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August 2015

Building in the green belt?

A report into commuting patterns in the Metropolitan green belt

Executive summary

Over the past year various think tanks, academics and policy commentators have considered whether green belt boundaries around London should be relaxed in order to ease the housing crisis. Their proposals often suggest the release of green belt land within easy walking or cycling distance of railway stations, land which could provide space for upwards of one million homes. The assumption behind these proposals is that the majority of new residents will commute by rail to jobs in central London, enabling sustainable housing growth in the wider Metropolitan region without placing excessive strain on existing roads. However it is difficult to offer insight on the implications of growth on commuting patterns without looking at those already living in the Metropolitan green belt. Where are these residents travelling for work, and what methods of transport are they using to get there?

By using travel-to-work data from the 2011 Census, the Royal Town Planning Institute (RTPI) has found that building one million homes around railway stations in the Metropolitan green belt could result in between 3.96 and 7.45 million additional car journeys per week on roads which are already struggling with congestion and delays. These findings also question the extent to which new residents would use trains to access jobs in central London.

The RTPI examined travel-to-work data for five medium-sized towns within the existing Metropolitan green belt, towns which are centred around railway stations and have direct connections to central London. We found that in these five towns, only 7.4% of commuters actually travel to London by train on a regular basis, despite living within easy walking or cycling distance of a station. The majority of commuters (72%) instead travel by private vehicle, mostly driving to jobs within their hometown and to other places not in London.

Contents

1. Introduction

In debates on how to solve the housing crisis, a growing number of voices are suggesting changes to the Metropolitan green belt which surrounds London. These range from proposals for a review of its current boundaries to calls for it to be scrapped completely.

Paul Cheshire from the London School of Economics (LSE) has calculated that the 19,334 hectares of green belt land that lies within 800 metres (or a ten-minute walk) of existing railway stations in the Metropolitan green belt could provide space for almost 1 million houses, assuming a ratio of 50 houses per hectare. He has also proposed that green belt land within 2km of a railway station could be considered suitable for development, a distance equivalent to a ten-minute bicycle journey (Cheshire, 2014).

These calculations have been repeated in recent housing reports. The Adam Smith Institute (ASI) has called for the removal of green belt designation from all intensive agricultural land within 10 minutes' walk of a railway station, to provide space for an estimated one million extra homes "...with easy access to central London" (ASI, 2015: 53). In their 2015 paper *Delivering Change: Building homes where we need them*, the Centre for Cities suggested a case-by-case review of green belt designations within 2km of a railway station, identifying space for a potential 3 million homes in the Metropolitan green belt (Centre for Cities, 2015).

These proposals share an assumption that housing in the Metropolitan green belt would generally support the goal of sustainable development if located within easy walking or cycling distance of a railway station with good connectivity to central London. This in turn rests on an assumption that housing demand largely arises from those who regularly commute to central London, and that proximity to a railway station is a good determinant of use. For example in their discussions around growth in the Metropolitan green belt, the ASI state that "…most of the demand for housing will be from people who wish to easily access London for work, commerce and leisure" (ASI, 2015: 53).

Aspects of these proposals now appear to have informed the government's Productivity Plan, which states that "areas around commuter hubs offer significant potential for new homes" (HM Treasury, 2015: 45). While the plan is silent on whether this should apply to commuter hubs in the green belt, it does indicate a possible consensus on where new housing might be located.

2. Commuting and its impacts

Commuting trips, from home to work or visa versa, account for around 16% of all trips taken. The average person living in England takes fewer commuting trips now than they did in 1995 - perhaps attributable to the growing number of those who work from home - although the average length and duration of commuting trips has increased (DfT, 2014a).

Commuting patterns are complex and represent the cumulative outcome of decisions made by individuals about where to live and work. These are in turn influenced by factors such as:

- The spatial context and competitiveness of property and labour markets
- Job characteristics, including location, wage, commuting costs and degree of specialisation
- Residential characteristics, including price, size, taste and commuting costs
- The cost, availability and preference for different transport options
- Decisions made by other household members (Cambridge Econometrics *et al.* 2005)

2.1. Contribution to economic growth and productivity

Transport infrastructure is a key determinant in the economic productivity of urban areas and their surroundings, enabling people to commute efficiently to and from work and delivering the benefits of agglomeration. Delays and unreliability on transport networks impose direct costs on individuals and businesses - some studies estimate that eliminating congestion on the road network would be worth £7-8bn of GDP per annum (Eddington, 2006).

2.2. Impacts on air quality, health and climate change

Over 11% of all trips are commuting journeys made by car or van (DfT, 2014a), modes of transport which account for over 14% of UK greenhouse gas emissions (CCC, 2014). The Government has enacted a number of policies to reduce transport emissions in support of their commitment to an overall reduction in emissions of 80% by 2050, including fuel efficiency improvements in conventional vehicles, incentives to increase the uptake of low and ultra-low emission vehicles, support for more efficient driving practices, and the allocation of funding to projects which encourage modal shift towards more sustainable modes of transport such as bus, rail, bicycle and walking (CCC, 2014).

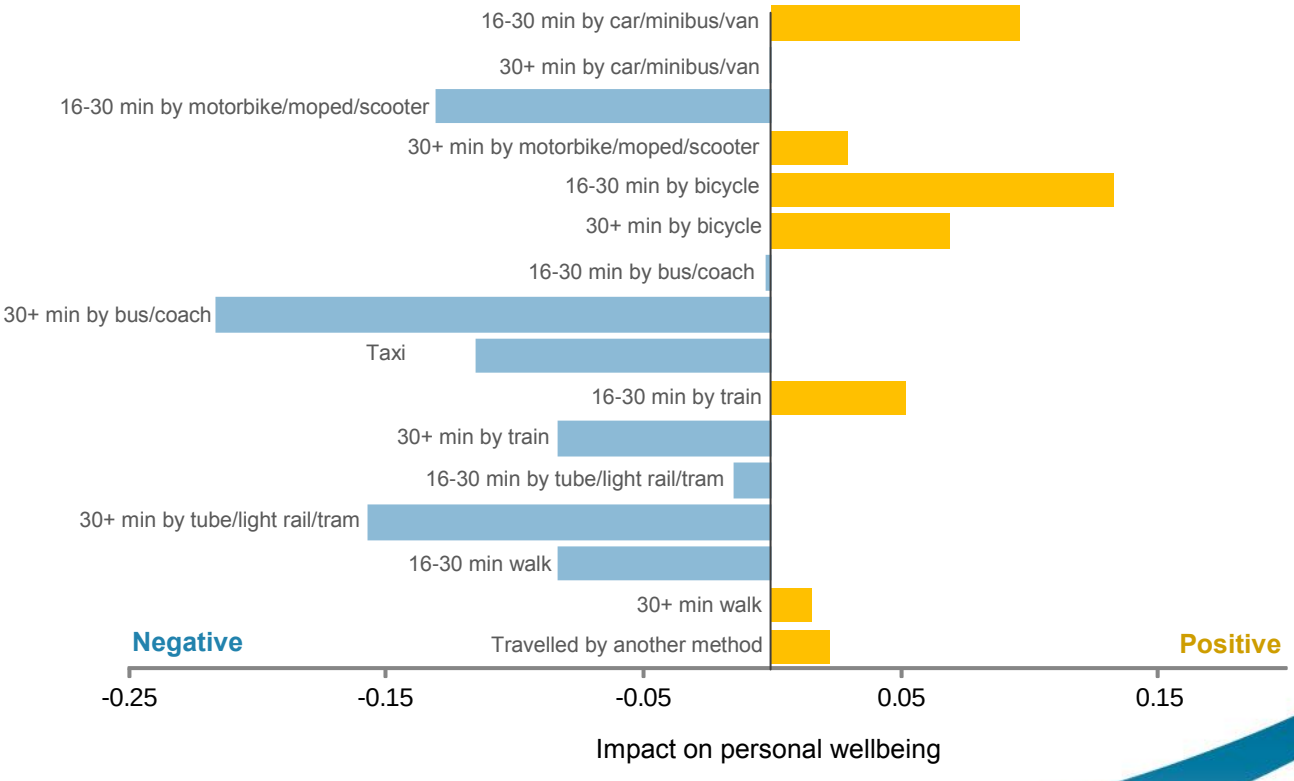
Emissions from petrol and diesel vehicles are also harmful to public health, triggering asthma and other breathing problems, reducing lung function, and causing lung disease (DEFRA, 2014). London has implemented several measures to reduce air pollution, including the Congestion Charge and Low Emissions Zones.

Commuting patterns and transport choice also affect overalls levels of road safety. While high levels of car usage in the UK mean that car occupants account for the majority of traffic causalities, pedestrians and bicycle/motorcycle users are disproportionately more likely to be injured or killed in accidents (DfT, 2015).

2.3. Impacts on wellbeing

A 2014 report from the Office for National Statistics suggested that longer commuting times generated negative impacts on personal wellbeing, with the worst effects reserved for those with journeys of between 61 and 90 minutes. When the method of travel was taken into account, those making bus and coach journeys lasting more than 30 minutes recorded the most negative impacts of wellbeing, while private vehicle commuters recorded lower anxiety levels than those travelling by train, and higher levels of life satisfaction than those that walk (ONS, 2014).

Figure 1: Effects of journey time and method of travel on personal wellbeing, compared to those whose travel to work takes 1-15 minutes by any mode of transport (data from April 2012-March 2013)



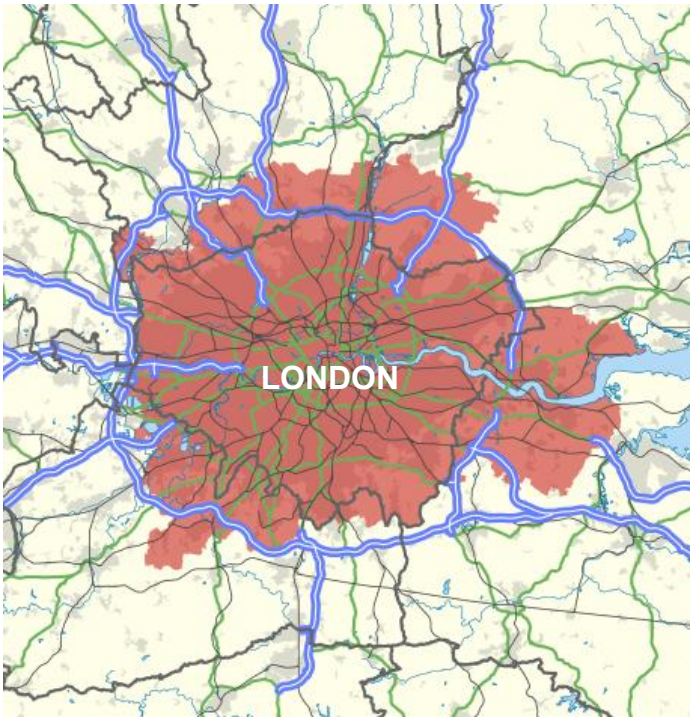
2.4. Patterns of commuting

London's housing market, employment market and infrastructure systems both depend on and impact upon areas beyond the formal boundaries of the city. This broader Metropolitan area can be defined in a variety of ways, as shown below.

Travel To Work Areas (TTWAs) are defined as areas with a working population of at least 3,500, within which at least 75% of the resident workforce work in the area, and at least 75% of the people who work in the area also live in the area. The TTWA for Greater London (right) can be seen to extend significantly beyond the A25 to include the local authorities of Thurrock, Dartford and Sevenoaks among others.

Alasdair Rae from the University of Sheffield has also produced a map (below) which shows commuting flows in South East England based on 2011 census data. Again this shows the significant pull that London exerts on the surrounding region.

The London Travel to Work Area



Credit: Nilfanion

Commuting patterns in south east England

Credit: Alasdair Rae

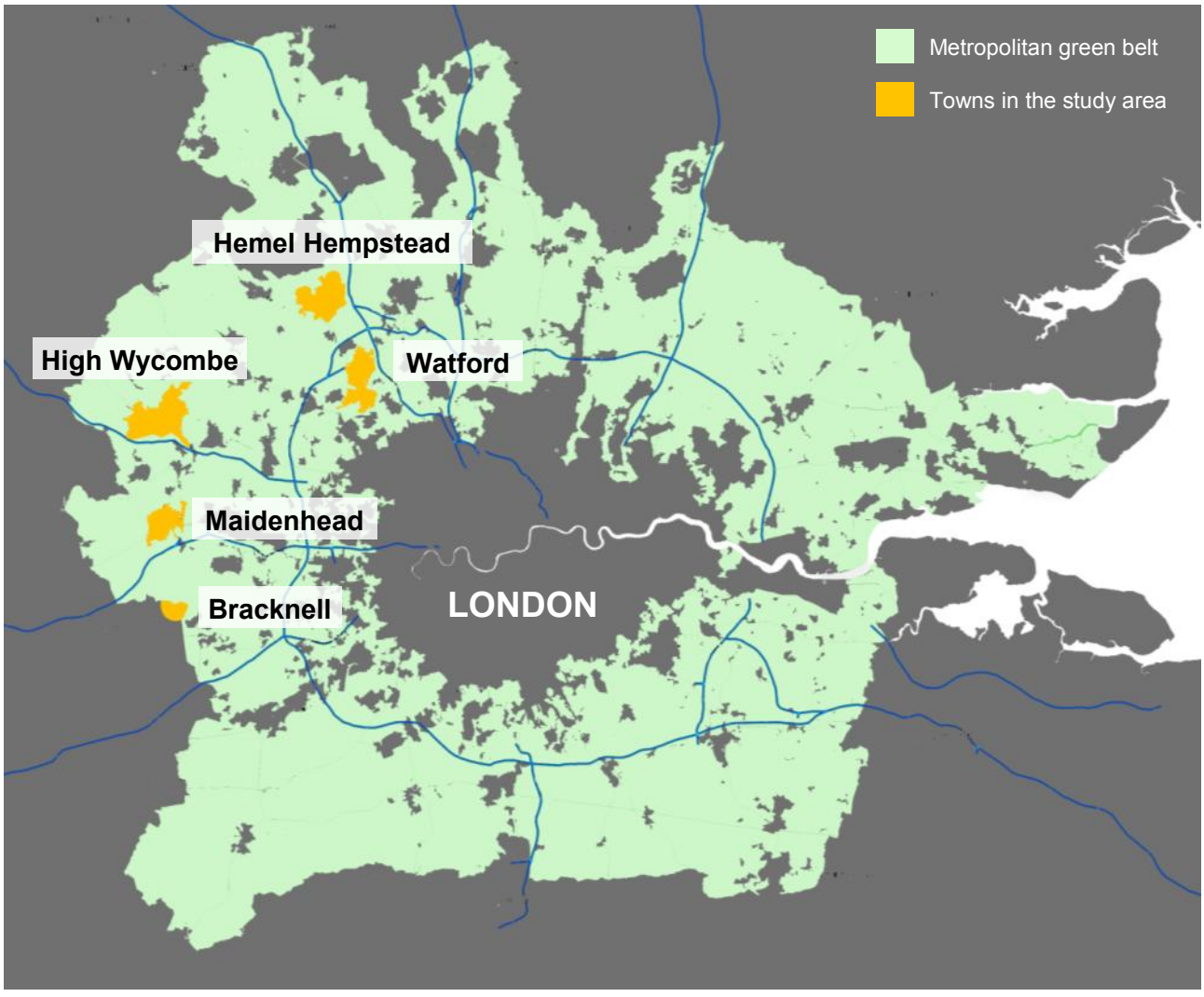
3. Analysis

3.1. Introduction

We are concerned that debates on growth in the Metropolitan green belt do not fully consider the complexity of commuting patterns in the region, and may therefore underestimate the potential impacts on transport infrastructure. Our analysis takes a close look at commuting data in a selection of medium-sized towns within the Metropolitan green belt, in order to gain insight into where existing residents work and the methods of transport they use to get there.

The map below shows the five medium-sized towns selected for analysis. Each is constrained by the surrounding green belt land and contains a railway station with direct routes to central London. Studying these existing towns helps to envisage what might happen to commuting patterns if green belt designations were relaxed around railway stations, and smaller settlements were permitted to grow into towns.

Map of the Metropolitan green belt and the five towns selected for analysis



Source: Alasdair Rae

3.2. Approach

Our analysis used 2011 travel-to-work census data from the Office for National Statistics (ONS) for the towns of Bracknell, Hemel Hempstead, High Wycombe, Maidenhead and Watford. Travel-to-work data was selected at the Middle Layer Super Output Areas (MSOAs) level, where each MSOA data point represents a population range of between 5,000 and 15,000, and a household range of 2,000 to 6,000. Using the DataShine Commute map developed by UCL Geography, we then selected the data points from the built-up area around the main railway station in each town (see maps on the following page).

From each of the MSOA data points within the five towns, we selected three datasets:

1. Place of work by method of travel to work
2. The number of household spaces (defined as the space used or available for use by an individual household)
3. Car and van availability

We then separated *place of work* into the following four categories:

1. **Inner London** (those commuting to the boroughs of Camden, Hackney, Hammersmith and Fulham, Haringey, Islington, Kensington and Chelsea, Lambeth, Lewisham, Newham, Southwark, Tower Hamlets, Wandsworth, Westminster and the City of London)
2. **Outer London** (those commuting to the boroughs of Greenwich, Harrow, Barking and Dagenham, Barnet, Bexley, Brent, Bromley, Croydon, Ealing, Enfield, Havering, Hillingdon, Hounslow, Kingston upon Thames, Merton, Redbridge, Richmond upon Thames, Sutton, Waltham Forest)
3. **Other areas** (those commuting to any other non-London location)
4. **Within locality** (those commuting within the local area)

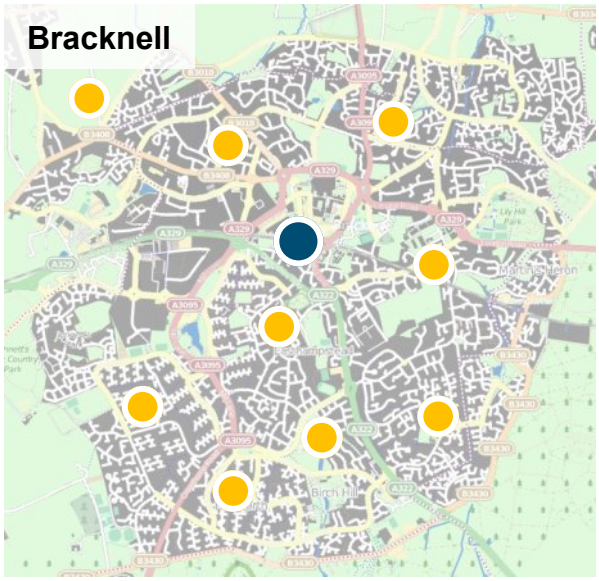
And finally separated the *primary method of transport* used for each commute into the following four categories:

1. Private vehicle (commuting by car, taxi or motorcycle, either driving or as a passenger)
2. Train or underground
3. Bus or coach
4. Bicycle or foot

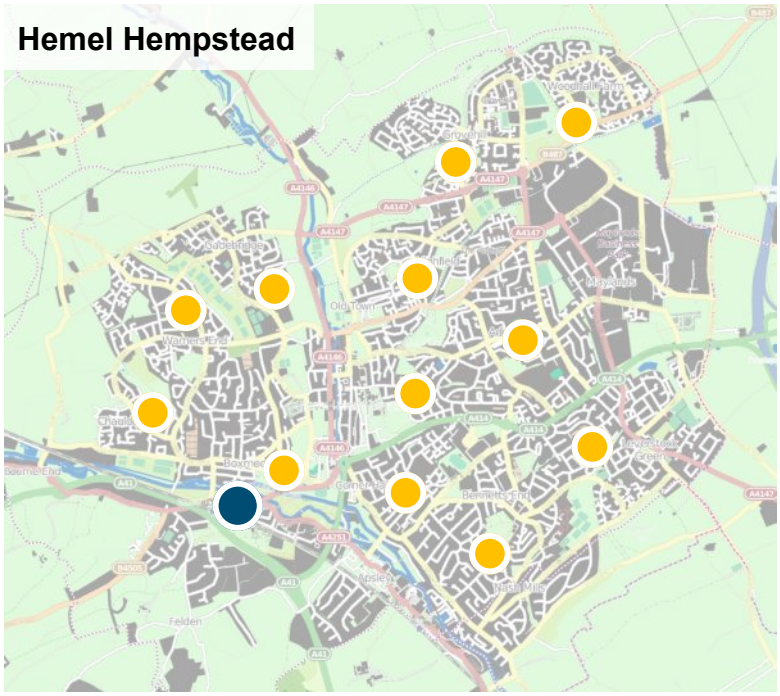
3.3. Data point maps

These maps show the MSOA data points and main railway stations for each town included in our analysis.

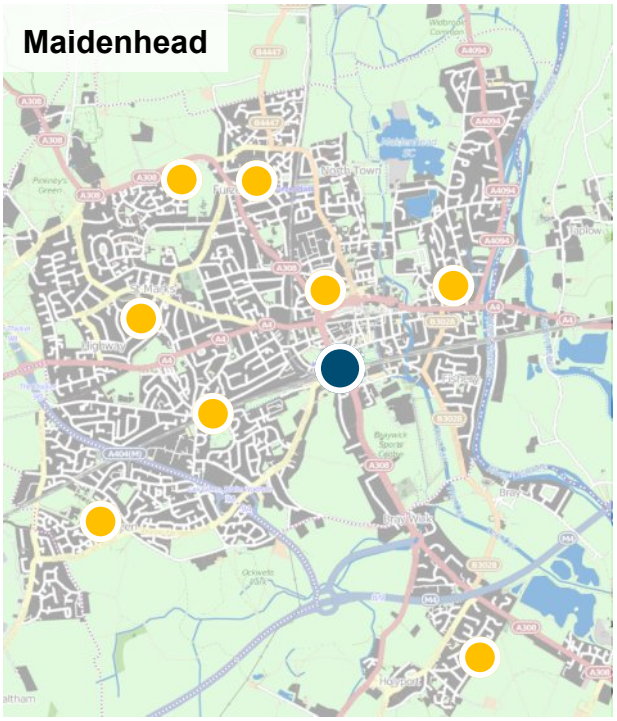
Bracknell



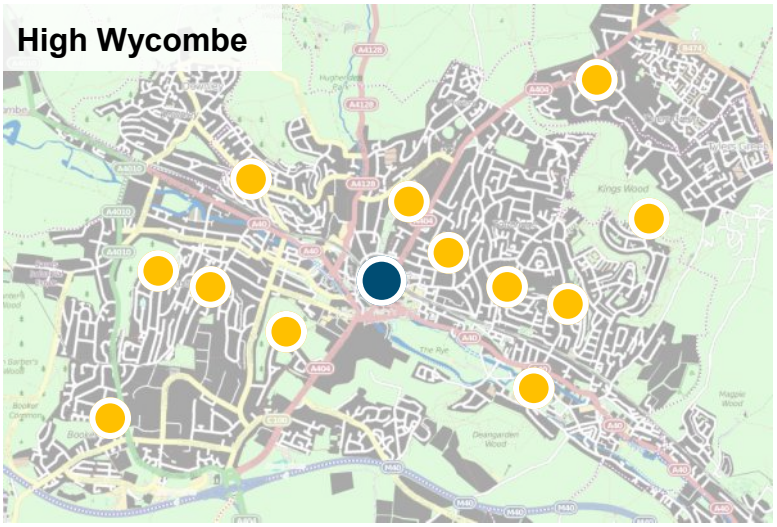
Hemel Hempstead



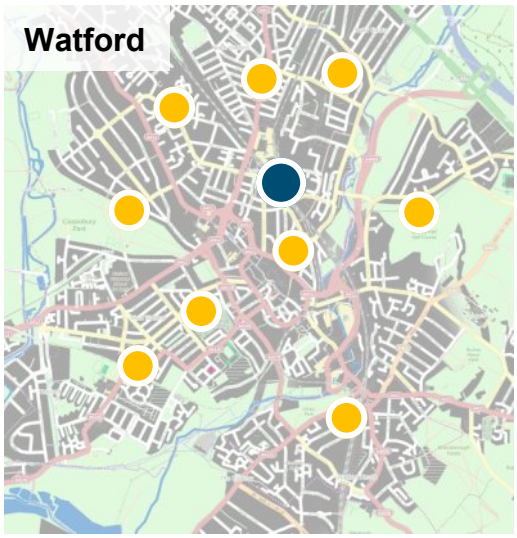
Maidenhead



High Wycombe



Watford



Railway station

MSOA data points

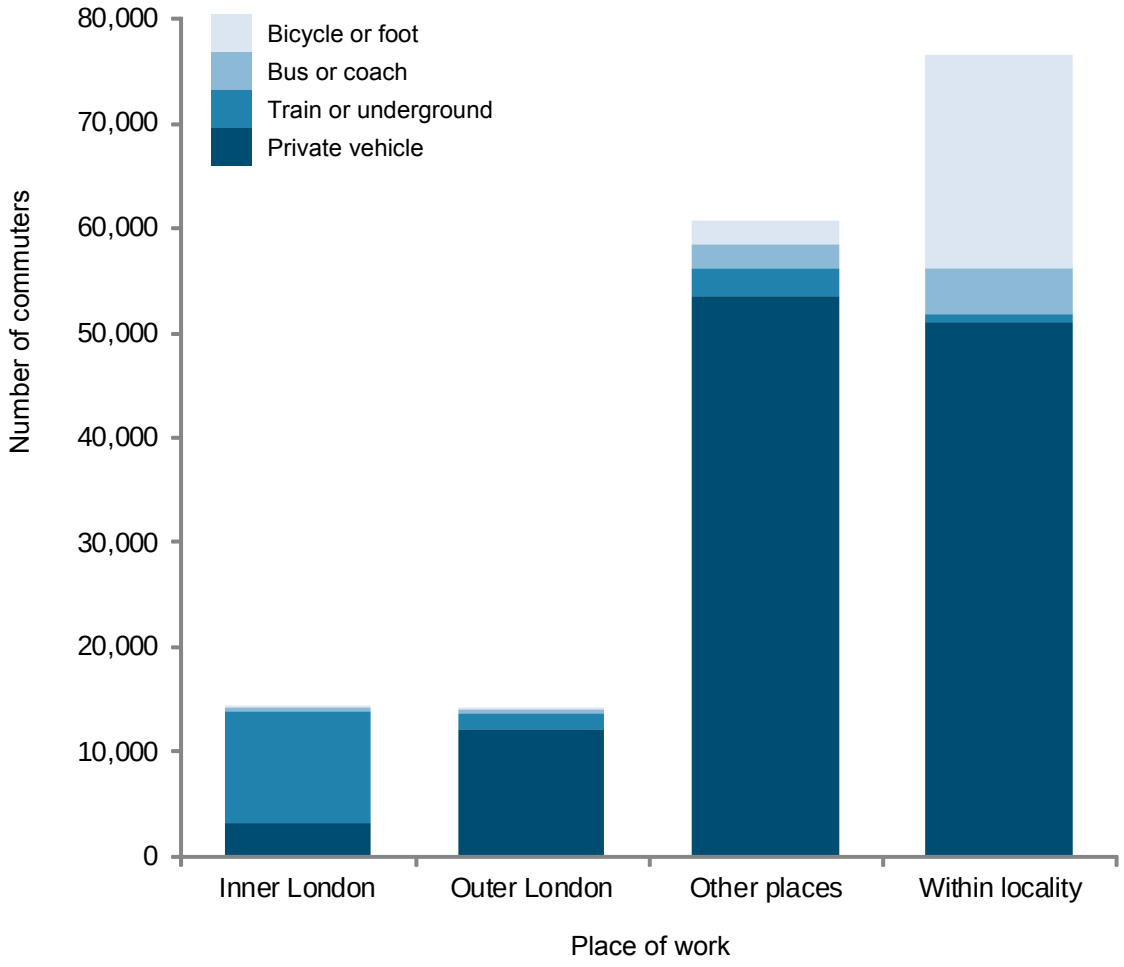
Number of household spaces (2011)
Bracknell: 30,015
Hemel Hempstead: 27,890
High Wycombe: 28,088
Maidenhead: 31,420
Watford: 28,072

Source: OpenStreetMap

4. Findings

In the five towns analysed, we found that the majority of commuters are not travelling into London on a daily basis, but rather to jobs located within their locality or in other places. With the exception of those commuting to inner London, the vast majority of all trips are made by private vehicle.

Figure 2: Number of commuters by place of work and primary method of travel (combined data from the five towns analysed)



Only 7.4% of commuters travel by train London

72% of commuters travel by private vehicle

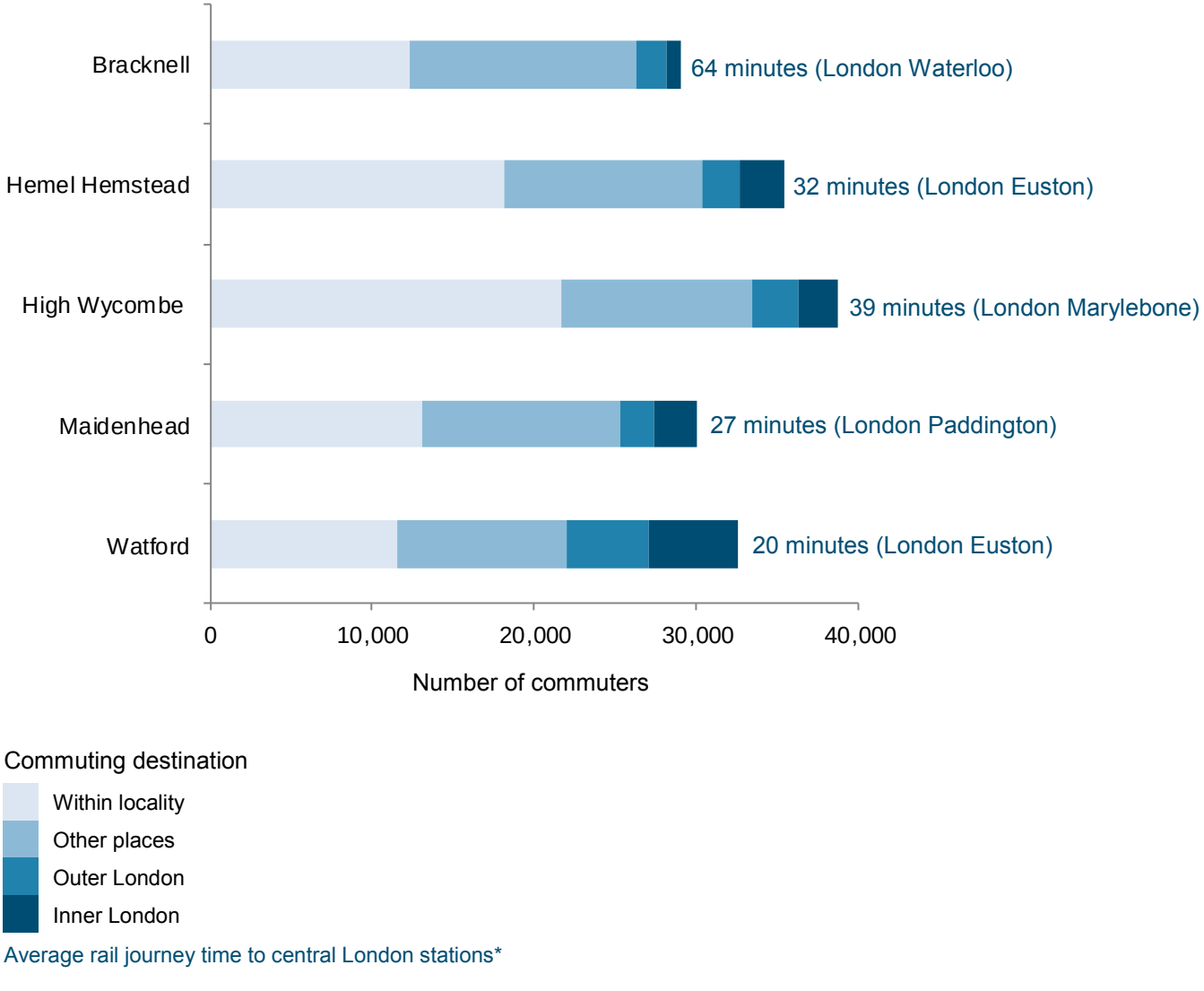
41% of commuters drive to jobs outside their town

9.4% of private vehicle commuters are passengers

Only 4% of commuters travel by coach or bus

The graph below shows some variation across the five towns in terms of where residents work, divided again to show the proportion of commuters travelling to inner London, outer London, other (non-London) places and within the locality. Unsurprisingly those towns with the shortest rail journey times to central London also display the highest proportion of commuters who work there. However for all five towns analysed the majority of residents either commute within their locality or to other non-London destinations, largely by private vehicle.

Figure 3: Place of work for commuters of each town in the study area, with average rail journey times to central London stations

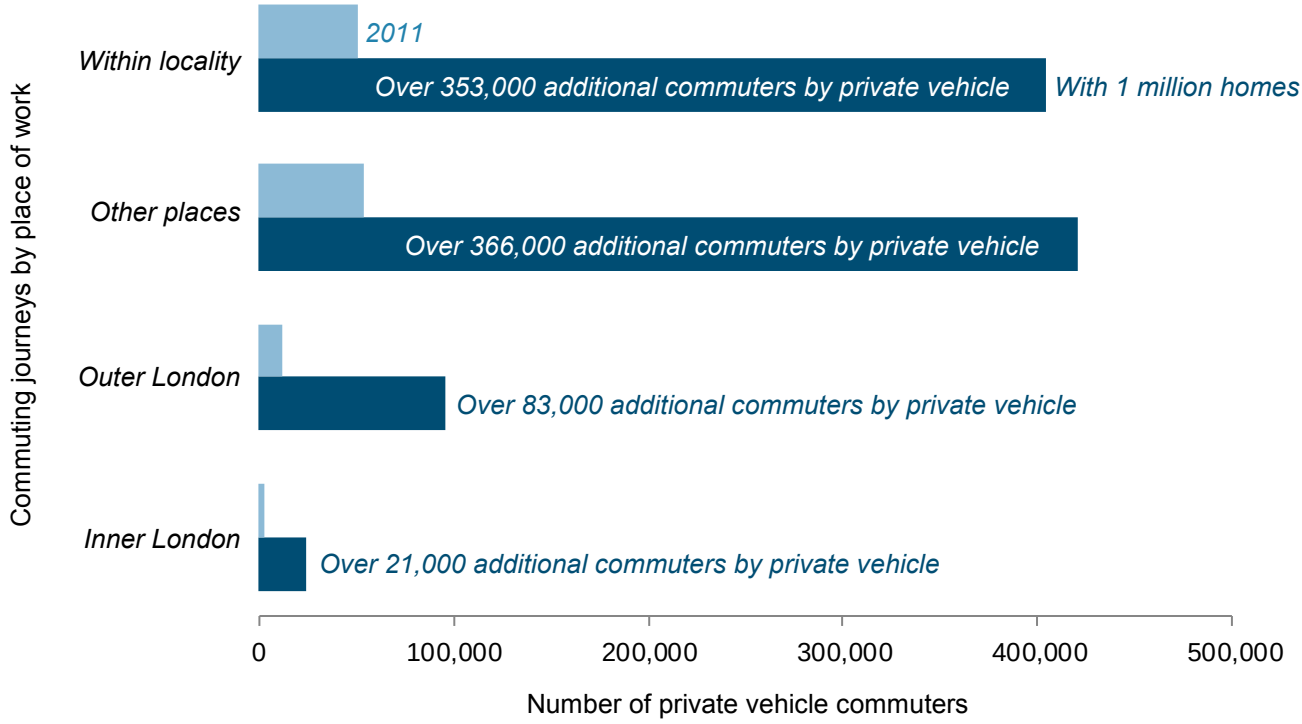


* Journey time estimates from: http://www.commutermaps.co.uk/

5. Implications of housing growth on commuting

The graph below imagines the implications for commuting from an additional one million homes in the Metropolitan green belt. If shows that the continuation of current travel-to-work trends would result in over **825,000 new commuters travelling by private vehicle**, which translates to **over 745,000 cars and vans on the road** once the figures are adjusted to remove those travelling as passengers or by other vehicles (such as taxis and motorbikes).

Figure 4: Number of private vehicle commuters by place of work with one million additional homes



How did we arrive at these figures?

The 2011 census data tells us that the five towns in our study area contain 145,485 household spaces and 119,523 private vehicle commuters, giving a ratio of 0.82 per household space. This can be separated by place of work to provide the following ratios:

	No. of private vehicle commuters travelling to:			
No. of household spaces	**Inner London**	**Outer London**	**Other places**	**Within locality**
145,485	3,060	12,064	53,405	50,994
Ratio:	0.0213	0.0838	0.3669	0.3529

Applying these ratios enables us to calculate the approximate number of commuters that would result from one million additional household spaces, again separated by place of work.

	No. of private vehicle commuters travelling to:			
No. of household spaces	**Inner London**	**Outer London**	**Other places**	**Within locality**
1,000,000	21,372	83,911	366,837	353,209
Total:	**823,329**			

In the towns analysed we found that 9.4% of private vehicle commuters do not drive their own car or van, but instead travel to work as passengers or use a motorcycle, scooter or moped. Removing this would leave just over 745,000 private vehicle commuters driving a car or van to work each day in each direction, which translates to 7,450,000 commuting trips by car and van per week.

745,000 x 2 x 5 = 7,450,000

(journeys to and from work) (a five day working week)

Could our calculations of additional traffic be an overestimate?

Firstly, many commuters do not travel to work every day, especially those making the longest journeys. By multiplying the number of commuters by four instead of five, we can assume a four-day working week and arrive at a lower estimate of weekly trips. Secondly, it is possible that if the additional households were accommodated in much smaller places than the towns that we analysed, then we might see a greater proportion commuting by rail into inner London.

To test this second assumption we looked at data for the affluent commuter village of Radlett in Hertfordshire. Here we found that 61% of commuting trips were made by private vehicle, compared to 72% for our study area, and that a greater proportion did travel by rail to inner London. Using this ratio in our calculations provides a reduced figure for the number of private vehicle commuters that would result from one million additional households (see below), again lowering the threshold for weekly trips.

Radlett commuting data

No. of household spaces	No. of private vehicle commuters	Ratio of commuters per household space
3,282 (2011 figures)	1,794	0.5466
1,000,000	546,618	

It seems unlikely that one million additional homes in the Metropolitan green belt would only cater to those employed in inner London. If more affordable homes were built in the places with limited local employment, then their residents would more likely commute by private vehicle to other places in the green belt as indicated in our analysis. However if we use the Radlett commuting data as our lower threshold (in which a million additional households translates into 547,000 private vehicle commuters), remove those commuters not driving a car or van, and assume a four-day working week, then our calculation for additional commuting trips per week by private vehicle would be as follows:

495,000 x 2 x 4 = 3,960,000

(journeys to and from work) (a *four* day working week)

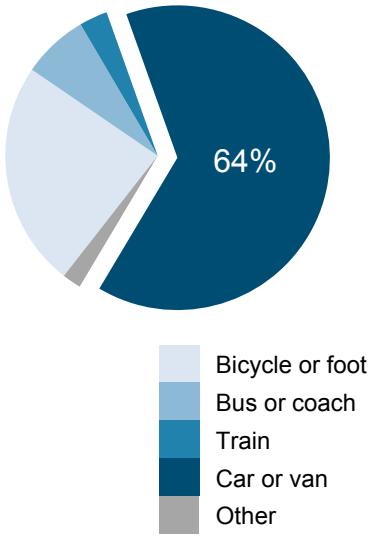
From this we can conclude that the estimated range of additional private vehicle trips that would result from one million homes in the Metropolitan green belt would be between **3.96 million and 7.45 million per week.**

Could our calculations of additional traffic be an underestimate?

This research has only looked at commuting trips, which at the national level account for just 16% of all journeys taken (DfT, 2014a). One million additional homes would also cause a large increase the number of trips made for other activities such as shopping, school runs and visiting friends. Given that 64% of *all* trips are made by car or van (DfT, 2014a), the likely impacts on traffic would be much greater than those estimated for commuting alone.

These other uses may explain why the census data shows a slight decline in the proportion of commuters travelling by private vehicle in the Metropolitan green belt since 2001, while in the same period there was an increase in the proportion of households with access to at least one car or van (ONS, 2013). The census data shows that the average household in the towns that we analysed has 1.31 cars or vans available to them, suggesting that a million extra homes could actually result in over 1.31 million additional vehicles if current trends continued.

Figure 5: Mode share for all journey types across England



Our analysis suggests that an expansion of housing in the Metropolitan green belt would result in a significant increase in the use of private vehicles, even if this housing were located within easy walking and cycling distance of a railway station. Several of the commentators referenced in Section 1 do recognise that housing growth needs to be coordinated with infrastructure provision across the Metropolitan area, however little is mentioned about the potential impact of housing growth on traffic, road congestion and pollution *within and between* green belt settlements. Even the assumption that new residents would commute by rail is questionable, given that many of the train lines into London are already operating at capacity (DfT, 2014b).

This second map (right) from Alasdair Rae again uses 2011 census data to show commuting patters in the south east, however this time with all journeys to London removed. It reveals a network of polycentric commuting patterns within the region, journeys which we have shown are predominantly made by private vehicle.

Commuting patterns in south east England (excluding London)

Credit: Alasdair Rae

Many of these routes already experience congestion and delays during peak times, and these conditions would likely worsen if significant volumes of new housing were built in the Metropolitan green belt. Congestion can prevent efficient driving techniques and lead to increased fuel consumption and vehicle emissions (Levy *et al*. 2010) although these impacts may be partially offset by the uptake of low emission vehicles. An increase in journey duration could also offset some of the positive impacts on wellbeing associated with driving short distances to work, as indicated in Figure 1.

In our paper *Strategic Planning: Effective Cooperation for Planning Across Boundaries*, we call for a stronger degree of spatial planning which makes choices between places, rather than establishing general criteria for decision-making (RTPI, 2015). As our analysis has shown, the principle of releasing green belt land for housing around railway stations may not deliver the sustainability outcomes that some commentators suppose, where new residents commute by rail

to jobs in central London. A more likely outcome would be an increase in private vehicle commuting within and between places in the Metropolitan green belt as individual settlements were permitted to expand, with negative impacts on congestion, pollution and wellbeing. Discussions on growth within the Metropolitan green belt need to move beyond the single criterion of rail accessibility and consider the need for polycentric public transport networks, critical size thresholds for local employment, the use of car-free developments, and policies which support sustainable modal shift.

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Data and maps

All 2011 census data from Nomis, a service provided by the Office for National Statistics. ONS. Available from: http://www.nomisweb.co.uk/

Page 5: Data source: Office for National Statistics. (2014) *Commuting and Personal Well-being*. ONS. Available from: http://www.ons.gov.uk/ons/dcp171766_351954.pdf

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