

# **Benefits of new postcode based geography**

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# ESRC/JISC 2001 Census Programme [www.census.ac.uk](http://www.census.ac.uk)

The screenshot shows a Microsoft Internet Explorer browser window displaying the website for the ESRC/JISC 2001 Census Programme. The address bar shows the URL <http://www.census.ac.uk/default.htm>. The page features the ESRC logo (Economic & Social Research Council) and the JISC logo. The main heading is "2001 Census of Population Programme". A navigation menu on the left lists various sections: About the Census, Data Support Units, Registration, For Teachers, For Students, Training, Census Research, Additional Resources, and News. The main content area includes an "About the Programme" section with a detailed description of the programme's purpose and funding, and a "This website" section explaining its maintenance by Professor David Martin. A footer note states "Last updated 13 September 2002".

**E·S·R·C**  
ECONOMIC  
& SOCIAL  
RESEARCH  
COUNCIL

**JISC** 2001 Census of Population Programme

**About the Programme**

**About the Census**  
**Data Support Units**  
**Registration**  
**For Teachers**  
**For Students**  
**Training**  
**Census Research**  
**Additional Resources**  
**News**

**The programme** facilitates the dissemination of data from the decennial UK Censuses of population to the Higher and Further education communities. The £3.75m programme is funded by the Economic and Social Research Council and the Joint Information Systems Committee and encompasses the purchase of data and provision of specialist data support units to provide data access and expert guidance to users. An online registration service ensures easy access for academic users to a full range of census data products including area statistics, geographical boundaries, interaction data and samples of anonymised records from censuses 1971-2001. The ONS Longitudinal Study is also part of the programme but covered by different access arrangements.

**This website** is maintained by the programme coordinator, Professor David Martin of the University of Southampton, as a central entry point to programme activities and census data resources.

**The links on the left** will assist you if you want to know more about the census, wish to find a specific data support unit or register to use the data. Programme news will be regularly posted on this site. The special sections for teachers and students focus on the needs of those groups, and pointers are provided to additional census resources.

*Last updated 13 September 2002*

# Overview

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- Background: why have a new geography?
  - Case for redesign
  - Overview of design methods
- 2001 Output area geography:
  - Key characteristics
- Potential developments
- A geography for Neighbourhood Statistics

# Background: why have a new geography?

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- Unsuitability of 1991-style enumeration geography as output geography
  - No linkage to postcode geography
  - Some sub-threshold populations, large range
  - No consideration of internal homogeneity
- NB England/Wales, Scotland, NI differences

# Case for redesign

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- Demands from census users:
  - Postcode and statutory geographies
  - Uniformity of population sizes (all above threshold)
  - Control over shape (observe settlement pattern and topographic features)
  - Internal homogeneity of population
  - Compatibility with previous census geographies!

# Overview of design methods

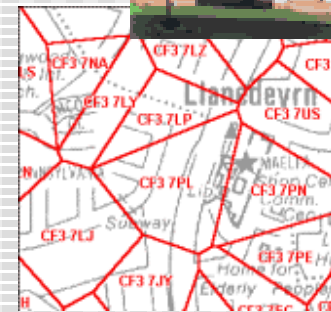
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- Step one
  - Assemble unit postcode geography
  - Create purpose-specific postcode polygons
- Step two
  - Assemble into output areas, meeting as many of the other criteria as possible
  - Use automated zone design

# Which postcode geography?

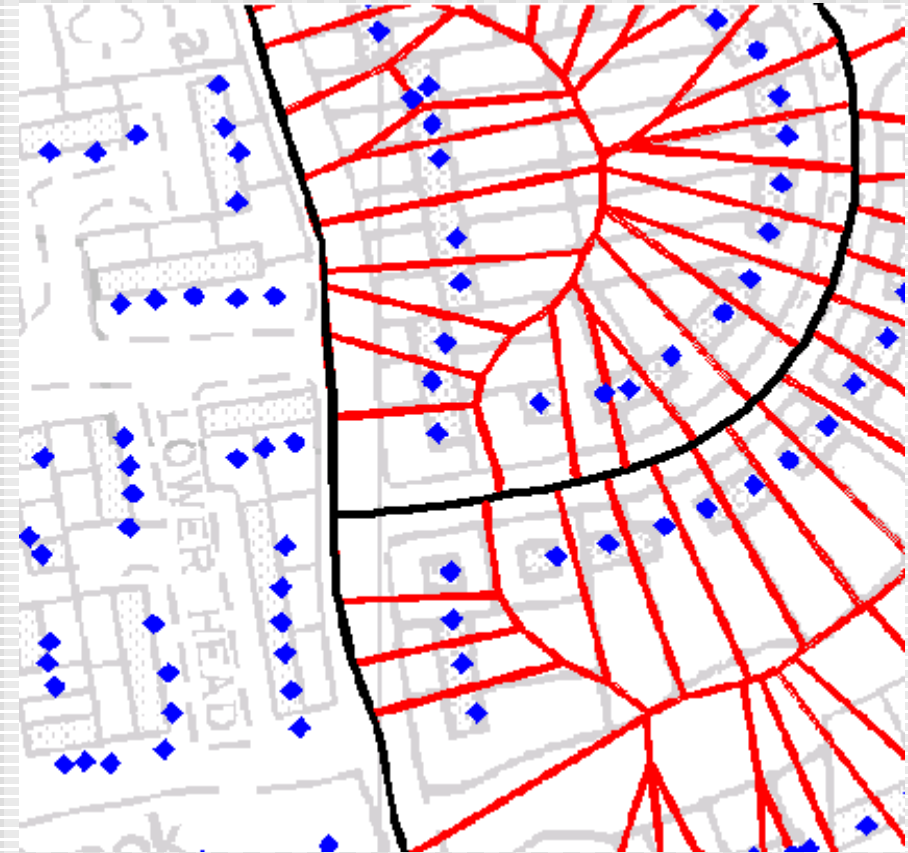
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- No existing postcode boundaries (as in Scotland)
- Code-Point with polygons – synthetic: no admin. boundaries
- MasterMap still under development
- Uncertainty at key stage



# Address-based Thiessen polygons

- Thiessen polygons around ADDRESS-POINTS
- Intersected with EDs, wards (Dec 2002), parishes and road centrelines





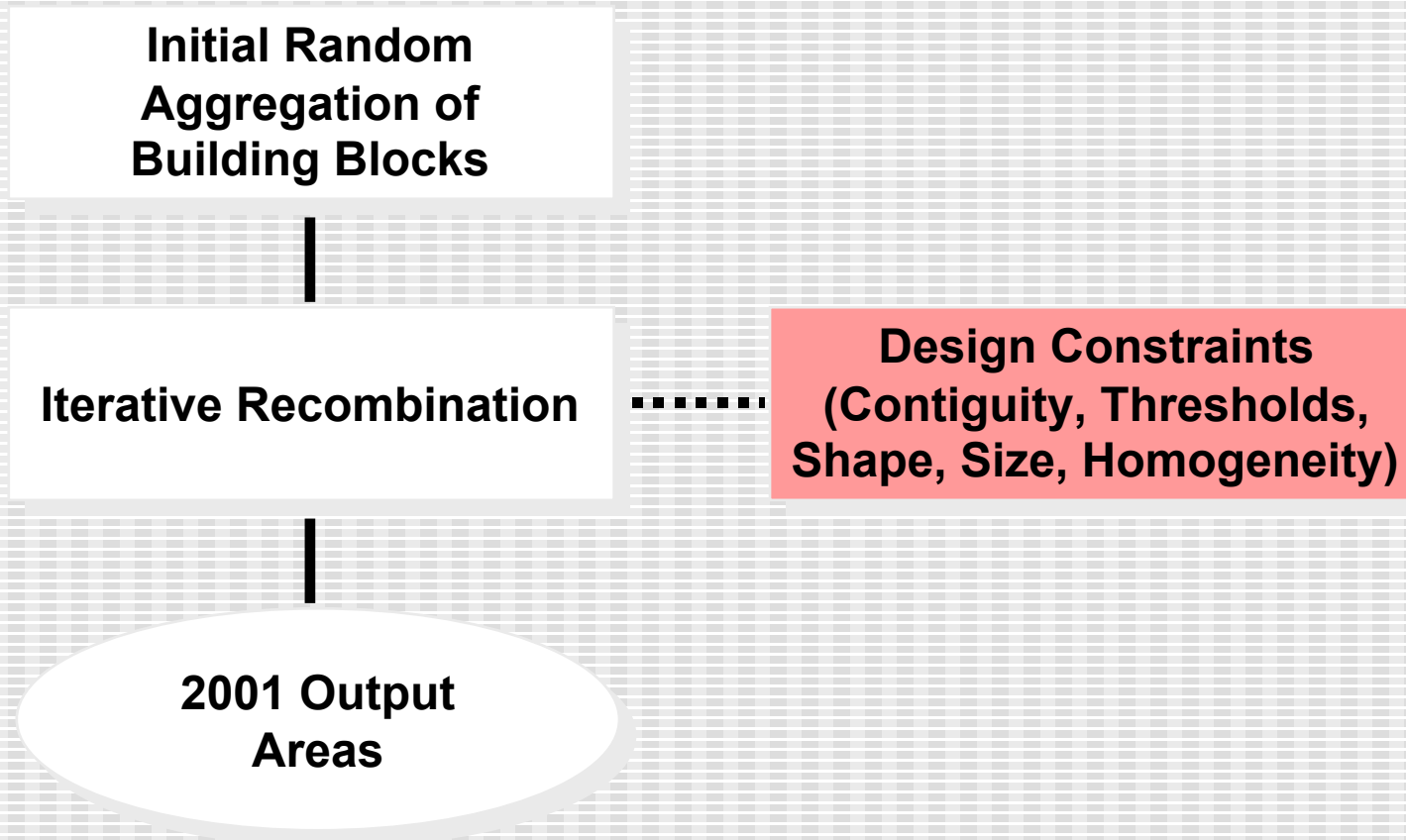
# Unit postcode building blocks

- Address polygon boundaries dissolved to form unit postcode polygon building blocks



# Automated output area design

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# AZP (Openshaw, 1977)

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- Random initial aggregation of building blocks into output areas within ward or parish polygon
- Compute design statistics
- Evaluate effect of possible swaps of building blocks between output areas
- Keep swaps that improve the overall solution

# Contiguities, thresholds, urban/rural

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- Output areas assembled from contiguous postcodes (NB treatment of stacked postcodes)
- Output areas above 100 person and 40 household thresholds (NB treatment of sub-threshold parishes)
- Initial postcode classification to urban/rural based on DETR boundaries

# Size and shape

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- Output areas should be as uniformly sized as possible; target 125 households

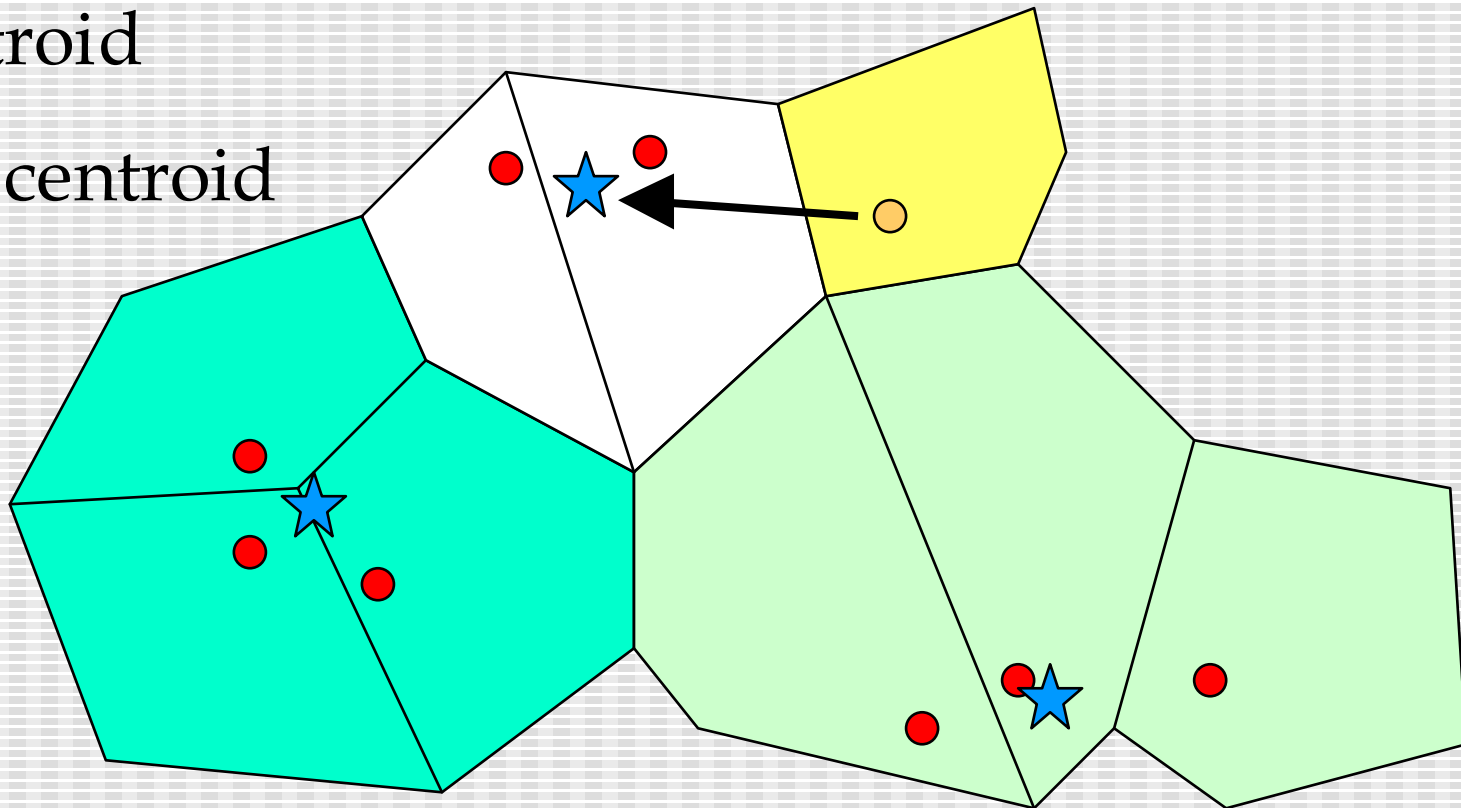
*minimize  $\Sigma(OA_{pop}-target)^2$*

- Output areas should be as compact as possible

*minimize distance to OA centroid...*

# Distance to OA centroid

- PC mean centroid
- ★ OA centroid



# Intra area correlations

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- Maximize intra-area correlations (IAC): ratio of area level to individual level variance
- Higher correlations  $\sim$  greater internal homogeneity
- Tenure (4) and dwelling type (7) categories used

# Combination of constraints

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- All constraint statistics recomputed at each iteration
- Must always meet contiguity and threshold requirements; urban/rural if possible above threshold
- Population, shape and homogeneity constraints combined with equal weighting

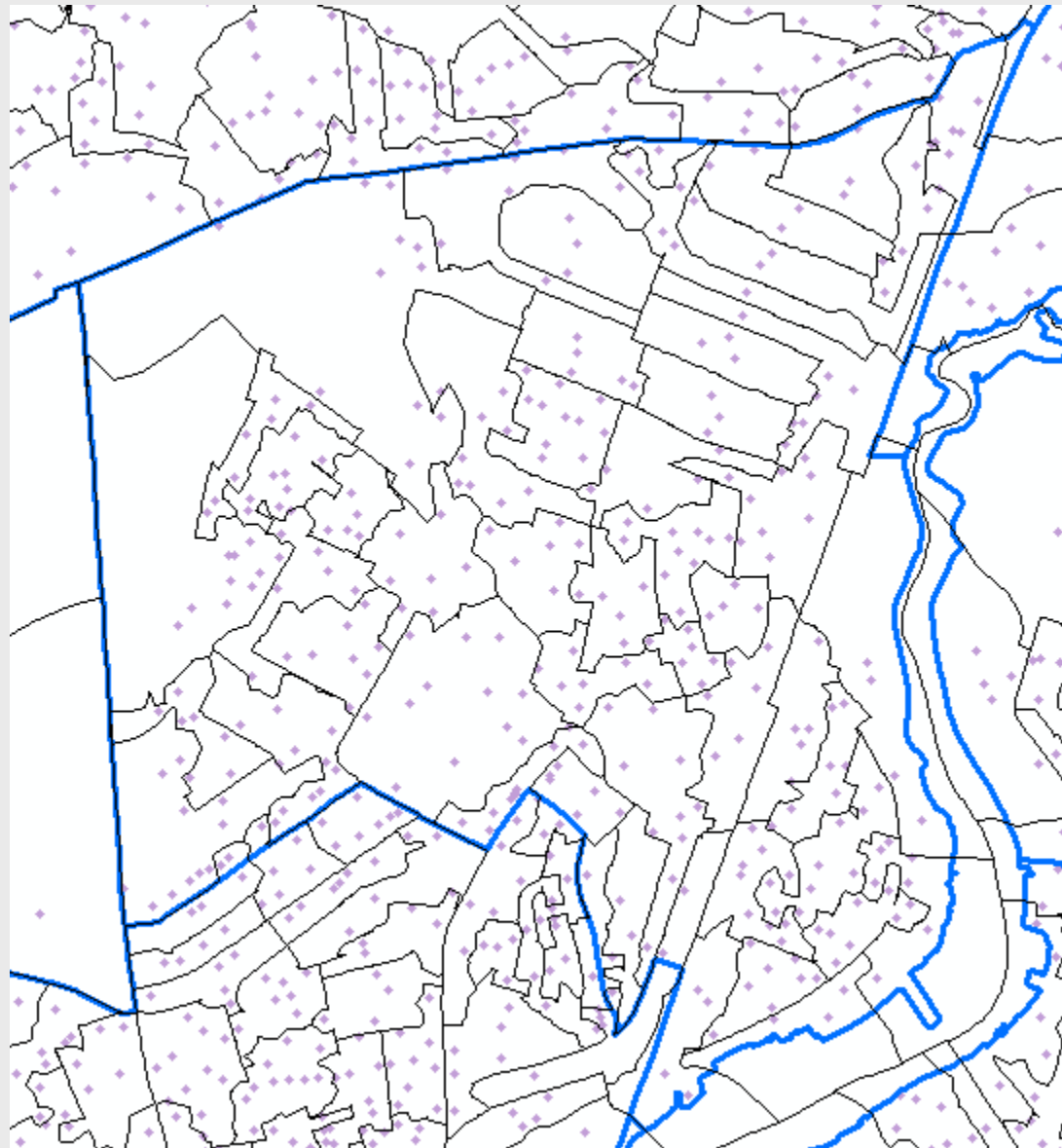


2001 Output  
Areas  
(n=175,434)



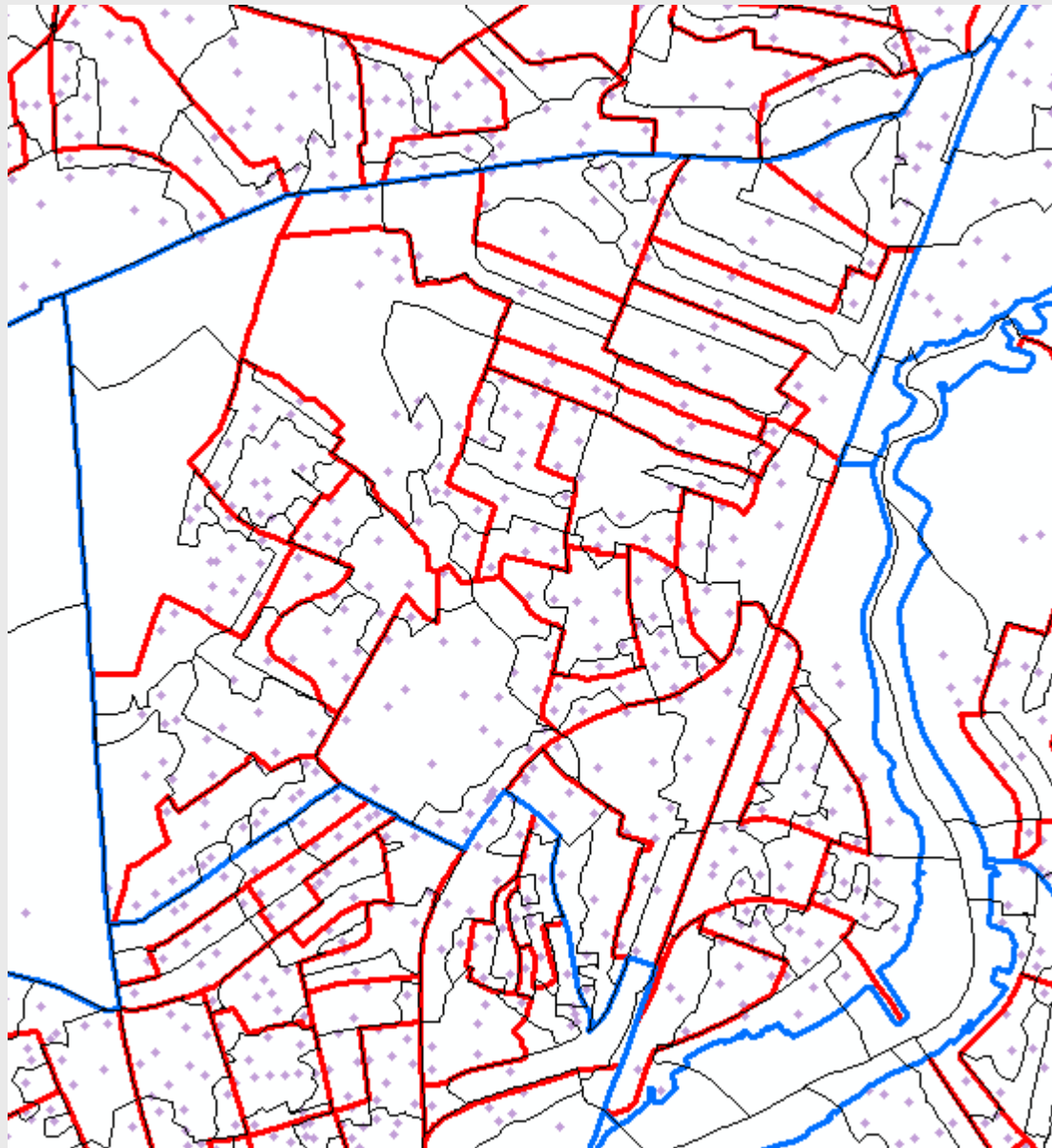
[England and  
Wales]

- 2001 OA
- 1991 Ward
- Code-Point



[Portswood,  
Southampton]

- 2001 OA
- 1991 Ward
- 1991 ED
- Code-Point



[Portswood,  
Southampton]

# Postcode-OA relationships

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- (Initial release – England and Wales)
  - 175,000 OAs
  - 1.25m postcodes captured at census and related to OAs in lookup table
  - 2.5% split between OAs (compared to 15% split across EDs in 1991)
  - Other postcodes and postcode head counts info to be added to lookup tables later

Microsoft Access - [Postcode to OA lookup : Table]

File Edit View Insert Format Records Tools Window Help

Type a question for help

County code	District code	Ward code	OA seq number	OA code	Postcode	Postcode split
00	MS	ND	0016	00MSND0016	SO169FQ	
00	MS	ND	0007	00MSND0007	SO169FR	
00	MS	ND	0016	00MSND0016	SO169FS	
00	MS	ND	0007	00MSND0007	SO169FT	
00	MS	ND	0018	00MSND0018	SO169FU	
00	MS	ND	0018	00MSND0018	SO169FW	
00	MS	ND	0019	00MSND0019	SO169FX	
00	MS	ND	0019	00MSND0019	SO169FY	
00	MS	ND	0019	00MSND0019	SO169FZ	
00	MS	ND	0020	00MSND0020	SO169GA	
00	MS	ND	0020	00MSND0020	SO169GB	
00	MS	ND	0020	00MSND0020	SO169GD	
00	MS	ND	0020	00MSND0020	SO169GE	
00	MS	ND	0020	00MSND0020	SO169GF	
00	MS	ND	0024	00MSND0024	SO169GG	
00	MS	ND	0024	00MSND0024	SO169GH	

Record: 1025923 of 1281120

Datasheet View

NUM

County

District

Ward

Output Area

Microsoft Access - [Postcode to OA lookup : Table]

File Edit View Insert Format Records Tools Window Help

Type a question for help

County code	District code	Ward code	OA seq number	OA code	Postcode	Postcode split
00	MS	ND	0016	00MSND0016	SO169FQ	
00	MS	ND	0007	00MSND0007	SO169FR	
00	MS	ND	0016	00MSND0016	SO169FS	
00	MS	ND	0007	00MSND0007	SO169FT	
00	MS	ND	0018	00MSND0018	SO169FU	
00	MS	ND	0018	00MSND0018	SO169FW	
00	MS	ND	0019	00MSND0019	SO169FX	
00	MS	ND	0019	00MSND0019	SO169FY	
00	MS	ND	0019	00MSND0019	SO169FZ	
00	MS	ND	0020	00MSND0020	SO169GA	
00	MS	ND	0020	00MSND0020	SO169GB	
00	MS	ND	0020	00MSND0020	SO169GD	
00	MS	ND	0020	00MSND0020	SO169GE	
00	MS	ND	0020	00MSND0020	SO169GF	
00	MS	ND	0024	00MSND0024	SO169GG	
00	MS	ND	0024	00MSND0024	SO169GH	

Record: 1025923 of 1281120

Datasheet View



## Postcode finder

Delivery point results This search has returned 270 results

Flat 96, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FY  
 Flat 97, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FY  
 Flat 98, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FY  
 Flat 99, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FY  
 Flat 100, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FY  
 Flat 101, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FZ  
 Flat 102, Millbrook Tower, Windermere Avenue, SOUTHAMPTON, SO16 9FZ

View label

English Welsh

New search

Help

# Potential developments

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- Integration with MasterMap to produce new polygon set?
- Maintenance in relation to changing postcode geography?
- Maintenance in relation to changing population geography?
- All based around address-level census database

# Neighbourhood statistics

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- Aggregated source records from multiple suppliers
- Single hierarchy based on census OAs (and hence primarily on postcodes, with lookup tables)
- Durable core geography
- Consultation Spring 2003, pilots and review currently under way



# Developments towards Super Output Areas

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- OAs as building blocks
- Three-tier geography
- Tier one (pop 1-3k)
  - Automated zone design, constrained to census wards
- Tier two (pop 5-10k)
  - Automated design, with consultation
- Tier three (pop 25-50k)
  - Local consultation

# Conclusion

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- Entirely new Output Area geography
- Strongly based on unit postcodes
- Full boundary set and postcode lookup table now available on CD from ONS – more to follow
- Potential for geography refinement and development
- Provides basis of durable geography for Neighbourhood Statistics