Geography –Scotland's Census 2022
How the Census geographies were created

2022 Frozen Postcode

The Postcode boundaries used to create the 2022 Census Output Areas, 2022 Census Settlements, and 2022 Census Localities. The Postcode boundaries have been maintained over time to take into account the relatively small number of local authority boundary changes there have been since 2011.

More information on Local Authority boundary changes since 2011 can be found in the 2022 Census Supporting Information section of the National Records of Scotland website.

The frozen postcodes are based on the April 2022 Royal Mail Postcode Address File.

2022 Census Settlement

The 2022 Census Settlement boundaries have been created using the Census 2022 frozen Postcode boundaries.

National Records of Scotland (NRS) create Settlement boundaries by categorising Postcodes as either high or low density. A Postcode was defined as high density if at least one of the following applied:

- It had more than 2.1 households per hectare.
- It had more than 0.1 non-residential addresses per hectare; or
- The Census population per hectare exceeds five people.

The threshold densities were set as they were found to give a good approximation to the built-up areas identified in previous Censuses using traditional methods. The second condition was included such that non-residential parts (e.g. industrial estates) of built-up areas could be identified and included.

An additional rule was implemented from the 2016 (non-Census) version, which stated that any Postcodes which fell within the previous version Settlement boundary (based on centroid point in polygon assignment) would automatically be included in the new Settlement.

The classified Postcodes were then grouped into areas of neighbouring high-density Postcodes, or 'Settlements'. Areas of low-density Postcodes completely surrounded by the high-density areas (i.e. 'holes') were incorporated into the Settlement. Populations for each area were then calculated, and any settlement with fewer than 500 residents was discarded.

2022 Census Locality

The Census Locality boundaries have been created using the Census 2022 frozen Postcode boundaries.

Geography –Scotland's Census 2022
How the Census geographies were created

National Records of Scotland (NRS) create Locality boundaries by first creating the Settlements geography, and then assigning any Postcode located within a Settlement to a Locality based on a point-in-polygon (PIP) process with the previous version of the Locality boundary. Postcodes that fall within a Settlement boundary that are unassigned after the PIP are manually examined and assigned to a Locality.

2022 Census Settlement and Locality Centroids

Each population weighted centroid was calculated using a median centroid algorithm, the result of which is less influenced by outliers than the result of an algorithm to calculate the mean centroid.

The process for creating Census 2022 Settlements centroids was automated using ESRI ArcGIS, but the general method is as follows.

The median easting and northing coordinate pair for all Census 2022 frozen Postcodes within the Settlement is calculated, giving a notional centroid of the Settlement. The distance from each of the Postcode centroids to the notional (or median) centroid is calculated using Pythagoras' Theorem. The Postcode coordinate pair with the shortest distance to the median was then chosen to represent the centroid of the Settlement/Locality.

2022 Output Areas

Output Areas (OAs) for the 2022 Census were created as groups of postcodes nesting as well as possible into the following geographies, in descending order of preference (when not all postcodes in the OA belong to a single combination of these area types).

- Council Area
- 2022 Census Locality

The main aim governing this order of geographies is to give continuity with the 2011 OAs while ensuring, as far as possible, that 2022 OAs fit into the appropriate Locality (urban area) which are seen as an increasingly important statistical area.
The majority of 2022 OAs will be of similar size to those used in 2011 to allow as much comparison as possible with the 2011 Census data. The 2022 census counts (population and households) were allocated to the individual Postcodes which were assigned to 2011 OA, these postcode boundaries were then dissolved to create a set of 2011 OA based on the 2022 frozen Postcodes. This highlighted the OAs which fell outside the stated parameters.

Where a 2011 OA dropped below the 2022 minimum threshold for confidentiality (60 persons and 25 households) it was merged with a neighbouring OA if possible or broken up. In addition, where a 2011 OA had increased in size and exceeded the 2022 recommended maximum threshold (approximately 90 households) it was split into two or more OAs.

Output Area Centroids

Each OA is assigned to an area in a higher geography by first selecting one of the Postcodes in the OA as a 'master' Postcode. The OA inherits all the characteristics of the 'master' Postcode including its assignments to higher statistical geographies and its grid reference.

The 'master' Postcode was selected using an algorithm which calculates the Postcode centroid within an OA which has grid references closest to the population-weighted centre of the OA.

Non-contiguous Output Area (OA)

As stated earlier, the OA boundaries are created by aggregating a small number of neighbouring postcodes. The vast majority of individual postcodes boundaries consist of a single polygon, i.e., all the addresses associated with a single postcode are contained within one continuous boundary. However, in some situations not all the addresses cannot be contained within a single boundary due to the addresses being separated by another postcode, water, or both postcode and water.

When aggregating the postcodes to create the OAs it is possible, because of the spatial configuration, that any selected group which contains a non-contiguous postcode may result in a non-contiguous Output Area, i.e. the OA will comprise of more than one polygon.

Output Area Part Removed

Of the 46,363 OAs created, there were 531 that were non-contiguous because the polygons were separated by other Output Areas.

It was agreed that the parts which did not contain any Postcode Grid References (in most cases this is the smaller of the 2 (or more) parts of the non-contiguous OA) would be removed and the area merged with an adjoining OA to create a single polygon where possible.

This was purely a cosmetic exercise and did not affect Census statistics, Output Area Centroid, higher area assignment or area calculations for the OAs all of which were based on all the constituent parts of the OA or Postcode Grid References.

Area Calculation

The area of the OA recorded in the postcode to higher area table (sqkm and hect) will not always agree with the area which users will be able to calculate from the shapefile.

This is because the area recorded in the OA to higher area table is based on the OA and all of its constituent parts, whereas some constituent parts have been removed from the shapefile (see OutputArea2022_PartRemoved_EoR or OutputArea2022_PartRemoved_MHW for parts that have changed).

Census Island Groups

As statistics for individual islands could reveal details about individual people, due to the size of the population, the individual islands have been grouped into 52 'island groups' (excluding mainland Scotland) for 2022 Census output.

The 2022 Census Output Areas were allocated to the individual Islands dataset, these output area boundaries were then dissolved to create a set of 2022 Census Island Groups. From this point any not meeting statistical disclosure rules were merged into a neighbouring Island Group.

The 'Islands' table on the NRS geography 2022 Supporting Information section of the website provides a breakdown of individual island to Census Island group, along with basic counts of the number of household residents and households in each individual island in 2022. This is the only detail, where it is possible to produce statistics at individual island level. The reason for this is that the lowest level of geography for which Census statistics are produced is Output Area and in order to prevent disclosure of information pertaining to individuals, these cannot contain less than 25 households or less than 60 residents. There are a number of individual islands that do not meet these criteria. Where an OA contains statistics for two or more islands, those islands are placed in the same 'Island Group'.

A total of 121 islands are classified as 'inhabited islands' for NRS statistical geography purposes; 19 of these islands had no usual residents at the time of the 2022 Census. The individual islands dataset is available on the Island section of the NRS website.

2022 Census Counts

Cell Key Perturbation has been applied to Scotland's Census 2022 outputs.

This means that small adjustments are made automatically to cells in tables, including the Postcode to Output Area lookup.

This is part of our Statistical Disclosure Control methodology, available on the Scotland's Census website.