



POPGROUP_{v.4}

User Guide 4

How to Create Population Projections led by a Plan for House-building

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I Introduction

This Guide shows how to find and enter data about the relationship between households and housing, and then to project the impact of a house-building plan on the local population. These are known as ‘dwelling-led projections’, and are often used in the development of Local Plans. This approach usually combines official projections of entire local authority districts with planned release of land for housing, as in the example in this Guide. The approach is also used with projections for smaller areas to assess the impact of a proposed development on population, including children of school ages.

POPGROUP is used for many other aspects of assessing the need for services according to the projected future age-composition of the population. This Guide focuses on one specific application in planning - to estimate the impact on population of planned numbers of dwellings.

1.1. What else will I need to know?

An experienced POPGROUP user will create the relationship between households and housing, and run a population projection led by a plan for house-building in less than an hour. Projections with alternative plans are then a quick revision achieved in a few minutes. A novice will want to put aside a full half day to work through the Guide and become comfortable with the data entry and interpretation of the results. Finding alternative data and preparing for likely challenges to results will take longer and depend on the local context.

1.2. What else will I need to know?

This Guide is intended for those who are new to dwelling-led projections, by providing step-by-step support for this specific task. It is assumed that the reader has prepared a population projection in POPGROUP and household projection using the Derived Forecast model for one or more local authority district; for example, from following the instructions in User Guide 1 *How to*

get started with population projections (up to section 3) and User Guide 2 *How to get started with household projections* (up to section 3).

In the example used in this Guide, both the population and the household projection start in 2001. These projections are the government 2012-based projections, updated with government population estimates to mid-2014. In Wales the equivalent projections are from 2011 at the time of writing, and during 2016, the sub-national projections of England, Wales and Scotland will all be updated to be 2014-based. However, this Guide's instructions may be used with any pair of population and household projections, so long as:

- The population and household projections name the same district(s) and,
- The household projection starts in the same year as the population projection, or in an earlier year.

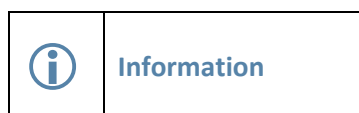
The POPGROUP v.4 reference manual remains the comprehensive guide that should also be consulted to learn how the software operates and its full range of functionality. Section 11.8 on constraints in POPGROUP includes the mathematics of how dwelling-led projections are calculated in POPGROUP.

1.3. About this Guide

In this document, the names of Excel workbooks are written in bold grey font (e.g. **POPGROUP_Scenario.xls**). Sheets within workbooks are written in bold grey italics surrounded by single quotation marks (e.g. '*Sched*').

References to cells within worksheets, or to buttons/options within the workbooks are in blue italics surrounded by single quotations, for example, '*Validate*'.

Two types of text box are used in this document:



2 Convert between Households and Dwellings

2.1. Households and dwellings: definitions

The first step in producing a dwelling-led projection recognises that the number of households and the number of dwellings are not the same. Traditionally in the UK, three elements of this difference have been recognised:

- Some households share the same dwelling. The dwelling is simply defined as sharing the same front door, while households share living space and meals. In a block of flats, each flat is a dwelling. The proportion of households sharing a dwelling is low in most Districts.
- Some dwellings are unoccupied because they are vacant. This is usually around 5% or less.
- Some dwellings are unoccupied because they are second or holiday homes. This varies greatly between areas, being under 1% for most districts but reaching over 10% in some coastal tourist districts.


2.2. Relationship between households and dwellings

The information relating households and dwellings is entered by the user in a POPGROUP file called **DFSsupply.xls**, because it refers to the *supply* of housing. You may enter either a rate for each of the three elements above, or a single conversion factor: the ratio of households to dwellings.

Best practice demands that each of the three elements is specified separately, so that assumptions can be made about the future of each rate. However, the 2011 Census does not provide a distinction between vacant and other unoccupied dwellings in England and Wales (it does in Scotland, and did in 2001 throughout Britain). In England and Wales, an estimate of vacant domestic dwellings must be made from the Council Tax register or other sources. In any

case, other sources might provide a reliable up-to-date estimate of vacant dwellings more recent than the Census.

The table below shows the cells from Table KS401 in the 2011 Census that gives the information required.

 2011 Census information to convert from households to dwellings		
Households sharing rate	<p>The number of Sharing households is calculated as...</p> $\frac{\text{All households} - \text{All occupied dwellings}}{\text{All households}}$ <p>In Table KS401 'All households' = "Household spaces with at least one usual resident".</p> <p>'All occupied dwellings' = total of dwellings minus those that are unoccupied: "All categories: Dwelling Type" – "Household spaces with no usual residents"</p>	The rate is calculated by dividing sharing households by all households.
Vacant dwellings rate	<p>Census Table KS401, Vacant dwellings = "All household spaces: Unoccupied: Vacant".</p> <p>See note for England and Wales</p>	The rate is calculated by dividing vacant dwellings by all dwellings.
Second or holiday homes rate	<p>Census Table KS401, Second or holiday homes = "All household spaces: Unoccupied: Second residence/holiday accommodation".</p> <p>See note for England and Wales</p>	Divide second or holiday homes by all dwellings: 'All categories: Dwelling Type'

Note for England and Wales: Only the total of unoccupied dwellings is given: "Household spaces with no usual residents". The division between vacant dwellings and second or holiday homes must be found or estimated from other sources, and this is left to the user.

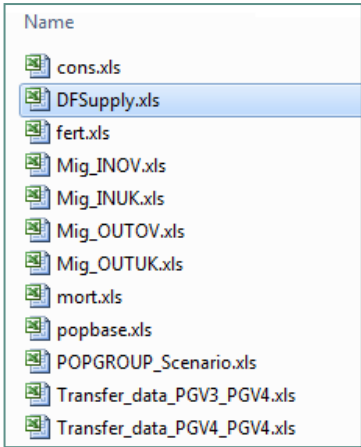
Overall conversion factor households/dwellings	<p>Census Table KS401 =</p> $\frac{\text{"Household spaces with at least one usual resident"} / \text{"All categories: Dwelling Type"}}{\text{households/dwellings}}$	<p>This overall factor and the three elements are related in this way:</p> $\text{households/dwellings} = \frac{(1 - \text{vacancy rate} - \text{holiday home rate})}{(1 - \text{sharing rate})}.$
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As the decade progresses, the 2011 Census becomes less reliable as a basis for planning. Where vacant or second/holiday homes are likely to be changing since the last census, it is worth finding sources of information outside the census, for example:

- [DCLG Live Table 615](#) for districts in England, where vacant dwellings include second homes
- [DCLG Council Tax Base](#) statistics for districts in England, where each year's table include second homes.

2.3. Create the DFSupply file

Once values have been found for converting between households and dwellings, they are entered into POPGROUP as follows:

Action: Fill DFSupply with evidence to convert households to dwellings	POPGROUP View
<p>From your POPGROUP model's skeleton folder, open the DFSupply file, e.g.</p> <pre>C:\Forecast\POPGROUP V4.0\ <ModelID>_skel\DFSupply.xls</pre> <p><i>Save as...</i> in your POPGROUP input folder with a new name e.g. DFSupply_Dwell.xls (to indicate it refers to dwellings. Other files may refer to jobs)</p>	

<p>Action: Fill DFSupply with evidence to convert households to dwellings</p>	<p>POPGROUP View</p>																								
<p>Complete the information on the 'Notes' worksheet.</p> <p>Choose the data that you will enter (see discussion in the text above).</p> <p>Document the sources of the data.</p> <p>Enter the title for the supply units, in our case 'Dwellings'.</p>	<div data-bbox="778 322 1353 887"> <p>Documentation of the information contained in this workbook</p> <p>This workbook allows POPGROUP to convert between a derived forecast (e.g. households, labour force) and a supply forecast (e.g. dwellings, jobs). A single conversion ratio (derived units)/(supply units)</p> <p>Single conversion ratio derived units/supply units <input type="radio"/></p> <p>Households to dwellings: separate rates for vacancy, holiday home and sharing <input checked="" type="radio"/></p> <p>Labour force to jobs: separate rates for unemployment and commuting <input type="radio"/></p> <p>Data are from 2011 Census, with unoccupied dwellings divided between vacancies and other estimated by Council from</p> <p>Last Updated: 1-Dec-15</p> <p>Enter a title for the supply units</p> <p>Dwellings</p> </div>																								
<p>On the area worksheet, enter the data.</p> <p>As on many POPGROUP files, a red triangle indicates a comment or note with helpful information.</p>  <p>The data may be entered for future years to indicate expected changes. If left blank, the last value is taken to apply to all subsequent years.</p>	<div data-bbox="762 1048 1369 1458"> <p>Derived/Supply units conversion information Cheshire E</p> <p><input type="button" value="Validate"/></p> <table border="1"> <thead> <tr> <th></th> <th>Forecast Years</th> <th>2001</th> <th>2002</th> <th>2003</th> <th>20...</th> </tr> </thead> <tbody> <tr> <td>Dwellings vacant rate</td> <td></td> <td>4.1%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Dwellings holiday/second homes rate</td> <td></td> <td>0.2%</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Households sharing rate</td> <td></td> <td>0.1%</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Rules</p> <p>A value is required in the first year either on the default sheet or on a group sheet.</p> <p>If subsequent years are blank the previous year's value is used.</p> <p>The values for the three housing factors must each lie between 0% and 100%. They are converted to an overall conversion factor as follows: households/dwellings = (100 - vacancy rate - holiday home rate) / (100 - sharing rate).</p> <p>If used for a particular year, each rate must have a non-blank entry.</p> </div>		Forecast Years	2001	2002	2003	20...	Dwellings vacant rate		4.1%				Dwellings holiday/second homes rate		0.2%				Households sharing rate		0.1%			
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Households sharing rate		0.1%																							
<p>Validate the file by clicking:</p> <p><input type="button" value="Validate"/></p> <p>Save the file.</p> <p>Record the values that will apply in 2012, in the section 'Your Answers' on page 24.</p>																									

In the example above, the conversion data were entered only for the first year, implying that

they will remain constant in the future. This is a reasonable starting point, but may be amended if better assumptions are found, for example if the vacancy rate can be convincingly shown to be temporarily high or low.

These assumptions about the future are important as they affect the number of households that will fit in a given number of dwellings, and therefore the population implied by a house-building plan.

3 Household & Dwelling Change Implied by a Population Projection

Before running a dwelling-led scenario, you may find it useful to evaluate the impact of population growth on the number of households and dwellings. This is an intermediate step before the planned housing is included. It is not necessary, but if this is the first time that you have run population and household projections together, it is worth doing to check that you have all the necessary files and that the conversion to dwellings is operating as expected.

You will record the population, household, and dwelling before the constraints from a housing plan are added, to later evaluate the impact of the housing plan. You can record this information in the section of 'Your Answers' on page 24.

When the 'base forecast' is mentioned in this Guide, it simply refers to your preferred assumptions for fertility, mortality, migration, and household formation (headship rates), that you have already collated, and which are the starting point for the forecast run in this section. These may be from the government's latest projections or they may be your own. In this guide, they are the assumptions from the 2012-based population and household projections for districts in England, updated with Mid-Year Estimates from ONS up to mid-2014. You should use your own existing forecast, but the following rules apply:

- The population and household projections must name the same district(s) and;
- The household projection must start in the same year as the population projection, or in an earlier year.

In this Section, you will run your base population scenario, adding information about people 'not in households', about household representative (headship) rates, and about the relationship between households and dwellings (**DFSsupply**). POPGROUP will produce the population forecast, and also the number of households and dwellings implied by that population forecast.

Action: Run a population, household and dwelling forecast	POPGROUP View
<p>From your POPGROUP model’s input folder, open the your Scenario file that has already been run, e.g.</p> <pre>C:\Forecast\POPGROUP V4.0 \<modelid>_inp\scenario_ <scenarioid>.xls<="" pre=""> <p>Change the <i>‘Scenario identifier’</i> to something relevant, e.g. add <i>‘withDwel’</i> to indicate the dwellings that will be forecast</p> </modelid>_inp\scenario_></pre>	<div data-bbox="703 338 1369 501"> <p style="text-align: right;">RUN THE MODEL</p> <p>Information for this scenario</p> <p>Scenario identifier: <input type="text" value="ONS2012from2014withDwel"/></p> <p>Contact details (to be included on all output files)</p> </div> <p>NB: If you do not change the <i>‘Scenario identifier’</i>, you will overwrite previous output files. This may not matter much in this section as we are only adding information on households and dwellings, not changing the population projection itself.</p> <p>Remember (from Guide 1) that you do not have to save the Scenario file. It is automatically saved in your input folder. The <i>‘Scenario identifier’</i> is used to name the Scenario file and all the output files.</p>
<p>Change to the <i>‘Constraints_and_impacts’</i> sheet.</p> <p>Leave the constraints file as it is, if you have one.</p> <p>Add the household representative rates file and the population adjustment file, by double clicking and navigating to your base files in the input folder of your DF household projection.</p> <p>Add the DFSsupply file you created in Section 2, by double clicking and navigating to the input folder of your POPGROUP projection.</p>	<div data-bbox="703 1144 1369 1485"> <p>ns and impacts on derived forecasts</p> <p style="text-align: right;"><small>Double click to browse for workbook names</small></p> <p>Annual Constraints: <input type="text" value="Cons_2002-37.xls"/></p> <p style="text-align: right;">CheckFiles</p> <p>First Derived Forecast</p> <p>Rates: <input type="text" value="C:\Forecast2_DFAV-CE-Mcr2001hh_inpIDFRatesStage2_CLG2012HH.xls"/></p> <p>Population Adjustment: <input type="text" value="C:\Forecast2_DFAV-CE-Mcr2001hh_inpIDFPopAdjustStage2_CLG2012HH.xls"/></p> <p>Sub-Population: <input type="text"/></p> <p>Factors: <input type="text"/></p> <p>Supply: <input type="text" value="DFSsupply_Dwel1.xls"/></p> </div>

Action: Run a population, household and dwelling forecast	POPGROUP View																																				
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> Wales </div> <p>Wales Government household forecasts use membership rates and an extra file, DFFactor_...xls, which must be entered here too.</p>	<p>In Wales the Factors file of household sizes is an extra entry:</p> <div style="border: 1px solid black; padding: 5px;"> <p>nts and impacts on derived forecasts</p> <p style="color: red; font-size: small;">Double click to browse for workbook names</p> <p>Annual Constraints <input type="text" value="Cons_Principal_from2014.xls"/></p> <p style="text-align: right;"><input type="button" value="CheckFiles"/></p> <p>First Derived Forecast</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Rates</td> <td>C:\Forecast2_DFCere2001HH_inpDFRates_WG2011HH.xls</td> </tr> <tr> <td>Population Adjustment</td> <td>C:\Forecast2_DFCere2001HH_inpDFPopAdjust_WG2011HH.xls</td> </tr> <tr> <td>Sub-Population</td> <td></td> </tr> <tr style="border: 2px solid red;"> <td>Factors</td> <td>C:\Forecast2_DFCere2001HH_inpDFFactor_WG2011HH.xls</td> </tr> <tr> <td>Supply</td> <td>Cer2001_inpDFSupply_Dwell1.xls</td> </tr> </table> </div>	Rates	C:\Forecast2_DFCere2001HH_inpDFRates_WG2011HH.xls	Population Adjustment	C:\Forecast2_DFCere2001HH_inpDFPopAdjust_WG2011HH.xls	Sub-Population		Factors	C:\Forecast2_DFCere2001HH_inpDFFactor_WG2011HH.xls	Supply	Cer2001_inpDFSupply_Dwell1.xls																										
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<p>Click:</p> <div style="border: 1px solid gray; padding: 2px; display: inline-block; margin: 5px 0;"><input type="button" value="CheckFiles"/></div> <p>The nature of each file will be shown alongside its name.</p>																																					
<p>Return to the <i>'Run_Details'</i> sheet.</p> <p>Add to the documentation.</p> <p>Click: RUN THE MODEL</p> <p>Once run, on the Comp output file, at the bottom of each sheet will be the impact of the population on households and dwellings.</p>	<table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <tr> <td style="width: 5%;">94</td> <td>Households</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>95</td> <td>Number of Households</td> <td>147,387</td> <td>148,482</td> <td>149,752</td> <td>15</td> </tr> <tr> <td>96</td> <td>Change in Households over previous year</td> <td></td> <td>+1,095</td> <td>+1,270</td> <td>-</td> </tr> <tr> <td>97</td> <td>Number of Dwellings</td> <td>153,855</td> <td>154,998</td> <td>156,324</td> <td>15</td> </tr> <tr> <td>98</td> <td>Change in Dwellings over previous year</td> <td></td> <td>+1,143</td> <td>+1,326</td> <td>-</td> </tr> <tr> <td>99</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>Note that the number and the change in dwellings is usually slightly more than households because unoccupied dwellings are more than sharing households.</p> <p>Record the population, households and dwellings for 2012 and 2037 in Your Answers, page 24, and calculate the change over the period. Later in this Guide you will compare the results with a projection led by a plan.</p>	94	Households					95	Number of Households	147,387	148,482	149,752	15	96	Change in Households over previous year		+1,095	+1,270	-	97	Number of Dwellings	153,855	154,998	156,324	15	98	Change in Dwellings over previous year		+1,143	+1,326	-	99					
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In this Section, you have repeated a population projection, but asked POPGROUP to run a household projection in the background (i.e. evaluating the dwelling and household growth impacts of the population projection). The household and dwelling growth outcomes are summarised at the bottom of the **Comp** output file.

When recording the change in population and households, you may notice that the number of households (and dwellings) grows more rapidly than the population. This usually occurs because

household size is reducing, especially because most areas of the UK are ageing. Older people tend to live in households of one or two people.

Running the household projection in the background of POPGROUP only provides the total number of households implied by that level of population growth. When you run the same household projection in the Derived Forecast module, it gives you details of household types, household size, the age of household representatives, and other analyses (see User Guide 2). You would have to run the household projection in the Derived Forecast software to get those other analyses.

4 Create Dwelling Constraints & their Impact on Population

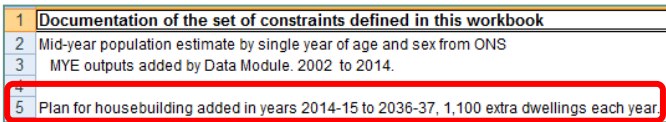
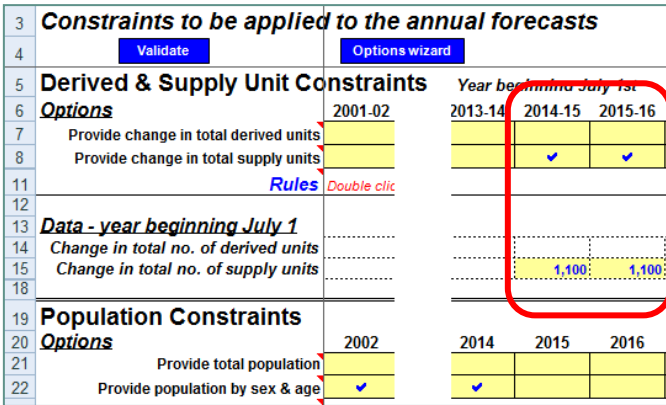
4.1. Create a dwelling constraints file

To evaluate the impact that planned house-building would have on the population, housing targets are defined in the constraints (**cons**) file. Migration is used to balance the relationship between population and housing: if there is insufficient population to fill the housing growth, more in-migrants and fewer out-migrants are needed. If there are too many people for the planned housing, more out-migrants and fewer in-migrants are needed.

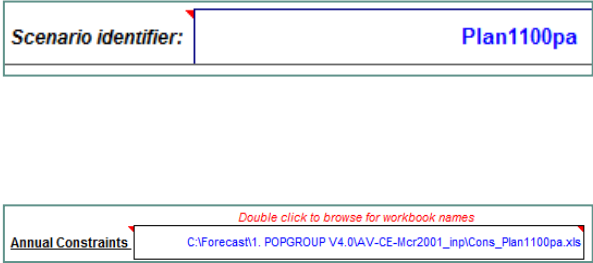

Planned house-building is entered as a *change* in the number of dwellings each year, and is therefore the *net* change in housing expected in the area by the plan. The net change includes conversions and demolitions. If a total for house-building is planned over a number of years, an annual schedule of implementing the plan must be entered. If there is no official schedule, it is normal to calculate and enter the annual average change each year. The change is entered in each year of the plan, which may be some or all of the forecast years – the rules are described in comments on the **cons** file itself, and in the POPGROUP reference manual.

If the model is for several areas, a constraint must be entered for every area.

You will normally have a constraints file already filled, used for your previous POPGROUP scenarios for the same areas, for example the one used by the scenario in Section 3. It makes sense to amend that one rather than to start from scratch.

Action: Complete a constraints file with planned housing	POPGROUP View
<p>From your POPGROUP model’s input folder, open the base Cons file that was already used in the scenario of Section 3, e.g.</p> <pre>C:\Forecast\POPGROUP V4.0\<ModelID>_inp\Cons_20 02-14.xls</pre> <p>If you do not have a Cons file, you may open a new one from the skel folder of skeleton files.</p>	
<p><i>Save as...</i> in the input folder, with a name that reflects the plan, e.g. Cons_Plan1100pa.xls</p> <p>On the '<i>Notes</i>' sheet, add Documentation.</p>	
<p>On the area sheet(s):</p> <ul style="list-style-type: none"> You may have '<i>Population Constraints</i>' ticked for past years. Keep them. If you have '<i>Population Constraints</i>' ticked for future years, delete them. You will want future years to be led by the dwelling constraints you will now enter. On row 8, double click each year of the planned housing. POPGROUP will enter a tick to show the option has been chosen. On row 15 enter the number of extra dwellings in the plan, for each year. 	
<p>Click: '<i>Validate</i>'</p> <p>Save the file.</p>	

4.2. Run a dwelling-led scenario

Action: Run a dwelling-led scenario	POPGROUP View
<p>From your POPGROUP model's input folder, open the scenario you used in Section 3, e.g.</p> <pre>C:\Forecast\POPGROUP V4.0\<modelid>_inp\ pre="" scenario_...withdwel<=""> <p>Amend the '<i>Scenario ID</i>' to remind you of the plan used.</p> <p>On the sheet '<i>Constraints_and_impacts</i>', double click the constraints file (Cons) and find the file you have just created.</p> </modelid>_inp\></pre>	 <p>The screenshot shows two input fields. The top field is labeled 'Scenario identifier:' and contains the text 'Plan1100pa'. The bottom field is labeled 'Annual Constraints:' and contains the file path 'C:\Forecast1. POPGROUP V4.0\A-V-CE-Mcr2001_inplCons_Plan1100pa.xls'. A red arrow points to the file path, and a red text label above it says 'Double click to browse for workbook names'.</p>
<p>Return to the '<i>Run_Details</i>' sheet:</p> <p>Amend the documentation</p> <p>Click: </p> <p>Once run, on the Comp output file, at the bottom of each sheet the number of households and dwellings will be reported.</p>	<p>The change in number of dwellings from 2014 in your Comp file should be what you defined in the Cons file. The population will have changed to match the plan of house-building.</p> <p>Write the results for 2037 on page 24, and calculate the new change over the period.</p> <p>The household and dwelling figures before 2014 will not have changed, because the house-building plan started after that year. (In the years prior to the house-building, the reported household and dwelling numbers are those that are implied by the population growth).</p>

Local Plans sometimes cater for more population and household change than the ONS and DCLG projections imply. If this is the case, the population change you record will then be greater than that implied by the base projection. POPGROUP has calculated the number of migrants needed to fill the houses in the plan, using the household representative rates and the profile of migration to the district that is in the input files.

If the plan was for *fewer* dwellings to be built than the base projection indicated, in Section 3, then POPGROUP would reduce migration accordingly. In the next Section, you will implement alternative housing plans and other assumptions.

5 Alternative Scenarios

The amendment of a **Cons** file to specify a housing plan in Section 4 is straightforward. It takes only a few minutes to replace one plan with another, document and save the **Cons** file with a new name, and run an alternative scenario to find the impact of the house-building plan on population.

POPGROUP uses your assumptions to compute the extra (or fewer) people in a projection led by the house-building plan. It compares the planned dwellings to those projected without the constraint, and then applies migration profiles with the representative rates to calculate the number of extra people needed to fill the dwellings. It outputs the new population projection with adjusted number of migrants.

It is relatively easy to investigate alternative plans in POPGROUP. This section gives instructions for two tasks:

- The first set of instructions shows how to specify a plan in which there is no change to the dwelling stock. This is unrealistic, but it is useful to show how population is expected to change even when there is no house-building.
- The other part of this section discusses the migration flows, which are used to balance between housing and population growth, and shows how to make an alternative assumption about these flows.

The later section 'Next Steps' lists some of the other scenarios that are tried in practice.

5.1. No new housing

Action: A plan for no house-building	POPGROUP View																																																															
<p>From your POPGROUP model’s input folder, open the Cons constraints file you used in Section 4 (it is usually easier to change an existing input file than start from scratch).</p> <ul style="list-style-type: none"> • Save as... with a different name, e.g. cons_NoDwelChange.xls • Delete the values for the previous housing plan, and insert zeros instead. • Document on the <i>'Notes'</i> sheet • Save the file with these new assumptions. 	<table border="1" data-bbox="778 479 1369 685"> <tr> <td>5</td> <td>Derived & Supply Unit Co</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>Options</td> <td>2012-13</td> <td>2013-14</td> <td>2014-15</td> <td>2015-16</td> <td>2016-17</td> </tr> <tr> <td>7</td> <td>Provide change in total derived units</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>8</td> <td>Provide change in total supply units</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>11</td> <td>Rules</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>12</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>13</td> <td>Data - year beginning July 1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>14</td> <td>Change in total no. of derived units</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>15</td> <td>Change in total no. of supply units</td> <td></td> <td></td> <td>0</td> <td>0</td> <td></td> </tr> </table> <p>In spite of the title of this section being ‘no new housing’, the assumption that you are making in this file is that in each year there is no net change in the number of dwellings. In reality, there may be some conversions, demolitions and new building that together add to zero change.</p>	5	Derived & Supply Unit Co						6	Options	2012-13	2013-14	2014-15	2015-16	2016-17	7	Provide change in total derived units						8	Provide change in total supply units			✓	✓		11	Rules						12							13	Data - year beginning July 1						14	Change in total no. of derived units						15	Change in total no. of supply units			0	0	
5	Derived & Supply Unit Co																																																															
6	Options	2012-13	2013-14	2014-15	2015-16	2016-17																																																										
7	Provide change in total derived units																																																															
8	Provide change in total supply units			✓	✓																																																											
11	Rules																																																															
12																																																																
13	Data - year beginning July 1																																																															
14	Change in total no. of derived units																																																															
15	Change in total no. of supply units			0	0																																																											
<p>Open the previous scenario from Section 4 and make the same changes as in that section:</p> <ul style="list-style-type: none"> • Amend the Scenario ID • On the sheet <i>'Constraints_and_impacts'</i>, double click the Constraints file and find the file you made earlier in this section. 	<div data-bbox="778 1115 1369 1167"> <p>Scenario identifier: <input type="text" value="NoDwelChange"/></p> </div> <div data-bbox="778 1227 1369 1279"> <p>Annual Constraints: <input type="text" value="Cons_NoDwelChange.xls"/></p> </div>																																																															
<p>Return to the <i>'Run_Details'</i> sheet:</p> <ul style="list-style-type: none"> • Amend the documentation • Click RUN THE MODEL <p>Once run, on the Comp output file, at the bottom of each sheet the household and dwelling outcomes are reported.</p> <p>Note that from the first year of the dwelling constraint, the numbers of households and dwellings remains constant and the change is zero, as you specified on the Cons file.</p> <p>The output also shows the impact on the population of the constraint.</p>	<table border="1" data-bbox="778 1424 1369 1592"> <tr> <td>91</td> <td>Population impact of constraint</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>92</td> <td>Number of persons</td> <td></td> <td>-3,188</td> <td>-3,188</td> <td>-2,972</td> </tr> <tr> <td>93</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>94</td> <td>Households</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>95</td> <td>Number of Households</td> <td>64,681</td> <td>73,479</td> <td>73,479</td> <td>73,479</td> </tr> <tr> <td>96</td> <td>Change in Households over previous year</td> <td></td> <td>-0</td> <td>-0</td> <td>-0</td> </tr> <tr> <td>97</td> <td>Number of Dwellings</td> <td>66,984</td> <td>76,094</td> <td>76,094</td> <td>76,094</td> </tr> <tr> <td>98</td> <td>Change in Dwellings over previous year</td> <td></td> <td>-0</td> <td>-0</td> <td>-0</td> </tr> </table> <p>Record the results for 2037 in Your Answers, page 24.</p> <p>Does the population decrease with the same amount of housing? This would often be due to the ageing population. However, household representative rates also change, and can mean that the population goes up with the same amount of housing.</p>	91	Population impact of constraint					92	Number of persons		-3,188	-3,188	-2,972	93						94	Households					95	Number of Households	64,681	73,479	73,479	73,479	96	Change in Households over previous year		-0	-0	-0	97	Number of Dwellings	66,984	76,094	76,094	76,094	98	Change in Dwellings over previous year		-0	-0	-0															
91	Population impact of constraint																																																															
92	Number of persons		-3,188	-3,188	-2,972																																																											
93																																																																
94	Households																																																															
95	Number of Households	64,681	73,479	73,479	73,479																																																											
96	Change in Households over previous year		-0	-0	-0																																																											
97	Number of Dwellings	66,984	76,094	76,094	76,094																																																											
98	Change in Dwellings over previous year		-0	-0	-0																																																											

Try a different housing plan if you have one in mind, evaluating the results in the same way as above. Look at the results until you are satisfied that you can explain them to others.

5.2. Which migration flow will fill housing?

In a dwelling-led scenario, migration is used to balance population and housing growth. If there is insufficient resident population to fill the new houses, migration is used to redress this imbalance. However, there are four flows of migration, so how does POPGROUP know which to use? If there is extra housing it could be filled from:

- More in-migration from other parts of the UK, or
- Less out-migration to other parts of the UK, or
- More immigration from overseas, or
- Less emigration to overseas.

Some analysts will argue that the new housing will be inhabited by people of specific ages; as the type of planned housing will be bedsits, or housing for workers at a particular industry or office development, or housing especially suitable for older people.

However, those who will fill the housing are likely to partly or even mostly come from within the District for which projections are being produced. Others will fill the housing they leave. The extra housing will result in migrants being attracted, but not to those particular new houses. Since it would not be feasible to model this sequence of house-moves, it is usually better to assume that the overall impact on migration will be to attract the kinds of migrant that the District has attracted in the past. In other words, it is reasonable to use the migration assumptions in the ONS or base projection. Nevertheless, the question remains: which of the four flows of migration will be affected?

In fact, POPGROUP does not know which flow of migration to use; it has to be told. There is a default setting on the **Scenario** file, which the user can change. The setting on the **Scenario** file is next to the list of input files. Migration weights on the scenario file specify the combination of migration flows that are used to meet a defined constraint:

23			
24	Input workbook names		
25	Base population	PopBase_2001.xls	
26	Births & fertility	Ferf_ONS2012fom2014.xls	
27	Deaths & Mortality	Mort_ONS2012fom2014.xls	
28	In-migration from the UK (optional)	Mig_INUK_ONS2012fom2014.xls	
29	Out-migration to the UK (optional)	Mig_OUTUK_ONS2012fom2014.xls	
30	In-migration from Overseas (optional)	Mig_INOV_ONS2012fom2014.xls	
31	Out-migration to Overseas (optional)	Mig_OUTOV_ONS2012fom2014.xls	
32	Special Groups (optional)		
33			
34			
35			

Save your input files before running the model.

Migration Weights	
Pop'n	Derived units
0%	50%
0%	50%
50%	0%
50%	0%

Migration weights - used only to implement constraints

Weights to be given to each of the four migrant flows when adjusting migration to meet a constraint. They are used only if a constraints file is specified, and may only be given for migration flows that have been specified.

The first is 100% minus the sum of the other three, which are the only ones that may be adjusted directly.

The default shown in the illustration above takes migration needed to meet a *population* constraint according to the overseas migration age-sex profile, and takes migration needed to meet a constraint of *derived units* (like households or dwellings) according to the UK migration age-sex profile.

The argument to justify this default setting is this. For many population projections, the least certain element is international migration. If the historical population is known but the migration is uncertain, POPGROUP by default meets the population figure by adjusting international migration. However, in a dwelling-led projection, the availability of housing is most likely to influence the decisions of migrants or potential migrants from other parts of the UK, so it is these migrants that POPGROUP uses to meet a dwelling growth target.

- In both cases, the default is set at value of 50% in each of in- and out-migration (i.e. a surplus of housing might both attract in-migrants and deter out-migrants)
- To change the settings, the user puts in figures for the last three rows of weights. POPGROUP automatically adjusts the first row so that the weights add to 100%.

For most districts, the age-sex profiles of in- and out-migration are not very different, nor are the age-sex profiles of UK and overseas migration. Migrants in all four flows are predominantly young adults, with some children accompanying family adults and fewer older people. For this reason, the choice of migration weights for the constraint does not usually make much of a difference to the end result.

However, if it is clear that the impact of a plan will be almost entirely on one flow, and if the age profiles are quite different in each flow, then the user should change the migration weights on the **Scenario** file to values that are more appropriate. The instructions below show how to change the migration weights. You can investigate the age profiles of each migration flow on the **dump** output file, for example by making charts from the five-year age-group migration held on its sheets.

The exercise below repeats the projection of Section 4, but using only UK in-migration to meet the constraint. You may wish to instead use only international immigration, or some other combination. The idea of the exercise is to compare results with Section 4: if there is a great difference, then you should think carefully which weighting of migration is most appropriate for your local plans.

Action: Change the migration flows used to meet a constraint	POPGROUP View												
<p>From your POPGROUP model’s input folder, open the Scenario file you used in Section 4 for a dwelling-led projection.</p> <p>Change only the ‘<i>Scenario ID</i>’ and the migration weights. For example, if you investigate the impact of using only UK in-migration:</p> <ul style="list-style-type: none"> • Change the ‘<i>Scenario ID</i>’ • In the box headed ‘<i>Migration Weights</i>’, write ‘0’ in the ‘<i>UK out-migration</i>’ cell, under ‘<i>Derived units</i>’. • Do not change the weights under ‘<i>Pop’n</i>’ as this refers to population constraints, not the (dwelling) constraints of the housing plan. • Amend the documentation, e.g. by adding ‘Constraint met entirely by altering UK in-migration’. • Click: RUN THE MODEL 	<div style="border: 1px solid #0000FF; padding: 5px; margin-bottom: 10px;"> <p>Scenario identifier: Plan1100paAllUKmig</p> </div> <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2" style="background-color: #D9EAD3;">Migration Weights</th> </tr> <tr> <th style="background-color: #D9EAD3;">Pop’n</th> <th style="background-color: #D9EAD3;">Derived units</th> </tr> </thead> <tbody> <tr> <td style="background-color: #D9EAD3;">0%</td> <td style="background-color: #D9EAD3;">100%</td> </tr> <tr> <td style="background-color: #D9EAD3;">0%</td> <td style="background-color: #D9EAD3;">0%</td> </tr> <tr> <td style="background-color: #D9EAD3;">50%</td> <td style="background-color: #D9EAD3;">0%</td> </tr> <tr> <td style="background-color: #D9EAD3;">50%</td> <td style="background-color: #D9EAD3;">0%</td> </tr> </tbody> </table> <div style="margin-top: 10px;"> <div style="border: 1px solid #0000FF; background-color: #006666; color: white; padding: 5px; display: inline-block; margin-right: 20px;">No need to change this column</div> <div style="border: 1px solid #0000FF; background-color: #006666; color: white; padding: 5px; display: inline-block;">Change to 0, as shown</div> </div>	Migration Weights		Pop’n	Derived units	0%	100%	0%	0%	50%	0%	50%	0%
Migration Weights													
Pop’n	Derived units												
0%	100%												
0%	0%												
50%	0%												
50%	0%												
<p>Once run, at the bottom of each sheet on the Comp output file the household and dwelling outcomes are reported.</p> <p>The number of dwellings and households at the end of the forecast should not change.</p> <p>These were fixed by your housing plan and the conversion between households and dwellings.</p> <p>However, the population will be different, as the different age-sex profile of migration will fill the housing depending on the representative rates for the district.</p>	<p>Record the results on Your Answers, page 24.</p> <p>Is the difference in population much smaller than the impact of the plan itself?</p> <p>Does it nonetheless make a significant difference?</p>												

Exact details of how a constraint is met within POPGROUP are contained in the POPGROUP Reference Manual.



Where can I view the age-sex profiles of migration?

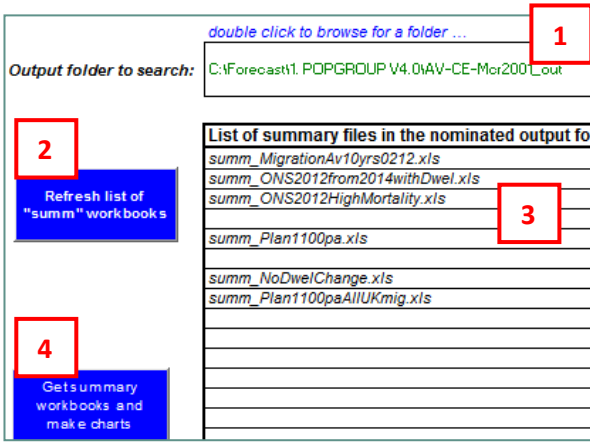
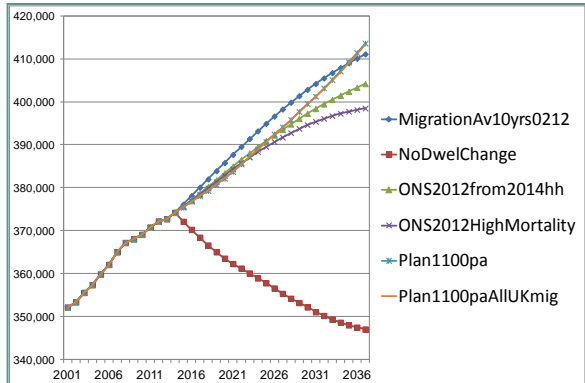
The input files have the assumptions about migration used in a projection, and often contain male and female migrants by five-year age-groups in each of the four flows (in and out, UK and overseas). Look at the **Scenario** – it lists the migration files used. Open them and view the historical migrants and the future assumptions.

However, the projection may use rates rather than counts for its projection. The best place to see the profile of migration *as projected* (i.e. the number of migrants) is in the **dump** output file of a projection. Each flow of migrants is listed each year by sex and single-year-of-age, and then summarized by five-year age groups. The *'Produce Flat File'* facility on the **dump** file puts all the results on a single sheet so that areas can be more easily compared.

Although there is not at present a package of migration analyses within POPGROUP, all the data are available for the user to examine.

6 Compare Scenarios

You will know how to compare the results of population projections, from User Guide 1. Use the utility `PGCompare.xls`, and check that the results are what you expect.

Action: Compare results of dwelling-led and other population projections	POPGROUP View
<p>Open <code>PGCompare.xls</code>, which is usually held in the directory:</p> <pre>\1. POPGROUP V4.0\.</pre> <ul style="list-style-type: none"> • Change the folder to your own • Refresh the list of projections • Delete those you do not want to compare on this occasion • Get the output workbooks and make charts. <p>If you have more than one area, then on this sheet also <i>'Select the population group for tables and charts'</i>.</p>	
<p>View and make sense of the total projected population.</p> <p>In the example shown to the right, the ONS projection, updated with mid-year populations to 2014 is shown in green. The population has been growing steadily, but also ageing. Various scenarios are shown from this User Guide and User Guide 1.</p> <ul style="list-style-type: none"> • With no housing growth (i.e. a fixed number of dwellings), the population declines. This is a result of the ageing population; the elderly population typically forms smaller, often one-person households, resulting in a reduction in average household size. 	<p>Population scenarios for Cheshire East & Chester</p>  <ul style="list-style-type: none"> • A high mortality variant results in lower population. • The housing-led projection with a plan of

Action: Compare results of dwelling-led and other population projections	POPGROUP View
<ul style="list-style-type: none"><li data-bbox="240 327 703 479">• A projection based on migration averaged from the ten years 2002-2012, results in extra population growth.	house-building, results in accelerated population growth in the second half of the projection. It is not visibly affected by the specification of the UK migration flows from which that population comes.

7 Your Answers

Use this section to record answers for each of your area(s). Write the area names in the column headings.

Section	Area 1	Area 2	Area 3	Area 4
2. Conversion between households and dwellings				
Vacant dwellings, rate				
Second or holiday homes, rate				
Households sharing, rate				
Overall households/dwellings ratio				
3. Population, households and dwellings from a base projection				
Total population 2012				
Total population 2037				
Total households 2012				
Total households 2037				
Total dwellings 2012				
Total dwellings 2037				
Change in population 2012-2037				
Change in households 2012-2037				
Change in dwellings 2012-2037				
4. Population, households and dwellings from a plan				
Total population 2037				
Total households 2037				
Total dwellings 2037				
Change in population 2012-2037				
Change in households 2012-2037				
Change in dwellings 2012-2037				
5.1 No change in dwelling stock				
Total population 2037				
Total households 2037				
Total dwellings 2037				
Change in population 2012-2037				
Change in households 2012-2037				
Change in dwellings 2012-2037				

Section	Area 1	Area 2	Area 3	Area 4
5.2 Migration weights changed to...				
Total population 2037				
Total households 2037				
Total dwellings 2037				
Change in population 2012-2037				
Change in households 2012-2037				
Change in dwellings 2012-2037				

8 Common Problems



Message 'Cannot run the Macro' or similar

POPGROUP works in Excel by using programs known as 'macros'. After installation, you must follow the instructions in the manual to enable macros and trust access to Visual Basic. Otherwise, POPGROUP cannot work and you will receive error messages.

If you do not have the manual, contact popgroup@edgeanalytics.co.uk.



I get a Windows error

Occasionally there will be a Windows error. Usually it is unclear why it has happened. Coming out of Excel and starting the task again will usually solve the problem. Occasionally after an error, you will be left with a window with program code. Again, close that window and Excel, and try again. These occasional errors are inevitable with a complex program working on many different operating environments, and are not unique to POPGROUP.

If an error occurs more than once, note what happened (take a screen shot if you can), and email details to popgroup@edgeanalytics.co.uk.

9 Next steps

9.1. Other guides in this series

POPGROUP is a versatile tool for analysis of population dynamics. The 'How to...' Guides currently expected in this series are:

1. How to get started with population projections
2. How to get started with household projections
3. How to get started with labour force projections
4. How to create population projections led by a plan for house-building
5. How to create population projections led by an economic plan for jobs
6. How to integrate population, housing and labour force projections

9.2. Service demand and school places

In this User Guide, we have used POPGROUP to estimate the future population when 'constrained' by a plan for house-building. The results are important as they show not only the total population, but also the demand related to particular age-group's adult, children's and other services.

For example, if house-building attracts some migration, some migrants will be children. Equally as important, the young adult migrants will have children during the years of the forecast. This is modelled by fertility rates within POPGROUP. For example, the output shows the future number of children aged 5–10 and 11–15 on the `comp` or `summ` files, which could be used to evaluate the extra demand for school places.

9.3. Small areas

Some users make forecasts for areas other than local authorities, for example for electoral wards or for service or housing market areas. Methods developed for small areas are documented and available from popgroup@edgeanalytics.co.uk. The NRS has its own [advice and guide](#) for small areas in Scotland.

9.4. Labour force and jobs

POPGROUP can show the impact of a housing plan not only on the population but also on the labour force and the resulting number of jobs. If the user sets up a labour force projection, it can be run in the background of POPGROUP in the same scenario that uses a housing plan as a constraint. The projection of the labour force, the relationship between the labour force and jobs, and the integration of population, housing and jobs, are the subjects of User Guides 3, 5 and 6.

9.5. What if a plan changes the vacant housing rate, or representative rates, or migration profiles?

This Guide has described how POPGROUP is used to estimate the impact of a housing plan on the resident population, by calculating the level of migration needed to fill the number of dwellings, according to the age-sex profile of migrants and the household representative rates that government has estimated for the District. In Section 5.2, the choice of migration age-sex profiles that can be used is discussed.

There are other issues which some users will want to consider, which cannot be given full treatment in this introductory guide. For example:

- Will vacancy rates remain the same during the projection? They can be altered on the DFSupply file (see Section 2).
- Will household representative rates remain the same during the projection? Will extra housing mean some 'spreading out' that increases representative rates?
- In areas with particular student migration, is the use of the area's usual migration including students, suitable to judge the impact of a housing plan?