

# **Calculating the Overbuilding Potential of Municipal Buildings in London**

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## **1. Introduction**

The world population is set to increase significantly, with the urban population expected to rise by 72% in the next 40 years from 3.6 billion in 2011 to 6.3 billion by 2050 (Nations, 2012). It is therefore necessary to take into consideration the continuing demands that the growing population is going to place on the city's infrastructure, and make preparations now for the future.

### **1.1 UK and England**

This study has been carried out with WSP | Parsons Brinckerhoff, one of the world's leading professional services firms in the built and natural environment. According to a report by KPMG and Shelter, a total of 250,000 new homes are needed annually in England to meet rising demand; in 2013 only 110,000 were built (KPMG and Shelter, 2014). The housing shortage is not limited to a single area, however due to the migration to London and the South East, the demand for housing here has increased. This shortfall in house building has had a major impact on house prices. Excluding London and the South East, UK house prices increased by 6.4% in the 12 months to May 2014. This is compared to a rise of 20.1% in London, 9.6% in the South East and 8.6% in the East during the same period (ONS, 2014a). These figures of house price inflation are much higher than the European average of 1.1%.

It is clear that there are major challenges in providing affordable housing, transportation infrastructure and employment for London's growing population (WSP, 2013). Recent projections by the Office of National Statistics (ONS) highlight that the population of London is to grow by 13% in the next ten years by 2022, with the latest estimates indicating

that by 2031 the population may exceed 10 million (ONS, 2014b, NLA, 2014). However, there is currently a substantial discrepancy between the increasing size of the population in London and the volume of housing available. It comes as little surprise then that one of the key messages taken from the Mayor's *2020 Vision* is tackling 'perhaps the gravest crisis the city faces – the shortage of housing' (Johnson, 2013). According to the 2011 Census, an estimated 40,000 new homes are needed every year to support the growing population, a figure that is failing to be generated (Hill, 2013). However, this figure is continually inflating, with new figures suggesting that more like 50,000 new homes are needed (Savills, 2014). Furthermore, even with the projected average of just under 35,000 homes are planned to be built every year for the next 5 years, there would still be a shortfall of 15,000 residential units.

## 2. Methodology

This study focuses on the concept of overbuilding, and calculating the potential solution this may provide to the chronic housing shortage currently faced throughout the UK. This concept is based on the multi-use developments that have been built across the world, including the Beekman Building, New York and The Plimsoll Building, London. This looks at taking existing public sector buildings and redeveloping them with public sector facilities on the lower floors and residential units above. This would involve public and private sectors working collaboratively together to provide the residential units that are needed and to improve existing public sector infrastructure.



Figure 1WSP's Artist's Impression of Overbuilding  
NHS Hospital (WSP, 2014a)

## **2.1 Planning Permissions**

The Department of Communities and Local Government currently is in charge of implementing ‘the planning guidance within which the plan for Greater London is developed’ (Fainstein, 2008). The Mayor of London is then responsible for development under the guidance of The London Plan. The London Plan is the ‘overall strategic plan for London, and sets out a fully integrated economic, environmental, transport and social infrastructure framework for the development of London until 2031. The plan has the power to determine the shape of the London skyline, by constricting tall buildings to areas that are deemed good opportunities and that has the required transportation infrastructure needed to support the higher development density (GLA, 2012).

### **2.1.1 Height Restrictions**

London has multiple guidelines in place that are specific to tall buildings, including the English Heritage and CABE’s Guidance on Tall Buildings. The purpose of this document is to enable informed decisions to be made in evaluating planning applications for tall buildings, and is endorsed by the government (Heritage and CABE, 2007).

Building height restrictions within London are determined on a borough basis. Whilst some areas welcome the development, others are deemed more sensitive to them, and other areas are considered to be inappropriate. In addition to this, one of the main concerns within London and the height of new developments are adhering to the protected vistas.

### **2.1.2 Protected Vistas**

Outlined in the revised 2012 London View Management Framework (LVMF), there are currently 27 protected views of London’s landmarks from different vantage points across the city. In addition to this, 13 viewing corridors are protected and require additional consultation when new plans and designs are being considered within these areas, Figure 2. Ultimately, this framework protects the views of both St Paul’s Cathedral and the Palace of Westminster as seen from London’s larger parks.

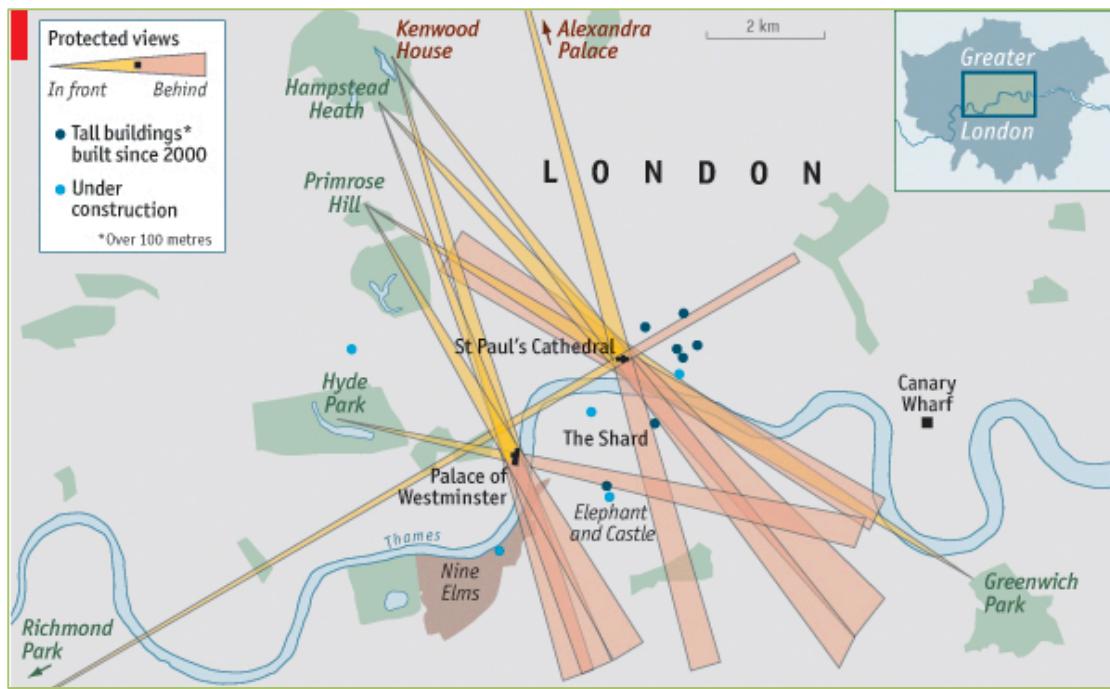


Figure 2 – London’s Protected Views (The Economist, 2014)

## 2.2 Data

Property data was obtained in the form of point data from a number of different sources including ‘data.gov.uk’, ‘data.london.gov.uk’ as well as local authority websites. An analysis of the availability of land and property data for London highlighted that there was a varied level of data available regarding public sector property for each of the boroughs. It was clear that of the 33 boroughs, Lambeth provided a large volume of suitable data, and as such this borough formed the case study area for the rest of the study. This data availability was summarised within Table 1, which indicates the data available directly from Local Authorities. Data regarding GP practices, leisure centres, hospitals, and schools were available nationwide and therefore for all boroughs, as such these have not been included within the matrix. This was further mapped by WSP, Figure 3.

In addition to the point of interest data, a base map was needed of building footprints. It was decided that OS MasterMap (OSMM) would be used, which provides a good level of accuracy of building footprint areas needed to complete the area calculations. Once the data had been obtained from the relevant sources, a spatial join (intersect) was completed within ArcMap. This joined the point of interest point data to the polygon building data of OSMM.

Table 1 – Data Matrix showing data available from Local Authorities (Accurate as of 20<sup>th</sup> August 2014)

Borough	Libraries	Police Stations	Fire Stations	Council Buildings	Places of Worship	Recycling Banks	Conservation Areas	Protected Line of Sight
Barking and Dagenham								
Barnet								
Bexley								
Brent								
Bromley								
Camden								
City of London								
Croydon								
Ealing								
Enfield								
Greenwich								
Hackney								
Hammersmith and Fulham								
Haringey								
Harrow								
Harvering								
Hillingdon								
Hounslow								
Islington								
Kensington and Chelsea								
Kingston								
Lambeth								
Lewisham								
Merton								
Newham								
Redbridge								
Richmond								
Southwark								
Sutton								
Tower Hamlets								
Waltham Forest								
Wandsworth								
Westminster								

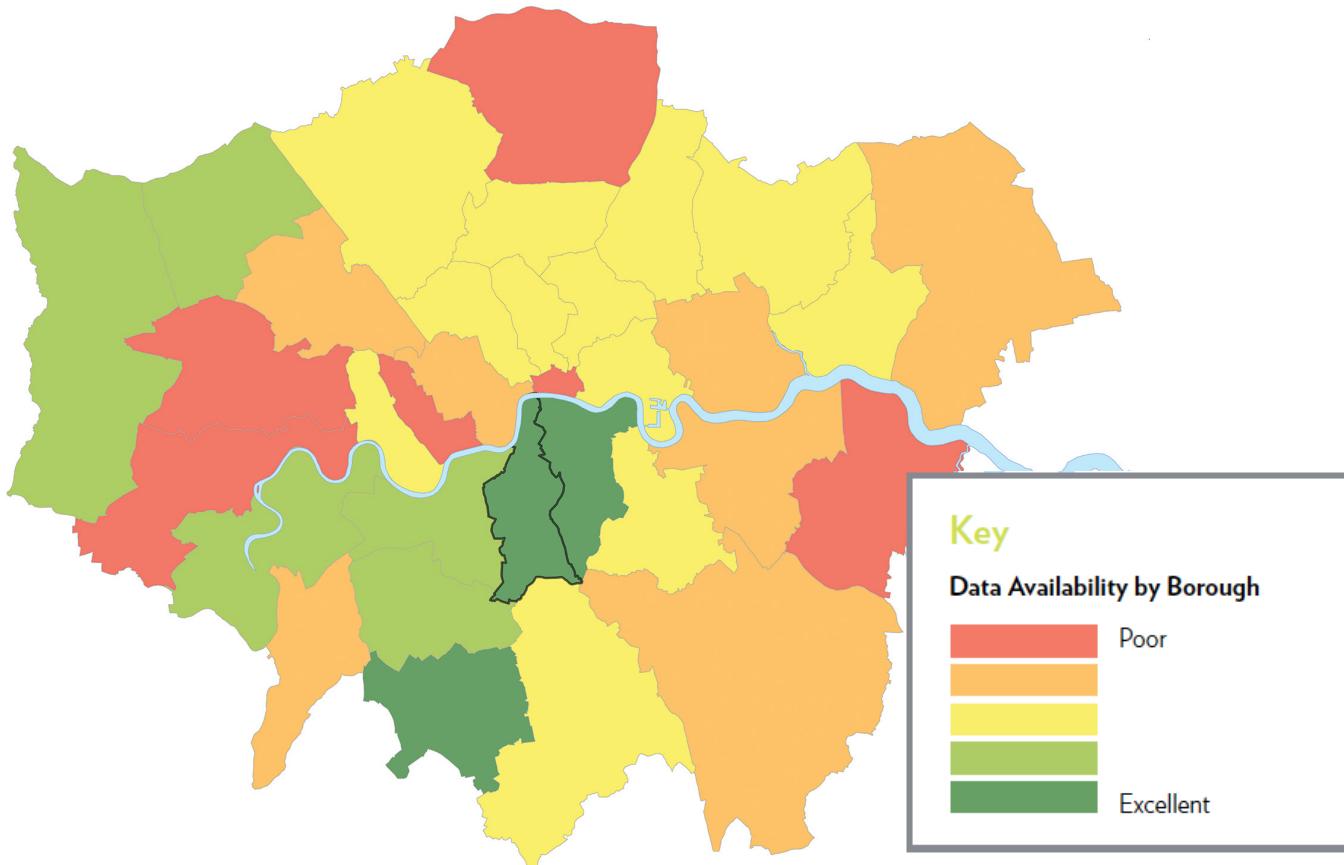


Figure 3 – Data availability mapped across London boroughs (WSP, 2014b)

### 2.3 Decision Support Tool

Web mapping applications have gained in popularity in recent years. Many more sites are using maps within their system as a way of visually representing necessary data and information to their users. For this study it was decided that a decision support tool would be created in the form of an interactive web map application. The integration of both the advantages of a web mapping application and the functionality of a GI system would allow for a more dynamic tool to support the decision making process. Due to the integration of different teams and disciplines within WSP for this project, meant that there were differing views on the importance and development potential of the various data layers. This meant that a flexible system was required in order for them to explore the data as necessary.

### 2.3.1 System Architecture

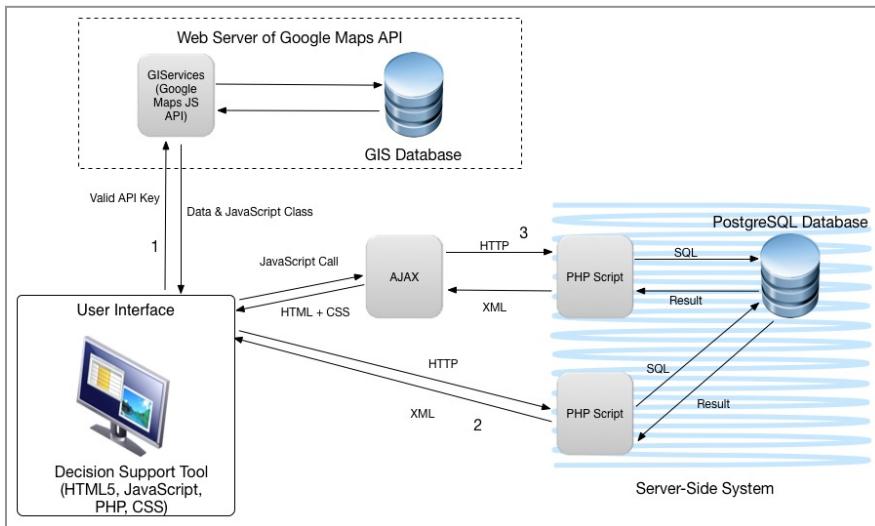


Figure 4 – Decision support tool system architecture

There are three main functions within this tool:

Load the Google Maps JavaScript v3 API (Process 1)

Load layers when toggle button is pressed (Process 2)

Compute the spatial query (Process 3)

The resulting decision support tool was created using a combination of different programming languages including: HTML5, Java Script, PHP, CSS and SQL.

## 3. Results and Analysis

### 3.1 Area Calculations

Table 2 is a summary of the area calculations that were obtained from the point of interest and OSMM building spatial join. There are currently 332 buildings in Lambeth that have been identified as being owned by Central Government, GLA or Local Authority, 78 of which have a listed status associated with them. This total of 332 does not take into account all of the buildings classified as a hospital, with only a single unit being counted for each of these sites. Table 3 represents the area calculation figures in terms of residential units, as estimated by WSP (WSP, 2014b). These are computed by estimating that a single residential unit would be 100 m<sup>2</sup>.

Table 2 - Summary of Area Calculations for Lambeth

	Building Footprint Single Storey Area (m <sup>2</sup> )  (minus listed buildings)	6 Extra Storeys Area (m <sup>2</sup> )  (minus listed buildings)	12 Extra Storeys Area (m <sup>2</sup> )  (minus listed buildings)
Sub-Total	264,134	1,584,804	3,169,608
Total Minus Duplicated Buildings	237,089	1,557,759	3,142,563

Table 3 – Residential Unit Estimates for Lambeth based on Area Calculations and a single residential unit measuring 100m<sup>2</sup> (WSP, 2014b)

Residential Unit WSP Estimates	6 Extra Storeys	12 Extra Storeys
Sub-Total	15,848	31,696
Total Minus Duplicated Buildings	15,578	31,426

Based on Lambeth, estimates of London's full municipal land overbuilding potential for all categories of municipal land have been calculated and mapped by WSP. This has been derived from scaling the Lambeth total potential to each borough based on the proportion of total population of each borough. This uses the assumption that supply and demand for municipal amenities are proportional to population.

Using single storey additions to all municipal buildings would provide 639 hectares of developable space.

- Six storey additions to all buildings would provide 4200 hectares
- 12 storey additions to all buildings would provide 8475 hectares

WSP have therefore calculated a mixed height solution (half six and half 12 storeys) would provide 6337 hectares. On this land, based on 100m<sup>2</sup> a unit, you could build 633,700 residential units.

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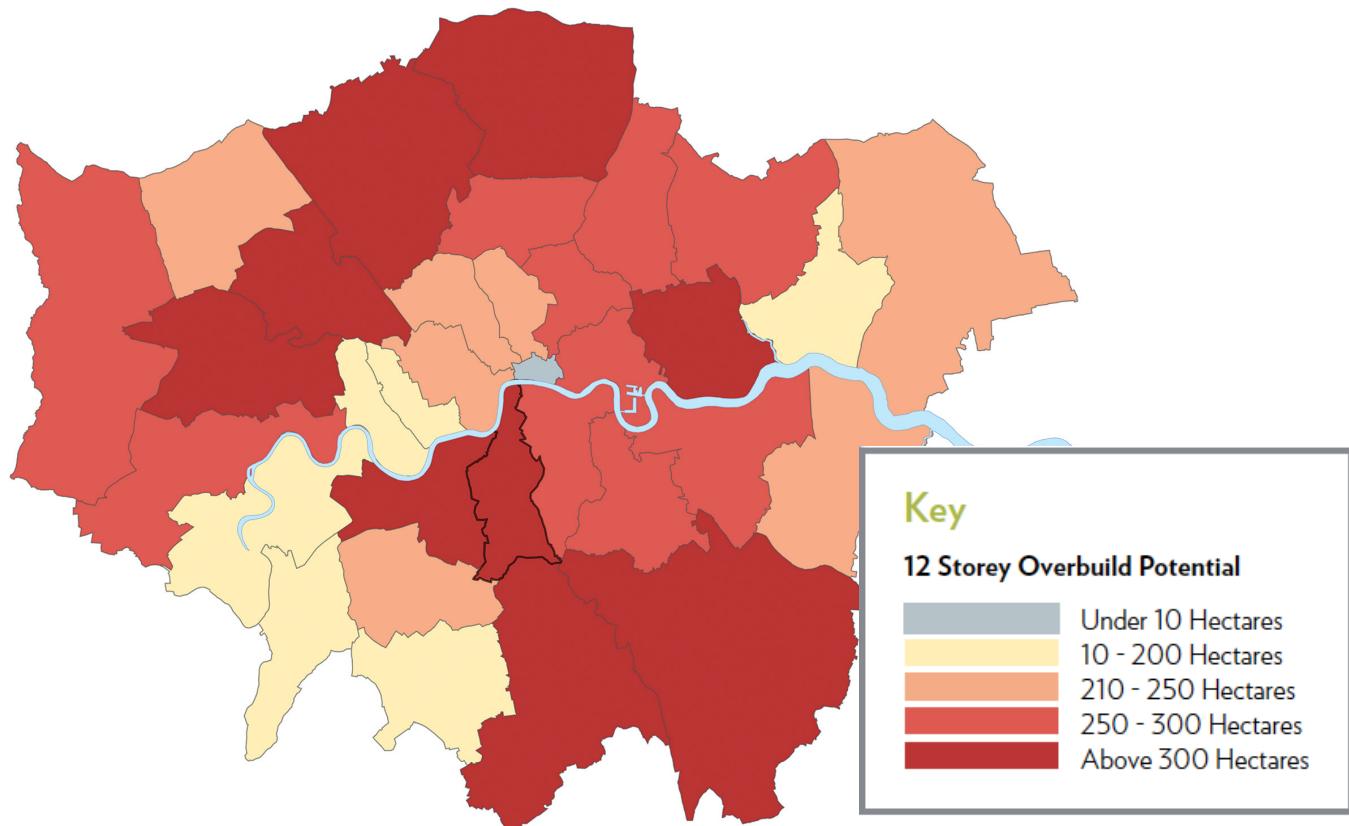


Figure 5 – Estimated 12 Storey Overbuilding Potential of London (WSP, 2014b)

### 3.2 Decision Support Tool

The web mapping decision support tool that has been presented is within the prototype stage of its development. This means that the basic functionality of the tool has been created, however there are a number of additional elements and functions that could be included.

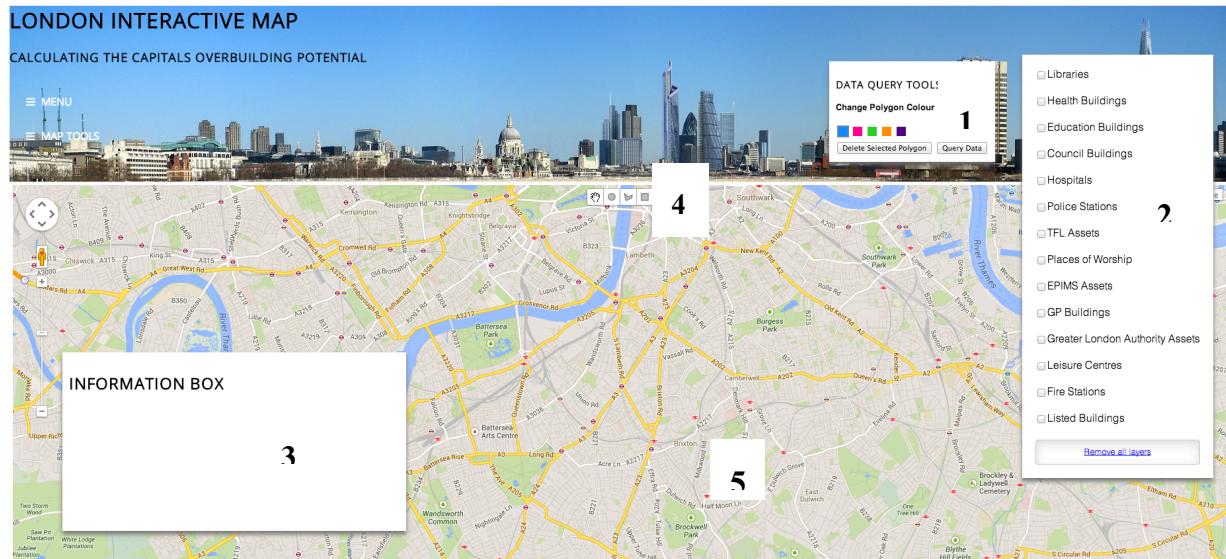


Figure 6 – Screen Shot of the Final Decision Support Tool

1. These are the Data Query Tools. From here the users is able to change the polygon colour and delete a polygon when selected. An additional button has been placed here, ‘Query Data’ which is currently not operational but would conduct the query when clicked rather than when the polygon shape was drawn.
2. This is the map layers toolbar. Layers can be added to the map by clicking on its associated button
3. This is the information box that is updated when the building in polygon query is started
4. There are the drawing tools. The button is the necessary drawing tool to construct the polygon.
5. This is the map created from the Google JavaScript APIv3

### 4. Discussion

From these results, it can be seen that this study has achieved its aim of investigating the overbuilding potential for Lambeth. The most significant challenge in this project has been the access to open data. Although Government had requested complete data transparency as outlined in the Local Government Transparency Code 2014 (Department for Communities and Local Government, 2014), gaining accurate information regarding the location and size of land and buildings owned by local authorities across London has been extremely difficult.

Although Lambeth’s data is more complete than most other sources, it could be improved further by providing metadata relating to the method of data collection. Detailed metadata to support the data that is published is crucial for the public to be able to understand the quality

and completeness of the data.

Making specific residential unit calculations at this stage is very difficult, as it is necessary to gain accurate building height data, as well as specific building floor usage for each of the points of interest. In addition to this, making calculations in terms of residential units could be misleading, as architects and designers would determine total property size at case specific stages within future site development. What this project has done is to present a new concept to solve the housing crisis, highlighted the missing data sets, calculated building area total for the data available and visualised this data in an interactive decision support tool.

## **5. Conclusion**

For the area of Lambeth, the next stages would be looking at buildings on a case-by-case basis in order to accurately obtain calculations as to the number of residential units each building could provide. To be able to accurately calculate areas for the rest of London would require that more datasets become available.

It is clear that there is not going to be an overnight fix to the situation, nor will that one solution on its own solve the housing problem. However, it has highlighted an opportunity that may be available, and that has a strong foundation for further research and development. Of course, it is unrealistic to state that all the land and properties that have been identified should be and will be overbuilt with housing. The main point that has been raised is that there is public land and property available, some of which could benefit from collaboration with private companies. By ensuring that data regarding governmental and local authority assets are kept up-to-date and at a specific standard level of detail will ensure transparency is achieved and potential assets can be identified. Maintenance of the datasets is key. This is essential for the continued development of this study from borough level to covering the whole of London, the South East and the rest of the UK.

## 6. References

- DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT 2014. Local Government Transparency Code 2014. In: GOVERNMENT, D. F. C. A. L. (ed.). London.
- FAINSTEIN, S. S. 2008. Mega-projects in New York, London and Amsterdam. *International Journal of Urban and Regional Research*, 32, 768-785.
- GLA 2012. London View Management Framework: Supplementary Planning Guidance. In: AUTHORITY, G. L. (ed.). London.
- HERITAGE, E. & CABE 2007. Guidance on tall buildings. In: HERITAGE, E. & CABE (eds.).
- HILL, D. 2013. London housing crisis: what is it, exactly? *Dave Hill's London Blog* [Online]. Available from: <http://www.theguardian.com/uk-news/davehillblog/2013/oct/28/london-housing-crisis> [Accessed 28th October 2013].
- JOHNSON, B. 2013. 2020 Vision - The Greatest City on Earth: Ambitions for London. In: AUTHORITY, G. L. (ed.). London.
- KPMG & SHELTER 2014. Building the homes we need: A Programme for the 2015 Government. In: KPMG (ed.). Online.
- NATIONS, U. 2012. World Urbanization Prospects: The 2011 Revision. New York: Department of Economic & Social Affairs.
- NLA 2014. London's Growing Up! - NLA Insight Study. In: NLA (ed.). London: NLA - London's Centre for the Built Environment.
- ONS 2014a. Release: House Price Index, May 2014. Online
- ONS 2014b. Subnational Population Projections, 2012-based projections. In: STATISTICS, O. O. N. (ed.).
- SAVILLS. 2014. London's housing need becomes more concentrated in lower mainstream - Is it time for developers and investors to look beyond prime? Available: <http://www.savills.co.uk/news/article/72418/176668-0/5/2014/london-s-housing-need-becomes-more-concentrated-in-lower-mainstream---is-it-time-for-developers-and-investors-to-look-beyond-prime->.
- THE ECONOMIST 2014. The ascent of the city. *The Economist*. Print.
- WSP 2013. Delivering the London 2020 Vision.
- WSP 2014a. Build Homes Above Hospitals to Solve London's Housing Shortage. In: GROUP, W. (ed.).
- WSP 2014b. BUILDING OUR WAY OUT OF A CRISIS - CAN WE CAPITALISE ON LONDON'S PUBLIC ASSETS TO PROVIDE HOMES FOR THE FUTURE?

## 7. Biography

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