Mapping Policies and Programmes: The Use of GIS to Communicate Spatial Relationships in England

Cecilia Wong*, Mark Baker*, Brian Webb#, Stephen Hincks* and Andreas Schulze-Baing~

* Centre for Urban Policy Studies, School of Environment, Education and Development, the University of Manchester, HBS Building, Oxford Road, Manchester M13 9PL.

School of Planning and Geography, Cardiff University, Glamorgan Building
King Edward VII Avenue, Cardiff CF10 3WA

~ Department of Geography and Planning, the University of Liverpool, Bedford Street South, Liverpool L69 7ZQ

Abstract

It has long been acknowledged that there is a gap between the advancement of GIS in the research field and its application in planning practice. This paper demonstrates the potential for employing simple GIS mapping overlays as a way of communicating complex planning issues in a 'language' that is easily understandable and effective at stimulating policy debate, critical thinking and learning. The analysis focuses on capturing the synergies and conflicts in two key planning challenges in England, pro-growth and housing delivery agendas. In a political context where spatial evidence-based policymaking has been eroded in recent years, the analysis demonstrates the need for policymakers to 'think spatially, act spatially' when developing different policies and programmes. The paper concludes that only by making spatial relationships of policies and programmes explicit in a manner that is easily understood by a range of actors, can different spatial scenarios and metaphors of future opportunities and challenges be developed to inform long-range development and planning.

Key words: spatial planning, policy coordination, monitoring, GIS mapping

Acknowledgements
To be added after peer review

Introduction

The spatial complexity of area-based urban initiatives in Britain was famously described by the Audit Commission (1989, page 1) as *'a patchwork quilt of complexity and idiosyncrasy'*. The 1990s had witnessed a trend towards more strategic thinking in co-ordinating urban regeneration activities in Britain. This was perhaps best illustrated by the introduction of the Single Regeneration Budget in 1994, which was intended to simplify the existing regeneration funding regime by integrating a variety of programmes and initiatives that were traditionally coordinated by several individual government departments. Nevertheless, a decade later, the then Labour government regeneration minister, Lord Rooker, graphically described the still chaotic landscape of urban policy as *'a bowl of spaghetti'* (Lords Hansard, 2003). In spite of the pledges made by the Labour government that they would deliver a more 'joined-up' policy landscape, the schizophrenic approach to policy planning and coordination that had been characteristic of previous political regimes continued throughout the 2000s (Baker and Wong, 2012).

The introduction of the 2004 Planning and Compulsory Purchase Act was intended to encourage improved spatial policy coordination (HM Government, 2004). The Act set out the basis for the transformation of the planning system in England from a 'traditional land use' to a 'spatial' orientated-system by attempting to emphasise critical thinking about space and place as the basis for land use intervention so as to encapsulate a broader meaning of planning (Shaw and Lord, 2009). The English spatial planning project has been critiqued for its political orientation (Allmendinger and Haughton, 2009) and for failing to address the longstanding disjunction between economic development and strategic planning across different spatial scales (Baker

and Wong, 2012). A new Coalition government came to power in 2010 and very quickly revoked all regional level strategies via the 2011 Localism Act (Pearce and Ayres, 2012). While the gravity shift to a more localised, open source approach provides opportunities for developing more contextualised planning, critics fail to be convinced by the argument that this can be achieved in the absence of a well-articulated national spatial planning framework that provides the parameters for local planning authorities to deliver their policies in a coherent and coordinated manner (Baker and Wong, 2012).

The lack of any strategic spatial plan at the UK or England level led the Royal Town Planning Institute (RTPI) to commission a study to map the policies and programmes of Government Departments, their agencies and non-departmental public bodies that have an explicit spatial expression. The *Map for England* initiative was launched in March 2012 with the aim of identifying patterns of spatial synergies and conflicts arising from existing government policies and programmes and to present these spatial synergies and conflicts through 'diagrammatic mapping'. Since there is not a single place or data source within government that makes such maps available to view systematically, *A Map for England* was designed to encourage policymakers to think critically about space and place by enabling them to visualise and communicate spatial synergies and conflicts across policies and programmes.

Despite the advancement of GIS technology, there has long been a gap between its research development and its application in planning practice (Vonk et al., 2005), which Batty (2004, 327) considers to be 'the tragedy of the field'. The comments made by Gilfoyle and Wong (1998) in the late 1990s remain true today that the large

majority of GIS applications in British planning remain lower order activities of cartographic outputs, rather than being used for analysis and decision-making. Technical complexity – real or perceived – is one of the major barriers inhibiting the use of decision-support tools, including GIS, in planning practice (Vonk et al., 2005). Therefore, the *Map for England* initiative was grounded in the notion that methodological and technical complexity should be minimised as far as possible and that analytical outputs should communicate results in a clear and uncomplicated style. Accordingly use was made of simple GIS *overlays* as the starting point for analysing the spatial synergies and conflicts within and between government policies and programmes. The advantage of the overlay approach is that it can be applied with technical ease and it has the potential to produce understandable but powerful visualisations of spatial phenomena.

The use of simple GIS overlays can be traced back to Ian McHarg's 1969 book, *Design with Nature*, where he set out a process for development-based decision-making by overlaying ecological and built environment data in a visual manner that was easily understandable by a range of actors. In doing so he was able to highlight constraints and opportunities that could be used as part of an over-arching narrative within which planning based decision-making could occur. Largely missing from McHarg's analysis, however, was the impact of government policies and programmes that also work to constrain and create opportunities. The *Map for England* study sought to bridge this gap and the study has been met with enthusiasm and sustained debate in planning practice and in the media. It has also been used by politicians to help them evidence and argue their points in public government committee hearings (see RTPI, 2014).

With this in mind, this paper aims to use the practical imperative of *A Map for England* to provide a policy-applied example of how a succinct and effective analytical approach can be used to communicate often complex and multi-sectoral spatial relationships to non-technical audiences. Through two key planning challenges in England, pro-growth and housing delivery agendas, this paper explores whether the pledges made by successive governments to improve the spatial coordination of policy following the use of the 'patchwork quilt' and 'spaghetti bowl' analogies has had any impact. It then demonstrates the merits of using GIS mapping overlays to monitor the impacts of spatial policy coordination and as a tool for stimulating reflective policy debate. The next section explores the conceptual debates regarding spatial policy coordination to foreground the various debates that emerge through the applied analysis in later sections of the paper.

Spatial policy coordination

The goals of planning are by their nature broad, varied, and complex and their delivery is reliant upon the action of a plurality of actors and agencies across operationally independent policy sectors (Albrechts, 2004). The endeavour to monitor and evaluate spatial planning has been largely focused on the challenge of identifying complex outcomes, but not on the process of policy development and coordination in terms of competing interests and practices across different policy sectors (Baker and Wong, 2006).

Since the publication of the European Spatial Development Perspective (European Commission, 1999), the emphasis on vertical coordination between different levels of

government and horizontal coordination across policy sectors with a spatial perspective has underpinned the rationale for spatial planning and its formal monitoring processes. There is also a third dimension of diagonal coordination that demands public and private institutions interact and cooperate to achieve policy goals (Priemus, 1999). Advocates argue that coordination can help address issues of redundancy, lacunae and incoherence in policy frameworks (Peters, 1998). Redundancy occurs when multiple actors are involved in the alleviation of the same problem, leading to a waste of resources and departmental conflicts over service to client groups. Lacunae is caused by a lack of involvement by any department in a task, leading to a gap in policy or implementation, because departments do not realise such a gap exists or a department believes the problem cannot be solved and would be a waste of resources. While incoherence arises when departments deal with the same policy sphere but with differing requirements and goals, leading to conflicting policies.

The path to a coordinated policy framework is often impeded when actors are compelled to operate within their own limited institutional arena. Benz (2002) regards such inflexibility as strict coupling which can lead to higher transaction costs as ever more empowered actors and institutions become involved in decision-making processes. The flipside of this situation is decoupling, whereby policy spheres are decentralised to the point where no interaction exists between institutions. Loose coupling, a balance between these two positions, is defined as an institutional environment whereby independent decisions taken in one arena will only have an impact on specific aspects of another, rather than completely changing it (Weick, 1985). In this environment, binding decisions are replaced by communication,

information exchange and persuasion across arenas with the aim of collectively resolving problems as policies intersect (Benz, 2002). The use of pre-designed and forced administrative efforts at coordination, even within one level of government, has consistently failed due to departmental struggles for power, departmental interest in protecting individual clienteles and personal concerns related to job security and career promotion (Kunzmann, 1998). The establishment of goal-directed, rather than serendipitous, networks is considered important by proponents seeking to overcome these problems (Agranoff and McGuire, 2003).

Likewise, it has been argued that a guidance approach can offer a more flexible route to establishing goal-directed networks designed to achieve short-term objectives (Jensen and Richardson, 2001). In theory, to bring about change, the guidance or visioning process would seek to formulate a conception of space and place that can be understood by a wide variety of actors, such that it results in a collective way of ‘seeing’ (Healey, 2007). The spirit of these ideas has found resonance with the `planning-as-learning' approach advocated by Faludi (2000, page 300) in which “strategic spatial plans must be evaluated, not primarily in the light of their material outcomes, but for how they improve the understanding of decision makers of the present and future problems they face”. However, critics have challenged the assumption that spatial planning, if undertaken collaboratively and transparently, will lead to better development on the grounds that marginal voices are often excluded from mainstream debates and that “…intractable tensions may be eased at the level of producing strategic documents, only for problems to surface at the level of implementation” (Allmendinger and Haughton, 2009, page 2548).

Irrespective of the conceptual standpoint taken, it is clear that in analysing the practices associated with policy coordination and their outcomes, attention needs to be paid to the interpretation of contextual variations and to their interaction with other policy initiatives as they coalesce to produce different spatial outcomes (Wong and Watkins, 2009). To Rittel and Webber (1973), only by laying out alternative understandings of problems, competing interests, priorities and constraints, is it then possible to apply more formal analytical tools to understand a specific problem scenario. While complexities in planning issues can encourage policymakers to question normative assumptions and permit stakeholders to rethink the principles of spatial organisation and activities, the challenge lies in balancing the presentation of complex concepts in a form which is understandable by a range of actors. Scott (1998) has noted the historic ways in which governments work to skew decision-making towards centralised systems of control and the favouring of expert knowledge away from the local level in order to force particular ways of thinking. This often results in a high level of institutional and policy complexity, serving to marginalise particular groups or perspectives. The emphasis on centralised systems of governance and expert knowledge may help to explain why the use of GIS to help coordinate departmental policy processes has not been extensively utilised despite technological advancements (Vonk et al., 2005). The potential of GIS and digital platforms to share knowledge across departments and to disseminate ideas to the public stands in stark contrast to the maintenance of centralised management and closed expert policy networks.

The paper now turns to explore how the application of a succinct spatial mapping analysis of government policies and programmes, coupled with a simple but effective

visualisation approach using GIS, can enhance the monitoring of complex planning activities and encourage the development of alternative and critical ways of viewing a spatial policy problem (see Rae and Wong, 2012).

The appraisal of government policies and programmes

The *Map for England* began with a systematic scanning exercise of policy documents and websites of different UK Government departments and their agencies and NDPBs (non-departmental public bodies). The exercise carried out in January 2012 covered a total of 95 relevant sources (Wong et al., 2012). These include documents and websites from the Department for Business, Innovation and Skills; the Department for Communities and Local Government; 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 etc.

The scanning exercise was undertaken with the aim of capturing the spatial and aspatial properties of various policy documents. Taking a lead from Harris and Hooper (2004), the exercise focused on two features: spatial references (e.g. locational information) and spatial implications (e.g. targeted funding frameworks; cross-boundary issues; and spatial concentrations). After appraising the 95 sources, just over a third (37) were found to have an explicit spatial expression and/or spatial consequences in terms of having maps, diagrams, or with clear data/text that specified the application of a policy to a particularly defined area. The remaining two-thirds, nonetheless, consisted of policies/programmes that have clear spatial consequences and outcomes but do not articulate such characteristics explicitly. The

analysis here focuses on these explicit spatial references, aiming to understand how government departments construct and think about space differently, and better understand how multiple concepts of space can often co-exist and overlap the same geographical space (Rae and Wong, 20012).

It is telling then that not a single document attempted to provide an integrated spatial framework for all these policies and programmes or to frame how they cumulatively interact and affect spatial development in England. Crucially, among the documents that shied away from any spatial articulation of issues were the National Planning Policy Framework (NPPF) (DCLG, 2012) and the majority of the existing Planning Policy Statements/Guidance. These are intended to form an integral part of the spatial planning system by providing an overarching framework for planning across England. Yet, despite the fact that the 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 than in other instances, such as in the case of the high-speed rail network proposal and other projects set out in the National Infrastructure Plan (HM Treasury and UK Infrastructure, 2011). Other mainstream government policies (e.g. on supply-side measures for tackling non-employment, on investment in flood risk prevention projects etc.) also bear implications for the spatial distribution of economic activities and opportunities, particularly recognising the challenge of cross-border planning.

Administrative boundaries at regional and local levels are often ineffective at capturing functional economic or social interactions because spatial processes do not cease at jurisdictional boundaries (Brown and Hincks, 2008; Hincks and Wong,

2010). Rather, there are ‘spillover effects’ reflecting within and 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 affected 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 south Milton Keynes. Certain sub-regions, such as High Peak and northern Cheshire, also have strong links into the Greater Manchester city-region. Relevant information with regard to these spatial functional connections can aid local authorities in the development of a balanced suite of strategies by taking account of key strategic issues such as the geographies of housing market areas and the impacts of future water stress on development activity (Wong and Watkins, 2009). The next section outlines the spatial context for future planning in England focusing primarily on two policy challenges: pro-growth and housing delivery agendas.

Mapping spatial synergies and conflicts in government policies and programmes

Planning is a future oriented activity and development across different local authority and partnership areas are very much affected by a combination of the physical constraints of landscape designation, the emerging development trends and the government’s own policies and programmes that exacerbate or reduce such trends. In recent years, the pro-growth agenda has infiltrated various public policy arenas in England as the Coalition government has worked to develop a roadmap out of recession. The analysis here focuses on two features of this agenda: Growth Funds

and city-regions, and future housing delivery. A core map was produced for each key planning issue. GIS overlay analysis was then used to impose different spatial contexts and different government policies/programmes onto the core map. These map overlays are used predominantly to display the spatial synergies and/or conflicts caused by the interaction of existing development trends and the pro-growth policy interventions, and between government policies/programmes across different sectors and spatial scales. The analysis presented here is not meant to be comprehensive or exhaustive. Rather it is intended to provide illustrative examples of the merits of thinking critically about the cumulative spatial impacts and opportunities brought by different policies and activities and the value of using simple analytical and visualisation techniques to communicate findings to non-technical audiences.

Growth funds and core city-regions

In the *Unlocking Growth in Cities* (UGC) report, the Deputy Prime Minister emphasised that, '... every city is different. So we are moving away from a one-size-fits-all model towards individual city deals' (HM Government, 2011, page iii). 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. 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[1] (LEPs) to expose the potential economic boosting effect in these areas. Figure 1 shows that whilst funding bids were submitted to the government from the core city-regions, the outcomes vary from place-to-place. Liverpool city-region clearly gains a much larger share of the pot in per capita population terms, followed by the West of England, and Greater Birmingham and Solihull. At the opposite end of the spectrum, the Leeds city-region has gained the least from the funding pot.

Since the government argues that cities are the economic drivers of growth, financial boosts from public expenditure can help address wider issues faced by the core city-regions. Discrete analysis of Growth Fund allocations helps shed light on the 'winners and losers' in the distribution of funding. However, such analysis fails to reflect the potential policy synergies, conflicts, and missed opportunities that emerge as different policy agendas interact to affect the spatial economy. New infrastructure features prominently in the pro-growth agenda, functioning to support new and existing economic activity. If the road network investment proposals in the National Infrastructure Plan are super-imposed on the Growth Fund map, it reveals 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 Yorkshire and the Humber, North East England, Nottingham, and Birmingham (Figure 1).

[1] Local Economic Partnerships (LEPs) are business-led, locally initiated partnerships that are suppose to be designed to meet local contexts focused around achieving economic growth. They have varying geographic boundaries, but broadly consist of existing sets of local authorities or in some cases functional economic areas.

In terms of synergies, across the M62 axis there is potential for Growth Fund and road network investment to deliver complementary economic development outcomes. The M62 corridor has long been the focus of policy initiatives culminating most recently in the now defunct *Northern Way* initiative (ODPM, 2004). This agenda aimed to anchor future economic development in northern England by exploiting the agglomerative benefits of the major urban areas along the M62. As advocates of agglomeration economics contend, transport connectivity is crucial to achieving economic returns (Krugman, 1998). As the overlays illustrate, connectivity is a major strength of the corridor to such an extent that the Chancellor of the Exchequer recently called for a new high-speed rail link – so-called HS3 – to be built along the M62 corridor to complement HS2 and existing transport connections (Watt, 2014).

However, the analysis is also helpful in pinpointing instances in which opportunities have been overlooked. One example is the absence of Growth Funding for East Yorkshire. The Hull city-region is strategically located at the eastern end of the M62 corridor but it has experienced decades of economic underperformance (see ODPM, 2006). This has largely stemmed from economic restructuring and the decline of the fishing industry from the late 1970s. Since undertaking this research, the Humber LEP has successfully attracted Growth Funding through subsequent rounds of funding allocations and the area is experiencing a renewed economic energy brought about through a growing green economy and investment in its seaport infrastructure. Nevertheless, the absence of early round Growth Funding is a case in point for demonstrating the utility of the simple overlay approach at capturing deficits in strategic-spatial policymaking.

Figure 1: Combined growth funds and road network investment

An alternative policy question might focus on the relationship between the distribution of Growth Funds and deprivation (Figure 2). When deprivation data is combined with Growth Fund allocations, there are synergies in the policy framework that suggest that the Liverpool city-region can continue to address concentrated deprivation within its neighbourhoods by targeting new job creation. This argument could also be made in relation to Greater Birmingham and Solihull.

A further synergy is evident in the allocation of funds to the Bristol city-region. However, in contrast to the experience of Liverpool or Birmingham, the alleviation of area-based deprivation is likely to be of secondary consideration. The Bristol city-region has much lower unemployment levels compared to its northern counterparts of Liverpool, Manchester, Leeds, and Nottingham, and while it has pockets of neighbourhoods ranked highly in the Index of Multiple Deprivation, it has much lower concentrations of deprivation than other city-regions. Moreover, the area has higher than average employment rates, a strong research capacity, a greater concentration of high-tech and knowledge intensive industries, and higher population growth rates when compared to the other core cities (ODPM, 2006). Bristol has long benefited from its location on the M4 growth corridor and from comparatively strong development in the manufacturing and service sectors owing to sustained foreign direct investment since the 1980s (Gripaios *et al*, 1997). In short, Bristol has seemingly responded more effectively to economic restructuring from the late 1980s in comparison to other English core cities (ODPM, 2006), which means that the

Growth Funding is likely to be used more strategically to consolidate existing capacity and further boost the economic performance of the city-region.

Figure 2: Combined growth funds and deprivation

In shifting the analysis to overlay Growth Fund allocations and cumulative cuts in revenue spending power between 2010/11 and 2012/13 across English local authorities, an alternative policy angle to the previous two emerges (Figure 3). The resulting patterns are not accidental. They reflect a recent change in policy which has seen the size and role of the public sector reduced in England as a result of austerity measures. As part of this agenda, Growth Funds have been allocated with the aim of stimulating private and voluntary sector activity. The intention is to encourage actors in these sectors to assume responsibilities that were once firmly under the remit of local authorities. In broad terms, the metropolitan local authorities, unitary authorities, and inner London boroughs face the most severe level of funding cuts per capita. A striking picture of local authority cuts is also evident along the M62 corridor. In this context, the Liverpool city-region has the highest level of growth funding, but its local authorities also face the highest levels of revenue cuts.

In contrast, the West of England city-region LEP received relatively high levels of Growth Funding but the cumulative reduction in revenue spending power per head of population in Bristol has been less extreme than in other city-regions. Indeed, the revenue spending power of Liverpool local authority is anticipated to fall by £329 per-person between 2010/11 and 2014/15 compared to £117 per-person in Bristol over the same period (Meegan *et al,* 2014). The reason for such extreme differences

reflects the underlying social and economic conditions of the two cities. In the past, Liverpool and the majority of other core cities have been much more reliant on redistributive formula grant and needs based grants to support their deprived populations compared to Bristol (Meegan *et al,* 2014). The most extreme cuts to date in local authority budgets have been in the allocation of area-based grants which Bristol lost in 2007 meaning that there has been a period of relative adjustment in Bristol before cost-cutting exercises even began affecting local areas post-financial crash (Meegan *et al,* 2014). Consequently, the combined impact of relatively manageable funding cuts, Growth Fund allocation, and a resilient local economy seemingly provide a strong platform for the Bristol area to continue to develop its competitive economic advantage.

Figure 3: Combined growth funds and local authority funding cuts

What the overlay analysis of Growth Funds, deprivation, and spending cuts reveals is that the nature of the synergies and conflicts within and between different policy agendas is not always immediately clear. Indeed, both the Liverpool and Bristol city-region examples revealed the existence of context specific synergies in the relationship between the Growth Fund policy framework, road network investments, and deprivation. This is a reflection of the malleability of the policy frameworks as they interact with the variable, and deeply entrenched, spatial and structural characteristics that condition the economic performance of each place (Krugman, 1998). The analysis also revealed instances where Growth Funds are delivering the government's intended shifts in the landscape of public sector funding, albeit to the detriment of the most vulnerable communities (e.g. the Liverpool city-region)

(Meegan *et al*, 2014). Moreover, 'sites' of contradiction were revealed where public expenditure cuts are not 'offset' at all through Growth Fund allocations. Inner London is perhaps the most striking example of this although such contradictions are also evident in Lancashire, North and East Yorkshire, and the West Midlands.

Future housing delivery

The NPPF makes it clear that the government's key housing objective is to increase significantly the delivery of new homes. However, it does not articulate the spatial aspects of housing supply and demand and fails to take account of the importance of strategic guidance when it comes to delivering new housing in the places where demand-supply pressures are most acute (Hincks and Baker, 2013). 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.

The National Infrastructure Plan, however, goes further to articulate the inter-sectoral connections between new housing delivery and infrastructure provision. It argues that new housing delivery has to be supported by infrastructure and that infrastructure providers need certainty before making investment decisions. The

National Infrastructure Plan 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).

The designation of national parks and areas of outstanding natural beauty, as protected environments and landscapes, sets out physical restrictions on the development of land. The longstanding planning tool of national green belt policy, checking the unrestricted growth of the conurbations and major towns into their rural hinterlands, imposes further restrictions on development, often in areas of the greatest development pressures (Gallent, 2009). The overlay approach was used to examine the relationship between projected household growth and the wider spatial contexts that affect housing delivery as reflected within government policies and programmes. Figure 4 captures projected household growth between 2008 and 2033 and landscape designations. It is clear where there are potential 'sites' of conflict in government policy agendas. The most obvious is in areas with projected growth of 35% and above which abut or intersect locations with high landscape value. Examples include the Yorkshire Dales, and the coastal areas along Norfolk and Suffolk, and Devon.

With concern growing over climate change, large-scale housing developments will need to take account of future water supply challenges (e.g. Arnell and Delaney, 2006). As shown in Figure 5, areas on the eastern side of England (with the exception of the Yorkshire and Humber growth areas) tend to suffer from more serious levels of relative water stress (partly related to their higher levels of drought

risk) compared to other parts of England. What is clear from the mapping exercise is that the areas with the highest levels of relative water stress intersect most acutely the areas that are projected to grow by 35% or more by 2033. Patterns of projected growth are largely in areas surrounding major urban centres, exceptions being Manchester, some inner London boroughs, and parts of the urbanised Midlands. The growth areas tend to be peri-urban and commuter locations – reflecting processes of counter-urbanisation – that are accessible for work, have good services, are less densely populated than main urban areas, and have access to 'green' environments (Fontaine and Rounsevell, 2009).

Figure 4: Key landscape designations and household growth projections

Figure 5: Relative water stress level and high household growth projection

Another key concern of housing delivery policy is how to address housing affordability within pressurised market contexts (e.g. Bramley and Karley, 2005). Figure 6 shows the relationship between areas projected to have very high household growth rates and their respective housing affordability ratios (normalised house price versus average household income). It is interesting to note the neat spatial 'affordability divide' drawn between the Severn and the Wash Estuary, the long standing North-South dividing line. Housing in high growth areas north of the dividing line is clearly much more affordable than areas to the south of the line.

Figure 6: Housing affordability and high household growth projection

From a policy perspective, northern England – with its extensive portfolio of protected landscapes – is unlikely to suffer from water stress or acute housing affordability pressures at least in the medium-term. This contrasts to the East of England where population growth is accelerating by virtue of spillover effects from a flourishing London and South East economy, but water stress and housing affordability pressures are also intensifying. The overlay analysis offers an accessible yet powerful discursive 'frame' that could be used to encourage more critical thinking about policy alternatives. In this context, this might involve developing more creative water management strategies in areas experiencing rapid growth. It might also involve policymakers analysing the quality of the land that is currently designated as green belt with the aim of re-designating land or thinking more creatively about derelict and vacant land in existing urban areas. But perhaps more significantly, the analysis clearly captures a cross-section of impacts associated with uneven economic growth in England. It is a further illustration of the need for more creative thinking about rebalancing the spatial economy away from London and the South East of England towards second-tier cities which on the whole have latent capacity to accommodate growth (Champion and Townsend, 2013).

Discussion

Since assuming office in 2010, the Coalition government has progressed a narrative that one-size policy measures are inefficient at reflecting local circumstances and that power and decision-making responsibilities need to be more extensively devolved to local authorities to allow them to address local issues in context specific ways (Baker and Wong, 2012). However, in implementing far-reaching changes to local and strategic planning in England, the government has failed to recognise the

magnitude of the challenge associated with coordinating activities that cut-across spatial and sectoral boundaries. The inclusion of a 'Duty-to-Cooperate' clause in the 2011 Localism Act places a legal obligation on local authorities and other public bodies to cooperate on strategic cross-boundary issues during plan preparation. However, a lack of spatial or sectoral guidance to accompany the clause has given rise to a host of problems at the local level (Geoghegan, 2014).

Crucially, the case studies analysed above have usefully demonstrated the potential fallacy of self-interested actions within government departments and the impacts that may result from poor-quality spatial policy coordination at the local level. While it is acknowledged that the mapping exercise is a simplistic way to explain complex problems, this simplicity is a necessary starting point for enhancing accountability in decision-making and for identifying the potential positive benefits that could be obtained by thinking critically about coordination practices as they affect the management of spatial processes and impacts, and the development of creative policy alternatives (see Peters, 1998).

The analysis of policies pertaining to pro-growth and housing delivery agendas demonstrated that government policies and actions, even without a deliberate spatial framework, create spatial outcomes and, cumulatively, they create differential spatial impacts. While a pro-growth policy framework has been consistently applied by Whitehall in recent years, there is a consistent lack of attention paid to the social and demographic drivers such as deprivation and household formation as well as the environmental drivers associated with climate change. This means that the allocation of Growth Funds does not follow any strategic rationale. Indeed, the Coalition

government is seemingly ambivalent about the challenges associated with alleviating area-based deprivation (e.g. Birmingham and Solihull), the challenge of compensating for the effects of public expenditure cuts (e.g. the Liverpool city-region), or the effects of consistently distributing funds to support high growth areas (e.g. Bristol). The analysis illustrates the variable nature of the synergies and conflicts of investment across different areas which fails to optimise the limited resources that are available to manage spatial change.

At a policy level, the NPPF avoids any spatial steer with regard to future housing provision and simply delegates the task to the SHMA and SHLAA exercises at the local level. The analysis of future household projections (the best guess of future housing demand) clearly shows 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 localities experiencing serious water stress. While each local authority can deal with the issue via their own local plan, the likelihood is that this approach will prove to be ineffective and inefficient as multiple authorities attempt to deal with the same issue independently and with only limited guidance from central government.

Methodologically, the overlay approach would seem to offer a simple but effective way of providing individuals with their own analytical space to interpret the patterns of the maps. This resonates with the loose coupling approach of decision-making that provides space for alternative narratives to develop (Benz, 2002). With the

advent of internet and GIS technology, the overlay of different map layers of policies and programmes can be made available online as open-source materials to maximise the number of policymakers and stakeholders involved (Kingston, 2007). Moreover, this has the potential to bypass the politics of expert control of knowledge and analysis by empowering others to advocate their own analysis to engage in policy debate and argumentation (Tulloch, 2007).

Of course, one clear advantage of using mapping analysis rather than traditional statistical data is the flexibility of linking datasets and issues across different spatial scales and different locations (Huby et al, 2007; Martin, 1996). However, the availability of open datasets is highly variable in the UK. For instance, Natural England makes many of its spatial datasets available via a dedicated GIS website following the requirements of the European INSPIRE directive. The data is made available under the government's 'Open Government License' which allows open access to the data without paying or obtaining special permission. In other departments, datasets are not publicly available and maps only exist in printed form, embedded in PDF files, or by special Freedom of Information request. The UK government's dedicated data portal, led by the Cabinet Office, is a positive step in developing open access public information. However, of the 17,835 'datasets' presented on the portal as of time of writing, 13,859 (78%) are listed as unavailable for download or are not openly licensed. Ultimately, efforts need to intensify to further broaden and institutionalise the availability of public data from government departments, as well as developing the leadership and culture to enforce open data standards.

There is not just a need for more public access to government data, but also a more coordinated approach to using data produced by different government departments in order to understand how multiple policies and practices spatially impact in different places (see Webb, 2011). There are also lessons that can be learnt from experiences at the pan-European level. Many EU institutions conduct spatial analyses and monitoring exercises including DG Mobility and Transport, Eurostat and the European Environment Agency. Likewise, the Directorate-General for Regional Policy conducts in-house studies and funds the pan-European ESPON (European Observation Network for Territorial Development and Cohesion) programme. Equally, some of the EU member states have national institutions tasked to produce spatial analyses and conduct spatial monitoring, like the German BBSR or the French DATAR. It is interesting to note that most of the analyses in the BBSR studies do not use the map overlay analysis discussed here. However, mapping overlays were used in a BBSR policy paper to develop three key future spatial development visions of Germany to initiate policy debate on future development trajectories of the country (Sinz and Aring, 2006).

In contrast, there is not a single institution remitted to oversee spatial monitoring or planning in England (or the UK). Research has found that ongoing policy fluxes at national and local levels is exacerbating analytical inertia and undermining the technical skill-bases of different institutions in different places to respond to the effects of spatial policy interactions (Shaw and Robinson, 2012). This issue is compounded because GIS and spatial analytical skills of graduates entering the planning profession are generally weak, and perhaps too often regarded as the preserve of a few highly specialised GIS or IT experts. The only relevant Learning

Outcome specified by the RTPI in their *Policy Statement on Initial Planning Education* is a generalised statement that graduates should "demonstrate effective research, analytical, evaluative and appraisal skills and the ability to reach appropriate, evidence based decisions" (RTPI, 2012: LO11) rather than a more specific reference to the merits of GIS and spatial analytical skills for planning practice. The Institute and UK planning schools more generally have a responsibility to ensure planning students are educated in the analysis of spatial data so that future professionals have sufficient knowledge and expertise to be comfortable with basic spatial data analysis and, in equal measure, the subsequent interpretation of such spatial data for application in a wider policy context.

Conclusion

This paper examines the interplay between policy needs and spatial contexts via spatial mapping of the policies and programmes of UK government departments, their agencies and NDPBs. The scanning and appraisal exercise of government documents, reports and websites raised a series of questions around whether current government policy has the scope to respond to strategic spatial challenges in England. The analysis here illustrates that government policies and actions – even without a deliberate spatial framework – create spatial outcomes and that these, cumulatively, create stark spatial impacts. It is these kinds of acute tensions, synergies and conflicts, emerging from different policy agendas and coupled with the asymmetric consequences of devolved political responsibilities, that need to be more clearly understood and monitored. This is not only relevant for England, but also for planning in other territorial contexts.

The GIS analysis of the two planning issues demonstrates that, by overlaying different spatial expressions, a spatial reference framework starts to emerge that captures synergies and conflicts in government policymaking. Making these explicit could help to inform policy debate and encourage more effective critical thinking about spatial processes and impacts, and alternative policy scenarios. Indeed, the initial success of the *Map for England* initiative demonstrates that there is appetite for critical thinking about coordination practices as they affect spatial processes, impacts, and policy interactions. Although the methodology is illustrated through the lens of planning issues in England, the mapping and visualisation methods are adaptable for application in other countries and at different spatial scales. However, overcoming the gulf between GIS research and planning practice has, perhaps, never been so pressing given the opportunities for critical thinking and learning that could be engendered, as evidenced by the analyses undertaken in *A Map for England*.

Appendix A: Figure source data

Figure	Data Source
1	HM Government Cabinet Office (2011) Unlocking Growth in Cities, London, Cabinet Office, 17, http://www.communities.gov.uk/publications/regeneration/growthcities For road network investment: HM Treasury (2011) National Infrastructure Plan 2011, London, TSO, 45, http://www.hm-treasury.gov.uk/national_infrastructure_plan2011.htm
2	Department for Communities and Local Government, The English Indices of Deprivation 2010, http://www.communities.gov.uk/publications/corporate/statistics/indices2010 HM Government Cabinet Office (2011) Unlocking Growth in Cities, London, Cabinet Office, 17, http://www.communities.gov.uk/publications/regeneration/growthcities
3	HM Government Cabinet Office (2011) Unlocking Growth in Cities, London, Cabinet Office, 17, http://www.communities.gov.uk/publications/regeneration/growthcities 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)
4	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 For 2008-based household projections to 2033, Department for Communities and Local Government Table 406, Household projections by district http://www.communities.gov.uk/publications/corporate/statistics/2033household1110
5	For 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, page 22. For household growth data see Figure 4
6	For housing affordability see Housing and Neighbourhood Monitor http://sed-gis1.humanities.manchester.ac.uk/jrf_dev_wms/ For household growth data see Figure 4

References

Agranoff R, McGuire M, 2003, *Collaborative public management: New strategies for local governments* (Georgetown University Press, Washington)

Albrechts L, 2004, “Strategic (spatial) planning re-examined” *Environment and Planning B: Planning and Design* **31** 743-58

Allmendinger P, Haughton G, 2009 “Critical reflections on spatial planning” *Environment and Planning A*, 41(11), 2544-2599

Arnell NW, Delaney K, 2006 “Adapting to Climate Change: Public Water Supply in England and Wales” *Climatic Change* **78** 227-255

Audit Commission, 1989 *Urban Regeneration and Economic Development: the Local Government Dimension* (HMSO, London)

Baker M, Wong C, 2012 “The delusion of strategic spatial planning: what's left after the Labour Government's English regional experiment?” *Planning Practice and Research* 28(1) 83-103

Baker M, Wong C, 2006 “Indicators and strategy monitoring: the case of the English regions” *Environment and Planning B: Planning and Design* **33**(5) 661-683

Batty M, 2004, “Editorial*” Environment and Planning B: Planning and Design* **31**(1) 326-330

Benz A, 2002, “How to reduce the burden of coordination in European spatial planning” in *European Spatial Planning: Lessons for North America* Ed (The Lincoln Institute, Cambridge Mass.) pp. 139-158

Bramley G, Karley NK, 2005 “How much extra affordable housing is needed in England?” *Housing Studies* **20**(5) 685-715

Brown PJB, Hincks S, 2008 “A Framework for Housing Market Area Delineation: Principles and Application” *Urban Studies* **45**(11) 2203-2223

Champion T, Townsend A, 2013 “Great Britain’s second-order city regions in recession” *Environment and Planning A* **45**(2) 362-382

Department for Communities and Local Government [DCLG], 2012 *National Planning Policy Framework* (DCLG, London)

European Commission, 1999, “European Spatial Development Perspective: Towards Balanced and Sustainable Development of the Territory of the European Union” (Office for Official Publications of the European Communities, Luxembourg)

Faludi A, 2000, “The performance of spatial planning”, *Planning Practice and Research* **15** 299–318

Fontaine CM, Rounsevell MDA, 2009 “An agent-based approach to model future residential pressure on a regional landscape” *Landscape Ecology*, **24**, 1237-1254

Gallent N, 2009, “The Future of Housing and Homes” *Land Use Policy* **26**(1) 93-102

Geogheegan J, 2014 “Duty to cooperate hits local plans” *Planning*, 17 January http://www.planningresource.co.uk/article/1227257/duty-cooperate-hits-local-plans

Gilfoyle I and Wong C, 1998, “Computer applications in planning: twenty years’ experience of Cheshire County Council” *Planning Practice and Research* **13**(2) 191-197

Gripaios P, Gripaios R, Munday M, 1997 “The Role of Inward Investment in Urban Economic Development: The Case of Bristol, Cardiff and Plymouth” *Urban Studies* **34**(4), 579-603

Harris N, Hooper A, 2004 “Rediscovering the 'spatial' in public policy and planning: an examination of the spatial content of sectoral policy documents” *Planning Theory & Practice* **5**(2), 147–169

Healey P, 2007 *Urban complexity and spatial strategies: Towards a relational planning for our times* (Routledge, Oxon)

Hincks S, Baker, M, 2013 “Housing market areas and the strategic planning of housing in England” *Town Planning Review* **84**(1) 127-152

Hincks S, Wong C, 2010 “The Spatial Interaction of Housing and Labour Markets: Commuting Flow Analysis of North West England” *Urban Studies* **47**(3) 620-649

HM Government, 2004 *Planning and Compulsory Purchase Act 2004* (HMSO, London)

HM Government, 2011 *Unlocking Growth in Cities* Cabinet Office, London

HM Treasury and UK Infrastructure, 2011 *National Infrastructure Plan 2011* (TSO, London)

Huby M, Owen A, Cinderby, S, 2007 “Reconciling socio-economic and environmental data in a GIS context: An example from rural England” *Applied Geography* **27** 1-13

Jensen O, Richardson T, 2001 “Nested visions: New rationalities of space in European spatial planning” *Regional Studies* **35**(8) 703-17

Kingston R, 2007, “Public Participation in Local Policy Decision-making: The Role of Web-based Mapping” *The Cartographic Journal* **44**(2), 138-144

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

Kunzmann K, 1998, “Planning for spatial equity in Europe” *International Planning Studies* **3**(1), 101-120

Lords Hansard, 2003 Lords Hansard text for 1 Apr 2003 (230401-01)

Martin D, 1996 *Geographic Information Systems: Socioeconomic applications* (Routledge, London)

McHarg I, 1969 *Design with Nature*. The Natural History Press, New York NY

Meegan R, Kennett P, Jones G, Croft J, 2014 “Global economic crisis, austerity and neoliberal urban governance in England” *Cambridge Journal of Regions, Economy and Society*. DOI:10.1093/cjres/rst033

Office of the Deputy Prime Minister (2004) *Making it happen: The Northern Way* (ODPM, London)

ODPM (2006) *State of the Cities Report* (ODPM, London)

Pearce G, Ayres S, 2012 “Back to the Local? Recalibrating the Regional Tier of Governance in England” *Regional & Federal Studies* **22**(1) 1-24

Peters BG, 1998 *Managing horizontal government: The politics of coordination*. (Canadian Centre for Management Development, Ottawa)

Priemus H, 1999, “Four ministries, four spatial planning perspectives? Dutch evidence on the persistent problem of horizontal coordination” *European Planning Studies*, **7**(5) 563-585

Rae A, Wong C, 2012 “Monitoring spatial planning policies: towards an analytical, adaptive and spatial approach to a ‘wicked problem’” *Environment and Planning B: Planning and Design* **39** 880-896

Rittel H, Webber M, 1973 “Dilemmas in a general theory of planning” *Policy Sciences* **4** 155-169

Royal Town Planning Institute (RTPI), 2012 *Policy Statement on Initial Planning Education* (revised), RTPI, London.

RTPI 2014, 'A Map for England', RTPI, London, http://www.rtpi.org.uk/knowledge/core-issues/map-for-england/

Scott J, 1998 *Seeing like a state: How certain schemes to improve the human condition have failed* (Yale University Press, New Haven, CT)

Shaw D, Lord A, 2009, "From land-use to 'spatial planning': Reflections on the reform of the English planning system" *Town Planning Review* **80**(4-5), 415-436

Shaw K and Robinson F, 2012, "From 'regionalism' to 'localism': Opportunities and challenges for North East England" *Local Economy* **27**(3), 232-250

Sinz M, Aring J, 2006, "Neue Leitbilder der Raumentwicklung." *Raumforschung und Raumordnung* 64(6), 451-459

Tulloch D, 2007 "Many, many maps: Empowerment and online participatory mapping" *First Monday* **12**(2) http://firstmonday.org/issues/issue12_2/tulloch/index.html

Vonk G, S Geertman, PP Schot, 2005, "Bottlenecks blocking widespread usage of planning support systems" *Environment and Planning A* **37**(5) 909-924

Watt N, 2014 “George Osborne calls for new Manchester to Leeds high-speed rail” *The Guardian* (Monday, 23 June).

Webb B, 2011 *Federalism and the Institutional Dynamics of Intergovernmental Spatial Policy Coordination* (University of Manchester, Manchester)

Weick K, 1985, “Cosmos vs. chaos: Sense and nonsense in electronic contexts” *Organizational Dynamics*, **14**, 50-64

Wong C, Watkins C, 2009, “Conceptualising spatial planning outcomes: towards an integrative measurement framework” *Town Planning Review* **80** (4/5) 481-516

Wong C, Baker M, Hincks S, Schultz-Baing A, Webb B, 2012. *A Map for England: Spatial Expression of Government Policies and Programmes*. London: RTPI.

Figure 1: Combined growth funds and road network investment (Full source data in Appendix A)

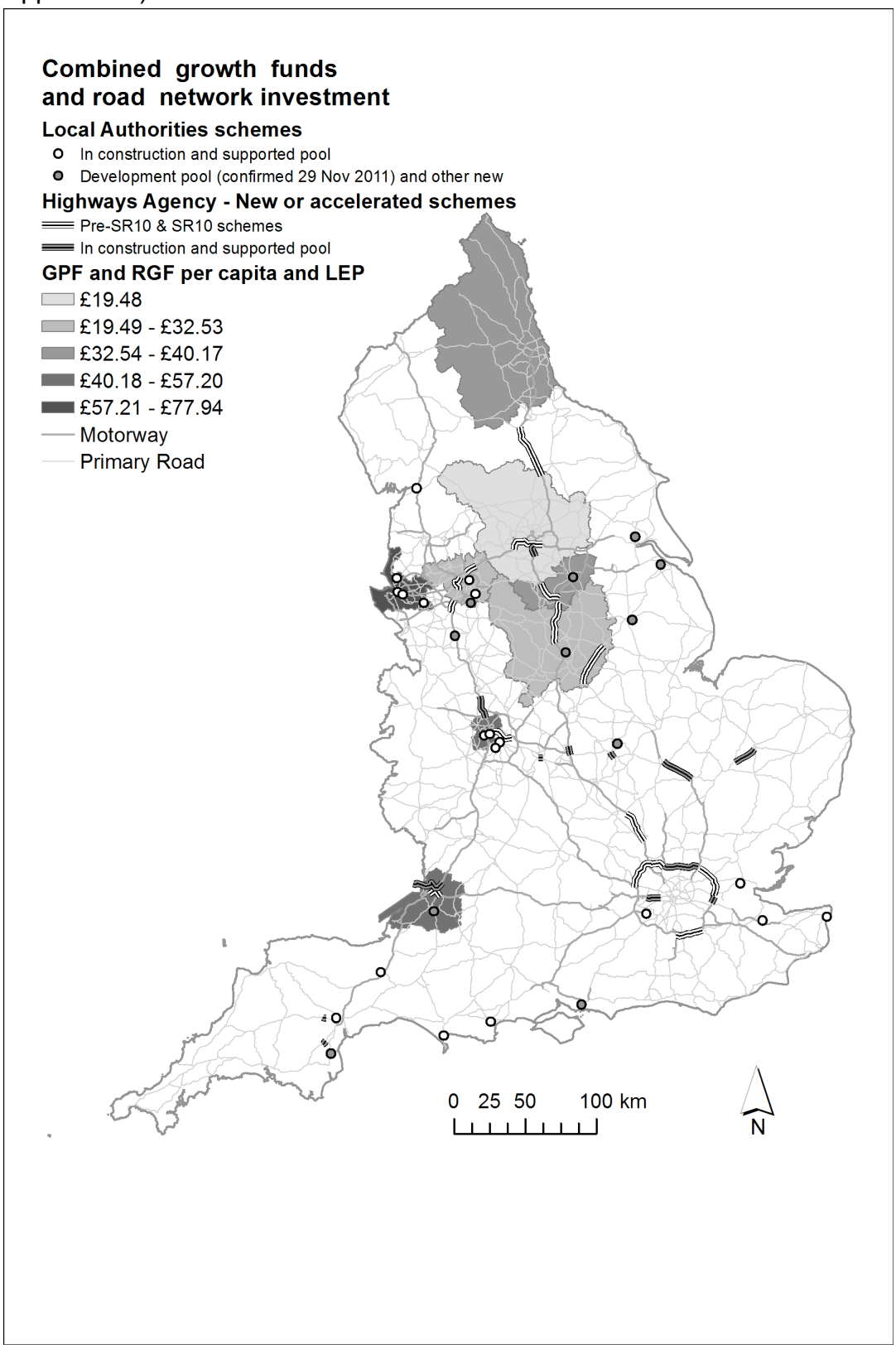

Figure 2: Combined growth funds and deprivation (Full source data in Appendix A)

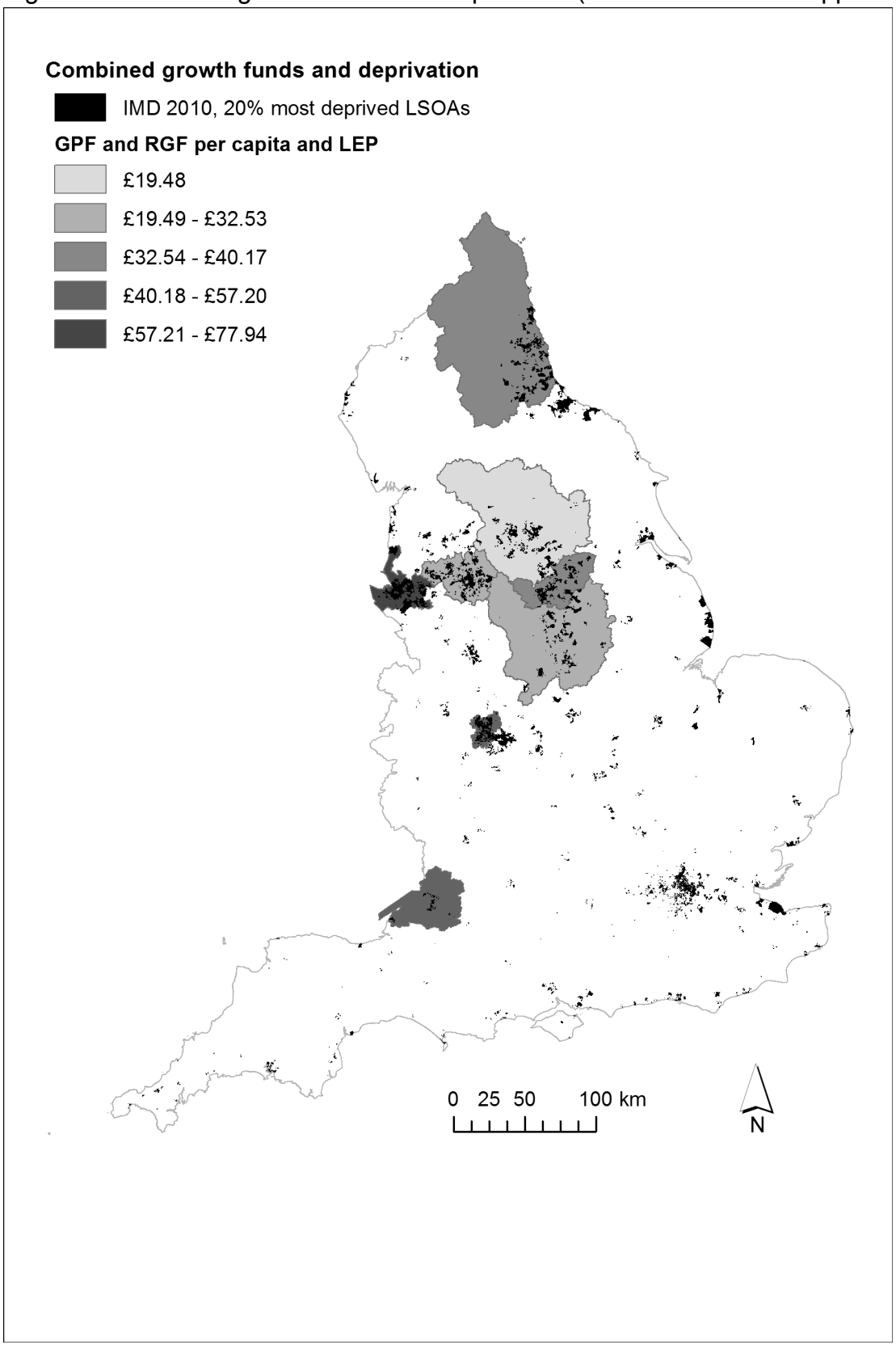

Figure 3: Combined growth funds and local authority funding cuts (Full source data in Appendix A)

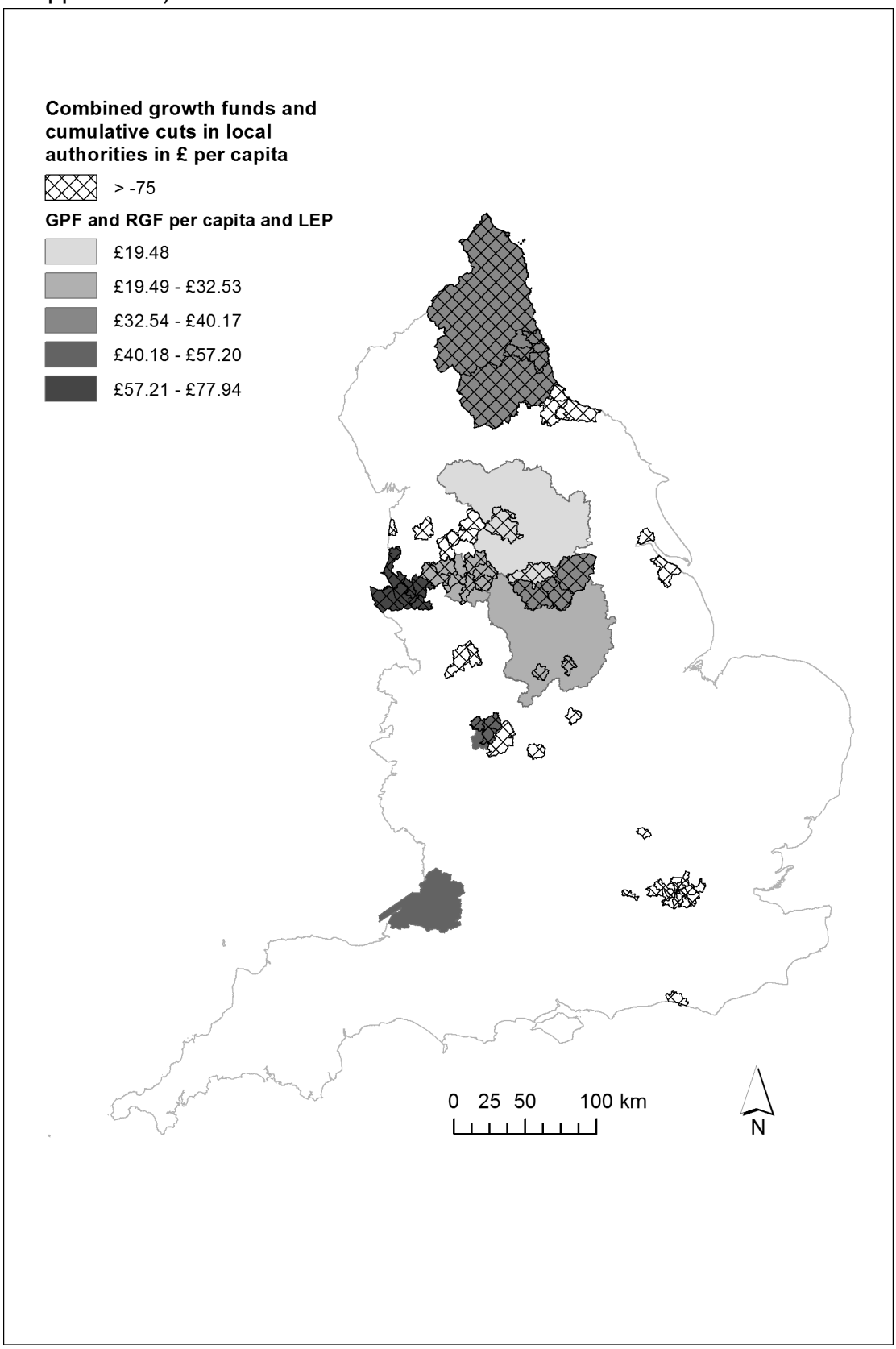

Figure 4: Key landscape designations and household growth projections (Full source data in Appendix A)

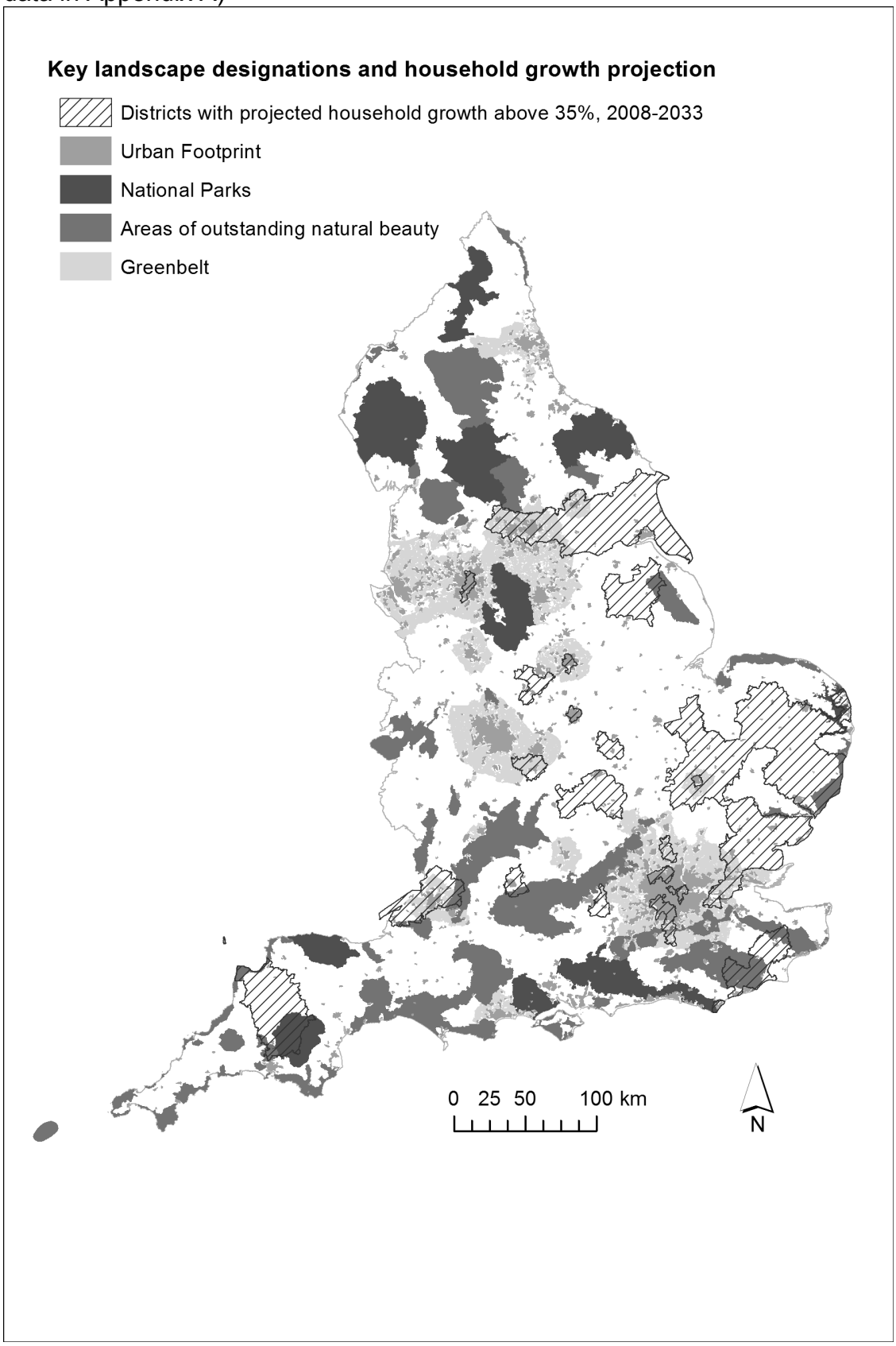

Figure 5: Relative water stress level and high household growth projection (Full source data in Appendix A)

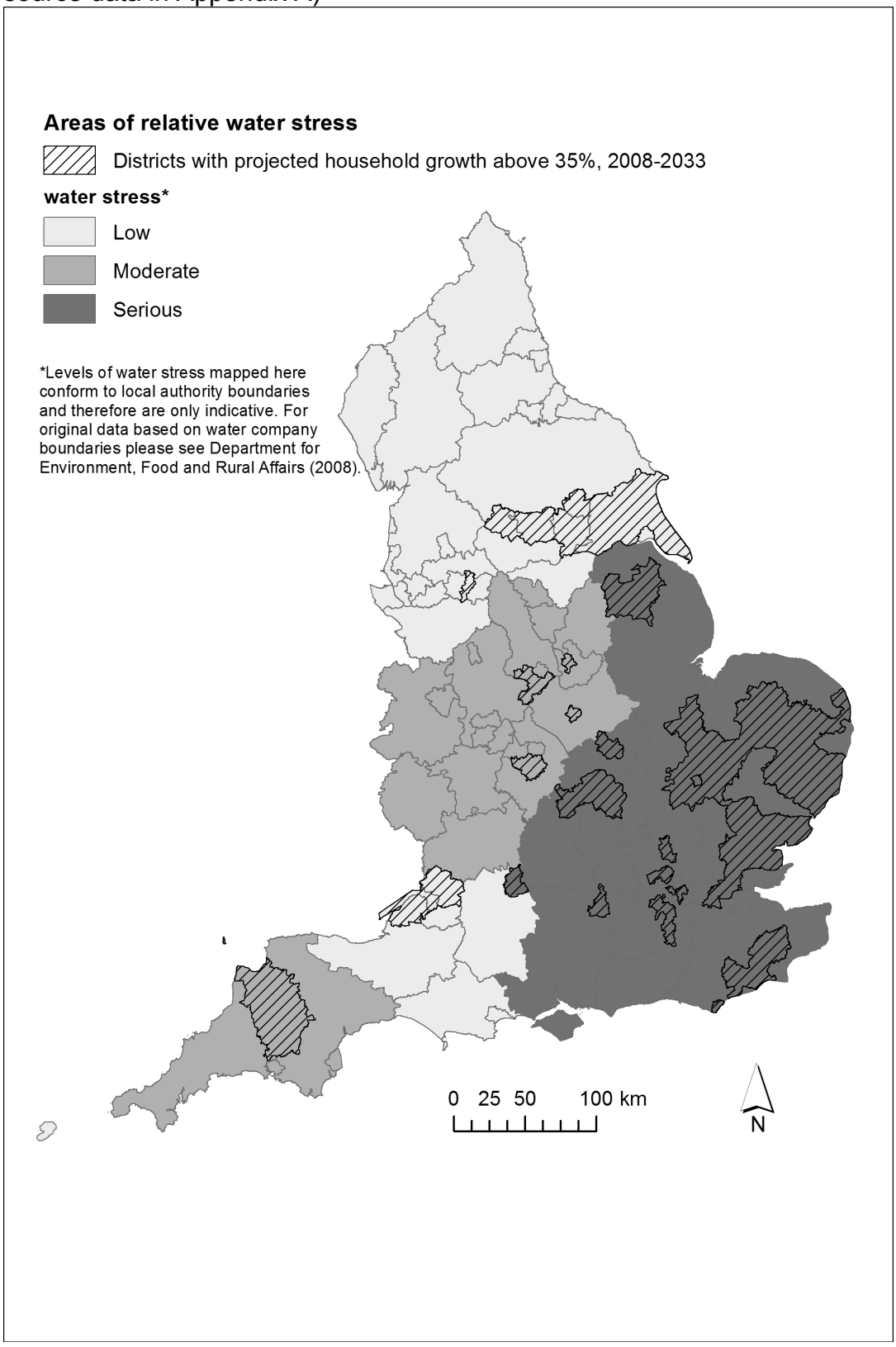

Figure 6: Housing affordability and high household growth projection (Full source data in Appendix A)