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Town & Regional Planning

Consultation internationale de recherche du PUCA

Vers des politiques de densification et d'intensification « douces » ? Intérêts, limites et opportunités

Les expériences anglaises en matière de densification douce : quel apport pour l'élaboration d'une politique publique construite ?

Rapport de la phase 1 relative à l'échelle nationale

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Summary

1. Policy Context

The following are key aspects of the policy framework relating to soft densification (SD):

- In England, there has been a long tradition of attempting to prevent urban sprawl, deeply rooted in popular politics. The CPRE has been highly effective in influencing state policy in this area.
- Since the 1947 Town and Country Planning Act, urban containment has been at the heart of British planning.
- Emphasis on "concentrated dispersal" to New Towns was established under the 1946 New Towns Act and later to the planned expansion of medium sized towns
- By the 1980s, the objectives of Green Belt policy were expanded to include the encouragement of urban regeneration.
- From the 1990s, the traditional concern of British planners with urban containment became allied with growing moves to foster sustainable development (Planning Policy Guidance Note 3 (PPG3)). A new emphasis on the principle of the compact city reinvigorated urban containment policy.
- In 1998 Government made the commitment that by 2008, 60% of new dwellings would be accommodated on previously developed land.
- With the revision of PPG3 in 2000, renewed stimulus was given to making the best use of previously developed land in housing developments.
- A new land-use category (P) identifying residential gardens has been included in LUCS returns since April 2010.

2. Components Of Soft Densification

2.1. Agents Engaging in Soft Densification (SD)

The agents PUCA envisages engaging in SD include:

- Small housebuilders;
- Community groups such as housing cooperatives;
- Professionals who might serve individual households (surveyors, architects etc); and
- Those providing finance appropriate to this scale of activity.

2.2. Definition of Soft Densification (SD)

SD is defined (in the Phase I Report) as comprising the following components:

1. Internal subdivision of houses into flats.
2. Extension and reconfiguration of large properties to provide new units.
3. Construction of auxiliary dwellings - one (or occasionally more) new dwellings built on residential land without demolition of a dwelling unit (approximating units gained through residential plot subdivision and referred to as "garden infill").
4. Division of house plots - i.e. within villa suburbs, the replacement of a very large dwelling in an extensive garden with a cul-de-sac providing smaller high-status houses (from the 1960s onwards), or (latterly on some such estates) by a low-rise, high-status apartment block.
5. Infill development on vacant or undeveloped plots.
6. Change of Use - i.e. construction on previously non-residential sites, and subdivision of non-residential buildings for residential purposes where radical change is not involved and where the development might reasonably be expected to be undertaken by the type of agent associated with SD.

It should be stressed that although conversion and subdivision activity forms an important part of SD, not all such activity belongs to the category of SD. Much conversion and subdivision (e.g. of former industrial premises such as textile mills) is at a scale entirely different from that of immediate concern and may need be undertaken alongside large scale new construction to ensure viability. The work of specialist developer Urban Splash provides good examples of large scale conversion and subdivision (Bloxham et al, 2011).

3. Main Influences On And Effects Of (Different Types Of) Soft Densification

3.1. Influences on SD

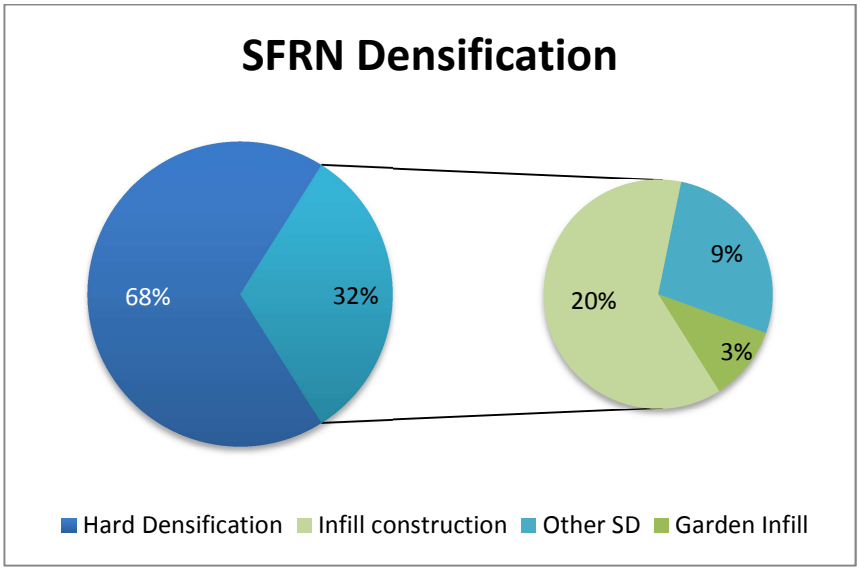
- Demand for additional housing space depends on **potential household growth**. Where household growth is limited, SD should not be expected, and where it is found in the absence of household growth this is indicative of other problems. High potential growth in the context of strict planning constraint may however promote conditions where high-cost radical densification schemes are favoured, hence limiting the role of soft-densification.
- SD through infill development depends upon **settlement morphology and land use mix**.
- SD depends on the responses of individual households and small builders to opportunities provided in different economic contexts. The **overall SD rate depends on counter-posed 'push' and 'pull' mechanisms**: the tendency to convert houses into flats, and the tendency to de-convert flats and to amalgamate dwellings. These counter-mechanisms allow the portfolio of houses to be adjusted to variation in market demand – satisfying, for example, demand for larger dwellings by long-distance commuters.
- **PPG3** densification policies **should be seen as the complement of long-established Green Belt policy**. Apart from the direct effect of exerting upward pressure on densities in urban areas this combination appears to have had **three further important effects**.
- **Significant physical expansion** of urban areas **became** very **unusual** – with Swindon (Sw) and Milton Keynes (MK) being the principal exceptions.
- **Emphasis upon previously developed sites favoured** not only **archetypal brownfield schemes** such as former inner city industrial sites, but also **large-scale rural brownfield development** on sites poorly related to the established framework of urban settlement (e.g. former military airfields, and 19th-century institutions deliberately sited away from urban areas).
- In many areas – particularly Greater London – this combination of policies exerted **substantial upward pressure on house prices**. At the same time, and arguably not disconnected from this policy combination, housing output over the decade was historically low.
- **Where demand is** sufficiently **high**, **bid prices** or bid rents **might ensure that radical densification projects might be viable.** However, bid prices for larger units and larger plots might in some circumstances be sufficiently high to remove any incentive to densify. In principle, this might weaken any tendency to subdivide dwellings or plots, or might even encourage de-conversion
- It appears that **negative SD rates are associated with particular high quality residential locales** that prove attractive to households seeking more housing space and whose members are willing to commute longer distances.

Effects of SD

- Some local authorities (e.g. Blackburn) have found that houses in multiple occupation (HMO's) and sub-division of terraced houses have a **seriously detrimental impact on the growth, regeneration, image, attitudes to investment** (both inward and local) **and sustainability** of communities and neighbourhoods where they are concentrated.
- Infill SD in general has consequences in virtue of its location relative to existing dwellings (pressure on infrastructure, additional traffic, loss of light, and intrusion). Garden infill in particular may have even greater impact, given additional biodiversity and neighbourhood character consequences.

4. Empirical Contribution To Densification

- Between 2001 and 2011, SD accounted for roughly one third (28.5%) of the total number of dwellings absorbed into the urban areas, or one fifth (17.1%) of the entire increase in England's dwelling stock.
- 37.8% of units attributable to SD were generated through internal reorganisation of buildings, including conversion and subdivision of buildings formerly in non-residential use.
- Within single-family residential neighbourhoods (SFRNs), SD accounted for almost a third of all properties gained through densification overall (32.1%, see below), though in other urban areas this falls to 16.3%.



- Within SFRNs, the majority of SD (62.2%) was generated through infill construction rather than from reorganization of existing buildings.
- Only a small part of this infill construction was accommodated on subdivided house plots. The majority was built on vacant plots or plots that had previously been in non-residential use.
- The year-by-year breakdown also suggests the price sensitivity of the flow of garden land coming forward for housing development. Although the *proportion* of new units accommodated through garden infill varied relatively little over the decade, it exceeded 10% as the boom neared its peak in 2007.
- Introducing the price of units into the analysis is not straightforward in practical terms.
- Negative rates of SD were not characteristic of larger low-growth urban areas.
- The least affordable areas generally show negative rates of SD, while higher rates of plot subdivision typify high status neighbourhoods.

- With the exception of the “Prospering Younger Families” group, all subgroups of “Prospering suburbs” show overall rates of SD below the average (1.9%), while members of the other supergroup distinguished by detached houses show rates above average.
- Those towns where the tendency to divide plots and create new dwellings through garden infill are paradoxically those where overall rates of SD are negative or very low.
- There was a clear tendency for development densities on a derived plot to be less than that typical of the 'host' OA.
- Those neighbourhoods that superficially seem physically most amenable to SD proved least likely to have densified.
- Some forms of housing stock adjustment (principally new build permissions) are far more easily monitored than others (conversions and building subdivision that require planning permission but which may not have it, and more particularly de-conversions and amalgamations which usually do not need planning permission).

5. Policy Implications

- The effects reported must be understood as depending upon strong green belt constraint and a well developed system of planning regulation more generally.
- Density depends in part on the scale at which it is measured.
- Local authority monitoring of starts and completions *a fortiori* is expensive in terms of staff time and monitoring outstanding planning permissions is particularly troublesome, given the number of variant permissions that may have been granted on the same site.
- Generally, unlawful development apart, it is easier for local authorities to monitor additions to the dwelling stock (simply because all require planning permission) than to monitor adjustments that reduce the stock (such as amalgamation and de-conversions).
- It is inevitable that sources maintained by local authorities will under-record downward adjustments to the dwelling stock and hence over-estimate SD.
- The implication is that the brownfield infill component of SD can be high relative to household growth when the planning system can effectively divert development to such sites. This is possible with a planning framework that prohibits development of greenfield sites, to the extent that settlement morphology and land use structure imply a commensurate expected flow of land for redevelopment.
- Government's responses to concerns about “garden grabbing” demonstrate the practical importance of being aware just how the dis-benefits of policies aimed at avoiding urban sprawl might be borne.

6. Choice of Case Studies for Phase II

- One important consideration in the choice of case-study localities may well be quality of available monitoring information.
- Investigation of the **London Borough of Ealing** would provide opportunities to examine circumstances where pressure for conversion and de-conversion were equally balanced, where it is possible to explore plot subdivision and also to consider covert densification (“illegal outhouses”).
- The relatively low incidence of garden infill presents a challenge for sampling, but areas with high intensity include Surrey districts such as Woking and Surrey Heath. Cheltenham DC has a clear policy on garden infill and shows a wide range of stock adjustments; conversion, de-conversion, plot subdivision in a context of overall *negative* SD.
- High Wycombe (Wycombe DC) might merit consideration regarding negative SD.

1 Introduction

1.1 The first work package of our programme of work is a quantitative overview of the varying incidence of soft densification across England emphasizing outcomes in the period between 2001 and 2011. Its aim is to introduce the policy framework which allowed or encouraged soft densification, to explore its relationship to underlying associated variation in physical and economic conditions, and to suggest the broad contours of its socio-economic effects. In addition to its principal role of providing a framework helping to guide subsequent more detailed examinations, this body of work seeks to address a series of questions close to PUCA's key concerns:

- within a policy framework conducive to soft densification, what is the extent of its contribution to the flow of additional dwelling units?
- under such a regime, what influences variation in the scale of that contribution from place to place?
- and finally, what needs are met by the units generated by soft densification, and what are the associated changes in the social and demographic composition of neighbourhoods?

2 Urban Land Recycling, Efficient Use of Housing Land and Soft densification.

A long tradition to prevent urban sprawl

2.1 In England, there has been a long tradition of attempting to prevent urban sprawl, deeply rooted in popular politics. The Campaign to Protect Rural England, a pressure group which has been highly effective in influencing state policy at both national and local level was founded in 1926, in response to inter-war urban growth. Since the 1947 Town and Country Planning Act, urban containment has been at the heart of British planning. In the immediate post-war period this led to an emphasis on "concentrated dispersal" to New Towns established under the 1946 New Towns Act, and later to the planned expansion of medium sized towns. By the 1980s, however, attention had come to focus on the core cities, the objectives of Green Belt policy having been expanded to include the encouragement of urban regeneration.

2.2 From the 1990s, the traditional concern of British planners with urban containment became allied with a growing concern to foster sustainable development. New concern for the principle of the compact city reinvigorated containment policy. Planning Policy Guidance Note 3 (PPG3) of 1992 marked a further step towards attempting to ensure that a greater proportion of housebuilding was accommodated on previously developed land and within existing urban areas. A new data source, the Land Use Change Statistics (LUCS) that became available in 1985 showed central government planners that almost half of new housing development was accommodated on previously developed (or "brownfield") sites. This formed the platform for a political commitment by Government in 1998 to ensure that by 2008, 60% of new dwellings would be accommodated on previously developed land.

2.3 With revision of Planning Policy Guidance Note 3 (PPG3) in 2000, renewed stimulus was given to making best use of previously-developed land in housing developments. Between 2000 and 2010, the proportion of new dwellings accommodated on brownfield sites became a key performance indicator against which local planning authorities were assessed by central government. At the same time, mindful of the commitment to achieve the 60% target, central government policy guidance introduced minimum density thresholds for the first time. Sites developed at less than 30 dwellings per hectare were considered not to make efficient use of housing land, and for the remainder of that decade local authorities were under pressure not only to favour brownfield sites but to lever up densities.

2.4 Throughout this period, the principal popular concern has been preventing sprawl, with far less attention being devoted to the particular ways in which urban areas might be densified. Indeed, the prime measure of performance was not concerned with the extent to which new development was concentrated in existing urban areas but directly with the contribution of previously developed land. Thus former airfields, other military sites and former hospitals far removed from urban areas were favoured for development. After 2000, as the pressure increased to secure higher development densities as planning permission was granted, there was relatively little concern for the effects on the urban areas. There is thus marked contrast with PUCA's concern with soft densification, where there is explicit concern with the impact of densification on pre-existing urban form. While

URBED (1999) had produced guidance on how to assess the capacity of urban areas to accommodate additional dwellings (through division of existing residential property, through making use of vacant space over retail premises, by initiatives to reduce vacant property, by conversion of redundant non-residential buildings to housing and a range of other means…) there has been very little quantitative analysis of precisely how densification has been achieved or its effects.

The developed methodology

2.5 By contrast, PUCA's interest in densification embodies a clear idea of where development might be accommodated and a concern for any potentially adverse effects rather than a simple commitment to avoiding urban sprawl. At the centre is an image of the existing suburban fabric conceived as contiguous areas of individual houses standing on plots accessed by residential roads. There is, however, limited explicit consideration of the relation of such plots to parcels *not* in residential use, either developed or undeveloped. For the purposes of the current exercise, it is therefore necessary to delimit suburbs of this kind which might be styled to **"single-family residential neighbourhoods" (or SFRNs)**[1]. The approach taken has been to overlay the mosaic of Output Areas from the 2001 and 2011 censuses on a grid representing the limits of physical settlement. OAs are the smallest units for which census data are released, each typically accommodating about 150 households. Census data allows the numbers of households living in each of a series of property types to be assessed in each OA (detached houses, semi-detached houses, terraced houses, converted flats in residential property originally designed for single household occupation, purpose-built flats, and further accommodation types). For the purposes of the present work, SFRNs are considered as constituting the residential property within output areas where more than half of all households live in whole houses or flats converted from whole houses. These OAs might be termed **SFRN-OAs**. The distinction between SFRNs and the SFRN-OAs in which they lie is important, as the OAs themselves typically include extensive non-residential land and property, and may extend beyond the physical limits of the urban area (see Box 1).

2.6 Use of the English evidence to address PUCA's concerns also entails developing a sharp definition of soft densification that can be made operational with available data. The principal data on which the measurement of soft densification are

- Royal Mail's Postcode Address File (PAF) for April 2001 and April 2011 which provide for the respective times a comprehensive listing of properties for the purposes of mail delivery, from which net change in numbers of units at small area level can be adduced, and
- The Land Use Change Statistics (LUCS) collected for Department of Communities and Local Government which indicates new housebuilding (most usually at individual land parcel level) and allows the role of new construction to be monitored.

Crucially these data allow analyses to proceed at a much finer grain than OA level and allow change to be represented hectare by hectare and results to be provided for broader areas by aggregation. In combination they provide an unrivalled resource for examining soft densification. Their principal weakness is that they will not detect *covert* densification related for instance to accommodation in illegal outhouses (see London Borough of Ealing, 2013).

[1] Strictly these should be understood as neighbourhoods where the property was originally intended for single family occupation, though it might include in 2001 houses converted into flats.

Box 1

Figure A: Output Areas and Buildings; Bolton and Bury, Greater Manchester

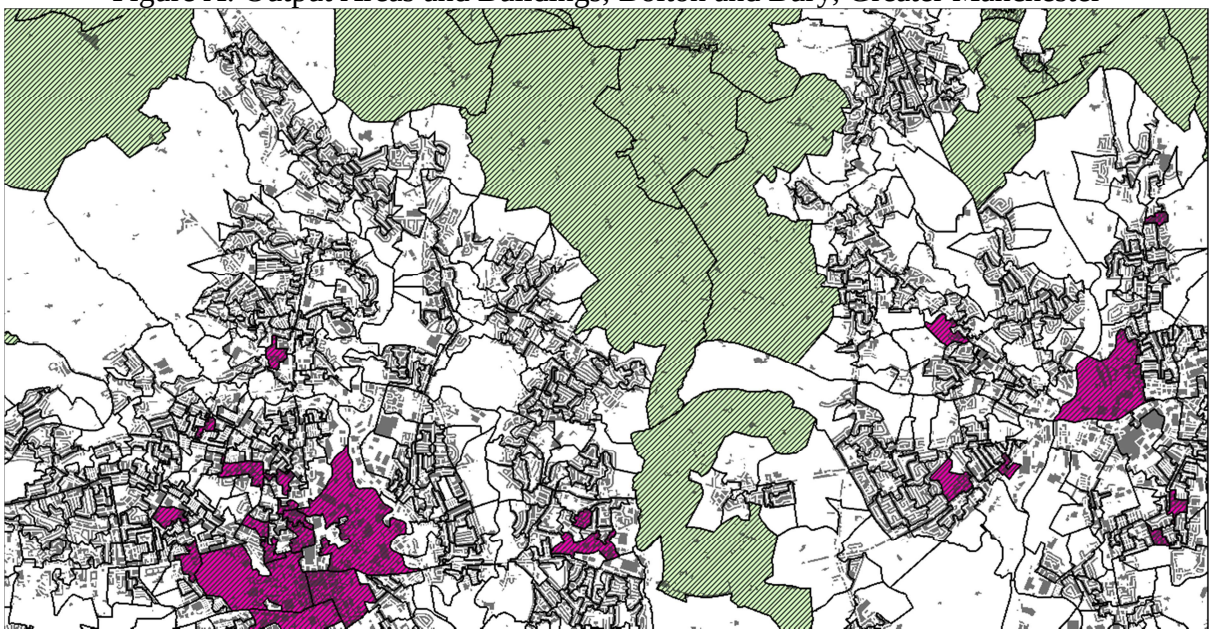


Figure B: Output Areas, Land Uses and New Build; Bolton and Bury, Greater Manchester

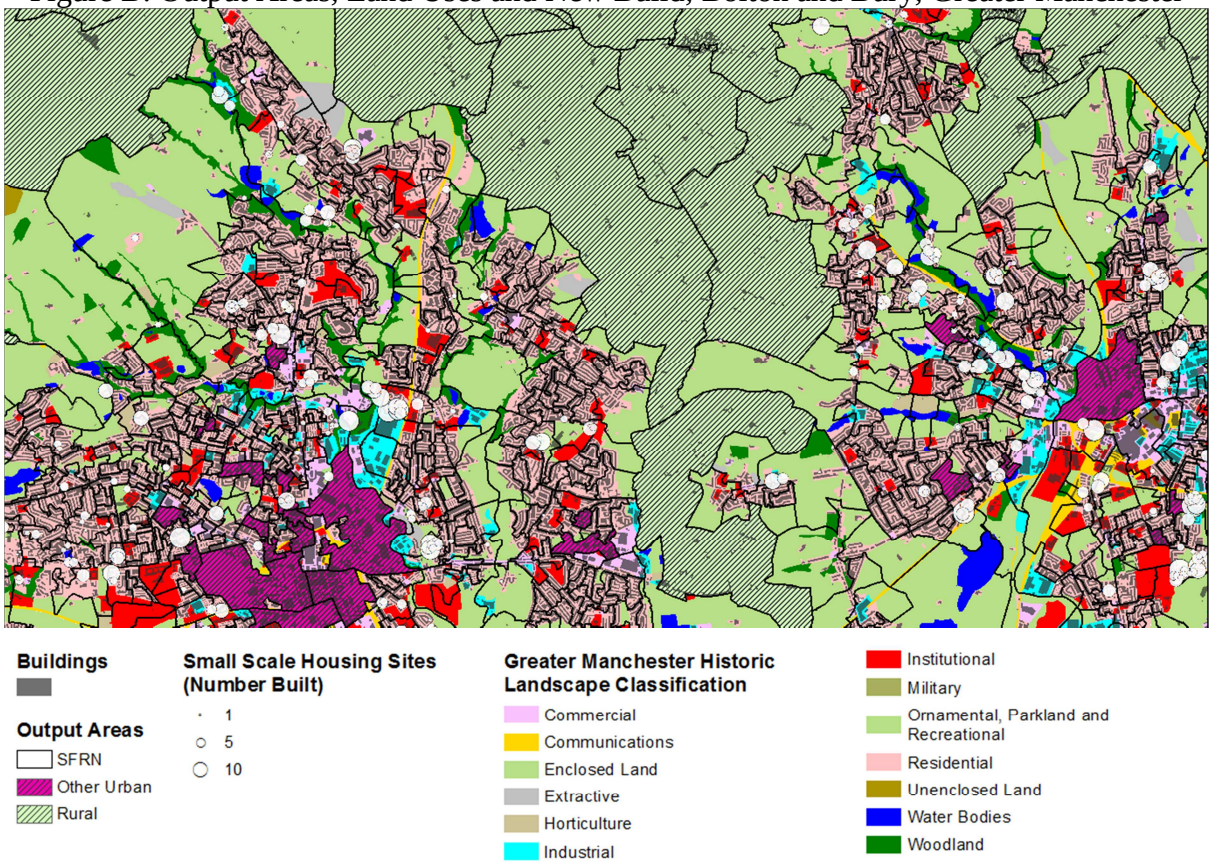


Figure A shows OAs that correspond to SFRNs as transparent (white) with a black outline, other urban OAs in purple with dark grey diagonal lines (principally the town centres of Bolton (to the West) and Bury) and rural OAs in pale green with dark grey diagonal lines. Buildings are shown in grey. Physical urban boundaries are very weakly related to OA boundaries (and for this reason the analyses of numbers of units created through soft densification are restricted to those parts of SFRN-OAs that lie within the physical urban area. It is clear, moreover, that although essentially residential, that those parts of SFRN-OAs within the physical urban area include large areas of land and building (not of direct significance for Census purposes) in non-residential use, and that development or conversion of this property contributes substantially to the densification of residential neighbourhoods.

Figure B repeats Figure A but also shows the pattern of land uses within the OAs corresponding to SFRNs (based on the GM Historic Landscape Classification), providing a clearer illustration of the balance of residential and non-residential land and building. Within this set of OAs small-scale housing sites developed between 2001 and 2011 are also shown by proportional white circles (whether or not they are associated with changed unit postcodes).

2.7 There are four elements to sharpening the operational definition of soft densification:
1. specifying the precise actions that fall within its scope; 2. clarifying which agents are or might be able to undertake such works; 3. defining a protocol for identifying “radical” change to the suburban environment and finally:
4. clarifying the relation of soft densification to non-residential land and property.

2.8 Although the possibility of extending the definition is raised below, the particular processes which are appropriately included in the expression soft densification are fairly clearly defined. These are:

- division of house plots
- construction on spare or undeveloped plots
- construction of auxiliary dwellings
- internal subdivision of houses into flats
- extension and reconfiguration of large properties.

2.9 The agents who PUCA envisage engaging in soft densification are also fairly clear. They include small housebuilders, or community groups such as housing cooperatives, together with professionals who might serve individual households or including surveyors, architects, and those providing finance appropriate to this scale of activity.

2.10 For the purposes of measurement in a manner consistent with PUCA's call for proposals, it is also necessary to apply some protocol in order to distinguish those types of change that do not radically alter urban form from others. Throughout the post-war period incremental construction on plots of land within established residential areas, referred to within UK planning practice as “infill development” (cf Cheltenham District Council, 2009, p5) had been managed through the planning system with relatively little contention (see for example Larkham, 1996). It is clear that the construction of an additional dwelling on a subdivided plot should not be considered “radical”. In many areas, infill involved development on non-residential land (exemplified in Box 1). De facto, densification of high status residential areas built at low densities in the nineteenth or early twentieth centuries was long-established and it was not unusual within villa-suburbs for a very large dwelling in an extensive garden to be replaced with a cul-de-sac providing smaller high-status houses (from the 1960s onwards), or (latterly on some such estates) by a low-rise high-status apartment block (see Box 2). Such development is initiated by an individual household and undertaken by small-builders and does not involve the provision of public infrastructure.

2.11 The identification of appropriate tests of radical change is not straightforward, and it would be difficult to apply such tests to individual developments at the national scale. For present purposes a pragmatic protocol has been adopted, which gauges the significance of change by its implications for postal deliveries and which can be made operational using PAF (Postcode Address File): a change is treated as an instance of soft densification if the creation of a new unit postcode is not required.

Box 2

Figure A: Four Oaks Estate

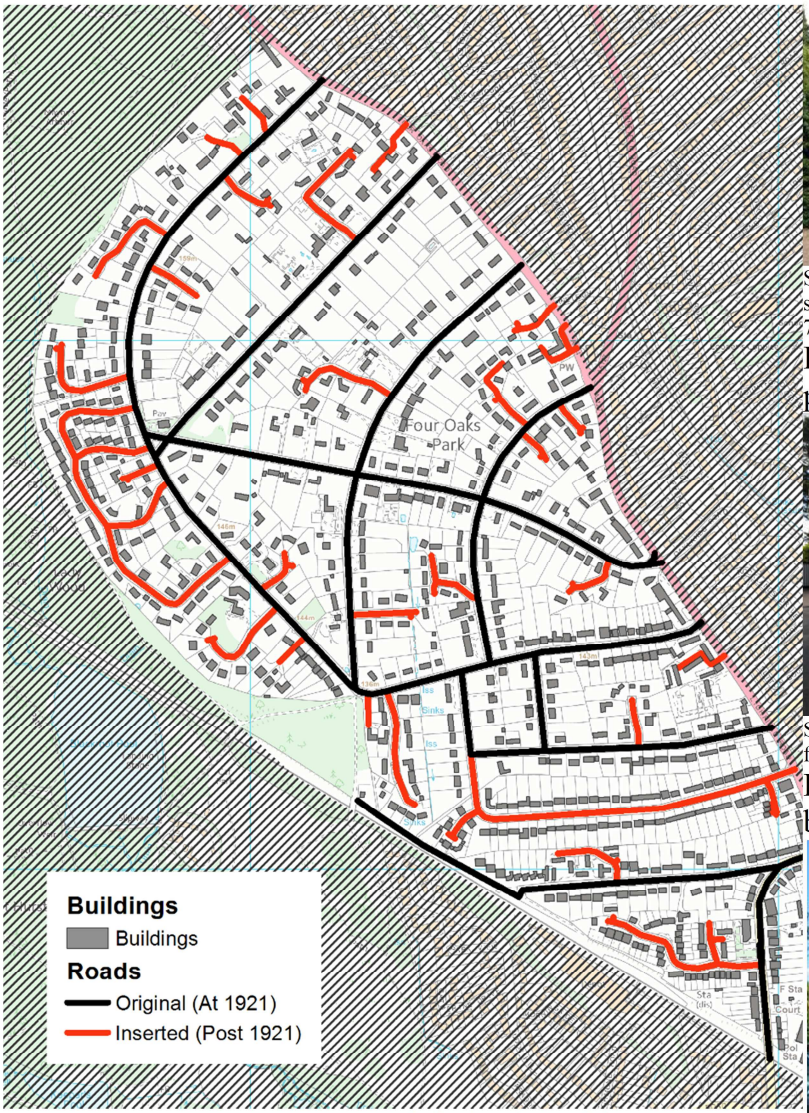


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Figure B: Original housing

Source: http://www.zoopla.co.uk/for-sale/details/35673222#VYpw6ppc9LYgJklJ.97

Figure C: More recent property on inserted cul-de-sac

Source: http://www.rightmove.co.uk/property-for-sale/property-49751912.html

Figure D: Low-rise apartment block

http://www.rightmove.co.uk/property-to-rent/property-31481556.html

Figure A shows the extent of the Four Oaks Estate in Sutton Coldfield, Birmingham. The low-density of the large detached villas comprising the original development can still clearly be seen, especially in the North of the estate, see Figure B. Figures C and D show some examples of the densification which has occurred since the original estate and the insertion of numerous cul-de-sacs where a large villa has been removed or its grounds developed on. Figure C shows an example of more modern, large dwellings which have replaced an original villa through construction of an inserted cul-de-sac. Figure D shows an example of the low-rise blocks of flats which can be found at the southern fringe of the estate.

A detailed discussion accommodating change in villa suburbs with conservation area status is provided in Larkham (1996, Ch9). A good example of local authority policy on garden infill (see para 2.27) in such suburbs is provided by Woking DC (2000).

2.12 To appreciate the nature of this protocol, some understanding of the UK postcode system is required. Each postal address is assigned a unit postcode (sometimes called a full postcode) by Royal Mail. They take the form

CN ML where
C comprises one or two characters (eg S, SW)
N comprises one or two digits (eg 3 or 13)
M is a single digit, and
L comprises two alphabetic characters

eg B74 4RJ for part of a residential road in Birmingham suburb.

2.13 One unit postcode refers on average to 14 properties (though the number varies adaptively; an isolated farmstead typically having its own postcode, and an apartment block having a single unit postcode). That portion of the postcode CN M (eg B74 4) is referred to as the postcode *sector*. In England there are in the order of 10,000 postcode sectors, the boundaries of which do not change as new properties are built (although they may be subject to comprehensive review in response, for example, to extraordinary growth across a whole town). Where new dwellings are created their postcode *sector* will be determined by their location. The question of whether new properties will be assigned to the same *unit* postcode as neighbouring properties depends on the scale of the change. Specifically it depends on the implications for mail delivery. In the case of those new dwellings created through subdivision of a house into flats, those accommodated where a residential parcel has been subdivided, or which are secondary dwellings within the curtilage[2] of a principal property, the new units will share the same full postcode as their host.

2.14 More radical change on the other hand will require the creation of one or more new unit postcodes within the same sector. Thus change that involves soft densification will not entail the creation of new postcodes, while radical change will. Identifying full postcodes that persist from one decennial census to the next and the number of associated residential changes provides a way of identifying the extent of soft densification, albeit it does not indicate the specific processes through which the additional unit was produced.

2.15 It is important to realise that very similar processes to those associated with soft densification can and in many circumstances do lead to a *reduction* in residential density across a locality. Thus in response to the preferences of individual households correspondingly small-scale adjustments (such as amalgamating adjoining dwellings to form larger units; or restoring subdivided houses to single units etc) will reduce densities. The general framework of UK planning law continued to allow such minor works, even though planning policies operating in England between 2000 and 2010 could prevent *new* houses being built at low densities. Measures of soft densification for any area therefore must be seen as *net* measures, reflecting the balance between those actions that increase residential density and those which reduce it.

2.16 The final matter that needs to be clarified before soft densification can be measured is the limits of the processes mentioned in para 2.8. It is clear that the agents who

[2] This is a legal term referring to the typically enclosed space of immediately surrounding a dwelling-house.

might undertake such activities might equally engage in other related small scale activity including the demolition of residential units, the conversion and subdivision of minor non-residential buildings. Equally, their construction activity might involve the development of a range of small sites, including those within the curtilage of existing houses, together with those previously developed for either residential or non-residential purposes and undeveloped sites within residential locales.

2.17 It is clear that the processes that have actually allowed the densification of suburbs in England are not limited to those listed in para 2.8. Other actions, at a similar scale, undertaken by similar agents have generated additional dwellings from land and property not previously in residential use. To appreciate this, it is important to recognize how in fact non-residential uses are intercalated within the spatial structure of essentially residential areas. As the mosaic of Output Areas (OAs) exhausts England's entire space, not just parcels given over to residential use, those OAs whose dwelling stock is constituted entirely or predominantly of single-family residential units also embrace neighbouring land in other uses, parcels of which form part of the flow of land for development. Box 1 provides an illustration of the relationship between OA boundaries, urban configuration and land use from Bolton and Bury in Greater Manchester.

2.18 More generally, as illustrated in Figure 1 on the evidence of basic-scale OS mapping[3], only a quarter of the *land* in the particular set of OAs constituting SFRNs is given over directly to house-plots (5.7% to domestic buildings; 19.2% to gardens) with 9.4% taken up by circulation space and 58.1% being in fact greenspace or water, and the remaining 7.7% being in some form of non-residential use. The footprint of non-residential buildings in these essentially residential neighbourhoods accounts for 2.6% of the area (approaching half of the footprint of the houses themselves). Moreover, apart from residual parcels[4] of undeveloped land, surrounded by later development, this may include portions of fringe belts reflecting the faltering history of development of the particular urban area (cf Whitehand and Morton, 2003), and areas of redundant utilities land or non-residential buildings.

2. 19 The present work exposes the extent of new residential development in non-residential parts of suburban OAs, and it may be critically important to appreciate the extent to which recent history of suburban densification in England does not rest directly on the densification of the use of house plots, but rather on forms of development of neighbouring land which have generated additional dwellings. Focussing solely on dwellings brought forward through infill construction in SFRNs in the inter-censal decade, LUCS shows that sites already in residential use contributed less to the flow of new units (24.1%) than did sites in non-residential developed uses (29.9%). This must be set alongside the contribution of building on vacant land (37.5%), and residual undeveloped land (8.5%). All these types of sites would have been favoured for development in the inter-censal decade.

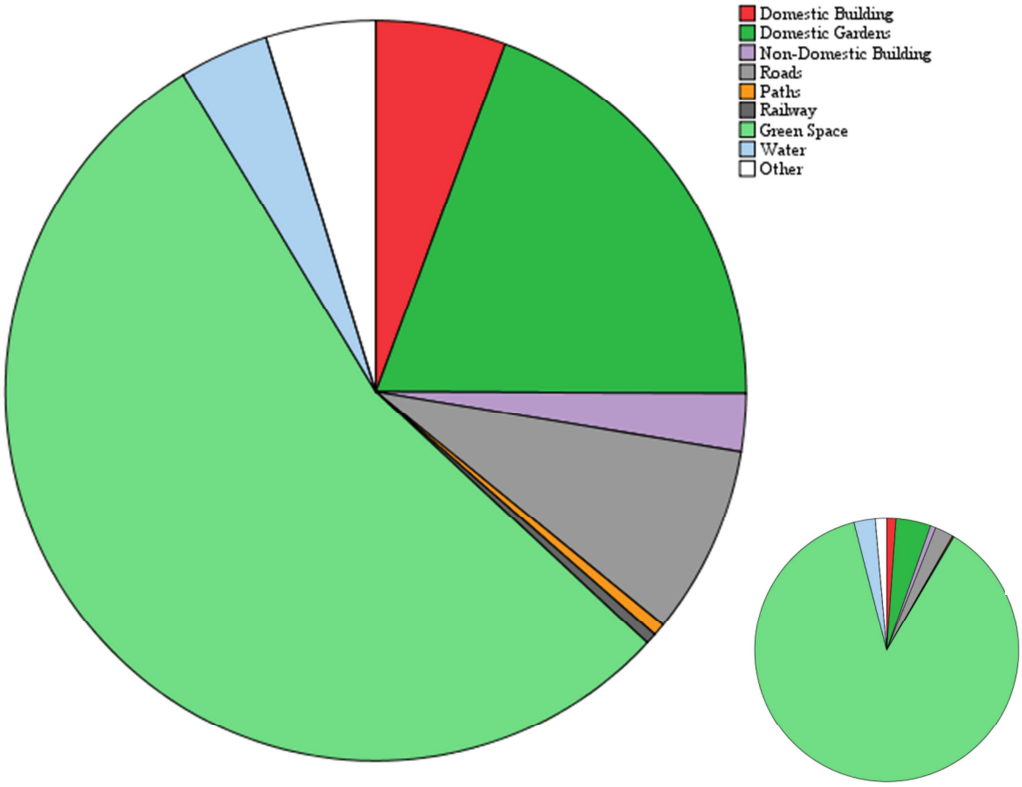
[3] These figures derive from experimental statistics produced by Ordnance Survey for Department of Communities and Local Government's Generalized Land Use Data Base (GLUD). Measures from OS MasterMap of total areas of land allocated to nine land use categories were reported at Output Area level. This distinguished residential from non-residential buildings, and domestic gardens from other green space (see Bibby, 2009).

[4] These relate to “agricultural residual” parcels in the spirit of Conzen (1960, pp. 81, 123).

2.20 In attempting to measure soft densification, this work therefore seeks to include *in addition to sources of additional dwellings listed in para 2.8* new housing construction on previously non-residential sites and change of use and subdivision of non-residential buildings for residential purposes *where radical change is not involved and where the development might reasonably be expected to be undertaken by the type of agent associated with soft densification*.

2.21 Given these considerations, the present work uses three principal sources to quantify its particular definition of soft densification. The **overall scale of**

Figure 1: Land Cover Mix of SFRN-OAs; England, 2005



Inset: All OAs

residential densification, however achieved, is estimated by the net change in the number of self-contained units of occupation (SCUOs) inferred from Royal Mail's postcode address file for April 2001 and for April 2011. The present work uses numbers of residential delivery points recorded on PAF together with supplementary "households" information from PAF to estimate the number of permanent dwellings for occupation by private households by making adjustments to exclude:

- student accommodation of various forms
- institutions (eg nurses homes, prisons, hostels)
- elderly persons homes
- units on caravan sites
- non-residential units (eg accommodation addresses, units in managed workspace)

but allowing multiple SCUOs

- in subdivided property
- in serviced apartments, and
- new residential blocks with what is termed by Royal Mail a single "delivery point" (ie where the postal service leaves mail for occupants at a single place within the building – such as a reception desk – rather than distributing it directly to the individual dwellings).

2.22 The SCUO counts on which the present work depends therefore rest on considering each delivery point on PAF in turn, and – where more than one "household" is recorded – determining the number of additional SCUOs to be admitted. In most cases, this determination was made by applying elementary natural language processing to the building names, sub-building names and occupier names included on PAF (using the artificial intelligence language Prolog and its Definite Clause Grammars extension (DCG)). This proves satisfactory where the textual information includes a literal business description (eg "X Home for the Elderly", "Y Leisure Park" or "Z Business Centre"), or where the business of specific occupiers (eg the Abbeyfield Society) though not explicitly recorded on PAF is well known and can be coded.

2.23 The overall scale of **soft densification** is estimated in the same way as total densification but only property in unit postcodes present in both 2001 and 2011 is included. This measure tracks change in the dwelling stock in all areas not subject to radical change in the sense discussed.

2.24 In practice PUCA is centrally concerned with soft densification within SFRNs. The work reported here focuses on such areas by identifying relevant OAs as indicated above. It should be clear on the evidence of Box 1 that it is necessary not only to focus attention on that set of OAs but to focus more particularly on the parts of those OAs which fell within physical urban areas in 2001. The official definition of urban areas within England and Wales treats them as physical settlements with a population of 10,000 or more. For the purpose of the 2001 Census, Ordnance Survey established a protocol for delimiting physical settlements and generated a set of physical settlement boundaries. This forms a critical component not only of a classification of OAs by predominant settlement type, but of individual hectare cells (see Bibby and Brindley, 2013), and the cell-level classification is used to restrict the definition of SFRN-OAs to SFRNs, making operational the distinction introduced in para 2.5.

2.25 PUCA is of course also concerned with the particular processes which generated the additional dwellings. The principal necessary distinction which can and must be made is that between those properties which are newly constructed and those which have been created through conversion or subdivision. The number of new dwellings built hectare by hectare is estimated from the Land Use Change Statistics (LUCS) at individual land parcel level. LUCS are collected for Department of Communities and Local Government by Ordnance Survey, the national mapping agency, as a by-product of updating basic scale plans.

2.26 When a land use change is noted by Ordnance Survey in the process of large-scale map revision, a LUCS record is created which includes:

- the grid reference (location) of the parcel affected by the change (correct to 10m);
- the area affected by the change (in hectares);
- the estimated year of change;
- the land use classification before and after the change;
- in the case of changes to residential property, the number of units demolished and the number of units built.

2.27 Given the relevant categories of soft densification identified by PUCA, the considerations raised above with regard to small-scale *housebuilding* on residential and non-residential land and the distinctions that can be sustained on the basis of LUCS, categories of soft densification recognised in this document are as follows:

- construction of one (or occasionally more) new dwellings built on residential land without demolition of a dwelling unit (approximating units gained through residential plot subdivision and referred to as "garden infill" below)
- construction of one or more new dwellings on parcels of no more than 0.4 hectares in extent[5] occupied by one or a small number of existing dwellings, possibly with demolition and replacement on that parcel (which would appear to fall within the capacity of agents with whom soft densification is associated)
- construction of one or more new dwellings on parcels of no more than 0.4 hectares in extent which were not previously in residential use (possibly involving demolition of non-residential buildings (which would appear consistent with the capacity of agents with whom soft densification is associated and including construction on spare or undeveloped plots)).

2.28 Measurement of densification realized through internal division of houses is assessed as the difference between the overall number of units attributable to soft densification and those forms involving new construction which can be estimated from LUCS.

2.29 It should be stressed that although conversion and subdivision activity forms an important part of soft densification, not all such activity belongs to the category of soft densification. Much conversion and subdivision (of former industrial premises such as textile mills) is at a scale entirely different to that of immediate concern and may need be undertaken alongside large scale new construction to ensure viability. The work of specialist developer Urban Splash provides good examples of large scale conversion and subdivision (Bloxham et al, 2011).

[5] This 0.4 ha measure is approximately equivalent to 1 acre, the traditional English measure of area. This cut-off is frequently used in Britain as a threshold in distinguishing small-scale from more significant development in the application of planning and similar ordinances.

3 The Extent of Densification and Soft Densification - A National Overview

3.1 Table 1 provides an overview of the contribution of different categories of settlement to accommodating additional dwellings between 2001 and 2011. The settlement typology is discussed in Box 3. Table 1 demonstrates the remarkable role of England's urban areas in accommodating more than a million additional dwellings over the inter-censal within their 2001 boundaries. This accounted for three in every five additional dwellings. By contrast, expansion of the contiguous urban area appears to have accommodated only 11% percent of the increase in dwellings over the period. In its own presenting terms, the policy revision encapsulated in the 2000 version of PPG3 was very highly successful in securing densification and hence avoiding urban spread.

3.2 The extent of soft densification summarised in Table 2 (a and b) should be put in this context. Col 5 of Table 2b demonstrates that on the basis of the definitions of Section 2, these forms of densification accounted for roughly one third (28.5%) of the total number of dwellings absorbed into the urban areas in the inter-censal decade, or one fifth (17.1%) of the entire increase in England's dwelling stock. As the physical extent of both the urban areas and of the SFRNs is known, in addition to the estimated number of units gained by soft densification, it is possible to gauge the extent to which this has increased ambient density[6]. Table 2b (col 7) shows that this amounted to an additional 0.32 dwellings per hectare in SFRNs.

3.3 At this general level, it is possible to distinguish different forms of soft densification in broad terms and to establish its significance in different contexts. Col 6 of Table 2b illustrates that on the definitions developed, 37.8% of units attributable to soft densification were generated through internal reorganisation of buildings (including conversion and subdivision of buildings formerly in non-residential use where this did not involve radical change of the type referred to in para 2.29). The difference between col 4 and col 8 of Table 2a indicates that portion of the overall increase in dwellings arising through conversion and subdivision of existing property that is attributable to more radical forms of densification.

3.4 In interpreting Table 2 it should be understood that subdivision of existing dwellings is treated as a form of soft densification not involving new construction, but conversion involving subdivision of buildings such as offices, substantial factories and so on is treated as part of radical densification even though it is not treated as part of new construction. For this reason not all conversion and subdivision activity is treated as involving *soft* densification.

[6] The term ambient density is used here to refer to the density of dwellings across an entire area (eg administrative or statistical unit) as distinct from the density at which dwellings are built on a site. The ambient density is much lower than the site density as the area over which it is calculated includes land in all non-residential uses including offices, parks etc.

Box 3

Figure A: South Midlands Settlement Morphology

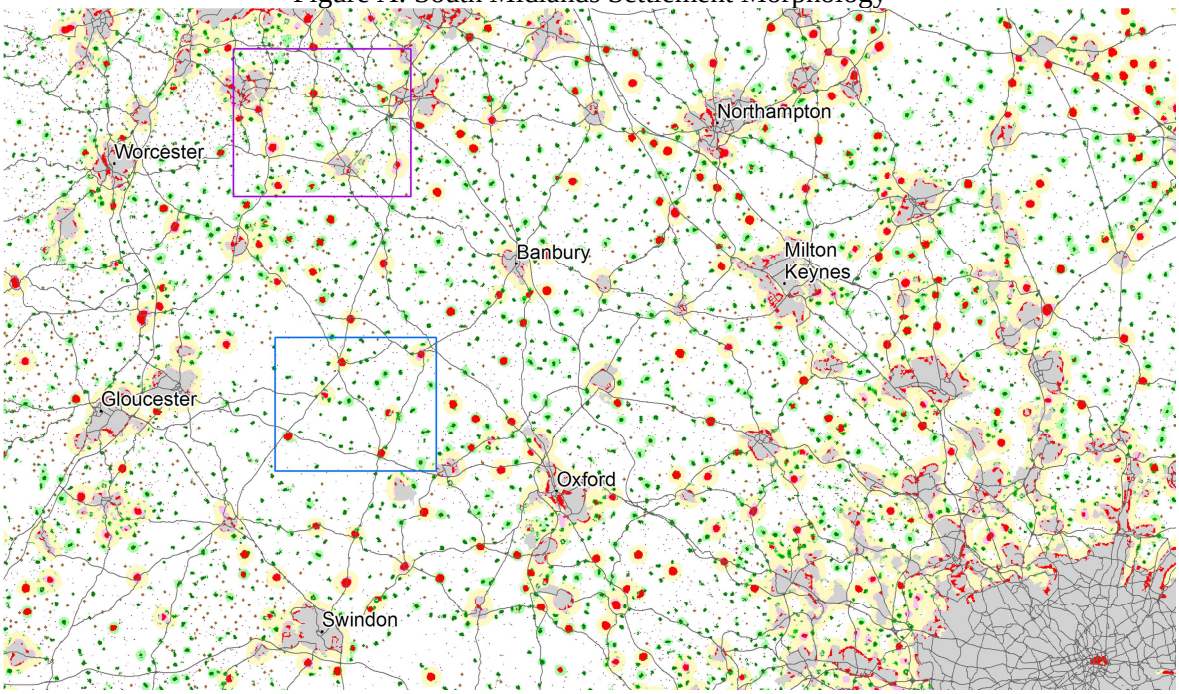
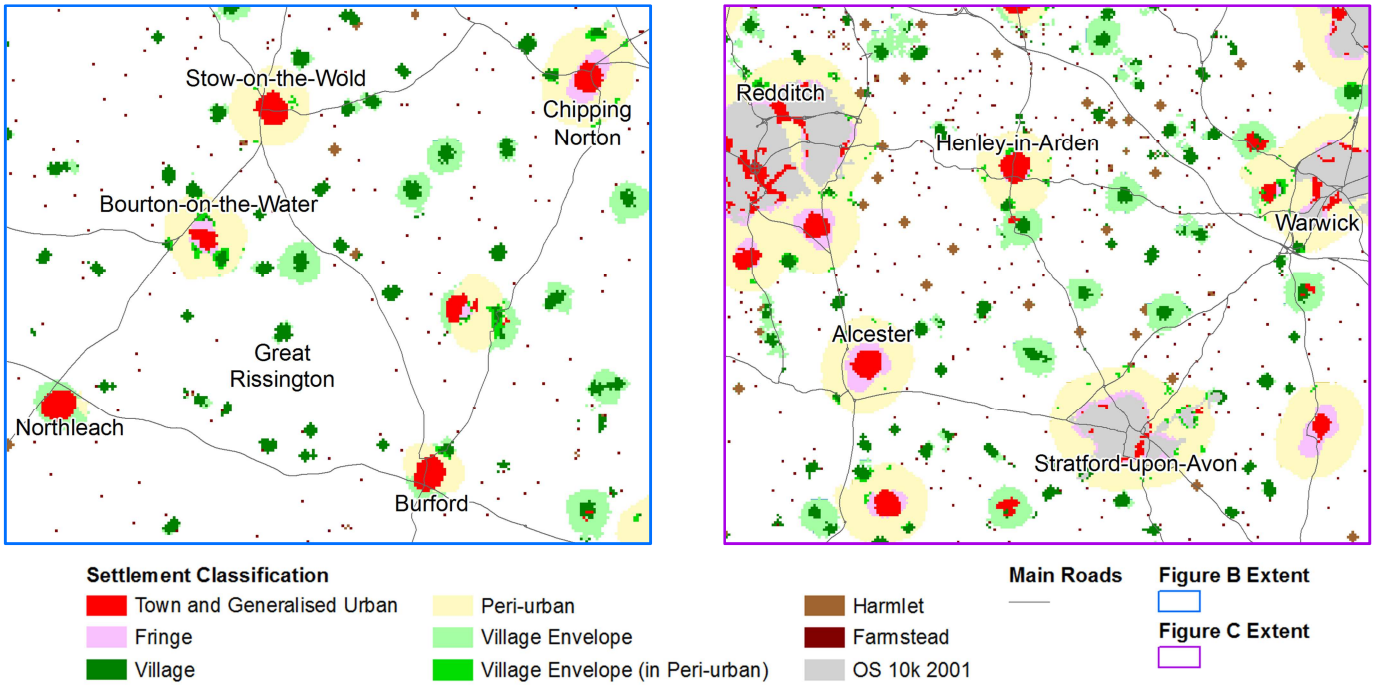


Figure B: While minor change occurred over the decade, the "village" rule was satisfied by the Great Rissington cells in 2011 exactly as in 2001.

Figure C: The dwelling stock of Henley-in-Arden in Warwickshire grew from 1400 to 1460 between 2001 and 2011, but it satisfied the "town" rule in both years.



Density depends in part on the scale at which it is measured. For any cell in a grid a series of density measures at 200m, 400m, 800m and 1600m can be estimated (forming a density profile). Different settlement forms have different typical density "profiles" (Bibby and Brindley 2013). In a compact village density falls rapidly as scale increases; in an urban area it will not. Consider 50 houses standing on a hectare of land – a single cell of a grid – surrounded by farm land, with no other dwellings within 1km. Density calculated over a broader area centred on that same cell (say, for a 200m radius around the centre of that cell), would not be 50 dwellings per hectare (dph), but only 4. In this idealized circumstance, density over an area 400m around the cell would fall by a factor of 4, to 1 dph and so on. This allows the construction of a series of rules for classifying cells by settlement type. In the case of urban areas with a population of 10,000 or more a detailed settlement boundary is added. The settlement elements identified in this way include alongside "towns" and nucleated villages, but also "envelopes" around villages, an "urban fringe" (where there are abrupt changes of density between scales), and areas of scattered dwellings. Areas of higher density dispersed settlement around cities also have a distinct "peri-urban" density profile.

Table 1: Increase in Dwellings by Settlement Class, England 2001-2011

Settlement class	Dwellings 2001	2001 (% share)	Dwellings 2011	2011 (% share)	Increase 2001-2010 (dwellings)	Share of increase (%)	Percentage increase
Urban 10k (as of 2001)	16,398,084	78.2	17,094,221	76.7	1,107,780	60.0	6.8
New urban10k	-	0.0	201,336	0.9	612,979	10.9	-
Town	1,596,745	7.6	1,771,610	7.8	174,865	9.5	11.0
Fringe	782,574	3.7	777,741	3.4	-4,833	-0.3	-0.6
Peri-Urban	363,100	1.7	485,468	2.1	122,358	6.6	33.7
Villages	1,419,697	6.8	1,542,980	6.8	122,283	6.7	8.7
Dispersed	407,141	1.9	529,242	2.3	122,101	6.6	30.0
Total	*20,967,351*	*100.0*	*22,814,241*	*100.0*	*1,846,890*	*100.0*	*8.8*

The various classes of settlement are those defined for a consortium of Government Agencies for use with the decennial Census. Definitions and discussions are provided in Bibby and Brindley, 2013.

Table 2a Numbers of Dwellings Gained by Soft Densification, English Urban Areas, 2001-2011

	Dwellings 2001	Net Increase 2001-2011	New Build 2001-2011	Gained by subdivision & conversion	Gained by Soft densification			
	(000s)	(000s)	('000s)	('000s)	Total (‘000s)	By Infill All (‘000s)	Construction Garden ('000s)	By internal subdivision & conversion (‘000s)
Area Class	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SFRNs	14,477	857	655	201	275	171	29	104
Other Urban	1,921	251	194	58	41	35	4	6
All Urban	**16,398**	**1,108**	**849**	**259**	**316**	**206**	**33**	**110**

Source:
1 Post Code Address File, 2001 QII
2 Difference between Post Code Address File, 2011 QII and Post Code Address File, 2001 QII
3 DCLG Land Use Change Statistics (adjusted)
4 Col 2 - Col 3
5 Difference between Post Code Address File, 2011 QII and Post Code Address File, 2001 QII for continuing unit postcodes
6 DCLG Land Use Change Statistics (adjusted) for selected sites in areas with continuing unit postcodes
7 Part of Col 6: DCLG LUCS (adjusted) for selected sites in areas with continuing unit postcodes (see Box4)
8 Col 5 - Col 6

Table 2b Dwelling Units Gained by Soft Densification, English Urban Areas, 2001-2011

	Units gained through soft densification as percentage of Stock, 2001				Units gained through soft densification		
	By Infill all	Construction garden	By subdivision	Total	As share of net change	Due to internal subdivision and conversion	Increase in density
	(%)	(%)	(%)	(%)	(%)	(%)	(Units per Ha)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SFRNs	1.2	0.2	0.7	1.9	32.1	37.8	0.32
Other Urban	1.8	0.0	0.3	2.1	16.3	13.7	0.46
All Urban	1.3	0.2	0.7	1.9	28.5	34.8	0.33

Source:
1 (Table 2a Col 6) / (Table 2a Col1)*100
2 (Table 2a Col 7) / (Table 2a Col1)*100
3 Col 4 - Col 1
4 (Table 2a Col 5) / (Table 2a Col1)*100
5 (Table 2a Col 5) / (Table 2a Col2)*100
6 (Table 2a Col 4) / (Table 2a Col5)*100
7 (Table 2a Col 5) / (Area)

3.5 This leads to two important conclusions at the level of England as a whole. First, Table 2 (a and b) also draws attention to the distinction between soft densification in those parts of the urban area treated as SFRNs and elsewhere. First, roughly two-thirds (71.5%) of the overall densification of English urban areas was achieved through new construction or large-scale conversion projects involving radical change. Within SFRNs, soft densification accounted for almost a third of all properties gained through densification overall (32.1%), though accounting for a much smaller in those parts of the urban area other than SFRNs (16.3%). Second, the larger portion of additional dwellings attributable to soft densification in SFRNs (62.2%) was generated through infill construction rather than from reorganization of existing buildings.

Soft-Densification, Infill and Garden Grabbing

3.6 Consistent with the remarks of paras 2.17-2.19, a third important conclusion may be drawn. Although soft densification produced more additional units through construction than alteration of existing buildings, only a small part of this infill construction was accommodated on subdivided house plots (or more generally on land previously in residential use). A larger proportion of these new units (their location in essentially residential areas notwithstanding) were built on vacant plots or plots which had been in non-residential use.

3.7 Nevertheless, beyond maintaining a distinction between new dwellings arising from forms of soft-densification traditionally described as "infill development" and those created by subdividing buildings already part of the townscape, Tables 1 and 2 attempt disaggregation of the infill element, by including a proxy for "garden infill" as defined in the first bullet of para 2.27. Such development *retains* the existing dwelling (or dwellings) while new units are built on rear gardens (or back land) generating "derived plots" by subdivision[7]. The proxy is intended to aid understanding of the character and consequences of soft-densification. Although any form of infill development tends to have similar consequences in virtue of its location relative to existing dwellings (pressure on infrastructure, additional traffic, and loss of light and intrusion caused by new buildings), "garden infill" may have a sharper impact, on biodiversity or neighbourhood character, for example. This point is especially significant because although infill development in England has not been particularly contentious historically, after 2005 opposition to some forms of densification crystallized around the pejorative term "garden grabbing"[8].

3.8 The nature of this proxy and its relation to the campaign against "garden grabbing" and Government's response is explained in Box 4. Overall, as indicated in Table 2a, "Garden Infill" activity (part of soft densification) accommodated an estimated 33,000 dwellings in urban areas in the inter-censal decade, of which 29,000 were within SFRNs. This represents 15.9% of all soft densification *infill* or 10.5% of all soft densification within these areas (ie 29,000/275,000). It is equivalent to 0.2% of

7 On derived (or derivative plots), see Conzen, 1960, p124. Although urban morphologists identify various ideal types of derivative plots, the most common distinction is between backland development and replacement of existing dwellings (usually by more units) along the building frontage. Debate in England after 2000 focussed on "back gardens".

8 The executive summary of the report by Sayce et al refers to "the issue of back garden development (sometimes known as 'garden grabbing'" (2010, p5).

their stock in 2001 ie 29,000/14,477,000 (see Table 2b). This might be thought of as the rate of residential plot subdivision per decade.

Box 4: Garden Grabbing and Garden Infill

The term "garden grabbing" has no consistent definition, but it became associated with a campaign inside and outside Parliament which drew particular attention to the extent of development on greenspace within residential curtilages. Given the specific concern of the campaigners with green land only, LUCS could not provide accurate information as all land within the curtilage of dwellings was classified as residential (R) regardless of whether it was "garden land" (as other uses, for instance, garage space are possible). The campaign prompted the (Labour) Government to commission a research project to assess the "type and quantum of developments on back gardens" (reported as Sayce et al, 2010), and to alter the specification of LUCS, allowing development on residential gardens to be measured in the future (announced as a ministerial statement (Healey, 2010)). Government's response thus focussed on the form of development termed "garden infill" referred to in the first bullet of para 2.27 involving development in rear gardens while retaining the existing dwelling (or dwellings). An objective of the research was to "determine both the quantum and type of development of back gardens over a five-year period from 1 April 2003 to 31 March 2008". The estimates made relied on a very partial survey of local authorities who themselves rarely collected the pertinent information (Sayce et al 2010).

Despite limitations, individual LUCS records which have the advantage of comprehensive coverage, might have been used to identify parcels changing from residential (R) to residential (R) use, where 0 units had been demolished, noting for each the number of new units built (n). These might be styled RR0n records, and these data might be aggregated to estimate additional dwellings built within residential curtilages. *Such an estimate would have been too high* (due to the fact that garden is not the only possible land use within the curtilage of a residential property). Reducing that estimate by excluding hard-surfaced areas to identify greenspace alone is not possible, but a reasonable assumption might be made. A similar approach is adopted here. Following Healey's statement, a new land-use category (P) identifying residential gardens has been included in LUCS returns since April 2010. This allows identification (by analogy with RR0n) PR0n cases. Estimates of this component of soft densification – labelled Garden Infill – are made by summing units built for all RR0n and PR0n cases where n<11 are tabulated in this report. Values for cases where n>= 11are labelled "Other curtilage" (and are excluded from soft densification).

Differences between the RR0n proxy and the PR0n measure can be gauged by reference to LUCS cases surveyed from April 2010. Where all land within residential curtilages to be garden land, *any* change of a type represented by a RR0n record if surveyed before April 2010 would prompt creation of a *PR0n* record if surveyed thereafter. Thus by hypothesis, any change surveyed after March 2010 but *still* recorded as RR0n rather than PR0n refers to a parcel lacking the essential qualities of a garden. In fact, restricting attention to SFRNs, from April 2010, of 2408 parcels which would previously have been recorded as RR0n, 2127 (88.3%) were recorded as PR0n. Limiting attention to cases which would have been recorded as RR0n (n <11), this proportion increases to 88.7% and for RR01 it is 95.3%. Those parcels actually recorded as RR0n after March 2010 tend to be at higher density (and include former garage space in social housing estates, for example). "Other Curtilage" cases are therefore not treated as garden land.

3.9 Table 3 sets the contribution of "Garden Infill" estimated in this way alongside all other sources of housebuilding land in SFRNs (not merely those associated with soft densification)[9] indicating that it accounted for 8.3% of all new construction. "Other curtilage" development (ie within residential curtilages on which more than 10 units were constructed) accommodated only 2.6% of units built in SFRNs. (This is excluded from soft densification – see Box 4).

3.10 It is important to appreciate the manner in which the remarkable densification of England's urban areas was achieved and to avoid unwitting conflation of densification and either soft densification or garden infill. Restricting attention to SFRNs, the relation between the number of units attributable to components of particular interest is as follows:

All densification:	857,000	100%
of which soft densification	275,000	32%
infill construction	171,000	20%
garden infill	29,000	3%

3.11 These summary figures together with Table 3 allows concerns about "garden grabbing" to be set in context. The extent of garden infill should be understood in the relation to the overall supply of land for residential development, the efforts of local planning authorities to achieve targets, and the house price boom. The overall pattern of development underscores the fact that **although SFRNs have an essentially residential character, the primary sources of land for new residential development were parcels previously developed but not in residential use, and previously developed vacant land.** Table 3 demonstrates that such sites were typically developed at higher density than others found in residential neighbourhoods and consistently accounted for more than 60% of new units. Sites on which residential property was demolished and replaced accommodated 17.2% of new units in neighbourhoods of this type, regardless of the scale of individual developments.

3.12 The year-by-year breakdown of Table 3 helps to appreciate the response of local planning authorities to the two core concerns of central government policy advice (to increase residential densities and to maximise development on previously developed land). Due to increasing planning constraints, greenfield (or undeveloped) housing sites within SFRNs became less significant once permissions granted before 2000 had been implemented, and so they accounted for less than 7% of new units between 2003 and the crash of 2008. Although sites started in 2001 were typically built out at a little over 31dph, pressure to lever up densities meant that sites begun from 2004 were typically built at a density higher than 45 dph.

3.13 The year-by-year breakdown also suggests the sensitivity of the flow of garden land coming forward for housing development to price (see also Figure 2). Although the *proportion* of new units accommodated through garden infill varied relatively little over the decade, it exceeded 10% as the boom neared its peak in 2007 (as it had in

[9] A breakdown of broad components of the housing land supply for soft densification construction alone is provided at para 2.19.ie division into (*Residential* combining garden infill, other curtilage and residential replacement); *Non-residential* ie Other Developed; previously developed *Vacant* land and *Undeveloped* land

1989-90 – see Figure 2). In absolute terms, the number of housing starts on garden infill plots in 2007 was three times greater than in 1996 (see Figure 2), providing perhaps some justification for evident concerns.

3.12 The character of garden infill development remained markedly different from other housing development. Although there was a some tendency for the density of property built on sites tracked by the garden proxy to increase over time, development densities were consistently well below those found in other contexts. As a result, the amount of residential space[10] secured by a household moving into a garden infill property was typically double that in other new built dwellings (see Table 3). Garden infill, while contentious, broadened the portfolio of high status properties in an area[11]. If the principal beneficiaries of garden infill were those who were able to realise the capital value of the land that they had made available for development, the derived plots undoubtedly afforded unusually large portions of residential space to their new occupiers. It is thus difficult to sustain the argument that "tens of thousands of gardens across the country were being dug up, and replaced with blocks of flats and high density buildings that spell disaster for the local environment and local infrastructure"[12].

3.13 Finally it must be recognized that the tendency to elide densification and garden infill arises in part because of the degree of effectiveness of the campaign against 'garden grabbing' in promoting this confusion. The campaign by key opposition politicians within Parliament sought to generate concern about possible implications of the Government's policy for voters in high status residential neighbourhoods.

Soft Densification in London: An Initial Overview

3.14 While the remainder of this report is concerned primarily with exploring variation in the scale of development attributable to soft densification at a series of spatial scales, the remainder of this section seeks to provide an initial intuitive impression of the varying character of soft densification by considering London. Figure 3 illustrates how the average number of units gained through soft densification varied in different parts of London. It is an absolute measure rather than one that measures rates relative to the stock of dwellings at the beginning of the period. Increasing intensity of red–brown denotes areas where numbers of units gained through soft densification exceed the national average. Those areas shown in increasing intensities of blues are those where this tendency falls further and further below the national average. The white space indicates areas without residential development, such as the Lee Valley, the Thames, the Royal Parks, and Richmond Park. The most obvious areas of soft densification are attributable to dwelling subdivision and are found in areas such as Willesden (W), Tottenham (T) and Edmonton (E).

[10] For the purposes of this document, “residential space” refers to the sum of the footprint of domestic buildings and residential gardens as estimated by GLUD.

[11] Comparison of residential density on each garden infill site (from LUCS) with the residential density of the “host” OA (from GLUD) shows that the former is typically 10 dph less than the latter.

[12] A claim by Conservative MP Zac Goldsmith (2010) in a blog entitled “Zac welcomes conclusion of Garden Grabbing campaign” when the newly elected Coalition Government announced that garden land was to be removed from the definition of previously developed land and the abolition of density targets.

Table 3: Sources of Housing Land and Development Densities 2001-2011, Urban SFRNs

Year	Garden Infill	Other Curtilage	Residential Replacement	Other Developed	Vacant	Undeveloped	Total
				Share of Housing Units			
				%			
2001	8.1	2.0	11.6	21.2	38.9	18.1	100.0
2002	7.9	1.8	12.3	23.7	41.8	12.5	100.0
2003	7.4	1.9	15.0	27.6	38.8	9.2	100.0
2004	7.0	2.4	18.4	29.7	37.0	5.5	100.0
2005	8.0	3.0	17.6	32.2	33.7	5.4	100.0
2006	7.8	3.3	18.9	30.8	33.3	5.9	100.0
2007	10.9	3.3	18.4	32.3	28.9	6.2	100.0
2008	8.2	3.6	20.1	38.6	23.7	5.7	100.0
2009	8.3	2.4	21.4	38.9	22.3	6.6	100.0
2010	8.4	1.6	17.6	41.8	20.5	10.2	100.0
2011	7.6	2.2	17.5	37.4	23.4	11.9	100.0
Decade	8.3	2.6	17.2	31.6	32.0	8.2	100.0
				Density			
				Dwellings Per Hectare			
2001	15.8	71.6	26.7	49.0	32.5	30.0	31.1
2002	16.2	66.0	25.1	50.4	34.3	31.2	32.3
2003	18.8	73.5	33.4	63.8	45.5	35.2	41.4
2004	19.3	78.4	35.7	71.3	51.9	35.4	45.6
2005	17.6	69.4	30.8	76.8	53.7	39.2	44.3
2006	19.0	70.9	36.0	81.1	57.5	41.9	48.0
2007	19.7	68.1	36.4	79.0	60.2	44.0	46.8
2008	20.2	74.7	32.6	75.6	56.0	41.1	46.7
2009	19.8	72.1	31.1	76.6	52.8	42.4	44.9
2010	21.2	70.8	33.9	65.3	52.2	44.5	45.5
2011	20.8	60.0	38.0	61.7	51.1	46.4	45.8
Decade	16.6	67.7	30.6	60.5	37.5	32.5	35.6

"Garden Infill" is measured by the Garden Infill proxy – see Box 4
"Other curtilage" development refers to construction of property within residential curtilages where more than 10 units were created. The sites do not seem to have the character of domestic gardens (See Box 4).

Figure 2: Sources of Housing Land; English Urban SFRNs 2001-2011

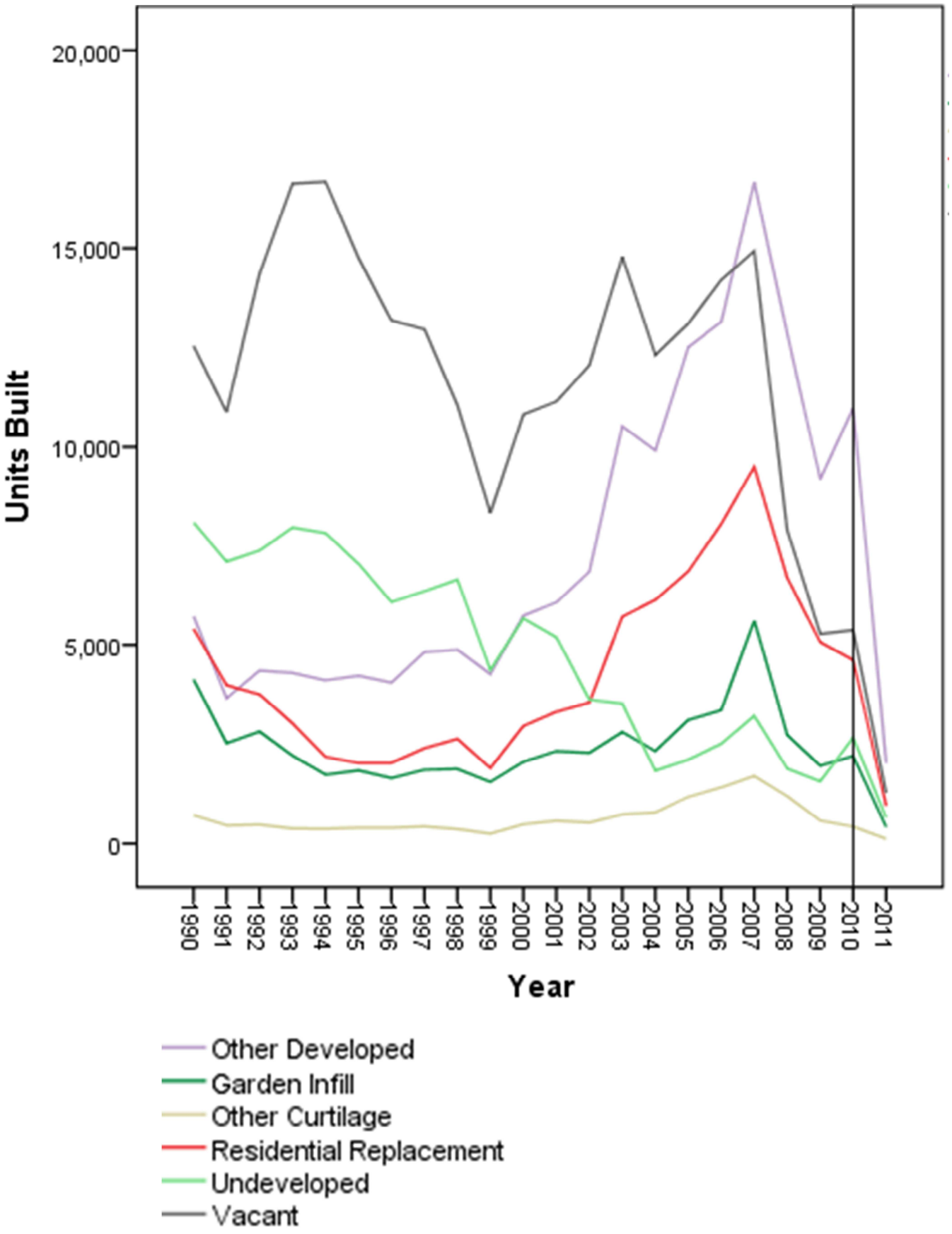


Figure 3: Varying Intensity of Soft densification: Greater London, 2001-2011 (See Para 3.13)

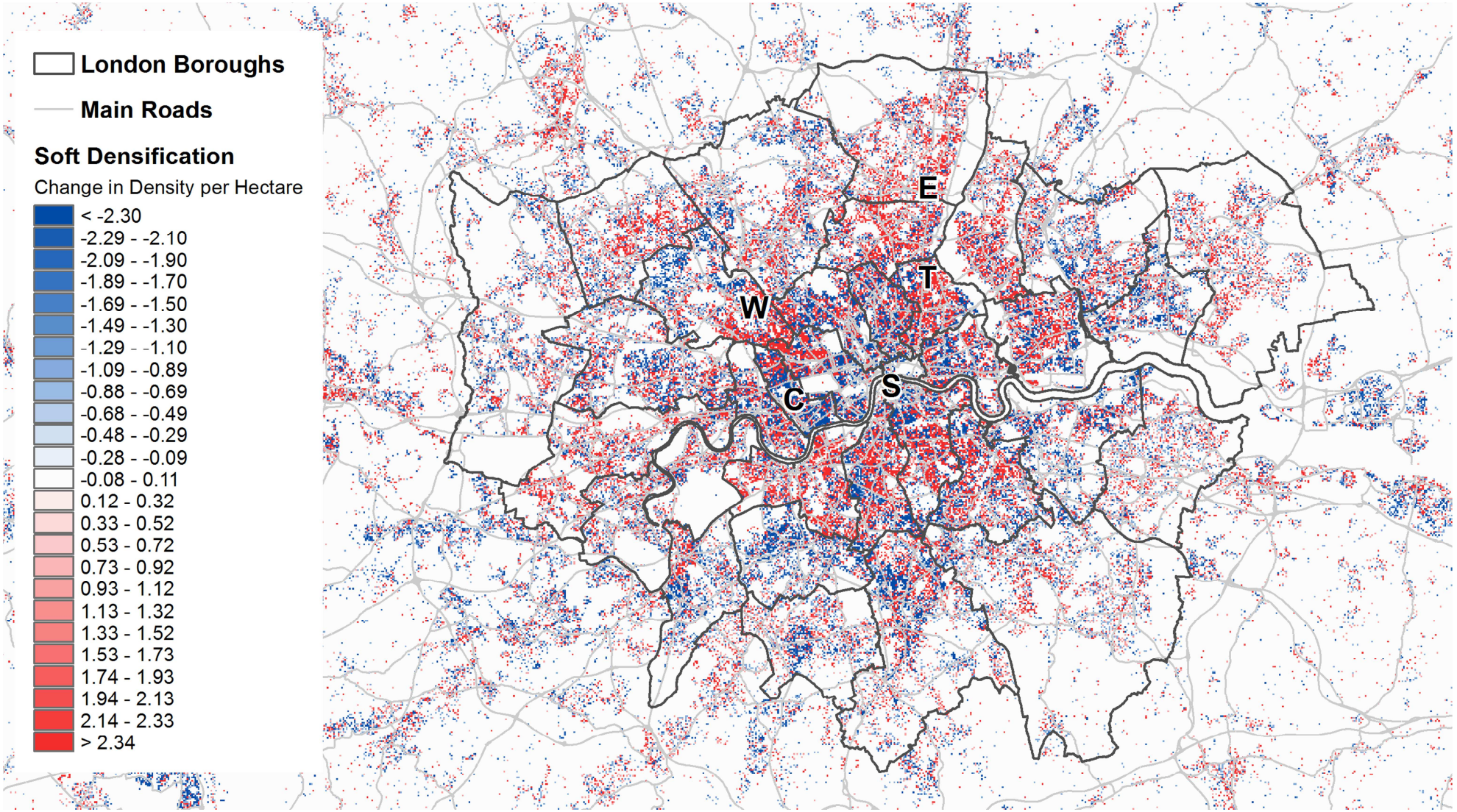


Figure 4: Varying Intensity of Soft densification: Greater London, 2001-2011 2km Moving Average (See Para 3.14)

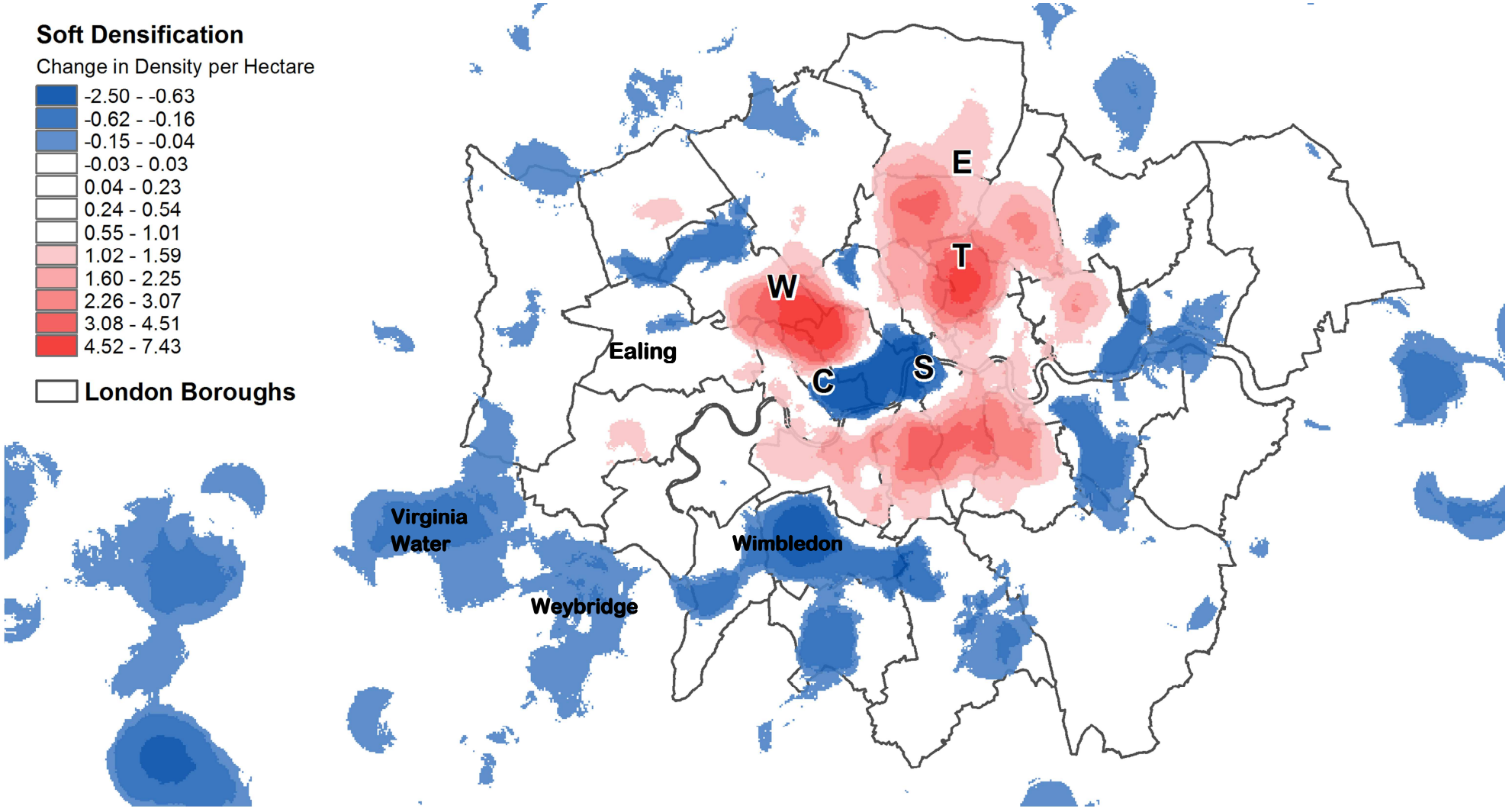
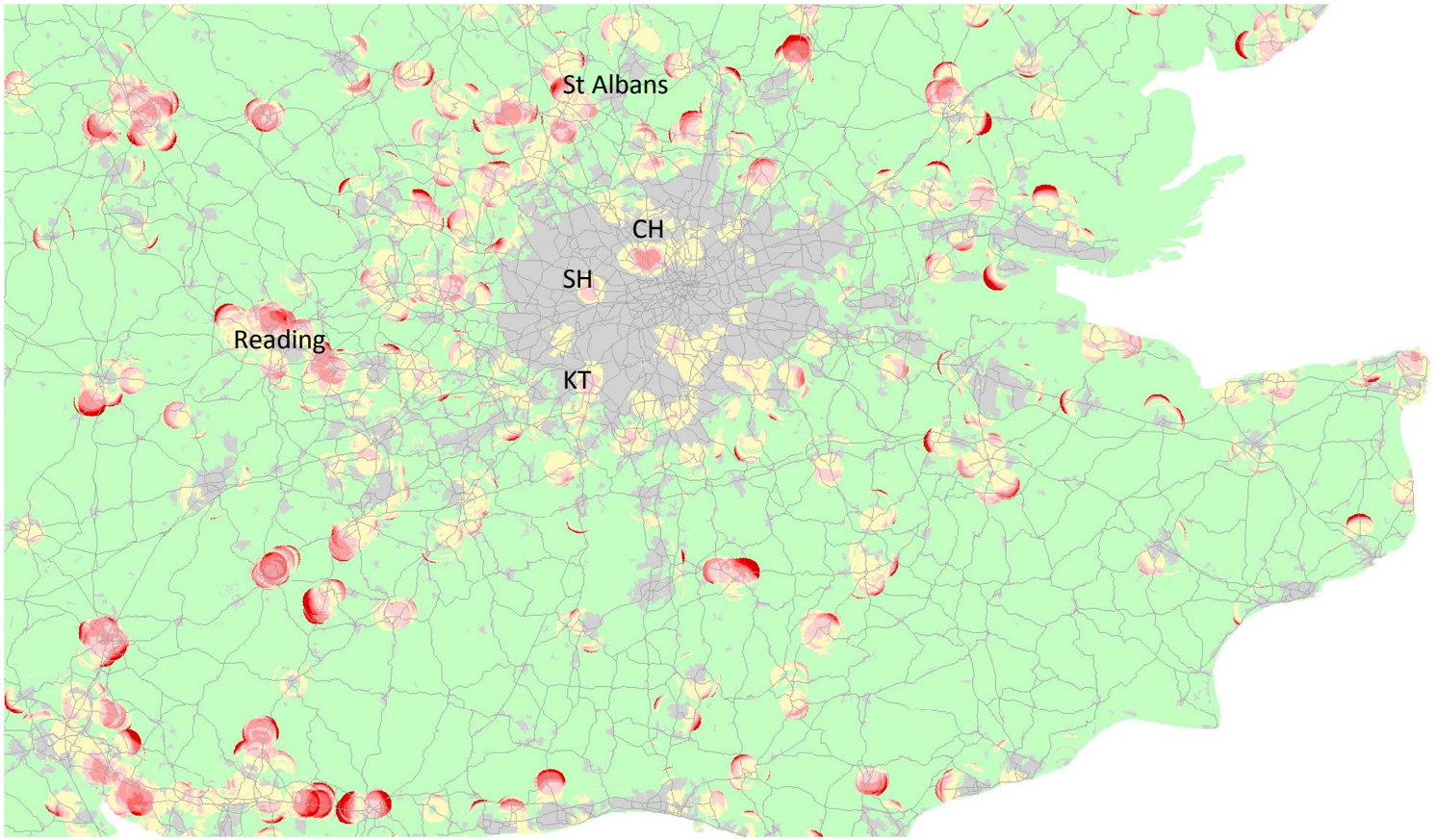
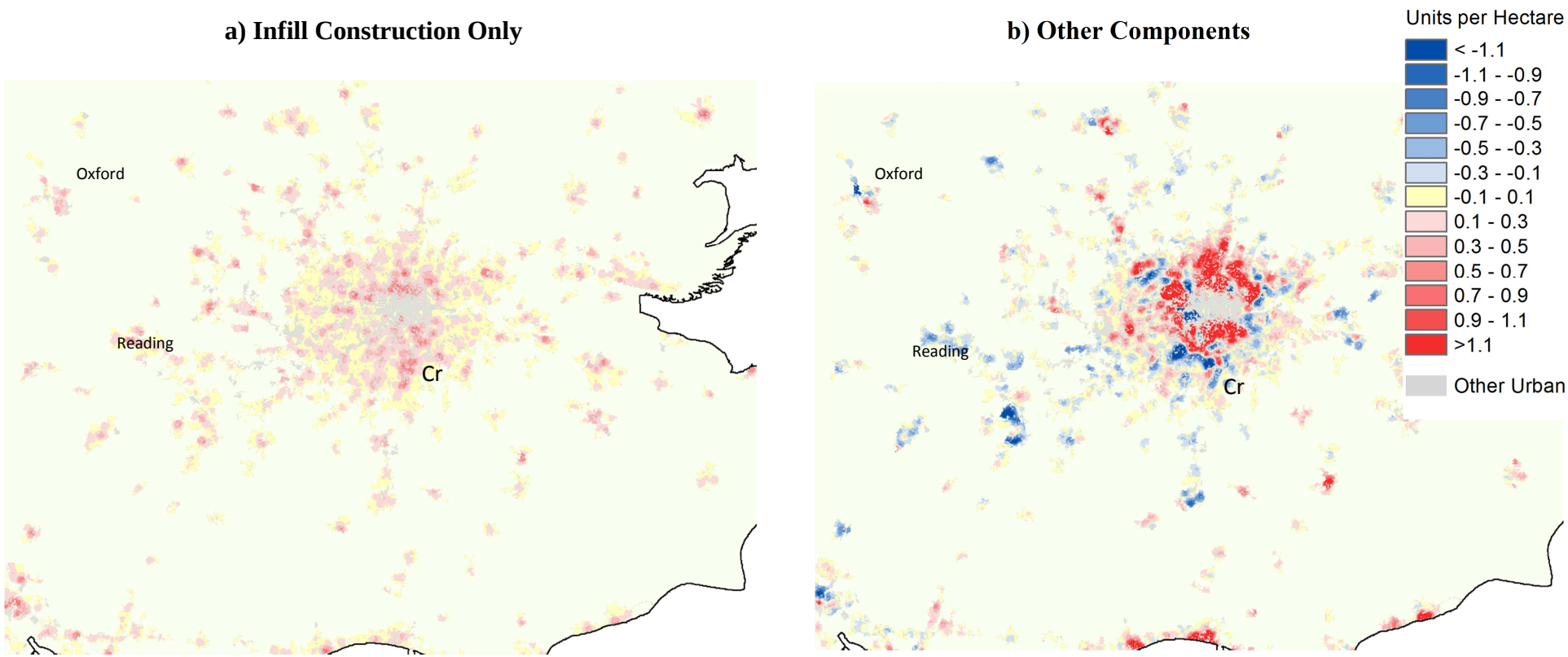


Figure 5: London & Environs; Rate of Garden Infill 2001-2011 Relative to Stock, 2001 (2km Moving Average)



CH Childs Hill KT Kingston-on-Thames SH Southall

Figure 6: London & Environs; Rate of Soft Densification 2001-2011 Relative to Stock, 2001



3.15 While Figure 3 provides an impression of the effect of soft densification almost street by street, Figure 4 provides a starker impression of the net effect of small scale adjustments to the dwelling stock within a 2km radius of any point. This again highlights the scale of soft densification in Willesden (W), Tottenham (T) and Edmonton (E). Net effects in other areas become clearer. The limited role of soft densification becomes clear in a group of localities such as Southwark (S) where large scale change is taking place. Here, as in the inner core of Westminster (C), the tendency to soft densification is weak, as change is controlled by major property interests. Figure 4 also highlights stable suburban areas both within the London administrative region such as Wimbledon and outside its boundary but within its physical urban area[13] where the net effect of small scale adjustments is strongly negative. The Surrey towns of Virginia Water and Weybridge provide examples of settlements of the latter type and are considered further in section 4. Finally comparison of Figure 3 and Figure 4 draws attention to contexts where there is substantial small scale activity but little net effect. This is exemplified by the eastern part of the London Borough of Ealing where conversion of family dwellings into flats appears to be almost exactly offset by deconversion[14] on a similar scale (a trend whose continuation since 2011 is confirmed in monitoring by the Greater London Authority (2014, p43)).

3.16 The extent of forms of garden infill consistent with the definitions of soft densification in London was relatively limited over the decade; a reflection of the generally high density of building on existing residential plots and a consequent emphasis on building extensions rather than plot subdivision. On the definitions used here, as evident in Figure 5, there are some areas of London where the rate of garden infill was higher – Southall (SH) in the London Borough of Ealing was one such area, an area centred on Childs Hill (CH) impinging on the London Boroughs of Camden and Barnet was another and Kingston-on-Thames (KT), a third. Higher rates were typical of suburban towns beyond the limits of Greater London, particularly in an arc stretching from Reading in the West to St Albans in the North.

3.17 Finally, Figure 6 highlights the manner in which the different components of soft densification combined to accommodate extra households in much of London's inner suburbs. This initial glance at London and its environs also serves to illustrate clearly that the welter of individual actions through which agents adjust the housing stock may and frequently do move in opposed directions. Not only are conversions and deconversions closely balanced in much of Ealing, for example, the relatively high rate of plot subdivision in Southall (Ealing) is not evident in the overall pattern of soft densification. Figure 6 points towards the extent to which a tendency towards densification evident in infill development may be negated by deconversions or amalgamation of dwellings. Within Greater London, it is clear that the high rate of infill construction found in much of Croydon is offset by adjustments to the existing stock tending to create fewer, larger dwellings. Figure 6 affords an initial appreciation of how this particular balance has offset or even

[13] See para 4.23.

[14] This term refers to conversion of a house which has been converted into flats back to its original usage as single dwellinghouse. The question of whether deconversion constitutes a material change of use requiring planning permission is not clear, but there is a legal precedent for this (London Borough of Richmond-upon-Thames v Secretary of State for the Environment, Transport and the Regions and Richmond upon Thames Churches Housing Trust [2000]).

negated any tendency to soft densification in areas to the South and West of Greater London.

3.18 The remainder of this report explores the geographic outworking of matters introduced to this point, working down the spatial scale and considering more systematically the issues raised in this sketch of soft densification in London. In the final section suggestions are made about the selection of case study areas for more detailed work. At this point, the London Borough of Ealing would seem a strong candidate given the different tendencies that were being played out. Its potential is enhanced further as it is one on the very few areas where a covert form of soft densification – accommodation in illegal outhouses – has been an issue (see see London Borough of Ealing, 2013).

4 Geographic Variation in Soft Densification in England 2001-2011

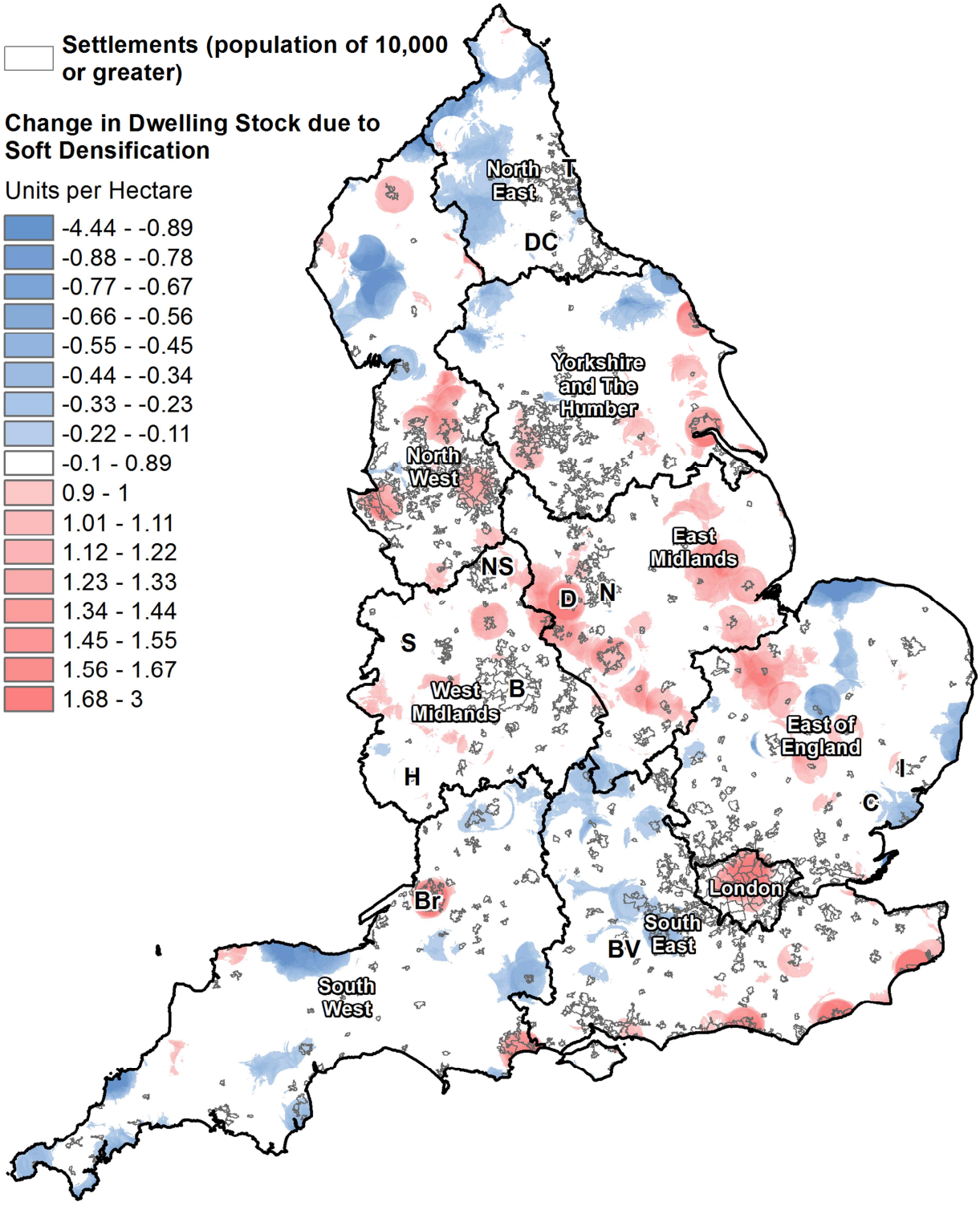
4.1 This section considers geographic variation in the extent of soft densification in the decade from 2001 and 2011 and the influences upon it. It aims to facilitate understanding of circumstances in which policies with a single-minded focus on urban densification – regardless of its form – are more or less likely to lead to forms of soft densification of interest to PUCA. From a policy perspective, of course, the immediately obvious influence was the appearance of the revised version of PPG3 in 2000, with its emphases on increasing residential density, and the recycling of previously developed land, but the following section attempts to understand outcomes in relation to policy more generally, and equally important, to geographic variation in market conditions.

4.2 Despite the remarkable extent to which urban areas proved capable of absorbing additional dwellings after 2001 (demonstrated in Table 1) and the undeniable contribution of soft densification (evident in Table 2), Figure 7 shows that its geographic incidence was very patchy. Figure 7 shows the effect on ambient density hectare by hectare across the country, with the boundaries of the NUTS1 regions and the limits of physical urban areas with a population of 10,000 or more also shown. Figure 8 complements this by showing variation in rates of soft densification over the decade relative to stock in 2001 (Figure 8a), and the share of overall growth in the dwelling stock over that period that soft densification accounted for (Figure 8b).

4.3 Figure 7 shows that the increasing densities so evident in London are reflected in Bristol (Br) in certain south coast towns and in many cities and towns in the East Midlands. The effect of soft densification on the major urban areas of the North West was clearly also important, but the effects on the conurbations of Yorkshire and the Humber was a little less clear, and the effect on the West Midlands conurbation faltering. Soft densification would appear to have had limited effect on densities in the North-East region (but Figure 8b shows that it was an important part of overall densification). It is evident from Figure 8a that the rate of soft-densification in Hull (Hu) was above average, but Figure 8b puts this in the context of that city's shrinking housing stock. Moreover the effect of households' preferences for more space ensured that in parts of the South-East and most of the South-West some combination of demolition, amalgamation of dwellings and deconversion cancelled out any tendency to soft densification, and reduced densification overall.

4.3 Figure 8b suggests the importance of seeing soft densification in the context of densification and change in the space economy more generally. Furthermore, the PPG3 densification policies should be seen as the complement of long-established Green Belt policy in many but not all parts of England. Apart from the direct effect of exerting upward pressure on densities in urban areas this combination appears to have had three further important effects, which seem to have altered the particular nature of change within those urban areas. First, as a corollary of the densification of urban areas evident in Table 1, significant physical expansion of urban areas became very unusual – with Swindon (Sw) and Milton Keynes (MK) being the principal exceptions. Second, the emphasis upon previously developed sites not

Figure 7: Growth in Dwelling Stock due to Soft Densification; England; 2001-2011 (10km Moving Average)



only favoured archetypal brownfield schemes such as former inner city industrial sites, but as suggested at para 2.4 also favoured large-scale development at brownfield sites in rural locations poorly related to the established framework of urban settlement. Sites such as former military airfields (eg Fradley in Staffordshire, or Hawkinge in the Kent Downs AONB), and 19th-century institutions deliberately sited away from urban areas became foci for development. These were the alternatives offered to households wanting *new* dwellings to the opportunities afforded by densification. Third, in many areas – particularly Greater London – this combination of policies exerted substantial upward pressure on house prices. At the same time, and arguably not disconnected from this policy combination, housing output over the decade was historically low. The effect on soft densification of the PPG3 policies should be seen in this context.

The position of the demand curve

4.4 In attempting to understand spatial variation in soft densification it seems reasonable to assume first that the position of the demand curve for a locality will depend on the scale of the existing dwelling stock. There is an expectation that variation in the rate at which units are created through soft densification[15] (along with growth in the dwelling stock more generally) will depend on potential household growth. The preferred measures to explore this are based on the projected growth of households between 2001 and 2037 (due to DCLG 2015). Figure 9a shows absolute projected growth in numbers of households, while Figure 9b shows this relative to the 2001 dwelling stock. These measures are treated as indicators of demand pressure, which may be correlated with measures of soft densification and its components. Measures based on long-term household projections are attractive in that (unlike estimates of recent housing output or overall recent growth in the dwelling stock) they are not directly affected by recent planning policy, constraint, or cyclical fluctuation. The statistical relationship between the rate of soft densification and the rate of long-term household growth is confirmed by the investigation (at the urban area scale), but it is very weak[16].

4.5 Two factors that might limit the relationship between the level of demand and the rate of soft densification might usefully be considered. First, where demand is sufficiently high, bid prices or bid rents might ensure that radical densification projects might be viable (high costs notwithstanding), and hence developers of those large-scale projects should be expected to be successful in securing the necessary land. This view would seem consistent with the dearth of soft densification in parts of central London (see Figure 4), and the tendency to find lower rates of soft densification (and for soft densification to play a smaller part in overall densification) at the cores of the provincial conurbations than at their fringes (see Figure 8 (Bi, Ma, Ls)).

4.6 A second consideration tempering the relationship between high demand and soft densification might be the possibility that bid prices for *larger* units and larger plots might in some circumstances be sufficiently high to remove any incentive to

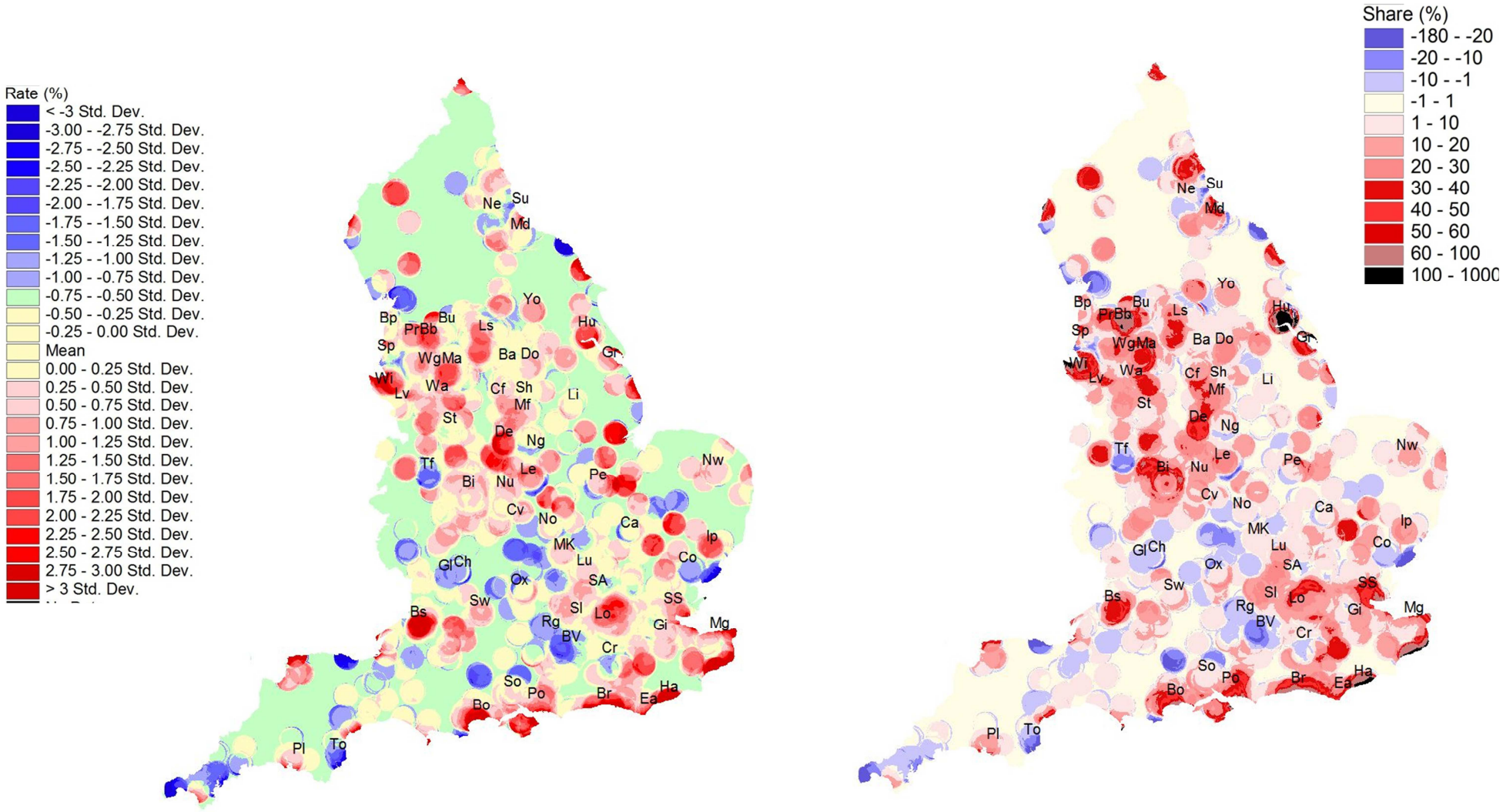
[15] References to the rate of soft densification refer to the estimated number of units gained through soft densification (as defined in para 2.27-2.28), over the period 2001-2011 as a percentage of the stock in 2001. It may be positive or negative.

16 Variation in this measure (mapped in Figure 4 for the London region) accounts for less than 6% of the variance of the rate of soft densification (ie R^2 is less than 0.06).

densify. In principle, as suggested in para 2.15, this might weaken any tendency to subdivide dwellings, or to subdivide plots or might even encourage deconversion

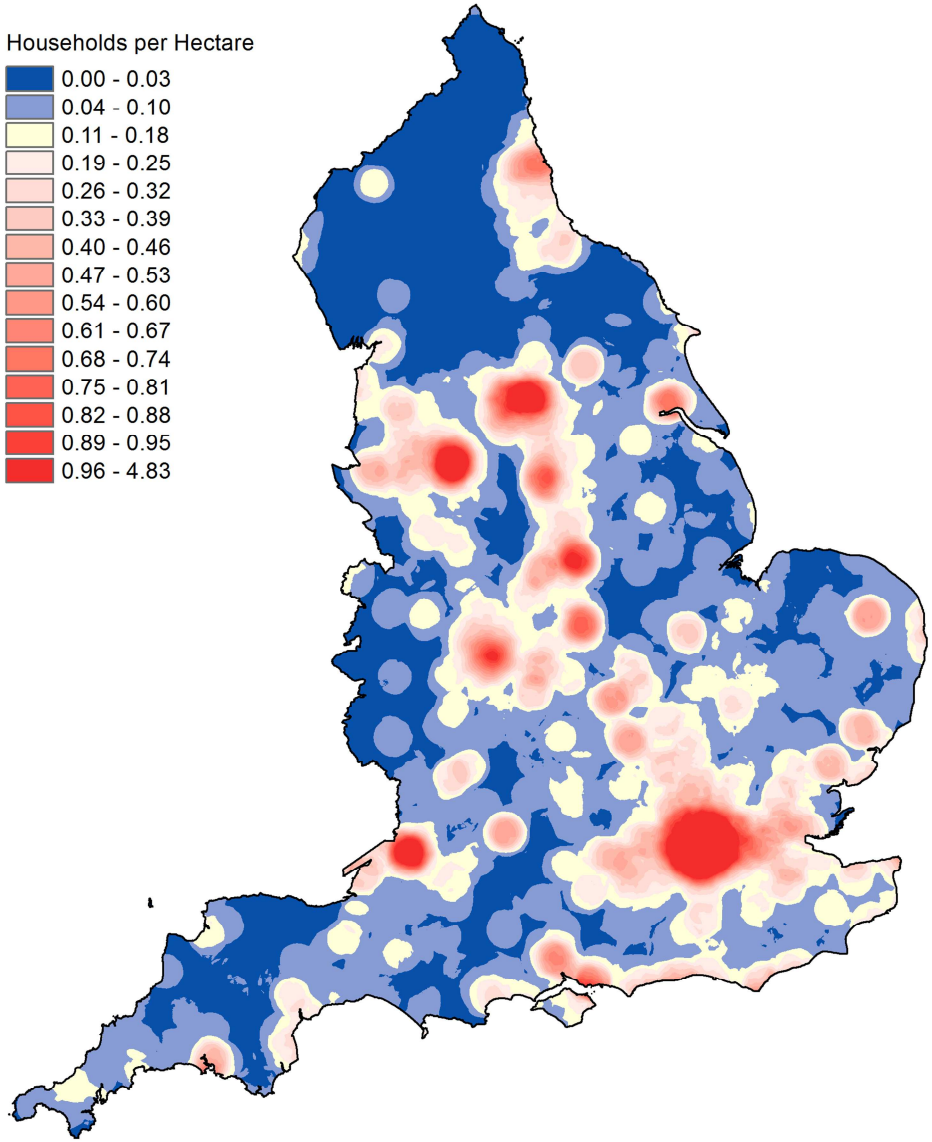
Figure 8: Variation in Soft Densification, England 10km Moving Averages

a)Rate of Soft Densification 2001-2011 relative to stock 2001 b) Soft Densification as a Proportion of Growth in Dwelling Stock2001-11

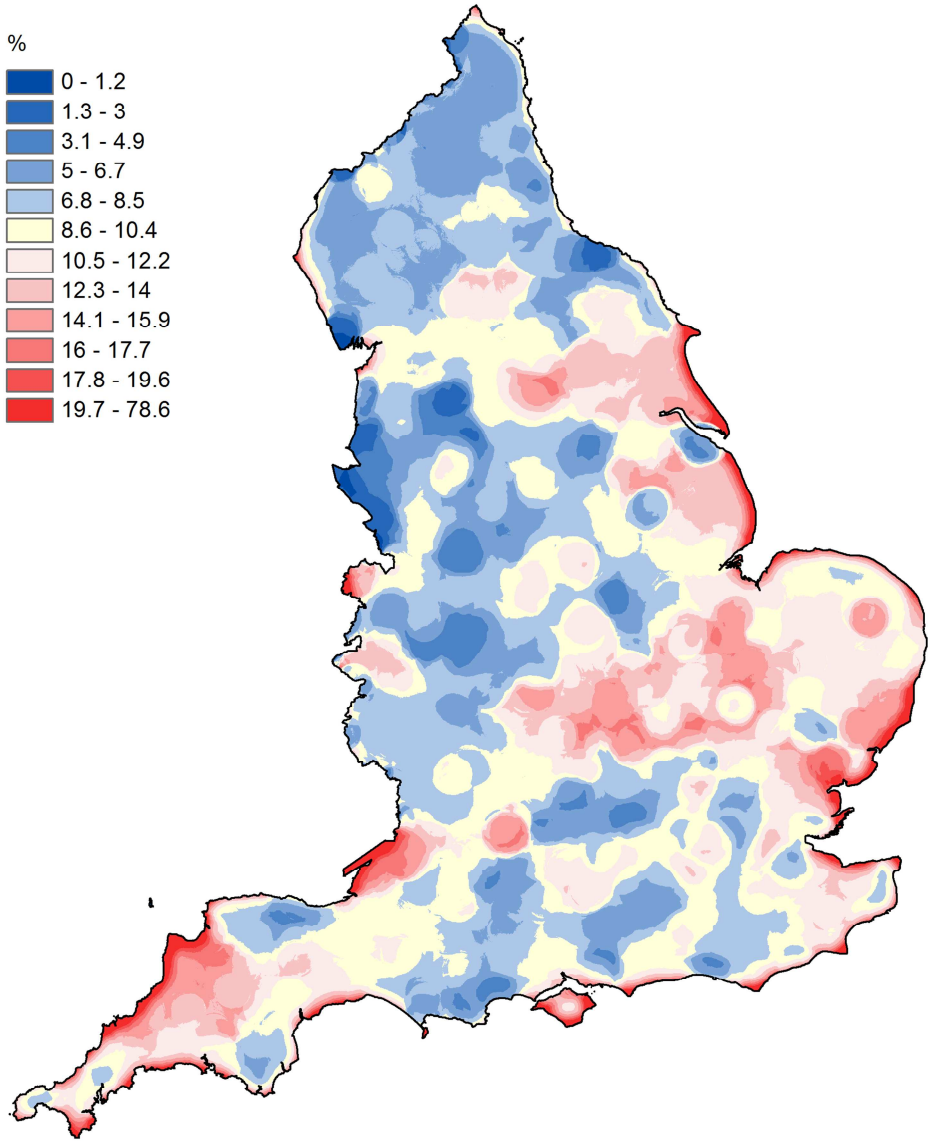


Towns to which mnemonics refer are listed in Table 5

Figure 9: Long Term Growth 2001-2036 a) Absolute b) as Percentage of Stock,2001

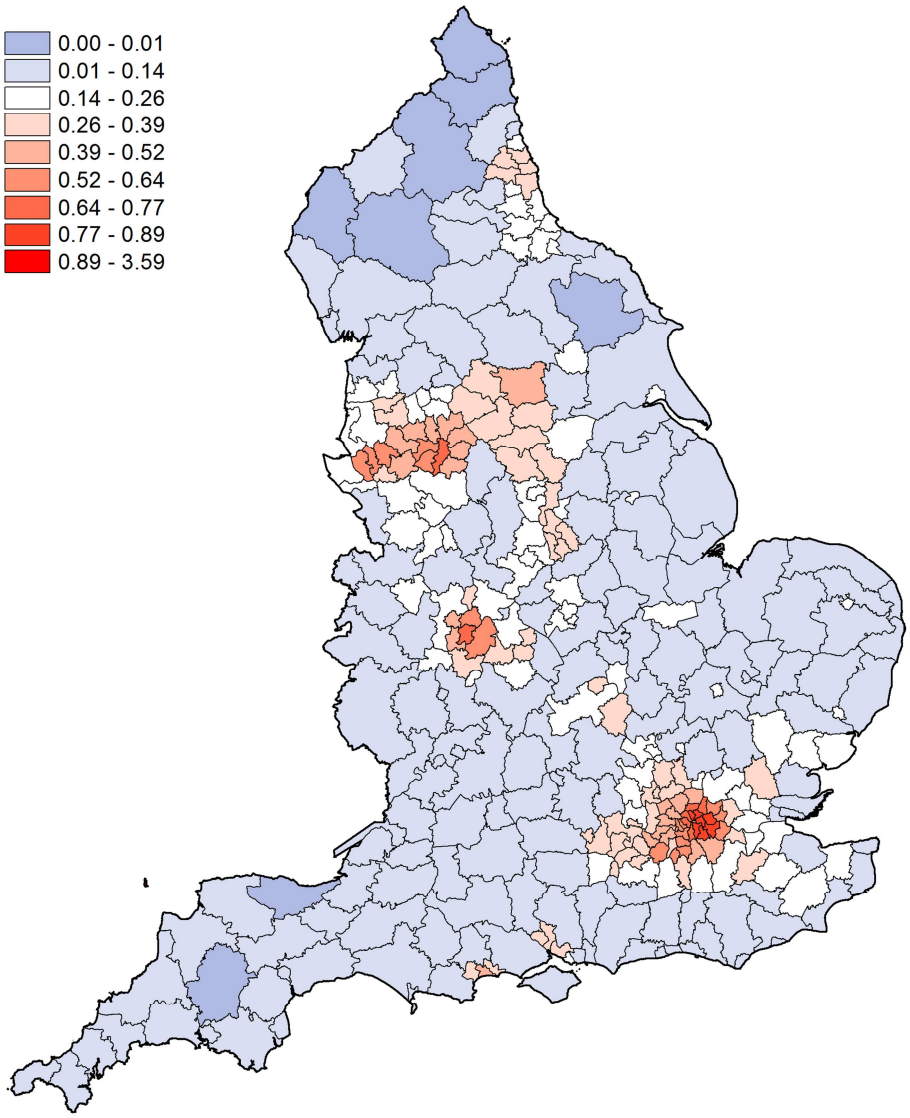


a)



b)

Figure 10: Potential Flow of Urban Land for Residential Development (Within Local Authority Areas)



construction of fewer, larger ones in their place. This is posited as the explanation of the effects observable in Ealing and the Surrey towns discussed in para 3.14.

The position of the supply curve

4.7 Turning to the supply side, it should be expected (other things being equal) that the position of the supply curve for previously developed land and for existing non-residential buildings will depend on the nature and configuration of inherited land uses ie the degree of physical urbanisation in a locality. This is not to say that the supply of land and property for soft densification is fixed, but that the scale of the stock of residential units (single dwellings for conversion to flats; divided houses for deconversion etc) will condition what can be provided from the existing building stock in the short term. Moreover, the amount of land coming forward for *infill* construction, although not fixed at some "available" level or limit will be strongly influenced by settlement morphology and land use structure.

4.8 Earlier work provides strong grounds for believing that regardless of reigning prices, the flow of land for infill construction and hence the rate of soft densification should depend on physical structure. Bibby and Brindley (2006) showed a strong relationship between the flow of previously developed land coming forward for housing development in each local authority district (HLANDBF), its urban extent[17], and measures of previously developed land (PDL) recorded as available for development in the National Land Use Database (NLUD-PDL):

HLANDBF = 0.0003 +0.0074*URBX +0.2150*PDLR +0.0318*PDLO - 0.0001*XDEN

where:

HLANDBF is the flow of brownfield land developed for housing in hectares

URBX is the proportion of the area that is urban

PDLR is the area of NLUD previously developed land allocated for residential use,

PDLO is the area of NLUD previously developed land allocated for other uses, and

XDEN is excess ambient dwelling density [18]

4.9 This expression accounts for more than 80% of the place-to-place variability of the flow of brownfield land actually developed for housing at the local authority district scale[19]. Predicted values are shown in Figure 10. The implication is that the brownfield infill component of soft densification *can* be high relative to household growth provided that the planning system is effectively able to divert development to brownfield infill sites. This is possible with a planning framework which prohibits development of greenfield sites, *to the extent that settlement morphology*

[17] "Urban extent" refers to the proportion of the area within a local authority's jurisdiction covered by physical settlement with a population of 10,000 or more. This is estimated by reference to settlement boundaries prepared by Ordnance Survey and shown on Figure 7.

[18] "Excess ambient dwelling density" measured as ambient density minus 20dph attempts to capture any tendency for infill construction to be limited as the proportion of plot area covered by buildings or more generally in response to what Conzen terms "repletion" (1960, pp. 59, 66). Its coefficient has the expected negative sign.

[19] $R^2 = 0.823$

and land use structure imply a commensurate expected flow[20] *of land for redevelopment* and, of course, that development on brownfield infill sites will be commercially viable. (That is to say that the market price of the property asset created will be greater than the cost of its creation).

4.10 Variant understandings of the relative importance of the influence of structural preconditions, reigning prices and local policy influenced the flow brownfield land for housing became important in the decade under investigation because the percentage of new dwellings that were accommodated on brownfield sites was used as an indicator of local authority performance in steering development and achieving the goals set out in the 2000 revision of PPG3, even though an authority had no control either over the inherited physical structure of its area or of land prices.

The complex influence of house prices

4.11 Introducing the price of units into the analysis is not straightforward in practical terms. From a market perspective, *even if* responses to change in price (ie elasticities) were uniform across the country, the number of units generated through soft densification in these different physical urban areas should be expected to reflect different equilibria. Similar rates may therefore be associated with widely differing prices. (Geographic variation in house prices and in a residual land value proxy are illustrated in Figure 11)[21]. As it happened, the rate of soft densification in Bristol between 2001 and 2011 (4.7%) was similar to that in Blackburn (4.6%), but typical house prices were very different. In Bristol, the average for the whole period was £238,523 compared with £165,381 in Blackburn (both in 2013 QIV prices)[22]. The fact that the anticipated flow of previously developed land in Bristol might accommodate household growth for 2.5 years[23] but the corresponding flow in Blackburn might suffice for 17.3 years reflects the differing position of the demand and supply curves in the two localities.

4.12 More generally, high rates of soft densification will be associated in some instances with high house prices driven by high demand. Elsewhere, they will be associated with low prices and significant stocks of vacant land. The implication for understanding the pattern of place-to-place variation in soft densification is not that price is unimportant, but that it would be desirable to understand its effect by estimating separate equations for the supply and for the demand for units generated through soft densification, and at the same time to estimate formally the effects of anticipated household growth, settlement and land use structure and other variables. Although this is an instance of the well-known "identification problem" which might in principle be circumvented by the use of two instrumental variables (one for the supply side and one for the demand side), a substantial preliminary statistical investigation failed to identify variables appropriate to serve as instruments.

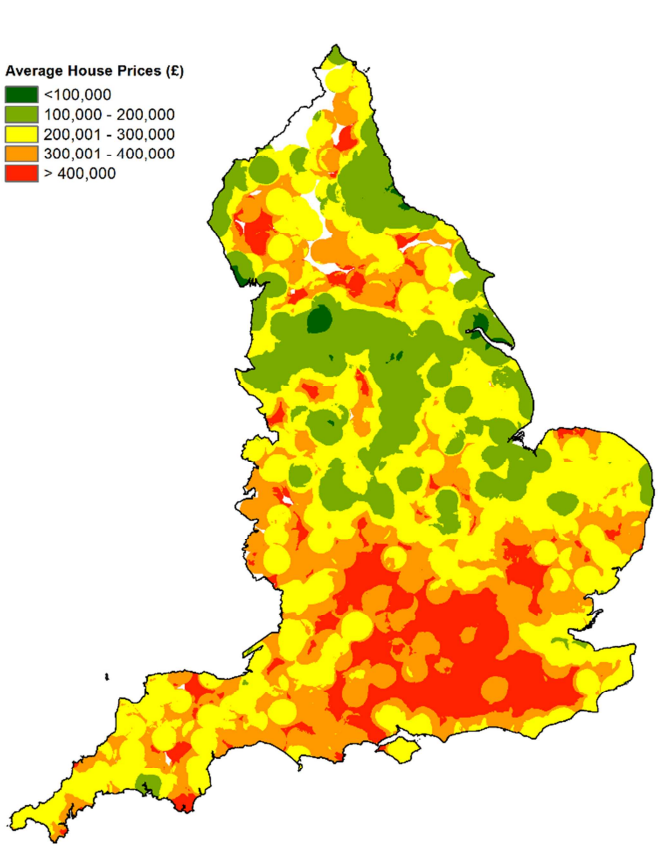
[20] HLANDBF is here treated as the expected flow of brownfield land for housing – a measure indicating the position of an upward sloping supply curve ie the constant in a supply equation.

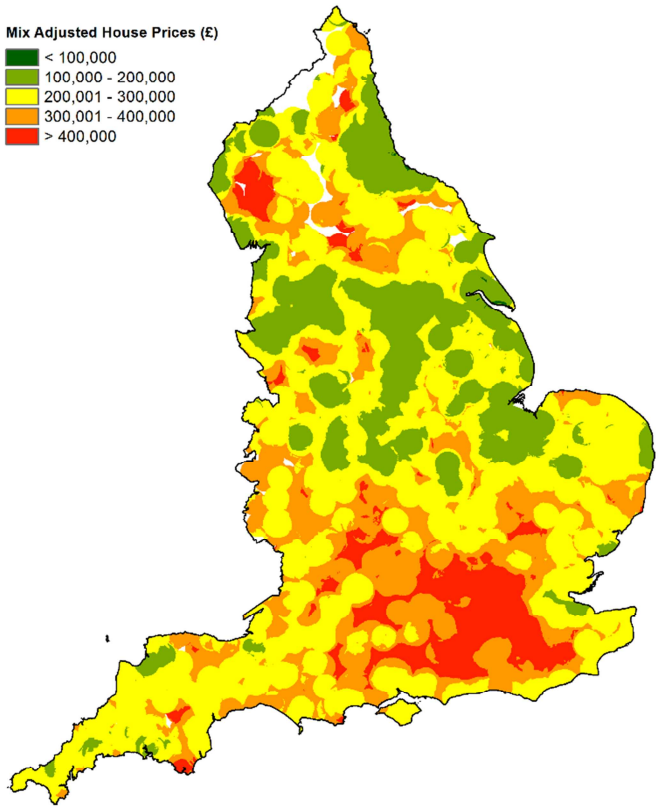
21 The residual land value proxy is constructed using the value of property described as "new" within the Land Registry data and site level dwelling densities from LUCS to estimate value per hectare and a yardstick estimate of costs.

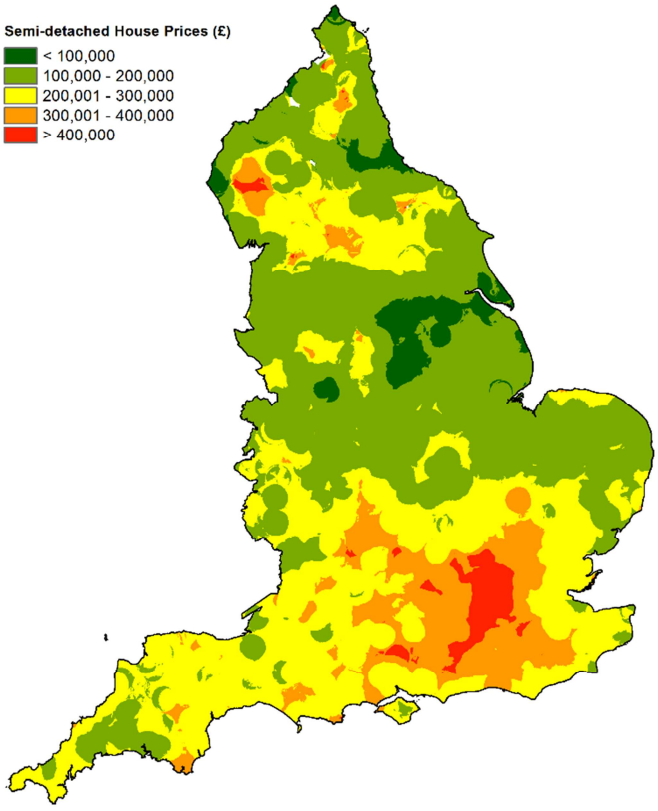
22 All house prices used in this report are adjusted to the level of the fourth quarter of the 2013 calendar year-abbreviated to 2013 QIV prices. These figures are drawn from Table 5. The interpretation and implications of the very high rate of soft densification in Blackburn is discussed in para 4.28.

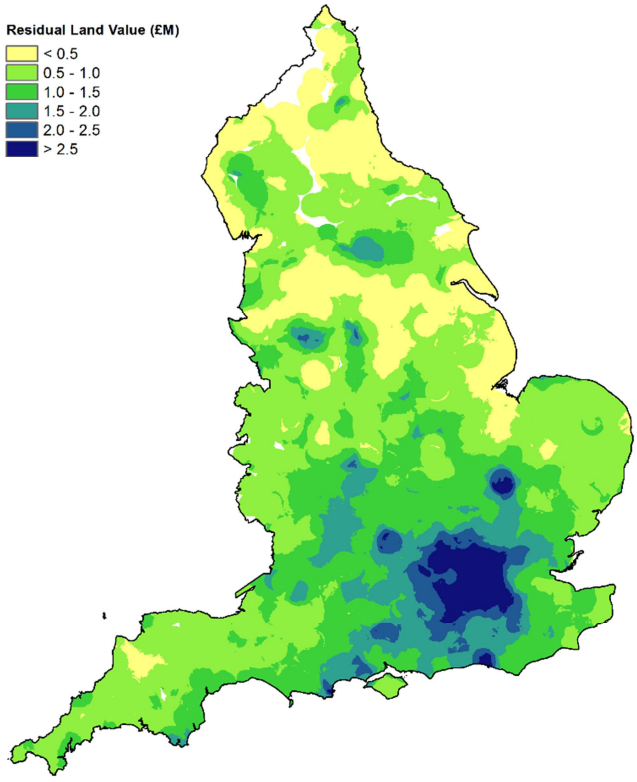
[23] These figures are based on the equation in para 4.8 and the assumption that units were built at 30dph.

Figure 11: House Prices 2001-2011 (2013 QIV values)









4.13 It therefore proves necessary to adopt a less formal approach. This still identifies the circumstances associated with different degrees and forms of soft densification, but can neither estimate elasticities nor coefficients encapsulating the potential response of the rate of soft densification or of its components to varying measures of urban structure or household growth.

Variation in Overall Densification in England 2001-2011

4.14 Overall spatial variation in the tendency to accommodate additional dwellings between 2001 and 2011 is illustrated in Figures 12, 13 and 14. Figure 12 has been produced by comparing counts of dwellings at the 100m cell scale for 2011 and 2001 and generalising the results using geographic moving averages at the 400 m scale. At this level of resolution it is possible to see not only the intensity of densification in much of London and the cores of cities such as Bristol, Manchester and Leeds, but also to visualise the very uneven nature of densification within midland and northern cities. Densification characterized the cores of those cities rather than their suburbs and the central cities of provincial conurbations rather than their satellite towns. Set alongside Figure 8b, soft densification has played a bigger role in those areas where overall densification was less marked.

4.15 Use of moving averages at the 10 km scale allows construction of Figures 13 and 14 from the same underlying data. Figure 13 shows absolute change over the decade in the number of dwellings within 10km of any point, while Figure 13 expresses this change as a rate relative to numbers of dwellings within 10km of that point in 2001. Figure 13 highlights the importance of the cities in absorbing additional dwellings, and the overall extent of densification generally. The dominant pattern responds to the series of cities which runs from London, through the West Midlands conurbation to the Mersey Belt extending from Liverpool to Manchester in the North West region. A second ridge of marked densification runs from the cities of Leicester and Nottingham in the East Midlands to Sheffield and Leeds (within Yorkshire and the Humber). In absolute terms, too, the mature urban areas of the North-East accommodated very substantial numbers of additional dwellings. Overall, the pattern evident in Figure 13 is substantially influenced by the expected flow of previously developed land (see paras 4.8-4.9).

4.16 Figure 14, although based on the same data, highlights *rates* of growth in the dwelling stock relative to 2001 levels, providing an entirely different picture. The highest rates of growth (marked by the deepest reds) are found in the South West from where the so-called “Golden Belt” (Hall, 1988; Bibby and Shepherd, 1991,1996) stretches north-eastwards to Cambridge, straddling the margins of the South East and the East and West Midlands, and extends northwards through Lincolnshire to York. From here a swathe of localities marked by relatively sparse populations, but high rates of growth form a North Pennine growth arc curving back towards Cumbria. In contrast to Figure 13, the pattern evident here is a reflection of potential household growth (Figure 9b).

Figure 12: Change in Estimated SCUOs 2001-2011; England (400m Moving Average)

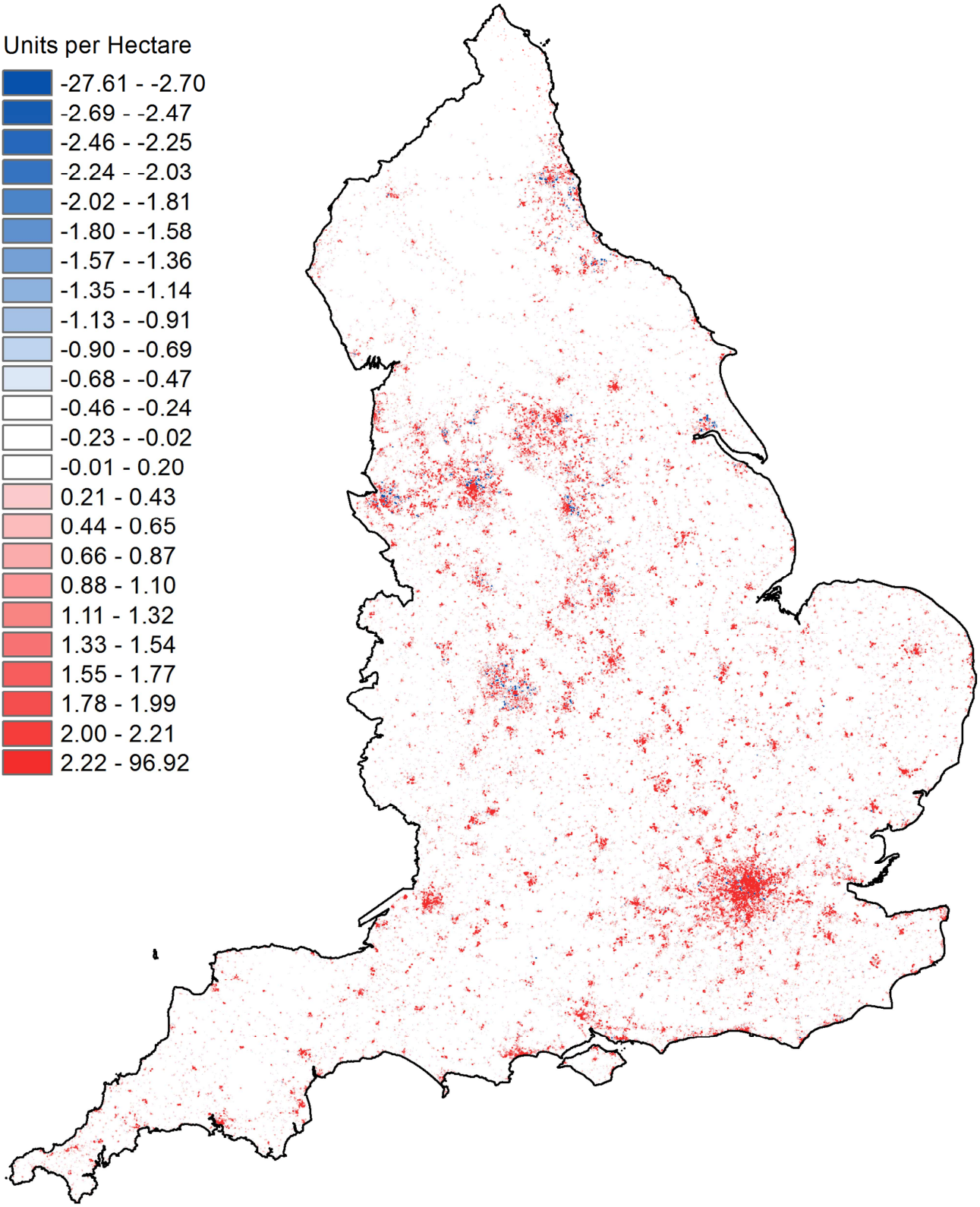


Figure 13: Absolute Growth in Dwelling Stock; England; 2001-2011 (10km Moving Average)

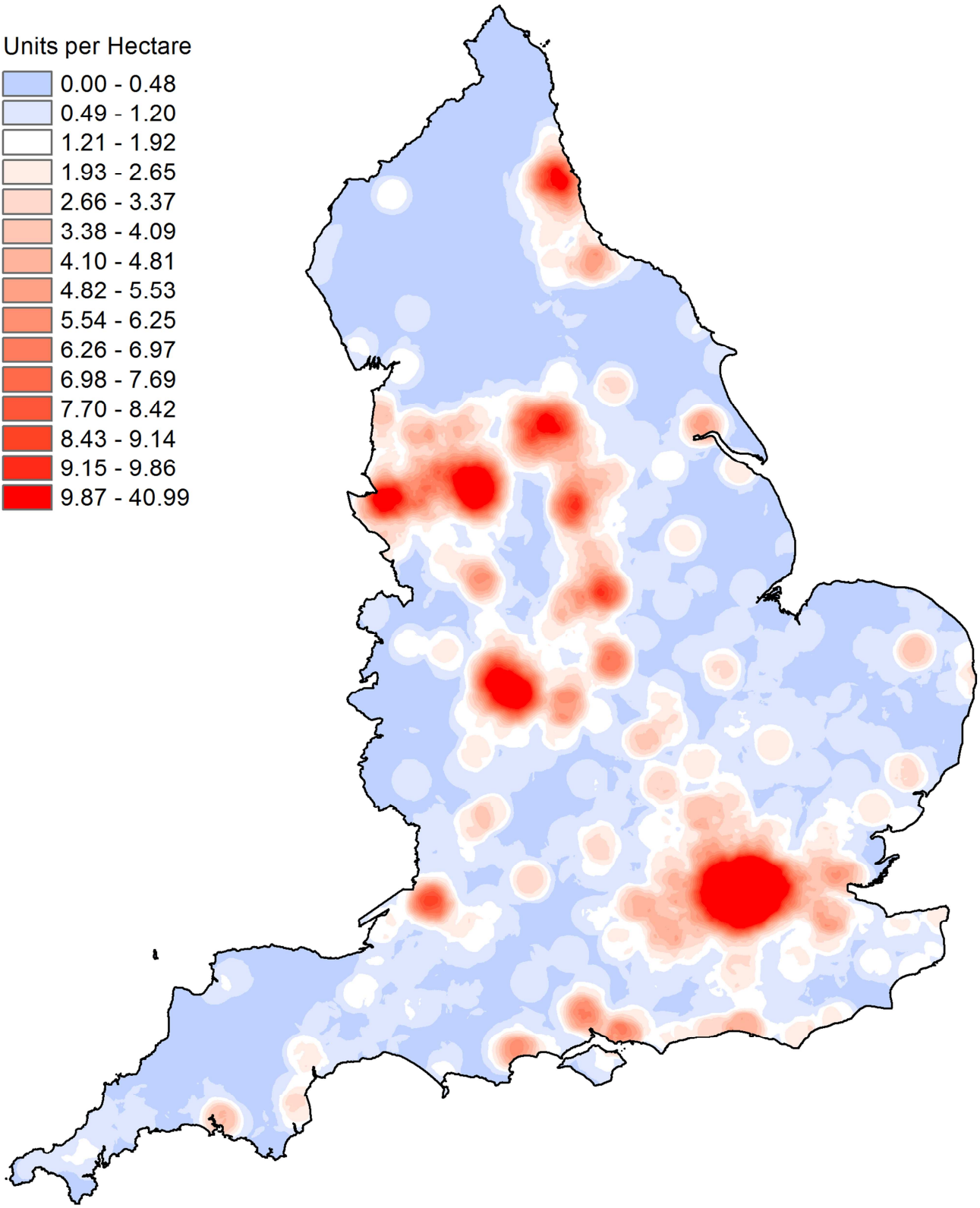
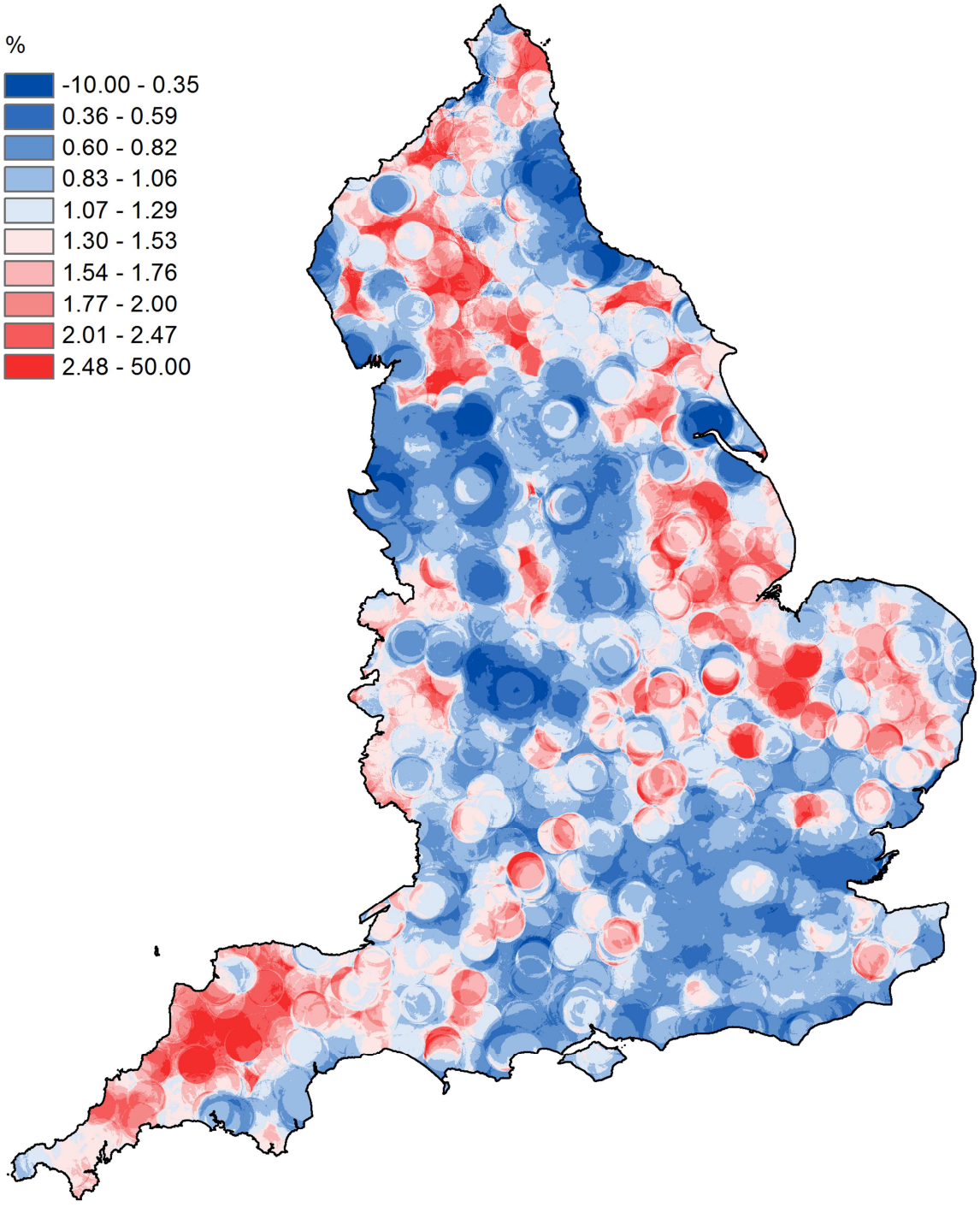


Figure 14: Relative Growth in Dwelling Stock; England; 2001-2011 (Percentage; 10km Moving Average)



Regional Variation in Soft Densification

4.17 The differentials in the rates of soft densification at the level of NUTS1 regions (whose limits are shown in Figure 7) are shown in Table 4. They reflect the relation between the patterns evident in Figures 13 and 14. Table 4 demonstrates the vast disparity in the scale of the dwelling stocks between the regions evident in Figure 13, while there is also an evident relation to the underlying rates of household growth evident in Figure 14. Table 4 shows only information for those parts of the urban areas in each region which are taken to exemplify the SFRNs.

4.18 At NUTS1 region level, London combines the second-highest growth in the dwelling stock in *absolute* terms with the second-highest *rate* of growth (see col 4 of Table 4). Soft densification accounted for over two-fifths (41.7%) of growth in its dwelling stock, and increased ambient density by 0.61 dwellings per hectare, but was achieved overwhelmingly through internal subdivision of buildings. (Table 4 shows that two thirds (68.3%) of soft densification came from this source). The opportunities afforded for recycling urban land and buildings and the rate of growth in potential households combined in the context of the very strict containment regime of the Metropolitan Green Belt to allow a soft densification rate of 3% per decade (col 10 of Table 4), almost half as great again as in any of the other regions.

4.19 The two NUTS1 regions with rates of soft densification closest to that of London (the East Midlands and the North West) embody very different combinations of circumstances. The rate of growth of dwellings in SFRNs in the East Midlands was 6.6%; that in the North West was 4.4%. The offsetting factor underlying the high rate of soft densification in the North West was the scale of the stock of urban land governing the position of the supply curve. Green Belt constraint beyond the urban areas, coupled with local policies guiding developers towards recycling the many small sites and urban infilling ensured that soft densification came to account for a large portion of the additional units created. It represented a larger part of the net increase in dwellings in the North West (48.5%) than in London (41.7%), the East Midlands (32.0%) or any other region.

4.20 More generally, reference to the rate of growth of the dwelling stock and the settlement structure of each NUTS1 region provides a way of beginning to understand place-to place variation in soft densification. The West Midlands and the North East with relatively low rates of growth experienced the lowest rates of soft densification (col 10). The South-West with a relatively small dwelling stock showed (at 8.5% over the decade) the highest rate of growth, but its urban structure – lacking major conurbations – did not favour soft densification, and the overall rate was a moderate 1.8% (col 10).

4.21 The various components of soft densification are differentially important in different regions. This is particularly clear in the case of garden infill. The rate of residential plot subdivision (marked "Garden Rate") shown in col 13 of Table 4), is associated with high demand. Division of this rate by the overall rate of soft densification (col 10) shows that in the South East and South West garden infill accounted for 18% of all soft densification, but only 5% in the North East.

Table 4: Soft densification, English Urban Area SFRNs only, by Region 2001-2011

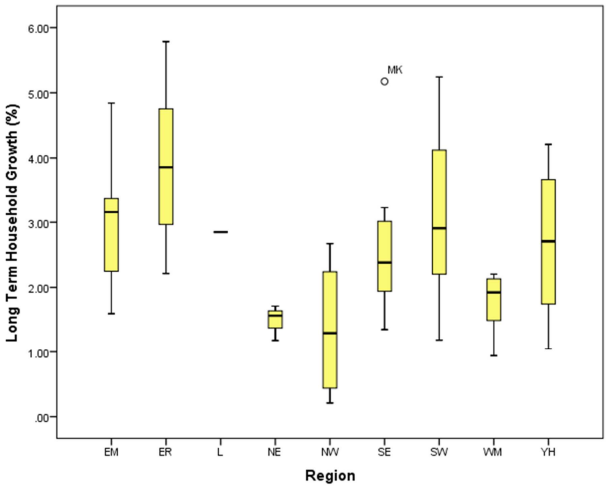
Region	Dwellings 2001 ('000s) (1)	Net Increase 2001-2011 ('000s) (2)	New Build 2001-2011 ('000s) (3)	Growth Rate (%) (4)	Building Rate (%pa) (5)	Gained by S&C ('000s) (6)	Gained by Soft Densification			Soft Densification				
							Total ('000s) (7)	Infill Construction ('000s) (8)	By S&C ('000s) (9)	Rate (%) (10)	Share of Net Change (%) (11)	Part By S&C (%) (12)	Garden Rate (%) (13)	Density Increase dph (14)
East Midlands	1134	75	56	6.6	4.9	19	24	14	10	2.1	32.0	41.7	0.29	0.34
Eastern	1355	92	68	6.8	5	24	20	16	5	1.5	21.7	25.0	0.23	0.24
London	2083	151	82	7.2	3.9	69	63	20	43	3	41.7	68.3	0.14	0.61
North East	811	23	28	2.9	3.4	-4	9	7	2	1.1	39.1	22.2	0.06	0.19
North West	2344	103	102	4.4	4.3	1	50	26	24	2.1	48.5	48.0	0.12	0.37
South East	2293	153	112	6.7	4.9	42	36	32	4	1.6	23.5	11.1	0.28	0.24
South West	1235	105	70	8.5	5.6	35	23	22	1	1.8	21.9	4.3	0.32	0.30
West Midlands	1694	75	74	4.5	4.4	1	24	17	7	1.4	32.0	29.2	0.17	0.22
Yorkshire:Humber	1528	79	65	5.2	4.3	14	27	18	10	1.8	34.2	37.0	0.21	0.30
England	**14477**	**857**	**655**	**5.9**	**4.5**	**201**	**275**	**171**	**104**	**1.9**	**32.1**	**37.8**	**0.20**	**0.32**

S & C Subdivision and Conversion

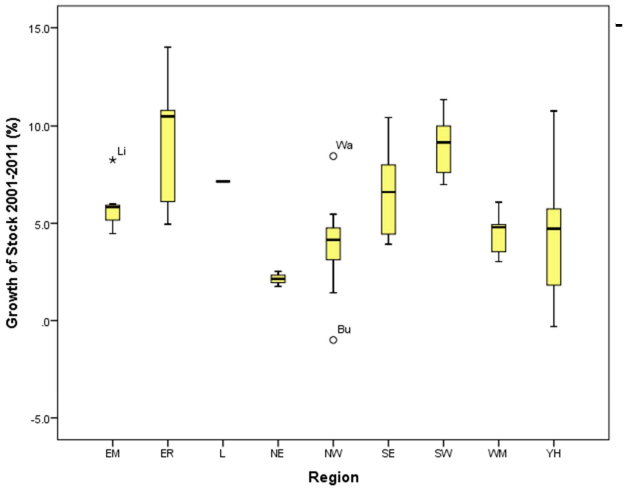
Source:
1 Post Code Address File, 2001 QII
2 Difference between Post Code Address File, 2011 QII and Post Code Address File, 2001 QII
3 DCLG Land Use Change Statistics (adjusted)
4 Col 2 / Col 1*100
5 Col 3 / Col 1*100
6 Col 2 - Col 3
7 Difference between Post Code Address File, 2011 QII and Post Code Address File, 2001 QII for continuing Unit Postcodes
8 DCLG Land Use Change Statistics (adjusted) for selected sites in areas with continuing postcodes
9 Col 7 - Col 8
10 Col 7 / Col 1*100
11 Col 7 / Col 2*100
12 Col 9 / Col 7*100
13 DCLG Land Use Change Statistics (adjusted) for selected sites in areas with continuing postcodes (See Box 4) / Col 1*100
14 Col 7 / (Area in SFRNs)

Figure 15: Regional and Sub-Regional Variation in Household Growth and Soft Densification; England; 2001-2011

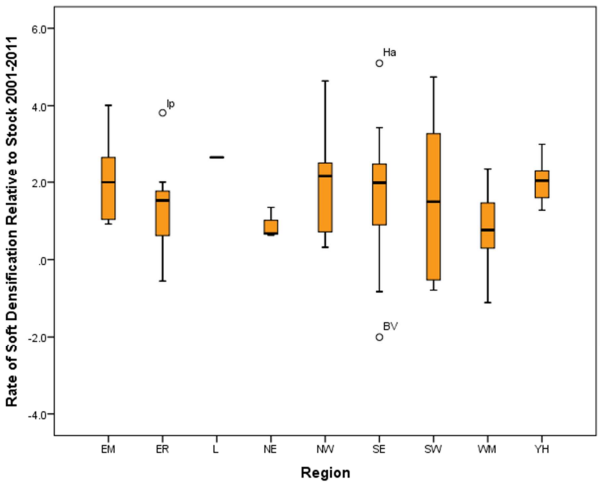
a)Household Growth



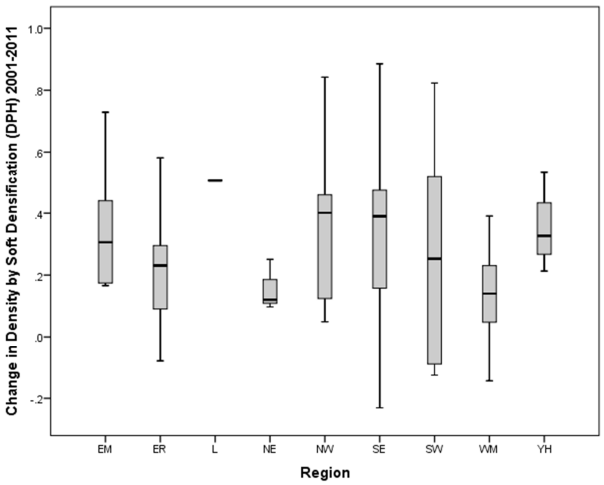
b)Increase in Dwellings 2001-2011



c)Rate of Soft Densification 2001-11



d)Change in Density by Soft Densification 2001-2011



NUTS1 Regions:

EM: East Midlands; ER: East of England; L: London; NE: North East; NW: North West; SE: South East;

SW: South West; WM: West Midlands ; YH: Yorkshire and the Humber

Box plots a to d above allow variation between NUTS1 regions and within regions (at the urban area scale) to be appreciated at the same time. Each plot represents variation within each region by a “box” and “whiskers”. The central bar marks the median value of the measure within any region. The box extends from the lower quartile (Q1) to the upper quartile (Q3) and so indicates the range within which the central 50% of values of each particular measure lie, its limits being referred to as the lower and upper “hinges”. The height of the box thus represents the interquartile range (IQR). Whiskers extend from the hinges, their length being up to 1.5 times that of the box, but they do not beyond the maximum and minimum values found. Beyond the limits of the whiskers, “outliers” may be found. These are shown by a circle and a two character marker indicating the urban area (see the key in Table 5), or in the case of extreme outliers by an asterisk and an urban area marker (as in Li in plot d indicating Lincoln). An extreme outlier is a value which falls outside the range Q1 - 3*IQR to Q3 + 3*IQR.

Sub-Regional Variation in Soft Densification

4.22 Both the marked differences in overall levels of household growth characteristic of different NUTS1 regions and the extent of variation within those regions are evident in Figure 15. Given the extent of heterogeneity, variation is examined below at the scale of individual towns and cities. Physical urban areas are used for this purpose. These have been defined at two levels by the national mapping agency, Ordnance Survey, for the Office of National Statistics for use with the 2001 population census. Identification of the upper level of 443 areas depends solely on operational rules applied by Ordnance Survey concerned with the size of parcels of urban land and the distances separating them. The second (lower) level recognizes administrative divisions within urban areas. All these upper level units are used in Figure 7 and summary information for the largest 61 such areas – ie those with more than 40,000 dwellings in SFRNs is shown in Table 5, and Figure 16.

4.23 The discussion of soft densification of physical urban areas is based primarily on components of change in the dwelling stock for the 443 areas, augmented by a range of statistical indicators for each town. The key components of change analysed are those listed in Table 5 for the largest towns. The focus is on understanding the substantive significance of the more extreme values found in the largest towns.[24]

4.24 As evidenced by Tables 2 and 4, at the level of NUTS1 regions the key components are well behaved and easily understood; in each NUTS1 region both net change in the dwelling stock and the rate of soft-densification are positive; in each region both soft densification and building subdivision account for proper percentages of net change. This is not true at the urban area scale. At this scale improper[25] and negative percentages are found, and as will become evident, the awkward cases may be used (cautiously) to identify matters of substantive significance.

4 .25 On average the number of dwellings within each of the 443 urban areas grew by 1.58% between 2001 and 2011 relative to the stock in 2001 as a result of soft densification (see Figure 17). This also held for the subset of the 61 largest urban areas. The differing importance of the prime components of soft densification within urban SFRNs is demonstrated by Figure 16. Although the larger part of soft densificatio nwas attributable to infill construction, where the rate of soft densification was unusually high this tended to reflect high rates of building subdivision.

24 It should be noticed in particular that on this physical definition, “London” extends beyond the administrative region referred to in Table 3, embracing locales of more suburban character. The overall rate of soft densification in London on this broader definition is rather lower (2.7% instead of 3.0%) and its contribution to the overall increase in stock is also lower (37.4% rather than 41.7%). The percentage of soft densification units attributable to building subdivision also falls from 68.3% to 61.9%.

25 An improper percentage is one that exceeds 100%. It is quite possible, for example, for the number of units created through subdivision of property to exceed the net growth in the stock (where new building is limited and large numbers of dwellings are demolished).

Table 5: Soft Densification in English Urban Areas, 20001-2011; Key Measures

Code	Region	Town	Stock	House Price	Net Stock Growth	Building Rate	Share of	Soft Densification Rates 2001-11			Share	Density
			2001	2001-2011	2001-11	2001-11	Net Change	*Overall*	*Infill Construction*	*Garden*	S&C	Change
			(000s)	(£'000)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	dph
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ba	YH	Barnsley	74	168	4.72	5.84	27.9	1.32	1.72	0.37	-30.0	0.22
Bi	WM	Birmingham	854	216	3.05	4.13	48	1.46	0.96	0.13	34.2	0.23
Bb	NW	Blackburn	54	165	1.41	3.25	328.4	4.64	0.78	0.07	83.1	0.84
Bp	NW	Blackpool	107	212	5.47	3.17	13.1	0.71	0.81	0.18	-13.8	0.12
BV	SE	Blackwater Valley	83	292	6.4	5.88	-31.3	-2.00	1.15	0.33	157.6	-0.23
Bo	SW	Bournemouth	145	314	7.52	6.45	58.3	4.38	3.07	0.47	30.0	0.68
Br	SE	Brighton	175	310	6.04	2.74	56.9	3.43	0.76	0.15	77.8	0.72
Bs	SW	Bristol	211	238	9.43	6.06	50.3	4.74	1.87	0.23	60.5	0.82
Bu	NW	Burnley	60	162	-0.99	2.42	-74.1	0.73	0.94	0.05	-28.6	0.16
Ca	ER	Cambridge	41	344	10.54	8.42	5.2	0.55	1.45	0.42	-163.7	0.08
Ch	SW	Cheltenham	43	305	11.35	6.36	-2.8	-0.32	1.88	0.30	688.5	-0.05
Cf	EM	Chesterfield	41	186	4.48	3.19	61.6	2.76	0.57	0.17	79.2	0.42
Co	ER	Colchester	41	233	14.01	12.27	-4	-0.55	1.37	0.28	349.8	-0.08
Cv	WM	Coventry	128	201	4.93	4.82	15.5	0.76	0.70	0.11	7.6	0.14
Cr	SE	Crawley	63	294	7.04	4.57	-11.4	-0.80	1.34	0.11	267.7	-0.11
De	EM	Derby	96	224	4.79	3.94	83.8	4.01	0.96	0.20	76.0	0.73
Do	YH	Doncaster	54	171	1.48	2.08	138	2.04	0.51	0.11	75.1	0.33
Ea	SE	Eastbourne	43	298	6.78	4.15	31.8	2.16	1.57	0.15	27.4	0.44
Gi	SE	Gillingham	89	246	4.15	2.93	43.8	1.82	0.90	0.15	50.4	0.34
Gl	SW	Gloucester	54	211	10.57	6.82	-7.5	-0.79	1.23	0.27	256.2	-0.13
Gr	YH	Grimsby	47	149	2.12	2.07	102.6	2.18	1.00	0.14	54.0	0.40
Ha	SE	Hastings	51	228	3.93	3.3	129.6	5.10	1.01	0.17	80.2	0.89
Ip	ER	Ipswich	55	206	10.49	7.49	36.4	3.82	1.42	0.25	62.9	0.58
Hu	YH	Kingston upon Hull	129	160	-0.31	2.4	-981.3	3.00	0.47	0.11	84.4	0.54
Ls	YH	Leeds	572	196	6.16	4.53	30.5	1.88	1.21	0.20	35.6	0.32
Le	EM	Leicester	151	207	5.98	3.34	43	2.57	0.71	0.20	72.2	0.46
Li	EM	Lincoln	40	193	8.22	5.12	12	0.99	1.73	0.20	-75.1	0.17
Lv	NW	Liverpool	328	183	3.25	4.89	62.8	2.04	1.09	0.10	46.4	0.39
Lo	L	London	2449	413	7.13	4.03	37.4	2.67	1.02	0.14	61.9	0.51
Lu	ER	Luton	86	205	5.17	3.72	29.8	1.54	0.78	0.18	49.2	0.29
Ma	NW	Manchester	884	203	4.76	4.96	50.4	2.40	1.31	0.12	45.4	0.43
Mf	EM	Mansfield	68	185	5.86	5.78	34.1	2.00	1.05	0.26	47.6	0.31
Mg	SE	Margate	49	206	9.39	5.41	26.1	2.45	2.60	0.25	-6.3	0.47

Md	NE	Middlesbrough	150	170	1.74	3.68	39	0.68	0.73	0.07	-7.9	0.10
MK	SE	Milton Keynes	72	245	6.31	5.07	28.2	1.78	1.05	0.07	40.8	0.24
Ne	NE	Newcastle upon Tyne	345	200	2.51	2.85	53.9	1.35	0.59	0.04	56.2	0.25
No	EM	Northampton	76	206	5.82	4.45	18.7	1.09	1.03	0.16	5.8	0.18
Nw	ER	Norwich	72	226	7.04	4.39	28.4	2.00	1.00	0.27	49.8	0.30
Ng	EM	Nottingham	266	201	5.55	4.07	16.6	0.92	0.99	0.13	-8.1	0.17
Nu	WM	Nuneaton	49	200	6.07	5.05	39	2.37	1.66	0.18	30.1	0.39
Ox	SE	Oxford	47	386	10.44	7.09	8.6	0.90	1.95	0.50	-116.4	0.16
Pe	ER	Peterborough	56	208	4.95	3.42	30.9	1.53	0.68	0.29	55.6	0.23
Pl	SW	Plymouth	92	211	6.97	3.77	21.5	1.50	0.88	0.13	41.3	0.25
Po	SE	Portsmouth	158	243	4.45	3.45	58.5	2.60	1.19	0.24	54.2	0.51
Pr	NW	Preston	100	202	4.16	3.01	60.6	2.52	0.77	0.13	69.4	0.46
Rg	SE	Reading	130	332	7.41	5.71	-11.1	-0.83	1.21	0.39	246.1	-0.13
Sh	YH	Sheffield	247	189	5.3	4.24	24.1	1.27	1.03	0.22	18.8	0.21
Sl	SE	Slough	42	286	7.97	5.98	30.4	2.42	1.47	0.32	39.3	0.45
So	SE	Southampton	104	245	8.99	6.04	14.9	1.34	2.35	0.32	-75.2	0.23
SS	SE	Southend-on-Sea	111	261	3.98	2.97	62.5	2.49	1.00	0.16	60.0	0.44
Sp	NW	Southport	46	260	3.14	2.5	11	0.34	1.00	0.17	-194.4	0.06
SA	ER	St Albans	41	397	11.05	7.16	6.3	0.70	1.31	0.35	-86.5	0.10
St	WM	Stoke-on-Trent	152	167	3.55	3.25	8.3	0.29	0.68	0.11	-135.2	0.05
Su	NE	Sunderland	71	199	2.12	3.54	29.8	0.63	0.87	0.05	-38.5	0.12
Sw	SW	Swindon	62	215	9.12	4.91	23.8	2.17	0.82	0.13	62.2	0.36
Tf	WM	Telford	47	209	4.8	4.08	-23.1	-1.11	0.85	0.29	176.4	-0.14
To	SW	Torquay	44	225	7.66	3.02	-9.5	-0.73	1.28	0.20	274.9	-0.13
Wa	NW	Warrington	64	205	8.42	7.35	3.8	0.32	0.67	0.09	-109.4	0.05
Wg	NW	Wigan	64	181	4.16	3.44	54.7	2.28	0.94	0.06	58.7	0.42
Wi	NW	Wirral	131	176	4.68	3.41	68.6	3.21	1.09	0.14	66.0	0.51
Yo	YH	York	54	240	10.77	7.46	22.8	2.46	1.99	0.27	19.1	0.46

1 Post Code Address File, 2001 QII
2 Land Registry All Residential Transactions 2001-2011 (converted to 2013 QIV) prices
3 Difference between Post Code Address File, 2011 QII and Post Code Address File, 2001 QII
4 [DCLG Land Use Change Statistics (adjusted)] / Col 1
5 [Estimated Units from all Soft Densification] / Col 3*100
6 [Estimated Units from all Soft Densification] / Col 1*100
7 [DCLG Land Use Change Statistics (adjusted) for selected sites in areas with continuing unit postcodes] / Col 1*100
8 [DCLG Land Use Change Statistics (adjusted) for selected sites in areas with continuing unit postcodes (see Box4)] / Col 1*100
9 ([Estimated Units from all Soft Densification]-[Estimated Soft Densification through Infill Construction]) / [Estimated Units from all Soft Densification]*100
10 [Estimated Units from all Soft Densification]/[Area of SFRNs]

Figure 16: Soft Densification a)Due to Infill Construction b) Due to All Forms

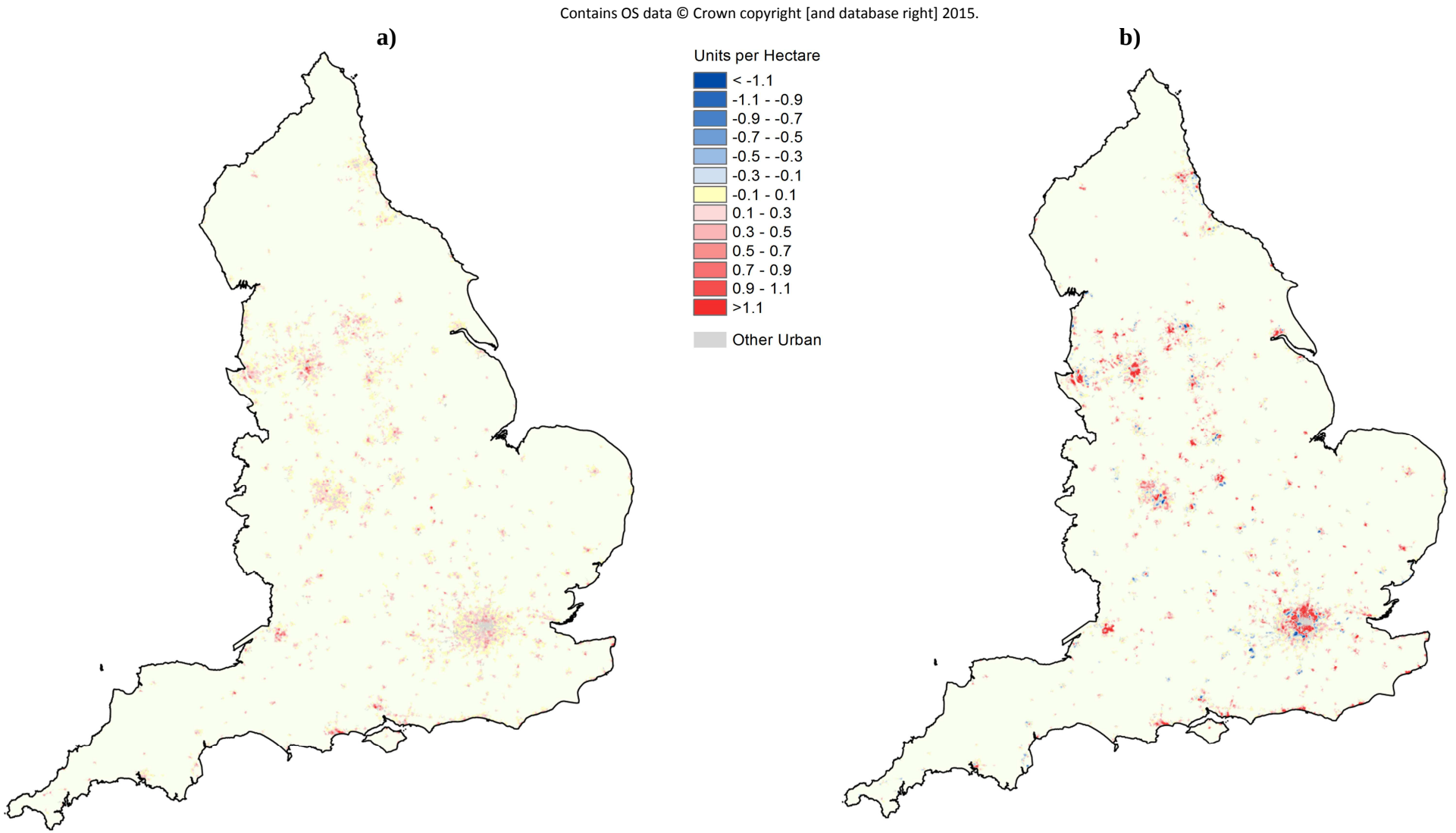
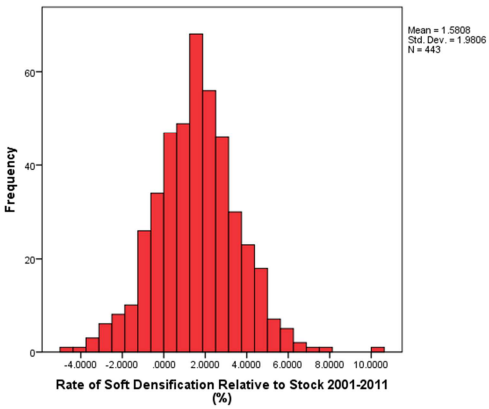
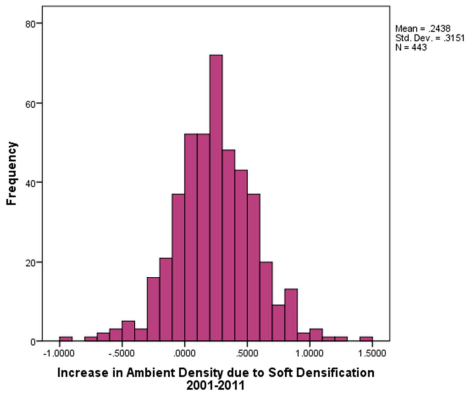
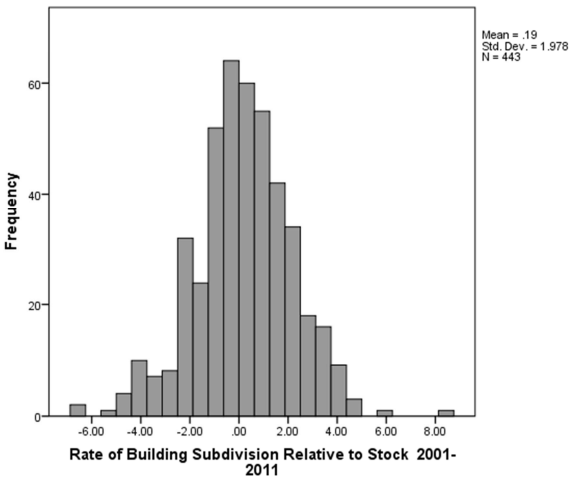
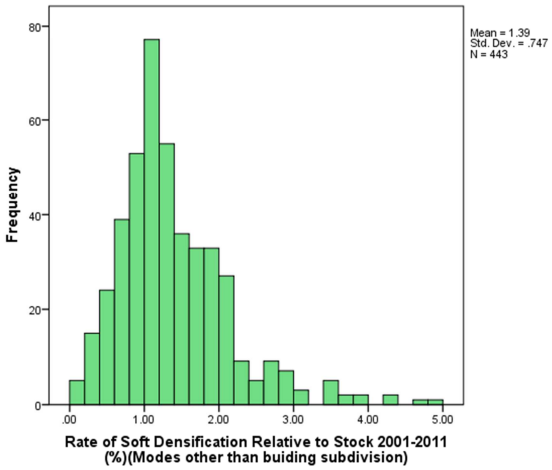


Figure 17: Variation in the Rate of Soft Densification and its Components; 443 Urban Areas; England; 2001-2011









4.26 Focussing solely on the larger urban areas (shown in Table 5), Hastings, Bristol, Bournemouth, Blackburn and Derby have the highest rates of soft densification, reaching 5.1% in the case of Hastings. In all these cases, consideration of components of change shows that subdivision of houses accounts for the larger part of soft densification, but that in both Hastings and Blackburn the proportions are extreme. In both towns, the number of dwellings that were created through subdivision of existing property exceeded the overall net increase in the dwelling stock. Using the methods described in Section 2, it is clear the core of St Leonards (a part of the Hastings urban area) was the focus of this activity, while the components of change shown in Table 5 indicate that this conversion has taken place in the context of shrinkage elsewhere.

4.27 It should not be surprising that local authority's Housing Strategy explains "central St Leonards has a concentration of poor quality private rented sector accommodation which has encouraged a transient population and exacerbated problems associated with deprivation such as high levels of crime, poor health and economic activity". It notes the "large number of flats, particularly conversions in comparison to the rest of the south east region" adding that "many of these are poor conversions in the difficult to adapt large properties built prior to 1919". (Hastings Borough Council, nd, p17).

4.28 In the case of Blackburn, the components of change in Table 5 show that the number of units created through subdivision outstripped net growth in the town by a factor of three. Again, the scale and rate of soft densification picked out in the present work highlights a cluster of conditions identified as problematic by the local authority who in a manner similar to Hastings DC associate these conditions with "population churn and destabilisation of communities" (Pennine Lancashire Councils, 2013). They comment in a policy document that "the Borough also experiences substantial pressure to create houses in multiple occupation...or HMO[26]s. Although there may be exceptions, the general view.... is that the majority of Blackburn and Darwen's HMOs, along with the creation of very small dwelling units through the sub-division of terraced houses, are having a seriously detrimental impact on the growth, regeneration, image, attitudes to investment (both inward and local) and sustainability of communities and neighbourhoods where they are concentrated". They add that "a total of 54% of private-rented properties in the Borough do not meet the Decent Homes standard, a figure which increases to 72% in respect of converted flats" (Blackburn with Darwen UA, 2012).

4.29 These two cases highlight a form of soft densification which has provided cheap low quality accommodation. In the case of Blackburn, in particular, numbers of units in subdivided houses has increased much faster than the housing stock as a whole as the broader housing market has stagnated. Variants of this situation marked a number of other northern agglomerations. In (Kingston upon) Hull, for example, the numbers of additional units created by subdivision of dwellings over the decade was equivalent to 3% of the stock in 2001, but in aggregate the dwelling stock shrank. These may be identified by comparing Figure 16a with Figure 16b

4.30 Towns with the highest rates of soft densification achieved through **infill construction** were predominantly buoyant towns where house prices were at least as high as the national average. Those with relatively high rates of infill

[26] House in Multiple Occupation.

construction included Margate[27], Southampton, York, Oxford, Cheltenham, Bristol and Lincoln. Amongst these towns, only Bournemouth had an unusually high rate of soft densification overall (more than double that characteristic of England's SFRNs generally). The components of change reported in Table 5 indicate how activities of householders and small developers in the other towns worked to create larger dwellings, offsetting gains through infill, and towns such as Cheltenham negating them entirely.

4.31 Similarly, restricting attention to towns with the highest rates of **garden infill construction** (ie over 0.3% of stock), Table 5 shows that only in Bournemouth was the *overall* rate of soft densification above average. In three of these (Reading, Blackwater Valley, and Cheltenham) the overall rate was negative. (These apparently perverse results are considered further in 4.38-4.45). There was some tendency for rates of residential plot subdivision to be higher in the smaller towns rather than those within the scope of Table 5, and (while not contributing to urban densification) also to be higher in the rural domain.

Circumstances Where Soft Densification Made No Net Contribution to Accommodating Additional Dwellings

4.32 Such particular perverse cases stand alongside other evidence from Table 5 and of earlier sections demonstrating many circumstances in which the activities of households and small developers reconfigured housing space in a manner which ran counter to general tendencies to densification. Figure 7 indicates the extent of those parts of England with negative rates of soft densification and it seems important that the "meaning" of such results and the circumstances of their occurrence are understood.[28]

4.33 Negative rates of soft densification are found where in aggregate the number of units lost through small-scale amalgamation of plots and of dwellings, and of deconversions is greater than the number gained through subdivision. It is important to appreciate that even in towns where this pertained, radical densification on other sites might lead to an overall increase in dwellings. It might even be argued that in many circumstances small-scale activity reduced density in order to compensate for the general tendency to densification.[29]

4.34 Places where in aggregate the activities of households, small builders and similar agents tended to reduce residential density included localities around the Durham coalfield (DC on Figure 7) including at the town level Seaham, Peterlee, Shildon, and Ferryhill where overall growth in the dwellings stock over the decade was less than 3%. In such contexts demand by households for more space is easily met by

[27] Presence of this town within this group seems anomalous.

[28] In a very few instances this effect arises simply because of the operational definitions used. In some instances where substantial areas of property had been demolished in 2011 and awaited re-development, individual unit postcodes remained on the Office of National Statistics Postcode Directory (ONSPD) but with no dwellings recorded on PAF. Attempts have been made to identify these cases (by reference to very intense falls in numbers of SCUOs in continuing postcodes at the 200m scale) and remove them (including a major redevelopment site in Aldershot overlapping an area of genuinely negative soft densification). Most are associated with particular military sites (eg Mildenhall and Lakenheath in Suffolk).

29 It is notable that where high-building rates in parts of the South West (towns in the Bristol-Torbay (M5) corridor have been achieved largely through construction of relatively small units by national housebuilders overall rates of soft densification are negative, perhaps suggesting that offsetting adjustments by households and small developers are increasing the supply of larger properties.

amalgamation of dwellings or of plots. Other "smaller urban areas" with negative rates of soft densification accompanied growth of less than 3% per decade were Cramlington (a now-struggling privately developed New Town in Northumberland), Barrow-in-Furness and the adjoining Isle of Walney, together with Whitehaven on the Cumbrian coast in the North West, Featherstone (a former coalmining settlement in West Yorkshire), Maghull a suburban town to the north of Liverpool, Canvey Island (a former petrochemicals complex), Carterton, a town in Oxfordshire dependent on military activity. Lowestoft, Marple and Kingsteignton also fall within this group.

4.35 Negative rates of soft densification were *not* characteristic of larger low-growth urban areas (ie those listed in Table 5). Alongside Blackburn (discussed above), larger towns where the dwelling stock grew by less than 3% were neighbouring Burnley, (Kingston upon) Hull, Grimsby, Doncaster, Newcastle upon Tyne, Middlesbrough and Sunderland. Reference to the components of change in Table 5 suggests the need to explore the implications of these relations as in the cases of Hastings and Blackburn.

4.36 Figure 7 also draws attention to a series of coastal localities with negative rates of soft densification. These include Minehead and Watchet in West Somerset, Morecambe in Lancashire, Skegness in Lincolnshire, Whitby in Yorkshire, Clacton, Frinton and Walton in Essex, and Penzance in Cornwall. These are all smaller urban areas below the threshold for inclusion in Table 5. In these areas, particular types of unit originally intended only for short term holiday occupation have subsequently been used as permanent homes, which has later led to pressure to reduce densities. "Park home estates" are an important special case. The term "park home" refers to caravans used for residential purposes. Most of these are accommodated either on park home estates (a specific development form of the period since 1980), or within caravan parks given over either entirely to residential use or where holiday caravans may also be present. Little research documents the dynamics of these areas, but it is estimated that park homes accommodate about a quarter of a million people, predominantly retired or semi-retired (see Butter, 2012). Over time, typical park homes have become larger and in response owners have sought large plots, stimulating changes in the layout of parks with reduction in density of units such that capacity may be reduced by 15-20% (Hotel Solutions, 2009). Although they may fall within SFRN-OAs, they are far from typical residential environments. It is important that their character is understood, however, in order to appreciate why rates of soft densification in some urban areas may be negative.

4.37 More generally, there may be a tendency for more conventional property at some point subdivided to provide holiday accommodation in coastal towns to subsequently pass into permanent residential use. With shifting patterns of holiday making, however, and reduction in demand for holiday accommodation there may also be pressure for deconversion. This would seem to be the case for example in Torbay where the rate of soft densification was -0.73% (see Table 5) and market pressures combine with local policy (Torbay UA, 2010) to favour reductions in density and conversion back to single family accommodation. At an extreme, in the case of the Jaywick "plotlands" in Essex, a negative rate of soft densification reflects thinning out poorly constructed single-storey properties, developed in the 1930s and intended for short-term holiday use, but subsequently occupied full-time. Thinning out results both from abandonment and demolition of the poorest

dwellings and creation of gardens in a context of very low property values, high flood risk and acute social deprivation[30].

Negative Rates of Soft Densification in Areas of High Demand

4.38 While it may be useful to understand the range of circumstances where the policy framework of the 2000s did not lead to soft densification, it seems particularly important to focus on towns in areas of high demand which show negative rates of soft densification. Understanding of the economic and social processes at work may help to appreciate the limits of soft densification policy. Although the mechanisms of amalgamation and deconversion are easily grasped, it may be more difficult to appreciate how in aggregate the activities of households, small builders and similar agents might tend to reduce residential density in areas of high demand. It is very clear from earlier work (Bibby, 2006) that amalgamation of properties can be an important means of satisfying housing requirements in high status rural areas. Nevertheless, there is a usual presumption that amalgamation of two dwellings will produce a combined unit with less value than the two separately, which may deter small-scale developers if not individual households from making such adjustments.

4.39 As a starting point, consider areas of high demand where rates of soft densification are deeply negative. In areas such as the Blackwater Valley towns (Farnham, Aldershot), strong mechanisms offset any tendency towards soft densification at the level of locality even where they may be common at plot level. Table 5 shows a soft densification rate of -2.00% of stock here. The area forms part of a very high-status subregion characterised by low density housing (including a number of villa suburbs as illustrated in Figure 18), extending from the margins of Greater London south westwards through Weybridge, Esher and Cobham to Farnham, where property agents report 20th-century houses on large plots are being demolished and rebuilt at similar or lower densities (Thorpe, 2014). This process sometimes referred to as to “tear-down” or “knockdown” typically creates more built space, but the same number of units. It is only viable where land values are extremely high, but (as in these examples) may be undertaken by small-scale speculative developers as well as by individual households. Comments from property agents indicate a degree of substitutability between tear-downs in Farnham and dwellings within established villa suburbs (Thorpe, 2014).

4.40 In terms of its physical character, this whole sub-region might be thought of as potentially readily amenable to soft densification, but this ignores social and economic processes. Negative rates of soft densification characterise the suburban locales outside the London region administratively but within the London urban area (see Weybridge and Virginia Water on Figure 4). Villa suburbs themselves resisted densification in the inter-censal decade in some circumstances. Thus at St George's Hill, a well-known villa suburb in Weybridge, embracing property with which Farnham teardowns compete, regulations secured by covenants on land and policed by a residents association provide that each dwelling must stand on at least 0.4 ha of land, with a maximum 20% plot ratio, and with plot subdivision prohibited (St Georges Hill Residents Association, 2013). Covenants serve a similar purpose at the Wentworth Estate in Virginia Water, where change to

30 The most deprived English LSOA in England is (Tendring 18a) to the east of the Jaywick area of Clacton on Sea (DCLG, 2011).

buildings not needing planning permission requires approval from a residents' committee (Wentworth Estate 2010).

4.41 The evidence suggests that particular areas within these suburban towns occupy a specific niche which in present circumstances limits their potential for soft densification. Property activity in these suburban towns is intense and despite the limiting effect of restrictions on densification, villas suburbs such as St George's Hill are favoured for teardowns. At an extreme, such estates provide for repeated demolition and replacement of extremely high status properties on the most prestigious sites, but some garden infill is also achieved (by sale of parts of plots to create new plots above the threshold)[31].

4.42 It might be argued that houses within these elite locations where overseas buyers may predominate[32] form a submarket which is insulated from residential development more generally. There would appear, however, to be continuous chains of substitutability between different property types and there is some evidence that the degree of soft densification in an area responds to the *pattern* of demand so that soft densification tends to be limited where typical property size is larger. The tendency to find a premium for larger houses and with it to reduce rather than increase densities should be understood by reference to the relation between house-price formation and commuting patterns.

4.43 More generally, it appears that negative rates of soft densification are associated with particular high quality residential locales that prove attractive to households seeking more housing space and whose members are willing to commute longer distances. The principle that the bids of such households force house prices upwards in those localities, thereby weakening the link to *local* earnings motivates production of league tables identifying towns where housing is considered unaffordable (eg Lloyds Bank annual Affordable Cities Review).Usually such arguments assume long-distance commuting to London. Lloyds TSB (2013) identify as least affordable (in decreasing order of average house prices to average incomes shown in brackets): Oxford (9.66), Salisbury (8.57), Bath (8.23), Truro (8.15), Winchester (8.04), Brighton & Hove (7.67), Cambridge (7.55) Chichester (7.44), Exeter (7.25) and St Albans (7.09). All but Brighton & Hove and Oxford and show negative rates of soft densification (and the last while positive is very low).[33]

4.44 It might even be suggested that this effect might be expected to affect the whole of the local labour market area centred on such desirable towns. This conjecture can be considered by estimating soft densification measures for “Travel to Work Areas” (TTWAs)[34]. Table 6 shows some basic indicators for those TTWAs across which overall rates of soft densification are negative, indicating the rate of soft densification attributable to infill construction, and the supply-side degree of self-containment for the TTWA. (If the postulated relationships were to hold, TTWAs in areas of high demand with negative rates of soft densification should be

[31] The case of a sale of 0.08 hectares for £650,000 at St Georges Hill to augment an adjoining plot and hence permit subdivision is reported by Clark (2010).

[32] Moreover, overseas buyers predominate at Wentworth, and are important at St George's Hill (Davis and Townshend, 2014; Pickford and Hammond, 2013).

[33] A less common variant of this approach considers *change* in affordability measured in this way over time. Centre for Cities (2015, p21) claims that over the period 2004-2014 multipliers climbed by factors greater than one in Cambridge (5.6), Oxford(3.3), Brighton (2.8), Aldershot (1.9), Reading(1.8), Crawley(1.6), Worthing (1.2) and Milton Keynes (1.1).

[34] This is an official set of approximations produced for Government on the basis of work travel data by the University of Newcastle-upon-Tyne (see Bond and Coombes, 2007).

expected to have a *low* degree of supply-side self-containment given the presumption of substantial out-commuting). The tendency to find negative rates of soft densification at the scale of a whole TTWA is in fact borne out – with a contiguous cluster of TTWAs to the west of London (Guildford and Aldershot; Reading and Bracknell; and Basingstoke) with Salisbury and Bath further west both negative too (see Figure 18).

4.45 The foregoing suggests the manner in which a group of interlocking processes serves to adjust the housing offer in attractive residential locations where expectations of long-term household growth combine with long-distance commuting to generate high demand in a context of significant planning constraint. There is specific demand for larger properties, and the dwelling stock in these locations includes a disproportionate amount of low density housing. Deconversion is significant, and amalgamation of dwellings relatively common. Resident households are more likely to supply garden land for development than is typical across England generally. Figure 19 shows that those towns where the tendency to divide plots and create new dwellings through garden infill are paradoxically those where overall rates of soft densification are negative or very low. The dwellings created this way are usually detached properties and are built at much lower than average density, adding to the high status stock (see para 3.12 and Table 3). On balance, however, it is de-conversion and amalgamation which have the greater impact on the scale of the dwelling stock in the locality. Rates of soft densification may therefore be negative or low in such locations and this will offset overall densification outcomes.

4.46 This sketchy explanation of negative soft densification in high demand areas has implications for empirical work. Documenting plot subdivision and densification of domestic gardens will prove useful for understanding effects on an immediate neighbourhood, but it will not capture the net effect of actions by individual households and small developers at the level of a district or a town. The processes of de-conversion and amalgamation (which do not usually require planning permission) are more difficult to see.

Figure 18: Rates of Soft Densification 2001-2011 Relative to Stock 2001; by 2001 Travel-to-Work Area; South East England

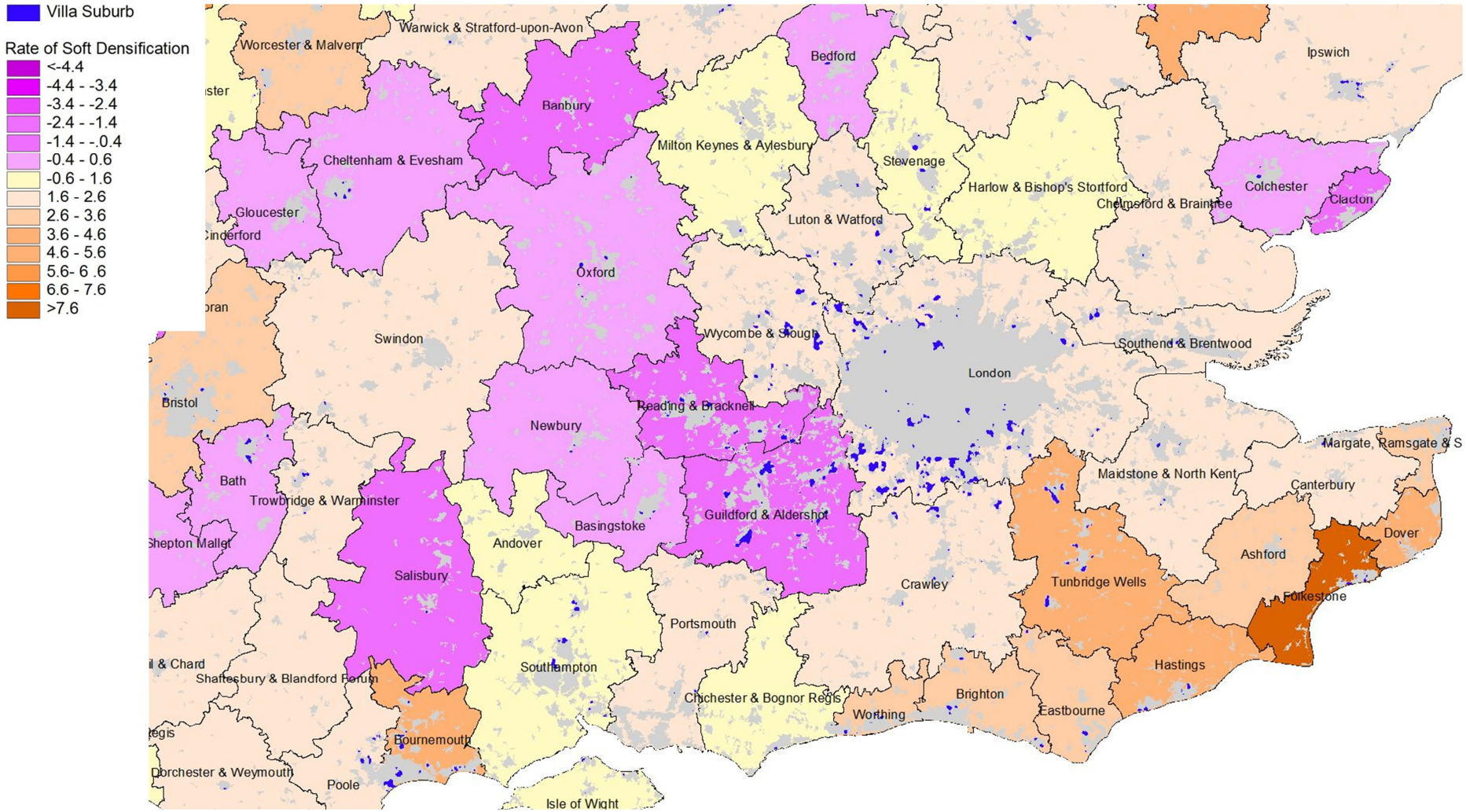


Table 6: Soft Densification Indicators 2001-2011; Selected Travel to Work Areas

Region	TTWA	SSSC (%)	Av Price (£'000s)	Build Rate	Soft Densification Rates (%)			
					Overall	*Infill*	*GI+*	*Garden*
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
SW	Minehead	81.7	260	6.12	-5.53	1.75	0.51	0.48
SW	Wadebridge	72.3	322	11.34	-4.29	2.20	0.74	..
YH	Whitby	73.6	219	5.47	-2.80	1.55	0.34	0.14
ER	Clacton	69.6	203	4.08	-2.00	1.87	0.40	0.32
NE	Hexham & Haltwhistle	69.7	255	5.25	-1.87	0.83	0.27	0.15
SW	Penzance & Isles of Scilly	82.0	259	5.23	-1.53	1.74	0.53	0.25
SW	Paignton & Totnes	69.8	247	3.56	-1.18	1.11	0.21	0.18
SE	*Salisbury*	76.3	314	5.91	-1.13	1.13	0.43	0.10
SE	*Banbury*	71.1	288	6.87	-0.97	0.94	0.31	0.15
ER	Thetford & Mildenhall	72.8	199	11.32	-0.75	1.15	0.72	0.54
SE	*Guildford & Aldershot*	70.2	377	5.60	-0.72	1.21	0.28	0.28
SE	*Reading & Bracknell*	73.1	359	7.14	-0.61	1.34	0.42	0.39
NW	Lancaster & Morecambe	83.1	165	4.83	-0.53	1.07	0.09	0.08
SW	Truro, Redruth & Camborne	81.9	253	8.04	-0.48	2.35	0.55	0.51
SW	Torquay	67.3	220	5.00	-0.45	1.96	0.27	0.21
NE	Bishop Auckland & Barnard Castle	67.2	130	6.61	-0.30	1.39	0.10	0.06
SW	*Gloucester*	71.3	212	9.37	-0.30	1.17	0.30	0.28
ER	*Colchester*	74.2	233	11.26	-0.20	1.40	0.38	0.32
NE	Sunderland	73.8	136	4.77	-0.19	0.87	0.05	0.05
SW	*Bath*	72.9	303	4.28	-0.16	1.46	0.49	0.40
SE	*Basingstoke*	68.4	283	13.42	-0.12	1.16	0.33	0.18
SW	*Cheltenham & Evesham*	77.7	288	6.51	-0.12	1.28	0.35	0.33
YH	Malton & Pickering	78.2	253	5.23	-0.03	1.29	0.62	..

1 SSSC - Supply-Side Self Containment ie Percentage of Workers resident in TTWA who work within it (algorithmically 66.67% is minimum-see Bond and Coombes 2007)

2 Land Registry All Residential Transactions 2001-2011 (converted to 2013 QIV) prices

3 All new units built 2001-2011 as a percentage of stock 2001 NB not restricted to *urban* SFRNs

4 Rate calculated as in Tables 4 and 5 NB not restricted to *urban* SFRNs

5 Rate calculated as in Tables 4 and 5 NB not restricted to *urban* SFRNs

6 Rate calculated as Garden Infill Rate in Tables 4 and 5 but not restricted to *urban* SFRNs

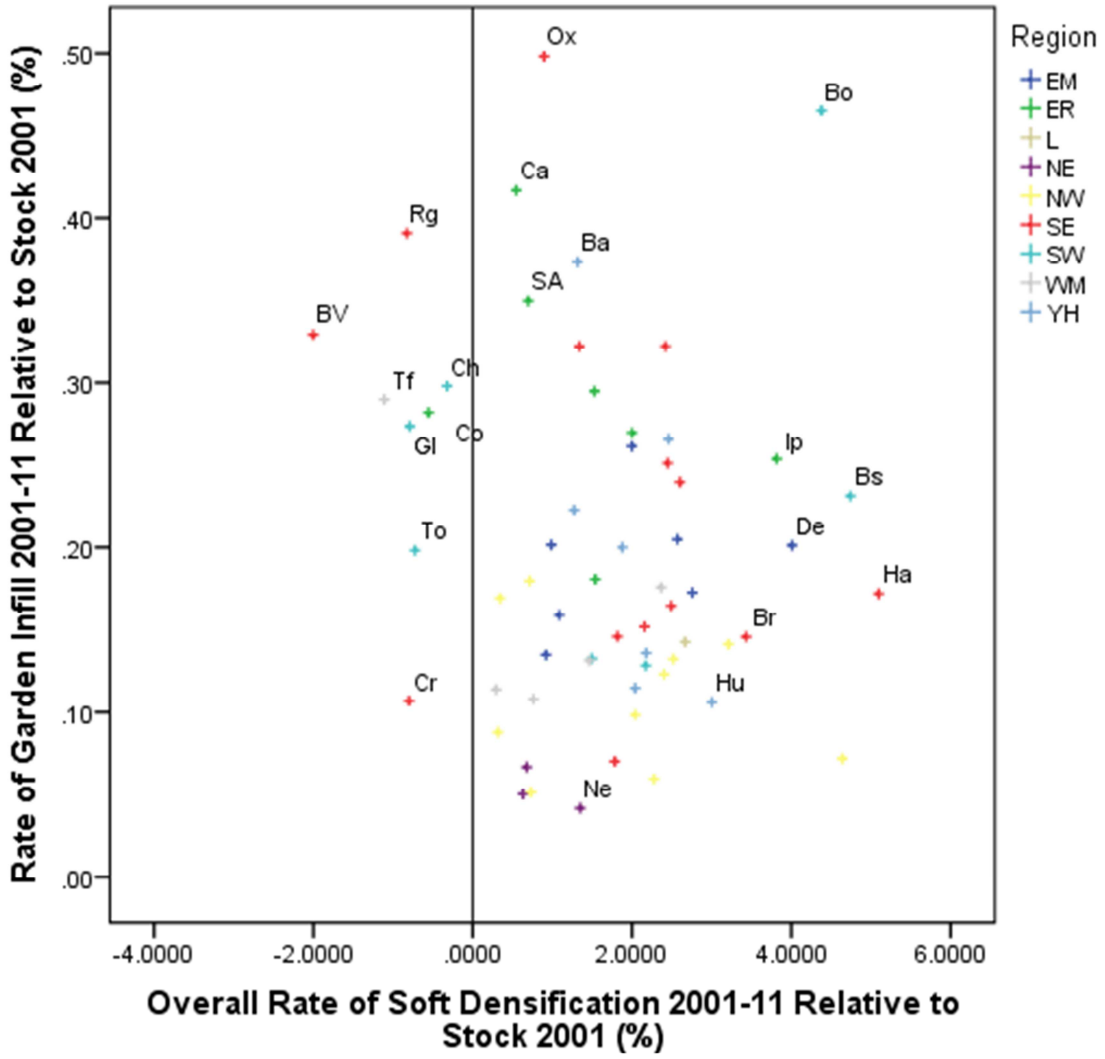
7 Rate calculated exactly as Garden Infill Rate in Tables 4 and 5 ie *restricted to urban* SFRNs

Italics Indicate TTWAs centred on "desirable towns" -see paras 4.43-4.44; Blue Tone indicates coastal TTWA (see para 4.36); Grey Tone indicates low demand

This Table provides indicators for *all* TTWAs in England which show overall negative rates of soft densification on the definitions used (in ascending order of rate). The definitions for cols. 2-5 are identical to those used elsewhere except that *all* SFRNs are included rather than only those in urban settlements (ie with a population of 10,000 or more). The indicator GI+ shown in col 6 is also calculated by reference to SFRNs without exclusion.

Col 7 shows the Garden Infill rate restricted only to urban areas. Note that Malton & Pickering TTWA and Wadebridge TTWA have no urban areas. The rate of residential development in the curtilage of dwelling houses is generally higher in the rural domain, and difference between cols. 6 and 7 reflects settlement structure.

Figure 19: Relationship Between Overall Rate of Soft Densification and Rate of Garden Infill 2001-2011 Relative to Stock 2001;Largest 61 Urban Areas; England



Key to town mnemonics is provided in Table 5

5 Variation at the Neighbourhood Scale: The Incidence of Benefits

5.1 In the process of working down the spatial scale to this point, apart from attempting to provide an operational definition of soft densification, little attention has been given to the character of change in the physical environment ie in the configuration of plots and the building stock. The next step therefore is to how neighbourhoods of different types have been *changed* by soft densification.

5.2 For this purpose, it would seem desirable ideally to identify a mosaic of specific neighbourhoods each having a homogenous physical and social character clearly related to the form of first development and subsequent changes in social and economic role. It would also seem desirable to deploy some typology – if not of genotypes then simply of denominations – to which these individual neighbourhoods could be assigned, recognizing characteristic features of demography, tenure, physical form and so on.

5.3 In practice, the obvious spatial units to stand in the place of neighbourhoods are the output areas (OAs) for the 2001 Census introduced in Section 2. They are designed to include similar numbers of households and to have some degree of social homogeneity. Although their physical boundaries may not be ideal, within the urban areas of concern here, they are of the appropriate physical scale and can be characterised by reference to an unrivalled range of social and demographic data.

5.4 The typology adopted in this study is an Output Area classification generated for the Office of National Statistics (ONS) by the University of Leeds (Vickers et al, 2005). It is described in Box 5. This classification groups OAs into clusters based on similarity of scores on 41 Census indicators. It is entirely empirical, using k-means clustering[35] to identify clusters in a multi-dimensional space defined by the indicators (defined as percentages and in some cases transformed to reduce skewness). Beyond the identification of indicators to be included, no a priori considerations influence the clusters that are defined. Procedures of this type have the advantage that they do not depend upon preconceptions of their designers. The corresponding disadvantage of this sort of procedure is that once a classification has been created algorithmically, the characteristics of its clusters have to be identified and named post-hoc. (This process is described by the developers of this particular classification as “one of the world’s most underrated art forms” (Vickers et al, 2005 p50)).

5.5 For present purposes it is important to see beyond the post-hoc cluster names and focus on those aspects of the bundles of characteristics denoted which in fact illuminate the context in which soft densification occurs. The relation between housing form and tenure and other socio-economic characteristics is crucial in this respect. Viewed through the frame of this classification, two striking findings emerge about soft densification. The first is its extremely uneven incidence at the

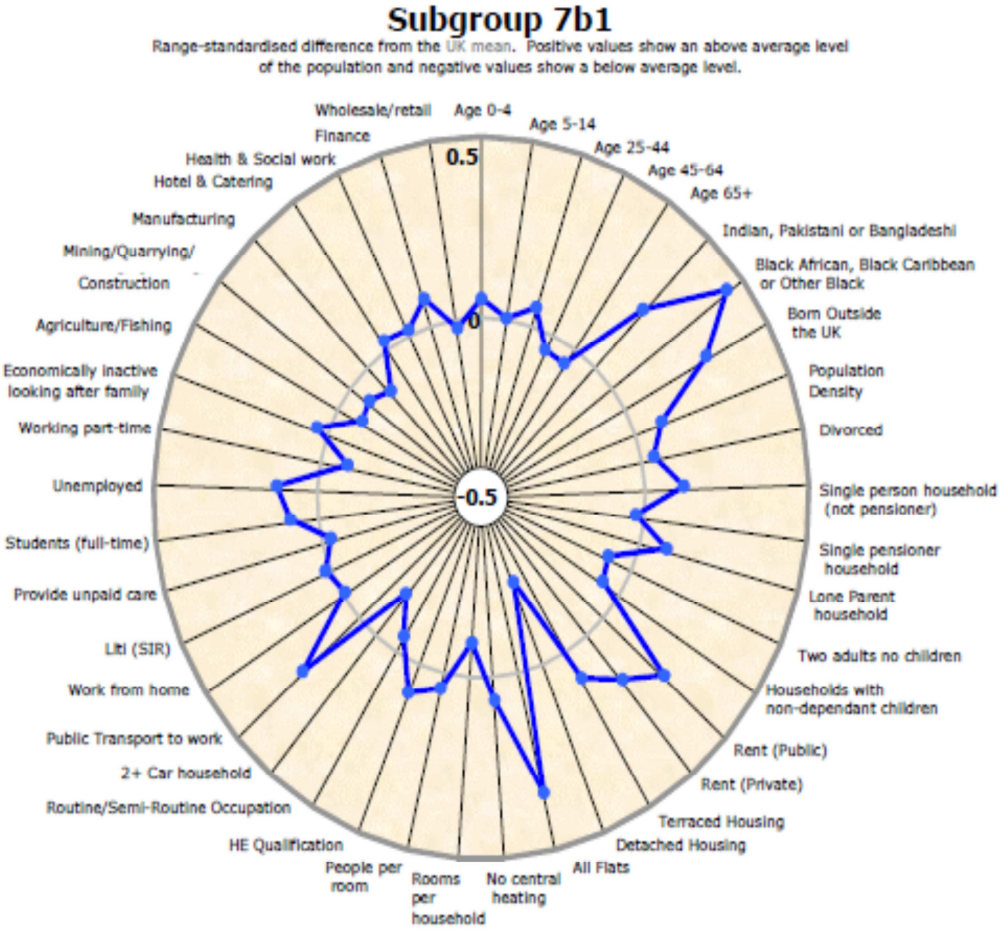
[35] This is a widely used technique for assigning a set of objects characterized by a range of numeric variables to a series of clusters on the basis of similarity of values on that set of variables. It requires that the user determine the number of clusters, k, that is to be generated a priori. The present classification uses a three-level hierarchical version.

Box5: Area Classifications: 2001: Output Areas

The OA classification for 2001was developed for ONS by the University of Leeds (Vickers et al 2005) and is structured as a three-level hierarchy involving 7 supergroups, 21 groups, and 52 subgroups. It is complemented by post-hoc names for supergroups and groups (assigned by the original developers) intended to convey their essence. Subgroups are unnamed (but referred to by tags such as 7b1). Cluster summaries are provided by ONS (nd) for all three levels, detailing for each the specific indicators whose values are variously "far below average", "far above average" or "close to the average". Cluster names are not used in the summaries as they are not formally part of the ONS product.

Supergroup 1 ("Blue-Collar Communities") is defined by relatively high representation of terraced housing and public sector renting. Subgroup 1c2 in particular tends to pick out areas developed as single tenure local authority estates. **Supergroup 2 ("City Living")** picks out a combination of non-pensioner singles, flats and private renting, including areas in city centre cores, but extending far beyond . Despite the label, OAs in **Supergroup 3 ("Countryside")**, are found in localities across England away from major cities and have high proportions of detached houses, which is also the critical characteristic of **Supergroup 4 ("Prosperous Suburbs")**. **Supergroup 5 ("Constrained by Circumstances")** – typically picking out concentrations of public sector housing. OAs assigned to **Supergroup 6 ("Typical Traits"),** tend to have an absence of public sector renting but otherwise include a broad spectrum of the population. **Supergroup 7 ("Multicultural")** areas are identified by a combination of renting and flats, with relatively high proportions of residents born outside the UK or belonging to Black and Minority Ethnic groups.

Varying characteristics of clusters are readily summarised as radar plots in ONS (nd), which show the indicators used and capture critical difference. That below refers to 7b1- the subgroup whose members made the greatest aggregate number of units arising from soft densification.



Source of diagram : ONS (nd)

neighbourhood scale, with just eight of the 52 subgroups accounting for half of all soft densification over the decade. The second is that the shifting balance between the conflicting tendencies to increase or reduce densities evident at the subregional scale (and emphasised in the last section) is entirely occluded. Only three subgroups are characterized by negative rates of soft densification and these are not high-status clusters.

5.6 The geographic incidence of the supergroups (within SFRNs) is illustrated in Figure 20. Table 7 presents the 52 clusters of output areas in descending order of their aggregate contribution to accommodating dwellings by soft densification. It is restricted only to SFRNs within urban areas whose population is 10,000 or more. The position of each cluster in the hierarchy is illustrated alongside soft densification measures and the critical Census indicators. Four of the eight subgroups which together account for half of all soft densification belong to Supergroup 7 ("Multicultural"), and that densification was achieved predominantly through the subdivision of buildings. OAs from these subgroups are included as SFRN-OAs where the majority of dwellings in 2001 were either houses in single family occupation or converted flats created from such property.

5.7 At the head of the table, Output Areas within Subgroup 7b1 alone accommodated one eighth of all dwellings attributable to soft densification in England over the decade. These neighbourhoods were found mainly within London, and ambient densities were already high in 2001 (26.4 dph). Soft densification – subdivision of houses – over the next decade added a further 34,000 dwellings to the 7b1 neighbourhoods (equivalent to 7.6% of stock at the time of the Census). Not surprisingly, the radar plot included in Box 5 highlights over-representation of flats, and of single person households, but also of terraced housing, private renting and people of African and Caribbean heritage[36].

5.8 The second cluster listed in Table 7 (7a3) has strong similarities with 7b1. Combining very high ambient densities in 2001 (22.1 dph) and high rates of subsequent soft densification (3.4%), these neighbourhoods are found almost entirely within London, and marked by high proportions of flats, terraced housing, private renting, black Afro-Caribbean residents and Indian, Pakistani or Bangladeshi residents. Such combinations are, however, not confined to London and a third group of neighbourhoods (7a1) again marked by initially high ambient densities (an average of 21.8 dph) and high rates of subsequent soft densification (4.18%) is particularly strongly focused in Birmingham and northern cities. These characteristics are reproduced through subdivision of terraced housing to create private lets, and within a subregional context of low demand and shrinking dwelling stock create the circumstances of Blackburn (discussed above). A fourth subgroup of OAs concentrated around Birmingham and London (7a2) again marked by coincidence of terraced housing, converted flats, and minority ethnic were further densified, so that taken together, these four subgroups accounted for 31.5% of dwellings added to England's SFRNs by soft densification over the decade[37].

[36] Even though there is a high representation of flats, SFRN-OAs may form part of this group where the housing stock was built for single family occupation.

[37] A further subgroup (7b2) of the "multicultural" supergroup made only a modest absolute contribution over the decade but started with the highest ambient density of all (29.0 dph) and subsequently grew at the fastest rate (7.84% over the decade).

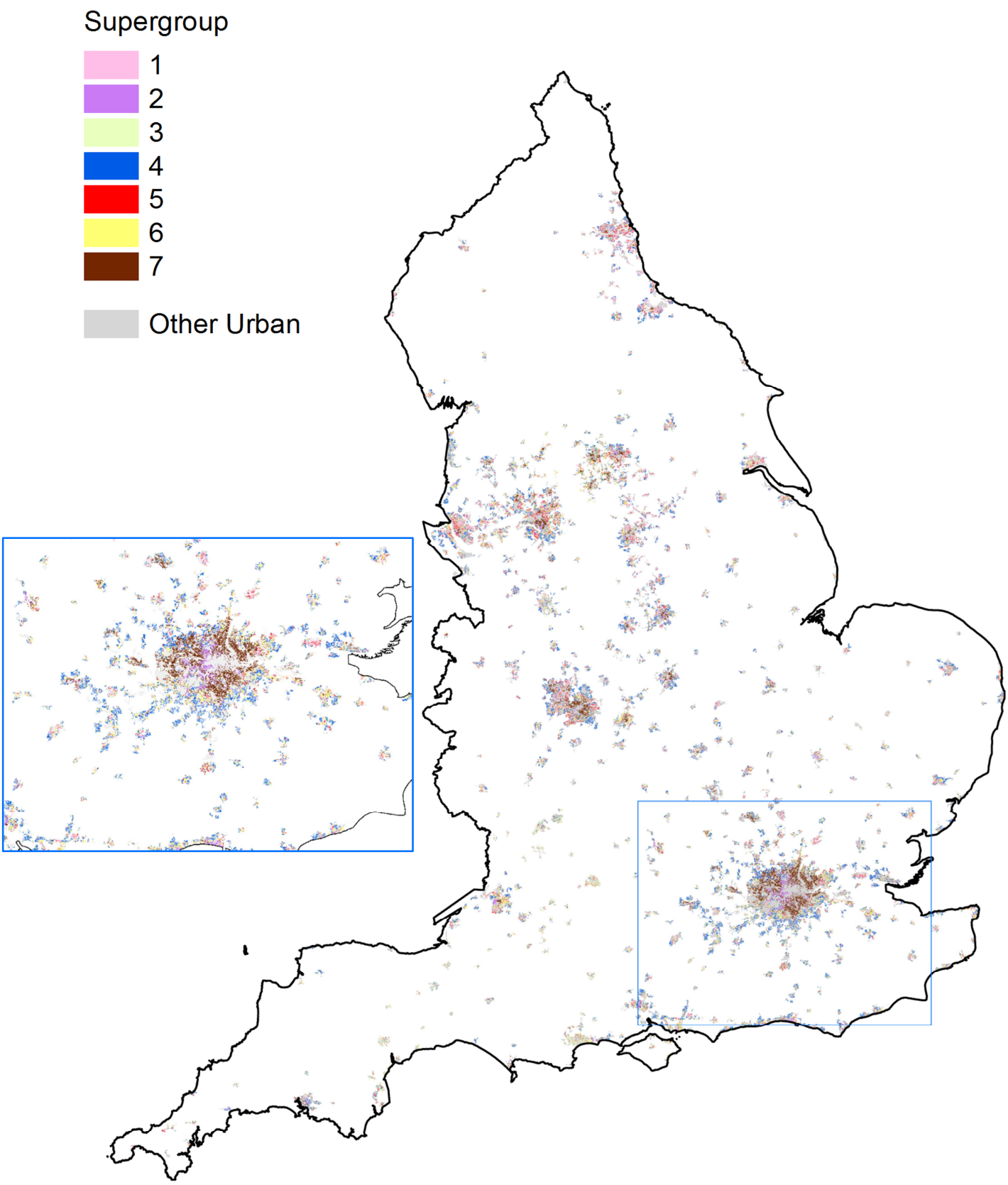
Table 7 Measures of Soft Densification 2011 for Output Areas 2001 Area Classification, England, Single Family Residential Neighbourhoods; Urban Areas with 10,000 or More Population

Supergroup		Group			Stock 2001		Soft Densification Additions 2001-11				
Code	Name	Code	Name	Subgroup	('000s)	Dph	('000s)	Rate	Share	Cumu	Characteristic
					(6)	(7)	(8)	(9)	(10)	(11)	12
7	Multicultural	7b	Afro-Caribbean Communities	7b1	453	26.4	**34**	7.6	12.5	12.5	Flats; Terraced Housing; Private and Public Renting; BME
7	Multicultural	7a	Asian Communities	7a3	637	22.1	**21**	3.4	7.8	20.2	Flats; Terraced Housing; Private Renting; BME
7	Multicultural	7a	Asian Communities	7a1	390	21.8	**16**	4.2	5.9	26.1	Terraced Housing; Private and Public Renting; BME
7	Multicultural	7a	Asian Communities	7a2	511	18.8	**15**	2.9	5.4	31.5	Flats; Terraced Housing; Private and Public Renting; BME
6	Typical Traits	6c	Young Families in Terraced Homes	6c2	432	19.6	**14**	3.3	5.2	36.7	Terraced Housing; Private Renting
2	City Living	2b	Settled in the City	2b2	433	20.8	**14**	3.2	5.1	41.8	Flats; Terraced Housing; Private Sector Renting
6	Typical Traits	6c	Young Families in Terraced Homes	6c1	493	23.4	**13**	2.7	4.9	46.7	Terraced Housing; Private Renting; not BME
6	Typical Traits	6a	Settled Households	6a1	531	16.5	**9**	1.8	3.4	50.1	Terraced Housing; Flats; Private Renting; not BME
2	City Living	2a	Transient Communities	2a2	121	28.6	**7**	5.9	2.6	52.8	Flats; Private Sector Renting
1	Blue Collar Communities	1b	Younger Blue Collar	1b1	709	18.4	**7**	1.0	2.6	55.4	Terraced Housing; Public Sector Renting
5	Constrained by Circumstances	5b	Older Workers	5b3	480	19.5	**7**	1.5	2.5	57.9	Terraced Housing, Flats; Public Sector Renting
4	Prospering Suburbs	4a	Prospering Younger Families	4a2	369	15.6	**7**	1.8	2.4	60.3	Detached Housing
6	Typical Traits	6d	Aspiring Households	6d1	429	15.5	**6**	1.5	2.3	62.7	Terraced Housing; Minimal Public Sector Renting
2	City Living	2b	Settled in the City	2b1	193	17.3	**6**	3.2	2.2	64.9	Flats; Private Sector Renting
4	Prospering Suburbs	4d	Thriving Suburbs	4d2	449	12.4	**6**	1.3	2.2	67.1	Detached Housing
6	Typical Traits	6b	Least Divergent	6b3	296	14.1	**6**	1.9	2.0	69.1	..
6	Typical Traits	6d	Aspiring Households	6d2	360	16.1	**6**	1.5	2.0	71.1	Terraced Housing; Flats; Private Renting; not BME
1	Blue Collar Communities	1b	Younger Blue Collar	1b2	536	20.4	**6**	1.0	2.0	73.1	Terraced Housing; Public Sector Renting
4	Prospering Suburbs	4c	Prospering Semis	4c2	482	15.2	**5**	1.1	1.9	75.0	Detached Housing
5	Constrained by Circumstances	5b	Older Workers	5b4	289	17.6	**5**	1.8	1.9	76.9	Flats; Terraced Housing; Public Sector Renting
6	Typical Traits	6b	Least Divergent	6b1	195	15.3	**5**	2.5	1.8	78.7	Terraced Housing; Flats; Private Renting; not BME
6	Typical Traits	6b	Least Divergent	6b2	360	14.1	**4**	1.1	1.5	80.2	Flats; not BME
4	Prospering Suburbs	4a	Prospering Younger Families	4a1	172	14.7	**4**	2.4	1.5	81.7	Detached Housing
6	Typical Traits	6a	Settled Households	6a2	466	21.1	**4**	0.8	1.3	83.0	Terraced Housing; Flats; Private Renting; not BME
1	Blue Collar Communities	1c	Older Blue Collar	1c1	293	13.8	**3**	1.2	1.3	84.2	Terraced Housing; Public Sector Renting
1	Blue Collar Communities	1c	Older Blue Collar	1c3	300	16.0	**3**	1.1	1.2	85.4	Terraced Housing; Public Sector Renting
4	Prospering Suburbs	4d	Thriving Suburbs	4d1	336	9.8	**3**	0.9	1.1	86.6	Detached Housing
3	Countryside	3c	Accessible Countryside	3c1	136	11.0	**3**	2.0	1.0	87.5	Detached Housing
3	Countryside	3a	Village Life	3a1	151	11.5	**3**	1.7	0.9	88.5	Detached Housing
4	Prospering Suburbs	4b	Prospering Older Families	4b4	191	11.6	**3**	1.3	0.9	89.4	Detached Housing
4	Prospering Suburbs	4b	Prospering Older Families	4b3	254	10.0	**2**	1.0	0.9	90.3	Detached Housing
4	Prospering Suburbs	4b	Prospering Older Families	4b2	235	14.8	**2**	1.0	0.8	91.1	Detached Housing
3	Countryside	3c	Accessible Countryside	3c2	130	11.3	**2**	1.7	0.8	91.9	Detached Housing
3	Countryside	3a	Village Life	3a2	127	13.2	**2**	1.7	0.8	92.7	Detached Housing

5	Constrained by Circumstances	5b	Older Workers	5b2	209	17.4	**2**	1.0	0.8	93.5	Flats; Public Sector Renting
5	Constrained by Circumstances	5c	Public Housing	5c3	162	20.5	**2**	1.3	0.8	94.2	Flats; Terraced Housing; Public Sector Renting
7	Multicultural	7b	Afro-Caribbean Communities	7b2	26	29.0	**2**	7.8	0.8	95.0	Flats; Public Renting; BME
4	Prospering Suburbs	4c	Prospering Semis	4c1	379	16.9	**2**	0.5	0.8	95.7	Detached Housing
4	Prospering Suburbs	4b	Prospering Older Families	4b1	224	13.0	**2**	0.9	0.7	96.4	Detached Housing
3	Countryside	3b	Agricultural	3b2	85	14.5	**2**	2.1	0.6	97.1	Detached Housing
1	Blue Collar Communities	1a	Terraced Blue Collar	1a1	222	20.1	**2**	0.8	0.6	97.7	Terraced Housing; Public Sector Renting
1	Blue Collar Communities	1a	Terraced Blue Collar	1a3	196	19.2	**1**	0.7	0.5	98.2	Terraced Housing; Public Sector Renting
5	Constrained by Circumstances	5c	Public Housing	5c1	73	21.7	**1**	1.7	0.5	98.7	Flats; Public Sector Renting
1	Blue Collar Communities	1c	Older Blue Collar	1c2	180	16.7	**1**	0.7	0.4	99.1	Public Sector Renting
3	Countryside	3b	Agricultural	3b1	43	12.0	**1**	2.3	0.4	99.5	Detached Housing
5	Constrained by Circumstances	5b	Older Workers	5b1	166	20.0	**1**	0.6	0.3	99.8	Flats; Terraced Housing; Public Sector Renting
4	Prospering Suburbs	4c	Prospering Semis	4c3	359	19.6	**1**	0.2	0.3	100.1	Mixed Type &Tenure
5	Constrained by Circumstances	5c	Public Housing	5c2	13	21.2	**0**	1.4	0.1	100.1	Flats; Public Sector Renting
1	Blue Collar Communities	1a	Terraced Blue Collar	1a2	97	21.2	**0**	0.1	0.1	100.2	Terraced Housing; Public Sector Renting
5	Constrained by Circumstances	5a	Senior Communities	5a1	27	19.5	**0**	-0.4	0.0	100.1	Flats; Public Sector Renting
5	Constrained by Circumstances	5a	Senior Communities	5a2	33	15.0	**0**	-0.3	0.0	100.1	Flats; Public Sector Renting
2	City Living	2a	Transient Communities	2a1	44	25.5	**0**	-0.7	-0.1	100.0	Flats; Private Sector Renting

Column
6 Number of Dwelling Units ('00s) 2001
7 Ambient Density 2001 (Dwellings Per Hectare)
8 Number of Units Added Through Soft Densification 2001-2011
9 Rate of Soft Densification Relative to Stock (Col 8 / Col 6) x 100
10 Share of all Units Gained by Soft Densification; SFRNs; English Urban Areas; 10,000+ Population
11 Cumulative Total Share
12 Key Characteristics of Area Type

Figure 20: Output Area Classification Clusters



5.9 Consideration of soft densification of Output Areas within a further set of four subgroups (6c2, 2b2, 6c1, 6a1) brings half (50.1%) of all dwellings generated through such processes in urban SFRNs within the scope of the account. One of these clusters (2b2) belongs to the "City Living" supergroup, marked at the time of the 2001 Census by private renting, converted flats and a social mix in which single person households (other than pensioners) and individuals born outside the UK feature relatively highly. OAs in this subgroup are found within cities, particularly London.[38]

5.10 The other members of this set (in subgroups 6c2, 6c1 and 6a1) belong to the "Typical Traits" supergroup ("characterized by its averageness" in the words of Vickers et al 2005, p57). For present purposes, it appears that SFRNs within these subgroups, in reflecting national averages at the microscale, rarely impinge on areas developed as large-scale social housing estates and in the case of 6c2, 6c1 and 6a1 show an over-representation of terraced housing. Moreover, these "mixed terraced" areas are characteristic of northern urban areas whose physical structure (like those illustrated in Box 1) intermingles residential, non-residential and undeveloped land. As illustrated below, soft densification of neighbourhoods of this type was less dependent on subdivision of existing houses than the forms typical of Supergroup 7 discussed in the preceding paragraphs.

5.11 In strong contrast to neighbourhoods in Supergroup 7 which densified primarily through subdivision of existing dwellings, and some clusters within Supergroup 6 where soft densification involved small developments of newly built units, densification of neighbourhoods with a high representation of detached housing was limited. These areas correspond to Supergroup 4 ("Prospering Suburbs") and Supergroup 3 which although styled "Countryside", includes suburban neighbourhoods developed at low density across England away from major cities. These OAs have high proportions of detached houses and are characteristic of suburbs of a number of major towns, especially in the South-West region (including Cheltenham and Gloucester, Swindon, Bournemouth, and Exeter).

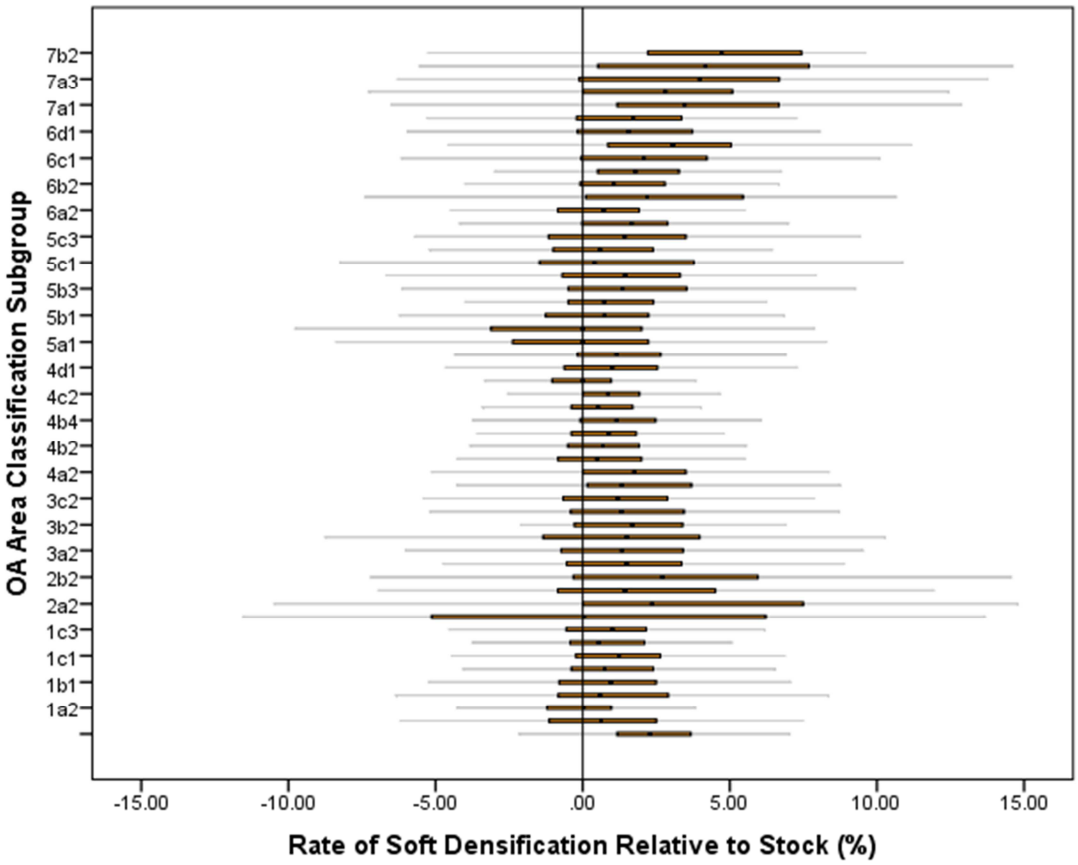
5.12 Nevertheless, while the intense concentration of soft densification in OAs belonging to categories near the head of Table 7 is clear, it is more difficult to grasp the differing contributions to and effects of soft densification in the other neighbourhood types. There is little clear relationship between the specific characteristics of subgroups within the detached housing supergroups (3 and 4), and the pattern of soft densification that occurred within them. Moreover, the tendency to negative rates of soft densification in particular areas of high demand discussed in Section 4 is *not* reflected in distinctions between different subgroups of neighbourhoods on the OA classification

5.13 Although in aggregate the sets of neighbourhoods characterized by detached houses did not show negative rates of soft densification, in many high status neighbourhoods any additional dwellings arising from soft densification were entirely offset by losses. Losses occur where households make adjustments such as deconversion or amalgamation of properties. Moreover, as Figure 21 shows, considered in aggregate, all the neighbourhoods belonging to one high status subgroup in a particular TTWA, will often show negative rates of soft

[38] Even though there is a high representation of flats, SFRN-OAs may form part of this group where the housing stock was built for single family occupation).

densification[39]. The boxes and whiskers of Figure 21 indicate the variability of the rate of soft densification of neighbourhoods in different subgroups. The topmost box, for example, represents the interquartile range of rates of soft densification in the aggregate of neighbourhoods in subgroup 7b2. The vertical line at the centre of the Figure marks where the rate of soft densification is zero. In many TTWAs, high status subgroups (within Supergroups 3 and 4) show negative rates of soft densification and so the a whisker extends to the left of the vertical line. In the case of 4c2, the median is just below zero, so adjustments that reduce the number of

. **Figure 21 Rates of Soft Densification by Neighbourhood Type, 2001-2011**



This box-plot follows the conventions explained in Figure 15, but it is rotated to make the distinction between positive and negative rates of soft densification clearer. Both outliers and extreme outliers are omitted for clarity.

[39] Figure 21 shows variation in rates of soft densification within and between what might be termed TTWA subgroup sets. A TTWA subgroup set is the aggregate of all OAs of the same subgroup classification in a particular TTWA. Examples are the aggregate of all 5b1 OAs in the Birmingham TTWA and the aggregate of all of the 1a2 OAs in the Liverpool TTWA. There are up to 166 subgroup sets represented by any box-whisker plot within Figure 21 (but there are fewer where a particular subgroup of the OA classification does not occur in a particular TTWA).

properties tend to outweigh those leading to densification in roughly half of all TTWAs. While particular suburban morphologies are more or less amenable to plot subdivision or to infill development generally, varying context ie differing degrees of potential household growth, of demand from potential long distance commuters, and of planning constraint implies differential stimulus to divide plots. Variation *within* the neighbourhood subgroups in the extent of garden infill and of the soft densification response more generally should therefore be expected.

5.14 Moreover, it is important to appreciate that variation in rates of soft densification at the town and TTWA scales (discussed in section 4) does not have a simple and direct relation to variation at the neighbourhood scale. Rates of soft densification as measured here represent the net effect of the *range* of adjustments made by and for households variously increasing and decreasing the aggregate numbers of dwellings. While some households seek to sell garden land for development in particular neighbourhoods characterized by detached houses built at very low density, others elsewhere within the city may seek to amalgamate semi detached house. At the same time owners with property in more central neighbourhoods may deconvert. The first of these actions densifies, the remaining two do the opposite. Crucially all three add to the number of units within the town that provide houses substantially larger than average on plots which are larger than average.

5.15 While units generated through subdivision of existing buildings were highly concentrated spatially, those gained through infill construction were more widely dispersed through neighbourhoods of different types. The extent to which garden infill was concentrated in particular types of neighbourhoods is a matter of some importance. Overall, with a rate of plot subdivision of 0.2% per decade, garden infill added just 29,000 units to the stock of dwellings in SFRNs. Most SFRN-OAs saw no instances of residential plot subdivision over the inter-censal decade. Moreover, as evident in Table 7 soft densification in one single group of neighbourhoods (7b1) – overwhelmingly concentrated in London –absorbed more additional dwellings than were accommodated by garden infill in urban SFRNs across the whole of England. The disparity between the political significance of "garden grabbing" and the quantitative insignificance of garden infill implies a need to focus very sharply on the incidence of plot subdivision and its implications.

5.16 The assumption that higher rates of plot subdivision typify high status neighbourhoods has been implicit in the foregoing discussion. Table 8 confirms this by providing a full breakdown of the incidence of residential plot subdivision and of dwellings gained through garden infill by neighbourhood type. Rows are in descending order of dwellings built (col 5), with the cumulative percentage of all dwellings attributable to garden infill in col 7. In eight clusters of neighbourhoods (3a2, 3c2, 4b4, 4b3, 3a1, 3c1, 3b1 and 4d2) highlighted by a green tone in Table 8, the rate (col 4) was at least double the national average. All of these belong to one of the two detached dwelling supergroups 3 ("Countryside") and 4 ("Prospering Suburbs"). In each of these eight subgroups, typical residential densities were less than 25 dwellings per hectare (col 2). Over the decade, at least one in five OAs within these subgroups saw some additional units created by residential plot subdivision (col 6).

5.17 By contrast, no additional units were created through plot subdivision in at least 95% of OAs in another thirteen neighbourhood subgroups (1a1, 1a2, 1a3, 1b2, 4c3, 5b1, 5c1, 5c3, 6a2 ,6c1, 7a1, 7a2, 7b1) highlighted in grey in Table 8. In these

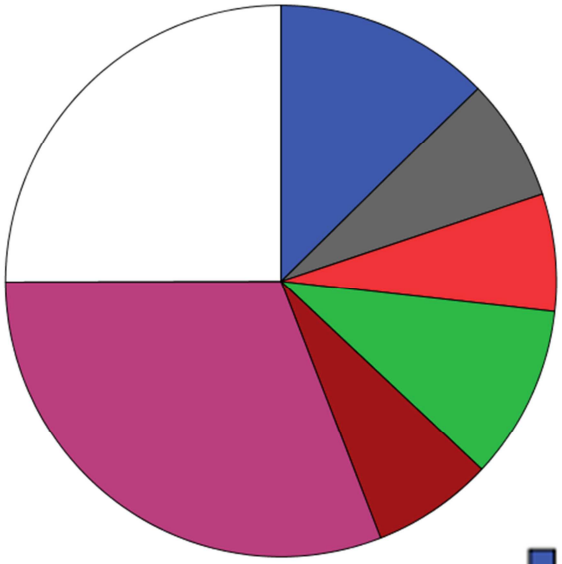
subgroups, the rate of plots subdivision tended to be around half the national average. Most of these belong to one of three supergroups (1 “Blue Collar Communities”; 5 “Constrained by Circumstances” characterized by social rented housing where the power to subdivide plots does not lie with the householders; and 7 “Multicultural” – the three specific subgroups being characterized by flats and smaller terraced houses).

5.18 Nevertheless – these differentials notwithstanding – the eight subgroups of neighbourhoods with relatively *high* rates of plot subdivision mentioned in para 5.16 only account for 21% of garden infill units (occupying 27.9% of the land). Moreover, the thirteen subgroups with particularly *low* rates of subdivision of para 5.17 together actually accommodated 15.3% of the garden infill units (on 11.7% ofthe land)[40]. The incidence of plot subdivision, though always slight, was thus more widely dispersed across varying types of suburban neighbourhood than the differential *rates* might initially suggest. A quarter of the units (24%) brought forward through garden infill (and a similar proportion of the land -23%) lay in neighbourhoods within Supergroup 6 (“Typical Traits”).

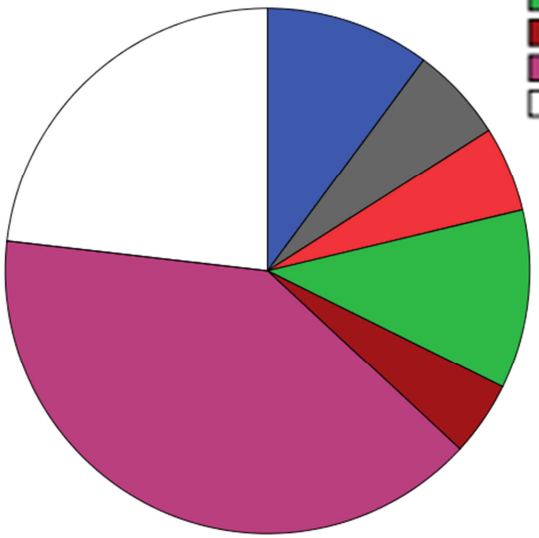
5.19 Overall, therefore instances of garden infill, although never common, were fairly broadly dispersed between neighbourhood subgroups as evident in Figure 22 (a and b). This relatively broad distribution arises both from variation between OAs within the same subgroup of the classification, and the heterogeneous physical structure of the OAs themselves (also evidenced by the relatively weak differences between the land use mixes of the supergroups shown in Figure 23). The relatively broad dispersal also reflects the absence of any tendency for neighbourhood subgroups more physically suited to garden infill to show uniformly greater rates of plot subdivision.

[40] These figures are aggregates of the absolute numbers of dwellings built in garden infill and absolute area of derived plots (respectively shown in cols. 5 and 3 of Table 8)

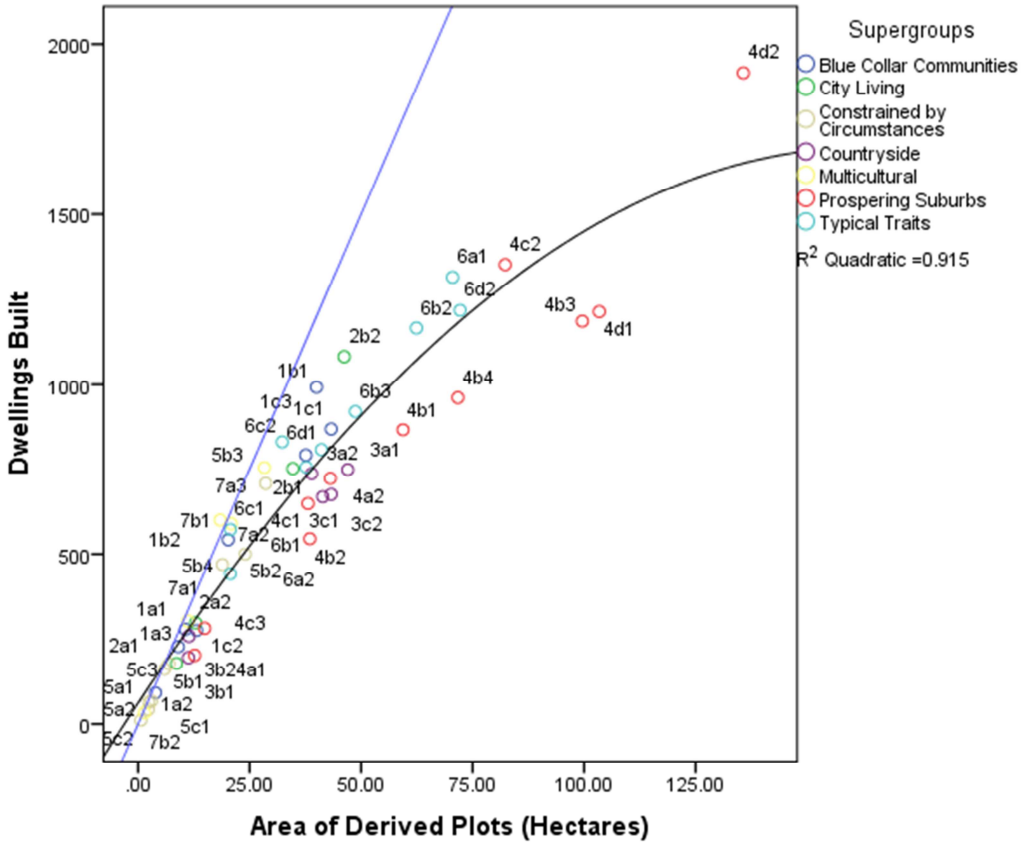
Figure 22 Garden Infill 2001-2011 by OA Classification



a) Number of Developed Units



b) Area of Derived Plots (Has)



Points indicate the total area of land transferred to derivative plots in OAs within each subgroup, and the corresponding number of units constructed. The blue line indicates "expected" numbers of units if building were at 30dph. Outcomes for clusters in Supergroup 1 (Blue Collar Communities) are near this line, but not for Supergroups 3,4 and 6.

c) Relationship between Derived Plots and Units Built at Subgroup Level

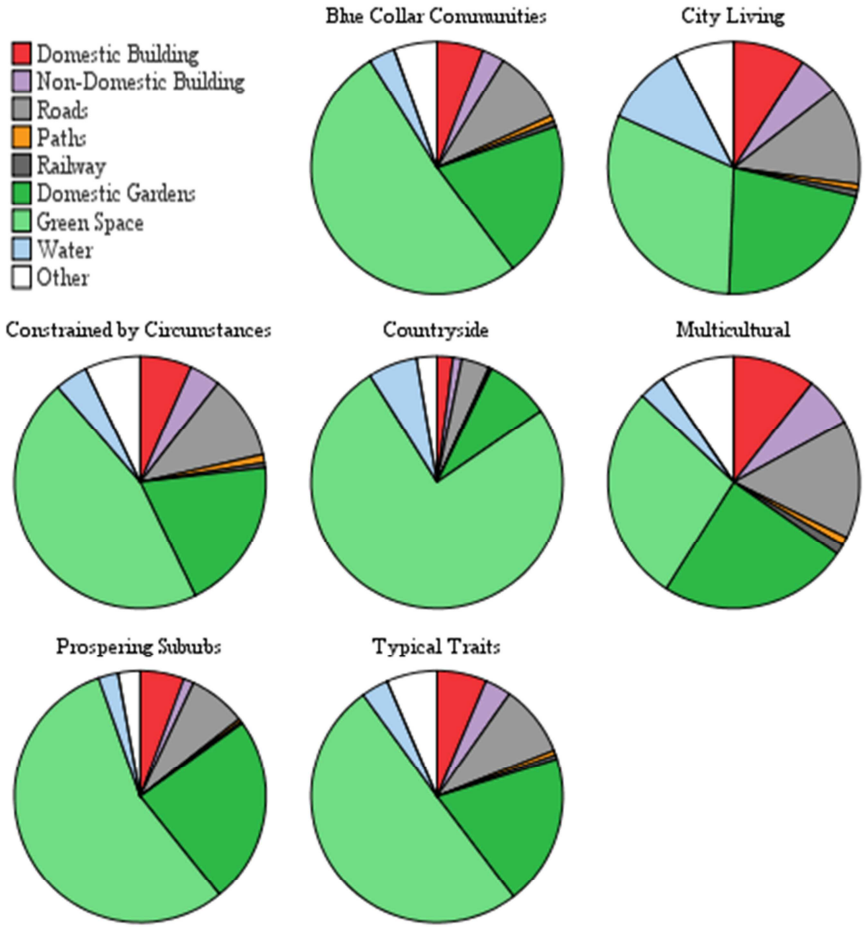
Table 8 Rate of Residential Plot Subdivision and Garden Infill; Urban SFRNs 2001-2011by OA Classification

Subgroup	Supergroup	Group	Density on Garden Infill (1)	Density in OA (2)	Area of Derived Plots (has) (3)	Rate of Plot Subdivision (4)	Units Built (5)	Pct of OAs Affected (6)	Cum Pct of Units (7)
4d2	Prospering Suburbs	Thriving Suburbs	15.1	18.6	135.7	0.41	1915	20.0	6.0
4c2	Prospering Suburbs	Prospering Semis	16.3	23.8	82.3	0.27	1352	13.0	10.2
6a1	Typical Traits	Settled Households	19.4	33.4	70.5	0.24	1315	11.0	14.3
6d2	Typical Traits	Aspiring Households	18.2	28.1	72.2	0.34	1218	15.0	18.1
4d1	Prospering Suburbs	Thriving Suburbs	13.1	14.3	103.4	0.37	1214	20.0	21.9
4b3	Prospering Suburbs	Prospering Older Families	12.4	12.8	99.6	0.46	1186	22.0	25.6
6b2	Typical Traits	Least Divergent	19.3	30.4	62.4	0.32	1166	13.0	29.2
2b2	City Living	Settled in the City	25.1	51.7	46.2	0.25	1082	9.0	32.6
1b1	Blue Collar Communities	Younger Blue Collar	25.7	38.4	40	0.14	992	5.0	35.7
4b4	Prospering Suburbs	Prospering Older Families	13.6	16.5	71.7	0.47	961	23.0	38.7
6b3	Typical Traits	Least Divergent	19.3	29.3	48.7	0.30	920	14.0	41.6
1c1	Blue Collar Communities	Older Blue Collar	21.2	30.0	43.3	0.29	868	12.0	44.3
4b1	Prospering Suburbs	Prospering Older Families	14.7	18.3	59.4	0.37	866	19.0	47.0
6c2	Typical Traits	Young Families in Terraced Homes	27.1	46.6	32.3	0.19	830	7.0	49.5
6d1	Typical Traits	Aspiring Households	21.3	30.6	41.1	0.19	807	8.0	52.1
1c3	Blue Collar Communities	Older Blue Collar	20.6	29.9	37.6	0.26	791	10.0	54.5
6b1	Typical Traits	Least Divergent	21.4	33.2	37.7	0.38	755	15.0	56.9
7a3	Multicultural	Asian Communities	26.8	47.9	28.3	0.12	754	5.0	59.2
2b1	City Living	Settled in the City	22.4	37.8	34.7	0.38	751	16.0	61.6
3a1	Countryside	Village Life	16.1	20.8	47	0.45	748	19.0	63.9
3a2	Countryside	Village Life	19.9	23.3	38.9	0.53	736	20.0	66.2
4a2	Prospering Suburbs	Prospering Younger Families	16.5	24.9	43.1	0.19	722	9.0	68.5
5b3	Constrained by Circumstances	Older Workers	26.9	46.3	28.6	0.15	707	5.0	70.7
3c2	Countryside	Accessible Countryside	16.1	18.9	43.3	0.48	675	21.0	72.8
3c1	Countryside	Accessible Countryside	16.9	20.8	41.4	0.44	668	19.0	74.9

4c1	Prospering Suburbs	Prospering Semis	16.8	25.8	38.1	0.17	648	8.0	76.9
7b1	Multicultural	Afro-Caribbean Communities	33.5	72.9	18.4	0.13	600	4.0	78.7
7a2	Multicultural	Asian Communities	28.3	46.8	20.9	0.12	589	4.0	80.6
6c1	Typical Traits	Young Families in Terraced Homes	28.1	51.2	20.7	0.12	572	4.0	82.4
4b2	Prospering Suburbs	Prospering Older Families	14.3	20.4	38.5	0.22	545	11.0	84.1
1b2	Blue Collar Communities	Younger Blue Collar	26.9	37.8	20.2	0.10	542	3.0	85.8
5b2	Constrained by Circumstances	Older Workers	21.6	36.2	24	0.23	500	10.0	87.3
5b4	Constrained by Circumstances	Older Workers	25.5	43.1	18.9	0.16	469	6.0	88.8
6a2	Typical Traits	Settled Households	21.5	37.9	20.7	0.10	442	4.0	90.2
7a1	Multicultural	Asian Communities	28.3	51.0	11.2	0.09	303	3.0	91.1
2a2	City Living	Transient Communities	24.0	80.9	12.9	0.18	298	7.0	92.0
4c3	Prospering Suburbs	Prospering Semis	18.4	27.7	14.9	0.08	282	4.0	92.9
1a1	Blue Collar Communities	Terraced Blue Collar	25.8	39.6	10.6	0.13	279	4.0	93.8
1c2	Blue Collar Communities	Older Blue Collar	20.2	30.4	13.1	0.15	276	6.0	94.6
3b2	Countryside	Agricultural	23.4	27.6	11.4	0.31	259	10.0	95.5
1a3	Blue Collar Communities	Terraced Blue Collar	25.4	39.9	9	0.12	228	3.0	96.2
4a1	Prospering Suburbs	Prospering Younger Families	15.9	22.5	12.7	0.11	203	5.0	96.8
3b1	Countryside	Agricultural	18.8	20.0	11.3	0.42	196	18.0	97.4
2a1	City Living	Transient Communities	25.4	67.4	8.6	0.33	179	11.0	98.0
5b1	Constrained by Circumstances	Older Workers	26.3	47.3	6.9	0.11	178	4.0	98.5
5c3	Constrained by Circumstances	Public Housing	27.8	39.8	5.9	0.11	162	3.0	99.0
1a2	Blue Collar Communities	Terraced Blue Collar	25.5	40.0	3.9	0.10	92	3.0	99.3
5a1	Constrained by Circumstances	Senior Communities	20.9	33.3	3	0.25	68	7.0	99.5
5c1	Constrained by Circumstances	Public Housing	30.0	38.9	2.4	0.09	64	3.0	99.7
5a2	Constrained by Circumstances	Senior Communities	18.5	32.7	2.3	0.13	43	7.0	99.9
7b2	Multicultural	Afro-Caribbean Communities	26.6	95.2	1.4	0.12	33	5.0	100.0
5c2	Constrained by Circumstances	Public Housing	18.3	34.2	0.6	0.09	11	6.0	100.0

Col 1 refers to the ratio of the aggregate number of units built on garden infill in OAs within the subgroup to the associated aggregate area of garden land developed. It thus provides a measure of residential density of housing developed on garden land. These figures derive from LUCS. Col 2 refers to the ratio of the aggregate number of dwellings in OAs within the subgroup (derived from the Census) to the associated aggregate area of residential space recorded on GLUD. Residential space is here defined as the sum dwelling footprint and residential garden. Cols 1 and 2 are directly comparable and capture residential space available to a household. This measure of density should not be confused with ambient density (see para 3.2).

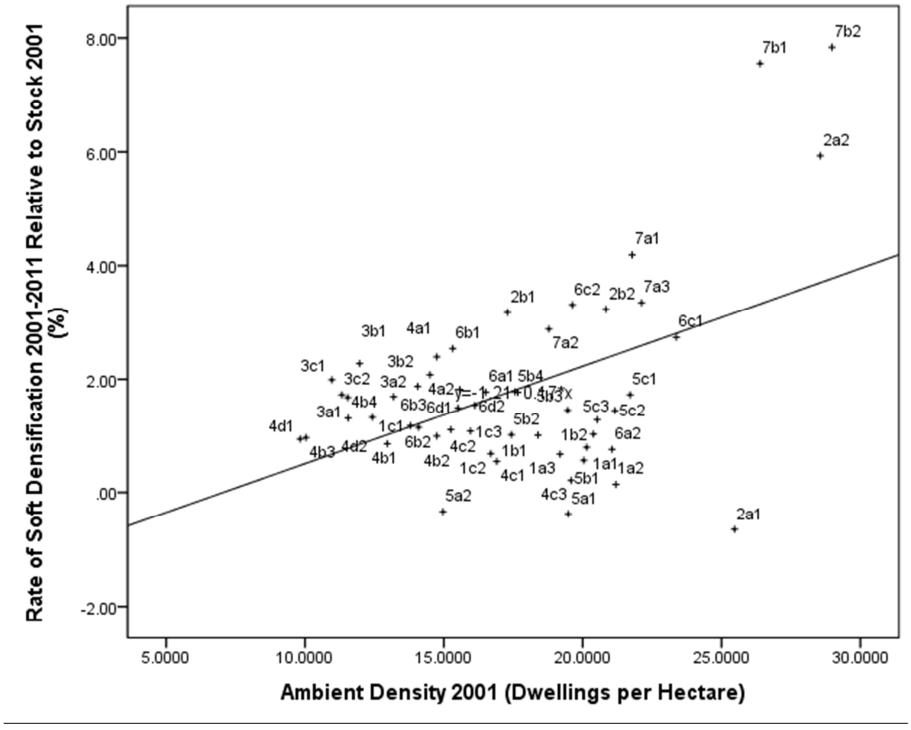
Figure 23: Land Use Mix, English SFRN OAs by Output Area Classification Subgroups



5.20 As stressed in para 3.12, the nature of the development realised on derived plots was distinctive. While this perhaps simply reflected the small size of the sites in absolute terms, there was a clear tendency for development densities on a derived plot to be less than that typical of the 'host' OA (even if higher than on the immediately adjoining properties. See Table 8). Equally significantly, the extremely low densities of garden infill schemes in high-status areas is clear from Table 8 and Figure 22c.

5.21 On the basis of the foregoing evidence, it might be suggested (provocatively) that over the inter-censal decade those neighbourhoods that superficially seem physically most amenable to soft densification proved least likely to have densified. There is certainly a weak but obvious tendency (illustrated in Figure 24) for neighbourhoods which were already most densely developed to densify further.

Figure 24: Relationship between Ambient Density 2001 and Rate of Soft Densification 2001-2011; Output Area Classification Subgroups



5.22 Government's responses to concerns about “garden grabbing” demonstrate the practical importance of being aware just how the disbenefits of policies aimed at avoiding urban sprawl might be borne. To assist in broader reflection, an indicator has been calculated gauging inequality of the distribution of residential space across England. A measure of the contribution of each Output Area to inequality of shares of residential space has also been calculated.

Figure 25a Indicator of Inequality in Shares of Residential Space , L_i (See Box 6)

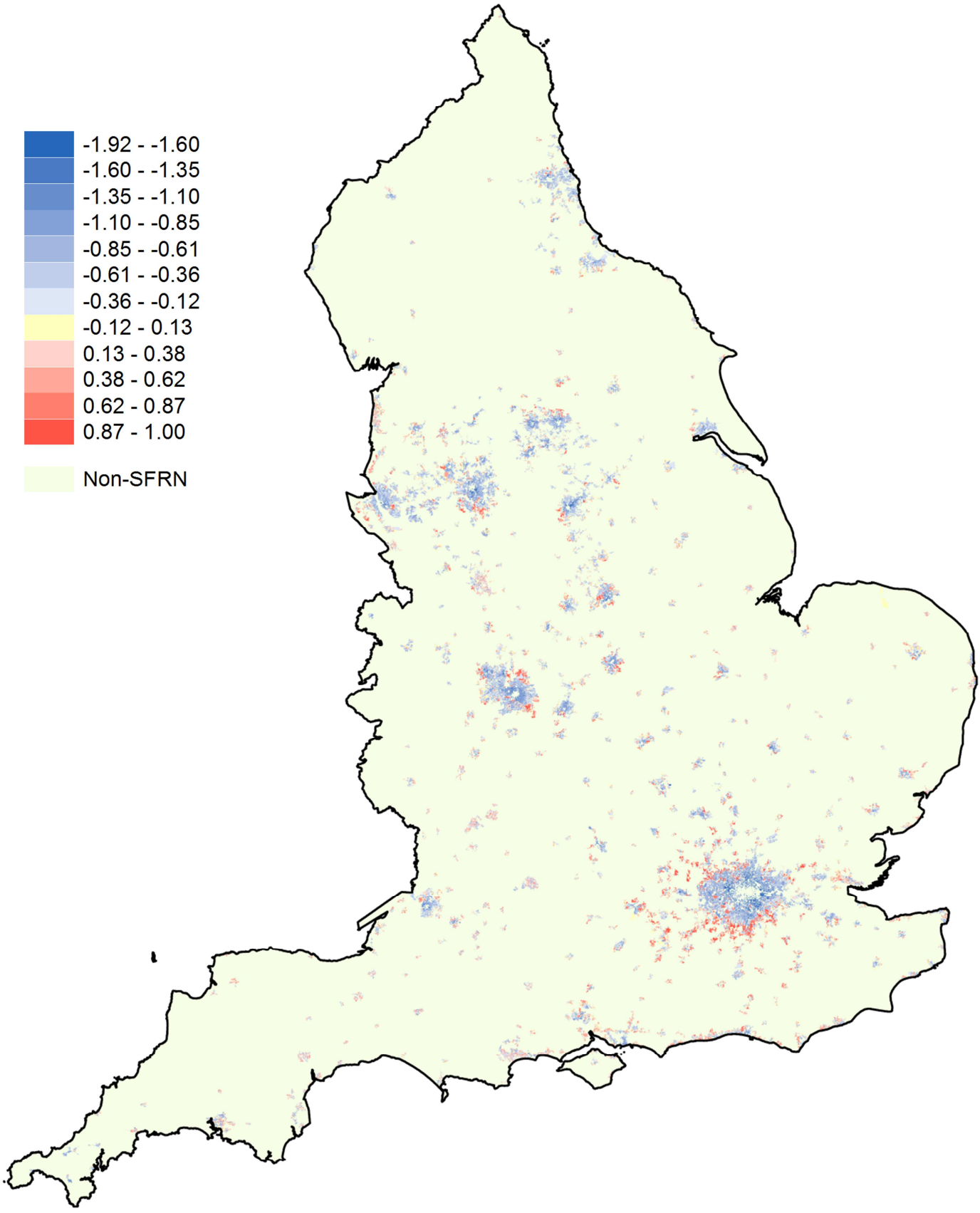
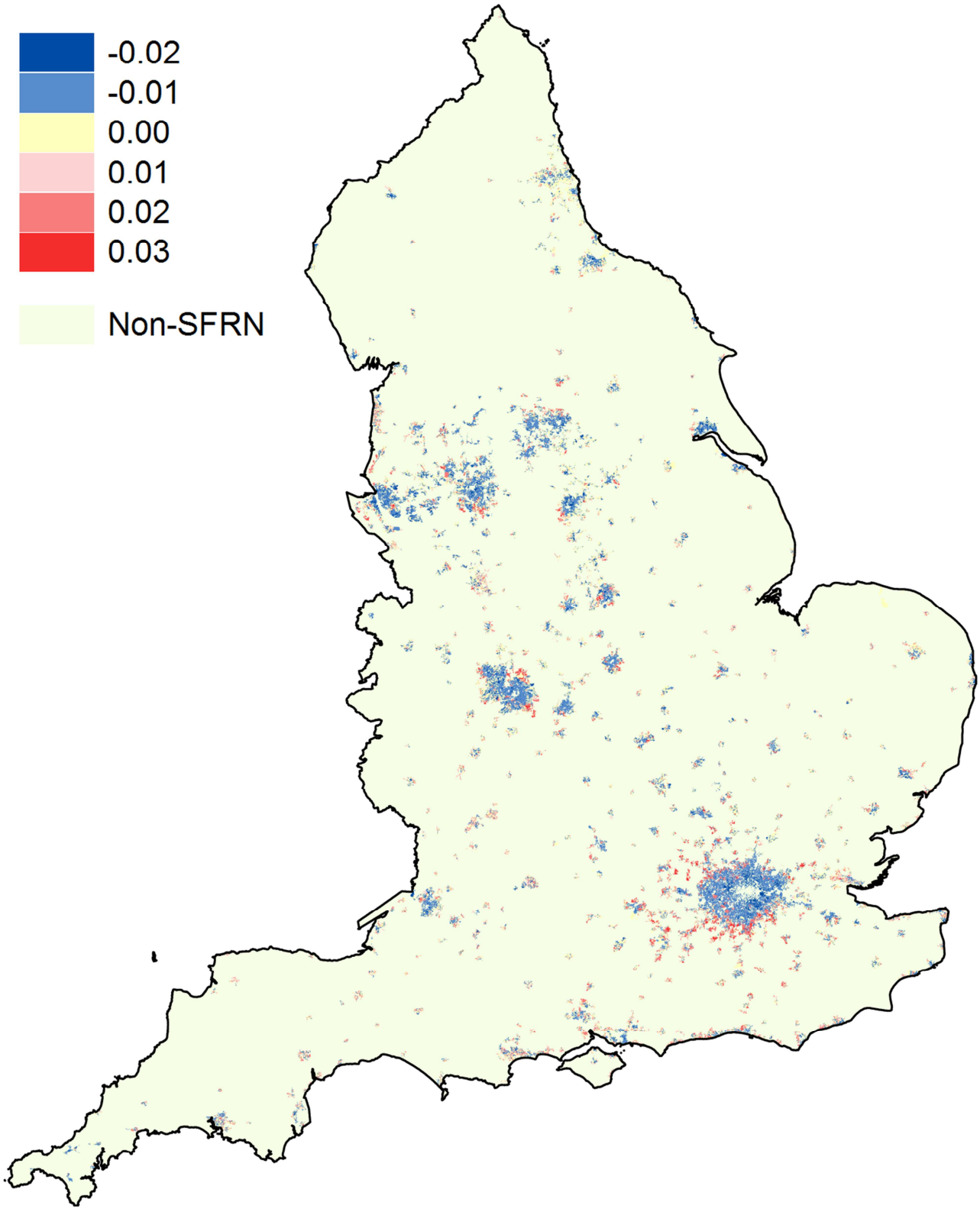


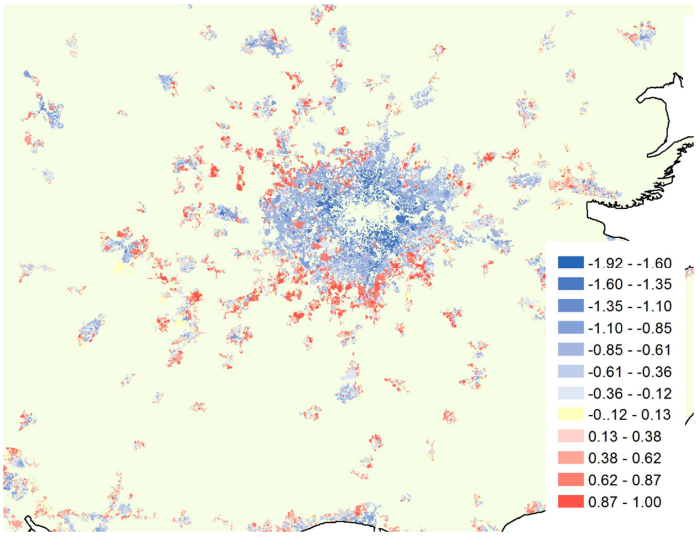
Figure 25b Contribution to National Inequality in Shares of Residential Space , C_i (See Box 6)



Box 6: Measuring Unequal Shares of Residential Space

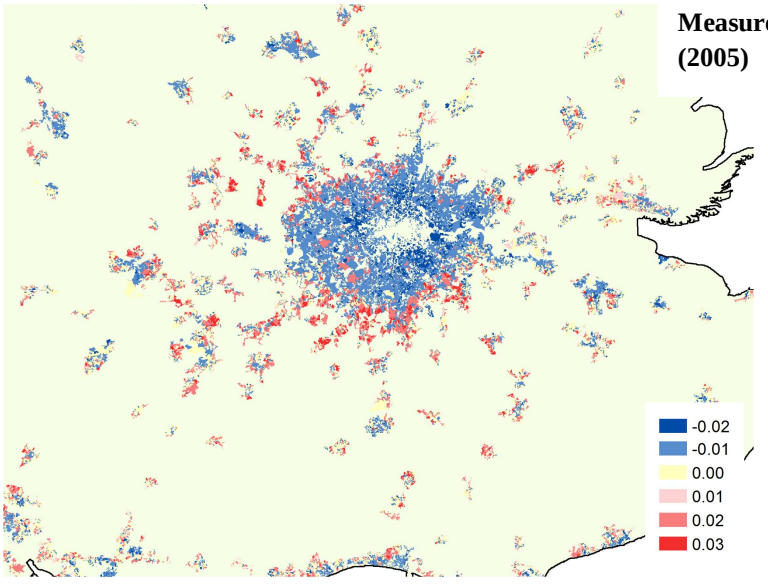
The term "residential space" is used here to mean the land on which dwellings stand and any surrounding garden land. This can be estimated at output area level for 2005 using GLUD (see para 2.18 above), allowing for more formal measurement of inequality of shares of residential space, using an index designed by Henri Theil (1967), frequently used for measuring income inequality.

Theil (1967) sets out the theoretical case for measures of inequality of this type, and a useful intuitive discussion is provided by Conceição and Ferreira (2000). Crucially for present purposes, however, the measure can be decomposed to show the contribution of any unit (such as an OA) or set of units (such as those belonging to the same supergroup) to accentuating or reducing inequality. At the core of the expression capturing the character of a unit is a ratio; the ratio of that OA's share of England's residential space to its share of England's households. The ratio indicates the extent to which households in that area enjoy an unusually large or small amount of living space. The logarithm of this ratio for the *i*th OA, say l_i varies between $-\infty$ and $+\infty$ expressing how extreme the ratio may be for that OA. High positive values indicate lavish shares of space while high negative values indicate cramming. If the logarithm of the ratio for output area *i* is multiplied by its share of England's residential space, s_i, and the values summed over every OA, this yields an index, $T = \Sigma\, s_i.l_i$ which varies from zero (where shares of residential space and of households are everywhere equal), to 1 (where maximally unequal).



Measure of l*i* for London & Environs (2005)

The measure $c_i = s_i.l_i$ captures the contribution of output area *i* to inequality in the distribution of residential space. A value of l_i may be exceedingly high in the case of properties with the most extensive grounds, though very extreme cases (if few in number and accounting for a very small share of aggregate residential space overall) may have less of an effect on overall inequality than a large number of properties with ample space.



Measure of c*i* for London & Environs (2005)

5.23 These measures are based on the Theil Index (see Box 6) and the contribution of each urban SFRN to inequality of shares of residential space is mapped in Figure 25. Construction of the index involves comparing each area's share of England's "residential space" with its share of households. The term residential space refers here to the area of land given over to domestic buildings together with their garden (estimated by GLUD measures assembled by Ordnance Survey for the Department of Communities and Local Government). These data were used to examine the balance of land-uses in SFRN-OAs represented in Figure 1, and variation in these balances between neighbourhood supergroups shown in Figure 23.

5.24 Figure 26 allows comparison between the contribution made to inequality by every neighbourhood subgroup in 2001 with the extent of soft densification in the decade 2001-2011 (expressed by the units added through soft densification). The contribution to inequality of residential space made by each subgroup of output areas is indicated on the horizontal axis of Figure 26. Those subgroups which plot to the left of the vertical reduce aggregate inequality.

Figure 26: Relationship between Inequality Contribution 2001 and Rate of Soft Densification 2001-2011; Output Area Classification

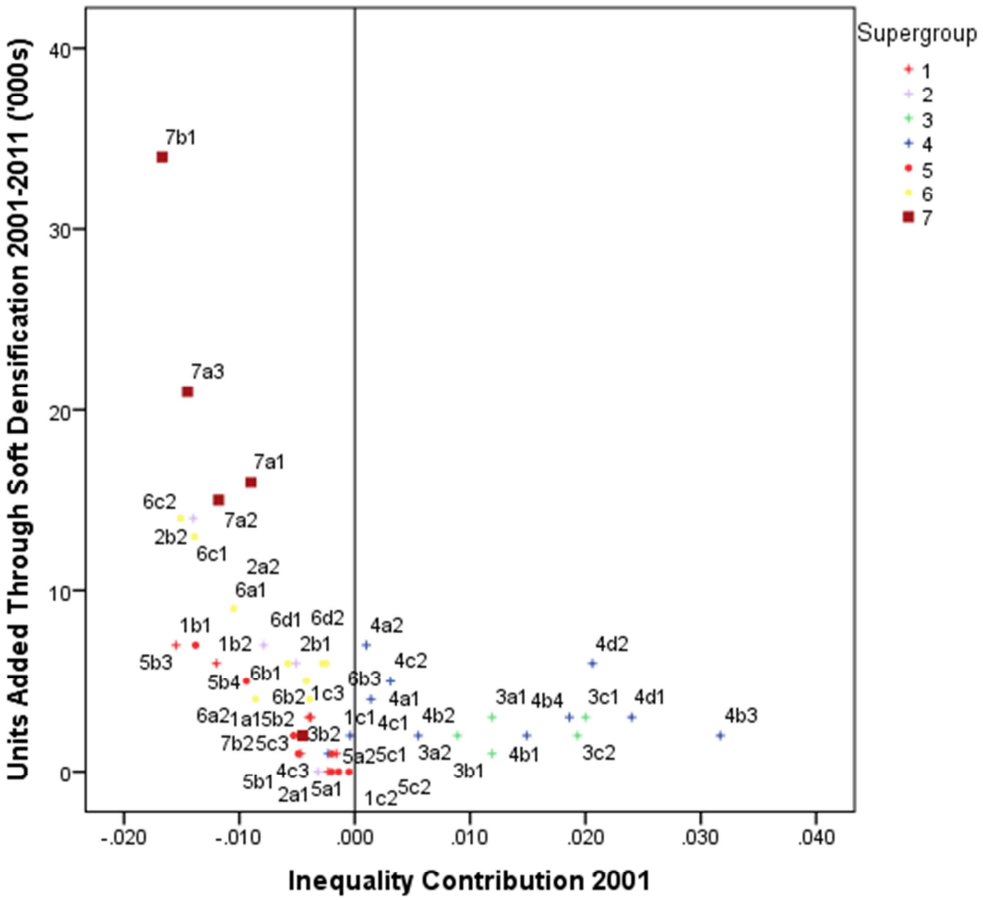
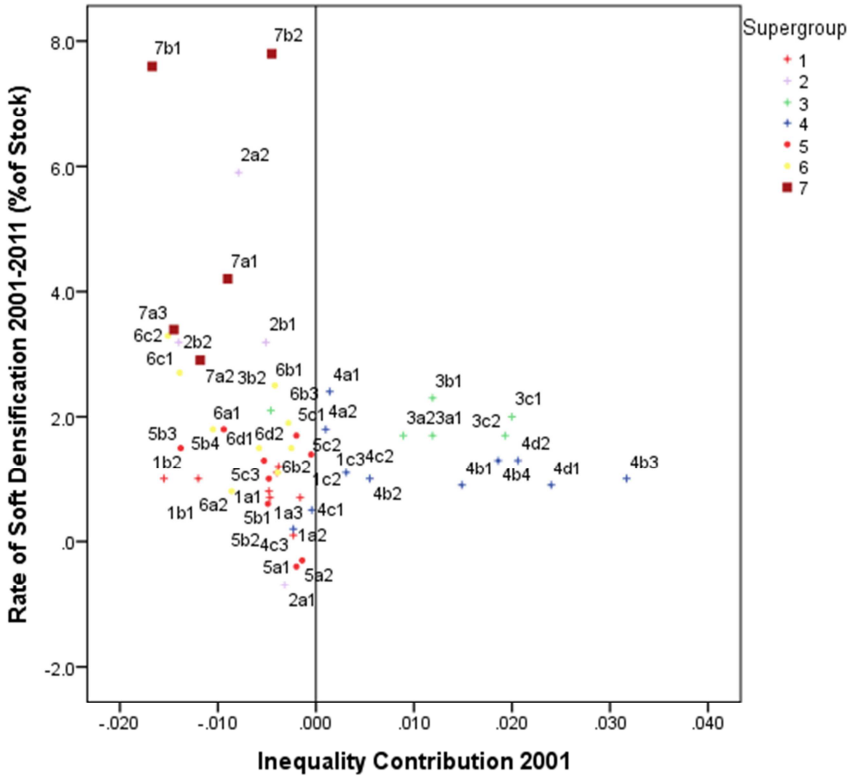
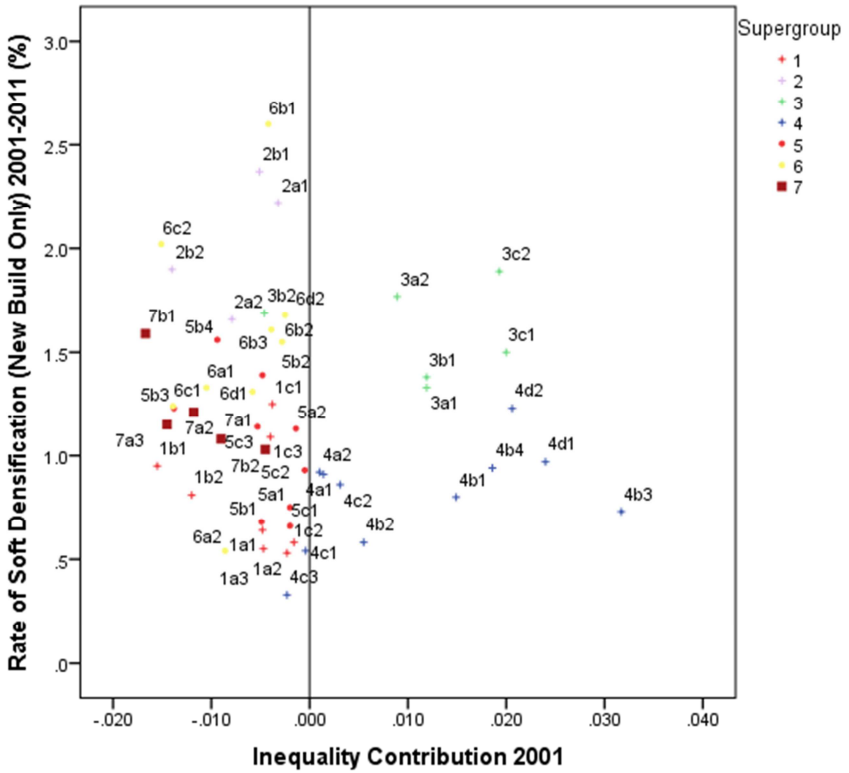


Figure 27: Relation Between Soft Densification 2001-2011 and Inequality of Shares of Residential Space by Output Area Subgroup

a) Overall Rate of Soft Densification



b) Rate of Soft Densification by Infill Construction



On the other hand those to the right have larger shares of residential space than they do of households. The initial impression certainly suggests that in practice soft densification in England compounded rather than reduce inequality of shares of residential space. The tendency to compound the already low shares of residential space in neighbourhoods in Supergroup 7 ("Multicultural") is particularly clear. Similarly there is a tendency for the two supergroups characterised by detached housing (3 and 4) and the highest endowment of residential space relative to their shares of households to have accommodated far fewer units through soft densification.

5.25 Between these two extremes come neighbourhood subgroups whose share of England's households in 2001was broadly similar to their share of the country's residential space. These subgroups – amongst whom social housing tenants (subgroups within Supergroup 5 "Constrained by Circumstances") figured prominently – were little affected by soft densification. For subgroups 5a1 and 5a2 where soft densification was minimal, the larger than usual share of elderly households might suggest less concern to densify even where units on estates have been sold to occupiers.

5.26 Finally, to be sure that the relationship evident in Figure 26 does not result simply from small numbers of OAs in Supergroups 4 and 5, and does not rest solely on the way in which building subdivision is concentrated in some subgroups of the OA classification, Figure 27 (a and b) provides a clearer view. Both figures show rates on the vertical axis, rather than numbers of units. Figure 27a is concerned with all forms of soft densification; but Figure 27b shows only infill construction. Two clear points emerge. First, with the exception of 4a1 and 4a2 (the "Prospering Younger Families" group[41]) all subgroups of "Prospering suburbs" show overall rates of soft densification below the average (1.9%), while members of the other supergroup distinguished by detached houses (3 Countryside) show rates above.

5.27 Second, there is some tendency within the detached housing supergroups to find higher infill building rates as a subgroup's contribution to inequality increases. (See members of Supergroups 3 ("Countryside") and 4 ("Prospering Suburbs") within the zone of Figure 27b to the right of the vertical line where each subgroup's share of residential space exceeded its share of households). Regardless of the contribution to inequality, however, the infill building rates in Supergroup 3 were consistently higher than those in Supergroup 4. Comparison with Table 8 shows that in Supergroup 4 ("Prospering Suburbs") the rates of infill construction were little more than double the rates for garden infill (and in the case of 4b3, not as high as that). The higher rates for OAs in Supergroup 3 depend on a broader range of sources of land for infill development (typically a rate four times higher than that due to plot subdivision alone).

[41] The contribution to inequality made by these two groups is in fact small as their share of residential space rarely exceeds their share of households.

6 Conclusion

6.1 The foregoing discussion has reviewed the overall pattern of soft densification across England in the period 2001-2011, attempting to provide an operational definition of soft densification, outlining the drivers to which it responded and exploring the forms of development by which it was achieved. It has examined regional and sub-regional variation in rates of soft densification and explored its incidence in neighbourhoods of different physical and social character. Crucially, rates of soft densification have been seen as a contingent matter, complementing (and competing) with more radical forms of densification in the context of a very strong policy commitment to recycling previously developed land and avoiding urban sprawl. The effects reported must be understood as depending upon strong green belt constraint and well developed system of planning regulation more generally.

6.2 This section sets out a few brief conclusions on the drivers which underlie rates of soft densification, and the balance of sources of additional dwellings before setting out – on the basis of the preceding discussion – some issues that might be considered when drawing a case study for detailed work.

6.3 First and fundamentally, demand for additional housing space depends on potential household growth. Quite clearly, in some locations household growth is limited. This may apply at the scale of whole regions such as the North East, or across major urban areas such as Stoke on Trent or (Kingston upon) Hull. Here substantial soft densification should not be expected, and where it is found in the absence of household growth this is indicative of other problems. High potential growth in the context of strict planning constraint may however promote conditions where high-cost radical densification schemes are favoured, hence limiting the role of soft-densification,

6.4 Second, soft densification through infill development depends upon settlement morphology and land use mix. Conversion and sub-division of existing buildings is always possible, and a tendency to release former holiday accommodation in coastal towns adds to the supply. Where strong planning constraint excludes alternate locations for development, the possibility of forms of soft densification other than sub-division of existing buildings depends upon the flow of land available for infill development. Although infill sites not previously developed are common in cities, in the period examined, there was a very strong emphasis on recycling previously developed land, limiting the possibility of densification of smaller but faster growing towns. Part of the supply of land for densification may be drawn from the subdivision of existing house plots, allowing creation of additional units through garden infill. Obviously of differing potential depending upon suburban morphology, this represented a small but contentious component of supply. It is the flow of land from previously-developed non-residential uses which form the largest (and frequently neglected) part of the supply of land for infill development.

6.5 Third, soft densification depends on the responses of individual households and small builders to opportunities provided in different economic contexts. The overall rate of soft densification depends not only on the tendency to convert houses into flats, but the counterposed tendency to deconvert flats and to

amalgamate dwellings. These counter-mechanisms allow the portfolio of houses made available for sale in a particular town to be adjusted to variation in market demand – satisfying for example demand for larger dwellings by long-distance commuters.

Towards More Detailed Work

6.6 In moving towards more detailed work which might link back to this quantitative overview, it is important to realize that some forms of housing stock adjustment (principally new build permissions) are far more easily monitored than others (conversions and building subdivision which require planning permission but which may not have it, and more particularly deconversions and amalgamations which usually do not need planning permission). Local authority monitoring of starts and completions a fortiori is expensive in terms of staff time and monitoring outstanding planning permissions particularly troublesome given the number of variant permissions that may have been granted on the same site. Generally, unlawful development apart, it is easier for local authorities to monitor additions to the dwelling stock (simply because all require planning permission) than to monitor adjustments that reduce the stock (such as amalgamation and deconversions). It is inevitable that sources maintained by local authorities will under-record downward adjustments to the dwelling stock and hence over-estimate soft densification. One important consideration in the choice of case-study localities may well be quality of available monitoring information.

6.7 Section 3 suggested that the investigation of the **London Borough of Ealing** would provide opportunities to examine circumstances where pressure for conversion and deconversion were equally balanced, where it is possible to explore plot subdivision and also to consider covert densification ("illegal outhouses"). Some possible suggestions for cases studies in provincial England are set out below:

Public responses to garden infill, and its management through the planning system.

6.8 The relatively low incidence of garden infill presents a challenge for sampling. Local authorities where garden infill was relatively common include Surrey districts such as Woking and Surrey Heath. Woking District produced a policy document in 2000 to guide development control in high-status suburbs over the following decade. Surrey Heath processed many contentious planning applications garden for garden infill schemes applications. Although these are not administratively in the London region, they are very close to London and parts of their physical urban areas are included within the (upper level) London urban area as discussed in Section 4. There would therefore be a strong case for considering an authority entirely separate from London. Cheltenham DC is an authority in the South West region which by the end of the decade under review also had a clear policy on garden infill. Cheltenham also shows a wide range of stock adjustments; conversion, deconversion, plot subdivision in a context of overall *negative* soft densification.

Variation between Rates of Soft Densification in High Status Residential Areas.

6.9 In seeking to understand rates of soft densification, Section 4 of this document considered areas stretching to the South and West of London where these were often negative. Areas to the North West of London in the Chiltern arc between

Reading and St Albans with some similar social characteristics and property types did not show negative rates. In this context, High Wycombe (Wycombe DC) might merit consideration.

Areas with High Rates of Soft Densification Involving Both High Rates of Infill and High Rates of Subdivision of Existing Buildings.

6.10 Bournemouth DC (South Dorset Conurbation) shows high household growth, a high building rate and high responses on all the soft densification measures including the rate of plot subdivision. As a resort town it also must tackle some of the problems of managing release of property formerly used for holiday accommodation. Although not offering the opportunity to explore this last aspect, Bristol also shows strong responses on building subdivision and new infill construction.

Areas of High Demand where Rates of Soft Densification are Low or Negative.

6.11 Apart from areas discussed in some detail in Section 4 where negative rates of soft densification were discussed (in the context of a putative link with house price formation, and long-distance commuting), negative rates are also found in much of the South West peninsula. Taunton Dene DC might be an appropriate case study authority though given the need to look at counterposed stock adjustments, the quality of monitoring information would be an important consideration. Similarly negative rates of soft densification combine with high growth in St Austell within Cornwall UA's jurisdiction. Other towns in Cornwall show this combination, but again, even if there is interest in understanding why (in net terms at least), quality of monitoring information would be an important consideration.

Areas with low overall rates of soft densification

6.12 Areas with low rates of soft densification may not be particularly interesting, where that reflects low demand. Birmingham, however, shows low soft-densification rates compared with competitor cities rates unless it can be assumed that a greater contribution to dealing with housing need might be made.

Comparison of Nearby Cities with Very Different Rates of Soft Densification

6.13 Derby and the neighbouring City of Nottingham are potentially interesting in that Derby shows a high rate of soft densification and Nottingham a low one, with densification in Nottingham being more associated with radical densification. This is particularly interesting in that relationships between conversion and deconversion in Nottingham must be seen partly in relation to studentification and because whatever the merit of densification policy, the Greater Nottingham authorities have undertaken a major Green Belt Review following which major releases of new housing land are in the pipeline.

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