

Data Management and Analysis Group

**2001 Census response in London
Census Information Note
CIN 2002-2**

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The One Number Census

The UK Census of Population is carried out in order to provide a snapshot of the entire population, including their characteristics and geographical distribution down to small areas across the country. The Office for National Statistics (ONS) report that every effort was made to ensure everyone was counted in 2001, and various initiatives were introduced to maximise coverage. These included encouraging people to post back their census forms to enable census staff to focus on those most likely to have difficulty filling in their forms, smaller workloads for staff in the more difficult areas, redesigned and carefully tested forms and questions, a community liaison programme including translation of census material into 26 languages, and a focused programme of awareness raising and publicity.

However, it has long been recognized that Census taking is difficult and is becoming more so, both in the UK and in other countries, with increased difficulties of contacting people and an increasing lack of co-operation from the general public. It was therefore expected that some people would be missed from the Census enumeration. It has become accepted practice in the UK and throughout almost all similar census-taking countries to assess the extent of any underenumeration, usually by means of a post-enumeration survey. This was done in Britain in 1981 and 1991. However, the small scale of the survey in 1991 meant that it failed to identify either the full extent of the underenumeration in the Census or the distribution of the undercount, either geographically or by population sub group.

Due to the difficulties encountered following the 1991 Census, and in the belief that enumeration in 2001 was likely to be more difficult than previously, ONS decided to institute a procedure to enhance the Census data to provide a full count of the population with detailed characteristics of all residents. This procedure became known as the One Number Census (ONC).

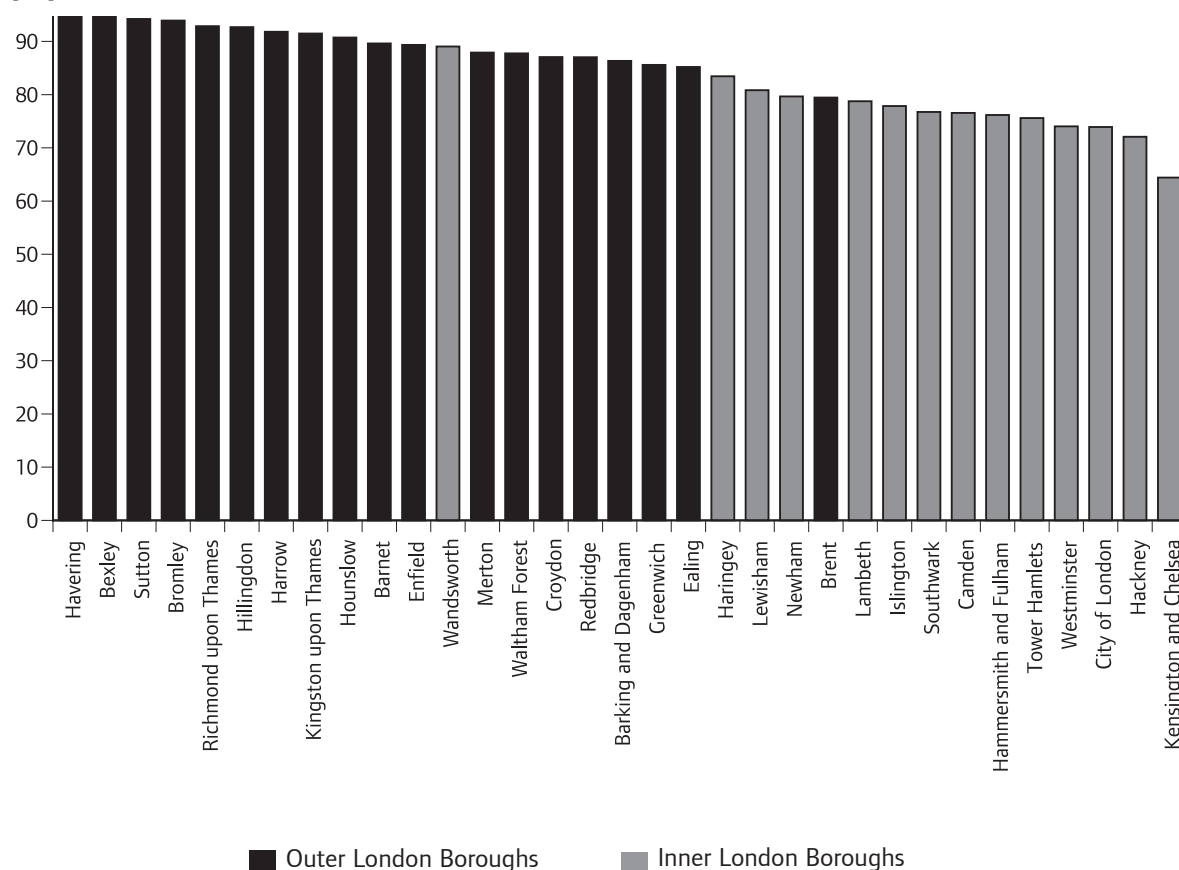
In essence, this process consisted of taking the Census itself and a very large scale follow-up survey, known as the Census Coverage Survey (CCS), which was a complete re-enumeration of a sample of areas and comparing the results to get an estimate of those missed in the Census. Missed households and individuals were then imputed to the Census database to produce a fully adjusted Census database from which all Census statistics will be generated.

Response rates in the 2001, 1991 and 1981 Censuses

Nationally, response to the 2001 Census is reported as 94 per cent. A further 4 per cent of the population are estimated to be resident in households identified by enumerators but from whom no completed census form was returned, with the remaining 2 per cent being people who were not included on returned forms and people in wholly missed households. The ONC process took this into account, with the result that of the 58.8 million people in the UK Census database, 6 per cent (3.5 million) have been imputed.

These figures compare with 96 per cent of people included on returned forms in 1991, a further 2 per cent in households identified by enumerators and, as in 2001, the remaining 2 per cent being people who were not included on returned forms and people in wholly missed households. The main difference is that in the 2001 Census results, all people are included, whereas this final 2 per cent were missing from the final 1991 Census data. It should be noted that these figures are net, since some people may have been counted twice in the Census.

Figure 1 2001 Census response rates in London Boroughs, % percentage of total population included on returned forms



In 1981, households where no one was home on Census night were not counted, so around 2 per cent of the population was not included in 1981 Census results. Just 0.4 per cent of the present population were found in the Post Enumeration Survey to have been missed in private households in the 1981 Census.

Geographical variation in response rates

There is a high level of geographical variation in these figures, ranging in 2001 from over 99 per cent response in some local authorities down to just 64 per cent in Kensington and Chelsea. The highest response rate in London was for Havering (97%), with the highest rate for an Inner London borough in Wandsworth (89%). Figure 1 shows this wide variation in the response rates for London boroughs - the figures are given in Table 1, along with the Census estimates and the numbers of respondents.

The contrast between 2001 Census response rates in London boroughs and local authorities in the rest of England is illustrated in Figure 2. This shows clearly that the response rates achieved in most London boroughs were below those for local authorities elsewhere. The lowest response rates outside London were in Slough (85 per cent), Luton (86 per cent), Rushmoor (88 per cent) and Liverpool (89 per cent). Slough, Luton and Liverpool are all very urbanised areas, while Rushmoor in Hampshire is an area with a high proportion of Armed Forces personnel. In contrast, just 10 of the 33 London authority areas had response rates of 90 per cent or above.

Table 1 Response rates and numbers included and imputed

	Total Census population¹	Response rate¹ (%)	Number included on a form²	Number imputed²	1991 response rate (%)³
City of London	7,186	74	5,311	1,875	81
Barking and Dagenham	163,944	86	141,542	22,402	98
Barnet	314,561	90	281,924	32,637	96
Bexley	218,307	96	209,411	8,896	99
Brent	263,463	79	209,304	54,159	91
Bromley	295,530	94	277,585	17,945	98
Camden	198,027	77	151,620	46,407	88
Croydon	330,688	87	287,946	42,742	96
Ealing	300,947	85	256,411	44,536	95
Enfield	273,563	89	244,466	29,097	97
Greenwich	214,540	86	183,616	30,924	95
Hackney	202,819	72	146,206	56,613	86
Hammersmith and Fulham	165,243	76	125,879	39,364	88
Haringey	216,510	83	180,671	35,839	89
Harrow	207,389	92	190,446	16,943	98
Havering	224,248	97	216,582	7,666	99
Hillingdon	242,435	93	224,720	17,715	98
Hounslow	212,344	91	192,645	19,699	95
Islington	175,787	78	136,891	38,896	90
Kensington and Chelsea	158,922	64	102,375	56,547	82
Kingston upon Thames	147,295	91	134,754	12,541	97
Lambeth	266,170	79	209,661	56,509	85
Lewisham	248,924	81	201,233	47,691	91
Merton	187,908	88	165,199	22,709	96
Newham	243,737	80	194,163	49,574	93
Redbridge	238,628	87	207,692	30,936	98
Richmond upon Thames	172,327	93	160,028	12,299	97
Southwark	244,867	77	187,955	56,912	87
Sutton	179,667	94	169,299	10,368	98
Tower Hamlets	196,121	76	148,257	47,864	92
Waltham Forest	218,277	88	191,573	26,704	94
Wandsworth	260,383	89	231,854	28,529	92
Westminster	181,279	74	134,212	47,067	84
Inner London	2,765,975	78	2,156,288	609,687	
Outer London	4,406,061	90	3,945,143	460,918	
Greater London	7,172,036	85	6,101,431	1,070,605	

Note 1991 response rate is calculated from imputation and estimated 'missing population' at Inner/Outer level

Source: 1 ONS response rate spreadsheet published on ONS website 30 September 2002

2 GLA calculations based on ONS response rate spreadsheet

3 GLA calculations based on levels of imputation published in 1991 Census County Reports and Adjustment Factors published in 1991 Census User Guide 58

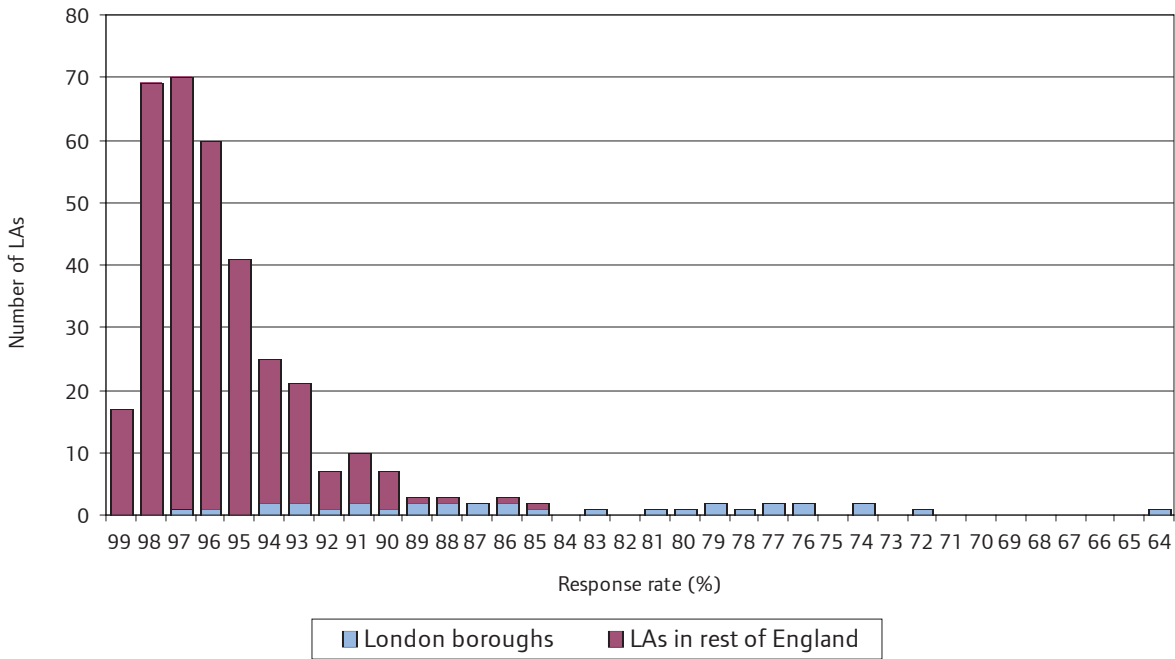
Overall, the final response rate achieved in 2001 for London was 85 per cent, well below the national average - 90 per cent for Outer London and 78 per cent for Inner London. The Census itself found just over 6.1 million residents altogether in London and over a million more were imputed.

These final response rates differ from the earlier postal response rates reported to the House of Commons Treasury Committee . This report included a list of the ten areas with the lowest postal response rates. Eight of the ten areas were in London. These, however, were based on previously estimated numbers of households and numbers of returned forms, whereas the final response rates are numbers of individuals included on returned forms as a proportion of the One Number Census estimate for each area. All of the areas on the Treasury Committee list had higher final response rates with the exception of Kensington and Chelsea.

The postal response rates (household based) were 64 per cent for Kensington and Chelsea (North) and 72 per cent for Kensington and Chelsea (South). The final response rate (person based) for the borough as a whole was 64 per cent. On the face of it, this appears to be a lower final response rate than at the earlier stage. This could be due to several factors, such as an overestimate of the number of households resident in the area, people missing from returned forms and/or people missed from communal establishments. The difference between the base of households and individuals would also have an impact.

This geographical variation was similar to that seen in earlier Censuses, in that local authorities in London, particularly Inner London had the highest proportion of missed residents. The non-response in 1991 is made up of two parts - the imputed population, estimated from the Census Validation Survey results, and the population missing from the Census figures. The final 1991 Census figures were estimated to have missed two per cent of residents overall, including four per cent of residents in Inner London and the main metropolitan areas such as

Figure 2 Frequency distribution of 2001 Census response rates in England



Birmingham, Bradford, Leeds and Liverpool and two per cent in Outer London. Two per cent of the population were also not enumerated, but were imputed, and so were part of the final 1991 Census figures.

Whereas the 'missing' population is only estimated for regions (including Inner and Outer London), the level of the imputed population is available for local authorities. This shows a similar pattern to that in 2001, with the highest levels of imputation in the City of London (13 per cent), Kensington and Chelsea (12 per cent), Westminster (11 per cent), Hackney and Lambeth (10 per cent each). Assuming that the missing population (four per cent in Inner London, two per cent in Outer London) shows the same pattern as the imputed population (eight per cent in Inner London, two per cent in Outer London), this would give actual Census response rates in 1991 as shown in Table 1.

In 1981, the best estimate of under-enumeration (excluding people in households who were absent on Census night) was 2.5 per cent for Inner London and 1 per cent for Outer London.

Response rates by age and sex

There was also a high degree of variation in response rates to the 2001 Census for different groups of the population, which is another reason for developing the ONC approach. As in 1991, the lowest response rates throughout the UK were for people in their twenties,

2001 Census response rates, Greater London

	Persons	Males	Females
Age	2001	2001	2001
0-4	80	80	80
5-9	83	84	83
10-14	86	86	87
15-19	84	84	85
20-24	76	75	77
25-29	77	77	78
30-34	81	79	82
35-39	84	82	85
40-44	87	85	88
45-49	89	88	90
50-54	91	91	91
55-59	92	92	92
60-64	92	92	92
65-69	93	93	93
70-74	93	93	94
75-79	94	94	94
80-84	94	92	95
85+	93	92	94
All Ages	85	84	86

Source: GLA calculations based on ONS response rate spreadsheet published on 30 September 2002

particularly men. The differences between the published response rates for men and women of this age were much smaller in 2001 than in 1991, but with the expected revisions to the estimates of the age/sex structure for 1991, the disparity in the rates for young men and women would be smaller. The 2001 response rates for women in their twenties, men aged 30-34 and for pre-school aged children were only marginally higher than the rates for men in their twenties.

The 2001 Census response by age-sex group for England as a whole varied from 98 per cent for men and women aged 70-79 and women in their sixties, to 87 per cent for males aged 20-24. The highest London response rates, as given in Table 2, were for women aged 80-84, with 95 per cent of all women in this age group living in London included on a Census form (92 per cent for Inner London and 97 per cent for Outer London). Across Outer London, the lowest response rate was 80 per cent, for men aged 20-24. In Inner London, the rates for all groups of males aged under 45 and all groups of females aged under 35 were below 80 per cent - just 69 per cent of males aged 20-24. At borough level, the range was from virtually 100 per cent of various groups, such as women in their sixties in Richmond, men aged 80 and over in Sutton and women aged 45-59 in Wandsworth, down to just 55 per cent of both boys and girls aged under 5 in Kensington and Chelsea.

Confidence intervals

Because the ONC process builds on the responses received to create population estimates, there is a level of uncertainty in the resulting figures. The degree of this uncertainty is given by the confidence interval. A wider confidence interval means less certainty in the accuracy of the estimate. The published confidence intervals are at the 95 per cent level. This means that assuming that the 'sample' of results obtained (ie the Census and CCS combined results) were a random sample, then the chances of the true population figures being in the given range are 95%. Table 3 gives the confidence intervals for the ONC estimates for each of the London boroughs.

It is clear from this table that there is a wide variation in the confidence intervals, from ± 1.0 per cent for Havering to ± 5.6 per cent for Croydon. The calculation of confidence intervals takes into account not only the size of the population and the response rate to the Census, but also the sample size and variability of response within the CCS sample and the proportion of the population missed by the Census, but found in the CCS. This is why boroughs with a similar population size and response rate can have very different confidence intervals. For example, Enfield and Wandsworth both had response rates of 89 per cent, and the population sizes are quite similar (274,000 and 260,000 respectively), but the confidence intervals were substantially different at ± 1.8 per cent for Enfield and ± 3.5 per cent for Wandsworth.

The very large confidence interval for Croydon, despite the large population size, which might be expected to have lead to a smaller confidence interval, is probably due to a high degree of variation in the response rates for the Census and/or CCS across and within the age groups. For example, the response rate among an age group such as males aged 30-34 in one part of the borough may have been quite high, in another part of the borough, or among another population sub-group, eg refugees or unemployed people, the response rate may have been much lower. This sort of variation in response rates leads to a larger confidence interval overall.

Table 3 95% confidence interval

	Total Census population	+/-	Lower bound	Upper bound
City of London	7,186	3.8	6,913	7,459
Barking and Dagenham	163,944	2.2	160,337	167,551
Barnet	314,561	1.9	308,584	320,538
Bexley	218,307	1.1	215,906	220,708
Brent	263,463	3.4	254,505	272,421
Bromley	295,530	1.8	290,210	300,850
Camden	198,027	4.7	188,720	207,334
Croydon	330,688	5.6	312,169	349,207
Ealing	300,947	3.3	291,016	310,878
Enfield	273,563	1.8	268,639	278,487
Greenwich	214,540	3.5	207,031	222,049
Hackney	202,819	4.2	194,301	211,337
Hammersmith and Fulham	165,243	3.7	159,129	171,357
Haringey	216,510	3.5	208,932	224,088
Harrow	207,389	2.3	202,619	212,159
Havering	224,248	1.0	222,006	226,490
Hillingdon	242,435	2.0	237,586	247,284
Hounslow	212,344	2.6	206,823	217,865
Islington	175,787	3.8	169,107	182,467
Kensington and Chelsea	158,922	4.8	151,294	166,550
Kingston upon Thames	147,295	1.9	144,496	150,094
Lambeth	266,170	3.1	257,919	274,421
Lewisham	248,924	3.8	239,465	258,383
Merton	187,908	2.0	184,150	191,666
Newham	243,737	4.1	233,744	253,730
Redbridge	238,628	2.3	233,140	244,116
Richmond upon Thames	172,327	1.8	169,225	175,429
Southwark	244,867	3.1	237,276	252,458
Sutton	179,667	1.9	176,253	183,081
Tower Hamlets	196,121	3.9	188,472	203,770
Waltham Forest	218,277	2.4	213,038	223,516
Wandsworth	260,383	3.5	251,270	269,496
Westminster	181,279	4.6	172,940	189,618
Inner London	2,765,975	1.6	2,721,719	2,810,231
Outer London	4,406,061	0.8	4,370,813	4,441,309
Greater London	7,172,036	0.8	7,114,660	7,229,412

Source: Office for National Statistics, 95% confidence intervals spreadsheet incorporating correction published on 15 November 2002

Only Luton, with its response rate of 86 per cent and population of 184,000 had a larger confidence interval than Croydon (± 6.1 per cent).

Quality assurance of the Census estimates

An essential part of the ONC process was the quality assurance checking. The population estimates for each local authority by age and sex resulting from the ONC process itself were compared with figures from a range of administrative sources such as Child Benefit records, pension records, health records, birth records and school census data and with demographic estimates (2000 Mid Year Estimates (MYEs) extrapolated to 2001). Information on particular population sub groups was also obtained, such as university records for students and data on armed forces to compare with the ONC estimates for these groups. Other qualitative information derived from the Census fieldwork and from the ONC estimation process itself, along with any other information such as feedback regarding the rolled forward MYEs and data on underenumeration in 1991 was also used to ensure that the estimates were acceptable.

Imputation

Once the ONC estimates, including the quality assurance procedures, were completed for local authorities, the next stage was adjusting the Census database by imputing people up to the level of the population estimates. While the ONC population estimates define the number of people to be imputed along with some basic information about coverage patterns for other characteristics, it is important that the detailed characteristics of those households and individuals missed by the Census are also included.

Some of the people missing were in households for which there was no Census form returned, ie the whole household was missed, while other people were missing within households for which details of other people in the household were provided, such as where children were missed from Census forms. The characteristics of people within entirely missed households differ from those missed from within otherwise counted households and from the characteristics of enumerated people. Careful matching of Census and CCS data provided information about these key characteristics, so that imputation of people and their characteristics could be carried out as accurately as possible.

In the database, imputed data on households, and therefore the people in them, were placed into either a gap with a physical location identified by census enumerators where no response was received (e.g. absent household, refusal, non-contact), or into areas where similar households already existed. The second stage of the process imputed characteristics for additional people to real households, resulting in a database consistent with the ONC population estimates, representing the best estimate of what would have been collected had the 2001 Census not been subject to underenumeration. Tabulations derived from this database will automatically include compensation for underenumeration for all variables and all levels of geography.

Further information

An illustrative quality assurance pack was issued by ONS at a meeting at the Royal Statistical Society on 31st October 2002. This will eventually be available from the ONS website

<http://statistics.gov.uk/census2001/>, but meanwhile a pdf version of this file is available from the Census Team at the GLA.

Spreadsheets containing response rates by age and sex and the first 2001 Census population figures by age and sex for all local authority districts are available from the ONS website or from the GLA Census website <https://extranet.london.gov.uk/census2001/>. For access to this website, see <https://extranet.london.gov.uk>.

Any further key information that may be published in the future will also be circulated to recipients of Census Information Notes or put on the GLA Census website.

There will be more detail on CCS sample sizes for local authorities, confidence intervals by age/sex group for local authority districts and levels of imputation for individual Census questions at a later date.

¹House of Commons Treasury Committee 'The 2001 Census in England and Wales' First Report of Session 2001-02

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Regular briefings and data from GLA Data Management and Analysis Group

We have instituted a new series of publications, covering all aspects of DMAG work. DMAG Briefings will now incorporate the Census Information Notes (CIN) and Population Advice Notes (PAN), both of which will still appear regularly.

Recent subjects of briefings include:

- Working Families Tax Credit
- ILO Unemployment
- 2001 Census: First Results and Implications for London Plan
- 2001 Census: First Population Statistics

The full list of DMAG Briefings is:

DMAG 2002-1	ILO Unemployment	Lorna Spence	February 2002
DMAG 2002-2	Education in London - Key Facts 1997-2001	Karen Osborne/ Iryna Pylypchuk	May 2002
DMAG 2002-3	Greater London Demographic Review: 2000	John Hollis/Baljit Bains	July 2002
DMAG 2002-4	GLA 2001 Round Ethnic Group Population Projections	John Hollis/Baljit Bains	August 2002
DMAG 2002-5	2001 Census: First Results and Implications for the draft London Plan	John Hollis	September 2002
DMAG 2002-6	2001 Census: First population statistics	Eileen Howes	October 2002
DMAG 2002-7	Mid-year Estimates	John Hollis/Baljit Bains	October 2002
DMAG 2002-8	2001 Census: First population statistics - London Plan Sub Regions	Eileen Howes	October 2002
DMAG 2002-9	Census Information Note 2002-1	Eileen Howes	October 2002
DMAG 2002-10	Ordnance Survey Data - Boundary-Line	Hywel Davies	November 2002
DMAG 2002-11	Ordnance Survey Data - Land-Line plus	Hywel Davies	November 2002
DMAG 2002-12	2001 Census response in London Census Information Note 2002-2	Rachel Leeser	November 2002

If you would like copies of previous briefings, please contact Jackie Maguire at the GLA, jackie.maguire@london.gov.uk. For access to the GLA's extranet sites please contact Michael Minors.

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