BCE/2009/Paper 9

INVESTIGATION INTO GEOGRAPHICAL UNITS BELOW WARDS

Meeting with Ordnance Survey (OS) on 6 August 2009

1. The Secretariat met with representatives to discuss whether a layer of geography exists below that of local government wards that could be used to construct Parliamentary constituencies, if the Commission was required to produce a greater degree of electoral parity than has previously been the case. The intended outcomes from the meeting were:-

a) identification of a layer(s) of geography that could be used; and

b) the cost and time implications of OS digitally mapping the layer so that it could be used in a Geographic Information System (GIS).

2. After an initial explanation from the Secretary as to how the Commission currently constructs constituencies it was agreed that whatever layer of geography was chosen it should, if possible, meet the following requirements:-

a) does the layer have statutory backing – it was accepted that this requirement was unlikely to be met below ward level;

b) can the electorate for the chosen unit be provided or created; and

c) can OS digitally map the unit.

Scotland and Wales

3. As the Secretariat had already looked at the current GIS and mapping arrangements in Scotland and Wales it was firstly agreed to consider whether either offered the English Commission a solution to the problem: two of the OS representatives had working knowledge of the systems currently in place in both countries. However, it was recognised that the arrangements in both Scotland and Wales, where the GIS was jointly used by both the Parliamentary and Local Government Boundary Commissions, allowed the Parliamentary Commissions to have access to digitised data that was created below ward level. Furthermore, the relatively small electorates of both Scotland (2009 = 3,867,785) and Wales (2009 = 2,278,875) meant that it was easier to provide solutions and to resolve any difficulties than would be the case in England with its electorate of approximately 38 million and more than 300 local authorities.

4. Use of the Scottish system, which can work with postcode areas, would require the English electoral registers to be disaggregated by address, with the addresses being matched to postcodes. From the Scottish experience, it was agreed that this would, in all likelihood, produce an unacceptably high level of address mismatches that made the option most

unattractive. It was viable in Scotland, as many years of work had already gone into reducing the level of address mismatches. Graham Head (OS – and, until 31 October 2009, Assessor to the Commission) confirmed that OS had conducted a similar investigation for the Boundary Committee for England (BCE) approximately four years ago which had to be abandoned because of the extremely high incidence of address mismatches. It was also noted that postcode area data, which is owned by the Post Office, is subject to regular change. It was accepted by those present that the Scottish experience did not offer the English Commission a solution.

5. It was also accepted that Wales did not offer a solution that the English Commission could adopt. In Wales, the Commission could use communities (and community wards) to construct constituencies. These are not only digitally mapped but, the Electoral Registration Officers (EROs) supply electorates for them each year. A level of geography based on communities is not available in England.

6. The independence and separation of the BCE and the Commission does not allow for an exchange of data between the two bodies, as is the case in both Scotland and Wales. However, even if the Secretariats to the two bodies worked together as one, such an exchange would not be possible as the BCE does not use digitised data below ward (and parish) level and it has previously decided against the use of postcode geography as postcodes pay no respect to local authority boundaries. There is also the problem of address mismatches referred to in paragraph 4. Therefore, a viable solution is not available from the BCE.

Census Output Areas

7. Consideration was also given to the possible use of the Census Output Areas (COAs) that are produced by the Office for National Statistics (ONS). It was noted that, whilst a set of digitally mapped COAs already existed (owned by ONS), the data relating to them would be at least ten years out of date before their possible use by the Commission. ONS has informed the Secretariat that it has created population estimates for each of the 2001 COAs, for each year since 2001 and for each age group: the latest estimates being 2008. These data are not routinely published but, it may be possible for ONS to make the data available to the Commission. Whilst ONS envisage that the majority (95%) of the COAs used in the 2001 census will be used for the 2011 census, it is estimated that some 5% will need to be changed, but the degree of change, and the nature of that change, will not be known until after the 2011 census has been undertaken.

8. However, as stated above, COAs are based on ONS population estimates, whereas it is expected that the Commission will be required to base its recommendations on the number of registered electors in the year on which the review commences. If ONS agreed to release the COA digital data, it would be necessary to construct the electorates for each COA. This would require the Secretariat to disaggregate the electoral registers with the resulting problem of address mismatches referred to earlier. This would be a task of enormous proportions to undertake for the whole of England and would, in all likelihood, considerably delay the start of a review. Therefore, it is considered that COAs are not a unit of geography that can be used in the construction of constituencies.

Polling Districts (PDs)

9. Some of the OS representatives were already aware of the work the Secretariat had conducted into the possible use of PDs. It was noted that, whilst PDs were created by individual EROs and changed by them when necessary, electorates for them did exist and, in many rural areas, they would comprise whole (or part) parishes which were already digitally mapped by OS in its Boundary Line product (used in the Commission's GIS). It was considered that, whilst using a set of boundaries that might be subject to relatively frequent change could be perceived as a problem, it might not prevent them from being used: after all, local government boundaries changed regularly and had done so throughout the last three general reviews.

10. OS considered that it might be possible to create a digital set of PD boundaries and agreed to conduct some tests based on PD information for a small number of areas – one rural, one semi-rural, and two urban (neighbouring boroughs) – that the Secretariat would supply.

Supply of Polling District Data to OS

11. In order to provide OS with sufficient data to conduct its tests, the Secretariat contacted eleven local authorities in mid-August who were asked to supply, if they were able, paper maps showing their PDs and/or ESRI shape files [a shape file is a digital representation of a geographic area], either on cd or electronically. It was requested that the information be provided, if possible, by the end of August. The response was generally good and the Secretariat received the information it had requested from a number of urban councils: Birmingham (the largest in England), Westminster, Lincoln, and Bexley and Greenwich (neighbouring London boroughs), and paper maps were received from Doncaster, which is both urban and rural in nature. However, no information was received from what could be described as a completely rural authority.

Questionnaire to EROs

12. It was agreed that whilst the test was being conducted – and this would take some months due to the other commitments OS had – it would be very useful to assess how many EROs held the boundaries of their PDs in digitised form and whether they would be able to supply that information to the Commission. OS considered that this might reduce considerably the amount of digitising that it would have to do if it was decided to create a digitised set of PDs.

13. A questionnaire was sent by email to the EROs of the 325 councils in England (i.e. all except the Isles of Scilly) during the last week of August. The email explained that the Commission was investigating whether a unit of geography existed below ward level that it could use, if required, to create constituencies. It was explained that the unit would need to be one for which electoral statistics could be made available and one which could be digitally mapped for use in a GIS. The email also informed EROs that the Commission was conducting the investigation jointly with OS and asked, as a first step, whether it would be possible to supply information by 30 September 2009 relating to PDs in one or more of the following formats:-

a) as shape files that could be used in a GIS;

b) as paper maps that could be digitised to create shape files; or

c) as a listings of postcode.

Initial Analysis of Questionnaire returns

14. By 12 October, replies had been received from 188 councils: a response rate of only 57.8%. Whilst such a low response rate must be considered alongside the fact that the information was requested from the EROs at what is a particularly busy time for them - as they compile the new electoral register before its publication on 1 December 2009 - it is indicative of some of the difficulties that the Secretariat has previously encountered obtaining information and data from EROs: even where there is a statutory obligation on them to provide it.

15. Of those that responded, 98 (30.1%) EROs said they would be able to supply the data either as shape files or in a similar format. In rural areas, some EROs commented that, whilst they had access to digitised maps of parishes, which were generally the same as PDs, where a town was divided into wards, this was not always mapped electronically. Whilst nearly all EROs should be able to supply lists of postcodes within a PD, it was noted that several of those who responded commented that some postcodes were divided between PDs, which may cause problems when trying to map PD boundaries. Only 18 (5.5%) EROs of those that responded confirmed that they would not be able to supply PD information in any of the requested formats.

16. A number of the EROs who responded also made comment on the possible use of PDs as building blocks to assist in the creation of constituencies. Whilst some noted that it was a logical decision to use PDs, if wards proved no longer to be a suitable option, others were opposed to the idea of using a building block smaller than a ward. The most common comment concerned the fact that PD boundaries were subject to frequent change. Some EROs did not want to have the process of creating PDs, which is done for purely administrative purposes, being "politicised". It was also noted that PD boundaries did not necessarily follow any geographical features and did not respect local ties. In more rural areas, it was stated that PDs varied considerably in electoral size, from the very small (40 electors) to very large (2,500 electors). However, it should be noted that in rural areas a unit of geography below wards is less likely to be required and that it will be in the urban areas where a unit with 2,500 electors would be most helpful in assisting with achieving electoral parity. Some EROs also mentioned that many local authorities will be due to review PD boundaries in 2011.

17. A small number of EROs raised issues relating to copyright. There were concerns as to whether the agreements they had with OS permitted them to supply the Commission with copyrighted material. Other EROs were concerned that, whilst they had created the PDs for their own administrative purposes, if OS re-created them as a digitised dataset for the Commission, it might then adopt them as part of its own dataset and seek to supply that data back to their councils within the OS copyrighted data, thereby charging their councils for data that they had originally created.

18. The Secretariat is not convinced that the frequency of changes to PDs should be a problem for the Commission (although it might be unpopular with EROs), since it would be

the PD data for a particular moment in time that would be used by the Commission. Therefore, subsequent changes to PD boundaries would have no impact upon the Commission's recommendations for a particular area. However, it could mean that the PDs that the Commission use might bear little resemblance to the PDs in force in a particular area when a review of constituencies is completed. Given that many councils will be reviewing their PDs in 2011, it may just be that they will be an appropriate unit to use in those areas where electoral equality is difficult to achieve as the legislation requiring the Commission to undertake a reducing review may not receive Royal Assent until some time after their creation.

19. Should a decision be made to use PD data as a geographical unit for assisting the achievement of greater electoral equality, it should be noted that there could be some opposition from those that would be required to provide the data. Additionally, there will be others issue such as copyright to resolve and the usual difficulty with ensuring a 100% compliance to any request for information.

Meeting with OS on 2 October 2009

20. The Secretariat met with members of OS to demonstrate how the Commission uses its GIS to construct constituencies and to discuss the issues the Secretariat currently faces when trying to create constituencies with electorates as close to each other as practicable. Although OS had not completed its work based on the creation of PDs for the areas that the Secretariat had supplied information for, the work undertaken at that stage had been very useful and had given OS an indication of the difficulties that were likely to be encountered.

Copyright

21. Although the OS representatives acknowledged that they were not experts in copyright, they considered that there was likely to be an issue about who owned the copyright for the PD data that had been created by EROs and that this could be a source of grievance to the local authorities. However, this might not necessarily prove to be the case as the OS representatives made it very clear that OS had no interest in the use of PD geography and was unlikely to want ownership of it. They considered that the PD data supplied to the Commission would be covered by the existing Pan-Government Agreement on the supply and use of OS data.

22. It was also the view of the OS representatives that if a complete set of digitised PDs was created, it was most likely that the Commission, as the organisation commissioning the work and its main user, would, by default, become the custodian of the data. It was thought that this would impose a number of legal responsibilities on the Commission for the secure handling of the data, for providing requests for the data to be made available in the pubic domain, and in compliance. However, the Secretariat consider that this may not be quite the problem envisaged by OS since the data would only be used once and would be quickly superseded by later changes made to the PDs by the EROs. Also, the digital dataset which would be created as shape files would hold no data from which individuals could be identified and the dataset could be made freely available on request. However, the Secretariat accept that these aspects would need further investigation to obtain definitive guidance.

PD Data

23. OS confirmed that the councils that supplied PD data to the Secretariat appeared to have gone about creating it in different ways. OS confirmed that, ideally, every council would provide data to them that had been created in exactly the same way. However, from the limited experience of the exercise, it was quite likely that a large number of different solutions had been adopted by the 325 councils: if so, this would cause considerable difficulty for OS. It was recognised that the Commission would have to rely upon the co-operation and goodwill of the councils as no statutory requirement existed which required the councils to provide data in a particular way and it was unlikely to be introduced.

Paper Maps

24. OS discovered that one of the councils that responded to the Secretariat's request for PD data (Doncaster) had captured it at one scale of mapping and had then imposed the boundaries onto another scale of mapping. When OS tried to change this back to the original scale they found that the data was vague and inaccurate and that a number of addresses would be hidden by the thickness of the boundary lines on the map. In such a situation, decisions would have to be made regarding which side of the boundary an address should appear – a manual process that would take a considerable amount of time if a number of local authorities had used a similar process. OS concluded that digitising the data in these circumstances would not be worthwhile as the scale used to capture the data would not provide an accurate enough picture.

ESRI Shape Files

25. OS considered that it should be reasonably straightforward to convert any MapInfo [another GIS software] file of PD data into an ESRI shape file. OS looked at the data supplied by the two neighbouring London boroughs (Bexley and Greenwich). Whereas Bexley had carried out a topology run on the data, which resulted in all the PD boundaries being coincidental, Greenwich had not. Although Greenwich had captured each PD polygon, the result was that the boundaries of some polygons overlapped with neighbouring polygons or fitted awkwardly, resulting in parcels of land that fell between each polygon or were shared. In theory, this should not mean having to calculate the number of electors in those areas that overlapped, although it would require OS to run a topology program to "tidy-up" the boundaries where polygons did not have a fully coincident boundary. However, even when the topology program was run on the Greenwich shape files, there were still mismatches due to the different scales that had been used.

26. During the fifth general review, ESRI(UK) had to perform a similar tidying up exercise with each of the data sets (wards for a district) produced by OS. This proved to be both a time consuming and expensive exercise. Clearly, if OS has to run a topology program on the raw data provided by the local authorities, it will involve more time and expense.

Postcode Data

27. The Secretariat had also supplied OS with a spreadsheet of postcode addresses for Oadby and Wigston (Leicestershire). OS had geo-coded this spreadsheet and this had highlighted duplicate addresses due to multi-occupancy dwellings. Furthermore, it was noted

that unless the address data supplied in the spreadsheets is compiled in a completely consistent way (e.g. road in column 2, town in column 3, county in column 4) some of the address matching software would be unable to tabulate the data. This would, therefore, require the Secretariat to undertake a considerable administrative task to ensure that all the postcode address spreadsheets for the whole of England were compiled and provided in exactly the same format.

Address Mismatches

28. OS used "Quick Address" software on the Doncaster data and this identified a very high level of address mismatches. Whilst there was a complete fit in approximately 90% of the addresses, with a further 5% of "good matches" at town and street level, there was a 4% match at street level which was considered "dubious". For 1% of the addresses there was no match at all. This suggests that as many as 5% of all addresses could contain mismatches which could only be resolved manually. With an English electorate of 38 million there is the potential for as many as 1,900,000 address mismatches that would require manual resolution.

The OS Grid Network

29. OS also considered whether some software programs they use to create polygons would offer a solution to the problem of identifying a geographical unit below ward level. However, they immediately noted that none of the softwares would enable the creation of polygons that would exactly match the external boundary of a ward. Therefore, the polygons would need to be individually adjusted to fit to ward boundaries.

30. As part of its data capture exercise for its own mapping purposes, OS has divided the whole of England into a grid network (1 kilometre square). The OS retains data for each address in each grid square but, in order to provide a consistent, accurate and viable dataset, OS would also need to identify the addresses in the part of the grid square that extended beyond the ward boundary. Once identified, these would then have to be cropped in order to provide the correct number of addresses for each grid square or part of a grid square within a ward. Whilst it would be possible to do this for the whole of England, it would be an enormous task to calculate the number of addresses to be cropped or added to each polygon and to then stitch the polygons together to create the wards. However, the creation of these polygons would bear little relationship to physical geography or communities.

<u>Next Steps</u>

31. It was agreed that OS would continue to explore the possibility of creating polygons from the grid network and would undertake further work on producing a more accurate PD dataset. The Secretariat and OS representatives will meet again (probably in the New Year), once the tests have been taken forward.

<u>Conclusions</u>

32. It would appear that none of the options considered as a possibility for providing a unit of geography below ward level, for which electorates could be supplied/created and for which digital mapping could be created, is without substantial problems that would involve lengthy and costly solutions. Neither the potential Scottish solution of using postcodes, which would

result in an unacceptable level of address mismatches, nor the potential Welsh solution of using Communities, which do not exist throughout England, offer an appropriate solution for England.

33. Census Output Areas (COAs) are not considered a viable option as those used for the 2001 census will be very much out-of-date by the time a review commences and those that are likely to be created by the 2011 census may not be available early enough to be of assistance to the Commission. Further, whilst ONS could provide statistics relating to population projections for each COA or could provide a population projection based on age profile (18+) for each COA, the Commission are required to use actual electors who appear on the electoral register at the date a review commences; this data is not available for COAs and would be difficult to create.

34. Whilst initial analysis suggests that it would be possible to create a digital dataset for PDs, and electorates already exist for them, such an approach would not be without the difficulties identified earlier and such a solution appears likely to require a large level of resource: both time and money (as yet unquantifiable), as well as the procurement of a completely new GIS solution. Additionally, it would also require a level of co-operation from each of the local authorities in England that past experience suggests would not be achieved. Even if the highest level of co-operation was achieved, it would still be most likely that the data would be subject to a considerable degree of inaccuracy that OS would be required to resolve.

35. Finally, although using OS grid squares would appear to be the easiest and quickest method of creating polygons at sub-ward level, there are concerns about the robustness of this method. It is also understood that it would not be possible to undertake this exercise for the whole of England at one time due to the size of the task. However, the main concern with the use of OS grid squares would be the need to create the electoral statistics for each polygon created from them, as it would inevitably produce a similar degree of address mismatch to that set out in paragraph 28.

36. In view of the above, Members will wish to consider whether any of the options set out above offers a viable unit of geography below ward level that should be explored further. If it is considered that none of the options provides an acceptable solution, within the constraints of the Commission's current GIS solution, then it is suggested that the focus should move from identifying an alternative geographical unit below ward level to persuading officials, politicians and their advisors that a more flexible tolerance (5-7.5%) than the 5% reported in the media should be adopted for creating constituencies during a reducing review.

<u>Review of constituencies with an Electoral Quota of 77,000</u>

37. The Secretariat has completed a preliminary review of constituencies in England based on an Electoral Quota (EQ) of 77,218. Members are asked to note Appendix A which analyses the results of the review. By review area, it shows:-

a) the number of constituencies that have been created – a total of 489 (a 8.26% reduction);

b) the number that fall within a 5.0% tolerance of the EQ – a total of 414 (84.7%);

c) the number that fall between a 5.0% - 7.5% tolerance – a total of 63 (12.9%);

d) the number that fall between a 7.5% - 10.0% tolerance – a total of 11 (2.2%); and

e) the number more than 10% from the EQ - one.

38. The Secretariat will be undertaking further work on the internal review in order to further reduce the number of constituencies with electorates that are in excess of 5% of the EQ. The results of this exercise, and maps of the schemes created, will be available for Members (Mr N Pringle and Mr D Elvin) if they are able to visit the Secretariat's offices in the New Year.