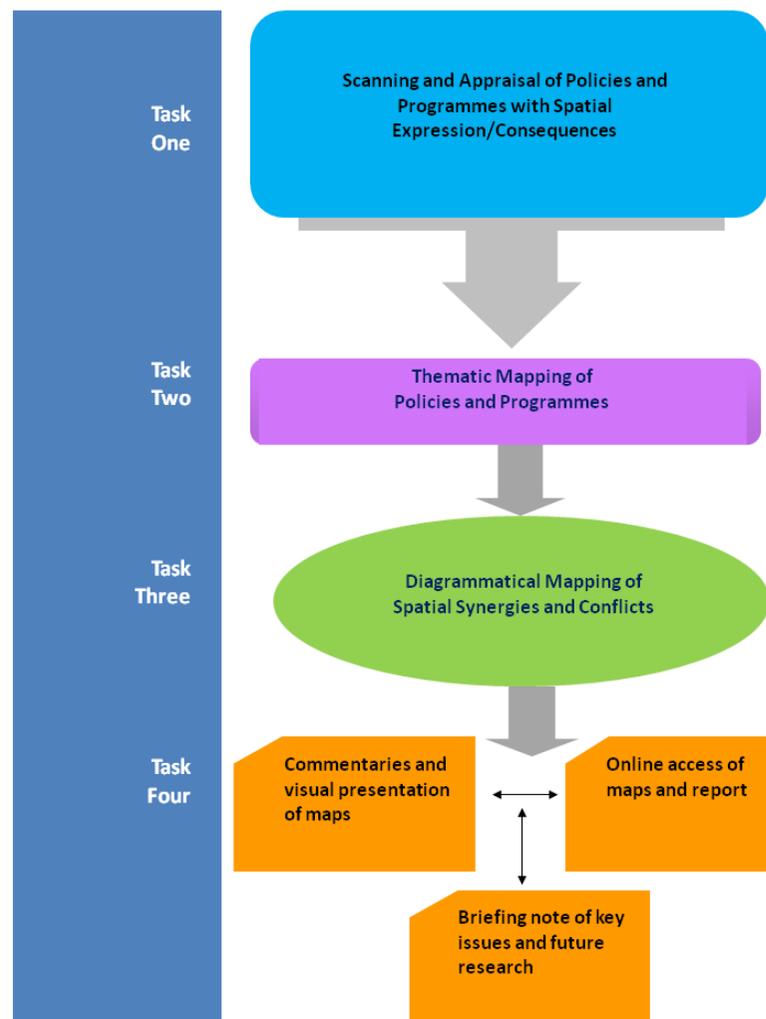
- Conducting a scanning and appraisal exercise of government policies and programmes;
- Compiling a compendium of spatial maps of key government policies and programmes as well as their wider operational contexts and future prospects of development;

- Diagrammatic mapping of spatial synergies and conflicts of key planning issues; and
- Analysis and presentation of key research findings.

The first task of the project involved a systematic scanning exercise of policies and programmes of different government departments and their agencies and NDPBs. The purpose was to tease out whether any of these have an explicit spatial dimension and/or potential spatial consequences.

The appraisal of Task One directly informed the collection of spatial maps in Task Two. GIS was used to collate maps that were already published in policy documents or electronic media as well as producing maps from data that were readily available (e.g. spending figures of programmes) to develop a compendium of spatial maps of government policies and programmes to illustrate their spatial expression.

Figure 1.1 Key work tasks and methodology



Task Three involved an overview of the compiled maps and identified areas where there are intensive interactive effects between different thematic issues across their contexts, future prospects and government actions. The use of the GIS overlay function helps to highlight areas of planning and other government policies and programmes that have potential spatial synergies and conflicts. These key messages are then visually illustrated by overlaying and visualising different spatial information and then these are presented in composite layered maps and diagrammatic maps.

The final task was to analyse and comment on these key issues and set out further research work required to fully address the need to provide a spatial framework to support the development of the NPPF and the delivery of the Localism Act.

Section 2

GOVERNMENT POLICIES AND PROGRAMMES: SCANNING AND APPRAISAL

The scanning exercise of policy documents and web sites identified 95 relevant sources (see Appendix 1) that contain policies and programmes that have an explicit spatial expression and/or spatial consequences. For example, these include documents and websites from the Department for Business, Innovation and Skills; the Department for Communities and Local Government; the Department for Environment, the Department for Environment, Food and Rural Affairs; the Department for Transport; the Department for Culture, Media and Sport; HM Treasury; Home Office; Cabinet Office; British Waterways; Environment Agency; and Natural England.

After appraising the 95 sources, only just over a third (37) of them are found to include explicit spatial expression of their policies and programmes by either providing maps/diagrams or clear text/data on the spatial dimension. The remaining 58 documents, nonetheless, consist of policies that have clear spatial consequences and outcomes but do not articulate such characteristics explicitly. While this quick scanning exercise is not meant to be comprehensive, it does provide a strong message that government policies and programmes are frequently spatially expressed and often result in spatial outcomes.

There is not a single document that tries to provide an overarching framework about the spatial dimension of all these policies and programmes and how they cumulatively interact and affect the development of the country. There is concern that, among the documents that shy away from making spatial articulation, are the draft NPPF and the majority of the existing Planning Policy Statements/Guidance. These are supposed to be an integral part of the spatial planning system to provide an overarching framework for spatial planning across the country.

The Coalition government has recently published three key policy documents which are significant in terms of shaping the spatial development of England:

- The National Infrastructure Plan (NIP)¹;
- Unlocking Growth in Cities (UGC)² document; and
- The Draft National Planning Policy Framework (NPPF)³.

Nevertheless, not all of these three documents contain a clear spatial expression of policies. In order to gain a better understanding of the extent that spatial expressions are embedded in this suite of policy documents, an analysis of their

¹ HM Treasury and UK Infrastructure (2011) National Infrastructure Plan 2011, London: TSO.

² HM Government (2011) Unlocking Growth in Cities, London: Cabinet Office

³ Department for Communities and Local Government (2011) Draft National Planning Policy Framework, London, DCLG.

text and content was carried out to unpick the spatial elements, synergies and conflicts.

National Infrastructure Plan

As stated in the Executive Summary, the NIP is intended to set out 'a new strategy for meeting the infrastructure needs of the UK economy' (p.5) based around:

- a cross-sector analysis of the UK's infrastructure networks and a clear pipeline of over 500 infrastructure projects for the medium term and across sectors;
- a new approach to coordinating public and private investment in UK infrastructure; and
- an active role in ensuring the infrastructure in the plan is delivered efficiently and on time, with priority given to those projects most critical for economic growth.

The NIP boldly claims (p. 6) to be the first time the government has taken a critical, cross-sectoral view of the UK's infrastructure as a system by setting out investment plans (ch.3) encompassing UK transport systems, energy systems, digital communication systems and environmental systems. It also sets out a series of priority programmes and projects (ch. 2) including 40 priority infrastructure investments (table 2B).

As most of these priority projects relate to specific projects (e.g. road improvements, public transport initiatives in specified towns or cities and new consents for power stations), they

clearly have spatial implications. This is also true for other major sectoral infrastructure projects and programmes such as those relating to the proposed new high speed rail links, international gateways and nuclear power stations. In some cases, spatiality is explicitly recognised in the NIP. For example, the priority programmes and projects are set out on a regional basis (see Figure 2.1), whilst existing and proposed road schemes are mapped (see Figure 2.2) and there are one or two other examples of figures/maps in the NIP relating to forecast peak period speeds on the strategic road network (NIP figure 3.A), performance of fixed broadband (NIP figure 3.C) and the location of major flood/ coastal erosion risk management schemes (NIP figure 3.D).

In other cases, specific geographic information is restricted to text references (e.g. airport capacity and connectivity with particular focus on the airports in London and the wider South East) or require knowledge of other relevant Government announcements or policy statements (e.g. national policy statements on nuclear energy, urban broadband funding and super-fast broadband supply, and the high speed rail proposal from London to Birmingham/ Manchester/ Leeds).

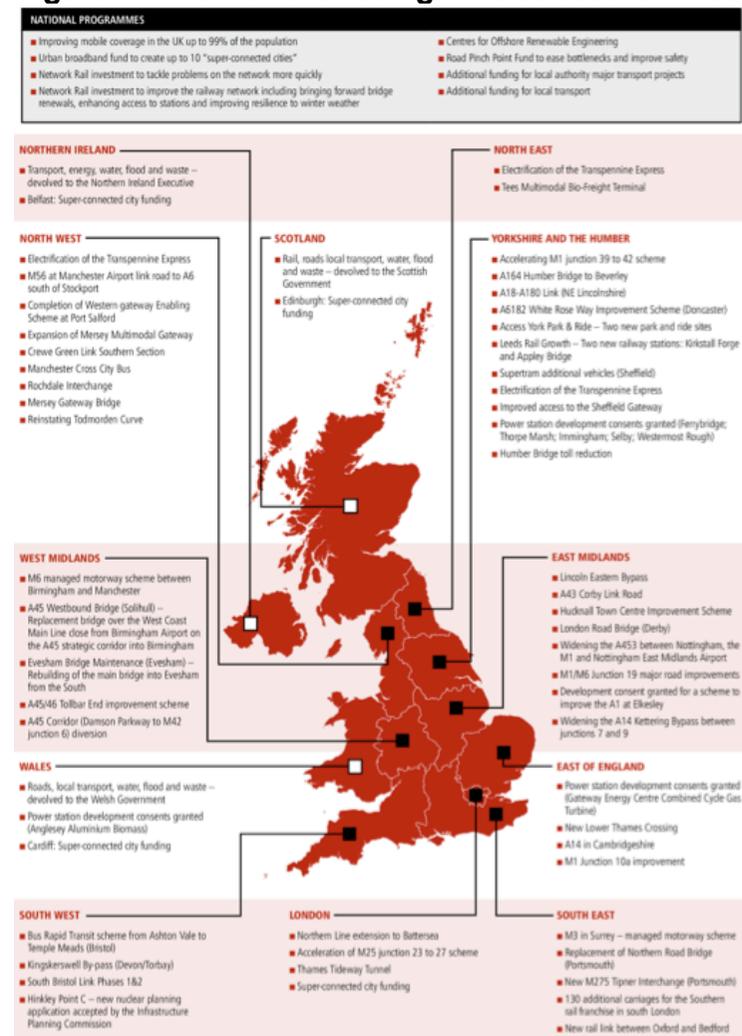
Even where spatial references are made in the NIP, this is only on a sectoral basis. There is no explicit attempt to provide an overarching diagram showing, for example, key investments relating to roads, rail, super-broadband, airports and energy and Figure 2.1 is probably the closest but is, in reality, merely a partial project list based on UK regions/territories. The NIP, however, recognises the inter-relationship of sectoral

infrastructure networks which does highlight the potential opportunities and threats created by increasing systemic linkages (para. 4.1) and thus advocates a joined-up approach (para 4.3) to infrastructure delivery; increased consistency in appraisal; security and resilience; inter-sectoral relationships; and, most interestingly in the context of this report, taking an integrated approach to infrastructure and housing planning.

The NIP recognises that (para. 4.23) housing supply and infrastructure are intrinsically linked, can place extra demands on strategic and local transport services, and have implications for environmental conditions. Reference is thus made to the land supply proposals of emerging local plans and the need for local authorities to work together across boundaries to properly plan for infrastructure provision (para. 4.24) as well as potential funding sources through the new homes bonus, retention of business rates receipts, the growing places fund and the community infrastructure levy (para. 4.5). It also refers to the Housing Strategy's⁴ aim of supporting local areas that want to deliver large scale new developments to meet the needs of their growing communities (para. 4.26).

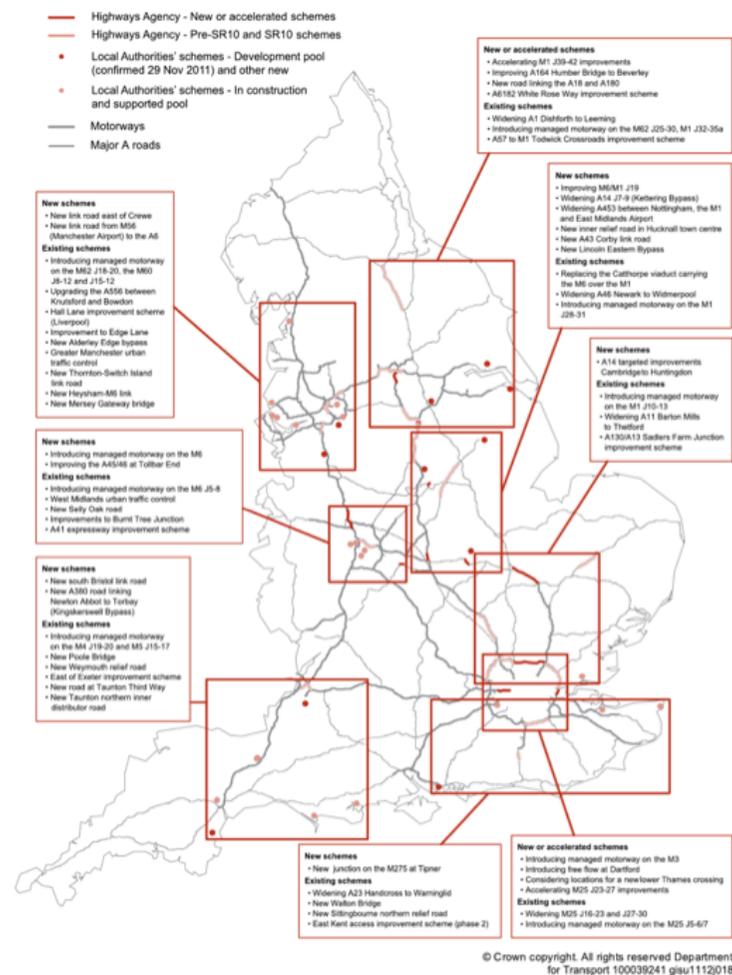
⁴ HM Government (2011) Laying the Foundations: A Housing Strategy for England, London:DCLG.

Figure 2.1 New and existing infrastructure investment



Source: NIP (2011), Figure 2.A, p.28

Figure 2.2 Road network improvement



Source: NIP(2011), Figure 3.B, p.45

Though these statements can be regarded as little more than rather generalised statements of intent, or even aspiration, the NIP does also link the opening up of development sites for housing and economic development more explicitly with the reasoning behind a number of the individual projects that are specifically mentioned in the document. Prioritizing investment along the A14 including the Kettering bypass and other targeted investment and junction improvements to ease congestion can be seen in this light, whilst other, more localised, examples include the new link road proposal to the east of Crewe to open up a key development area, access improvements to the Sheffield Gateway site to deliver over 1 million square metre of business space and around 5000 new homes, and improvements to junction 10A of the M1 which currently constrains economic growth in the area. The NIP also makes reference (para. 4.27) to the role infrastructure plays in supporting the Government's agenda for cities.

Unlocking Growth in Cities

The main focus of the Unlocking Growth in Cities statement is to outline the evolving relationship between central government and the UK's major cities, promising a series of tailored city-deals to enable cities 'to do things their way' (p.1), via agreement and partnership with central Government. These developments are intended to build on existing steps to support cities such as the creation of local enterprise partnerships (LEPs), enterprise zones, regional growth fund (RGF), growing places fund, urban broadband fund (related to up to 10 'super-connected cities') and more flexible financial powers through business rate retention and new borrowing powers.

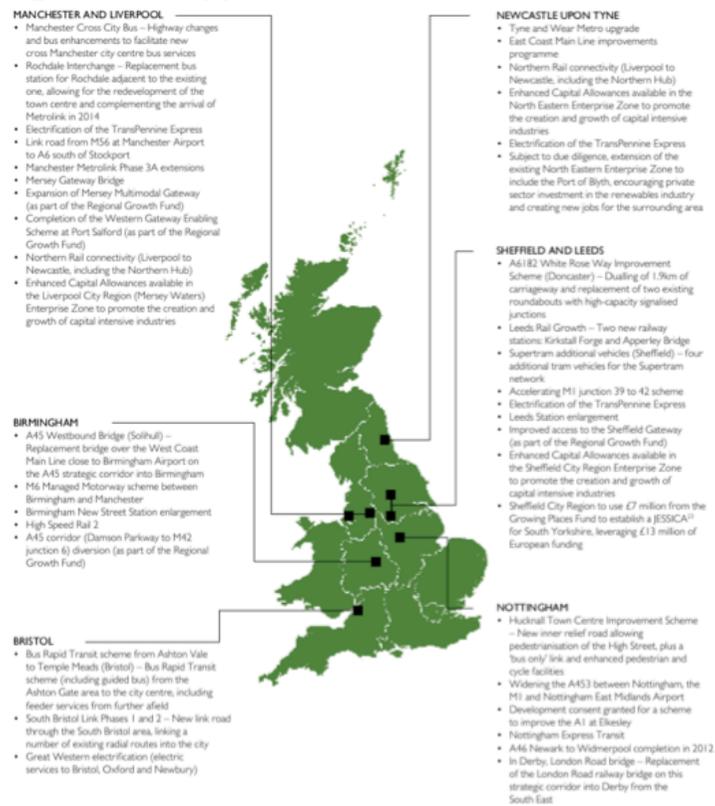
Cities are recognised as engines of growth and critical to economic recovery (para. 1.3). The statement (p.8-9) refers to a wide range of initiatives and devolved powers that are intended to provide for growth and deliver critical infrastructure, including the introduction of a consolidated capital pot; access to additional RGF; devolving local transport major funding and responsibility for commissioning local/regional rail services; granting LEPs consultee status for planning proposals; and competitive bidding for broadband infrastructure plans (a £100m capital pot). These activities are supported by a designated Minister for Cities and a Cities Policy Unit based in the Cabinet Office.

This Cities policy statement clearly has important spatial implications because it concentrates a substantial amount of attention and financial resources on eight designated English core cities and their surrounding functional areas. These include a series of specific projects and programmes, which are set out for each core city (figure 5, printed as Figure 2.3 here).

In terms of actual funding from the RGF and the Growing Places Fund, indicative totals are provided for each core city region, revealing that the highest sums have been awarded to projects within the Liverpool (£114.8 million) and Manchester (£85.5 million) city regions and the lowest to Leeds (£58 million) and the West of England (£53.8 million). Annexes are also included on each core city (based on existing city-region strategies and ongoing work by the newly formed LEPs) to briefly summarise their socio-economic characteristics, key challenges and ambitions.

Overall, however, there is no attempt to set this important national policy focus and concentration of resources, on promoting economic growth in eight English core cities within the wider context of the NIP and other key Government proposals (such as HS2). Cross references to broader statements of national planning policy, including environmental considerations, are similarly absent other than a brief consideration (para. 2.9) of the need to create a safe and secure urban environment in which people want to work and live; to deliver the housing that people require and providing the buildings, services and infrastructure that sustainable cities of the future will need.

Figure 2.3 Support to core cities' LEPs



²³ Joint European Support for Sustainable Investment in City Areas
Source: UGC (2011): 18

Draft National Planning Policy Framework

The draft NPPF, published for consultation in July 2011, ‘sets out the Government’s economic, environmental and social planning policies for England ... these policies articulate the Government’s vision of sustainable development’ (para. 4). The NPPF is intended to replace the previous system of separate topic based planning policy statements with a single concise document and it is claimed that over a thousand pages of former planning policy statements will be reduced to around 50.

In common with much of the previous national planning policy – indeed, even more so, given its brevity - the NPPF is deliberately *aspatial* in content. In other words, it sets out a national set of policy principles that are expected to be universally followed by local planning authorities when preparing their local plans and taking planning decisions. The over-riding concern is for the planning system to deliver sustainable development, interpreted (para. 10) as pursuing an integrated approach to planning for prosperity (an economic role), planning for people (a social role) and planning for places (an environmental role). However, the main emphasis is subsequently placed on the need to support economic growth through a ‘presumption in favour of sustainable development’ (paras. 13-14).

Although these planning policies may affect, or be applied in, particular localities and communities in different ways because of their different social, economic and environmental characteristics and issues, the NPPF does not in any way distinguish or highlight particular locations or provide different

policy approaches for different regions or parts of the country. Given the deliberately aspatial and 'one size fits all' stance of the NPPF, it is not surprising to find that it contains no maps or spatially referenced figures of any kind.

Nevertheless, the NPPF does contain some national planning policies that relate to topics with a spatial dimension to them. Most obviously this applies to the sections of the NFFP that provide a national policy context to development within areas designated as green belt and environmental designations such as AONBs, heritage coasts, internationally important nature conservation sites and designated (Ramsar) wetlands etc. Other sections imply a need for local planning authorities to think spatially in relation to their own areas and undertake analyses based, for example, around strategic housing market areas, and flood risk assessments. Local authorities are also exhorted (paras. 44-45) to cooperate with each other on issues that cross administrative boundaries and to work collaboratively with other bodies, including on the delivery of sustainable economic growth in consultation with LEPs.

The NPPF is almost silent on linkages with other areas of Government policy with strong linkages to the planning process. Although the Government's first NIP was published in 2010, there is no mention of it in the NPPF other than a statement (para. 6) that nationally significant infrastructure projects are set out in other national policy statements which are part of the overall framework of planning policy. Thus, key infrastructure proposals such as those relating to national and strategic local road schemes, new / improved national rail

network linkages and the HS2 proposals, other public transport (e.g. tram / city-rail proposals), energy (e.g. new conventional and nuclear power stations), broadband communications ('superconnected' cities) etc. are not mentioned at all. Since the UGC report was issued after the draft NPPF, the lack of any direct mention of it in the NPPF is not unreasonable. However, even in a more general way, there is no explicit reference to the eight English core cities or indeed any obvious spatial focus on urban areas, other than a section on town centres (which is followed by a short section on supporting the rural economy).

Summary

The examination of the three key recent statements of government policy reveals that two documents (NIP and UGC) set out projects, programmes and funding sources that are explicitly spatially targeted (e.g. in terms of locations of major new infrastructure; concentrating resources on eight core cities etc.), but do not generally present or analyse this spatial targeting in a cross-sectoral or integrated manner. Meanwhile, the third document (the draft NPPF) is deliberately, and unrelentingly, aspatial in content and contains very limited cross references to any of the other, more spatially explicit, statements of national policy.

The result is, at best, a partial picture of sectorally-based spatial developments. Hence, questions like the degree to which the national road, rail and digital communication proposals will, in combination, concentrate resources along particular strategic corridors and/or complement the potential concentration of resources on eight core cities remain

unanswered. Similarly, the relationships between these and other issues (e.g. the location of new power stations; future airport capacity etc.) and the spatial context of environmental constraints (e.g. national parks, AONBs, nature conservation sites) and risks (e.g. flooding) are not explored at the national level or in the light of spatially varied socio-economic contexts relating to future population projections, house prices and affordability, unemployment, levels of deprivation and so on.

There is, therefore, little understanding of how these sectoral issues might complement or conflict with each other, creating synergies or tensions that might lead to future successes or failures in delivery and implementation and ultimately contributing to, or frustrating, the future economic growth and sustainable development that the Coalition Government has committed itself to achieving.

Section 3

SPATIAL CONTEXT FOR GOVERNMENT POLICIES AND PROGRAMMES

The exercise of scanning key policy documents and websites demonstrates that maps are often included in policy documents to illustrate spatial patterns and development trends as well as the government's recent, existing or proposed policies and programmes. Having compiled and considered the spatial maps from these documents, this section outlines the overarching strategic context – what we term the 'supra spatial context' - that forms the backdrop to shape the operation of cross-cutting planning issues.

Why space matters?

Nobel laureate, Paul Krugman⁵, argues in his thesis of New Economic Geography (NEG) that industries, skilled labour and technologies cluster in geographical space. The spatial concentration of interconnected firms provides a mechanism for enhancing competitive advantage by reducing training and recruitment costs associated with the labour force and by enhancing competition as well as facilitating cooperation between firms. Economic agglomeration, however, is not consistent across space but occurs in different ways in different

places at different scales. More importantly, agglomeration is only one part of the story; dispersion also occurs – centripetal forces such as market access and skill bases pull economic activities together, whilst centrifugal forces such as congestion and rent costs disperse economic activities.

In attempting to establish a robust framework for sustainable growth in England, one can learn from the key message of NEG that the processes of concentration and dispersion have historically generated uneven distributions of economic activity and socio-spatial configurations within and between different localities at different scales. To be able to grasp the nuances of such spatial variations/configurations, and to devise appropriate policies and programmes to address the resulting issues, is thus pivotal to the development of any robust national planning framework.

The concept of a business cluster is frequently invoked by the Department of Business, Innovation and Skills (BIS) within wider government strategies related to economic growth and innovation. While such a strategy contains an implicit spatial component, it is rarely contextualised within the wider explicit spatial policy. The BIS cluster policy focuses on encouraging the geographical concentration of inter-connected companies, firms, suppliers, providers and institutions in order to promote innovation and encourage economic growth in specific employment sectors, such as biotechnology, advanced manufacturing and aerospace. But the outcomes of encouraging and promoting best-practice within and between clusters can also significantly affect the spatial landscape of

⁵ Krugman, P. (1991) Increasing returns and economic geography, *Journal of Political Economy*, 99, pp. 483–499.

Krugman, P. (1998) What's new about the new economic geography? *Oxford Review of Economic Policy*, 14 (2), pp.7-17.

economic development in particular localities. This includes, for example, the development of the North West Biomedical Cluster, the Humber Seafood Processing Cluster and the East of England Health and Life Sciences Cluster.

Supra spatial context

The 2006 Uniting Britain report⁶ shows the complexity of the urban-regional spatial system and how different spaces are (or are not) functionally connected in the UK. The construction of the spatial cluster focuses on the crucial areas of economic activity, that is, the labour market areas (based on commuting patterns), the housing market areas (based on migration patterns), the presence of knowledge industries, land-based transport connectivity; as well as deprivation patterns. Within these clusters, interaction tends to be significantly higher than with outside areas, both in terms of commuting and migration flows. There are four identified spatial clusters (see Figure 3.1) in England:

- The Greater London Cluster (the London Supernova)
- The Central Constellation
- The Tyne-Tees Cluster
- The South Wales and Bristol Channel Cluster

The broad spatial structure and context of the transport infrastructure network (Figure 3.1), the distribution of GVA per

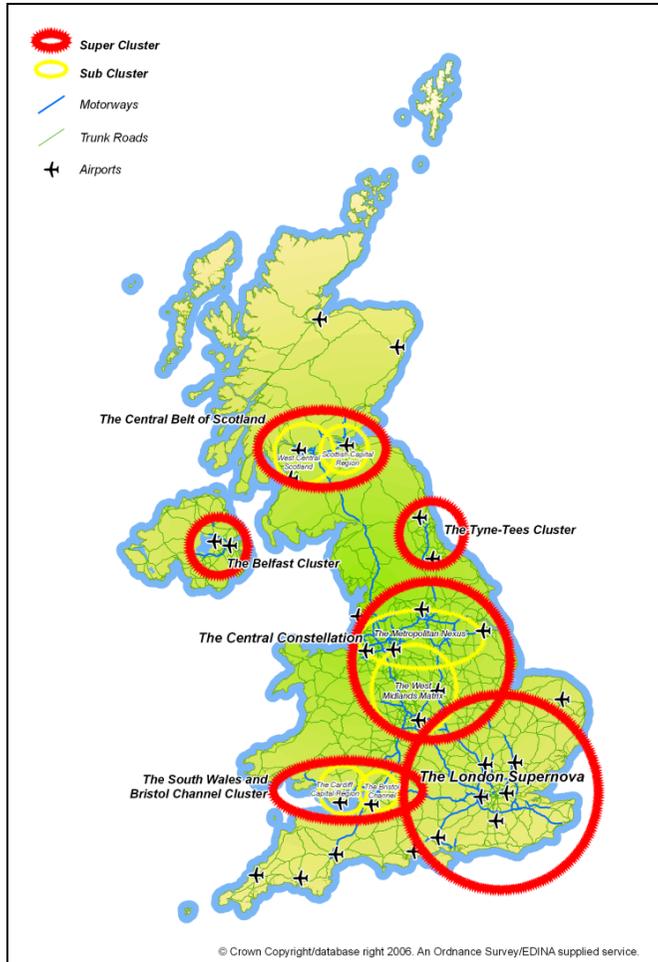
⁶ Wong, C; Rae, A. and Schulze Baing, A (2006) Uniting Britain – The Evidence Base: Spatial Structure and Key Drivers, London: the Royal Town Planning Institute.

capita (Figure 3.2) and the spatial patterns of multiple deprivation (Figure 3.3) compiled for 2010 have not altered the classification. This can also be validated with the maps compiled for Joseph Rowntree Foundation's Housing and Neighbourhood Monitor⁷.

London stands out as a world city with its unique gravitational power absorbing the surrounding area in the South East, forming the economic powerhouse of the UK. The spatial structure of the Greater London area forms a polycentric configuration, with the dominant city of London spreading out to absorb its suburbs and incorporate its commuting hinterland, thereby forming a significant magnet for activity. The commuting zone stretches out with a 60 km inner radius from Central London. London itself, however, suffers from similar socio-environmental problems that other global cities have. In the inner urban area, there are still pockets of areas suffering from multiple deprivation and low levels of employment. More importantly, high population and traffic density means that it suffers from the highest levels of air pollution.

⁷ JRF Housing and Neighbourhood Monitor website: www.hnm.org.uk – a three year project carried out by CUPS at Manchester University and Glasgow and Ulster Universities.

Figure 3.1 Transport infrastructure and functional spatial clusters



Source: Uniting Britain 2006: 53

Figure 3.2 GVA per head (NUTS 3 region), 2009

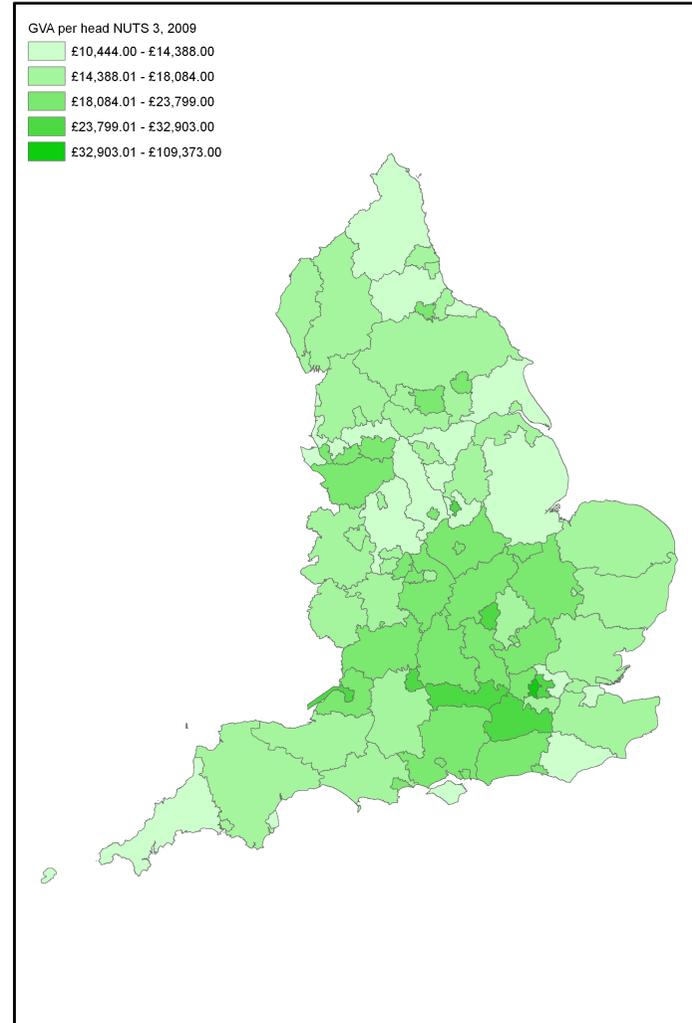
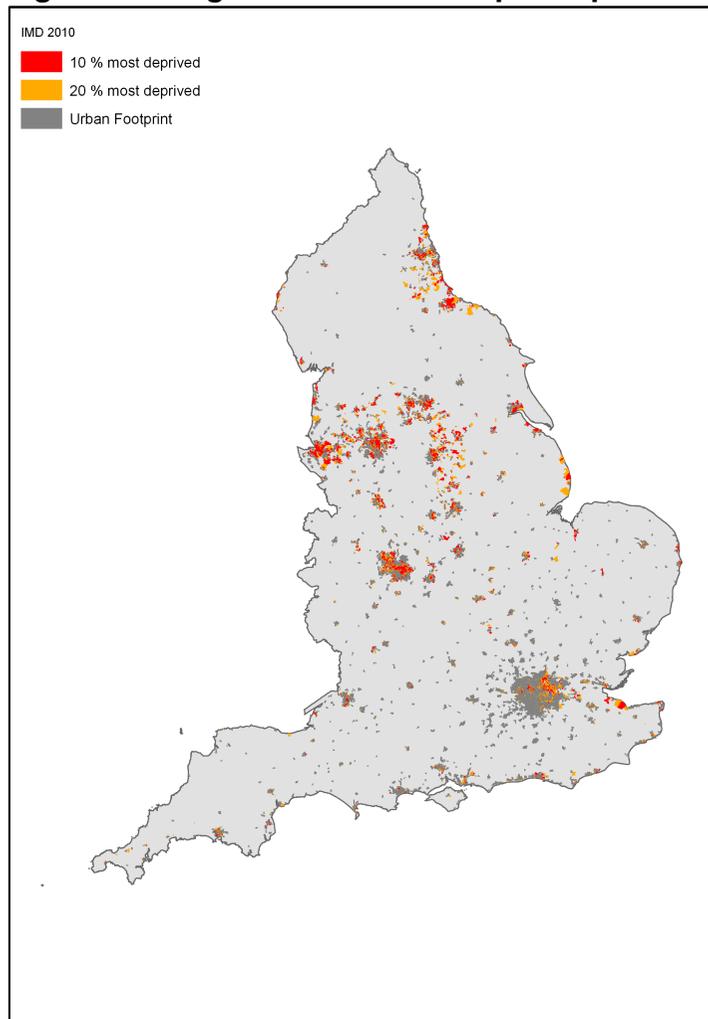


Figure 3.3 English Index of Multiple Deprivation, 2010



The spatial interaction between provincial cities in northern England has led to an emerging 'polynucleated metropolitan region' of the 'Central Constellation' containing these linked components:

1. The Metropolitan Nexus operates along the M62 corridor and the Transpennine rail link. This cluster of cities has good inter-city rail links and motorway networks, Manchester International Airport and 3 other airports, the largest international seaport at Grimsby and Immingham, and a strong cluster of higher education institutes. They have, however, suffered from continuous population loss as well as having the highest levels of social deprivation.
2. The West Midlands Matrix is centred on the Birmingham city-region. This area has significant interaction with the Metropolitan Nexus through its high density rail links and motorway networks as well as enjoying spatial proximity to London. It also has an above average employment rate, a strong research capacity from a number of HEIs, and a cluster of high-tech and knowledge-based industries.

The Tyne-Tees Cluster is separated both geographically and functionally from its closest neighbouring cluster. Although the Transpennine rail link connects the towns and cities in this spatial area with other northern cities, the journey time is rather long. This cluster has two medium-sized regional airports and the Tees and Hartlepool port for international trade links. This area has continued to suffer from population loss, with a relatively small proportion of working age population. The area

has suffered from deprived social conditions, with the lower average earnings and the lowest average house price levels.

The Bristol and Cardiff city regions are functionally quite separate, each with their own commuter belt and their own airport, though there is still significant commuting between the two cities and they show a relatively high degree of linkage (in comparison to the level of commuting flow between Manchester and Leeds). The impact of London as a major destination for long-distance commuting does not extend all the way to Bristol. The Bristol city-region also has some deprived areas, yet not to the same extent as some other large urban areas. It has a higher than average level of employment, a larger number of high tech and knowledge intensive employment, and a strong research capacity.

Spatial contexts for planning in the future

The supra-spatial context provides a useful backdrop for grappling with the very different development trajectories across England. Since planning is a future oriented activity, the development across different local authority and partnership areas is very much affected by a combination of the physical constraints of landscape designation and the emerging development trends as well as the government's own policies and programmes to exacerbate or reduce such trends.

The designation of national parks and areas of outstanding natural beauty, as protected environments and landscapes within England, sets out physical restrictions on the development of land. Even more significant than such

environmental designations, the longstanding planning tool of national green belt policy to check the unrestricted growth of the conurbations and major towns into their surrounding countryside, impose further restrictions on development, often in areas of the greatest development pressures. Unlike national designations such as SSSIs and other nature conservation sites that operate at a very localised, site level, these more strategic types of national designation cover immense areas of land and thus have significant implications for spatial development at the national scale. As shown in Figure 3.4, the main urban centres are tightly defined by the green belt. In contrast, the areas with less national land use restrictions tend to be located on the eastern side of England including Norfolk, Suffolk, Essex, East Midlands and Hull and East Riding. The scope for development in the South West is very limited and is mainly focused on parts of Somerset and Devon.

Another strategic context for planning activities is the future demand for housing, services and employment. Figure 3.5 shows the projected household growth during the 25 year period of 2008 to 2033. Areas projected with the highest household growth (above the 27% average of England) are mainly found in commuting areas to major townships and urban areas. In Eastern England, high growth areas are found: around the major townships of Ipswich, Colchester, King's Lynn, Cambridge and Northampton. High growth is also expected in the Ashford/Kent area and in part of London in the South East. Significant household growth is projected in the South West Region: the M5 corridor near Bristol; and areas around Exeter and North Dartmoor. In the Midlands, major

household increase is projected around South Derbyshire, Warwickshire, and the High Peak area. When moving further north, there is a growth belt running from the Yorkshire Dales, Bradford, Leeds, Selby, York, West Lindsey, East Riding and Hull.

By simply putting Figures 3.4 and 3.5 together, it is clear that there are potential conflicts in locations with high landscape value and with high projected household growth. The obvious examples are the Yorkshire Dales, Devon and the coastal areas along Norfolk and Suffolk (see Figure 3.6). Since most of these high growth areas are commuting belts to major townships or urban areas, transport accessibility becomes another important concern to get these economic functional spaces connected. Figure 3.7 shows the scenario of traffic congestion levels if the current situation continues in the next 10 years. The picture shown is a worrying one as the highest levels of road traffic congestion coincides with many areas projected to have very high household growth levels. The only areas maintaining very limited increase in traffic congestion are the major urban centres and cities.

By adding up these three maps, a long list of planning challenges has already emerged. These challenges will be further analysed in the next section by examining the interaction between these spatial contexts and the government's policies and programmes.

Figure 3.4 Key landscape designations

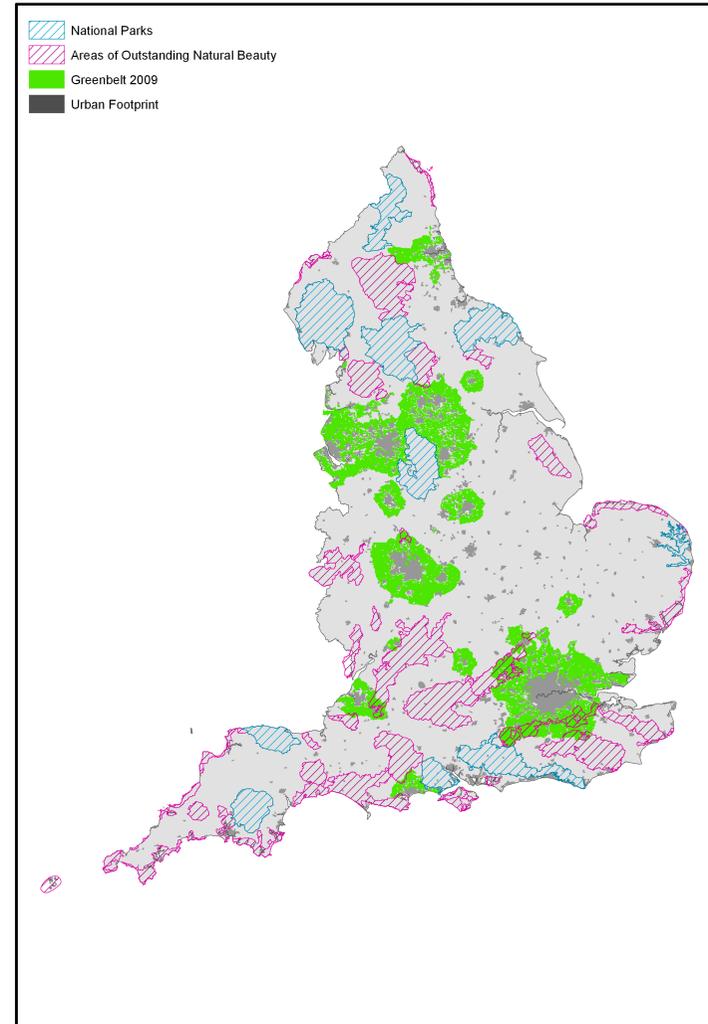


Figure 3.5 Projected household change, 2008-2033

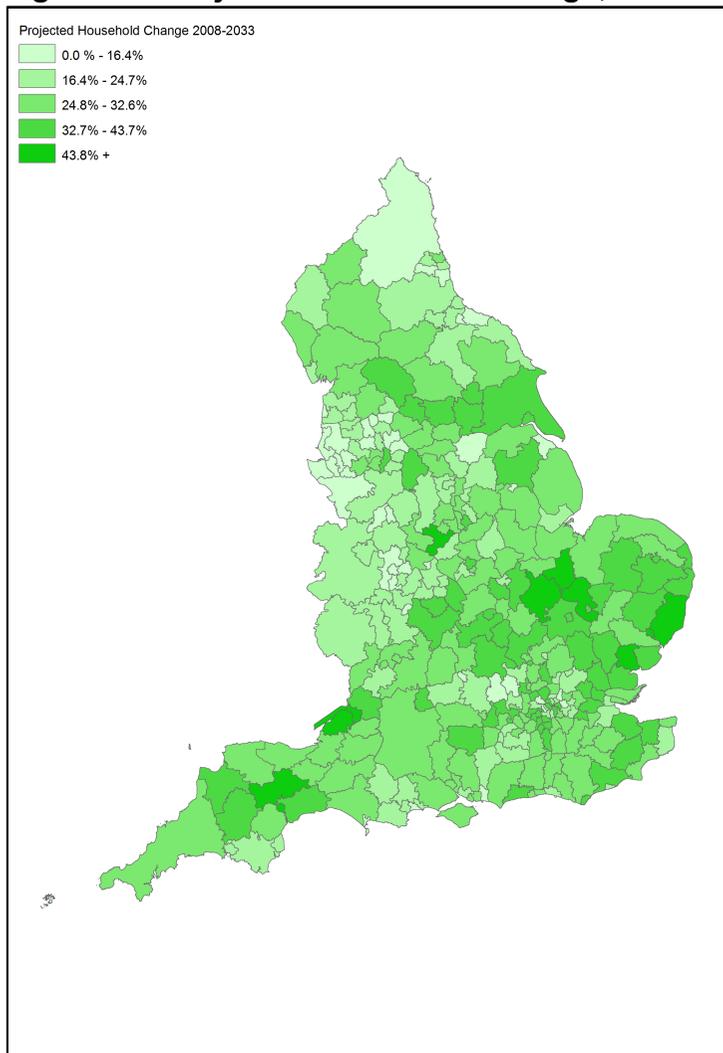


Figure 3.6 Key landscape designations and household growth projection

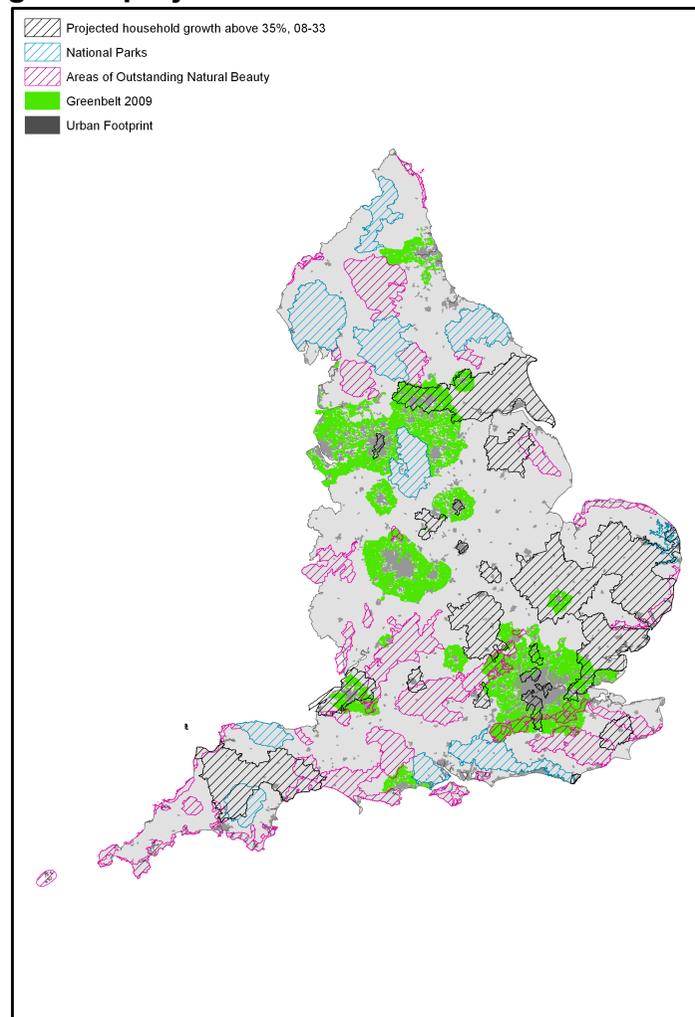
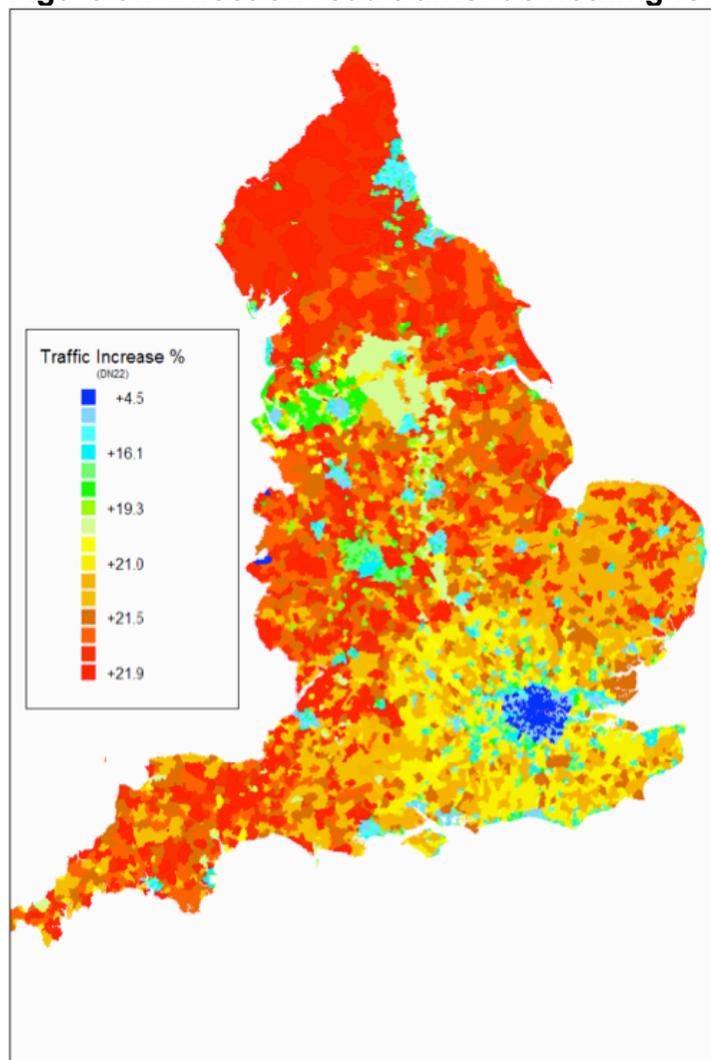


Figure 3.7 Effect on road traffic: do nothing for 10 years



Section 4

SPATIAL SYNERGIES AND CONFLICTS: GOVERNMENT POLICIES AND PROGRAMMES

Based on the spatial maps compiled from government documents, analysis was carried out to identify key planning challenges and opportunities in terms of the spatial synergies and conflicts presented in different policies and programmes and their interaction with the wider spatial contexts as explained in Section 3. The purpose of such visual analysis is to illustrate the need to ‘think spatially, act spatially’ when devising government policies and programmes to galvanise capacities and to maximise opportunities, but also to minimise potential conflicting landuses to mitigate negative consequences to places and their residents.

Based on the recently published government reports, three sets of key planning issues are identified for further analysis:

- The Growing Places Fund and Regional Growth Fund;
- The High Speed Rail Link; and
- Future Housing Delivery.

These issues are all growth related, which probably reflects the Coalition Government’s pro-growth strategy. By unpacking the ways these pro-growth strategies interact with other economic, social and environmental issues, the analysis here aims to demonstrate that differential spatial effects and outcomes will be created, whether intentionally or not.

A core map is produced for each key planning issue. GIS overlay analysis is then used to impose different spatial contexts and different government policies/programmes onto it. These map overlays are used predominantly to display the spatial synergies and/or conflicts over different areas caused by the interaction of existing development trends and policy interventions or between government policies/programmes across different sectors.

The analysis here is not meant to be comprehensive or exhaustive of all government policies and programmes, but rather to serve as some examples to illustrate the importance of understanding the cumulative spatial impacts and opportunities brought by different policy frameworks and activities.

Growth funds and core city-regions

In the *Unlocking Growth in Cities* (UGC) report, the Deputy Prime Minister emphasises that, ‘every city is different. So we are moving away from a one-size-fits-all model towards individual city deals’ (p.iii). This statement signals a recognition that locality matters, though without further elaboration.

Each city is different. However, some share very similar problems and others are doing rather better. This is clearly articulated in figure 2 of the UGC report showing that knowledge-intensive cities have tended to see lower increases in unemployment. It also illustrates that Bristol city-region is performing much better in terms of lower unemployment level than its northern counterparts in Manchester, Leeds and

Nottingham even when they have a similar share of knowledge-intensive industries. This is because their levels of economic competitiveness are shaped by other wider spatial contexts as discussed in the supra-spatial context section of this report. As argued by the new economic geography thesis, spatial structures and their underlying performance tend to be deeply entrenched and can only be changed with major economic shocks. In terms of economic competitiveness, the Bristol area has a higher than average employment rate and a larger number of high tech and knowledge intensive employment in comparison with the other core cities. This area has a strong research capacity considering the population size of its urban areas. This also explains the fact that the Bristol urban area has shown an overall gain of population from other urban areas over the last two decades. While it has pockets of areas ranked highly in the Index of Multiple Deprivation, the extent of such deprivation is much lower than in its northern counterparts.

It is good to see that the UGC report calls for core cities to submit proposals to unlock government resources to serve their own priorities by providing:

- a clear economic rationale;
- a strong evidence base;
- appropriate geography; and
- appropriate governance and accountability.

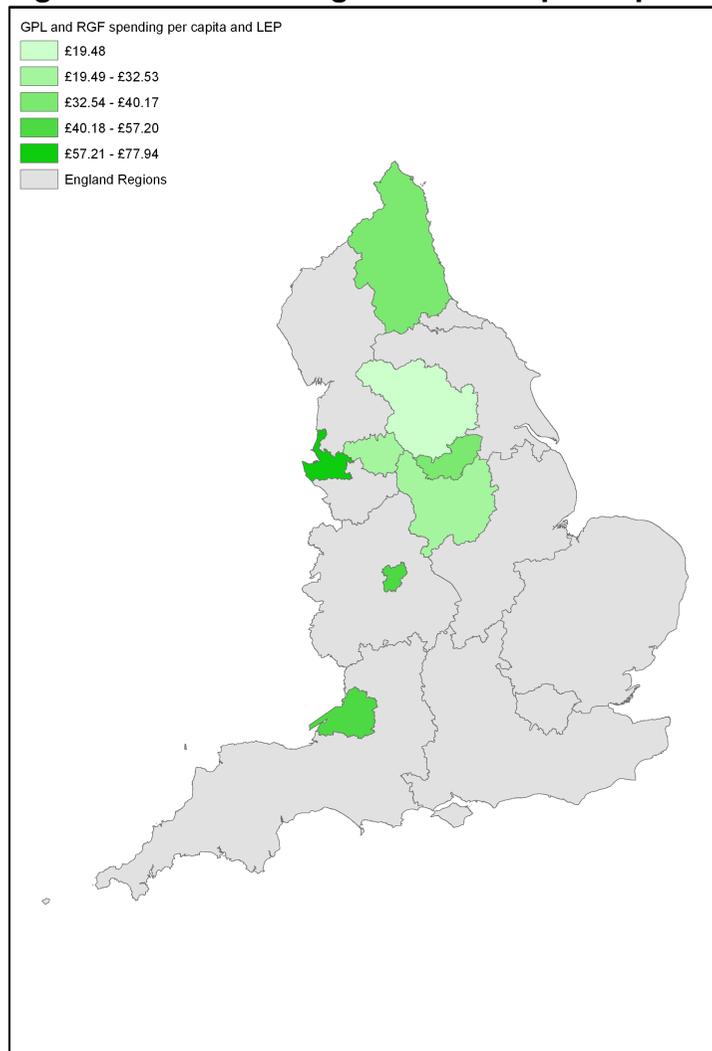
Of the four criteria used by government to make the assessment, the first three have an explicit spatial component as shown by Krugman and others.

In order to demonstrate such spatial expression, the analysis here focuses on mapping the distribution of the £1 billion Regional Growth Fund (2nd Round) and the £500 million Growing Places Fund across the core city-region local enterprise partnerships (LEPs) to see the potential economic boosting effect in these areas. Figure 4.1 expresses these combined funding as per capita population.

While funding bids were submitted to the government from the core city-regions, it is clear that the outcomes are rather different. Liverpool City Region clearly gains a much larger share of the pot in per capita population terms, following by West of England, and Greater Birmingham and Solihull. At the opposite end, Leeds City Region has the least gain from the funding pot.

Since the government argues that cities are the economic drivers of growth, it is useful to see how financial boosts from public expenditure provide opportunities to address the wider issues faced by the core city-regions. The road network investment proposals in the National Infrastructure Plan are thus super-imposed on the funding map. Figure 4.2 shows that the road investment proposals will mostly benefit the M62 corridor (along Liverpool, Greater Manchester and Leeds city-regions) and its north-south connections with the North East, Nottingham and Birmingham.

Figure 4.1 Combined growth funds per capita



The distribution of growth funds is also examined with the location of the proposed nuclear power stations in Figure 4.3. Bristol and the West of England will clearly benefit further from the proposed nuclear power sites surrounding it. The other city-region LEP area with close proximity to nuclear power proposals is the Leeds City Region.

Another interesting spatial aspect of growth funds is the relationship with the location of the top 20% most deprived neighbourhoods. Figure 4.4 shows that the growth funds allocated to Liverpool City Region will have synergy to deal with its extreme deprived conditions. Similarly, this works well in providing an economic boost to the deprived areas in Greater Birmingham and Solihull. To a lesser extent, such financial support from the government will also help the northern city-region LEPs, though not with a focused coverage.

The high allocation of regional funds to Western England, nonetheless, will have an economic boosting effect, but not bringing in extra benefits in terms of alleviating area deprivation issues as this area has the lowest level of deprivation in comparison to other northern city-region LEPs. The growth fund in this area does have a close relationship with its projected household growth as shown in Figure 4.5. Such growth synergy to a certain extent is also found in the Leeds City Region, but not in other city-region LEPs.

Figure 4.2 Combined growth funds and road network investment

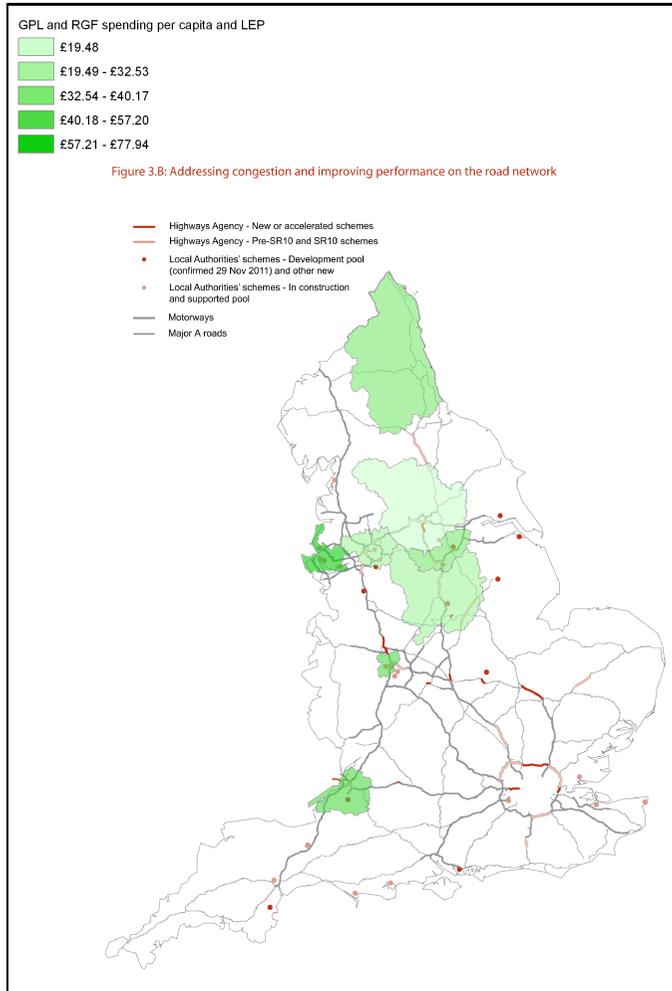


Figure 4.3 Combined growth funds and nuclear proposals

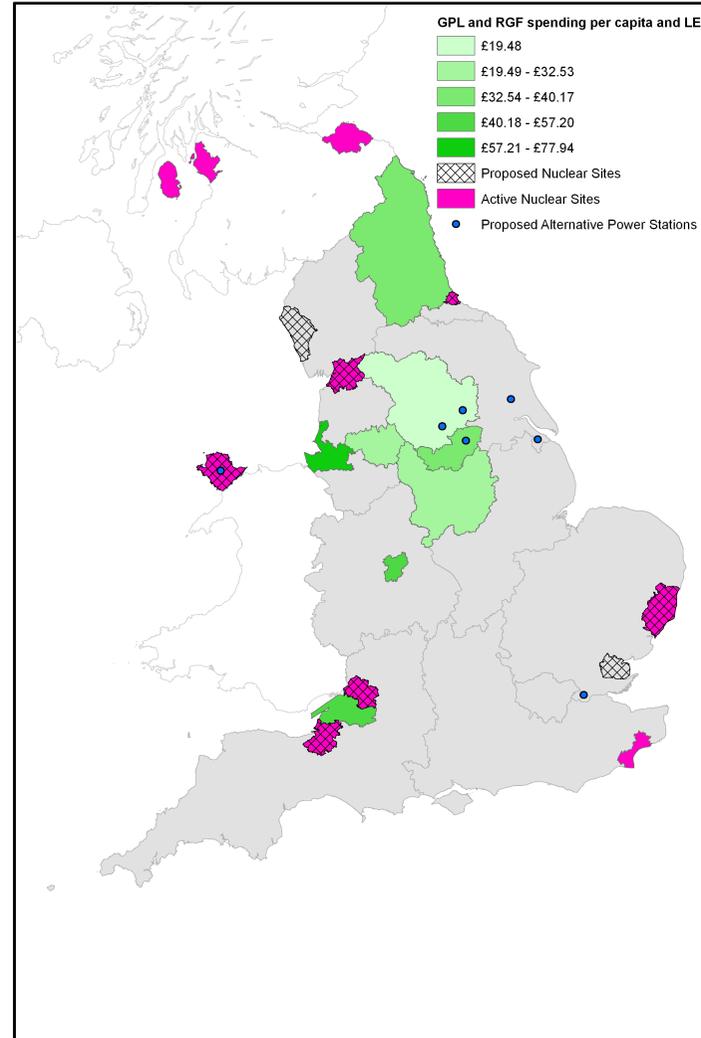


Figure 4.4 Combined growth funds and deprivation

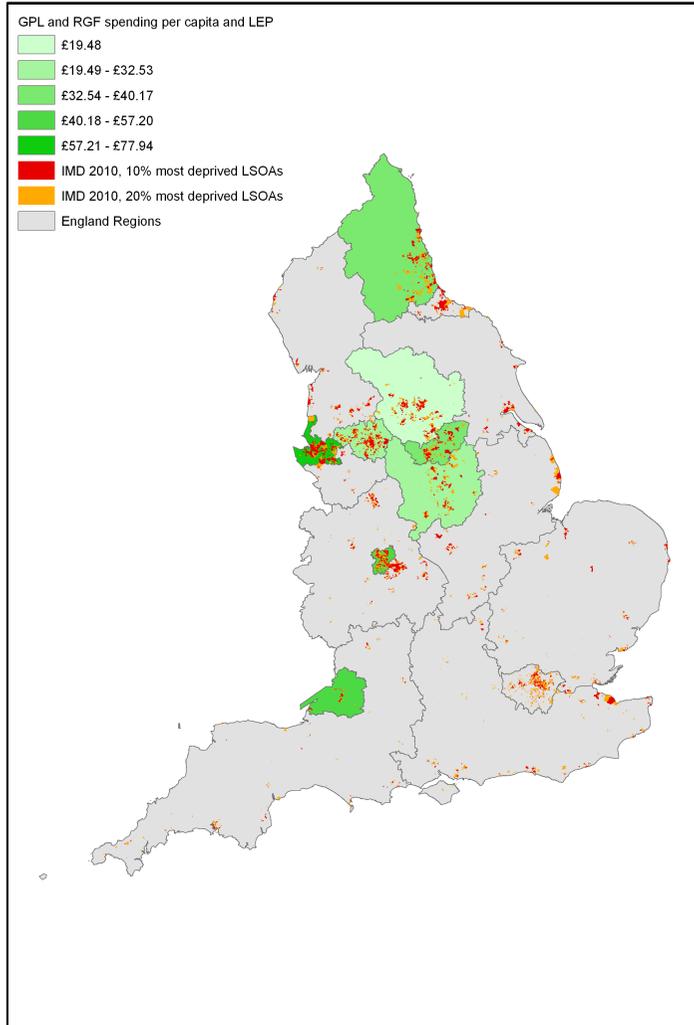
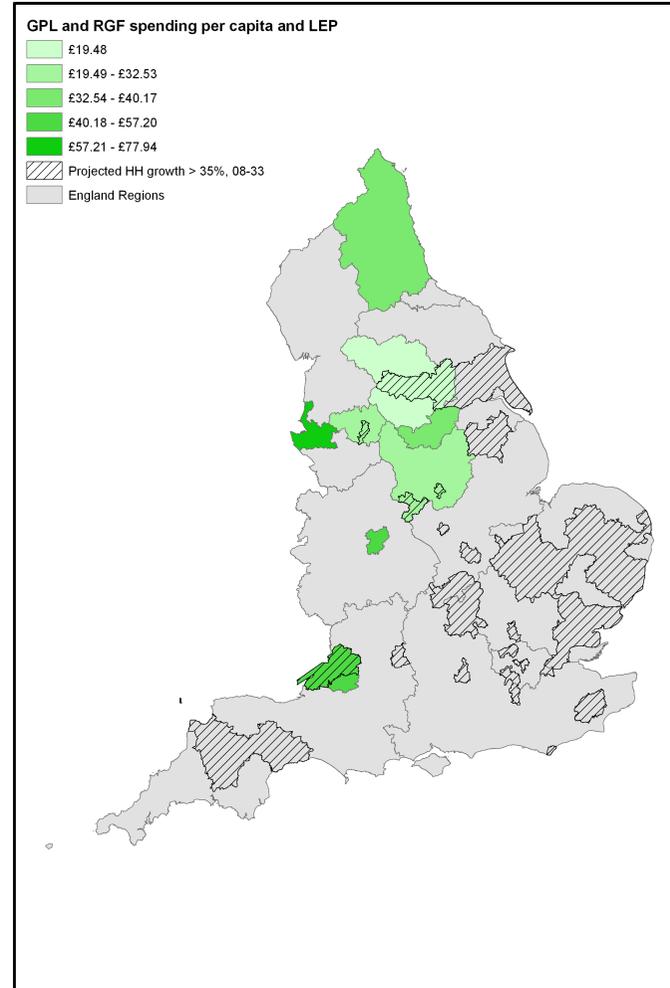


Figure 4.5 Combined growth funds and high household growth projection



The flip side of the growth fund to city-regions is funding cuts in local authority areas within the core city-regions. Figure 4.6 shows the cumulative cuts of revenue spending power per capita between 2010/11 and 2012/13 across English local authorities. It is clear that the metropolitan local authorities, unitary authorities and inner London boroughs face the most severe level of funding cuts. It is also interesting to note that local authorities along the M62 corridor have relatively higher levels of funding cuts, as does the entire North East region.

When taking the growth fund allocations and the local authority revenue cuts together (Figure 4.7), some interesting patterns emerge. While the West of England city-region LEP receives a relatively high levels of growth funds, the revenue spending power of local authorities in that area also faced the lowest levels of funding cuts. This reinforces the message that the combined impact of funding cuts and growth fund boosts provide a strong platform for this area to continue its competitive economic advantage. At the opposite end of the spectrum, the North Eastern LEP not only receives a relatively low level of growth funding, but the local authorities in the city-region, (especially those in Tyne and Wear and Teesside) have high levels of funding cuts.

While the Liverpool city-region has the highest level of growth funding, its local authorities also face the highest levels of revenue cuts. This creates a rather mixed picture and potentially a shift of power from the local authorities to the city-region LEP.

Figure 4.6 Local authority cumulative funding cuts per capita, 2010/11-2012/13

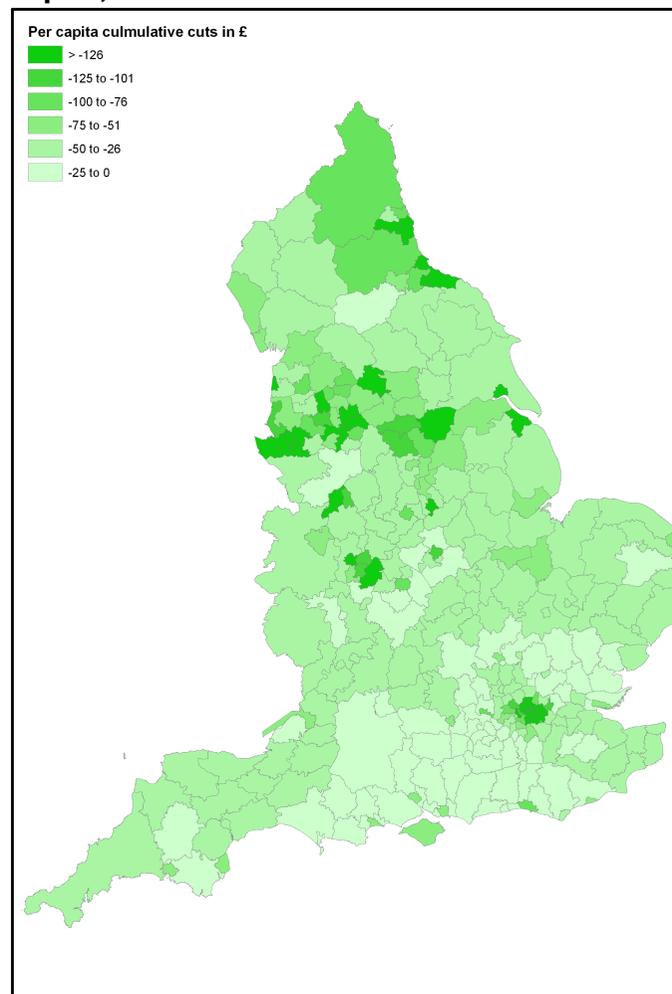
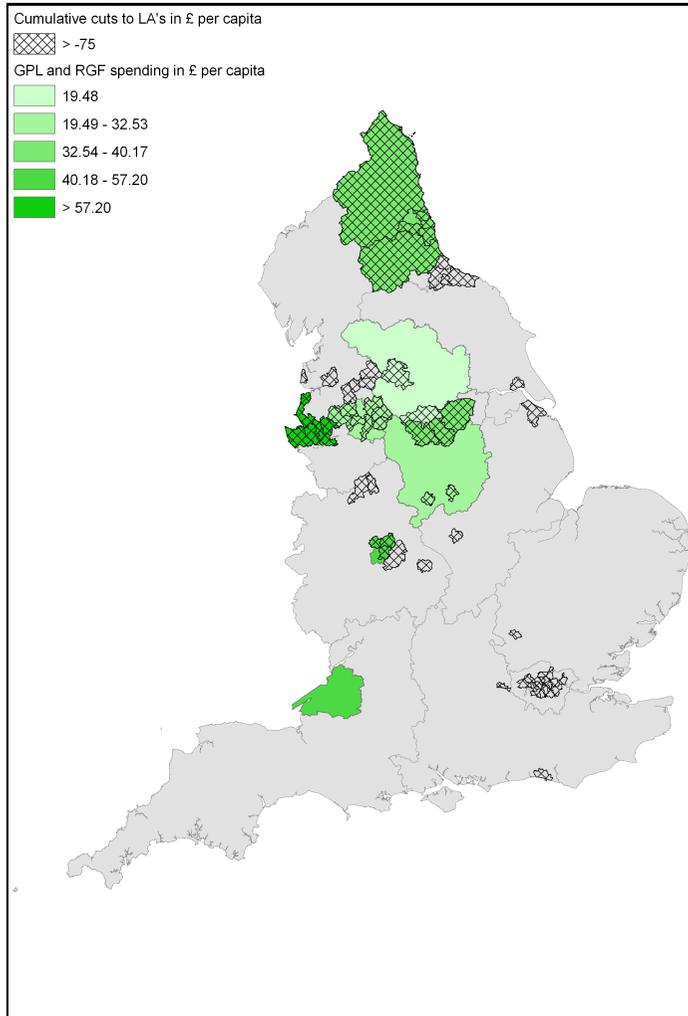


Figure 4.7 Combined growth funds and local authority funding cuts



High Speed Rail Link

The National Infrastructure Plan announces a package of over 500 projects worth of a total of £250 billion across multiple sectors, including: transport, energy, communication systems and environmental systems. It has a priority of delivering 40 major programmes to push forward economic growth including the High Speed 2 (HS2) rail link. The HS2 Y-line proposals, which will first connect London to Birmingham and then Birmingham to Manchester and Leeds, are seen as a major transformational project by compressing the time-distance travel between the London hub and the northern provincial cities. The analysis here focuses on examining the proposed route of HS2 and its spatial interaction with other infrastructure investment proposals and wider spatial contexts.

As announced by Transport Secretary, Justine Greening in January 2012, the HS2 Y-network is intended to provide direct, high capacity, high speed links between London, Birmingham, Leeds and Manchester, with intermediate stations in the East Midlands and South Yorkshire. There will also be direct links to Heathrow Airport and to the Continent via the HS1 line. HS2 is planned to be built in two phases: The line from London to the West Midlands and the connection to HS1 are expected to open in 2026, followed, in 2032-33, by the onward legs to Manchester and Leeds and the connection to Heathrow.

The NIP also clearly states the importance of improving connectivity and capacity between the main urban areas, and between these and the international gateways. The proposed connection to international gateways, nevertheless, is London

centric by emphasising the role of air capacity of Gatwick, Stansted and Luton to support London's and the UK's aviation connectivity. More importantly, it will consider options to maintain the UK's aviation hub status with the exception of a third runway at Heathrow. Recent press speculation of an imminent announcement in respect of consultation on a proposed new Estuary Airport reinforces such a London centric perspective.

However, figure 4.8 overlays the HS2 proposals with the projections of international air passengers in 2050. This map shows the future transport infrastructure capacity within and outside the UK and highlights some interesting points.

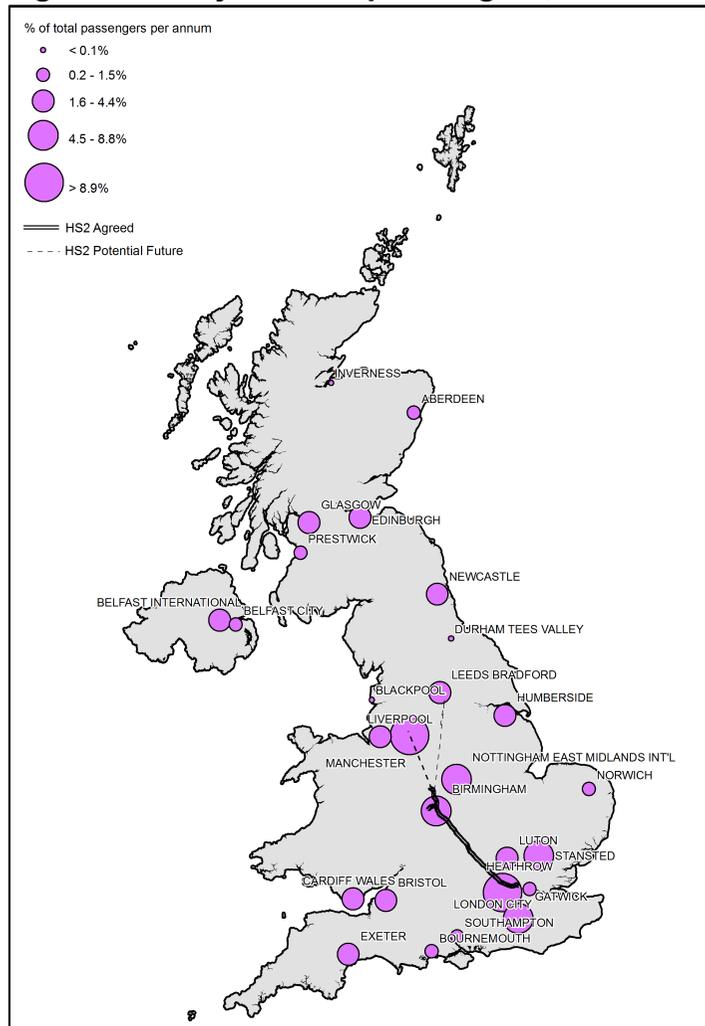
Although Manchester Airport has the largest international passenger capacity outside the 3 main London airports⁸ in the UK, it does not get much of a mention in the NIP. Due to the dominance of the London airports, the HS2 will be vital to the future economic competitiveness of the northern regions, but this will largely serve the Birmingham-Leeds-Manchester triangle. This means the regional rail and road networks near the triangle have to be improved to maximise the benefit from such world class infrastructure. There is also a need to carefully consider whether there should be a HS2 terminal at Manchester Airport, considering its international flight capacity. All these will inevitably create differential spatial advantages:

⁸ Manchester Airport was 4th busiest airport in the UK in terms of passenger numbers and the 3rd busiest in terms of total aircraft movements, and the 24th busiest airport in Europe in 2010.

areas that do not directly benefit from the HS2 (e.g. the North East, the East and the West of England) will be doubly hampered by their sluggish connectivity both domestically and internationally.

Since the economic benefits from the HS2 are very much about connecting key terminal points, it is important to ask whether areas not benefitting from such physical connectivity can be compensated by high speed mobile connectivity. The NIP has a £100m pot to create up to ten 'super-connected cities' (including the four capital cities across the UK), with 80-100 megabits per second broadband and city-wide high speed mobile connectivity to serve small and medium sized businesses and strategic employment zones. Figure 4.9 shows the current availability of superfast broadband across England and that the proposed HS2 route connects up with cities that already enjoy superfast broadband. This suggests that London, Birmingham, Manchester and Leeds will be super-connected physically and virtually, while other urban areas and semi-rural locations will be further left behind if they cannot benefit from the superfast broadband project.

Figure 4.8 Projected air passengers, 2050 and HS2



One may also question whether the investment on a transformational infrastructure project such as HS2 will bring benefits to the most deprived communities. Figure 4.10 shows that the HS2 will reach the deprived population in London, Birmingham, Manchester and Leeds. However, whether the economic benefits can be further spread out to their wider city-regions and beyond will very much depend on the local and regional transport networks. Deprived areas in Liverpool and the North East city regions, for example, will not gain much from the HS2 and the same may even remain true of places such as Nottingham and Sheffield, depending on whether, and where, the actual East Midlands and South Yorkshire stations are eventually located. In any event, more rural areas will miss out on most of the benefits but could be adversely affected if HS2 should happen to pass through their patch.

The construction of HS2 will create a new transport corridor and, inevitably, environmental impacts. In Figures 4.11 and 4.12 respectively, the broad location of HS2 is mapped onto key landscape designation and habitat fragmentation levels. The main constraint of the confirmed part of the HS2 to Birmingham is that it will cut across the Chilterns AONB. The controversy has made the government announce the building of a 1.5 mile tunnel (around £500m) under the Chiltern Hills beyond Amersham. The proposed Birmingham-Leeds-Manchester line can potentially have an impact on the Peak National Park. Both the Chilterns and the Peak are of very important landscape value and currently have relative low levels of habitat fragmentation.

Figure 4.9 Superfast broadband and HS2

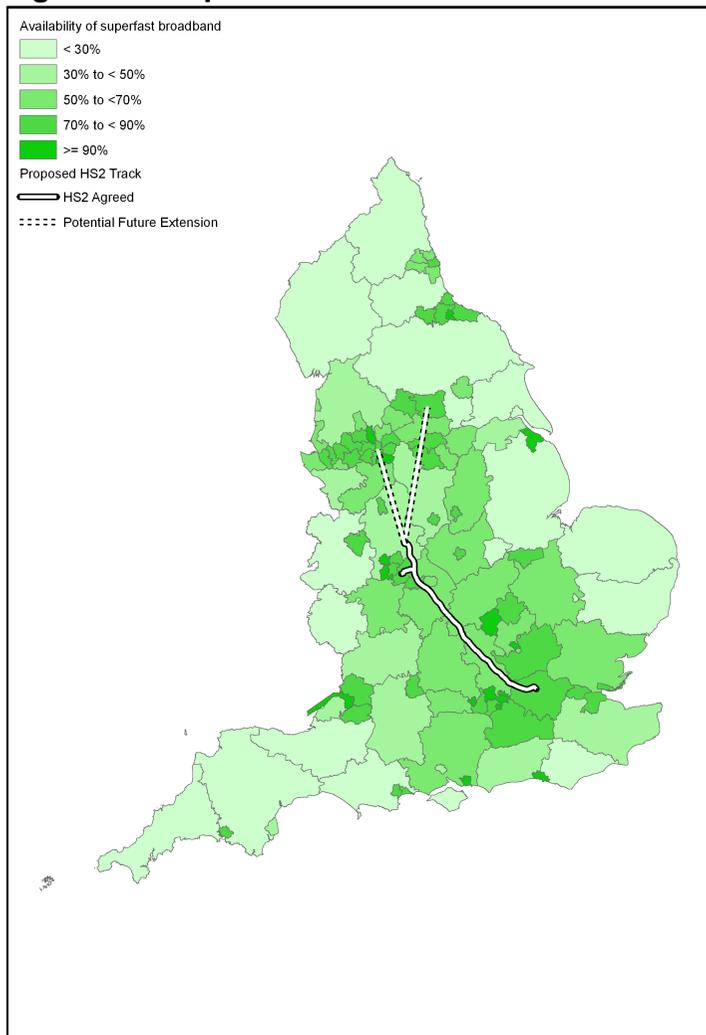


Figure 4.10 HS2 and deprivation

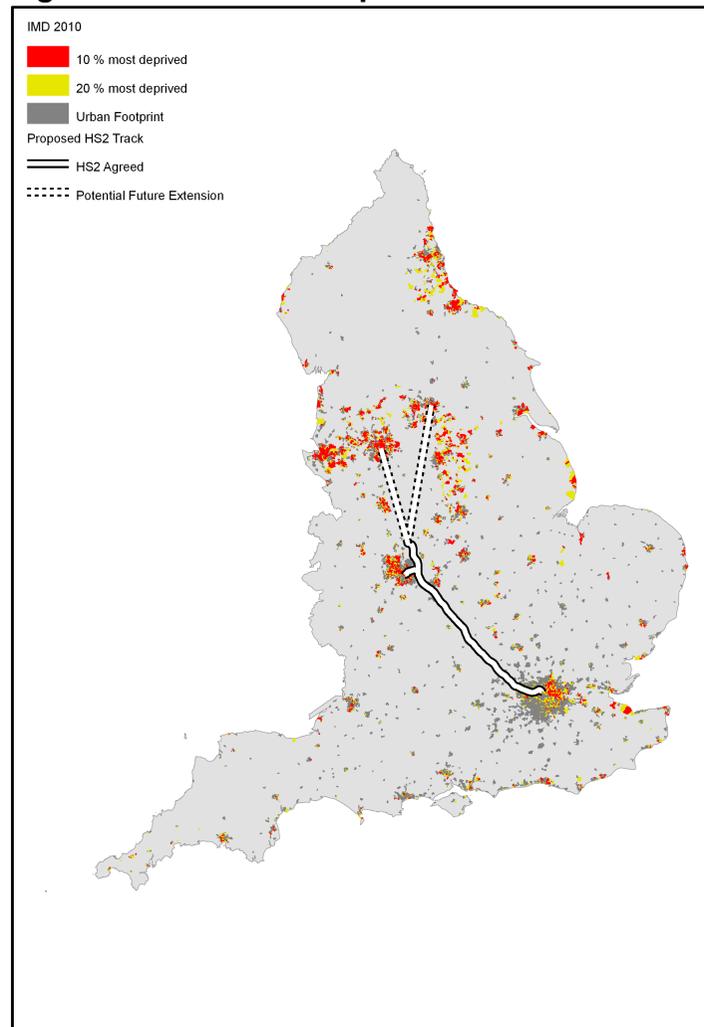


Figure 4.11 Key landscape designations and HS2

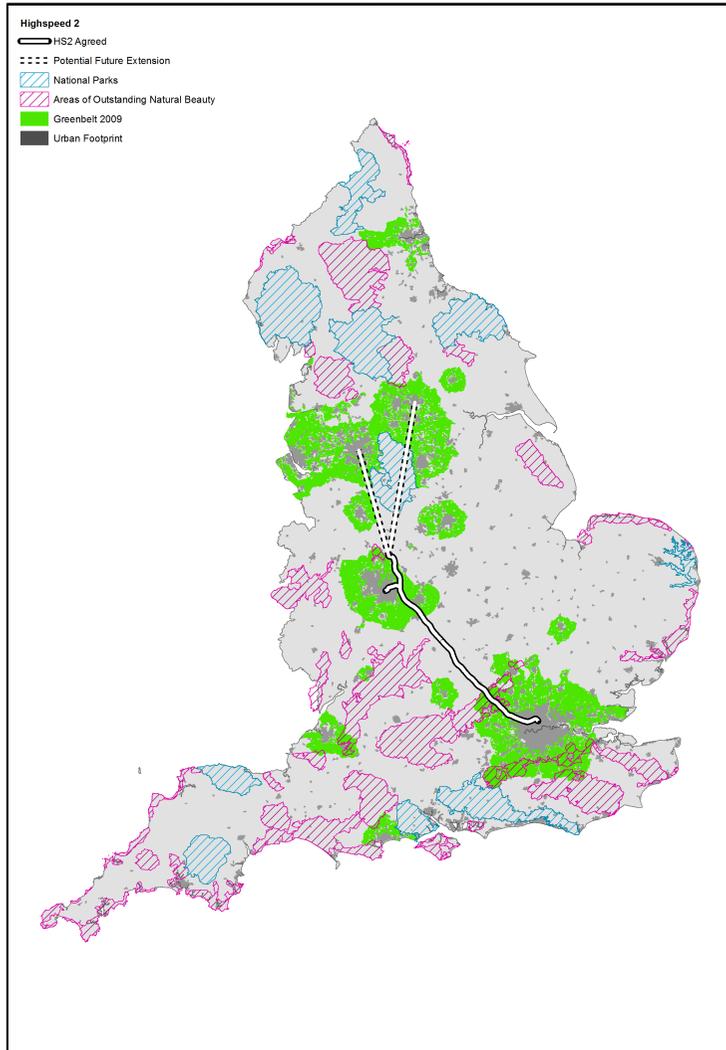
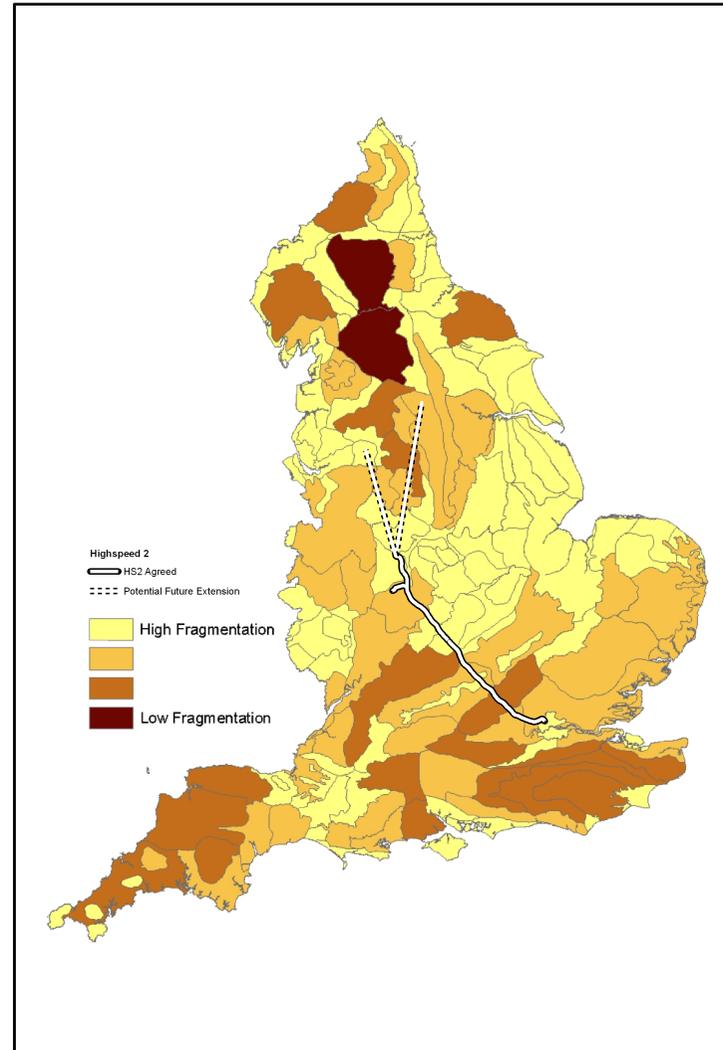


Figure 4.12 HS2 and habitat fragmentation



Future Housing Delivery

The draft NPPF makes it clear that the government's key housing objective is to increase significantly the delivery of new homes. It, however, does not articulate the spatial aspects of housing supply and demand. Instead, it requires local planning authorities (with neighbouring authorities where housing market areas cross administrative boundaries) to prepare a Strategic Housing Market Assessment (SHMA) to assess their full housing requirements in terms of the scale and mix of housing and the range of tenures. They are also required to prepare a Strategic Housing Land Availability Assessment (SHLAA) to establish realistic assumptions about the availability, suitability and the likely economic viability of land to meet the identified requirement for housing over the plan period. The outcomes of conducting SHMA and SHLAA are to find out the spatial requirements of different types of housing within the local plan.

However, the NIP goes further to articulate the inter-sector connections between new housing delivery and infrastructure provision. It argues that new housing has to be supported by infrastructure and infrastructure providers need to have certainty over new housing delivery before making investment decisions. The NIP makes reference to the land supply proposals of emerging local plans and the need for local authorities to work together across boundaries to properly plan for infrastructure provision (para. 4.24) as well as potential funding sources (para. 4.5).

This analysis, therefore, focuses on examining the relationship of trend based household growth projections and the wider

spatial contexts of housing delivery and their interaction with other government policies and programmes.

As shown earlier in Figure 3.4, there are potential conflicts in locations with high landscape value and with high projected household growth such as in the Yorkshire Dales, the coastal areas along Norfolk and Suffolk and Devon. Similarly, Figure 4.13 shows that certain high growth areas may have conflicts of interest over areas with low levels of habitat fragmentation such as in Dartmoor and the Ashford and Kent area.

With the growing concern of climate change and the unpredictable natural events associated with the temperature change, large scale housing developments have to take account of flood risks and water supply issues. High levels of flood risk are projected in the high growth areas near the coastal areas of North Somerset and Hull and East Riding (see Figure 4.14). At the opposite end of the problem is relative water stress. As clearly shown in Figure 4.15, areas on the eastern side of England (with the exception of the Yorkshire growth areas) tend to suffer from more serious levels of water stress (partly related to their higher levels of drought risk), which unfortunately covers most of the projected household growth areas. This means any major housing developments have to take flood risk and water supply into account.

Figure 4.13 Habitat fragmentation and high household growth projection

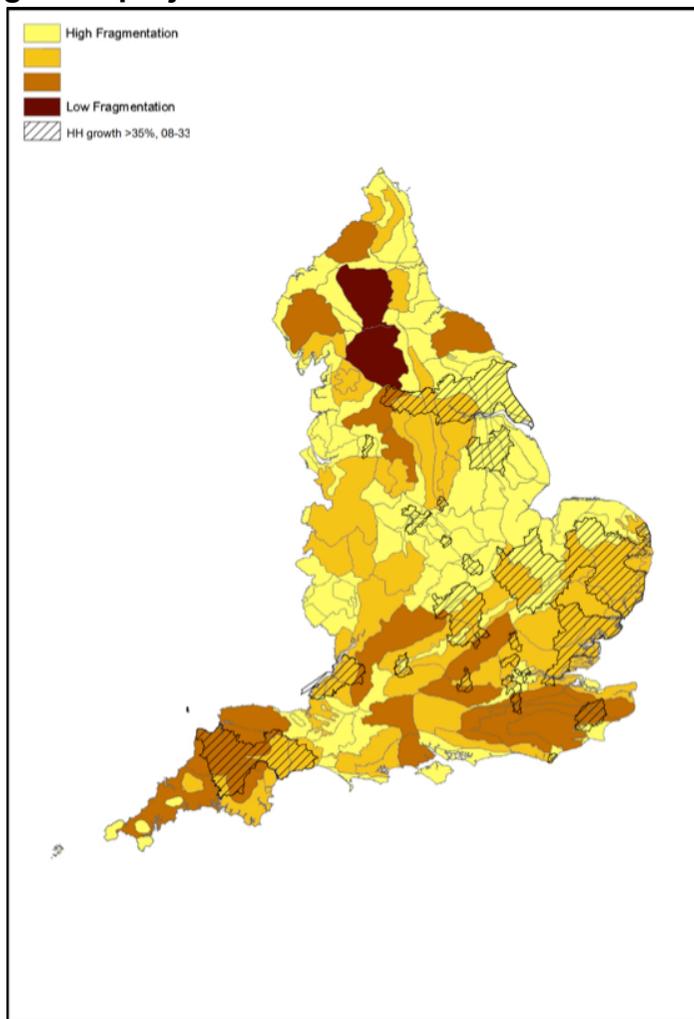


Figure 4.14 Flood risk and high household growth projection

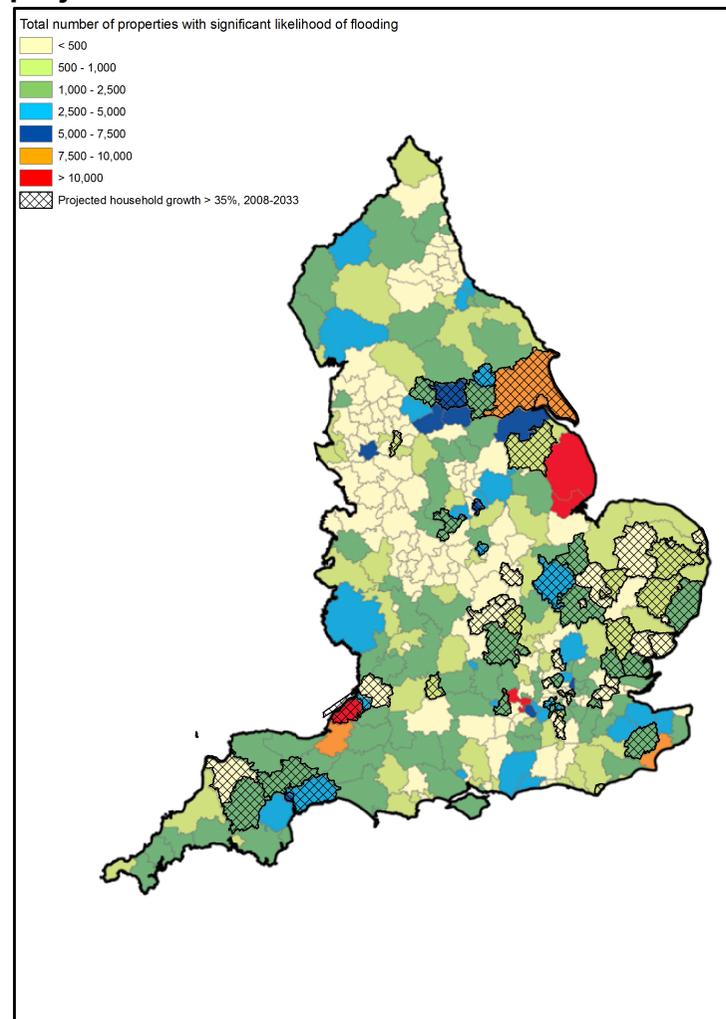
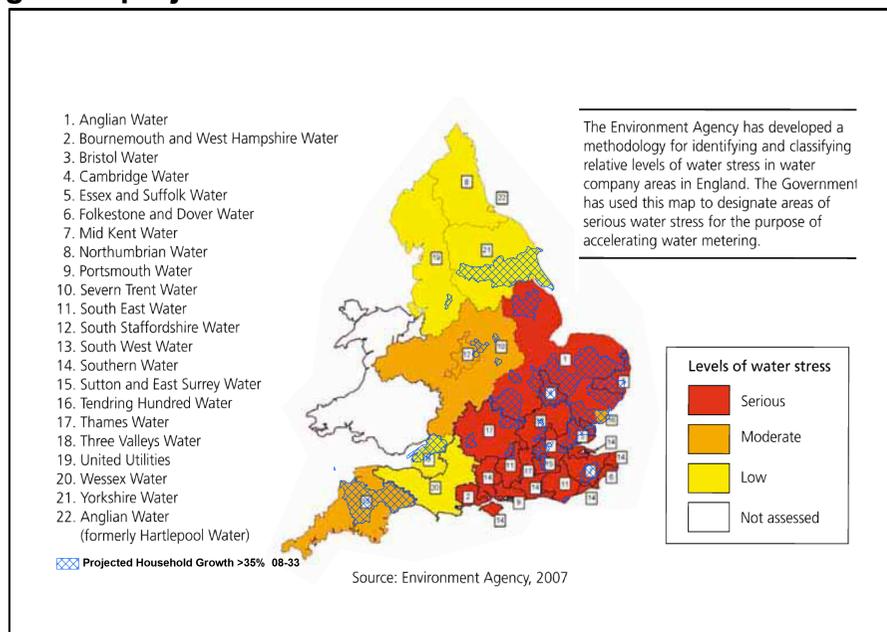


Figure 4.15 Relative water stress level and high household growth projection



Another key concern of housing delivery is housing affordability. Figure 4.16 shows the relationship between areas projected with very high household growth rates and their respective housing affordability ratios (normalised house price versus average household income). It is interesting to discover that there is a very neat spatial divide in terms of the affordability ratio of different high growth areas. The line drawn between the Severn and the Wash Estuary can neatly

summarise the situation, high growth areas north of the dividing line are much more affordable than areas in the southern side.

As most of the projected growth areas are smaller townships and semi-rural locations with commuting distance to major urban areas, it is also interesting to find out their socio-economic conditions and their accessibility. Figure 4.17 shows the level of small town deprivation and the relationship with growth areas. The spatial distribution patterns suggest that higher levels of deprivation are found on the Norfolk coast and Hull as well as in the rural localities of Dartmoor.

In terms of accessibility, due to the less urbanised nature of these projected growth areas, the road network in these areas tends to be less dense and there is very limited planned investment that will change the situation (see Figure 4.18). Most of these areas also have very low levels of super broadband provision, particularly, in the eastern side of England and Dartmoor (as shown in Figure 4.19). Growth areas with higher level of superfast broadband provisions tend to be around major urban areas such as Bristol, London, Reading and Warwick. Again, this bears implications about how to connect the future growth areas with key employment centres and with mobile technology to allow home working and the development of small and medium size enterprises to reduce commuting traffic.

Figure 4.16 Housing affordability and high household growth projection

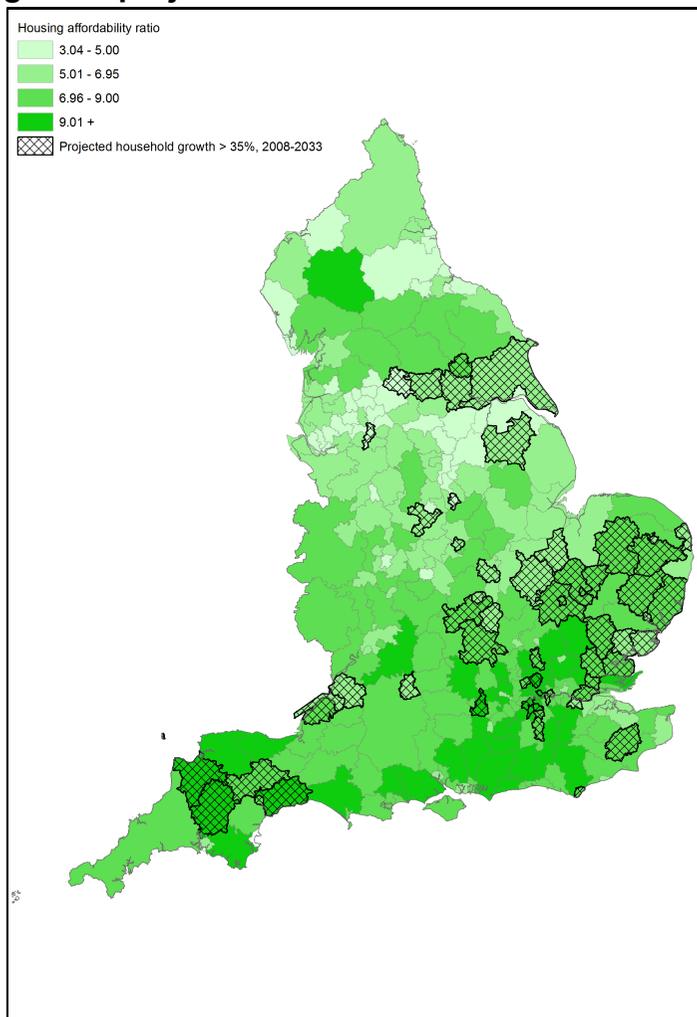


Figure 4.17 High household growth projection and small town deprivation

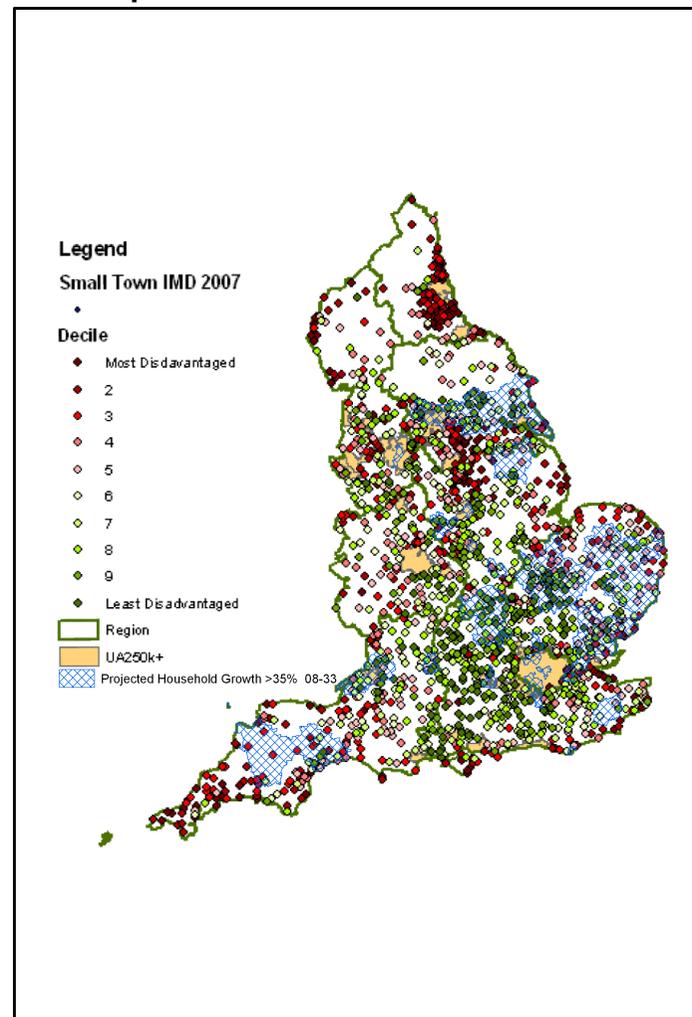


Figure 4.18 Road network investments and high household growth projection

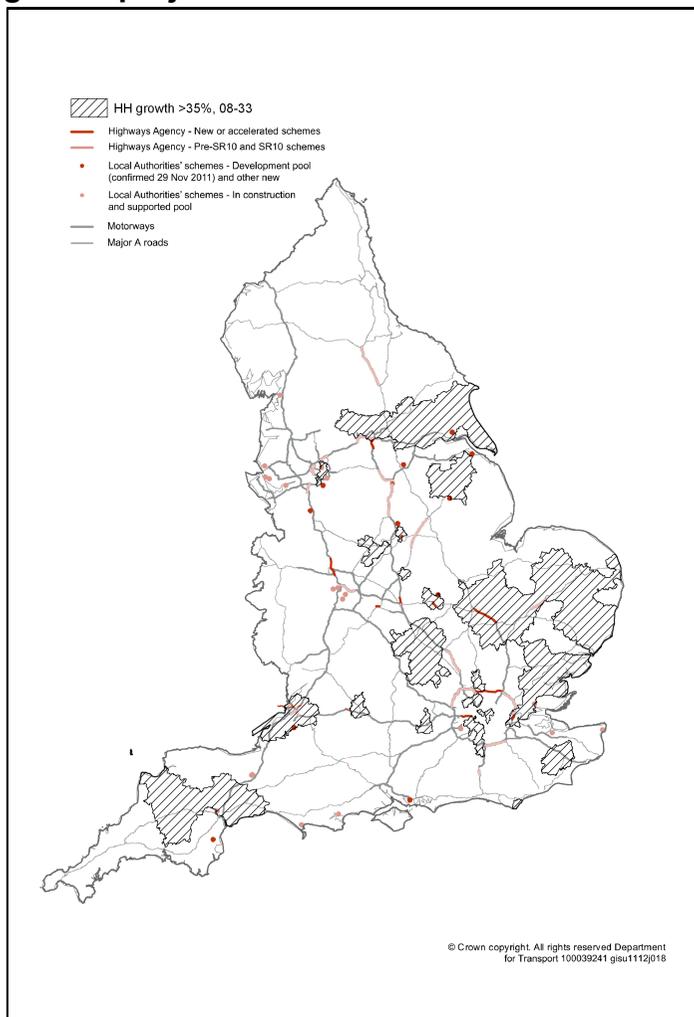
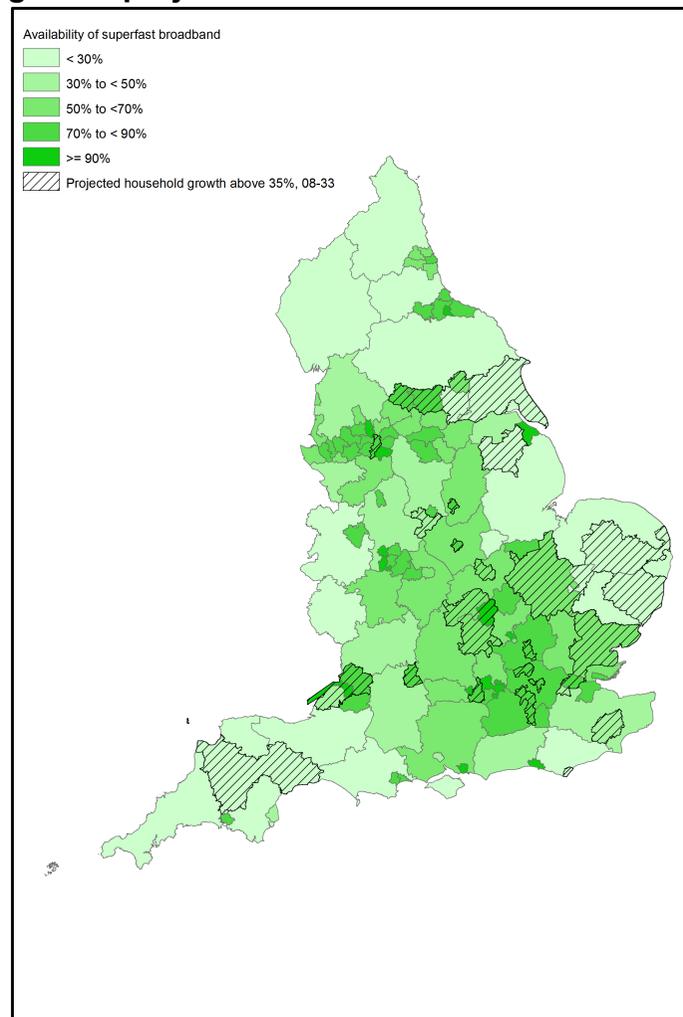


Figure 4.19 Superfast broadband and high household growth projection



Summary

While the government acknowledges that one size does not fit all and intends to devolve more power to local authorities to address their own local issues, this should not be confused with the need to coordinate activities and to provide spatially integrated guidance to local authorities to deliver local policies.

The analysis in this section of growth funding, the HS2 proposal and housing trends shows that government policies and actions, even without a deliberate spatial framework, create spatial outcomes and, cumulatively, they create very stark spatial impacts. For instance, the NIP very much focuses on reinforcing London's super position with major investments strengthening its spatial connections domestically (via the HS2), internationally (to maintain its international aviation hub status) and virtually (to be one of the super-connected cities via superfast broadband). At the opposite end of the spectrum, the North East hardly gets much of a mention and is very much isolated from the major investment plans and projects of the government.

It is clear that a pro-growth policy framework has been consistently applied across different government documents. As a result, there is a consistent lack of attention paid to the social and demographic drivers such as deprivation and demographic change as well as the environmental driver of climate change. The draft NPPF deliberately avoids any spatial steer to future housing provisions and simply delegates the job to the SHMA and SHLAA exercises at the local level. The analysis of future household projections (the best guess of

future housing demand) clearly show that the high growth areas in eastern England are likely to be in the least sustainable locations if there is no containment policy combined with brownfield new build targets, nor major infrastructure investments to improve their physical (road and rail) and mobile accessibility. More importantly, these areas are also classified by the Environment Agency as amongst those with serious water stress. While each local authority can deal with the issue via their local plans, it will not be effective and efficient for multiple authorities to deal with the same issue independently without some overarching guidance from the government.

The analysis of spatial synergies and conflicts over the three sets of planning issues in this section helps inform the development of broader spatial thinking over future planning challenges and opportunities in England. These spatial patterns will be mapped as conceptual diagrams and presented in the next section.

Section 5

PLANNING CHALLENGES AND OPPORTUNITIES: CONCEPTUAL PRESENTATION

This section provides some diagrammatical presentations of different planning challenges and opportunities across England. Notwithstanding the lack of a spatially expressed national planning policy framework, the interaction of different packages of policies and programmes does, deliberately or unintentionally, alter the spatial dynamics and interaction of different places. This may improve or weaken the relative competitive advantage of different places in the domestic and global market place. The emphasis of sustainable growth, in combination with a lack of strategic thinking over the integration of economic, social and environmental drivers, means that there will be a significant shift in the spatial landscape of planning activities. These future perspectives of change are analysed and conceptually mapped in this section.

‘One day’ England: time-space compression to London

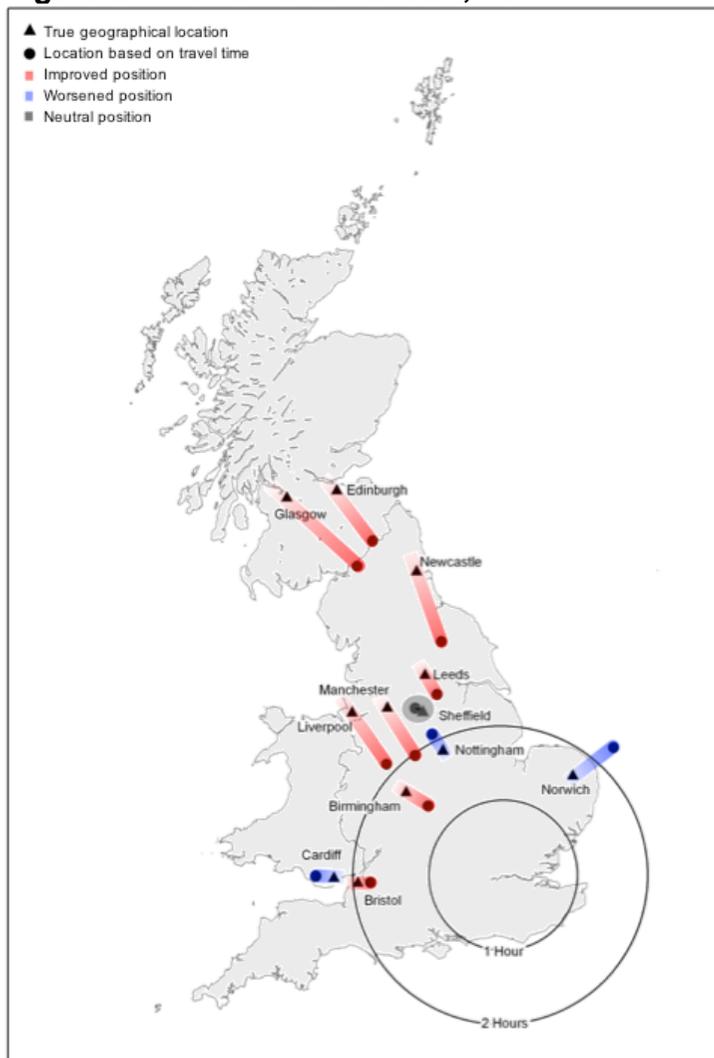
With the dominance of London as a world city and the government’s strategy to retain its international aviation hub status as Britain’s international gateway, the ability to go to business meetings in London on a day trip is critical. In order to illustrate the rail journey times for inter-city links with London, Figure 5.1 shows the differential quality of the rail connections between different provincial cities and London in terms of the actual journey time incurred. With the faster speed rail links, the journey time between London and many northern cities such as

York, Newcastle-upon-Tyne, Edinburgh and Glasgow (marked in red) are significantly reduced, thereby enhancing the mobility of the population for business and leisure trips. Although Manchester is in closer proximity to these northern cities, train journey times to them are actually very similar to those to London. On the other hand, some cities such as Norwich, Nottingham and Cardiff (marked in blue) have a relatively lengthier journey to London when compared with their physical locations.

More interesting, Figure 5.1 shows which cities are currently within a one day round trip journey time (up to 2 hours each way) to London⁹. Of the 8 core cities in England, only Birmingham clearly makes it and some trains from Bristol and Manchester also make this cut-off point, whereas Liverpool and Nottingham just marginally miss this cut-off. Compared to the high speed rail networks in Europe, Japan and recently in China, it is clear that the physical rail connections between major British cities are way behind their counterparts elsewhere in the world.

⁹ The journey time is based on the quickest train journey during on-peak-business hours of the National Rail Planner between City Y and London. The time calculation is simply based on the assumption that it takes 1 minute to travel 1 mile. So, if City Y is 60 miles from London then it should take 60 minutes to travel to city Y from London. However, this might not always be the case. For example, rail service capacity or infrastructure quality and/or provision might mean that it takes less time to travel to City Y than would be expected by its distance from London (e.g. Newcastle) or that it might take longer (e.g. Norwich).

Figure 5.1 Rail time to London, 2011



With the HS2 proposal, it is thus interesting to see what ‘one day’ England will look like. Figure 5.2 calculates the time-space compression introduced between Birmingham, Leeds and Manchester to London by HS2 as there are confirmed terminals in these cities. It is rather interesting to see that the journey time to Birmingham will tip into the 1 hour circle (50 minutes) and Manchester will move from the edge of the 2 hour cut-off to within 1 hour 15 minutes. However, the biggest winner is Leeds as this journey to London will be compressed from 2 hours 35 minutes to 1 hour 20 minutes.

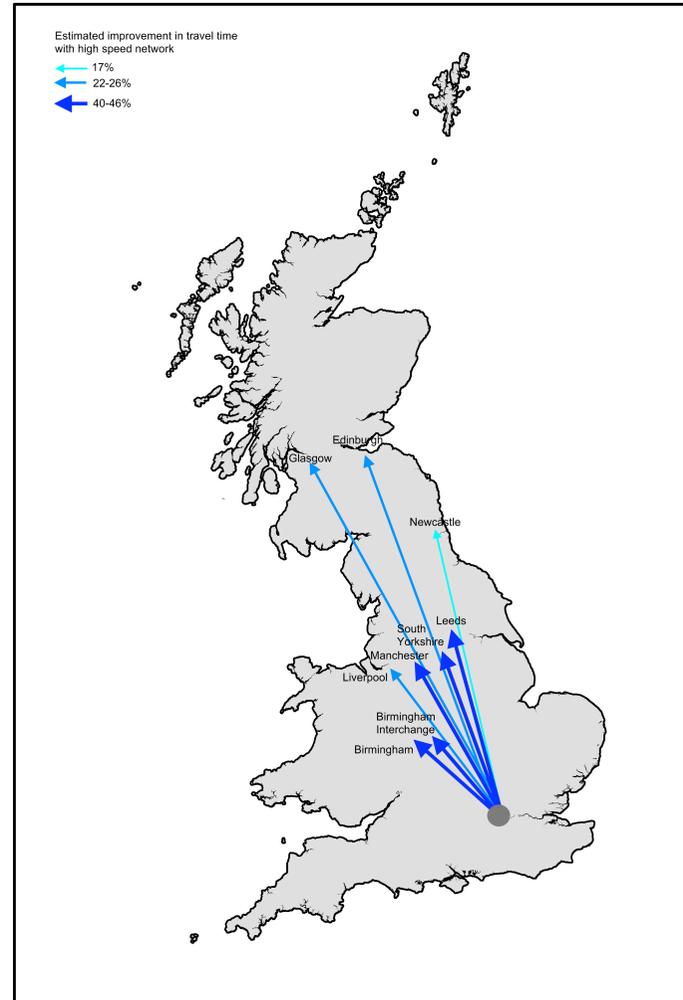
These, of course, are some crude estimates and the real journey time saving will very much depend on the final confirmed routes and the number of terminals along the lines. Based on the data provided in an earlier consultation document of High Speed Rail¹⁰, an alternative scenario of the estimated journey time improvement to London is provided in Figure 5.3. These calculations are based on the assumptions that there will be terminals in Birmingham Airport, East Midlands and South Yorkshire along the Birmingham to Leeds line. This alternative scenario will share out the time saving advantages between other areas along the line rather than just speeding up the journey to Leeds.

¹⁰ Department for Transport (2011) High Speed Rail: Investing in Britain’s Future - Consultation Summary, London: DfT, p.20.

Figure 5.2 Estimated rail time to London after HS2



Figure 5.3 Estimated rail journey improvement from London: HS2



The analysis shows that any proposed programmes or minor alterations will shift the comparative spatial advantages of places significantly. This is one reason why countries such as the Netherlands have a National Spatial Strategy to provide a policy reference framework to address key planning issues. Open debate over different scenarios and principles of development was encouraged by integrating all relevant governmental departments and engaging all stakeholders in the process of preparing such a strategy.

Multi-speed England: London and the *BLM* Met-Triangle

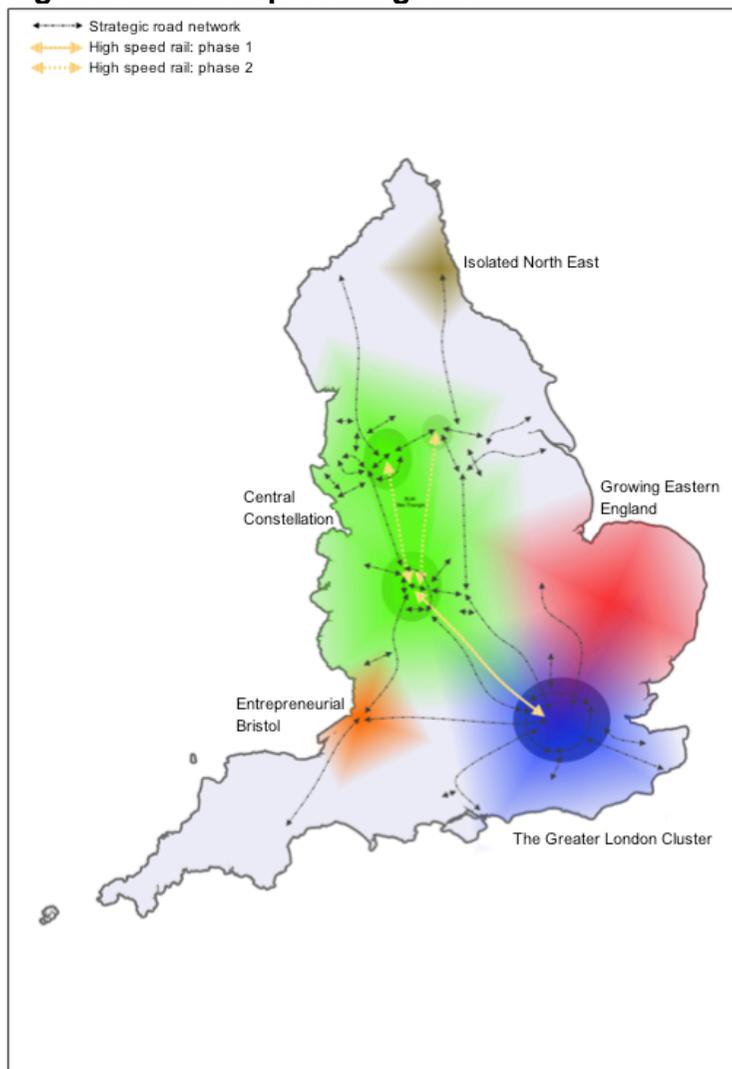
All government reports consistently highlight the superior position of London as a world class city. The gravity of British spatial connections has been pulling towards London. Different places in England are already in multiple speeds, both in terms of rail journey times and economic competitive advantages. However, a major infrastructure project such as the High Speed Rail Link will provide a major shock to the system and have transformational effects on competitive spatial advantages. Who are the winners of the multi-speed England in the future?

London is clearly the winner and will continue its position as a world city. Currently, it has a 60 km commuting radius and has functional dominance over the entire South East and beyond. With the HS2, London can stretch its influence 170 miles away to the northern cities of Manchester and Leeds. With time-space compression, one argument from the new economic geography thesis is that the major hub will suck up the peripheral areas to create a much bigger hinterland to support the centre's economic growth and competitiveness. This is a

very likely scenario as the NIP emphasises the role of the 4 London airports as the international gateways for external connections and sidelines the role of another major international airport in Manchester which could have served as another international gateway connected by the HS2. Without the need to bid for the capital pot, London has already secured the status of Super-connected cities with super fast speed broadband provision. Figure 5.4 conceptually illustrates London's functional dominance.

The other winners in the speed race are Birmingham, Leeds and Manchester in the Central Constellation cluster. In the 2006 *Uniting Britain* report, we conceptualise the Central Constellation as a galaxy of the northern cities, within which there are two inter-related functional areas. The HS2 and the improvement of the TransPennine rail service will no doubt help to bring the two functional areas closer together, but mainly via the new triangular nexus between Birmingham-Leeds-Manchester and we name it the 'BLM Met-Triangle'. This means London continues as the transport hub and Birmingham will be a min-hub with Leeds and Manchester as the spoke.

Figure 5.4 Multi-speed England



In our 2006 study, we argued that the Central Constellation offers both opportunities and challenges. In spite of their close proximity and significant spatial connections through population movements and transport links, they are operating under different administrative frameworks and institutional structures as they transcend the boundaries of four separate regions. In the current and future context, this argument remains true. If there is no proper partnership working and strategic thinking, the BLM will continue to compete with each other to gain international and domestic investment and public sector resources. More importantly, in order to maximise the HS2 benefits, this functional spatial region has to be strategically developed and managed. This will require the city-region LEPs as well as some of their strong performing neighbours (e.g. Cheshire and North Yorkshire) to work together to develop joint capacity and inter-connections.

While there is a larger share of regional and places growth funds going to the Liverpool City Region and major resources to other core city-region LEPs, it is clear that they will be in a lower gear if local and regional communication networks are not upgraded to spread the spatial benefits outwards from the BLM Met-Triangle.

Functional spatial clusters in multi-speed England

Based on the analysis of recent government policies and programmes, the conceptualisation of the functional spatial clusters in the 2006 Uniting Britain report is revisited and readjusted.

The Greater London Cluster

- international financial centre and a world class city;
- the highest level of GVA per capita but also house prices;
- major public investments such as the Olympics, HS2, airports, Super-Connected Cities projects;
- continues its world city position by stretching its spatial dominance and functional areas;
- problem with traffic congestion, housing affordability and housing supply;
- inner London suffers from the paradox of having social and deprivation problems as well as extremely high living cost.

The Central Constellation and the BLM Met-Triangle

- closer connections among the 3 core cities and shrinking rail journey times to London via HS2;
- uncertainty over spatial connections outside the BLM triangular nexus and the remaining functional regions in the cluster;
- connection of the Metropolitan Nexus along the M62 corridor will be improved via the investments in improving the TransPennine Rail Link and other road improvement projects;
- Liverpool City-Region LEP gets a high share of the combined growth funding, but the other core city region LEPs do not have such a high share;
- development and growth potential, but continues to suffer from the legacy of industrial decline;
- high levels of social deprivation and uneven intra-regional development, with low level of projected household growth

except the high growth belt along the Yorkshire Dales to East Riding and Hull.

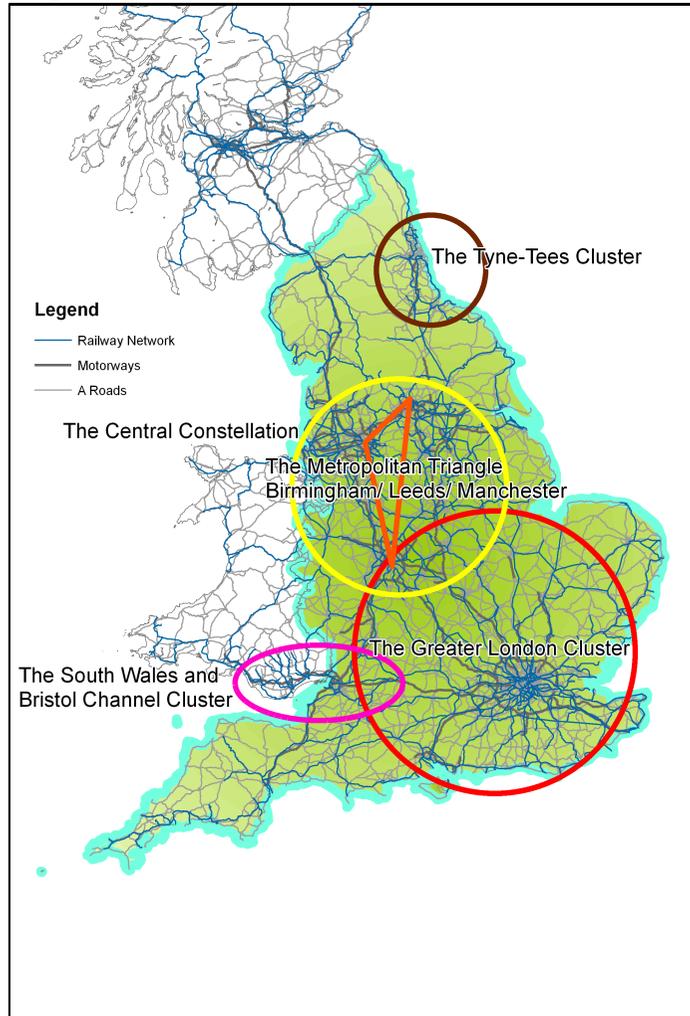
Entrepreneurial Bristol Cluster

- enjoys one of the largest share of regional growth funding, which will boost the already well performing economy;
- benefits from the proposed nuclear power development;
- has a higher than average employment rate and a larger number of high tech and knowledge intensive employment; and strong research capacity;
- lower level of deprivation compared with other core cities;
- an area with projected high household growth with the surrounding areas in north Somerset;
- its functional relationship with Cardiff is still a potential opportunity to be developed.

Isolated Tyne-Tees Cluster

- the North East City Region LEP receives a moderate share from the growth funding pot;
- Teesside only receives road and project improvement investments from the NIP;
- projected household growth is at low levels;
- has major unemployment and social deprivation issues;
- does not feature much in government reports and is very much isolated from the major infrastructure improvement schemes.

Figure 5.5 Functional spatial clusters in multi-speed England



Besides these four functional spatial clusters, the analysis of the demographic drivers of household growth shows a very stark picture of high growth spreading over Eastern England. It is thus worth to mention that there is a demographic track of growth here. The high growth of Eastern England is due to its attractive living environment with commuting distance to small to medium size townships. However, such growth levels may create tensions with the capacity of the area in terms of the relatively sparse road and rail networks and the low level of high speed broadband provisions. It is an area with severe water stress and high drought risk. These issues may impinge on the development of the Greater London Cluster as the housing pressure of London/South East is spreading eastwards. There is a strong argument to have greater spatial coordination over the provision of infrastructure and housing delivery as mentioned in the NIP, though not reflected in the NPPF.

England within a UK spatial development context

Though the analysis so far has focused inwardly within England, it is important to emphasise that spatial planning is about spatial connectivity at all levels. For instance, the Scottish Government is already considering its potential infrastructure investment plans to connect Glasgow with Manchester via a high speed rail link all the way to Scotland if HS2 is built. However, the issues raised in this report about the lack of transparency, or at least the ease by which the spatial implications of English policy can be readily identified in a joined-up manner, makes it harder to plan major infrastructure connections in a fully integrated manner across the UK's

internal borders. Thus, while the government policies and programmes looked at in this report here have so far focused on England, it is interesting to at least briefly contextualise the English development framework within the wider UK.

Scotland

With its only land border connecting to England, Scotland can be influenced by decisions south of the border. While England shifts away from formal spatial planning such as RSS, Scotland has maintained the national spatial planning approach first laid out in the National Planning Framework for Scotland and subsequently updated in the National Planning Framework 2 (NPF2) which sets out strategic priorities for the improvement of infrastructure and targeting of regeneration activity. The £60 billion Scottish Infrastructure Investment Plan, released in December 2011, complements the NPF2 by detailing where and how infrastructure investment will be targeted to 2030. There is a particular emphasis on the role of capital spending for infrastructure in order to encourage economic growth. Investment is largely targeted at transportation projects, including dualling the routes between all major Scottish cities by 2030 and completing the dualling of the A9 by 2025. Of particular importance is the potential extension of the HS2 line to Edinburgh and Glasgow. Uncertainty remains as to whether such a connection will ever be established. The Infrastructure Investment Plan commits to paying up to £9 billion on condition that the UK Government pays for the connection from Manchester to the Scottish border. However this would require a further investment of approximately £15 billion beyond the Manchester/Leeds investments, none of which is currently

planned. The lack of strategic direction on the future of HS2 in the North of England creates uncertainty for the Scottish Government in terms of future capital investment in rail and station infrastructure.

Wales

The spatial question in Wales is somewhat different. The main transport connections with England run through the coastal zones of north and south Wales, in the latter case, stretching westwards to Swansea and beyond through the South West Wales and Bristol Channel cluster already described above. Meanwhile, the north Wales transport axis forms part of the Trans-European Network (TEN) mentioned in the next section on Ireland. Other than these east-west transport links, meeting energy demands in the future has emerged as a key political issue in the UK and wind energy in particular has risen up the political agenda in Wales. The question of whether further powers should be devolved to the National Assembly for Wales with regard to energy beyond existing powers has been widely debated in recent months. This political decision will have distinct spatial implications. The Wind Capacity map produced by the Department of Energy and Climate Change provides shows a significant concentration in Wales with a cluster of over 30 onshore and offshore wind farms with turbines above 225kW, particularly in mid Wales.

Ireland

The Trans-European Network (TEN) – a far-reaching set of infrastructure comprising roads, railways and sea connections – serve to connect England with the rest of Europe. As an

important component of this, the London-Chester-Holyhead-Dublin axis is vital for moving freight between England, the rest of the UK and Ireland, and onto or from neighbouring European countries. It is estimated that annually 1.5 million tonnes of imports, and a slightly lower volume for exports, flows across the British land corridor between Ireland and the rest of Europe¹¹. How such connectivity - between England, the wider UK and Europe - is planned for in the future will have major implications for the economic health of England in the long-term.

England within the European spatial development context

The discussion now moves beyond the UK to consider the development of England within the wider European spatial development context. Debates over varying spatial development patterns in Europe have had a major impact on European regional policy, particularly on the controversial issue of defining the core and peripheral areas of development. The European Spatial Development Perspective (ESDP) describes the economic core of Europe as a 'pentagon'¹² (see Figure 5.6), comprising a dynamic area between London, Paris, Milan, Munich and Hamburg to form a global economic integration zone where no less than half of the EU's total GDP is being generated. The ESDP advocates the need to break up this

¹¹ IBEC-CBI (2008) *Freight Transport Report for the Island of Ireland*. Newry, The Trade and Business Development Body.

¹² European Commission (1999) *European Spatial Development Perspective: Towards Balanced and Sustainable Development of the Territory of the EU*, Luxembourg: Office for Official Publications of the European Communities, p.20.

spatial concentration of economic development by developing a more balanced polycentric spatial economic system in Europe. European regional policy has aimed to work against these patterns by providing support to regions that are lagging behind economically. In England sub-regions such as Merseyside and Cornwall have benefitted from these programmes. In addition, strategic investment in European transport infrastructure in the form of the Trans-European Transport Network (TEN-T) is a part of the policy to create more balanced economic development. An example for such a TEN-T investment in the UK is the A55 corridor from North West England to Holyhead to improve the road in North Wales and beyond for ferry connectivity to Ireland.

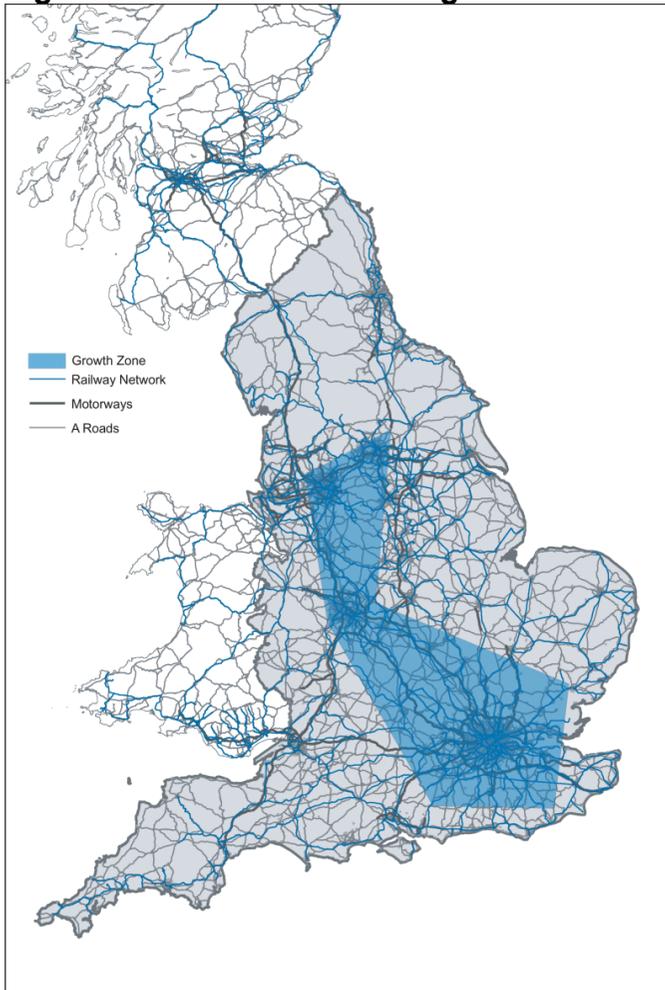
Similar to other major European countries such as France, Italy and Germany, only part of the territory of England/UK is within the high growth pentagon zone. The spatial policy response of many European countries is to support regions that are lagging behind as well as by making strategic transport investment, particularly in a high speed rail network. The investment in high speed rail links in England can be seen as a comparable strategy of enlarging the reach of and accessibility towards the core economic zone of Europe. As shown in Figure 5.7, the major infrastructure investment of the HS2 will create a one day Britain, stretching from London to the BLM Triangle to form a growth area. This means that the London corner of the pentagon will be stretched out to the BLM Triangle and alter the economic competitive advantage of this part of northern England, allowing it to be more connected to the core of the mega European economic zone (Figure 5.6).

Spatial proximity though is not the only factor impacting on economic success in regions and cities. Many areas of the UK have become more connected with the European continent through the availability of cheap air travel leading to some parts of southern Europe becoming attractive retirement locations. For businesses outside the wider London area, direct connectivity by planes to places in the continent within one to two hours flight time can be as important as a link to London. On the European scale, this partly explains the relative success of peripheral places such as Barcelona/Catalonia or Helsinki/Tallin. By looking outward from a wider European spatial perspective, policy attention should not only be paid to improving transport links between Northern England and London, but also transport and economic links with continental Europe by developing sustainable strategies for future airport development in provincial cities.

Figure 5.6 The core-periphery of the European spatial development context



Figure 5.7 Growth area of England



Section 6

RECOMMENDATIONS FOR FUTURE RESEARCH DEVELOPMENT

This study sets out to examine the interplay between policy needs and spatial contexts via mapping the policies and programmes of Government Departments and their agencies /NDPBs. Despite working on a very tight timetable, a quick scanning and appraisal exercise of government documents and websites has proved that many government policies and programmes do have strong spatial expression or, more importantly, significant spatial consequences. However, these expressions could easily be ignored if there is only an occasional map here or a diagram there, scattered in different sectoral policy documents.

The GIS analysis of the three suites of growth related planning issues in this report further demonstrates that, by placing these spatial expressions together, a spatial reference framework starts to emerge to reveal some implicit assumptions or random decisions of government policy-making. Making these spatial challenges and opportunities explicit will help to inform policy debate and encourage partnership working to better coordinate and manage the delivery of very complex spatial planning policies. On the contrary, by not articulating the spatial relationships of planning issues such as future household growth and the spatial strategy of housing delivery can lead to disjointed and ad hoc management of infrastructure and service provisions at the local level.

The different spatial scenarios and metaphors of the future spatial opportunities and challenges in England and Europe also serve as a reference point to stimulate policy debate and thinking. While the analysis in this study is based on a few key planning issues, it does demonstrate the function and value of having a national spatial planning framework. It also shows that the GIS analytical methodology of spatial synergies, conflicts, challenges and opportunities can be applied to a whole array of planning issues and different sectoral policies at national as well as regional and sub-regional levels to inform policy-thinking. With more resources, more sophisticated mapping packages and datasets could be purchased to refine and develop the analysis further to cover all the key topics of the NPPF.

Finally, the maps compiled in the separate volume of 'A compendium of spatial maps for England' for this study and the maps compiled for the Joseph Rowntree Foundation's Housing and Neighbourhood Monitor project provide a very useful resource to inform local planning authorities and LEPs on the spatial context and spatial expressions of different government policies and programmes. These will be provided on the following websites:

- Maps in the 'A compendium of spatial maps for England': www.sed.manchester.ac.uk/cups
- Maps for the JRF Housing and Neighbourhood Monitor: www.hnm.org.uk

APPENDIX 1 Government Policies and Programmes with Spatial Expression or Spatial Consequences

(* with explicit spatial expressions in terms of maps, diagrams and statistics)

- *British Waterways (2004) Water Ways: Inland waterways and sustainable rural transport. Watford: British Waterways
- *British Waterways (2004) Waterways 2025: Our vision for the shape of the waterway network. Watford: British Waterways
- *Centre for Ecology & Hydrology (2011) Land Cover Map 2007, Dataset Documentation.
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- *Communities and Local Government (2010) Geography of Housing Market Areas. London: Stationary Office
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- *Department for Transport (2010) Investment in Highways Transport Scheme. London: Stationary Office
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- *Department for Transport (2011) High Speed Rail: Investing in Britain's Future. London: Stationary Office
- *Department for Transport (2011) Strategic Rail Freight Interchange Policy Guidance. London: Stationary Office
- *Department of Energy and Climate Change (2011) En-6 Nuclear Power Generation NPS - Volume II, London: Stationary Office
- *Environment Agency (2007) Areas of water stress, final classification.
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- *Government Statistical Service / Department for Environment, Food and Rural Affairs (2011) Statistical Digest of Rural England 2011. London: Stationary Office
- *HM Government (2007) National Asset Register. London: Stationary Office
- *HM Government (2011) Laying the Foundations: A housing strategy for England. London: Stationary Office
- *HM Government (2011) Unlocking Growth in Cities, London, Cabinet Office.

- *HM Treasury (2011) Public Expenditure Statistical Analysis PESA 2011 section 4 – Country and regional analyses http://www.hm-treasury.gov.uk/pesa2011_section4.htm
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- *Lawton, J.H. et. al (2010) Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra.
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- Communities and Local Government (1991) Planning Policy Guidance 18: Enforcing Planning Control, London: Stationary Office
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- Communities and Local Government (2001) Planning Policy Guidance 8: Telecommunications, London: Stationary Office
- Communities and Local Government (2002) Planning Policy Guidance 17: Planning for Open space, Sport and Recreation, London: Stationary Office
- Communities and Local Government (2004) Planning Policy Statement 22: Renewable Energy, London: Stationary Office
- Communities and Local Government (2004) Planning Policy Statement 23: Planning and Pollution Control, London: Stationary Office
- Communities and Local Government (2004) Planning Policy Statement 7: Sustainable Development in Rural Areas, London: Stationary Office
- Communities and Local Government (2005) Planning Policy Statement 1: Delivering Sustainable Development, London: Stationary Office
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APPENDIX 2

Data Sources and Definitions

Figure	Indicator	Data Source	Definition and Health Warnings
Figure 2.1	New and existing infrastructure investment	HM Treasury (2011) National Infrastructure Plan 2011, p. 28 http://www.hm-treasury.gov.uk/national_infrastructure_plan2011.htm	
Figure 2.2	Road network improvement	HM Treasury (2011) National Infrastructure Plan 2011, p. 45 http://www.hm-treasury.gov.uk/national_infrastructure_plan2011.htm	
Figure 2.3	Support to core cities' LEPs	HM Government Cabinet Office (2011) Unlocking Growth in Cities, p. 18, http://www.communities.gov.uk/publications/regeneration/growthcities	
Figure 3.1	Transport infrastructure and functional spatial clusters	Cecilia Wong, Alasdair Rae, Andreas Schulze Bäing (2006) Uniting Britain: Developing a UK-Wide Spatial Planning Framework: Spatial Structure and Key Drivers in the UK. London: Royal Town Planning Institute, p. 53	
Figure 3.2*	GVA per head (NUTS 3 region), 2009	Office for National Statistics, http://data.gov.uk/dataset/gross_value_added_gva_per_head Table 3.6 GVA per head (constrained to headline NUTS2) at current basic prices	Estimates of workplace based GVA allocate income to the region in which the economic activity takes place.
Figure 3.3*	English Index of Multiple Deprivation, 2010	Department for Communities and Local Government, The English Indices of Deprivation 2010, http://www.communities.gov.uk/publications/corporate/statistics/indices2010	Only 10% and 20% most deprived LSOAs are shown in the map.

Figure 3.4*	Key landscape designations	For National Parks and Areas of Outstanding Natural Beauty: © Natural England [2010], reproduced with the permission of Natural England. Data accessed from GIS Digital Boundary Datasets of Natural England, http://www.gis.naturalengland.org.uk , For Greenbelt: Static PDF Map from 2009 available at http://magic.defra.gov.uk/staticmaps/maps/gn_belt_col.pdf	
Figure 3.5*	Projected household change, 2008-2033	Department for Communities and Local Government, 2008-based household projections to 2033, Table 406, Household projections by district http://www.communities.gov.uk/publications/corporate/statistics/2033household1110	The 2008-based household projections are linked to the Office for National Statistics 2008-based Population Projections, and are not an assessment of housing need or do not take account of future policies. They are an indication of the likely increase in households given the continuation of recent demographic trends.
Figure 3.6*	Key landscape designation and household growth projection	See detailed reference in figures 3.4/3.5	
Figure 3.7	Effect on road traffic: do nothing for 10 years	Glaister, S. & Graham, D. (2003) Transport Pricing and Investment in England: Summary Report. Oxford: Independent Transport Commission, p. 8.	See Glaister, S. & Graham, D. (2003) Transport Pricing and Investment in England: Technical Report. Oxford: Independent Transport Commission, pp. 15-30 for full details on the model and data sets used.
Figure 4.1*	Combined growth funds per capita	HM Government Cabinet Office (2011) Unlocking Growth in Cities, p. 17, http://www.communities.gov.uk/publications/regeneration/growthcities	This data combines spending in Growing Places Fund and Regional Growth Fund. The report only provides data for funding in LEPs including core cities. Detailed data for other LEPs is only published for the Growing Places Fund but not for the Regional Growth Fund.
Figure 4.2*	Combined growth funds and road network investment	See detailed reference in figure 4.1 For road network investment: HM Treasury (2011) National Infrastructure Plan 2011, p. 45 http://www.hm-treasury.gov.uk/national_infrastructure_plan2011.htm	

Figure 4.3*	Combined growth funds and nuclear proposals	See detailed reference in figure 4.1 Department of Energy and Climate Change (2011) National Policy Statement for Nuclear Power (EN-6) Volume I of II, p. 33 http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/consents-planning/nps2011/2009-nps-for-nuclear-volumel.pdf	
Figure 4.4*	Combined growth funds and deprivation	See detailed reference in figures 3.3 and 4.1	
Figure 4.5*	Combined growth funds and high household growth projection	See detailed reference in figure 3.5 and 4.1	
Figure 4.6*	Local Authority cumulative funding cuts, 2010/11 to 2012/13	Data compiled by the Guardian: http://www.guardian.co.uk/news/datablog/2011/nov/16/local-authority-cuts-north-south Original data source: Newcastle Council using DCLG data, Inc NHB & Adntl Ctax Freeze Grant (but not police element), TOTAL AREA CUT 10/11 In Yr Cuts, 11/12 & 12/13 Cuts. The calculations for an 'area' per capita figure: Revenue Spending Power (including indicative New Homes Bonus)	The data used to calculate the spending power used did not take account of the 2010/11 in year cuts already experienced by councils. The data also includes Indicative figures for New Homes Bonus for 2011-12 and 2012/13 and the additional Council Tax Freeze Grant. To show the cumulative total change per head of population required the calculation of the 2010/11 in year change, 2011/12 change post cuts and the 2012/13 change are divided by the relevant populations for billing, county and fire authorities in each year and then added together.
Figure 4.7*	Combined growth funds and local authority funding cuts	See detailed reference in figure 4.1 and 4.6	
Figure 4.8*	Projected air passengers, 2050 and HS2	Department for Transport (2011) UK Aviation Forecasts (August 2011), p. 149 http://assets.dft.gov.uk/publications/uk-aviation-forecasts-2011/uk-aviation-forecasts.pdf Department for Transport Plan for proposed route: http://www.dft.gov.uk/publications/hs2-proposed-route-maps	UK aviation forecasts are based on the central forecast model. HS2 route is based on preliminary route outlined in: Department for Transport (2011) High Speed Rail: Investing in Britain's Future - Consultation Summary, London: DfT.

Figure 4.9*	Superfast broadband and HS2	Ofcom Communications Infrastructure Report 2011: Fixed Broadband Data http://stakeholders.ofcom.org.uk/binaries/research/broadband-research/Fixed_Broadband_June_2011.pdf See detailed reference for HS2 track in figure 4.7	HS2 route is based on preliminary route outlined in: Department for Transport (2011) High Speed Rail: Investing in Britain's Future - Consultation Summary, London: DfT.
Figure 4.10*	HS2 and deprivation	See detailed reference in figures 3.3 and 4.7	
Figure 4.11*	Key landscape designation and HS2	See detailed reference in figures 3.4 and 4.7	
Figure 4.12*	HS2 and habitat fragmentation	See detailed reference for HS2 track in figure 4.7 Habitat Fragmentation: Lawton, J.H. et. al (2010) Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra, p. 51 http://www.defra.gov.uk/news/2010/09/24/nature-news/	
Figure 4.13*	Habitat fragmentation and high household growth projection	See detailed reference in figures 3.5 and 4.11	
Figure 4.14*	Flood risk and high household growth projection	Environment Agency (2009) Flooding in England - a national assessment of flood risk, p. 27 http://publications.environment-agency.gov.uk/pdf/GEHO0609BQDS-E-E.pdf See detailed reference for household growth data in figure 3.5	
Figure 4.15*	Relative water stress level and high household growth projection	For household growth data see figure 3.5 For the map "areas of relative water stress" see: Department for Environment, Food and Rural Affairs (2008) Future Water: The Government's water strategy for England. London: Stationary Office, p. 22	
Figure 4.16*	Housing affordability and high household growth projection	For housing affordability see Housing and Neighbourhood Monitor www.hnm.org.uk/maps For household growth data see figure 3.5	Housing affordability: this is a calculation of the lower-quartile house price (cheapest housing) compared to the lower-quartile household income (lowest incomes). These are combined to construct a ratio of lower-quartile price to income ratio

Figure 4.17*	High household growth projection and small town deprivation	For household growth data see figure 3.5 For small town deprivation: Commission for Rural Communities (2011) State of the Countryside update: Market Towns, p. 18 http://www.defra.gov.uk/crc/documents/state-of-the-countryside-report/sotc-updates/	
Figure 4.18*	Road network investments and high household growth projection	HM Treasury/Infrastructure UK (2011) National Infrastructure Plan 2011, p. 45 http://cdn.hm-treasury.gov.uk/national_infrastructure_plan291111.pdf For household growth data see figure 3.5	
Figure 4.19*	Superfast broadband and high household growth projection	Ofcom (2011) Communications Infrastructure Report 2011, pp. 11-16. http://maps.ofcom.org.uk/broadband/downloads/ofcom-uk-broadband-speed-report-2011.pdf For household growth data see figure 3.5	
Figure 5.1*	Rail time to London, 2011	The journey time is based on quickest train journey during on-peak-business hours of the National Rail Planner between City Y and London.	The time calculation is simply based on the assumption that 1 minute is equal to 1 mile journey, which is commonly adopted in space-time analysis.
Figure 5.2*	Estimated rail time to London after HS2	Based on estimated journey times provided in: Department for Transport (2011) High Speed Rail: Investing in Britain's Future - Consultation Summary, London: DfT, p.20.	
Figure 5.3*	Estimated rail journey improvement from London: HS2	Based on estimated journey times provided in: Department for Transport (2011) High Speed Rail: Investing in Britain's Future - Consultation Summary, London: DfT, p.20.	
Figure 5.4*	Multi-speed England	Map 5.4 is based on OS Strategy dataset from Digimap: (c) Crown Copyright/database right 20(yy). An Ordnance Survey/EDINA supplied service.	
Figure 5.5*	Functional spatial clusters in multi-speed England	Map 5.5 is based on OS Strategy dataset from Digimap: (c) Crown Copyright/database right 20(yy). An Ordnance Survey/EDINA supplied service.	

Figure 5.6*	The core-periphery of the European spatial development context	Map 5.6 (Europe) is based the ESRI Europe Dataset provided with ArcView GIS 3.3	
Figure 5.7*	Growth area of England	Map 5.7 is based on OS Strategy dataset from Digimap: (c) Crown Copyright/database right 20(yy). An Ordnance Survey/EDINA supplied service.	

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