Cambridge Centre for Housing & Planning Research

Experimental review of the Cambridge Travel to Work Area (TTWA) as a tool for informing local housing policy - including a study of the Ely housing market in the context of the Cambridge TTWA

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Key findings

Cambridge TTWA

- Cambridge TTWA has expanded since 2001 more than any other TTWA in England.
- The bulk of this expansion is in the southern part of the area, with the absorption of Bishop's Stortford and Harlow.
- Local authority areas inside the Cambridge TTWA include, from north to south, East Cambridgeshire, Forest Heath, South Cambridgeshire, Cambridge, St Edmundsbury, Uttlesford, North Hertfordshire, East Hertfordshire and Harlow.
- In addition to Cambridge City, nine employment hubs in the TTWA are designated as LSOAs (Lower Layer Super Output Area): Ely, Newmarket, Haverhill, Royston, Saffron Walden, Bishop's Stortford, Ware, Hertford and Harlow.
- Also of note, St Ives, an LSOA with high workforce density, located marginally outside the current official TTWA boundaries, is in fact geographically closer to Cambridge City than is Bishop's Stortford.
- Residential areas for Newmarket, Haverhill and Bishop's Stortford hubs cross the TTWA border.
- The residential areas for workforce in the Cambridge employment hub extend mainly East-West across the TTWA border, while their expansion towards the south remains well within the TTWA.
- Residential areas for employment hubs other than Cambridge typically extend only a few miles from each hub centre and, with the exception of Bishop's Stortford, have a noticeable volume of commuters to Cambridge City.

Case study on Ely

- Housing stock density was the highest in the central part of Ely. Littleport, a town at the north end of Cambridge Broad Rental Market Area (BRMA), also has relatively high density.
- Housing density is higher in settlements around and connected to the A10.
- The north eastern Ely LSOA and the west Littleport LSOA have relatively large amounts of recently built properties.
- Lower quartile (LQ) house prices for the two Middle Layer Super Output Areas (MSOAs) covering Ely were £188.5k and £187.5k respectively. Their midpoint (£188k) was below the LQs of three South Cambridgeshire's MSOAs where the A10 runs (£210k, £228.6k and £265k), and failed to reach even the tenth percentiles of two of the three MSOAs (£215k and £225k).
- We estimate 40 to 48% of households in the Ely-Cambridge (E-C) corridor could not afford to buy a property costing above £200k. Houses recently sold below £200k are observed mainly in the northern half of the E-C corridor beyond Ely (i.e. Littleport) or in towns connecting to the A10 via a major road (e.g., Sutton, Haddenham and Soham - all in East Cambridgeshire).

1. Introduction

- A Travel-to-work Area (TTWA) theoretically represents a self-contained labour market area in which all commuting occurs within the boundary of that area[1]. It has been re-defined once a decade when analyses on commuting patterns drawn from the UK Censuses were completed. In December 2015, the Office of National Statistics (ONS) published TTWAs based on the 2011 Census results.

- TTWAs are used primarily to aid understanding of labour markets across the UK. However, residential location and commuting patterns can also contribute to understanding local housing markets. The conventional assumption is that local labour markets are spatial proxies for housing markets. Indeed, housing professionals have been employing TTWAs in this way in their strategic plans.

- One of the issues in using existing TTWA s in this way is that they do not allow for overlap. Consider a household with two earners, one of whom is commuting within the TTWA while the other is commuting to a business hub outside their TTWA. For example, Cambridge TTWA has now expanded as far south as Hertford and Harlow – settlements containing many London commuters.

- Taking Cambridge as our example we attempt in this paper to experimentally identify commuting areas for Cambridge that lie within the boundaries of other employment hubs, such as Ely. In this way we can start to address the reality that TTWAs, certainly in terms of local housing markets, are not discrete – they overlap.

- The remainder of this brief report is structured as follows: Section 2 considers various alternative local housing market definitions and compares them to the 2011 Cambridge TTWA. Section 3 selects several employment hubs closest to Cambridge City, and uses Lower Super Output Areas as the basis for identifying the relevant local housing market area for the city and surrounding areas. In Section 4 we consider the housing needs (availability and affordability) of households of two earners, one of whom is commuting to work in the Ely employment hub while the other is commuting to Cambridge employment hub – producing a more complex but more accurate picture of local housing needs. Section 5 discusses the findings and suggests further research in respect of local housing markets in and around the Cambridge TTWA and beyond.

[1] Coombes, M. and Office for National Statistics (ONS). 2015. *Travel to Work Areas*. Newcastle University. www.ncl.ac.uk/curds/assets/documents/documents/RR2015-05.pdf

2. *Overview of Cambridge TTWA and its development*

- Cambridge TTWA is the fastest expanding TTWA in England.
- Table 2.1 sets out top ten fastest growing English TTWAs during the latest inter-census period[2]. Currently the Cambridge TTWA covers 2,682.1 hectares (or 10.4 square miles), up from 1,877.0 hectares (7.2 mi^2) in 2001, an increase of 805.1 hectares (3.1 mi^2).
- This is almost double the expansion of the second fastest growing TTWA, Manchester (425.6 hectares or 1.6mi^2).

Table 2.1 Top ten fastest growing English TTWAs (hectares)

TTWA name	2001 area	2011 area	change
Cambridge	1,877.0	2,682.1	805.1
Manchester	1,412.4	1,838.0	425.6
Barrow-in-Furness	281.3	670.8	389.5
Chesterfield	259.1	634.0	374.9
Hull	1,390.7	1,719.3	328.5
Oxford	1,819.0	2,143.9	324.9
Carlisle	1,935.3	2,180.1	244.8
Ludlow	1,133.2	1,377.5	244.3
Bury St Edmunds	642.4	873.0	230.6
Basingstoke	467.6	694.9	227.3

Note: For the definition of an English TTWA, see Footnote 2. TTWA. Source: Authors' calculation based on information provided by ONS.

- Map 2.1 shows the boundary changes of the Cambridge TTWA from 2001 to 2011.
- The current TTWA is almost unchanged along its northern, eastern and western boundaries, with a slight decrease in places.
- The significant expansion is in the southern part, with the absorption of Bishop's Stortford and Harlow.
- Currently, the Cambridge TTWA covers nine local authority areas (not necessarily consistent with administrative boundaries) – from north to south: East Cambridgeshire, Forest Heath, South Cambridgeshire, Cambridge, St Edmundsbury, Uttlesford, North Hertfordshire, East Hertfordshire and Harlow.

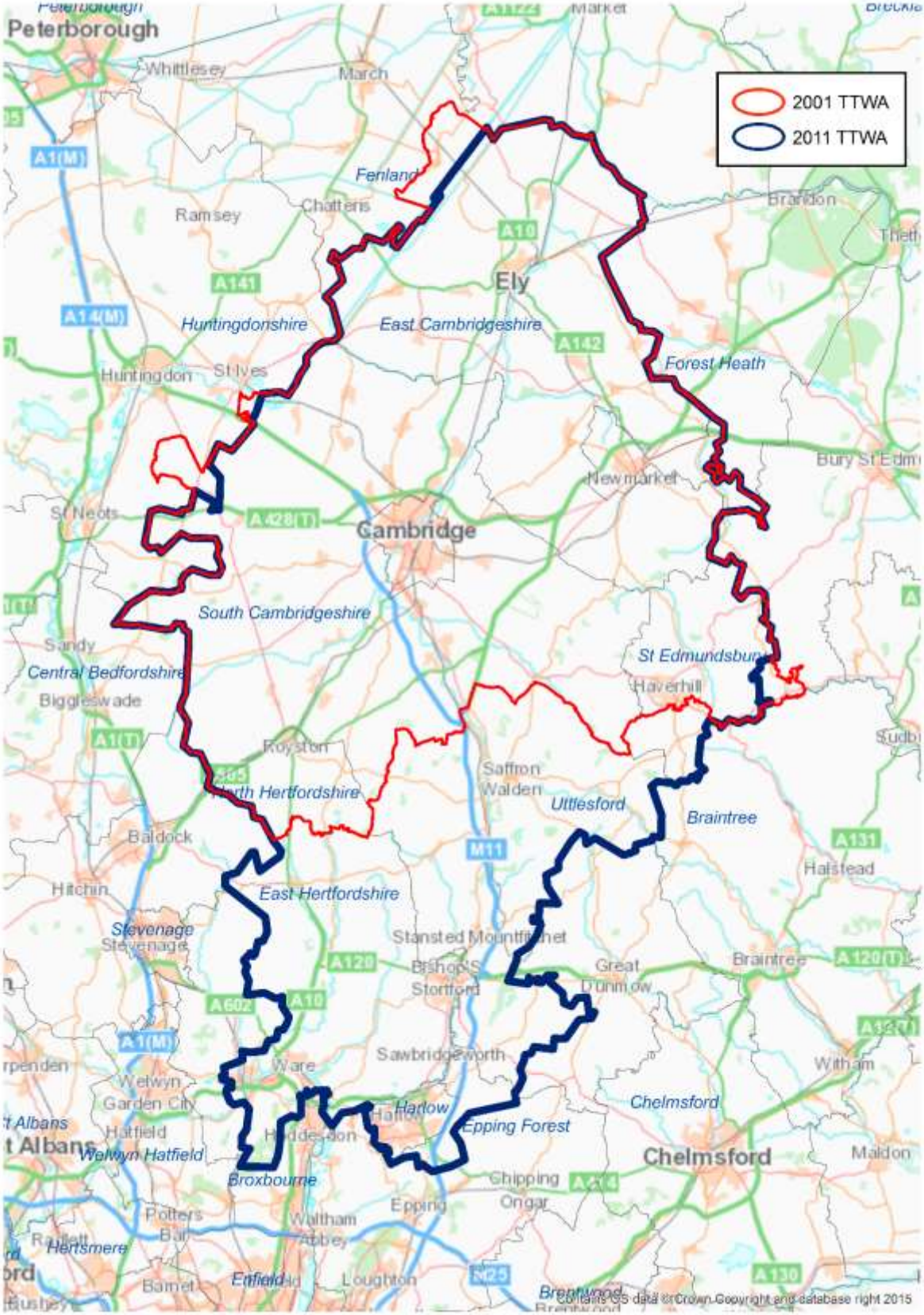
2.1 A Note on Broad Rental Market Areas (BRMA)

- The Broad Rental Market Area (BRMA) is an alternative measurement unit for local housing market size. BRMAs were introduced to determine the Local Housing Allowance (LHA) rate by the Valuation Office Agency (VOA).
- A BRMA must contain a statistically relevant number of privately rented homes within its tenures, a requirement that means it may differ from both TTWAs and standard local housing market areas, which are defined functionally, taking into account not only where people live and work, but also areas of high and low housing demand and patterns of relocation by homeowners and tenants.

[2] In this paper, we define the English TTWAs as TTWAs whose name is observed in England. Their boundaries could cross national boundaries – for example, Carlisle TTWA, part of which extends into Scotland.

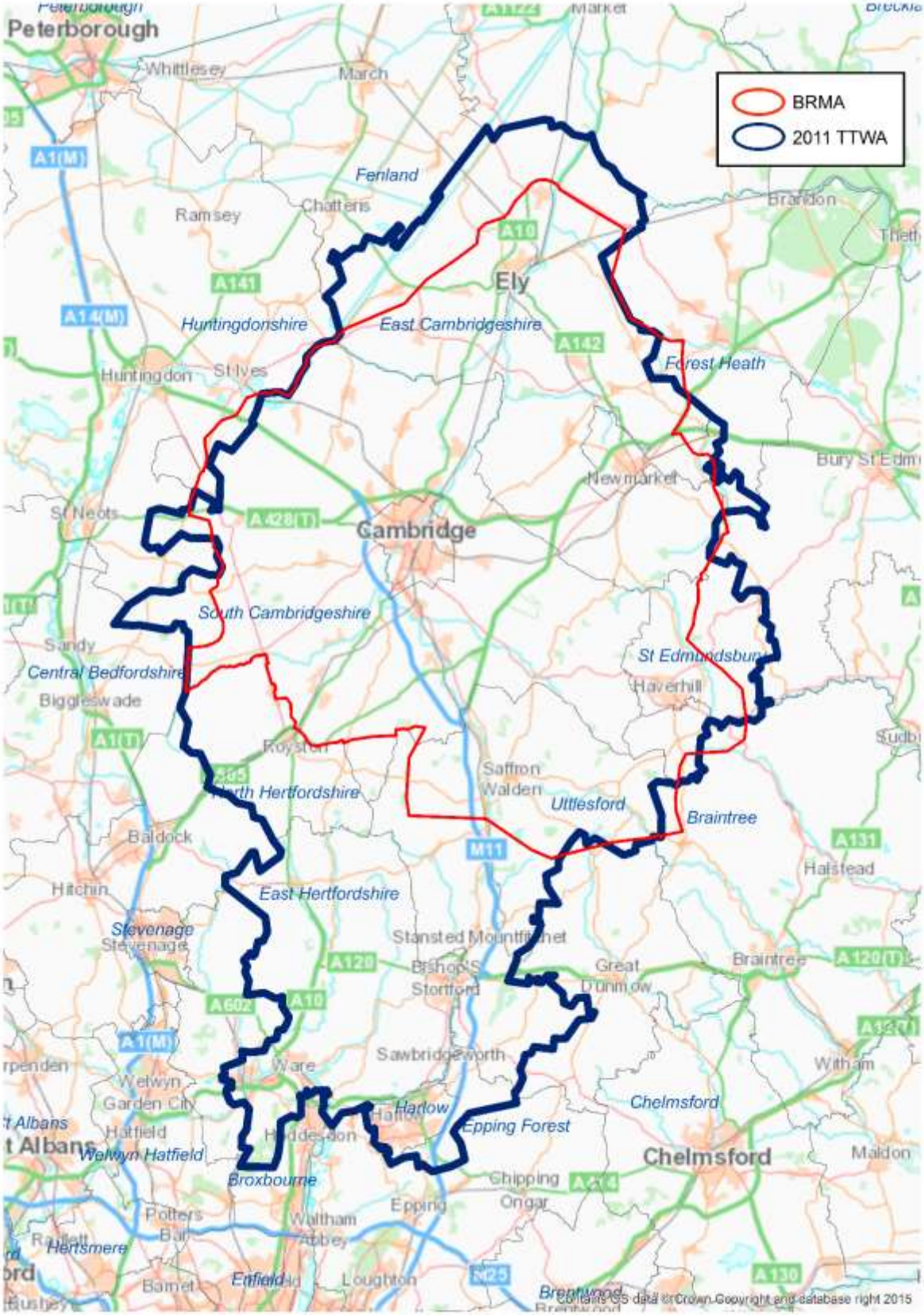
- For example, areas of high concentration of two-earner households are likely to indicate high levels of owner-occupation with an under-developed rental market, and will thus not form part of a BRMA.
- BRMAs do not allow for overlap, which is another drawback in their utility for assessing the actual size and shape of a local housing market.
- The current Cambridge BRMA is shown with the 2011 Cambridge TTWA in Map 2.2.
- The BRMA is much smaller than the TTWA and excludes southern towns such as Harlow and Bishop's Stortford.
- Rather it is more comparable with the 2001 TTWA, partly because both are based on the 2001 Census. The current Cambridge BRMA was however introduced in July 2009.

Map 2.1 Cambridge TTWA – 2001 and 2011 versions



Source & note: See Table 6.2.

Map 2.2 2011 Cambridge TTWA and Cambridge BRMA



Source & note: See Table 6.2.

3. Employment hubs in and around Cambridge TTWA and their workforce's residential areas

- TTWAs are defined to theoretically represent a self-contained labour market area within which all commuting occurs[3]. In general, they have multiple employment hubs within their territories which complicates the picture.
- To identify employment hubs in and around the 2011 Cambridge TTWA, Map 3.1 sets out workforce density by Lower Layer Super Output Area (LSOA), drawing on the 2011 Census results. LSOAs with the highest density are shaded darkest in the map[4].
- In addition to Cambridge City, nine towns had LSOAs with the highest workforce density – from north to south: Ely, Newmarket, Haverhill, Royston, Saffron Walden, Bishop's Stortford, Ware, Hertford and Harlow.
- St Ives also had a LSOA with highest workforce density. Although located marginally outside the TTWA, it is geographically closer to Cambridge City than Bishop's Stortford.
- Based on the findings, this paper selects seven employment hubs closer to Cambridge City, shown in Table 3.1, which also summarises their accessibility to the city. To examine residential workforce areas we define an employment hub as a cluster of accessible LSOAs with high workforce density[5].

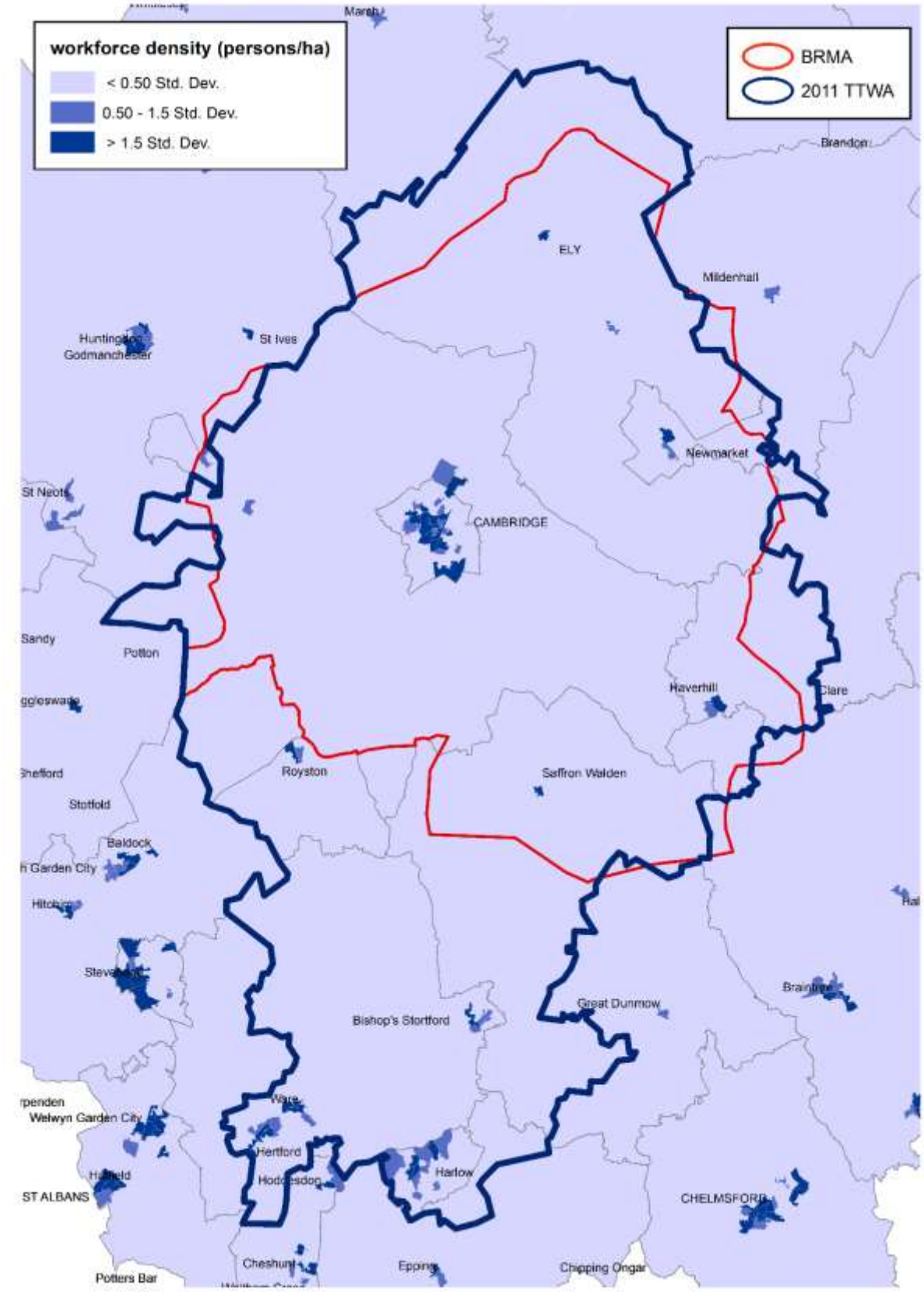
Table 3.1 Selected employment hubs in and around Cambridge

	TTWA 2011	TTWA 2001	BRMA	access to Cambridge City					
				Road mileage	(in km)	Bus	(minute*)	Rail	(minute*)
Bishop's Stortford	√			30.9	49.8			√	38
Ely	√	√	√	17.0	27.4	√	50	√	14
Haverhill	√	√	√	18.7	30.1	√	46		
Newmarket	√	√	√	13.4	21.6	√	37	√	27
Royston	√	√		18.6	29.9	√	70	√	15
Saffron Walden	√		√	16.0	25.7	√	92	√ (Audley End)	20
St Ives				18.3	29.6	√	47		

Source: AA mileage calculator (Road mileage). Cambridgeshire County Council. *Bus Timetables by Location*. National Rail. *Enquires Journey Planner*. Note: * minimum minutes of buses or trains arriving at Cambridge City Bus or Railway station between 8 am and 9 am, as of April 2016.

[3] As Footnote 1.
[4] Highest density was defined as density being greater than the average density plus 1.5 standard deviation. The statistics were created by sampling LSOAs in nine local authority areas that fully or partially covered Cambridge TTWA and adjacent local authority areas.
[5] High density was defined as density being greater than the average density plus 0.5 standard deviation. In the case of Cambridge City employment hub, the constituent LSOAs were not necessarily adjacent to each other, being separated by spatially small residential (non-business oriented) LSOAs.

Map 3.1 LSOAs with high workforce density



Source & note: See Table 6.2.

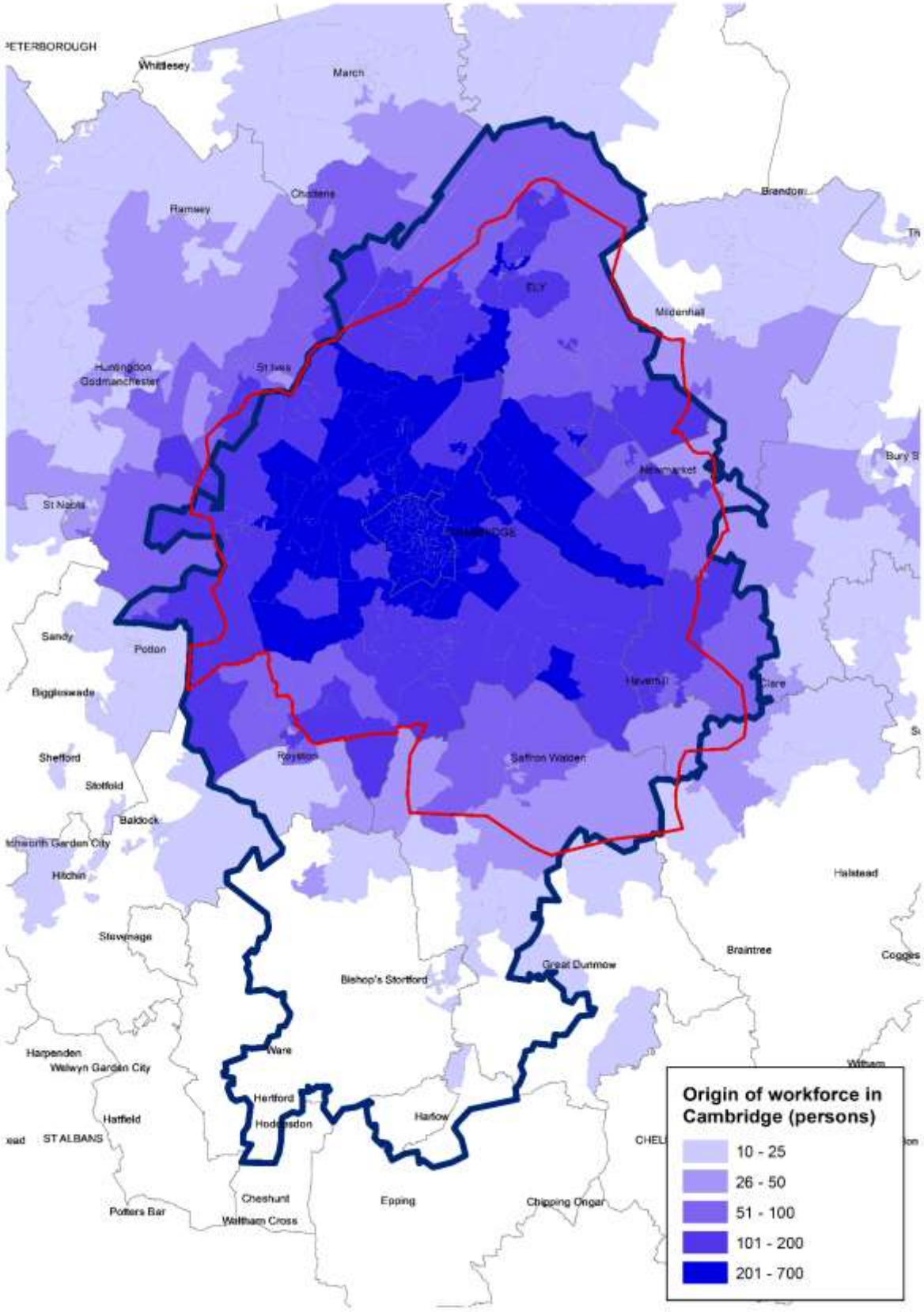
- Map 3.2 sets out residential workforce LSOAs for the Cambridge employment hub. The data source for this and the following two maps is the 2011 Census.
- The residential areas extended mainly in the east and west directions, crossing the border of the TTWA, while the expansion southwards was well within the TTWA.
- Map 3.3 uses a measurement unit of persons per hectare to control for larger rural LSOAs. Nonetheless, the residential areas stretch across the eastern and the western borders. The south end of the TTWA has smaller LSOAs with some noticeable density of residents working in Cambridge employment hub, but still contain larger areas with very few Cambridge commuters.
- This suggest that towns in the southern part of the TTWA, such as Harlow, Ware and Hertford, are less likely to be viewed favourably for settlement by workers in Cambridge City.
- With the exception of Ely, the selected employment hubs had at most one hundred residents commuting to the Cambridge Hub in each of the constituent LSOAs, presumably because most residents chose to work in their closest employment hubs.
- Map 3.4 shows residential workforce LSOAs for each of the selected seven employment hubs in the form of proportional circles (the measurement unit is the number of persons), superimposed on Map 3.2.
- Residential areas for each for the hubs appear to be limited to within a few miles of the hub centre but, with the exception of Bishop's Stortford, do contain a noticeable volume of commuters to the Cambridge hub.
- Residential areas for Newmarket, Haverhill and Bishop's Stortford hubs cross the TTWA border.
- These findings suggest that straightforward application of the Cambridge TTWA for determining the details of the workforce housing market would be subject to a wide margin of error .[6]

3.1 Residential area for Ely-Cambridge households

- Residential LSOAs for Ely employment hub had a large population working in the Cambridge employment hub as well, suggesting that these LSOAs are likely to be functioning as a local housing market for households with two earners one of whom is commuting to Ely and the other to Cambridge City (henceforth for convenience we term these E-C households).
- Taking solely into account two earners' mutual travel convenience, the optimal residential location for E-C households would be somewhere between the two employment hubs, i.e., on the Ely Cambridge corridor (henceforth, E-C corridor).
- Of LSOAs on the E-C corridor however, only those closer to Ely hub had noticeable commuters to the employment hub.
- Even LSOAs north of Ely contain E-C households.
- These findings suggest that for E-C households there could be barriers to finding a home on the southern half of the E-C corridor (i.e., push effect) and/or attractions on the norther half of it (pull effect). A case study in the next section experimentally examines these hypotheses.

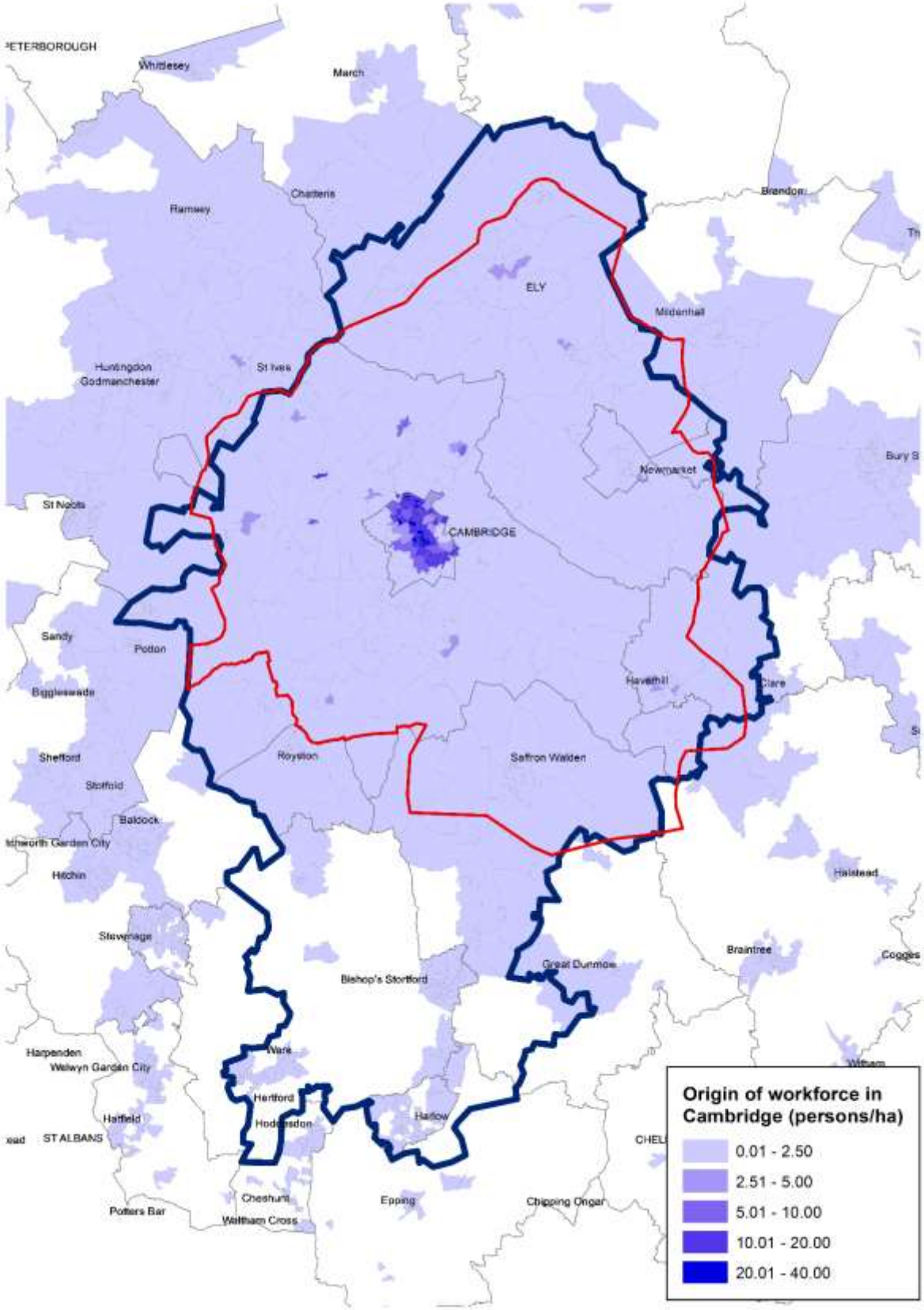
[6] On the other hand, there are some cases where TTWA boundaries are consistent with local housing markets. St Ives hub, which is marginally away from Cambridge TTWA, attracted workers mainly from outside the TTWA.

Map 3.2 Residential LSOAs of workforce in Cambridge employment hub (persons)



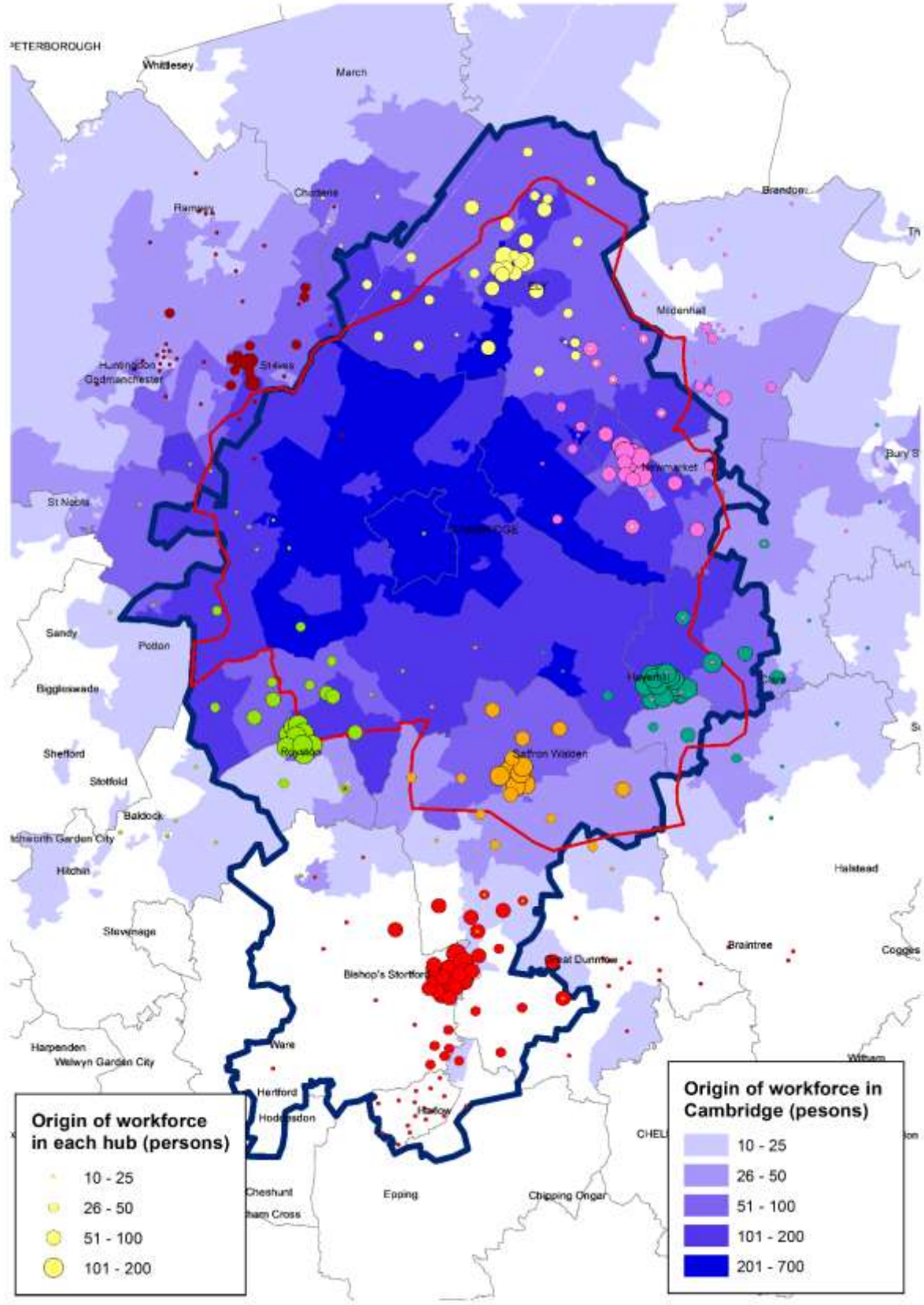
Source & note: See Table 6.2.

Map 3.3 Residential LSOAs of workforce in Cambridge employment hub (persons/ha)



Source & note: See Table 6.2.

Map 3.4 Residential LSOAs of workforce in the selected local employment hubs



Source & note: See Table 6.2. Different coloured circles represent origins of workforce for different hubs.

4. Local housing market barriers and attractions for E-C households

- As seen in the previous section, LSOAs in and around Ely hub and LSOAs on the northern half of the E-C corridor are likely to contain E-C households. But those on the southern half of the E-C corridor (i.e., LSOAs in South Cambridgeshire) are less likely to be functioning as such.
- This section experimentally examines a likely housing market for E-C households from two viewpoints - housing availability and affordability with suggestions on local barriers and attractions.
- Although availability and affordability are reciprocally related to one another, this case study examines them separately. Further research would be required to assess a mutual cause-and-effect relationship between housing stock and prices.

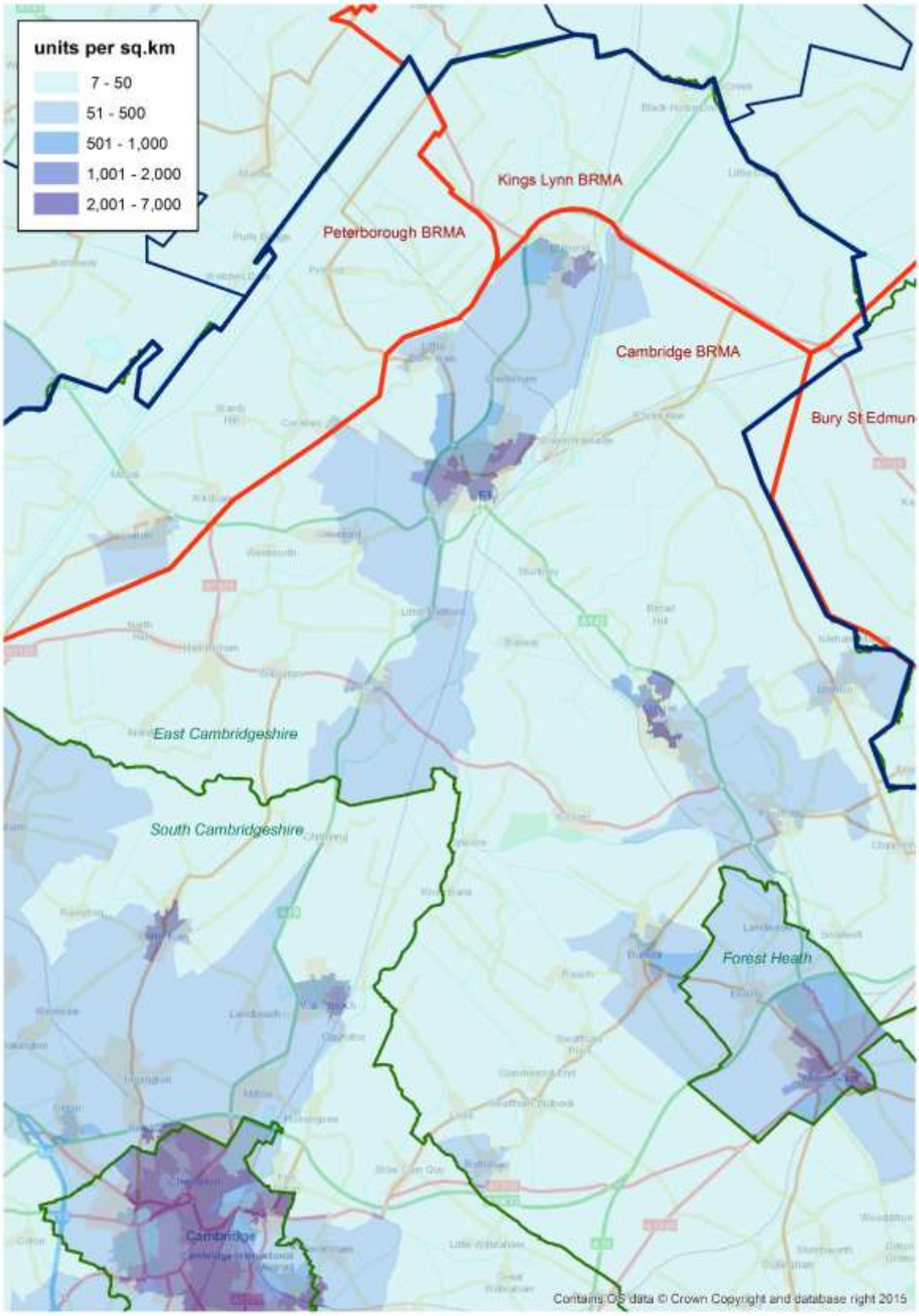
Housing stock

- Map 4.1 sets out housing stock per km^2 by LSOA in and around Ely. The data source for this and the following two maps is the Valuation Office Agency (VOA) administrative database, accessed 31 March 2015.
- Housing density was the highest in the central part of Ely. Littleport, a town at the north end of Cambridge BRMA, had relatively high stock density as well.
- Looking at LSOAs on E-C corridor, those with settlements connecting the A10 had more stock per km^2.
- LSOAs northerly beyond the BRMA, but in the TTWA, had lower density. (They belonged to either the Peterborough BRMA or Kings Lynn BRMA.)

- Map 4.2 plots one- to three-bedroom housing stock by LSOA as bar charts superimposed onto Map 4.1.
- One-bedroom properties (the minimum size for, presumably childless, E-C households) were located mainly in the central part of Ely and Littleport. Cambridge City has a substantial amount of one-bedroom stock, but given the low numbers of commuters from the city to Ely (see Map 3.4) the city cannot contain many E-C households.
- Two-bedroom properties are more numerous in the East Cambridgeshire part of E-C corridor.

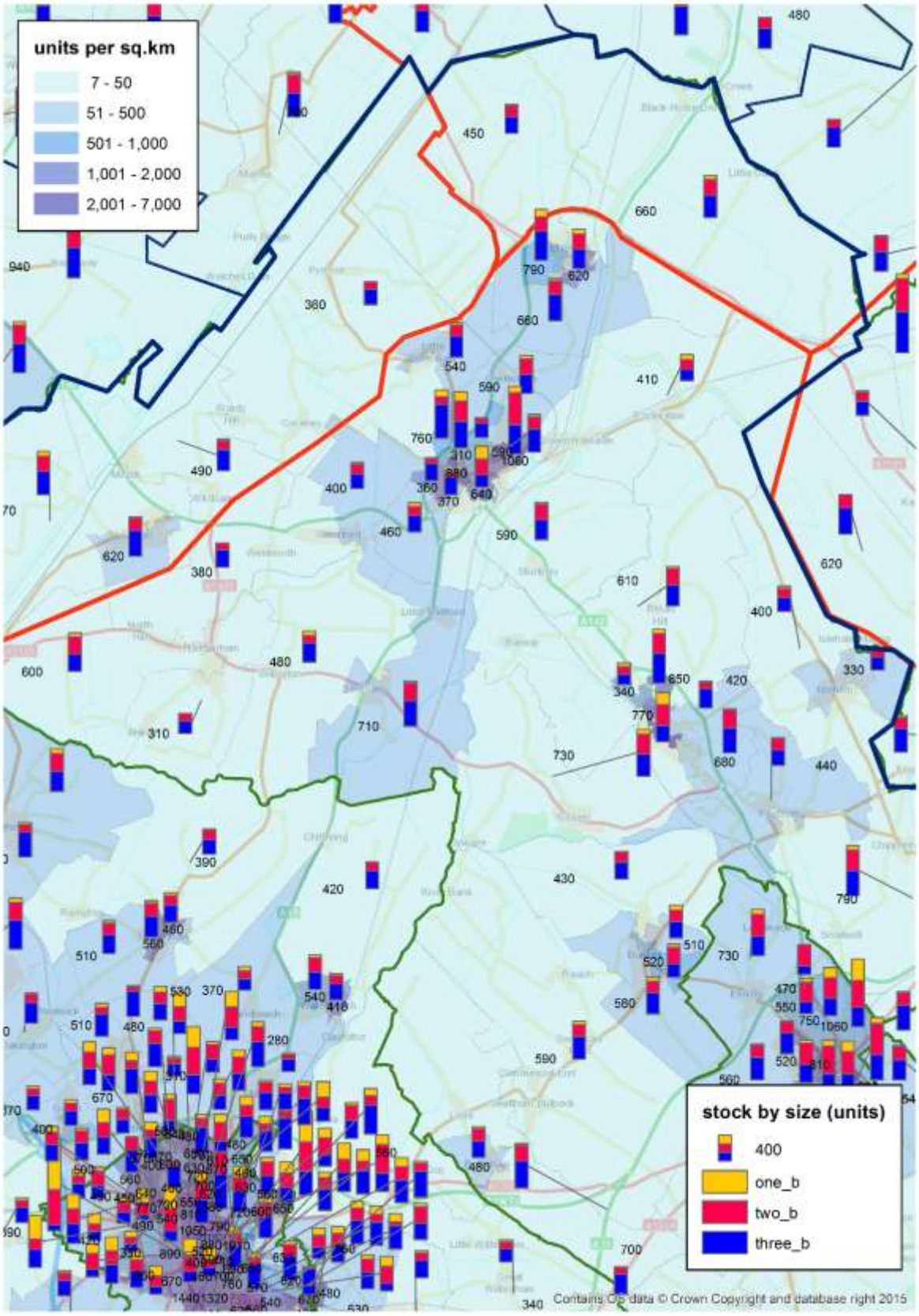
- Map 4.3 plots housing stock built from 2010 to 2015 (the latest available period from the data source) by LSOA as proportional circles, mapped onto Map 4.1.
- The north eastern Ely LSOA and the west Littleport LSOA have relatively large stocks of recently built homes.
- With respect to the other parts in East Cambridgeshire, LSOAs having that include towns such as Wicken and Soham have a robust housing supply. These towns also had commuters to Ely and Cambridge employment hubs (see Map 3.4).

Map 4.1 Housing stock (units per km^2) in LSOAs in and around Ely: March 2015



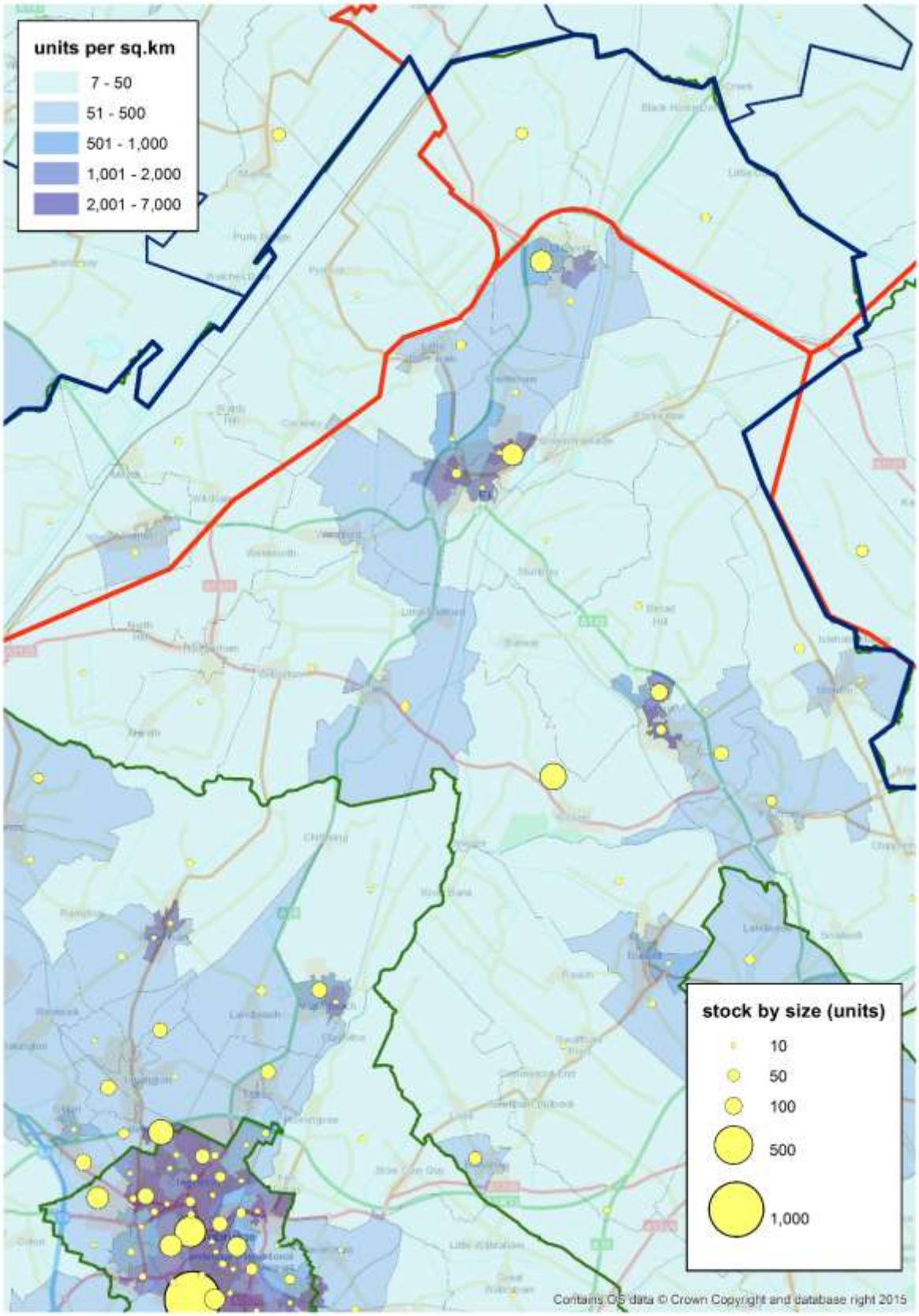
Source & note: See Table 6.2.

Map 4.2 One- to three-bedroom housing stock in LSOAs in and around Ely: March 2015



Source & note: See Table 6.2.

Map 4.3 Housing stock built in 2010 to 2015 in LSOAs in and around Ely: March 2015



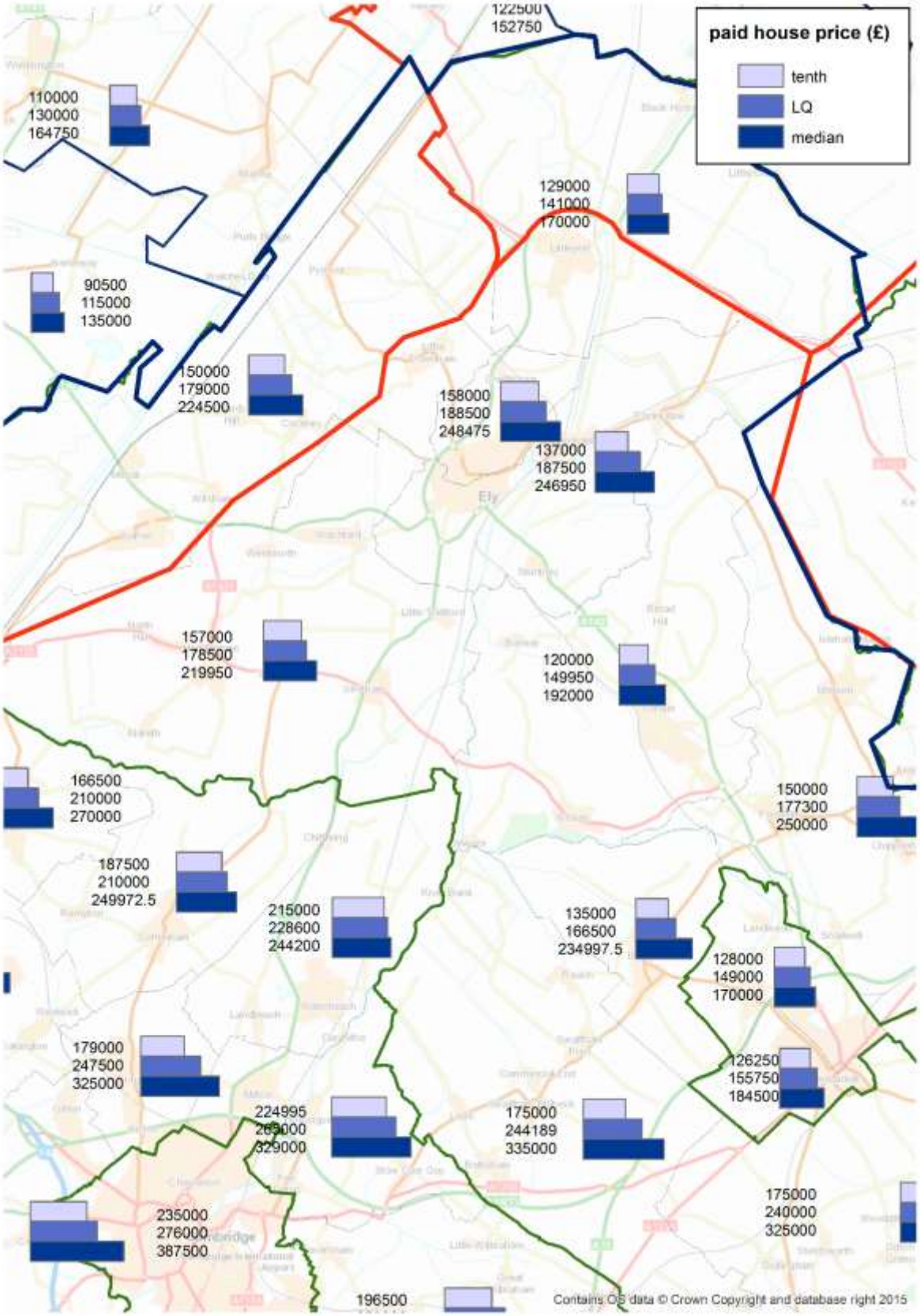
Source & note: See Table 6.2.

House price

- Map 4.4 sets out the 10th percentile, lower quartile and median for house prices paid over the four quarters ending Q2 2015 by middle layer super output area (MSOA). The data source is House Price Statistics for Small Areas (HPSSA) by the Office for National Statistics (ONS). Examined prices are those of any sized property in a fully open market.
- The lower quartile (LQ) price paid in the two MSOAs covering Ely were £188.5k and £187.5k respectively.
- Their midpoint (£188k) was below the LQs of three South Cambridgeshire's MSOAs where the A10 runs (£210k, £228.6k and £265k), and failed to reach even the tenth percentiles of two of the three MSOAs (£215k and £225k).
- The midpoint, however, outperformed the LQ of a MSOA of East Cambridgeshire on E-C corridor (£178.5k).
- The reference level was also well above the median of Littleport MSOA (£170k) – the area northerly adjacent two Ely MSOAs.

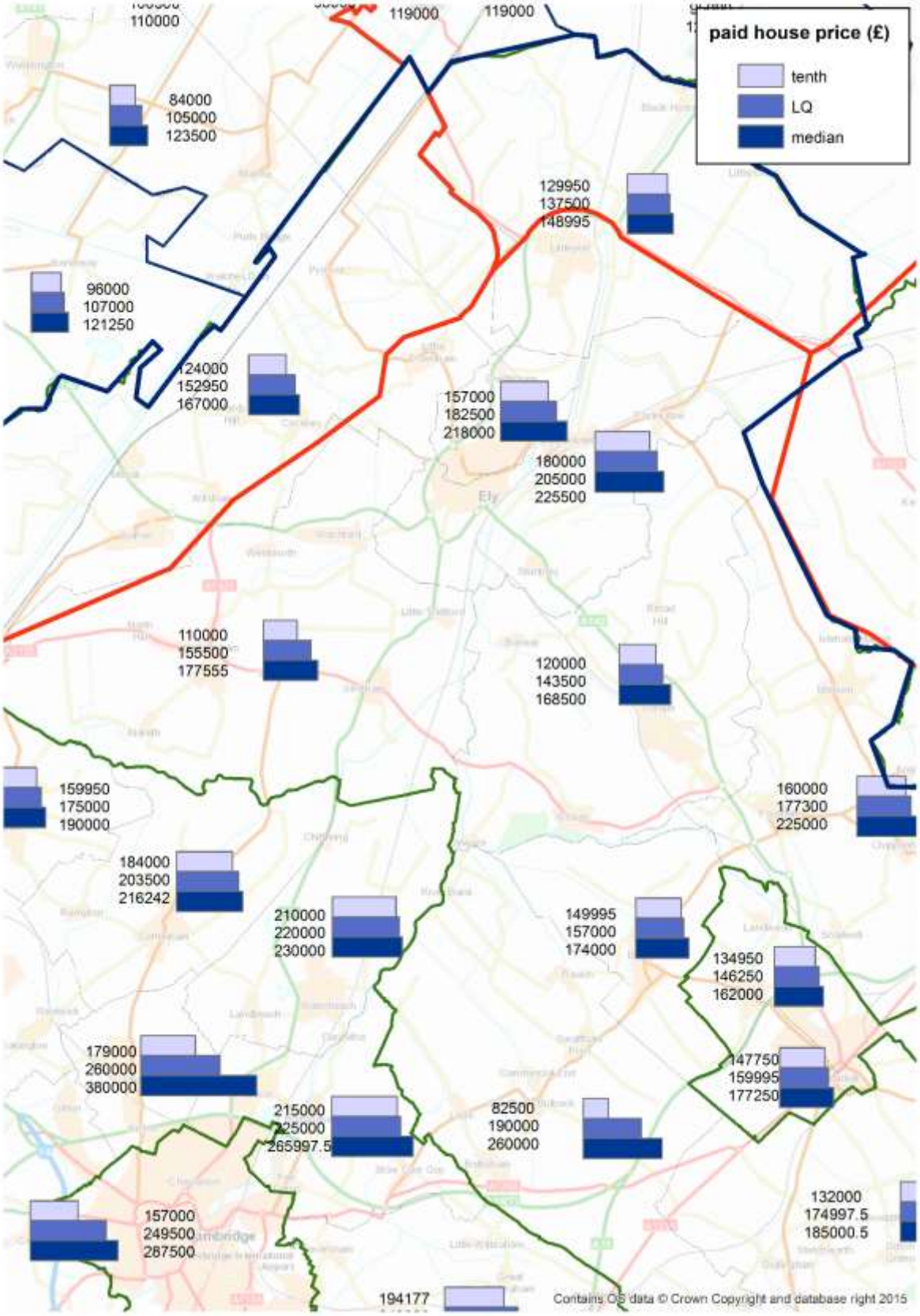
- Note that these statistics do not control for property size which could mean they are slightly over-stated. ONS did not categorise the price data by bedroom count but does so by property type. In order to capture prices of properties with a size suitable for E-C households, we examined paid prices solely for terraced houses. Properties of this type are highly likely to have two or three bedrooms (e.g. see housing stock in East Cambridgeshire by property type and bedroom count in Table 6.1 in the Annex).
- The results are broadly as above.
- The LQ of terraced house prices for the two MSOAs covering Ely were £182.5k and £205k, which means their midpoint is £193.8k.
- The midpoint is lower than the LQs for three South Cambridgeshire's MSOAs having the A10 (£203.5k, £220k and £225k) and again failed to reach the tenth percentiles for two of the three MSOAs (£210k and £215k).
- The reference level was, however, comfortably above the medians for those surrounding the two Ely MSOAs (£149k, £167k and £177.6k and £168.5k).
- These findings suggest that properties on the northern half of the E-C corridor, or those beyond the north of Ely, would be more affordable for E-C households.

Map 4.4 Paid house price (£s) in MSOAs in and around Ely for 4Qs ending Q2 2015



Source & note: See Table 6.2.

Map 4.5 Paid house price (£s; terraced) in MSOAs in and around Ely: 4Qs ending Q2 2015



Source & note: See Table 6.2.

Affordability examination drawing on estimated income distributions

- This examination firstly estimates income distribution of the likely E-C households who could possibly purchase a home on the E-C corridor – more specifically, two-earner couples (with or without children) who are residing in one of the six MSOAs in East Cambridgeshire (a shaded part of Map 6.3 in the Annex)[7] and whose reference person is below 40 years of age. An earner in this context means an employed person (including self-employed) – either full-time or part-time.
- A key variable is a household income before tax and national insurance but net of income-related benefits (henceforth, termed net income) as of April 2016. The income-related benefits are listed in Table 6.3 in Annex. For the methodology of the estimation, see Udagawa and Sanderson (2015) [8] .
- A second variable is the proportion of likely E-C households who would perceive a specified housing cost (e.g. mortgage payment) as (un)affordable.
- The resultant findings will be used to suggest an explanation for the uneven distribution of E-C households' residential areas throughout the E-C corridor, and in the final section of this report, to discuss the optimal supply of homes for E-C households with respect to tenure types, dwelling sizes and locations at a sub-local level.

- As a benchmark housing cost, we selected a weekly mortgage payment for a first-time buyer of a home priced at £200k [9]and assume:
  - A loan-to-value of 85%;
  - A repayment term of 25 years.
- Nationwide (2016) *Our mortgage rate* [10] shows that monthly mortgage payments would range from £707.38 to £887.02, which equals £163.24 to £204.70 per week.
- We assumed that a housing cost should be at or lower than 35% of net income, i.e.:
  *housing cost ≤ 0.35 * net income*.
  This gives the minimum required net income as:
  net income = mortgage payment / 0.35.

- The estimated result is displayed as an income distribution curve (the green line) in Figure 4.1.[11] The horizontal axis of the chart represents a weekly net income, and the vertical axis represents the cumulative percentage of likely E-C households whose net income is up to the specified level.
  The analytical process is:
  - The lower weekly mortgage payment to buy a £200k property is £163.24. This means the minimum weekly net income required to afford the payment is £466.40 (= £163.24 / 0.35).
  - On the horizontal axis, the level is at ***A***, and the corresponding point on the distribution curve is ***B***.
  - The cumulative proportion corresponding to ***B*** is at ***C*** on the vertical axis, 39.5%.
  - This indicates that 39.5% of the likely E-C households could not afford to buy a £200k home, even with the lowest mortgage payment.
  - The higher weekly mortgage payment, which if affordable would presumably expose borrower to less risk from interest rate rises, is £204.70. The minimum

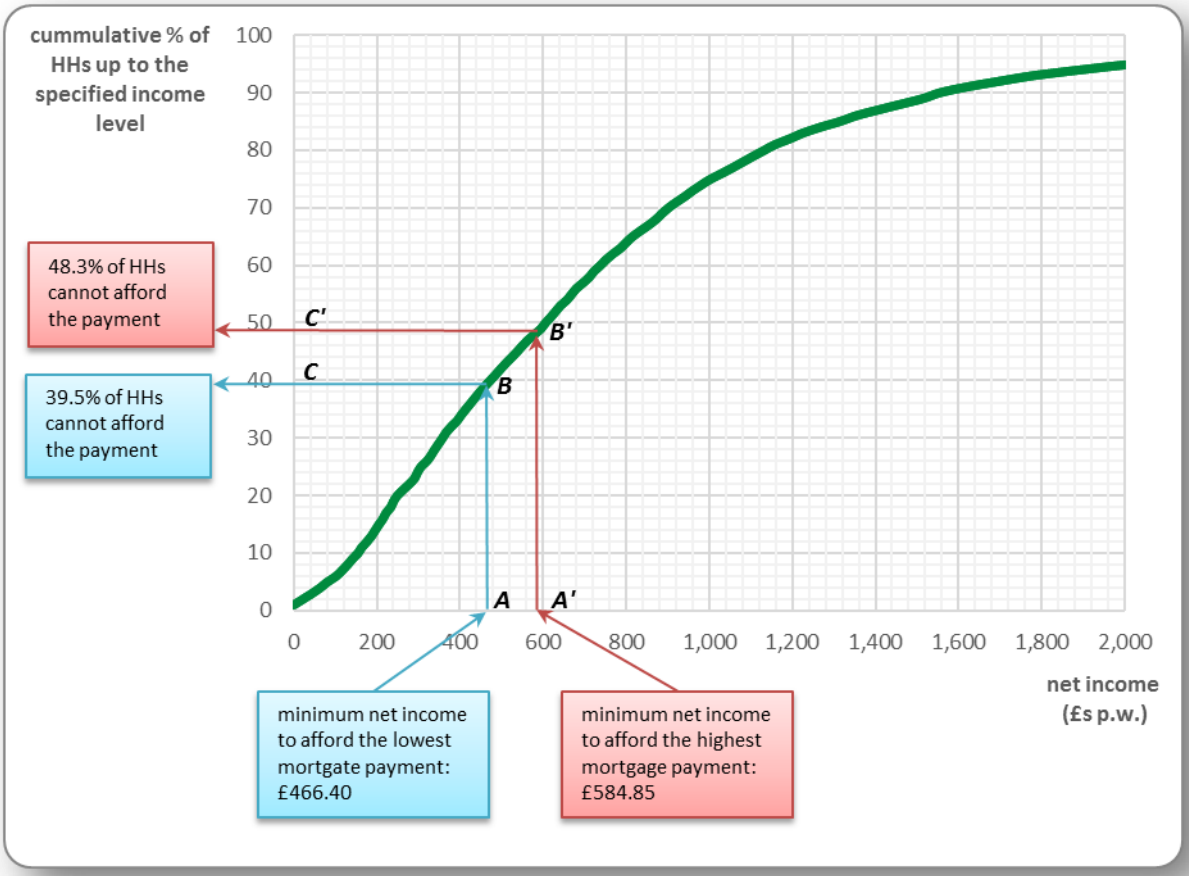
[7] There were not many E-C commuters on the southern half of E-C corridor (i.e., MSOAs in South Cambridgeshire or in Cambridge City) as shown in Map 3.4.
[8] www.cchpr.landecon.cam.ac.uk/Downloads/Estimated-net-income-distribution-working-households-household-type-locality
[9] The price threshold was defined in reference to the LQ of terraced house prices around Ely.
[10] www.nationwide.co.uk/products/mortgages/existing-customer-moving/mortgage-rates#tab:Ourmortgagerates. Accessed on 4th of April 2016.
[11] The data file of the chart is available upon request.

net income required to afford the payment would be £584.85 (= £204.70 / 0.35) - ***A'*** on the horizontal axis.
    - The proportion of the likely E-C households who could not afford the mortgage payment is at ***C'*** (via ***B'***), 48.3%.

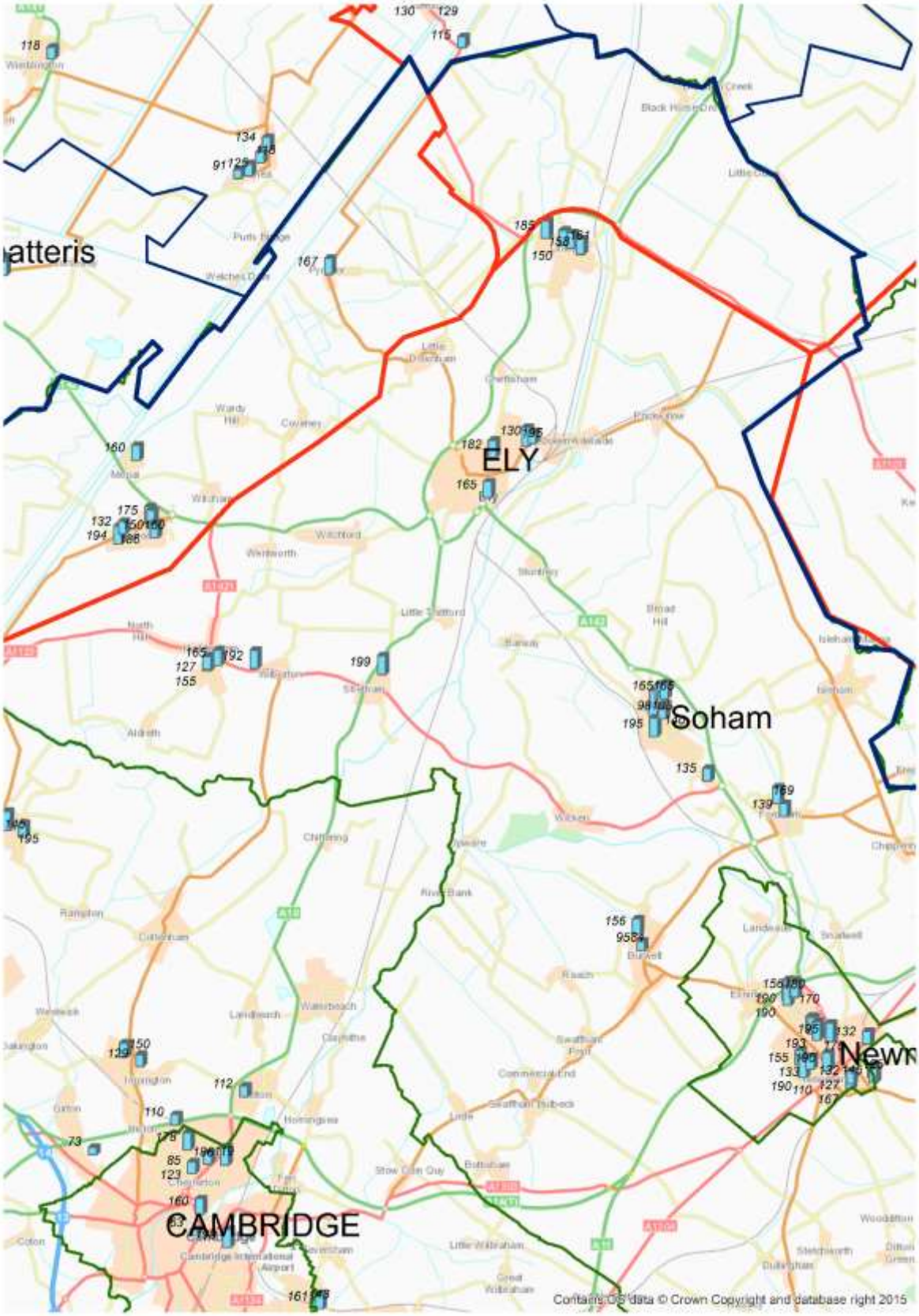
- Note that the examined subjects were "likely" E-C households, which means the demographic group includes current non E-C households. Therefore, care needs to be taken over interpretation.
- The estimate, however, does suggest that some of the likely E-C households in the percentage groups might be/have been attracted into a local housing market offering properties below £200k[12].
- Paid open market house prices over the twelve months ending January 2016 (Map 4.6)[13] show that some properties priced below £200k can be found even in Cambridge City, but these would be unlikely to suit couples. Map 4.7 (which excludes flats in an attempt to partly control for size bias, as information by bedroom count is not available), shows that houses recently sold below £200k were observed mainly:
    - on the northern half of E-C corridor;
    - beyond the north of Ely (i.e. Littleport);
    - in towns connecting to the A10 via a major road (e.g., Sutton, Haddenham and Soham - all in East Cambridgeshire).
- The observation suggests that, without a concessional sub-market, for example, shared ownership, it would be difficult for likely E-C households to find a home below £200k on the southern half of the E-C corridor.

[12] It should be also noted that the causality can run in the opposite direction. That is, households to purchase a low priced house need not to earn a lot with the result of moderate income, for example, by reducing working hours.
[13] The data source is Land Registry (accessed in April 2016). Only records on sales at fully market prices.

Figure 4.1 Income distribution for the likely E-C households: April 2016 price

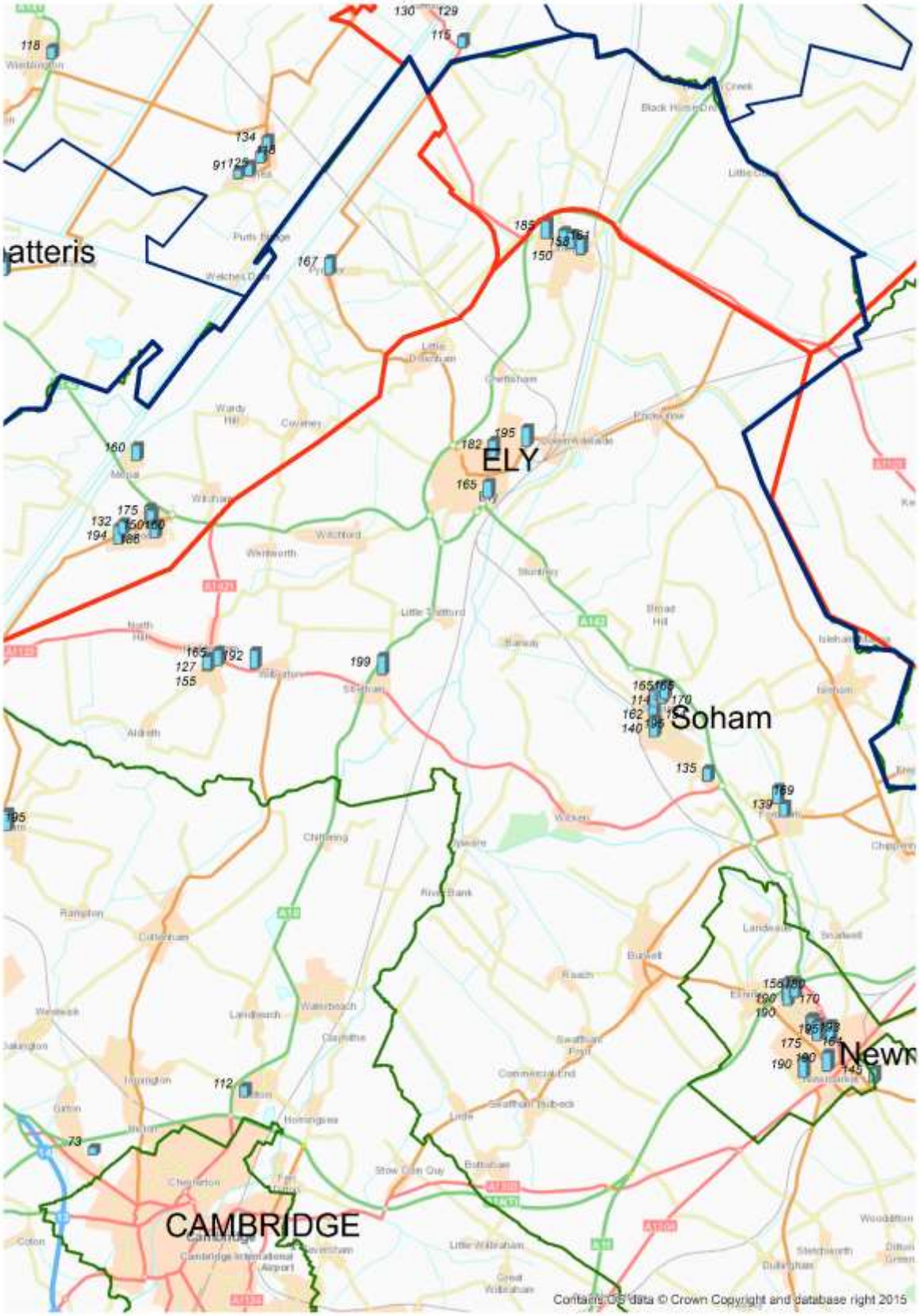


Map 4.6 Paid house price (<£200k) by location : 12 months ending January 2016



Source & note: See Table 6.2.

Map 4.7 Paid house price (<£200k: excluding flats) by location: 12 months ending January 2016



Source & note: See Table 6.2.

5. Discussion

- Over the past decade, Cambridge TTWA has been the fastest growing TTWA in England, due mainly to enlargement of residential areas for the workforce in Cambridge City.
- The residential areas apparently overlap those for workforces in other local employment hubs in and around Cambridge TTWA. These overlapping areas are likely to have a number of households with two earners commuting to different business hubs.
- E-C (mixed Ely and Cambridge) households were rarely observed in the southern half of the E-C corridor (in South Cambridgeshire District) but were found more often in the northern end of the corridor (i.e. in East Cambridgeshire District).
- Our estimated income distribution of the likely E-C households found that around 40 to 48% of the households would find a house priced at £200k unaffordable. And properties with a price under the threshold and of a size suitable for a family were to be found almost wholly in East Cambridgeshire.

- Although a converse cause-effect relationship between households' income and house price can be argued (i.e., households to buy a low priced house need can reduce their minimum income requirement), further research is required on whether E-C households move out of the southern half of the E-C corridor in a northerly direction (a push effect). An assessment could also be made of whether there is any pull effect from Ely and Littleport (beyond the north end of E-C corridor), where there has been considerable stock expansion.[14]

- Further research also needs to examine some issues that this brief study did not take into account. Firstly, the supply and demand impact of shared ownership and similar schemes on commuting patterns.

- Future housing supply and commuting patterns should also be studied in in conjunction with infrastructure planning and local environmental protection – currently the Cambridge Green Belt, a constraint on housing supply, occupies nearly half of the southern E-C corridor (see Map 6.2 in Annex).

- All of these areas for research indicate a critical role for administrative coordination at local and national levels. The Cambridge TTWA now covers nine local authority areas while local housing market assessments are still focused on local authority areas.

[14] Ely, however, had no sales records of newly built homes at full open market value, while Littleport saw 40 records (see Map 6.1 in Annex). It might be worthwhile to examine whether this would be a sign of a further push-out effect from the north end of E-C corridor.

6. Annex

Table 6.1 Housing stock by property type and bedroom count in East Cambridgeshire

Property type	bedroom count	units	%
Flat/Maisonette	1	1,350	49.6
	2	1,270	46.7
	3	80	2.9
	4+	10	0.4
	All	2,720	100.0
Terraced	1	230	3.4
	2	2,600	38.7
	3	3,330	49.6
	4+	560	8.3
	All	6,710	100.0
Semi-detached	1	50	0.6
	2	1,920	22.8
	3	5,690	67.6
	4+	770	9.1
	All	8,420	100.0
Detached	1	20	0.2
	2	680	6.5
	3	3,710	35.6
	4+	5,980	57.4
	n.a.	20	0.2
	All	10,410	100.0
Bungalow	1	860	12.1
	2	3,450	48.4
	3	2,440	34.2
	4+	380	5.3
	n.a.	10	0.1
	All	7,130	100.0

Source: Authors' calculation drawing on VOA (2015). Table CTSOP3.0. Note: Due to rounding to the nearest ten, "All" might not agree to a total.

Table 6.2 Map data sources and notes

Map no.	Source & notes
Map 2.1	**boundary source & note** TTWA 2011 and TTWA 2001: Drawing on a look-up table of TTWA and LSOA published by ONS, Author dissolved LSOA boundaries. The source of LSOA boundaries are as Map 3.1. Local authority area (LA): Gillard, Emily; EDINA. This dataset was made from the OS OpenData Boundary Line product http://www.ordnancesurvey.co.uk/oswebsite/products/boundary-line/index.html Base map: OS Open Carto Tile Layer owned by Esri_UK. The sources of data are Ordnance Survey Strategi data for small and mid-scales and Vector Map District and Open Map Local for the largest scales. The currency of the data is - Strategi - 01/2015; Vector Map District - 09/2014 and Open Map Local - 03/2015 Contains public sector information licensed under the Open Government Licence v3.0.
Map 2.2	**boundary source & note** TTWA 2011, LA and Base map: as Map 2.1. BRMA: Boswarva, Owen. Released by the Valuation Office Agency on 16/09/2014 via correspondence (enclosed). This data is made available under the Open Government Licence.
Map 3.1	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. LSOA: University of Edinburgh. Data sourced from ONS - http://www.ons.gov.uk/ons/guide-method/geography/products/census/spatial/2011/index.html Data made available Under the terms of the Open Government Licence (OGL) and UK Government Licensing Framework (launched 30 September 2010), anyone wishing to use or re-use ONS material, whether commercially or privately, may do so freely without a specific application for a licence, subject to the conditions of the OGL and the Framework. Users reproducing ONS content must include a source accreditation to ONS. For more information please see http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/licences/index.html. town names: **statistics** Authors' calculation based on 2011 Census.
Map 3.2	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. LSOA and town names: as Map 3.1. **statistics** Authors' calculation based on 2011 Census.
Map 3.3	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. LSOA and town names: as Map 3.1. **statistics** Authors' calculation based on 2011 Census.
Map 3.4	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. LSOA and town names: as Map 3.1 **statistics** Authors' calculation based on 2011 Census.
Map 4.1	**boundary source & note** TTWA 2011, LA and Base map: as Map 2.1. BRMA: as Map 2.2. LSOA: as Map 3.1. **statistics** Authors' calculation based on VOA Council Tax: Stock of Properties 2015 Table CTSOP1.1.
Map 4.2	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. LSOA: as Map 3.1. Base map: as Map 2.1. **statistics** As Map 4.1
Map 4.3	**boundary source & note** TTWA 2011, LA and Base map: as Map 2.1. BRMA: as Map 2.2. LSOA: as Map 3.1. **statistics** Authors' calculation based on VOA Council Tax: Stock of Properties 2015 Table CTSOP4.1.
Map 4.4	**boundary source & note** TTWA 2011, LA and Base map: as Map 2.1. BRMA: as Map 2.2. MSOA: as LSOA in Map 3.1. **statistics** House price Statistics for Small Areas (HPSSAs) by ONS. The statistics were calculated using open data from the Land Registry.
Map 4.5	**boundary source & note** TTWA 2011, LA and Base map: as Map 2.1. BRMA: as Map 2.2. MSOA: as LSOA in Map 3.1. **statistics**

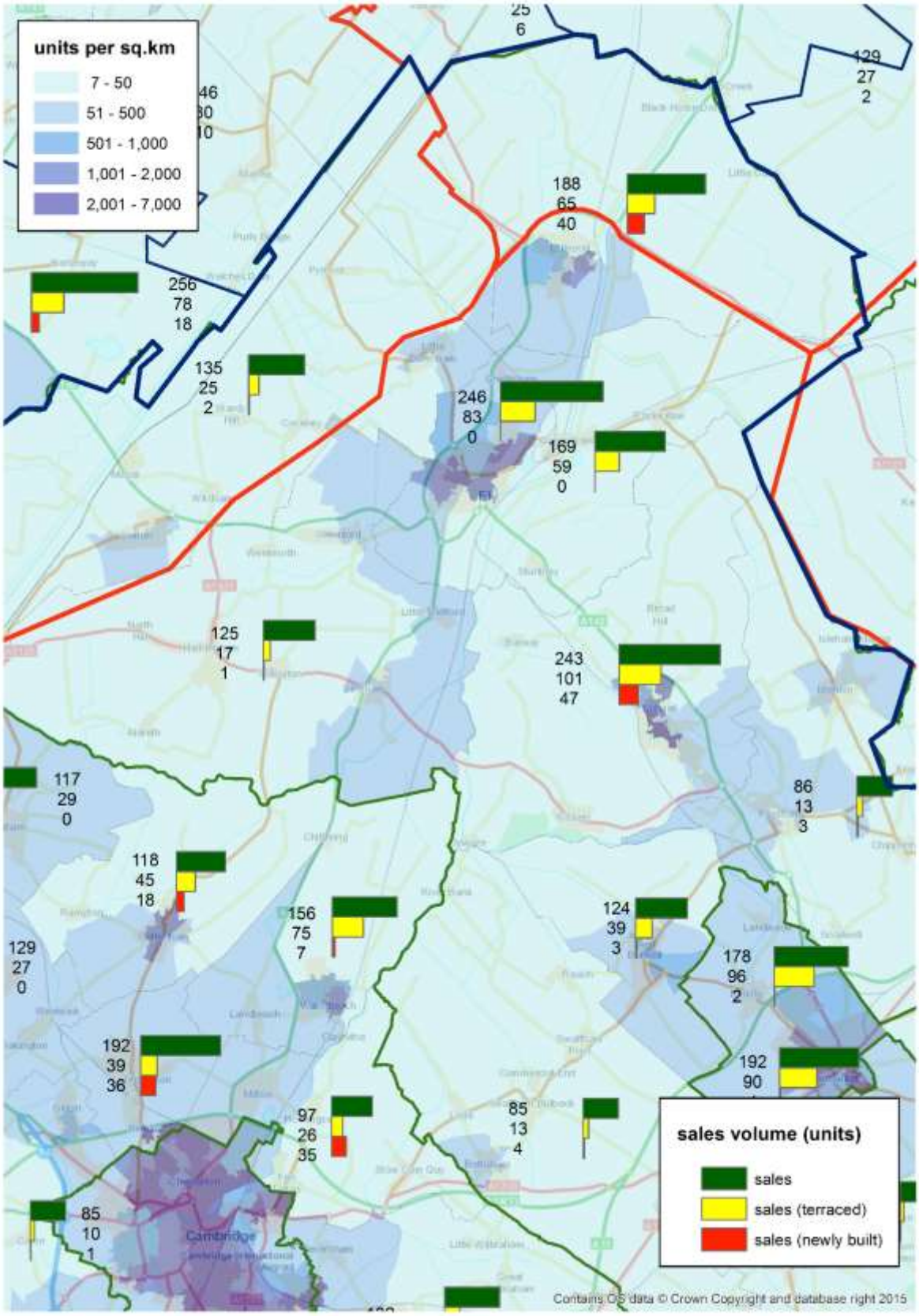
	As Map 4.4.
Map 4.6	**boundary source & note** Base map: as Map 2.1. **statistics** Land Registry. Excluding the changed and deleted prices. Fully market prices only. Records of twelve months ending January 2016.
Map 4.7	**boundary source & note** Base map: as Map 2.1. **statistics** As Map 4.6.
Map 6.1	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. Base map: as Map 2.1. **statistics** sales: as Map 4.6. stock: As Map 4.1.
Map 6.2	**boundary source & note** TTWA 2011 and LA: as Map 2.1. BRMA: as Map 2.2. Base map: as Map 2.1. Green Belt 2011: University of Edinburgh. This data was sourced from the Daily Telegraph. You can view their online-interactive map. The data MAY have been collected in collaboration with the Campaign to Protect Rural England (CPRE). This data is made available under the Creative Commons Attribution 3.0 license.
Map 6.3	**boundary source & note** TTWA 2011, LA and Base map: as Map 2.1. BRMA: as Map 2.2. MSOA: as LSOA in Map 3.1.

Table 6.3 List of income-related benefits

Council Tax Reduction
Employment and Support Allowance (income- related element)
Extended Payments (Council Tax Reduction and Housing Benefit)
Housing Benefit
In Work Credit
Income Support
Job Grant
Jobseeker's Allowance (income-based element)
Pension Credit
Rates Rebate
Return to Work Credit
Social Fund – Community Care Grant
Social Fund – Funeral Grant
Social Fund – Sure Start Maternity Grant
Universal Credit

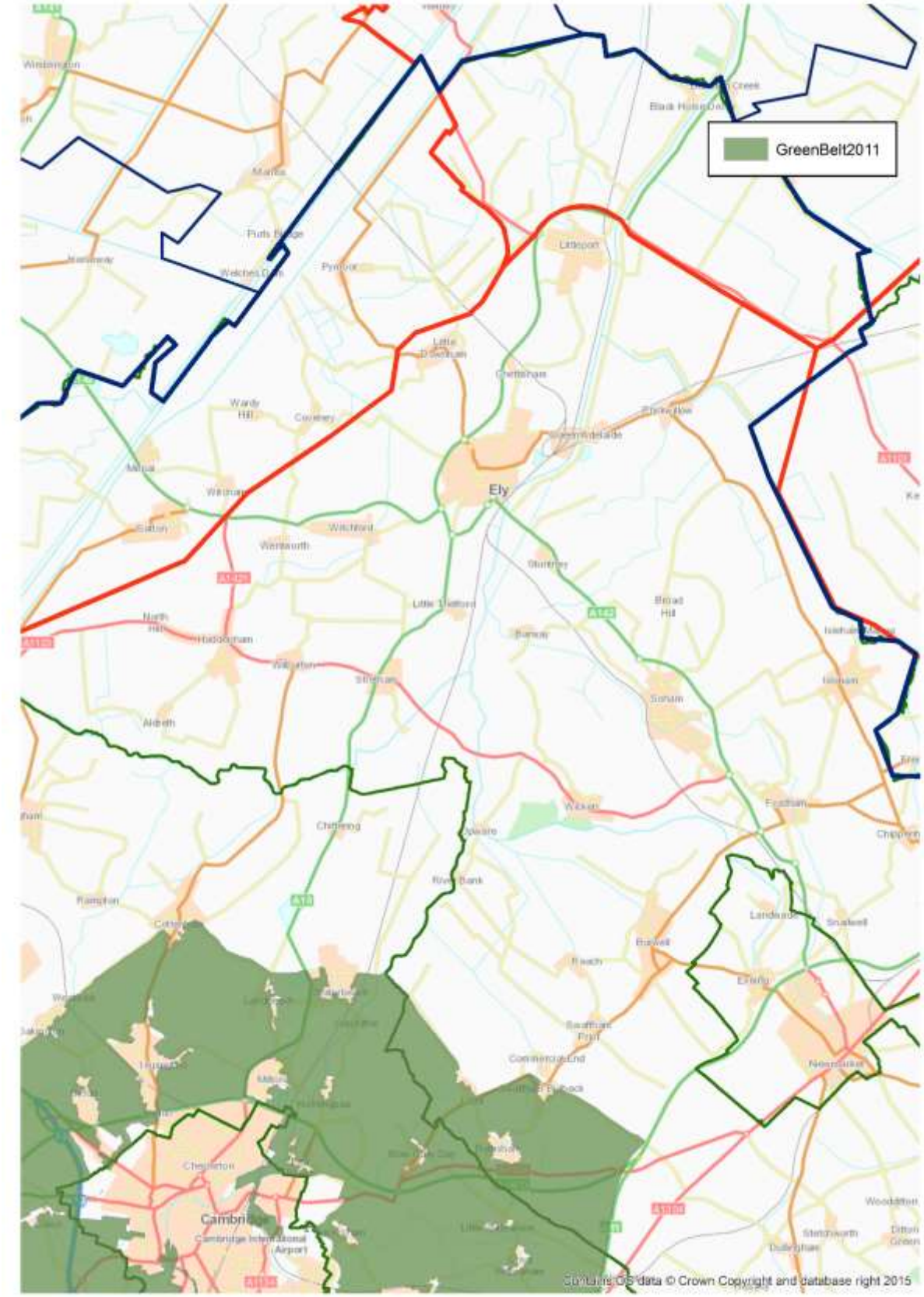
Source: Department of Work and Pension (2015) Family Resource Survey United Kingdom 2013/14. Available from www.gov.uk/government/uploads/system/uploads/attachment_data/file/437481/family-resources-survey-2013-14.pdf.

Map 6.1 Sales volume by MOSA in and around Ely: 4Qs ending Q2 2015



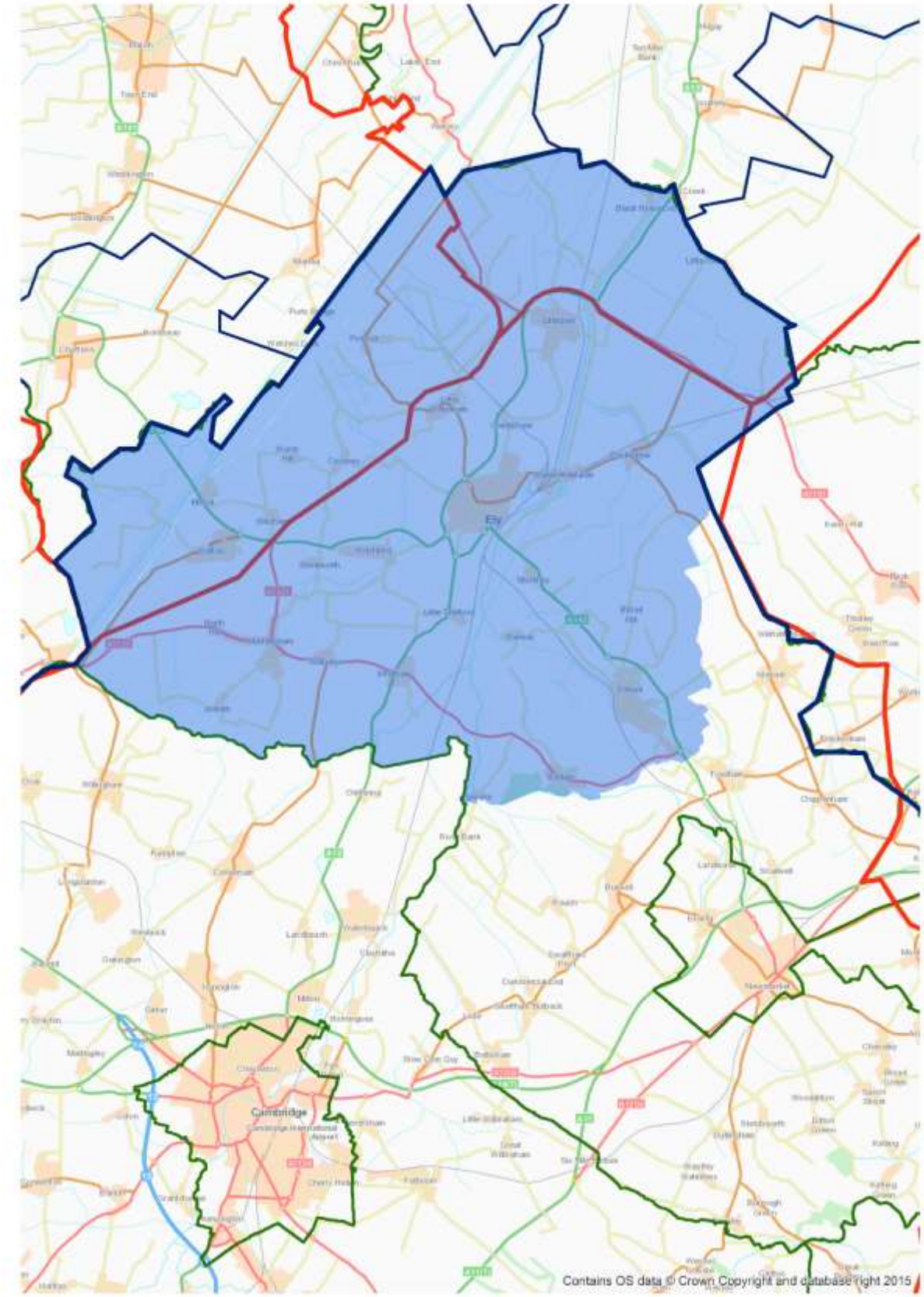
Source & note: See Table 6.2.

Map 6.2 Green Belt (2011) on E-C Corridor



Source & note: See Table 6.2.

Map 6.3 MSOAs in East Cambridgeshire for Income distribution estimate



Source & note: See Table 6.2.