Office for National Statistics

ONS Geography Products and Services Review Response

May 2016

Executive Summary

The 2016 ONS Geography Products and Services Review gathered views about the geographic data, guidance and services ONS Geography provide. The Review is part of our ongoing commitment to ensuring our geographic products and services are fit for purpose. This evidence is critical for ONS Geography as it allows us to further strengthen our business cases to ensure we can best provide users with efficient, refreshed and/or new geographic services. The Review ran from 8th February to 7th March 2016. We received 102 responses from national and local government, academia, commercial and voluntary sectors.

We asked about the following:

- ONS Geography Products
- ONS Geography Services
- National Statistics Address Lookup (NSAL)
- GSS Coding and Naming Policy for UK Statistical Geographies
- Producing population estimates for Civil Parishes
- Output Area Classification
- Grid-based Population Estimates

You said

- Administrative boundaries and postcode products were the most used products. You demonstrated there are many varied and interesting uses of our products and their application in research, analysis and service delivery.
- 93% respondents would like to access statistics and geographies from the same website.
- 42% had downloaded the National Statistics Address Lookup (NSAL) or would do so in the future. Users who are not members of the Public Sector Mapping Agreement (PSMA) are still unable to benefit fully from using the UPRN.
- 9 character GSS codes are now widely used and well understood. Many users are now embedding the codes in automated operational systems.
- The 2011 Output Area Classification is valued for its free, detailed assessment of the population and widely used across many sectors.
- Potential applications of grid-based population statistics are being explored by users, but there is still concern about their benefit when compared to traditional administrative and Census geographies.

We did

- We will continue to maintain our existing geographic products, but research options for adding new geographies where there is an identifiable and evidenced need.
- We will work towards creating a consolidated platform for accessing geography and statistics.
- We have applied to Ordnance Survey for further derived data exemptions to enhance the National Statistics Address Lookup product by adding more geographies.
- We will continue to work with users who are experiencing barriers to adopting the GSS 9 character codes.
- We will continue to investigate alternative methods for producing parish level statistics that provide a balance between the number of parishes for which statistics can be published and the requirement to protect the data for disclosure control purposes.
- We will investigate the potential of using Administrative Data to update area classifications more regularly following the 2021 Census.
- We will research the options for producing population statistics on grids. The intention of the ONS is to offer more flexibility for our users by releasing statistics on grids, Census and administrative geographies.

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Contact

If you have any queries or comments about the consultation process, please email ONS Geography at ons.geography@ons.gsi.gov.uk or call 01329 444971.

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For further information on ONS consultations, please visit http://www.ons.gov.uk/ons/about-ons/get-involved/consultations/index.html

Introduction

We would like to thank everybody who gave us their views by responding to the ONS Geography Products and Services Review.

We invited responses to the ONS Geography Products and Services Review between 8th February and 7th March 2016.

The aim of the Review was to gather views about the geographic data, guidance and services ONS Geography provide. This is part of our ongoing commitment to ensuring our geographic products and services are fit for purpose. This evidence is critical for ONS Geography as it allows us to further strengthen our business cases to ensure we can best provide users with efficient, refreshed and/or new geographic services.

The purpose of this report is to provide an overview of the responses received. We have provided comment on the responses and where appropriate identified our future plans relating to the topic. A more detailed breakdown of the results can be found in the following document: ONS Geography Products and Services Review Results.

We consulted on the following themes:

- ONS Geography Products
- ONS Geography Services
- National Statistics Address Lookup (NSAL)
- GSS Coding and Naming Policy for UK Statistical Geographies
- Producing population estimates for Civil Parishes
- Output Area Classification
- Grid-based Population Estimates

ONS Geography received 102 responses to the Review, 58 were from organisations and 44 were from individuals. Table 1 shows the number of responses by sector.

Table 1: Responses by sector

Sector	**Total Respondents**
National Government department / organisation	22
Local or regional government / public organisation	45
Academia / Research	11
Commercial Sector	10
Voluntary / Charity	5
Other	9
TOTAL	**102**

Please be aware not all responses total 102, as respondents were not required to answer every question.

1. ONS Geography Products

The Open Geography portal[1] provides open and free access to a huge range of geographic data and products to support statistics. We were interested in identifying the products that are most widely used.

Overall 95 respondents answered at least one question about this topic.

1a) In the last 12 months, which ONS Geography products have you used the most often?

There were 90 responses to this question. We asked users to rank the products they used most often. The top 3 most used were:

=1. Boundaries – Administrative
=1. Postcode Products
2. Boundaries - Census

1b) In the last 12 months, what business problems have you solved using ONS Geography products?

There were 73 responses to this question. We received many varied responses to this question, which illustrated the breadth of usage of ONS Geography Products.

The most popular usage of ONS Geography products was to use the lookups between geographies to solve business problems:

- Use lookups to aggregate data from old geographies onto new geographies e.g. best fitting 2011 Census data to current wards or parishes.
- Identifying which postcodes are assigned to a ward or LSOA for data analysis.
- Using postcode products to link person level datasets (i.e. birth or death registrations) into small area geographies.
- Allocating statistical or administrative geographies to records at postcode level.
- Mapping postcodes to LEPs, Parliamentary Constituencies, Local Authority Areas and Regions.

[1] Open Geography portal: https://geoportal.statistics.gov.uk/

The geographic products were also used to create bespoke geographies to be used in data analysis or service provision:

- Using boundary products to create specific geographies (localities, neighbourhoods) for statistical analysis.
- Used Population Weighted Centroids to assign geographic areas to custom geographies, in particular our County Council Electoral Divisions. Used this relationship to produce 2011 Census and other statistics for these custom areas.
- Using census boundaries and health boundaries to create our own bespoke regional boundaries.

Users also generated their own thematic and reference maps to display data relevant to their work:

- Using boundary products to produce value and census thematic maps.
- Visualisation of land, housing and price paid data to explore housing pressures.

Respondents had also used products to solve specific business problems:

- Service provision
  - Social Care provision: creating delivery area for commissioning services; using boundaries to map care provision and then compare with the population in these areas.
  - Calculate distances from postcodes to various services (e.g. Sure Start centres, Jobcentre P lus, GPs, Family Centres) and distances between services.
  - Using Postcode to allocate disadvantaged funding to FE Colleges/ Providers.
  - Using LSOA populations to determine waste water catchment populations.
  - Using health boundaries to create sales territories.

- Understanding particular geographic areas
  - Working to assess likely usage of cycle hire in two cities
  - Using various output area and ward data as part of an evaluation into functional economic market areas for a complete refresh of the local economic assessment
  - Visualisation of land, housing and price paid data to explore housing pressures
  - Using ONS workplace zone data to create new population density datasets

1c) We are aware there are alternative providers and websites through which to obtain geographic products (boundaries, lookups etc). If you do use alternative data providers and products, please provide details.

There were 60 responses to this question. Respondents noted a variety of sources through which to obtain geographic and statistical data. These can be found in table 2; providers listed in **bold** print were the most popular.

Table 2: Alternative data providers

Consumer Data Research Centre	Local Authorities
data.gov.uk	Natural England
Department for Communities and Local Government (DCLG)	NHS Postcode Directory
Digimap	NOMIS / Neighbourhood Statistics
doogal.co.uk	**National Record of Scotland**
EDINA	**Northern Ireland Statistics and Research Agency**
E-mapsite	Open Street Map
English Heritage	**Ordnance Survey Open Data**
Environment Agency	Ordnance Survey Points of Interest
Greater London Authority Datastore	**Ordnance Survey PSMA**
Google Maps	Parish Online
HERE Streets	Royal Mail PAF
Health and Social Care Information Centre	Scottish Spatial Data Infrastructure
Local Government Boundary Commission	UK Data Service

ONS Geography response:

- We are pleased to see so many varied and interesting uses of our products and their application in research, analysis and service delivery. We are now able to contextualise information we have gathered about the volume of product downloads from the Open Geography portal. This evidence is critical for ONS Geography as it allows us to further strengthen our business cases to ensure we can best provide users with efficient, refreshed and/or new geographic services.
- We will continue to maintain our postcode products and boundaries and add new geographies where there is an identifiable and evidenced need. The responses have placed us in a better position to target our research and identify how to improve our products. We will look for ways to add value through enhancements to existing products or by developing new products.
- These responses have provided us with a richer understanding of our user needs. Where appropriate, we will now be able to collaborate more effectively with other data providers to enhance the products we provide and to ensure quality, harmonisation and consistency across all products and coding.

2. ONS Geography Services

ONS Geography currently provides a range of services for users to discover, view and download geographical reference data to support National and Official Statistics. These are provided through the Open Geography portal and Linked Data portal. We were interested in identifying which geographic services are most important for our users.

Overall 97 respondents answered at least one question about this topic.

2a) In what format do you prefer to work with your data?

There were 94 responses to this question. We asked users to rank the format they most preferred to receive data in. The most preferred formats were:

- Tabular data – CSV / .txt
- Spatial data – Shapefile
- Application Programming Interface (API) – GeoJSON
- Linked Data – RDF (Resource Description Framework)

2b) In what order do you prefer to see datasets listed and select them?

There were 90 responses to this question. We asked users to rank how they prefer datasets to be listed. The most preferred layout was:

- Organised by category (e.g. boundaries, lookups etc)

2c) Do you have a requirement to extract data for a specific geographic area (subsetting) e.g. give me the postcodes in Fareham?

There were 90 responses to this question, 66% of respondents had a requirement for subsetting of data. There were 62 respondents who had a requirement for subsetting data, 44 would prefer to extract data via a tabular query (e.g. where POSTCODE = PO15 5RR), and 26 would like to be able to draw the extent on a map. There were 8 respondents who would like to be able to do both.

2d) When you access ONS statistics (e.g. via NESS or NOMIS), would you find it helpful to access the geographies (e.g. boundaries) from the same place?

There were 83 responses to this question and 93% of respondents would find it helpful to access statistics and geographies from the same website.

2e) If you have a query about one of our products or services where are you most likely to go?

There were 93 responses to this question. The majority of respondents would be most likely to contact ONS Geography Customer Services - via email if they had a query about one of our products or services.

2f) We asked users to provide any further feedback about our service.

Users provided comments about various aspects of the services we provide. They were pleased with the level of customer service provided by ONS Geography. We received several comments about the design of the Open Geography portal:

- Many files on the portal are too large, which makes it difficult to download and manipulate the data.
- Open Geography portal could be better publicised.
- Categorisation of data on the portal could be better to enable users to search for products more efficiently.
- Data extraction functions could be made more explicit – i.e. tabular extract tool.

ONS Geography response:

- The ONS is moving towards consolidating platforms and the integration of data and geography. These responses will be integral in shaping the future services we provide to you.
- We will continue to provide products in the formats most used, but we will be responsive to user requirements for new file formats as they emerge and their demand increases.
- We currently provide web services and an API for our products through the Open Geography portal. We will focus on promoting these services further and highlighting their benefit.
- We are pleased to hear our customer services team is providing a good and effective service.

3. National Statistics Address Lookup (NSAL)

In 2015 we launched the National Statistics Address Lookup (NSAL)[2]. This product allocates each current address in Great Britain to an Output Area (OA) using the Unique Property Reference Number (UPRN) and point-in-polygon methodology. These OAs are then referenced to a wide range of higher statistical geographies (for example, local authority districts) using the population weighted centroid by a best-fit methodology that uses Census population data, in the same way as the National Statistics Postcode Lookup (NSPL). We were interested in evaluating its usage one year after launch.

Overall 88 respondents answered at least one question about this topic.

3a) Have you downloaded the National Statistics Address Lookup (NSAL)?

There were 85 responses to this question, 42% of those who responded had downloaded the product or were likely to do so in the future. The majority of those who had downloaded the product were from local or regional government / public organisations.

3b) Do you use the UPRN to reference / link datasets?

There were 45 responses to this question, 36% of those used the UPRN to link datasets. The majority of people were from local or regional government / public organisations.

3c) How have you used/ how do you intend to use the National Statistics Address Lookup (NSAL) in what you do?

We received 36 responses to this question; respondents had either used the product or could identify potential uses within their work/organisation. The majority of respondents who utilised NSAL did so to link datasets:

- Linking Local Land and Property Gazetteer to ONS geographies.
- Using the UPRN to link datasets and support the delivery and commissioning of healthcare services.
- Assigning environmental exposure to small areas in academic research.

[2] http://www.ons.gov.uk/methodology/geography/geographicalproducts/nationalstatisticsaddressproducts

There were several users who noted limitations with the NSAL:

- File size of the product was too large.
- Grid reference of address is not attached to the UPRN in NSAL.
- Users who are not members of the Public Sector Mapping Agreement (PSMA) are unable to fully benefit from the product as they are not able to access AddressBase without cost.

ONS Geography response:

- We recognise the power of using the UPRN to join datasets and share information across both the public and private sector. We will continue to publish this dataset, but work with other organisations, particularly within the PSMA membership to promote the value of the UPRN.
- Unfortunately, due to licensing restrictions we are unable to provide geo-referenced data attached to the UPRN. We have applied to Ordnance Survey for further derived data exemptions to enhance the NSAL product by adding more geographies.
- We support the lifting of licensing restrictions around the UPRN. We would encourage users who are prohibited from accessing AddressBase to demonstrate where open access to the UPRN and associated grid-reference would add value to their business processes.
- We will investigate potential options for further subdividing the NSAL dataset to make this more manageable for users.

4. GSS Coding and Naming Policy for UK National Statistics

In 2011 the GSS implemented a new coding and naming policy for statistical geographies. Every geographic feature is given a specific and unique 9 character code. The codes were introduced to provide consistency across the National Statistics community and allow the exchange and integration of geographical data. The GSS codes do not include any in-built intelligence and are not dependent on higher geographies, for example including the code of the local authority the geography falls within. This is to prevent code failure because geographies change frequently in the UK. They also avoid the use of multiple names existing for a single instance (excluding where Welsh names are provided). The 9 character codes are important for ensuring successful data sharing between organisations and digital transformation (e.g. Linked Data).

We were interested in determining how widely this policy is understood and implemented.
Overall 93 respondents answered at least one question about this topic.

4a) Are you aware that all instances of a geographic area have a unique 9 character code e.g. E92000001 (England)?

There were 91 responses to this question, approximately 91% of those who responded were aware that all instances of a geographic area have a unique 9 character code.

4b) Do you use names or codes for navigating through the data?

There were 88 responses to this question, approximately 89% of those who responded used either only GSS Codes or both GSS Codes and Names to navigate through the data.

4c) Please can you give examples of how you use the 9 character codes?

We received 74 responses to this question and a range of insightful uses of 9 character codes. The majority of respondents use 9 character codes for linking and joining datasets; for example:

- Linking data to geographic boundaries
- Linking data to geographic boundaries to produce thematic maps
- Linking multiple tables of data from different sources
- Linking datasets to enable spatial analysis of data

They are also being used for:

- Confirming the currency of the data provided
- Exchanging datasets within and between organisations, increasing interoperability
- Integrated into operational and analytical systems within organisations, i.e. using codes as unique IDs in computational data analysis and to request data from APIs for specific geographic areas.

There were several users who used both the names and codes. The use of codes was beneficial when joining and merging datasets and extra value could be added to maps by using the name.

4d) If your organisation has had difficulty using the 9 character coding system in your own data, please provide further details.

There were 35 responses to this question. We received a range of comments about the problems faced with 9 character GSS codes.

We received several comments noting the lack of hierarchy existing in the new coding structure. This was most pronounced within local or regional government / public organisations. Users found they were no longer able to use logical identifiable codes that nested within each other to select the areas relevant to them. However, there were some users who have adapted to not having in-built intelligence by using higher geography information to view alongside the codes.

Users also commented that even small boundary changes (~10 houses) can result in the change of a code and there can be problems reading “E01” in some systems, for example shapefiles.
Several respondents raised the issue that some National Government departments / organisations do not yet widely use 9 character codes, particularly in the areas of education and health. This has caused problems when attempting to join data produced by these organisations and ONS statistics.

ONS Geography response:

- We are pleased to see the GSS Codes are widely used and well understood. It is encouraging to hear organisations are working towards ensuring the 9 character codes are embedded into their systems. We will continue to work on getting the widest possible range of organisations using the codes. We will also work more closely with users who are experiencing barriers to adopting the 9 character codes.
- We recognise there is a desire, from some, for the GSS Names and Codes to contain an element of inbuilt intelligence. However, we have to be mindful of the breadth of users of our

codes and their different needs. The unique code is a critical part of referencing in digital transactions and enables data to be presented in a machine readable format.

- We are aware some respondents cited difficulties in matching expired codes with new codes. ONS Geography currently produces the Code History Database. We will be working to ensure this product is better promoted and used. We have recently modified products to contain a local authority district code to easily subset data.

5. Producing population estimates for Civil Parishes

Following the 2011 Census, around 10% of Civil Parishes in England had a population too small to be allocated an Output Area (OA) population weighted centroid within their boundary. In these instances, statistics were not released for these Civil Parishes. ONS also provided 2011 Census population estimates at the postcode level. A direct postcode lookup to parish was produced to enable a more precise estimate of males, females and households.

Since 2014, we have undertaken research to identify alternative methods for estimating parish statistics[3]. The research has attempted to find a solution where statistical data could be published for the majority of parishes without a significant amount of disclosure control being applied which could impact the utility of the data.

What has become clear in the assessment of 36 different parish methodologies is that there is no optimum solution. There is a tension between the desire to publish precise data for areas with small populations and the ONS' statutory requirement to prevent disclosure of individual data. The highest quality data can only be released in conjunction with existing disclosure control measures. It might be possible to generate statistics for more areas, but the trade-off would be that the statistics for any given area would be less accurate.

We will continue to work towards a solution for parishes that defines a balance between the number of parishes for which statistics can be published and the requirement to protect the data for disclosure control purposes. It would be useful to understand what priority you place on that balance.

Overall 68 respondents answered at least one question about this topic.

5a) We would therefore like to know which of the following options you would prefer:
We asked users to express their preference for the following options regarding the production of statistics for parishes. There were 57 responses to this question. There were 4 respondents who answered preferred both options.

56% of respondents were in favour of estimates being available for all parishes even if that involves significant disclosure control being applied to the data and limited variables available. This

[3] https://geoportal.statistics.gov.uk/Docs/Better_Statistics_for_English_Civil_Parishes.pdf

was compared to 44% who would like lots of variables available for parishes even if that means that 10% of parishes will have no estimates published for them.

5b) We welcome any comments or feedback on this work.

There were 35 responses to this question. The value of this data was highlighted by several users who require it for making evidence based decisions. This is demonstrated in Neighbourhood Plans, grant applications and the planning of community facilities, such as children's recreational areas. This requires parish level data for the parish in question.

We received a variety of comments about the production of statistics for parishes, with no clear evidence for a particular methodology.

There were some users who would like more data for fewer parishes:

- The benefit of having data for the majority of parishes outweighs the lack of data for a very small number of parishes.
- Parish data is often used in planning applications (for example informing school pupil and early years forecasting) and population estimates and projections by single year of age are therefore helpful. However, in the instances of suppressed values reasonable assumptions can be made about the values.
- The detail of the data is more important than the geography at the small level. Merging data for smaller parishes is preferable to having less detail for 100% of parishes.

Then there were others who would like data for all parishes:

- The variation between parishes can be large and some parishes are considerably different from their neighbours. Hence, it is important to have statistics for these areas to ensure their long-term sustainability.
- Service provision, for example utilities and recreational facilities, in rural areas may only serve a few households. It is important for planning purposes to have data for these areas.
- There would be a greater requirement for more complex analysis to support parish councillors in understanding their residents, if data was not available for all parishes.
- If small parishes containing a large number of residents, but below the disclosure threshold, with particular attributes were excluded, this could potentially skew the overall picture.

There was also interest in any research relating to the production of statistics at the grouped parish council level (where two or more civil parishes share administration). These geographic boundaries were being used more frequently on maps produced by the Local Authority. We also received a

suggestion to vary the number of variables available for different parishes based on their population size.

ONS Geography response:

- The ONS is very much aware of the value of parish level statistics for our users and there are no intentions to cease producing statistics for parishes. If required, users can currently download population estimates at the postcode level for England and Wales.

- The responses suggest there is no clear and distinct steer for the production of parish level statistics. The ONS will continue to investigate alternative methods for producing parish level statistics that provide a balance between the number of parishes for which statistics can be published and the requirement to protect the data for disclosure control purposes.

6. Output Area Classification

Area classifications group together geographic areas according to key characteristics common to the population in that grouping. These groupings are called clusters and are derived using census data. The area classifications are hierarchical classifications, consisting of three tiers: Supergroups, Groups and Subgroups. The 2011 Area Classification for Output Areas (2011 OAC) was published in 2015[4]. We were interested in identifying the utility of the product and its uptake since release.

Overall 92 respondents answered at least one question about this topic.

6a) Have you used the 2011 Area Classification for Output Areas (2011 OAC)?

There were 91 responses to this question, approximately 67% of respondents had either used the product or intend to do so in the future.

6b) How have you used the 2011 Area Classification for Output Areas (2011 OAC) in your work?

There were 46 responses to this question. We received many varied responses to this question, but the product was widely used to support business outcomes. Respondents noted they used this classification to:

- Classify the population to target specific services to specific populations (fundraising campaigns, media campaigns, transport planning).
- Comparing different geographic areas based on their demographics.
- Geo-demographic profiling of bespoke catchment areas i.e. supermarkets.
- Background context to specific geographic area in studies and projects (i.e. Parish Neighbourhood Plans).
- Understand the methodology for creating geo-demographic classifications.
- Provide a classification which can be used alongside other datasets to describe an area (i.e. Indices of Multiple Deprivation, health data, rural/urban classification).

[4] https://www.ons.gov.uk/methodology/geography/geographicalproducts/areaclassifications/2011areaclassifications

6c) What benefit do you feel this product provides to what you do?

There were 45 responses to this question and users reported many benefits of the Output Area Classification:

- Detailed assessment of population.
- Consistent generalisation.
- Provides overview on differences between groups of small areas, rather than between small areas themselves.
- Based on trusted Census data and unbiased towards commercial outcomes.
- Benchmark for other geo-demographic products.
- Ability to aggregate to larger areas.
- Free and open source product with methodology provided.
- Limitations of product are evident.

However, there were some users who noted limitations with the product:

- Limited benefit as small areas are not homogeneous.
- Too generalised for some geographic areas.

6d) The Output Area Classification (OAC) is updated once every 10 years, following a Census. Does this limit the value of the OAC to you?

There were 82 responses to this question. There was no clear evidence identifying whether the OAC was of limited value as it is only updated once every 10 years. There were 52.4% of respondents who felt the decadal OAC did not limit its value, compared to 47.6% who did.

6e) Other organisations produce geo-demographic area classifications for the UK. Do you use any of these area classifications (e.g. Mosaic, Acorn)?

There were 82 responses to this question. There were 52.4% of respondents who used other area classifications. Respondents mentioned they used:

- MOSAIC
- ACORN
- CACI

6f) We welcome any further feedback about the ONS area classifications.

There were 30 responses to this question. Users provided a range of useful comments about the Output Area classification and its future development:

- It is a detailed dataset, with groups and subgroups of the population which are very useful.
- Free product with open source code and transparent methodology.
- Comparable to commercial products.

Limitations:

- Too generalised to make a clear assessment of a local area.
- Hierarchy of names used could be less ambiguous.
- Supporting material is limited in comparison with other geo-demographic products and pen portraits are very basic.

Possible future developments:

- Classifications at higher level geographies would be useful – i.e. LSOA could be compared against Index of Multiple Deprivation.
- It would be useful to update the OAC intercensally, possibly every 5 years, and using Administrative Data where possible. This would enable it to compete with commercial products.

ONS Geography response:

- We are glad there are so many uses of the Output Area Classification in research, analysis and service delivery. This has been useful in understanding how our data has been used and will be very useful in thinking about how we develop our products and services.

- We recognise the importance of classifications to users of geography and statistics. We are planning to publish updated area classifications for other geographies later in 2016 and 2017. We have already developed the Workplace Zone Classification for England and Wales and we will be publishing a UK version in 2016.

- The ONS is currently exploring the usage of Administrative Data sources to create population statistics. We will investigate the potential of using Administrative Data to update classifications more regularly.

7. Grid-based Population Estimates

In 2011, the ONS published population estimates on a 1km grid[5]. The grid contains 2011 Census data on total population and number of households for the United Kingdom and a breakdown by sex for England, Wales and Northern Ireland. These data are provided on the basis of the previously released postcode information from the Census where each postcode (and its associated data) is allocated to the grid square on the basis of its grid reference (point-in-polygon). We were interested in identifying how widely grid-based population estimates are used.

Overall 90 respondents answered at least one question about this topic.

7a) Have you used the 2011 population grid statistics?

There were 88 responses to this question. 32% of respondents had used the population grids or intended to do so in the future.

7b) How have you used the 2011 population grids in what you do?

There were 16 responses to this question. Several respondents noted they had not yet used this product, but were researching possible applications of this dataset in their work. There were also suggestions provided about how the population grids could be used:

- Population estimation for emergency response.
- Estimating population density at low geographic levels.
- Constructing population estimates at non-standard geographies.
- Integrating gridded population estimates with meteorological and environmental indicators, produced using a gridded surface.
- Identify population concentrations in rural areas, where Output Areas may cover a large geographic area.
- Obtaining population and household estimates for small geographic areas (postcodes) to inform and improve targeting of resources, projects, initiatives and services and communications with local residents.

[5] http://www.ons.gov.uk/ons/rel/census/2011-census/headcounts-and-household-estimates-for-postcodes-in-england-and-wales/index.html

7c) We are currently exploring the potential of producing more statistics using Geostat Grids. We will maintain Output Areas for the 2021 Census, but recognise that longer term it may not be possible to do so. We may also produce a limited number of grid based statistics following the 2021 Census. We welcome any further feedback about the use and value to you of grid based statistics.

There were 33 responses to this question. Respondents provided a range of general comments about producing population estimates using grids, along with potential advantages and disadvantages.

Respondents also provided some more general comments about how they envisage grid-based population estimates:

- If grids were to replace Output Areas, then it would be useful for multiple population variables to be attached to each grid square, for example: population, age, gender, ethnicity.
- It would be useful to have a lookup between other geographies and grids.

Grid-based statistics were favoured by several respondents:

- A fixed grid can avoid the problem of boundary change over time (Census or otherwise), which enables time-series analysis to be undertaken.
- Grid-based population estimates enable better integration with meteorological and environmental models.

Respondents also expressed some concern about the use of grids to produce population estimates, particular in comparison to the use of Output Areas:

- Output Areas provide a regular zoning system with relatively homogenous and comparable spatial units, which can be used in segmenting the population and social research. Grid based systems will not provide populations of a similar size.
- Output Area boundaries, in the majority of cases, are left unchanged between each Census, which can be used to assess long-term trends.
- Output Areas boundaries are produced to respect, where possible, natural and physical boundaries. A single grid square could include population from multiple communities; equally it could divide buildings and residential tower blocks. Output Areas currently ‘nest’ within local authority boundaries which does not occur with grids.
- Grids squares can cover different spatial areas compared to Output Areas, in urban areas this would result in considerably less detail in the estimates provided. In rural areas, there may be squares for which data cannot be published because of statistical disclosure concerns.

- Postcodes - in rural areas, the postcode centroid may not represent the concentration of population, due to its size. Hence, the best-fit of postcodes may not be accurate. Postcodes also terminate or are reassigned to different areas and this could potentially cause problems with trend based analysis.

ONS Geography response:

- We welcome the comments about grid-based population statistics provided by respondents, both positive and negative. The use of grids to produce population statistics is becoming increasingly important on the European (Eurostat) and global (United Nations Sustainable Development Goals) geospatial agendas. There is also an increasing need for statistics on UK grids to allow integration with statistics that do not fit within geographic boundaries such as environmental phenomena. This is a topic we are going to continue to research leading up to the 2021 Census. The responses provided by users will inform our future research.
- The intention of the ONS is to offer more flexibility for our users by releasing statistics on both grids and Census and administrative geographies. At present, grids will be an addition to our suite of geographies and will complement the Output Areas and Workplace Zones following the 2021 Census.