

Urban Grammar - Age Capsule

Linking building age with their Spatial Signature

Dani Arribas-Bel

[\[PDF\]](#)

TL;DR

This note presents an overview of how the way new British residential property is developed and the type of environment in which it is built have changed in the course of the last 125 years, with a focus on the last three decades. We find six key trends:

1. Most of the current stock is built in suburban and peri-urban areas, characterised by low density and lack of access to services, employment, and urban amenities (i.e., “urban function”).
2. The vast majority of the current stock was built in the period shortly after WW-II (1950-75), and located in areas displaying the Open sprawl and Urban buffer spatial signatures.
3. There is a correlation between the degree of urbanity of a signature and the period where most properties in such signature were built. Older signatures tend to be denser, more compact and more “function oriented” rather than residential.
4. Open sprawl and Urban buffer are not only the most prominent signatures, their importance has increased over time.
5. Since the financial crisis of 2008, Urban buffer has steadily grown and become the single most prominent signature

where new building takes place, overcoming even Open sprawl.

6. Central and other residential areas were on a moderate upward trajectory, gaining relevance, until the financial crash but have since flattened the trend or even decreased in importance.

Introduction

This capsule considers the temporal dimension of the Spatial Signatures (Fleischmann and Arribas-Bel 2022). It is a start to unpacking how the development of different signature type has unfolded over time. Hence, we try to answer questions such as *when did most of the development that lead to dense, compact neighborhoods took place?* or *what has been the main spatial signature of the last decades which has most recently been shaping the landscape?*

The analysis presented here relies on three datasets. First, the Spatial Signature characterisation proposed by Fleischmann and Arribas-Bel (2022) for Great Britain and based on the approach outlined in Arribas-Bel and Fleischmann (2022). Second, data on Energy Performance Certificates (EPC), released by the Department of Levelling Up, Housing and Communities.¹ This is a registry of all the properties in England and Wales that have received an Energy score. As part of the process, much more information is collected, including the period in which the property was built on, which is what we use here. And third, we use Land Registry's Price Paid data², which records almost every³ house transaction in England and Wales since 1995.

The remainder of the document is structured in three sections: we first consider the overall distribution of properties across signatures; then we move on to evolution over the XXth Century

¹Available at: <https://epc.opendatacommunities.org/>

²More information available at: <https://www.gov.uk/government/collections/price-paid-data>

³There are some exceptions. For more detail, please see: <https://www.gov.uk/guidance/about-the-price-paid-data#data-excluded-from-price-paid-data>

evolution; and wrap up with a detailed zoom into the last two decades in the XXIst Century.

Building properties across signatures

As a first step, we consider how prevalent different development patterns, or *spatial signatures*, are. To do that, Figure 1 shows the proportion of EPC properties located within each signature type, sorted by their degree of “urbanity”, with the most urban signature (“Hyper concentrated urbanity”) at the top, and the least (“Wild countryside”) at the bottom. Starting with this figure is useful because the exercise below will essentially unfold its temporal dimension to consider how this has been built over time.

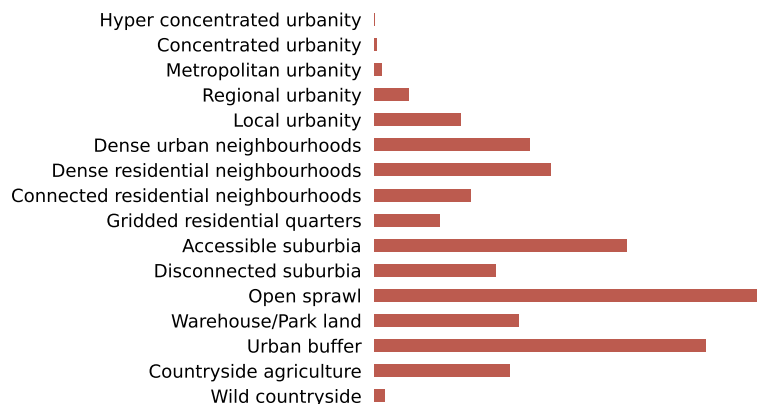


Figure 1: Proportion of EPC properties by signature type

There are three important aspects to highlight from this figure. First, although conceptually very important for urban life, very few of the properties are in what we consider “urbanity”, possibly with the exception of the local variation, which is common in most cities and towns. Regional, metropolitan, and (hyper) concentrated are only present in a minority of cities and thus, in the broader context, are not very relevant. Second, we can observe two peaks of signatures that group two distinct types of development. One around more compact neighborhoods, with “Dense residential neighborhoods” as its most common type, and another one on more suburban development with “Open sprawl” and “Urban buffer” as the most common signatures in the entire set. This has important implications when we are

trying to understand in what context most housing properties are located, pointing towards one with lower density and less connected structure. Third, despite being the most prominent area-wise, “Countryside agriculture” and “Wild countryside” have very few properties. This is less counterintuitive than it first appears when one considers the main characteristics of these signatures are being home to functions that do not imply human residences.

The long view

The first approach to unfolding the temporal dimension of Figure 1 takes a long-term view. We use the age column in the EPC dataset and re-aggregate it in periods of, roughly, 15 to 20 years. Figure 2 displays a heatmap with the number of properties built in each period and located in areas of each signature. This first crude overview already provides interesting insight. The highest concentration of properties corresponds with houses built in the immediate post-war years (ca. 1950-75) in locations labelled as Accessible suburbia, Open sprawl, and Urban buffer. This trend represents the suburbanisation that occurred shortly after WW-II and that still characterises today’s housing stock.

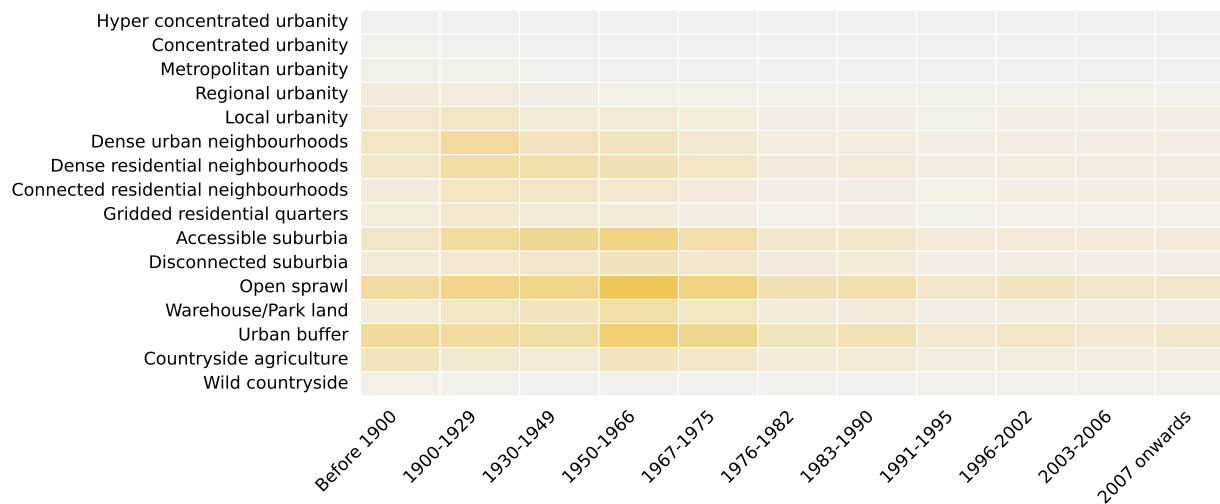


Figure 2: EPC properties by signature type over time periods

Figure 3 makes the absolute view in Figure 2 relative to each spatial signature. The heatmap is constructed so that it represents the proportion of all the houses in a signature type that correspond to each time period. This transformation allows us to see more detail in signatures that had too small counts to be picked up visually in the previous figure. Of particular interest are all the “urbanity” classes, which represent the town centres and most urban cores of British cities. In almost all cases, these are the oldest areas as they represent the kernel where the city or town was originally founded. In almost all cases too (with the exception, for example, of cities that were heavily bombed during WW-II), they are all made up of older stock that has been gradually upgraded rather than replaced. This is what is represented in Figure 3 by the darker yellow (higher values) in its top left corner. The figure also makes clear that, even signature by signature, most of the housing stock in Britain was built before 1975, and the signature where it was built is correlated with time: most of the urbanities was built prior to 1900, and current residential neighborhoods later.

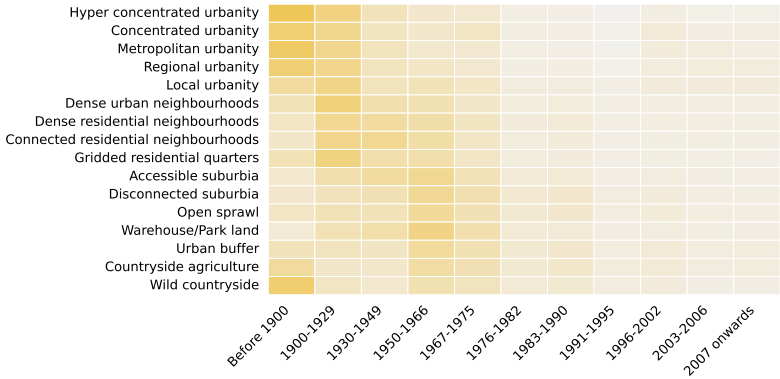


Figure 3: Proportion of EPC properties by signature type over time periods (rows add up to 100%)

Our final look at the period in which the building stock was built considers another relative view, but this time by period. Figure 4 represents the proportion of all houses built in a given period that is located in an area with a particular spatial signature. Here we come back to the patterns we initially saw in Figure 1, but this time we can see more detail on the relevance of each period for signatures (which was obscured before by the high numbers for some periods). The focus here thus is back on the more suburban signatures (Open sprawl, Urban buffer) but

we can now see how the relevance of those types actually grows over time. Before, we established that the peak period was 1950-1975. This is when the vast majority of the current stock was built, and it was developed following suburban patterns. What this figure makes clear is that the suburban nature of development actually grew over time well into our present day. Even though the total number of new houses built in Britain since 1975 was not as high as before, the proportion of them that were in suburban areas has steadily grown.

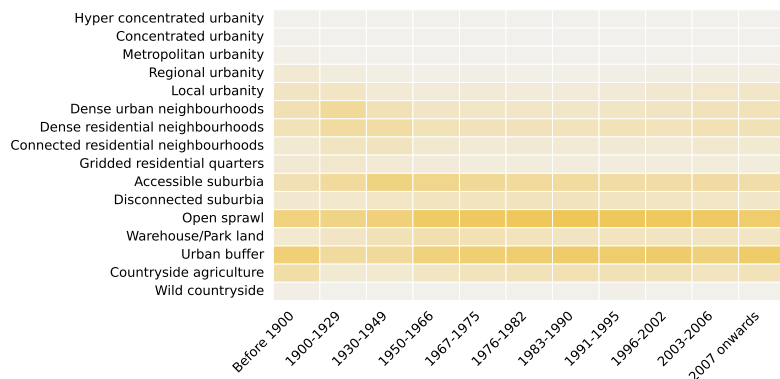


Figure 4: Proportion of EPC properties by signature type over time periods (columns add up to 100%)

The last 25 years

We now turn to the last 25 years of development and take a closer look. For this task, we use Land Registry data, recording every new residential property transaction since 1995. Figure 5 shows the volume of transactions recorded monthly, with a slight trend upwards, stopped by a dip shortly after the financial crisis and a recovery following. Throughout the period, clear seasonality effects are apparent.

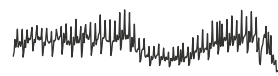


Figure 5: Land Registry new properties

We then disaggregate by signature in Figure 6. It is hard to see details, but one clear pattern rapidly emerges: there are some signatures that attract many more property transactions than others. In particular, Open Sprawl and Urban Buffer consistently feature more transactions throughout the entire period (and, in some ways, drive the overall pattern we saw in Figure 5). The seasonal variation mentioned above translates in this figure into large jumps up and down by month across the properties in all signatures, making it hard to see more trends.

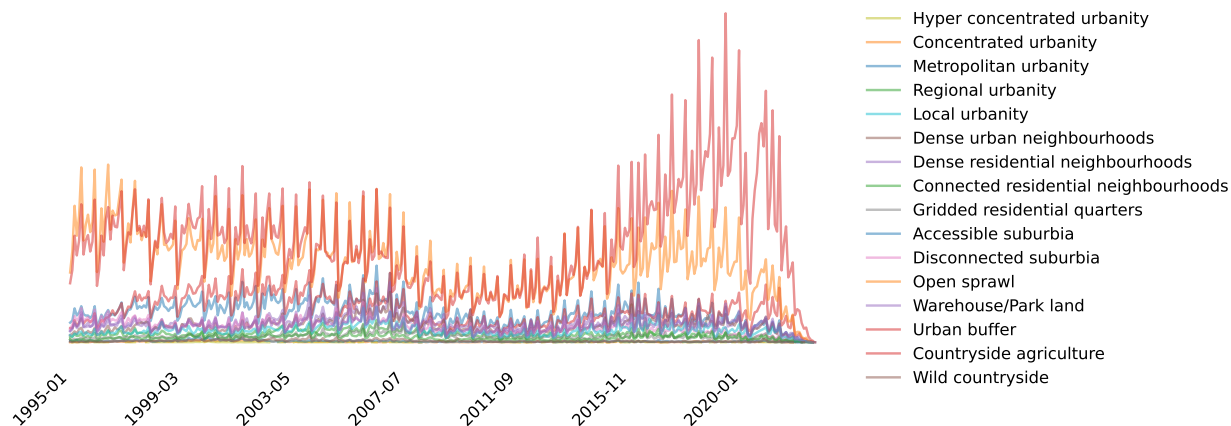


Figure 6: Land Registry new properties by signature type

To obtain a cleaner view that is decoupled from total volume of transactions, Figure 7 presents the proportion of transactions that relate to properties in each signature, monthly. This makes differences across months less relevant if the importance of each signature stays constant from month to month, and thus presents a cleaner picture of the relative evolution of the prominence of each signature. The figure contains several interesting insights and, to make them more explicit and put the spotlight on each of them, below we present subsets of signatures in isolation from the full set.

Figure 8 shows the evolution for Open sprawl and Urban buffer, the two most prominent signatures in the period. We can see how both classes represented roughly the same proportion of properties sold every month up until, approximately, September of 2015. Open sprawl started the series with a small lead and, by about 1999, positions changed, with Urban buffer leading up until 2007, when the ranking reversed again. Around 2008, Urban buffer started growing in relevance by the month and, by 2011, it surpassed Open sprawl (and every other signature) only to continue climbing in relevance until today. Overall, these interrelations are the product of two distinct behaviours: Open sprawl has been steadily losing relevance in this period, while Urban buffer saw a dip around the financial crisis of 2008, but had a spectacular recovery. It is important

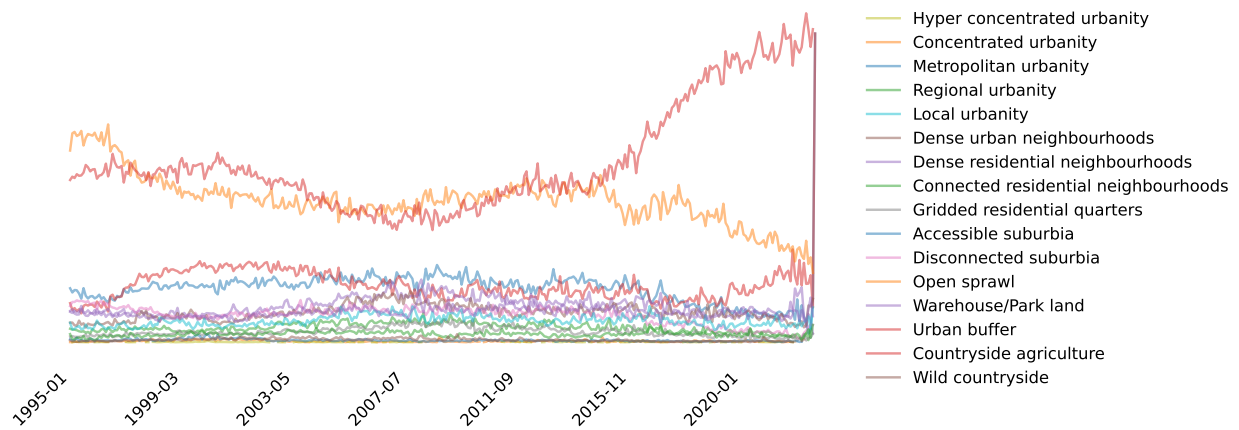


Figure 7: Yearly proportion of Land Registry new properties by signature type

to remember how these two signature types compare. Open sprawl is an urban class characterised by low density, large amounts of green space and the presence of transport infrastructure (e.g., highways). Urban buffer is a slightly more suburban class, with less developed area and more green spaces.

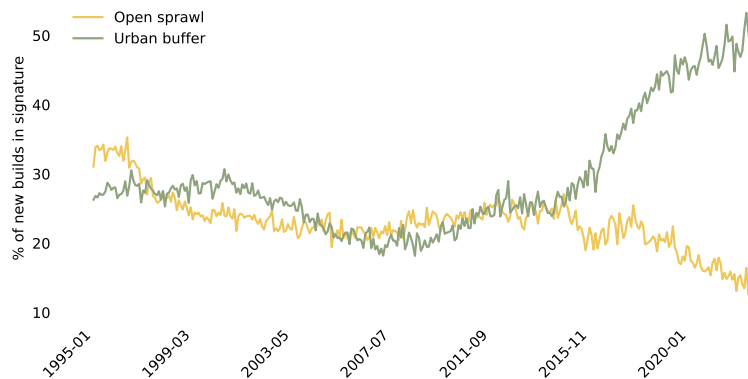


Figure 8: Yearly proportion of Land Registry new properties

What Figure 8 is showing us is two main things. First, the two areas where most of the building activity has been focused over the last three decades is more suburban and sparse, less compact and dense. Cities are becoming less “city-like”. Second, this trend was accentuated after the financial crisis of 2008 where a wedge opened between these two classes, progres-

sively favoring more and more the most suburban development type.

Figure 9, in contrast, displays the evolution of the five urbanity classes which, collectively, take a small proportion of all transactions in every month, but represent important areas for British cities. These are centres of towns, CBDs, and generally compact concentrations that attract a large amount of employment and amenities. Two main insights are apparent in this figure. First, as expected, the proportion of properties built in each of these signatures is aligned with the prevalence of the signature types they represent: Hyper concentrated urbanity, for example, is a signature with a very small footprint (only in central parts of London) and thus consistently sees very small numbers month after month; while Local urbanity, an signature present in the centre of almost every town, is much more prevalent. The second interesting pattern in the figure is that, although these signatures gained a bit of relevance (upward trend) until the financial crisis, they have plateaued and even decreased (e.g., Local Urbanity) ever since. This is consistent with the picture in Figure 8: development efforts since the financial crisis have increasingly focused in more peri-urban, previously undeveloped areas and followed a dispersed, less compact pattern.

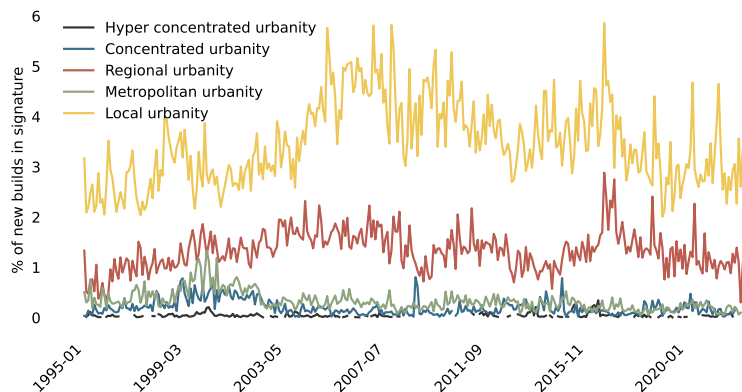


Figure 9: Yearly proportion of Land Registry new properties

Finally, Figure 10 presents individually the evolution in the different signatures that capture mostly residential neighborhoods. Here the picture is more nuanced and less relevant: each signature roughly maintains its relative importance over the period. Nevertheless, some interesting variation emerges.

The first pattern to note is that, similar to the previous figure, most classes present a slight upward trend up until around 2008. Until the financial crisis, the proportion of new-built properties being developed in relatively compact environments was growing. Afterwards, we find a more mixed picture, where some classes (e.g., Dense urban neighbourhoods) show a flatter trend, while others present slight declines (e.g., Gridded residential quarters).

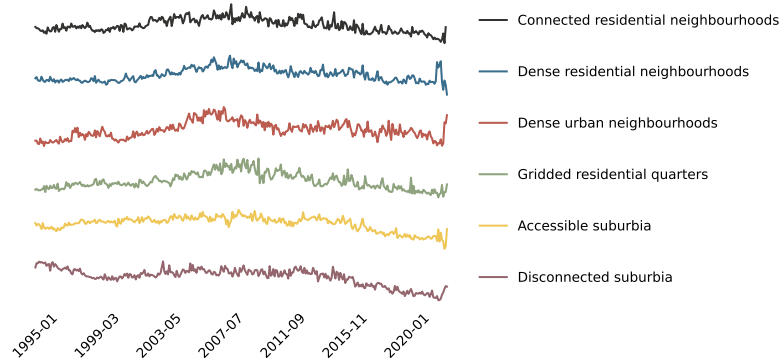


Figure 10: Yearly proportion of Land Registry new properties

References

- Arribas-Bel, Daniel, and Martin Fleischmann. 2022. “Spatial Signatures - Understanding (Urban) Spaces Through Form and Function.” *Habitat International* 128: 102641. <https://doi.org/https://doi.org/10.1016/j.habitatint.2022.102641>.
- Fleischmann, Martin, and Daniel Arribas-Bel. 2022. “Geographical Characterisation of British Urban Form and Function Using the Spatial Signatures Framework.” *Scientific Data* 9 (1): 1–15.