ORS Housing Mix Model
Technical Paper:

1. This paper provides a technical overview of the ORS Housing Mix Model, including information on the data sources, key assumptions and the way in which the Core Outputs are derived.

2. Reference is made as appropriate to the Strategic Housing Market Assessment Practice Guidance (Version 2) issued by the Department for Communities and Local Government (CLG) in August 2007, to demonstrate the way in which the Housing Mix Model provides robust and credible evidence to inform Strategic Housing Market Assessment Core Outputs.

Introducing Strategic Housing Market Assessments

3. Strategic Housing Market Assessments (SHMAs) aim to provide evidence to inform policies about the level of affordable housing required and aimed at providing the right mix of housing across the whole housing market (both market and affordable housing).

4. The Practice Guidance for undertaking SHMAs outlines the process criteria required and sets out eight Core Outputs that need to be provided as a minimum in order for SHMAs to be considered robust and credible. The SHMA Core Outputs are summarised in Figure 1, which also identifies that the ORS Housing Mix Model provides three of the eight Core Outputs required.

Figure 1
CLG SHMA Practice Guidance Figure 1.1 – Core Outputs

	SHMA Core Outputs	Core Output from Housing Mix Model
1	Estimates of current dwellings in terms of size, type, condition, tenure	-
2	Analysis of past and current housing market trends, including balance between supply and demand in different housing sectors and price/affordability. Description of key drivers underpinning the housing market	-
3	Estimate of total future number of households, broken down by age and type where possible	-
4	Estimate of current number of households in housing need	-
5	Estimate of future households that will require affordable housing	YES
6	Estimate of future households requiring market housing	YES
7	Estimate of the size of affordable housing required	YES
8	Estimate of household groups who have particular housing requirements e.g. families, older people, key workers, black and minority ethnic groups, disabled people, young people	-

5. The Practice Guidance also provides advice on the issues that should be considered when deriving the Core Outputs – but it is not prescriptive in its approach, and notes (page 9):

> *Housing markets are dynamic and complex. Because of this, strategic housing market assessments will not provide definitive estimates of housing need, demand and market conditions. However, they can provide valuable insights into how housing markets operate both now and in the future.*

6. Practice Guidance also promotes the use of secondary data where appropriate and feasible, recognising that they can provide consistency between different housing market areas, reflect actual behaviour and events rather than aspirations, are often cheaper to obtain than primary data and allow the monitoring of trends, usually on an annual basis. They can also provide a picture of market conditions based upon small areas and are less affected by methodological problems of bias than surveys. While secondary data studies can have limitations such as understanding household aspirations and recent trends in housing market drivers, many local authorities have sought to move towards exclusively secondary data housing assessments.

7. Within this context, the Housing Mix Model developed by Opinion Research Services is based exclusively on secondary data from a wide range of sources. In particular, the model has been designed to help understand the key issues and provide insight into how different assumptions will impact on the required mix of housing over future planning periods. The secondary data used in the model includes evidence collected by Opinion Research Services from primary data surveys across the country. However, this data is only used to help underwrite parts of the model such as the household income profile. No local survey data is required for the model, so it can be run in any area of the country from secondary data sources only.

The Future Housing Market

8. In considering the future housing market, the Practice Guidance recommends that housing market partnerships should base their analysis on the most recent official government population and household projections. Such projections are trend-based, so the Practice Guidance also suggests that partnerships undertake sensitivity testing of likely future household growth by varying the assumptions underpinning change and considering the impact of housing led forecasts.

9. The Practice Guidance recognises that future housing demand is extremely difficult to quantify – so partnerships are encouraged to ensure that the evidence brought together enables the identification of high-level messages about the key trends and drivers to which future policies will need to respond (including an estimate of the scale of future housing requirements based on net household projections) rather than aiming to pin down numerous details. It is also recommended that partnerships consider affordability trends, to understand how changes in affordability might affect the future housing mix.

10. Many County Council and Unitary Authority Research and Information Units already undertake demographic work to inform a wide range of strategic policies – therefore it is not normally necessary for SHMAs to produce independent household projections. Using existing projections can provide consistency in planning across the range of different service areas covered by Local Authorities and other public services; therefore it is helpful for SHMAs to base their analysis on existing projections.

11. For this reason, the ORS Housing Mix Model builds on existing household projections to effectively profile how the housing stock will need to change in order to accommodate the projected future population. Assumptions on changes in affordability and the projected relationship between future housing costs and household income are readily updateable to enable effective sensitivity testing to be undertaken.

Housing Need

12. The Practice Guidance considers the future housing market from a high-level, strategic perspective; considering how key drivers and long-term trends will impact on the structure of the household population over the full planning period. In contrast, the approach suggested for assessing housing

need adopts a low-level, operational perspective; focussing on short-term trends and individual household transactions considered on a year-by-year basis. Furthermore, whilst the Practice Guidance seeks to understand affordability in the context of the future housing market, the affordability analysis for assessing housing needs again focuses on current household incomes and housing costs.

13.   The approach suggested for assessing housing need includes many aspects which are a legacy from the earlier guidance "Local Housing Needs Assessment: A Guide to Good Practice" published by the Department for the Environment, Transport and the Regions (DETR) in July 2000, which is one of the documents that the SHMA Practice Guidance supersedes.

14.   Whilst the suggested approach builds on a well-established framework, unfortunately it does not comfortably reconcile with the strategic nature of SHMAs in the same way as the proposed methods for considering the future housing market. This in itself is not a problem – but one of the key questions for partnerships to consider in relation to the assessment of housing need is (page 53):

How does the net annual need figure compare to the estimate of total future annual change in total numbers of households derived from Chapter 4 [the future housing market]? What are the implications of this in terms of estimating the number of households requiring market housing?

15.   In order to meaningfully compare the assessment of housing need with the change in total numbers of households (and the overall requirement for additional housing), both numbers need to be derived in comparable ways – either focussing on short-term trends and individual household transactions on a year-by-year basis, or alternatively considering key drivers and long-term trends over the full planning period.

16.   ORS has a well-established model – the ORS Housing Market Model – that considers housing need in the context of overall housing requirements on a short-term basis, which has withstood scrutiny at numerous Planning Inquiries since its inception in 1995. Nevertheless, this model is dependent on a significant amount of local-based information about current, past and future household circumstances, which requires primary data gathered through detailed personal interviews.

17.   The ORS Housing Mix Model used for this study considers both housing need and overall housing requirements on a longer-term basis, providing robust and credible evidence about the required mix of housing over the full planning period and understanding how key housing market drivers (such as affordability) will impact on the appropriate housing mix.

18.   In order to provide this long-term context for understanding housing needs, the Housing Mix Model does not adopt the granular approach suggested by the Practice Guidance in the housing needs chapter; but instead it further develops the approach suggested by the Practice Guidance in the chapter on the future housing market.

Satisfying the Practice Guidance Requirements

19.   The Practice Guidance is not a prescriptive document, but a tool to assist partnerships conducting SHMAs.

20.   It recognises that different studies will adopt different approaches to deriving the required Core Outputs, and as long as the SHMA clearly satisfies the required process criteria (including ensuring that assumptions, judgements and findings are fully justified and presented in an open and transparent manner; a full technical explanation of the methods employed is included; and that house builders and
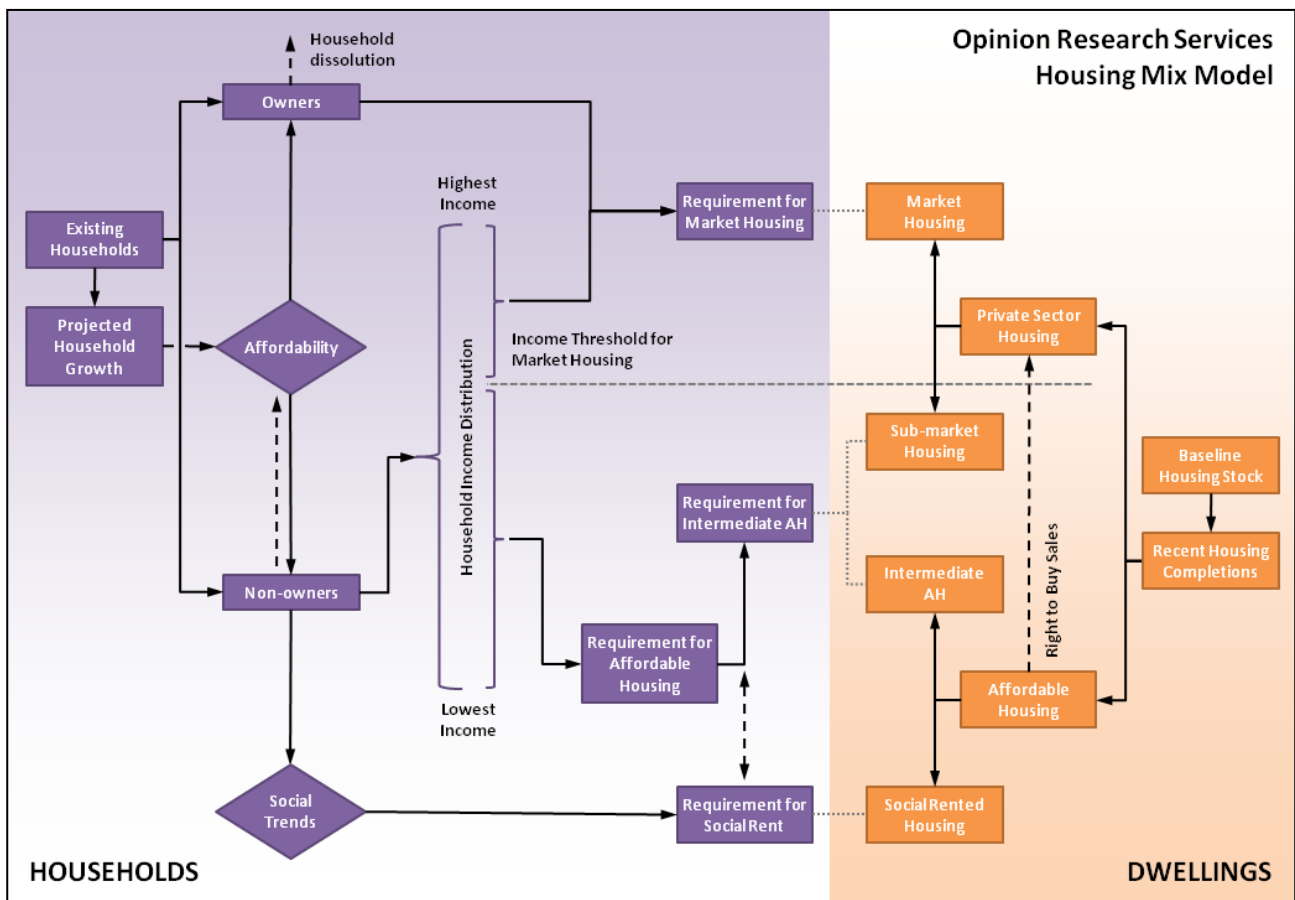
21. Strategic Housing Market Assessment Practice Guidance (Version 2) states that, 'There is no need for the approach used to be considered at the independent examination. Any discussion at should focus upon the assessment's findings'. Therefore, Practice Guidance is not prescriptive on how a study should be undertaken, only on the outputs it produces.

Introducing the ORS Housing Mix Model

22. The ORS Housing Mix Model is based exclusively on secondary data from a wide range of sources. It has been designed to help understand the key issues and provide insight into how different assumptions will impact on the required mix of housing over future planning periods.

23. The model builds on existing household projections to effectively profile how the housing stock will need to change in order to accommodate the projected future population. Assumptions on changes in affordability and the projected relationship between future housing costs and household income are readily updateable and are easily fed into the model to enable effective sensitivity testing to be undertaken.

24. Both housing need and overall housing requirements on a longer-term basis are considered by the mdoel, providing robust and credible evidence about the required mix of housing over the planning period and understanding how key housing market drivers, such as affordability, will impact on the appropriate housing mix. For affordable housing the balance between intermediate affordable housing and social rented housing is estimated.

25. The model has been specifically designed to provide strategic information which covers extended planning periods. Therefore, it has not been designed to provide a snapshot of the current housing market or to provide detailed information for very localised areas.

26. The ORS Housing Mix Model is contained within an Excel spreadsheet which has been provided to the authority. The model has been produced in a manner which allows the authorities to update with new data and to sensitivity test with different assumptions.

27. Figure 2 provides a detailed overview of the structure of the Housing Mix Model and the way in which the different stages of the model interact.

   ▪ The left hand section of the diagram considers households in terms of the baseline population and projected household growth, and their associated affordability and housing requirements.

   ▪ The right hand section of the diagram considers the dwelling stock in terms of the tenure and housing costs for both the existing stock and the recent housing completions.

28. The Housing Mix Model considers the projected household population alongside the existing dwelling stock in order to establish the necessary balance between Market Housing and Affordable Housing in relation to the additional dwellings to be provided, and within the Affordable Housing dwelling provision the appropriate role of Intermediate Affordable Housing and Social Rented Housing. The model can provide results at any level of geography for which household projections exist. The results for each level of geography are based upon data which directly relates to the area under consideration.

29. The following sections set out the operation of individual components of the model in further detail. References to data sources are highlighted in **bold** with references to assumptions in *underlined italics*.

Establishing the Affordability of Owner Occupation

30. To establish the number of household who can afford owner occupation requires a deeper understanding of household affordability. To understand affordability it is essential to consider the equity that existing owners have in their current home alongside household income. Many existing owners would be unable to afford to purchase a suitable home on the basis of their income alone – although they were able to afford when they first entered home ownership, and can now benefit from the equity that has appreciated in their property as house prices have increased.

31. Whilst some homeowners may move back into rented accommodation during later stages of their housing career, the substantial majority will continue to own their own home. For this reason, it is important that the model considers the requirements of owners and non-owners separately –

therefore the first stage of the model separates households into these two groups on the basis of baseline **information about existing households taken from the 2001 Census**.

32. The model utilises **household projection data**. These do not provide information about changing tenure patterns; therefore the model seeks to divide additional households into owners and non-owners on the basis of an affordability assessment.

33. The affordability assessment considers the ability of newly forming households to afford market housing, but also the changing patterns of existing households to afford their housing costs. It is important to recognise that the income distribution is cyclic to an extent – young households will tend to have lower incomes, incomes will tend to increase during the period that households are economically active and working (some incomes only changing marginally whereas others increasing more significantly), and finally incomes will tend to reduce later in life as households retire from paid work and subsequently as pensioner couples become single pensioners following the death of one partner.

34. In this context, many households will not be able to afford home ownership at the time that they initially form – but changing circumstances will enable them to move from rented to owned accommodation later in their housing careers. For this reason, the affordability assessment considers wider affordability across the full income distribution rather than focussing only on the income of newly forming households at the time that they form. The analysis assumes that the income distribution of non-owners remains constant over time so the same proportion of non-owner will have incomes in any income band at any point in time.

35. The model also takes account of the household dissolution of existing owners that is projected to occur over the household projection period (based on **Government Actuaries Department survival rates and 2001 Census data on the tenure mix for older households**), offsetting this loss of owner occupiers against any new owners identified through the affordability analysis.

36. The outcome of this stage of the analysis is to establish the number of households who are owners and non-owners at each stage of the given household projection. This balance will be sensitive to assumptions about *affordability* and the *long-term relationship between house prices and incomes*.

Establishing the Income Threshold for Market Housing

37. To assess household affordability, it is necessary to profile the income distribution of households in the study area. ORS has developed a model for profile the income distribution of households from secondary data sources. Information on this model can be found in Appendix A of this Technical Paper.

38. For the cost of market housing, by taking information from the **Land Registry transaction database for April 2007 to March 2008**, it is possible to profile the distribution of purchase prices for properties across a given area. Combining the Land Registry data with information from the **2001 Census on the balance between owner occupiers and private renters** (specific to the location and property type of each sale) the model establishes the likelihood of the transaction being a property that will be occupied by the purchaser or let privately. Areas with higher levels of private renting at the time of the 2001 Census are assumed to contain more private rented dwelling now and the private rented sector is also assumed to turn over more quickly than owner occupied dwellings.

39. For those properties that are likely to be owner occupied, the Housing Mix Model translates the recorded purchase prices into the household income that would be required to purchase each property

by taking assumptions about _mortgage income multipliers_ and _deposit levels_. The profile of required incomes will be sensitive to these assumptions about affordability.

40. For those properties that are likely to be rented privately, the Housing Mix Model translates the recorded purchase prices into the household income that would be required to rent each property by taking assumptions about _rental yield_ and _income multipliers relating to the proportion of weekly or monthly household income to be spent on rent_. The profile of required incomes will be sensitive to these assumptions about affordability and rental yield.

41. The Housing Mix Model considers both housing cost distribution profiles in order to establish the distribution of incomes required to access private sector housing. This profile is considered alongside the income distribution profile for non-owners. The income threshold for market housing is set at the level where there is sufficient private housing available to house all of the identified non-owners within the income group. If there is less private housing available than households seeking that housing, affordable housing will be required to address the shortfall and therefore the threshold price for market housing must be set above this level.

42. There will be some private housing affordable to households with incomes below the income threshold for market housing adopted by the Housing Mix Model. This is consistent with the Practice Guidance, which suggests the use of private sector lowest quartile prices as thresholds for market housing – therefore (by definition) leaving a quarter of private sector housing below the market threshold. The Housing Mix Model considers all private sector housing which is affordable to households with incomes below the income threshold for market housing as "Sub-market Housing".

43. The process described above can be visualised in Figure 3. The chart splits household incomes and the affordability of the existing housing stock in £5,000 bands. The dotted line shows percentage of all households who have no existing equity in their current homes by their income band. As an example, around 2% of all existing households have no existing equity in their current home and have household incomes in the range £20,000-£24,999.

44. The bars on the chart show the percentage of the current housing stock which is affordable to households with no existing equity in their home by income band. Each bar represents the additional housing which is affordable if household income increases from one band to the next. Therefore, around 2% of the total housing stock becomes affordable if household income rises from the band covered by £15,000-£19,999 to the band covered by £20,000-£24,999. Properties which would only be affordable to households with no existing equity in their home who have household incomes over £100,000 have been excluded from the chart, so the total stock does not sum to 100%.

45. The percentage of the dwelling stock which becomes affordable as household income increases is split by tenure, with all of the social housing stock being assessed as being affordable to households with incomes of less than £15,000. Therefore, when household income reaches £20,000-£24,999, the chart shows nearly 1% of the stock becomes available to buy and just over 1% becomes available to rent.

46. The chart therefore highlights the lack of housing which is currently available to households with incomes of £15,000-£24,999 with a greater share of households having incomes in this range than dwelling stock being affordable to them. There is also a shortfall of owner occupied dwellings up to household incomes of £29,999. It should also be remembered that some of the cheaper properties may be occupied by households with higher earnings than are technically required to service the

housing costs on those homes on the basis of the proposed CLG affordability tests and therefore the gaps in the available housing stock will be even larger.

Figure 3
Affordability of Housing Stock for Non-owners

Establishing the Requirement for Market Housing

47. Once the Income Threshold for Market Housing has been established, the Housing Mix Model can establish the number of households who are non-owners that can afford market housing. Combining this with the projected number of owner occupiers establishes the total number of households requiring market housing within the area.

48. The total number of market homes required can then be estimated by considering the overall number of households requiring market housing alongside assumptions about the *proportion of dwelling stock that is vacant or occupied by second home owners* who are not counted within the number of households normally resident.

Establishing the Requirement for Affordable Housing

49. The requirement for Affordable Housing can be established by offsetting the total number of households requiring market housing (as calculated above) from the **overall household projections**.

50. The Housing Mix Model considers the need for Social Rented Housing on the basis of social trends. By considering each type of household within the household projections individually, the model establishes the way in which their dependency on social housing has progressively changed over the 20-year period 1981-2001 on the basis of **tenure data from the 1981, 1991 and 2001 Censuses**. The overall social trend is compared to **tenure data from annual Housing Strategy Statistical Appendix submissions to CLG (from 1997 onwards)** to confirm the accuracy of the model projections.

51. The social trends for each household type are then applied to the **household projection data** to establish the level of social rented requirement for future years for each type of household. The model is therefore underwritten by long-term social trends rather than short-term affordability considerations. Considering the collective requirement for all households, the model establishes a total requirement for Social Rented Housing. The model for social rented requirement does not require an understanding of dissolution and formation rates among households because it is based on demographic trends and not affordability.

52. The requirement for Intermediate Affordable Housing can be established by offsetting the total number of households requiring Social Rented Housing from the projected number of households requiring Affordable Housing overall. Therefore the Intermediate Affordable Housing represents a residual obtained by calculating the number of households who can afford market housing and those requiring social housing and subtracting these numbers from the total housing requirement. If affordability changes the intermediate and market housing requirement will move in opposite directions, but the social housing requirement remains unchanged as it is controlled by demographic factors.

53. Once again, assumptions can be taken about *vacancy rates within the affordable housing stock* to establish the overall affordable housing requirement.

Establishing the Housing Stock Profile

54. To establish the housing stock profile, the Housing Mix Model considers the baseline **housing stock from the 2001 Census broken down by tenure** and supplements this information with data on housing completions broken down by tenure reported within **Local Authority Annual Monitoring Reports**.

55. The Housing Mix Model also considers data on losses from the affordable housing stock based on **Local Authority returns to CLG about Right-to-Buy sales**, and projects the likely future losses from stock on the basis of trends in sales since the change in legislation.

56. The private sector housing stock is divided into Market Housing and Sub-market Housing on the basis of the analysis employed for Establishing the Income Threshold for Market Housing – where any private sector property that is affordable to households with incomes below this threshold point is considered Sub-market Housing and all other private sector housing is considered Market Housing.

Establishing the Tenure Mix for Additional Housing Provision

57. The Housing Mix Model considers the future requirement for Market Housing alongside the stock of Market Housing to establish the net additional dwellings that are required to be provided as Market Housing.

58. The future requirement for Intermediate Affordable Housing is considered alongside the stock of existing Intermediate Affordable Housing and also the stock of Sub-market Housing (which is affordable to households on incomes below the Income Threshold for Market Housing) to establish the net additional dwellings that are required to be provided as Intermediate Affordable Housing. The shortfall would need to be provided as Intermediate Affordable Housing (including appropriate occupancy constraints) in order to ensure that it meets the needs of lower income households.

59. The future requirement for Social Rented Housing is considered alongside the stock of existing Social Rented Housing to establish the net additional dwellings that are required to be provided as Social Rented Housing.

Establishing the Size Mix for Additional Housing Provision

60. The Housing Mix Model considers the nature of **housing that was occupied by different household types in terms of size and tenure on the basis of information from the 2001 Census**, which recognises that many households will under-occupy their homes (and choose to live in larger properties than they technically need on the basis of the bedroom standard set out in the Housing Act) – although housing allocation policies will mean that social tenants will tend to be less likely to under-occupy their homes.

61. This trend-based occupancy profile is applied to the projected household mix in terms of the type of household in each housing tenure to establish an overall size mix of future housing requirements. This is then set alongside information about the existing housing stock to establish the net additional dwellings that are required to be provided within each tenure split by size. This information is provided on the basis of the total number of rooms, due to limitations of outputs from the Census data. The output is transformed to provide information on the number of bedrooms by applying a profile based on existing **primary data from a number of household surveys**.

Appendix A: Profiling the Household Income Distribution from Secondary Data Sources

62. To assess household affordability, it is necessary to profile the income distribution of households in the study area. , Practice Guidance identifies a number of models are available that estimate household income at a local level, but many only provide an estimate of the mean or median income for the area and do not provide detail on the income distribution.

63. In developing the Housing Mix Model, ORS recognised the need for local level data about household incomes and secured a license to use the CACI Paycheck data within the model. This dataset provides information at both postcode level, detailing the mean and median income for the area and also the number of households in each £5,000 income band ranging from "Less than £5,000" through to "95,000 but less than £100,000", and also those with incomes of "£100,000 or more".

64. Since 1995, ORS has undertaken many thousands of detailed personal interviews to inform Housing Requirement analysis across a wide range of different local authority areas across England and Wales. These interviews have gathered a substantial amount of factual data about households' housing circumstances, including household income.

65. We have been able to establish that a good correlation exists between relative average incomes reported by the CACI data and the results from primary data in the areas where we have conducted household surveys. Nevertheless, analysis of the two sources shows a substantial discrepancy between the CACI income distribution and the household survey data.

66. Figure 4**Error! Reference source not found.** illustrates the income distribution for a sub-region where a household survey of over 5,000 personal interviews was conducted (and weighted to compensate for identified non-

Figure 4
Comparison of Income Distribution from Household Survey Data and CACI Paycheck Model
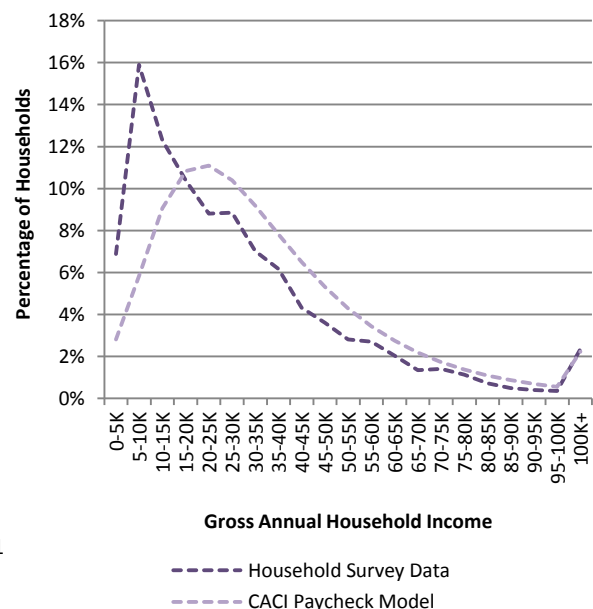
response bias) alongside the equivalent distribution from the CACI model.

67. It is worth noting that the household survey data is subject to sampling error, which is why the curve appears to be less "smooth" than the output from the CACI model. Despite this, it is clearly evident that the household survey shows a significantly higher proportion of households in lower income groups than the CACI model suggests.

68. The results from the CACI model consistently follow the same distribution pattern across every area, with the mean and standard deviation of the curve being adjusted to reflect local variations. The mismatch observed in the example sub-region illustrated in the chart above is typical of the mismatch found in every area where the household survey and CACI data were compared – but what was particularly noteworthy was that the household income profile curve derived from each primary dataset tended to follow the same shape – with a sharp income peak that gradually fell away.

69. Given the consistency of this pattern, ORS has developed a model that profiles the distribution of local income on the basis of existing **primary data from a number of household surveys**. The data for each survey has been normalised to take account of the date that the data was gathered, using information from the **Annual Survey of Hours and Earnings** to adjust earnings and the **Retail Price Index** to adjust other income sources. The relative average income of the area (taken from **CACI Paycheck**) was also used to normalise the income to a consistent baseline.

70. Through taking the relative average income from CACI Paycheck for an independent area (for which we have no primary data), it is possible to produce an income distribution profile. In the absence of any primary data, it is not possible to validate the model output – therefore, we have used to model to profile the income distribution in areas that we already have primary data to compare the household survey with the modelled income. This has been undertaken both for areas where the survey data contributed to the model, and also in areas where we have subsequently undertaken household surveys where the data has not been included in the model.

Figure 5
Comparison of Income Distribution from Household Survey Data and ORS Income Model:
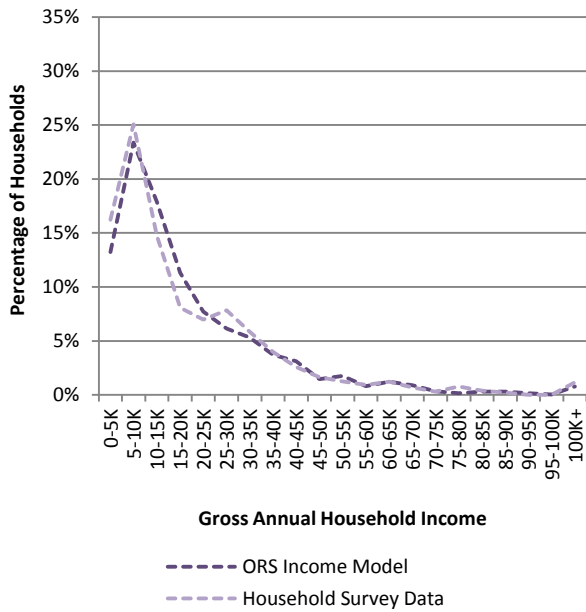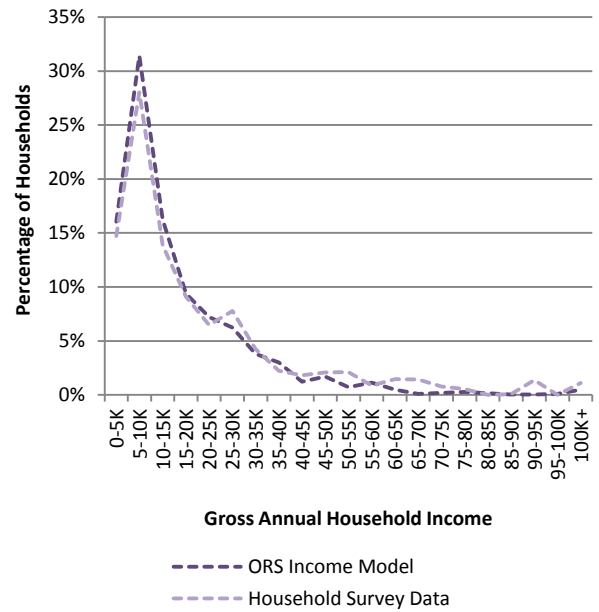**Rural District, East of England, Data Contributed to Model Baseline**

Figure 6
Comparison of Income Distribution from Household Survey Data and ORS Income Model:
Urban Borough, Inner London, Data Independent of Model Baseline

71. Whilst the curve from the ORS Income Model differs slightly from the curve from the household survey data, outputs from the model clearly mirror the equivalent primary survey data and the input parameters derived from CACI Paycheck control the model outputs effectively in order to properly take account of local differences.

72. Given the information available within the primary data base, the ORS Income Model is also able to separate the income distribution of owners and non-owners to directly inform the Housing Mix Model affordability profiling. This means that while the current study used uplifted survey household income, the model can now run completely independently and so can be updated in the future without any further survey being required.