A Guide to Census Geography

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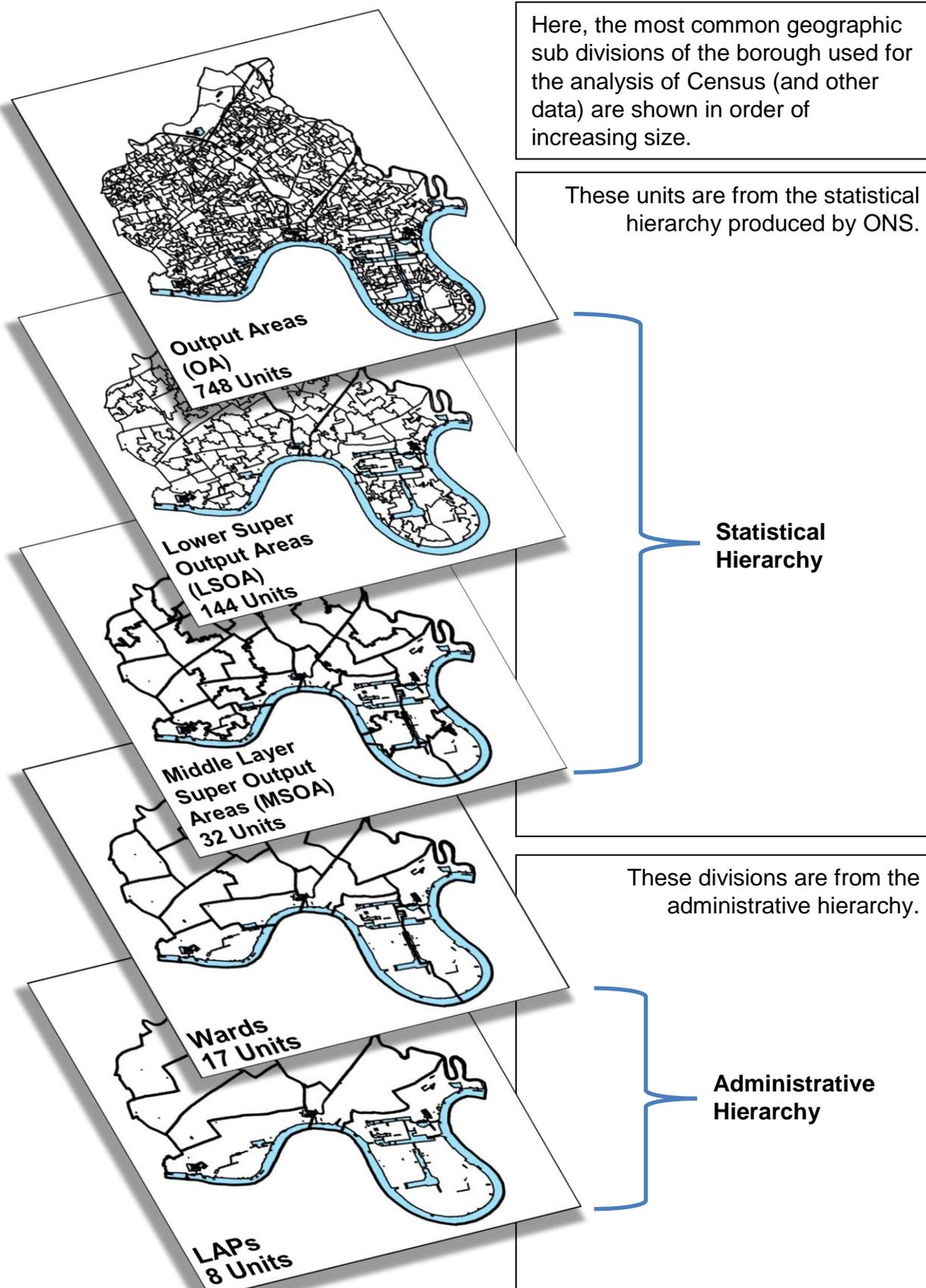
This guide gives a brief overview of the main census geographical units that are available to users of census data. The focus will be on what is known as the 'statistical hierarchy' (which may be unfamiliar to some), how the units apply to the borough, relate to one another, and also relate to the more familiar geographies (i.e. wards or LAP's).

This guide also covers the changes that have been made to the available geographical units between the 2001 and 2011 census to accommodate population change, and provides (in appendix B) a lookup table for aggregating 2001 and 2011 census data to a common geography for comparability.

Appendix A features an interactive map of Tower Hamlets where the reader can select different geographies to be shown (either singularly or together) to see how they relate to the borough and to each other. **This feature can only be used when viewing this guide in Adobe reader.**

Commonly used geographies for sub borough analysis of census data

Here, the most common geographic sub divisions of the borough used for the analysis of Census (and other data) are shown in order of increasing size.

These units are from the statistical hierarchy produced by ONS.

Statistical Hierarchy

Output Areas (OA) 748 Units

Lower Super Output Areas (LSOA) 144 Units

Middle Layer Super Output Areas (MSOA) 32 Units

These divisions are from the administrative hierarchy.

Administrative Hierarchy

Wards 17 Units

LAPs 8 Units

1 About this Briefing

Census data is available at a variety of geographies ranging from the national and regional, down to single output areas (the smallest possible unit).

This guide will focus on how these geographies apply within Tower Hamlets, how they relate to one another and how they have changed between 2001 and 2011.

Other geographical units are made available by ONS such as workplace zones and parish areas which are not covered in this document. More technical guidance on national census geography and information about the other geographical units can be found at the following address.

http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/census/census.html

2 Sub Ward Geography

For most analysis, ward level data will be sufficient; however, for some specific purposes this will not be the best geography to use. This can be because of the large variance in ward area and population sizes, and also because of possible areas of significance being obscured by the effect of averaging over larger areas.

There are also cases where analysis is required for bespoke areas that are not covered by the existing geographical units. In these instances a best fit area can be created by aggregating the smaller geographical units into an area where the borders match the area of interest as closely as possible. An example of this is shown in Appendix B.

3 The Geographical Hierarchies

When obtaining Census data below local authority level, a user will usually be asked to choose one of either the statistical hierarchy or the administrative hierarchy.

- ### Administrative hierarchy

The administrative geographical hierarchy will consist of areas that will be familiar to most users. These range from national and regional data, down through local authorities and then to wards, which are the smallest geographical unit in this set.

- ### Statistical hierarchy

The statistical hierarchy also ranges from the national down to local authority, but will exclude wards and move on to some geographical unit types which users may not be familiar with. These units were created especially for the dissemination of 2001 census data and are each described in turn in the following section.

4 The Statistical Hierarchy

- **Super Output Areas (OAs)**

These are the smallest statistical unit available from the census and were created from postcode sectors. They were originally designed to have a minimum of 100 residents and 40 households with a target of 125 households (based on 2001 census data).

OAs are irregular in shape and were not intended to represent neighbourhoods, though they did attempt to be socially homogenous in terms housing tenure and dwelling type (based on the 2001 census).

- **Lower Super Output Areas (LSOAs)**

LSOAs were constructed out of OAs and were designed to contain 1,000 to 3,000 residents and 400 to 1,200 households. Both OAs and LSOAs can be aggregated up in to either wards or MSOAs.

The map below shows how both LSOAs and OAs fit within the ward of St Dunstan's & Stepney Green.

Fig 1: OAs, and LSOAs in St Dunstan's & Stepney Green
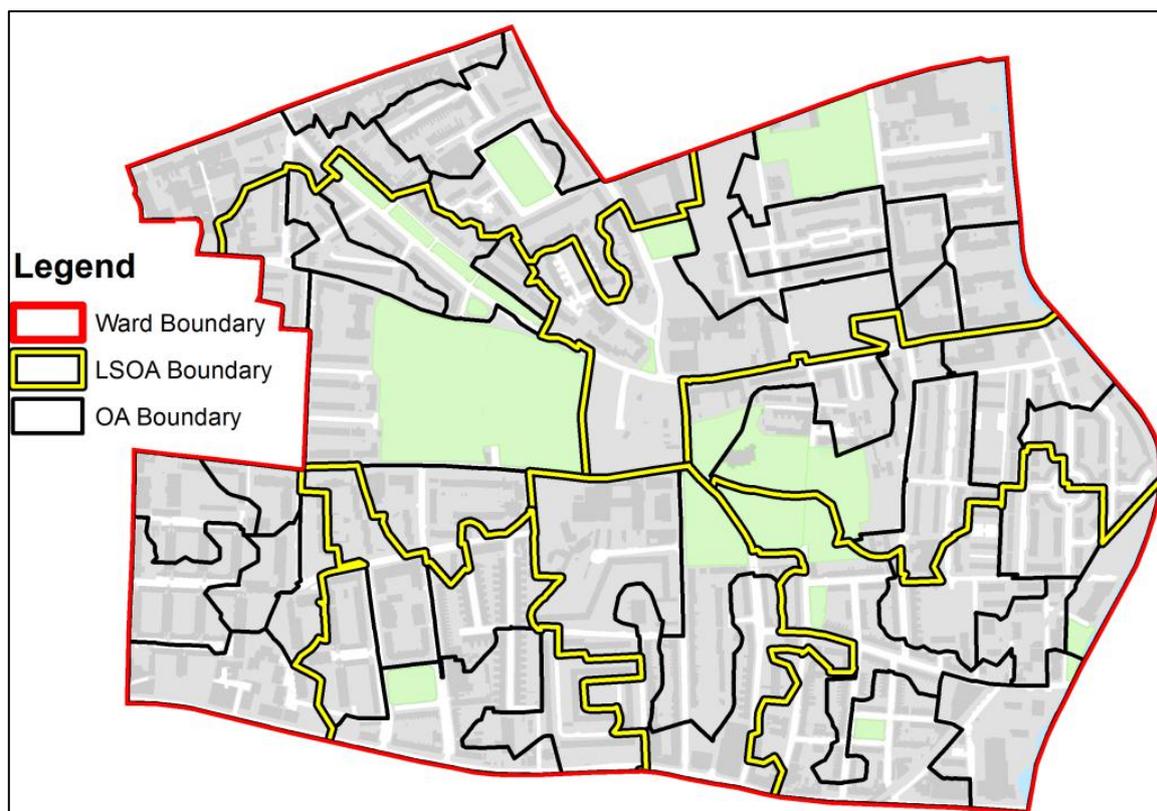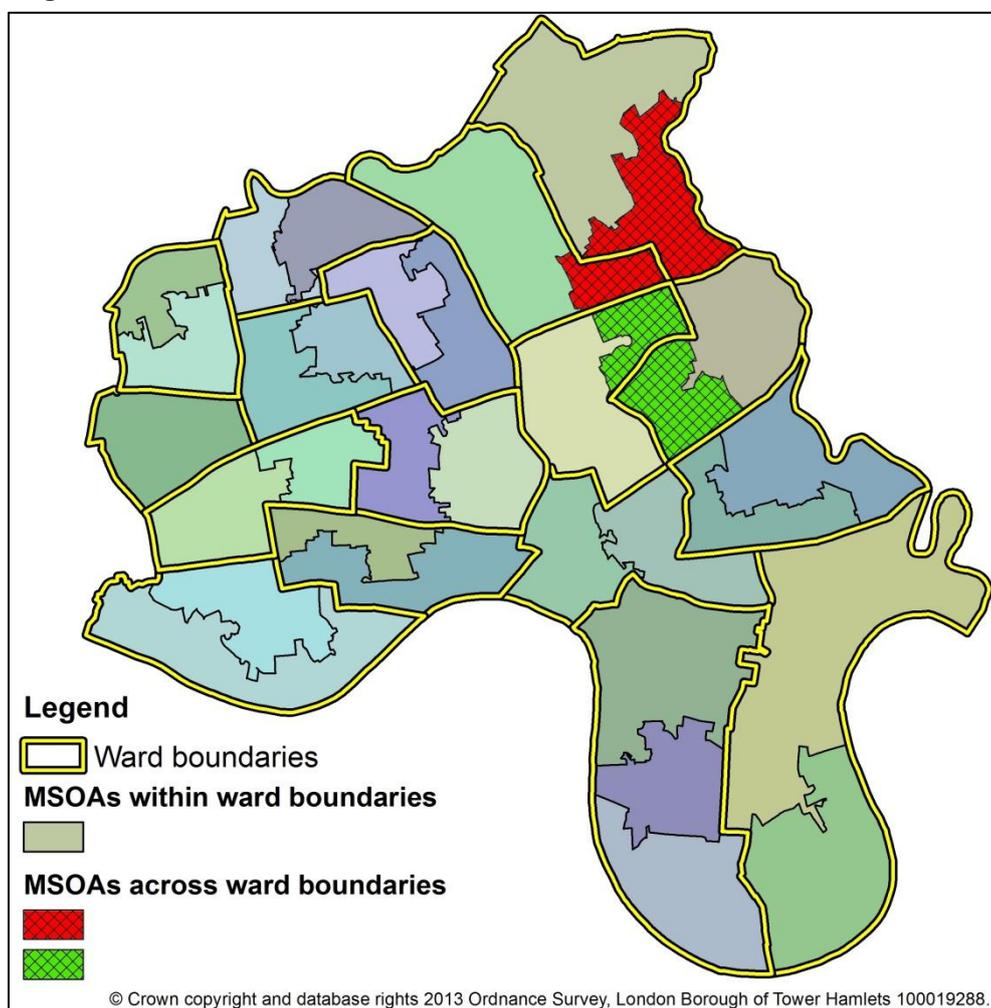
- **Middle Layer Super Output Areas (MSOAs)**

MSOAs are constructed from groups of LSOAs and are designed to contain 5,000 to 15,000 residents and 2,000 to 6,000 households.

It is at this point that the statistical and administrative geographies diverge. Whilst MSOAs are smaller than wards, they do not fit into them because some MSOAs span across multiple wards in the north east of the borough.

MSOAs can, however, be grouped together to form LAPs

The map below shows the MSOAs in Tower Hamlets in relation to the wards, with the two MSOAs that sit across ward boundaries highlighted.

Fig 2: MSOAs in Tower Hamlets

Legend
Ward boundaries
MSOAs within ward boundaries

MSOAs across ward boundaries

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5 Nesting

Nesting is where the smaller geographical units (such as OAs) can be simply added together to form the larger units (such as MSOAs).

The following table shows where this is possible, each geographical unit in the table will nest (fit) in to the layer directly above, except for where there is a split between the administrative and statistical units. Nesting in this case is indicated by the arrows.
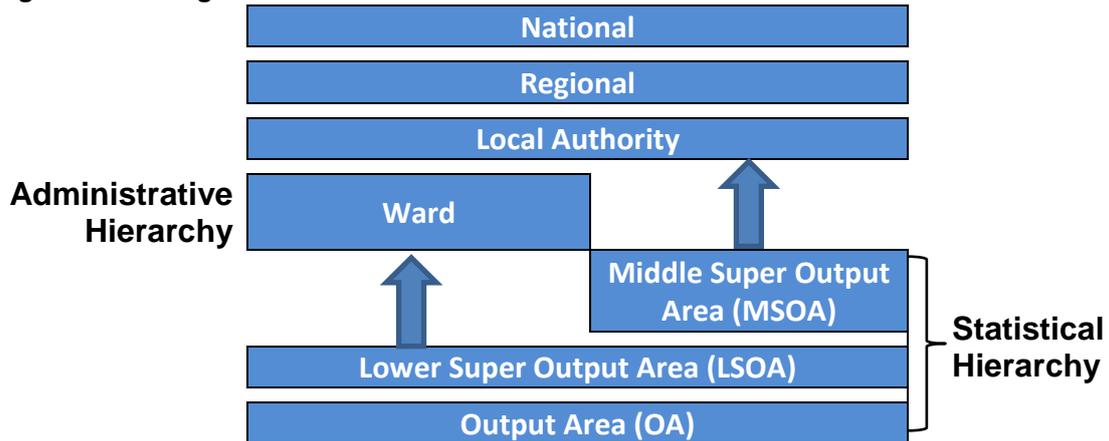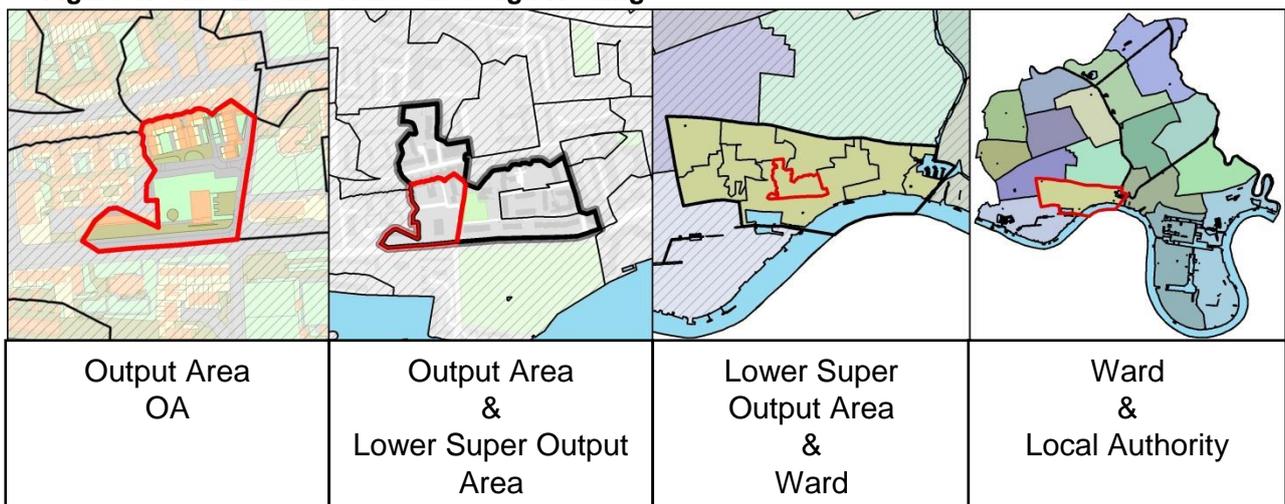
Figure 3: Nesting

Figure 4 shows how an Output Area (in Shadwell) forms a part of its parent LSOA, which in turn forms a part of the surrounding ward.

Figure 4: OA – LSOA – Ward - Borough Nesting

Output Area OA	Output Area & Lower Super Output Area	Lower Super Output Area & Ward	Ward & Local Authority

6 Geographical Unit Attributes

To get an idea of the relative size of the different units, and the possible range of values found within each type, the following table gives a breakdown of the maximum, minimum and average population size for each unit type using 2011 Census data.

Figure 5: Area Attributes in Tower Hamlets

Geographical Unit	LBTH 2011 Census			
	Number of Units	Minimum Population	Maximum Population	Average Population
Ward	**17**	**10,286**	**23,084**	**14,947**
MSOA	32	5,705	12,678	7,940
LSOA	144	1,076	2,852	1,765
OA	748	91	1,055	340

7 Disclosure Control and Small Geographies

ONS have applied disclosure control to the Census releases, which is intended to prevent individuals from being identifiable from very small numbers within the data. This will not be a problem at the larger geographies, but can be relevant when looking at LSOA and OA level.

When data is sought relating to specific characteristics of people and/or households the cohort in question may be quite small, if this data is then also sought at small geographies, the numbers can be so small as to come up against disclosure control. If this is the case ONS will either not publish the census data at that level, aggregate groups to reduce detail or randomly swap some records in the census table. This means that very small numbers in the census relating to a just a few individuals or households will not be robust.

Further technical detail on the ONS disclosure control policy can be found here. http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/2011-census-user-guide/quality-and-methods/methods/statistical-disclosure-control-methods/index.html

8 Changes Between 2001 and 2011

To accommodate population growth since 2001 ONS has made several changes to the statistical geography for 2011. In Tower Hamlets (which was the fastest growing local authority in England & Wales) this has led to increases in the number of units at each level of geography. These changes are shown in the table below.

Figure 6: Changes to the Number of Statistical Units in Tower Hamlets

| Geography	2001	2011	Change
MSOA	31	32	+1
LSOA	130	144	+14
OA	627	748	+121

These changes mainly consisted of splitting old 2001 areas in to new multiple areas for 2011, to accommodate the change in households and resident population. At LSOA level there was also a merger of two areas from 2001 in to a single LSOA for 2011. The changes for each level of geography are set out in more detail below.

Figure 7: OAs in LBTH

- **Output Areas (OAs)**

  - 59 Output Areas from 2001 were split to form 180 new Output Areas for 2011.

  The net effect of this change was to increase the number of OAs from 627 units, to 748 units in 2011.
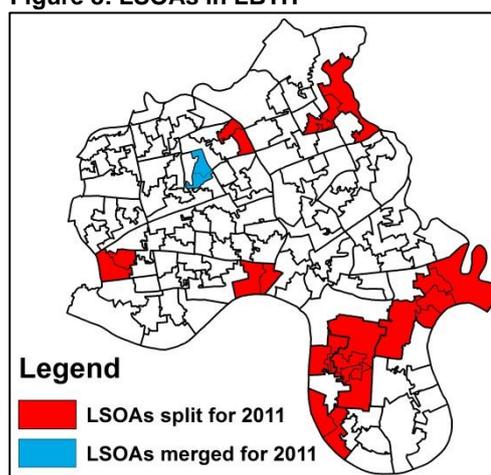
Figure 8: LSOAs in LBTH
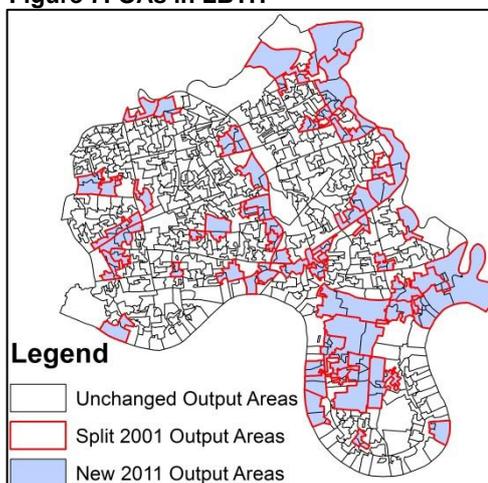
- **Lower Super Output Areas (LSOAs)**

  - Two 2001 LSOAs in Bethnal Green South were merged in to one larger LSOA for 2011

  - Eight 2001 LSOAs around the borough were split to form twenty three smaller LSOAs for 2011

  The net effect of these changes was to increase the number of LSOAs in the borough from 130 to 144.
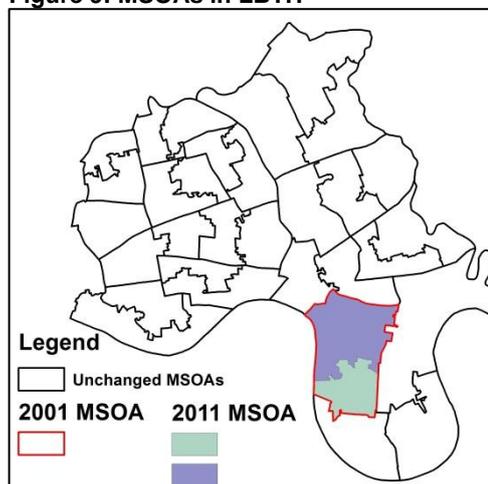
Figure 9: MSOAs in LBTH

- **Middle layer Super Output Areas (MSOAs)**

  - One 2001 MSOA in Millwall was split to become two 2011 MSOAs.

  The net effect was to increase the number of MSOAs to 32

9 Comparability Between the 2001 and 2011 Census Areas

Because of the changes above, the 2001 and 2011 census data at geographies smaller than wards are not directly comparable on a like for like basis. Maps of 2001 and 2011 data can still be compared side by side, but if a value needs to be produced which quantifies the amount of change in an area then some additional work is required.

To artificially split the 2001 data to match the 2011 geography would introduce some uncertainty in to the figures whatever the criteria used to achieve this, and so the most robust method for achieving comparability is to aggregate areas to a common level. Some geographic detail is lost as smaller 2011 areas are added together to match larger 2001 areas (and vice versa), but the resulting data will be comparable and will be exact.

For some levels such as OAs and MSOAs this is simply achieved by adding up the new 2011 areas to match the 2001 areas that were split. The data can then be represented and analysed at the 2001 geography.

For LSOA level the procedure is similar, but because of the merger of two LSOAs for 2011, neither the 2001 or 2011 geography is suitable. In this case a third composite geography is needed to analyse and present the data. This composite geography is simply the 2001 LSOA geography with the merged 2001 LSOAs substituted with the resulting single 2011 LSOA.

A table showing the LSOAs and MSOAs that would need to be aggregated for comparable data sets is given in the appendix. This is not possible for OAs because of the large number of changes.

10   Code structure

All of the Census data areas are represented by codes, and LSOAS and MSOAs also have names. The names given to these areas are hierarchical and show parent/child relationships between the levels of geography (i.e. LSOA 'Tower Hamlets 010A' will be a sub area of MSOA 'Tower Hamlets 010').

OAs do not have names, and the codes associated with them do not give any clue as to which of the larger units they are within. However, when Census data is obtained by OA, each area record will also have a reference to its parent LSOA and MSOA. The codes themselves have a prefix which denotes which level of geography they are, ranging from E00 (OAs) up to K02 (the United Kingdom).

Figure 10: Area Code Examples

Geography	Prefix	Code Example	Name Example
Local Authority	E09	E09000031	Tower Hamlets
Ward	E05	E05000573	Bethnal Green North
MSOA	E02	E02000873	Tower Hamlets 010
LSOA	E01	E01032787	Tower Hamlets 011F
OA	E00	E00167180	N/A

11   Sources

Census data at all of these geographical levels and others can be obtained directly from the ONS website.

http://www.ons.gov.uk/ons/guide-method/census/2011/census-data/index.html

However, this site can be hard to navigate and other more simple options are available. These are:

- http://www.nomisweb.co.uk/

Under the detailed statistics option on the right (the 'wizard' and 'advanced queries') allows you to download the smaller geographies data. This can be for individual units and all of the units within a group of, or a single local authority. Nomis also hosts other non-Census data which can also be obtained at LSOA level.

- http://www.neighbourhood.statistics.gov.uk/dissemination/

The Neighbourhood Statistics site allows you to view individual geographical areas in turn, or download data for all of the geographical units in a region in one go. This is found under the option 'topics'. This site also hosts other non-Census data at the smaller geographies.

- http://data.london.gov.uk/

The GLA Datastore has Census and other data available down to LSOA, most of which is already presented graphically as well as in data tables. A good example of this is the LSOA Atlas which can be found here:

http://data.london.gov.uk/datastore/package/lsoa-atlas

12   Potential Ward Changes

The Local Government Boundary Commission for England produced a set of proposals for new wards in the borough on the 25th March 2013. These are currently awaiting parliamentary approval and then, if granted, will be in place for the 2014 elections.

The proposal is for the borough to consist of 20 wards, with the objective of maintaining electoral equality (the ratio of electors per councillor in each ward) up to 2018.

The ward proposals take no account of census geographical units and so will not fit with the existing geographical hierarchy. Exact census data by these proposed wards will not be possible, and would have to be produced on an approximate fit basis.

The proposals and the methodology behind them can be viewed on the LGBCE site:

http://www.lgbce.org.uk/all-reviews/south-east/greater-london/tower-hamlets-fer

Tower Hamlets - Geographical Units

This map will allow you to select and view the different geographic units to see how they relate to one another. This is done by switching the individual layers on and off in the panel on the left of Adobe reader (by clicking on the'eyebal'l icons).
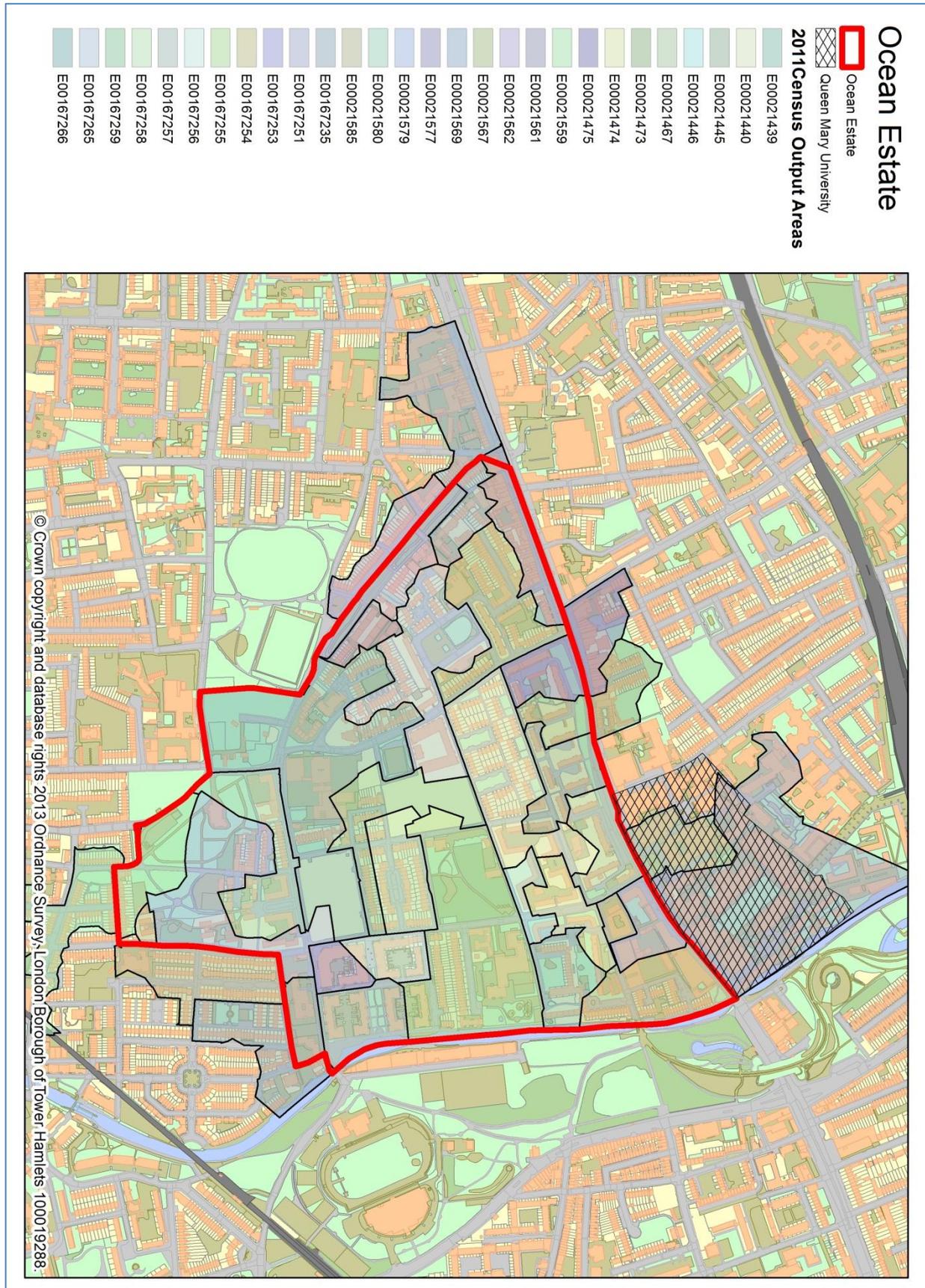
To enable this you may need to selext 'View' from the main menu bar,
then 'Show/Hide'
then 'Navigation Panes'
and finally 'Layers'.
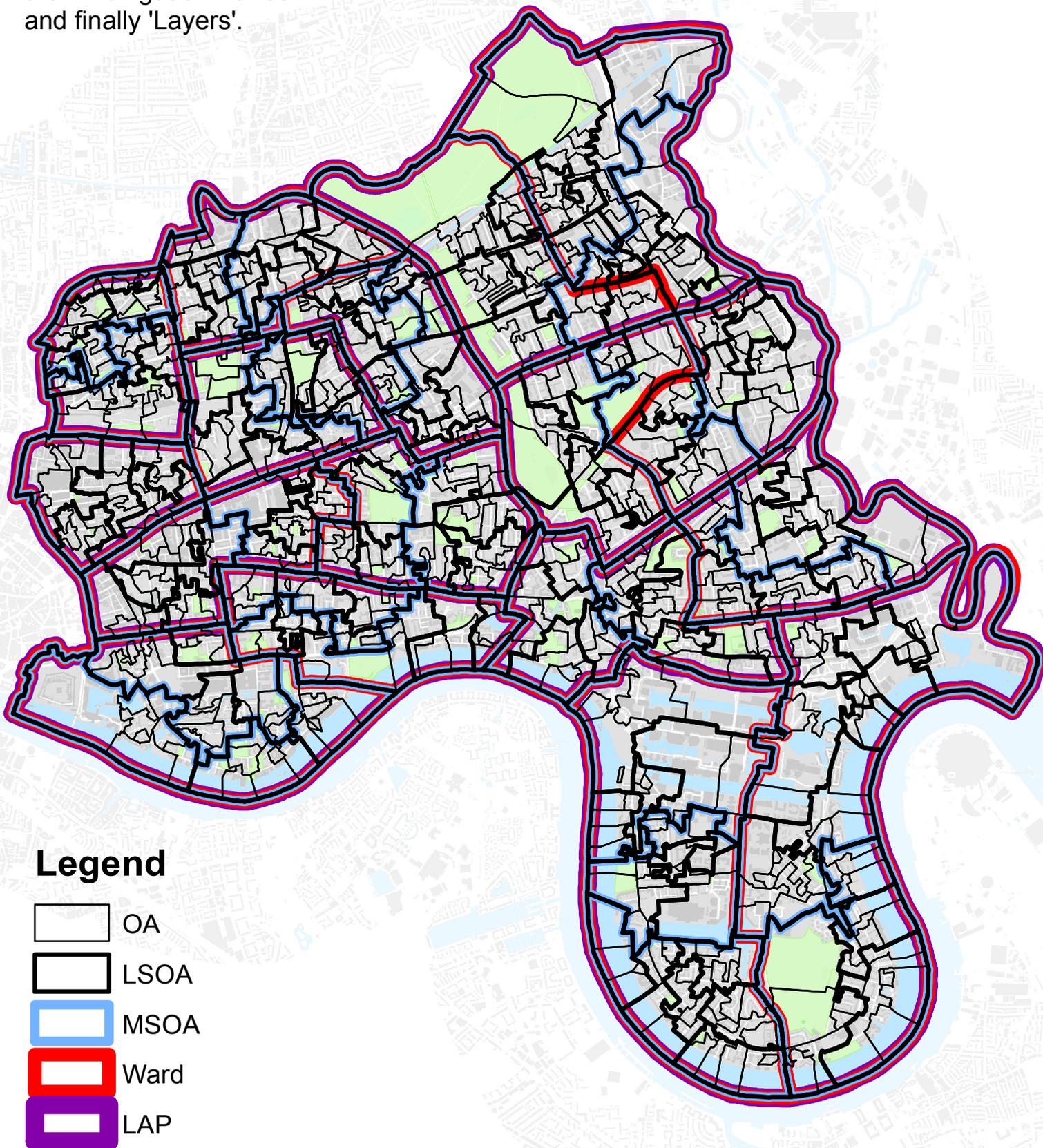
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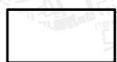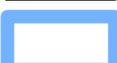
- OA
- LSOA
- MSOA
- Ward
- LAP

14   Appendix B: Example of bespoke area creation using census Output Areas

15 Appendix C: Lookup table for 2001 to 2011 LSOA and MSOA changes

2001 LSOA Code	Composite Geographical units	2011 LSOA Code
E01004210, E01004213	A	E01032787
E01004220	B	E01032776, E01032777, E01032778, E01032779, E01032780
E01004227	C	E01032764, E01032765, E01032784
E01004265	D	E01032785, E01032786
E01004278	E	E01032770, E01032771, E01032772, E01032773, E01032774
E01004279	F	E01032781, E01032782
E01004282	G	E01032775, E01032783
E01004299	H	E01032768, E01032769
E01004320	I	E01032766, E01032767
All other LSOAs remain unchanged		

2001 MSOA Code	Composite Geographical units	2011 MSOA Code
E02000892	A	E02006853, E02006854
All other MSOAs remain unchanged		