



## TEIGNBRIDGE MAPPED DATA- CALCULATING DWELLING COUNTS

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## Section 1. Introduction

The following is an explanation of how dwelling counts were derived for use in allocating EPC emissions in Teignbridge.

At district level there are household estimates from ONS, however, these are not published at the lower levels such as Census Output Areas that we require.

An estimate could probably be made using Ordnance Survey AddressBase or MasterMap, however, these are paid for products.

Fortunately, there are 2 datasets which are available under Open Government Licence that are available without charge:

- Land Registry Index Polygons
- OS Open Map Local

When these datasets are intersected, they provide a first approximation at building outlines.

### 1.1 Land Registry Index Polygons

Land Registry index polygons provide a boundary for each parcel of land ownership. In areas of freehold owner occupation, there is one index polygon for each dwelling.

Areas of tenanted property such as council estates, and leasehold property such as flats need special attention as LR Polygons are not a good guide to the number of households in these areas.

Unfortunately, historic polygons are sometimes included in this dataset, so a point can be within more than one polygon.

See also Technical Details of Land Registry Index Polygons



### 1.2 OS Open Map Local

For the purposes of estimating dwellings there are two important layers:

- Buildings
- Important Buildings

Buildings give an outline for built structures regardless of their occupancy, so for example a row of terraced houses will probably be represented by a single rectangle. Buildings will include many things that aren't dwellings, such as garages, sheds, agricultural, commercial and industrial buildings.

Important buildings are things like monuments, public buildings, post offices; for this purpose we can say that these are not dwellings.

See also Technical Details of OS Open Data



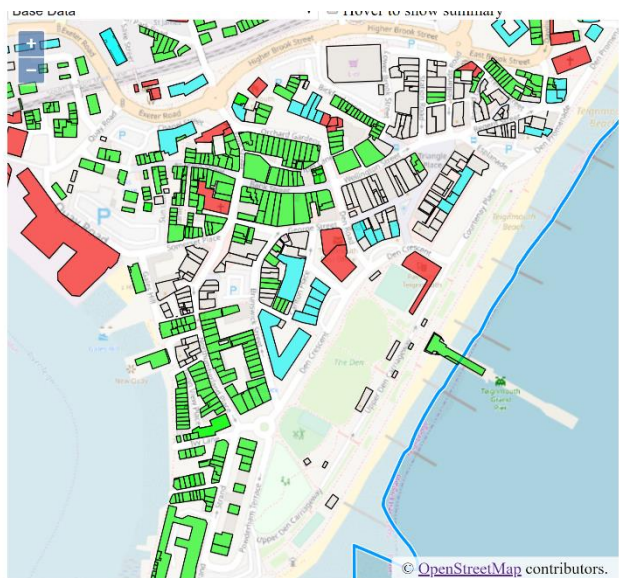


## Section 2. Processing LR Polygons and OS Open Map Local

A table (BUILDINGS\_WITH\_POLY) containing the intersections of LR Polygons and Buildings is constructed by a process which attempts to:

- Intersect LR Polygons with Building polygons
- Eliminate unwanted artifacts and very small buildings
- Remove duplicate building polygons
- Marks important buildings as not dwellings.
- Preserve manual amendments when the dataset is regenerated.

The process described above results in a dataset similar to the following after some manual corrections have been performed:



OSOpenMapLocal

- Buildings with outline only are not dwellings
- Buildings filled with green are single dwellings
- Buildings filled with red are important buildings
- Buildings filled with Cyan are more than one dwelling.

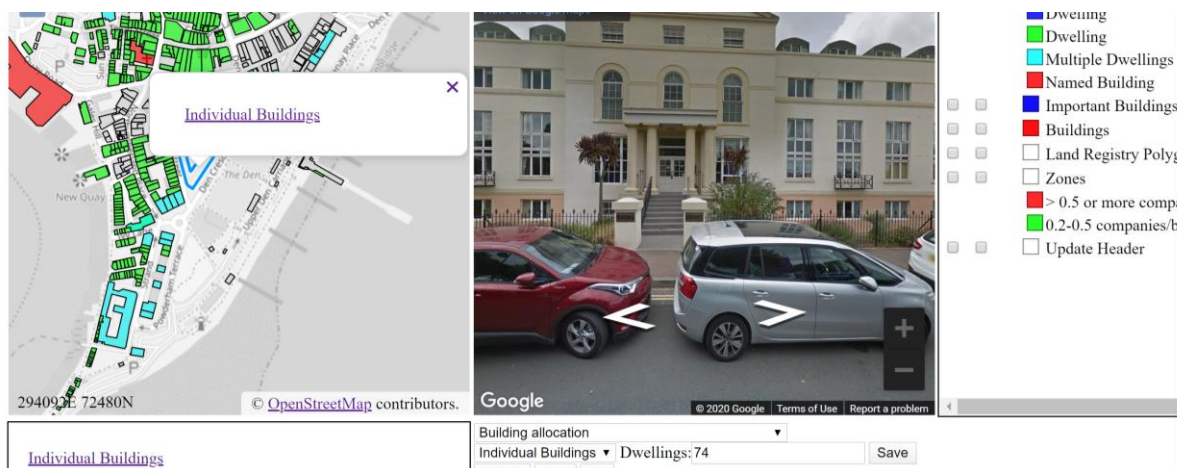
See also Technical description of the Process to produce individual buildings from LR Polygons and

### 2.1 Process for manual amendment

For some areas, such as near town centres, many buildings are not single dwellings and they cannot be classified by the automatic process described above. If this is not corrected any estimates made based on counts of dwellings will underestimate towns.

An efficient manual process has been developed to add attributes to geographic features. In this case alterations to the DWELLINGS attribute on either single buildings or all buildings within a polygon. This process consists of:

- Twin view with map in the left pane and google streetview in the right pane.
- Lightweight server process to serve mapping and apply updates in memory data and record these in a MongoDB database.
- Process to import updates into SQL Server and apply permanently to the next generation of data.



When the user clicks on a building in the left pane, its details are shown bottom centre-right, and a view of the building is shown in the streetview pane. You can then search for clues to determine the number of dwellings such as counting letter boxes, finding a building name and looking up recent sales. Commercial buildings are generally fairly obvious as well.

A pass over all of Teignbridge manually took about 2 days.

Using this tool we estimate the number of dwellings in Teignbridge to be 57,890. This compares with ONS Household estimates of 58,414 for 2019 and 57,287 for 2017.

## 2.2 Technical Details of Land Registry Index Polygons

Land registry index polygons are published as a download for each district at the beginning of the month.

The url for Teignbridge polygons is:

<https://www.gov.uk/government/publications/teignbridge-inspire-index-polygon-data>

From this url a zip file containing a GML format file can be downloaded.

Unfortunately, this file contains IP addresses on the Land Registry's LAN, so a generic program to read this GML will fail. For this reason our own program LRPolyLoader.exe is used to convert this GML file into a geoJSON format file.

This is then loaded into the SQL Server database.

## 2.3 Technical Details of OS Open Data

This dataset is published by Ordnance Survey every 6 months in April and October.

The url for this data is:

<https://www.ordnancesurvey.co.uk/business-government/products/open-map-local>

This data is in Shapefile format, and can be imported into SQL Server using ogr2ogr.exe

Data is supplied in 100km X 100km tiles, we are interested in the SX tile.

After loading this data it is intersected with the Teignbridge boundary after import to produce a TeignbridgeBuildings table.



## 2.4 Technical description of the Process to produce individual buildings from LR Polygons and OSOpenMapLocal

This process is performed by the createBuildingsWithPolygon stored procedure, An outline of this process as follows:

1. Table BUILDINGS\_WITH\_POLY is created.
2. IDs of LR Polygons (INSPIREID) and Building polygons (ogr\_fid) that intersect are inserted into BUILDINGS\_WITH\_POLY.
3. The geometry of each row in BUILDINGS\_WITH\_POLY is formed by intersecting the LR Polygons and Building features joined by ID.
4. The AREA attribute for each row of BUILDINGS\_WITH\_POLY is calculated.
5. Rows of BUILDINGS\_WITH\_POLY with area < 10 are deleted, these are assumed to be unfeasible as dwellings, and are more likely to be either artifacts of the intersection process or things like garden sheds.
6. A spatial index is created on BUILDINGS\_WITH\_POLY
7. The SEED (Point somewhere on the surface) of each BUILDING\_WITH\_POLY geometry is calculated.
8. Buildings whose SEED is null whose geometry is not a Geometrycollection are deleted.
9. GeometryCollections are reduced to polygons or multipolygons, effectively disregarding any points or linestrings that have been created in the intersection process.
10. Seeds for these modified geometries are calculated.
11. A table of possible duplicate buildings is formed containing the buildings whose seed intersects an LR Polygon other than the one that was to create the building.
12. A table of possible duplicate polygons is formed from possible duplicate buildings containing the other LR polygon ID and a count of the number of buildings where this was the other polygon. The possible duplicate polygons table is filtered so it only includes polygons that are used 2 or more times.
13. Buildings whose LR Polygon ID is in the possible duplicate polygons are deleted.
14. The largest building (by ground floor area) in a LR Polygon has its DWELLINGS attribute set to 1.
15. Buildings in the original OSOpenMapLocal data that are not now represented are added to BUILDINGS\_WITH\_POLY as dwellings.
16. Buildings whose geometry is a multi-polygon are separated into a number of separate dwellings.
17. A table of important building seeds is formed.
18. Buildings that contain an important building seed are marked as important buildings and their DWELLING count is set to 0.
19. Any manual corrections that have been stored in the UPDATE\_HEADER and UPDATE\_DETAIL tables are applied to the dataset.