Glasgow and the Clyde Valley Strategic Development Plan

Proposed Plan

Background Report 07

Land-use and transport integration

June 2011

07

Contents **Page**

1. Introduction

This Background Report accompanies the Strategic Development Plan and provides an analysis into the future integration of land-use and transport in Glasgow and the Clyde Valley. This Report looks at potential economic and demographic futures outlined by Oxford Economics in Background Paper 1 and looks at and compares how each economic future scenario integrates with future land-use and future transportation provision.

To assist in this task the Strathclyde Integrated Transport and Land-Use Model (SITLUM07) has been used to provide guidance for decision-making. The Model has two elements – a land use model and a transport model which interact. This is a very powerful tool but requires to be firstly coded with the three new economic reference cases to be compared. In this case Scenarios IF, IG and IA. This report will describe how the scenarios were applied by consultants DSC to cover the GCVSDPA area and the adjusting of SITLUM's internal demographic and economic scenarios so that the rate of change (growth) was consistent with the externally generated scenario. This was done firstly for Scenario's IF and IG and in a separate exercise for Scenario IA the "rebalancing" scenario.

This report will describe the process of Integrating Future Transport Proposals (WSPTCS) into the Strathclyde Integrated Transport Model (SITM4A Model). Transport Scotland and GCVSDPA worked with SPT to assist in identifying heavy rail and/ or light rail (LRT) proposals emerging as part of the overall STPR Intervention 24 – West of Scotland Strategic Rail Enhancements that could be modelled in place of the heavy rail and LRT proposals suggested in the West of Scotland Strategic Rail Enhancement. Jacobs consultants assisted in developing proxies to represent possible Public Transport improvements and the report explains the assumptions that were used. These new Public Transport improvements were used to re calibrate the model and create new path links between transport zones.

The Report provides further details of the three economic and demographic future scenarios which are to be tested through the SITLUM07 model. Each of the possible economic future was compared against each other to assess the differences in terms of absolute figures but also relative % differences. These differences were then modelled spatially to show the relative differences between each transport zone and an assessment made on the absolute numeric differences but also as to the spatial effect at the conurbation or strategic level of each of the demographic or economic activity change.

Finally this report provides a summary of the six assessment tests undertaken and a conclusion as to the economic and demographic scenario which best fits the overall philosophy of the SDP.

2. Strathclyde Interactive Land Use and Transportation Model (SITLUM07)

A. Ethos and Approach: Development of new reference cases.

SITLUM stands for Strathclyde Interactive Land use and Transport Model and is a full interactive model. The current version (SITLUM07) has a base year of 2007.

The land-use model forecasts changes in both land use and the population and employment associated with different land uses (i.e. residential, office, industrial, retail etc). This information is passed to the transport model where it is used to generate travel demand and forecasts of traffic flows within and between zones. Information on the ease of travel between different zones is fed back from the transport model to the land use model where it is used to calculate an indicator of each zones' accessibility. This in turn influences the modelling of the location choices of businesses and households in terms of where to locate and where to live.

The model operates in single year steps, starting from a base year (2007) and forecasting change for each subsequent year of the forecast period. This enables the user to understand how change occurs over time and how changes in one part of the model, for example the provision of additional residential floorspace in one area, may have an impact upon population levels, employment, commuting patterns over time.

The Land use part of the model is forecast by DELTA package designed by David Simmonds Consultancy (DSC) and the transport model is run with STM software by TRL.

The users of the SITLUM07 model have to define:

- demographic and economic scenarios for Scotland in total;
- planning policy inputs, mainly in terms of how much development is permissible in each zone for each year of the forecast period; and
- transport networks, pricing and public transport services.

The model takes these inputs as given. It then forecasts the regional and zonal households, population, employment, economic production, property markets, new floorspace, and the patterns of travel and goods transport.

In October 2010, DSC was commissioned by SDPA to generate new demographic and economic scenarios for Scotland in total, and then to constrain the scenarios at the Glasgow and the Clyde Valley Strategic Development Plan Area to match the projections.

At this stage two new reference cases were developed using the SITLUM model:

- The first was calibrated to match the Oxford Economics economic and demographic scenarios. This is later described as Scenario IF in the SITLUM model. (Model can only use two letter abbreviations)
- The second was Oxford Economics economic scenario combined with "Scenario C" demographic scenario. This is later described as Scenario IG in the SITLUM model.

Both tests were run as a full land-use transport interaction model.

The following sections first describe the different elements of these scenarios, at the Scotland wide and Glasgow and the Clyde Valley level, before describing the implementation of the scenarios in SITLUM07.

B. Elements of Scenarios Used for Scenario IF and Scenario IG

In this section the scenarios used are described. They were :

- The Oxford Economics Economic Scenario:
- The Oxford Economic Demographic Scenario; and
- The Scenario 'C' Demographic Scenario.

These scenarios were provided to David Simmonds Consultancy (DSC) by Glasgow and Clyde Valley Strategic Development Planning Authority and reflected the set of forecasts that SDPA had commissioned from Oxford Economics.

In applying these scenarios DSC undertook two broad steps. Firstly, and where appropriate, to adjust the scenario(s) so that they cover the whole of SITLUM's Fully Modelled Area (i.e. the whole of Scotland). Secondly the adjusting of SITLUM's internal demographic and economic scenarios so that the rate of change (growth) is consistent with the externally generated scenario.

Oxford Economics Economic Scenario

Oxford Economics projections of employment and Gross Value Added (GVA) were used to calibrate the SITLUM economic scenario.

The following Table 1 shows the Oxford Economics projection for total employment in Scotland by sector. Between 2007 and 2031 employment was forecast to increase by 2.95%. The largest employment increase was in Business Services whilst Agriculture, Extraction, Manufacturing and the Utilities sectors were forecast to decline.

Table 1 Oxford Economics Scotland Employment (000's)

Industrial Sector	2007	2012	2017	2022	2027	2031
AB - Agriculture	62.5	63.0	58.2	53.9	49.4	46.1
CC - Extraction	29.6	28.1	25.5	22.9	20.0	18.0
DD - Manufacturing	239.6	202.7	179.7	159.2	141.3	128.7
EE - Electricity, gas & water supply	17.2	17.0	15.5	14.0	12.4	11.2
FF - Construction	184.7	173.4	184.0	188.5	191.1	192.4
G - Distribution	390.1	393.3	412.4	421.2	425.6	428.7
H - Hotels	187.8	181.6	189.6	193.0	193.5	192.7
II - Transport & Communications	147.3	140.7	144.0	146.0	146.5	146.5
J - Financial Services	94.7	92.2	95.6	97.6	98.6	99.2
K - Business services	402.0	415.4	476.7	504.4	526.6	539.6
LL - Public admin & defence	164.6	142.8	139.0	138.4	137.7	136.9
M - Education	193.9	195.6	191.7	192.1	192.2	191.8
N - Health	401.2	408.3	409.1	424.0	438.4	449.4
OO - Other personal services	158.8	164.1	169.8	174.5	174.0	172.6
Total	2692.6	2636.6	2709.2	2748.2	2765.8	2772.1

T

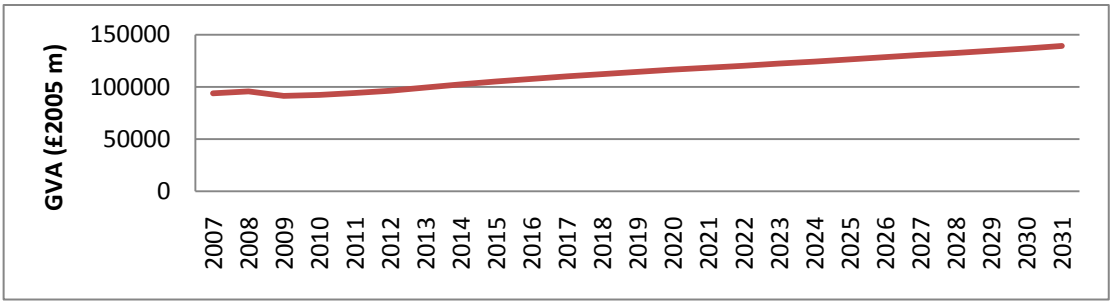
Table 2 contains the same data for the Glasgow and Clyde Valley Strategic Development Planning Area. Within this area total employment is forecast to increase by 4.03% between 2007 and 2031.

Table 2 Oxford Economics Glasgow and the Clyde Valley Employment (000's)

Industrial Sector	2007	2012	2017	2022	2027	2031
AB - Agriculture	4.0	4.9	4.6	4.2	3.9	3.7
CC - Extraction	1.2	0.8	0.6	0.5	0.4	0.4
DD - Manufacturing	78.4	66.2	58.8	52.1	46.3	42.2
EE - Electricity, gas & water supply	6.2	6.3	5.7	5.1	4.5	4.1
FF - Construction	62.7	59.1	62.9	64.6	65.8	66.5
G - Distribution	131.5	136.4	143.1	146.4	148.5	150.1
H - Hotels	57.7	53.8	55.9	56.7	56.8	56.5
II - Transport & Communications	59.0	52.8	53.4	53.6	53.5	53.2
J - Financial Services	36.6	36.0	37.7	38.8	39.5	40.1
K - Business services	161.1	164.5	189.3	200.8	210.1	215.8
LL - Public admin & defence	61.9	55.2	53.3	52.7	52.0	51.4
M - Education	62.5	62.9	61.2	60.9	60.3	59.7
N - Health	138.7	141.4	140.2	143.9	147.4	149.9
OO - Other personal services	49.2	54.6	56.0	57.2	56.9	56.3
Total	913.3	897.8	925.6	940.4	948.8	952.6

Figure 1 plots total GVA for Scotland as a whole between 2007 and 2031; overall GVA is forecast to increase by 48.35% over the 24 year period. Detailed information about change in GVA by sector was not available but is required for DELTA calibration, therefore DSC made assumptions about the growth and decline of different sectors using Table 4.5 of the Oxford Economics Report.

Figure 1 Scotland GVA (£2005 m) Source: Oxford Economics



Oxford Economics Demographic Scenario

For this scenario DSC assumed that the Oxford Economics Demographic scenario would be applied within the Glasgow and Clyde Valley area whilst the GROS population projection would be applied across the rest of Scotland.

In order to calculate the targets which should be used when calibrating this scenario it was necessary firstly to take the GROS projection for Scotland, then to subtract the GROS projection for the Glasgow and Clyde Valley area and finally to add in the Oxford Economics projection for Glasgow and Clyde Valley.

Table 3 contains the GROS demographic projections for Scotland and for Glasgow and the Clyde Valley.

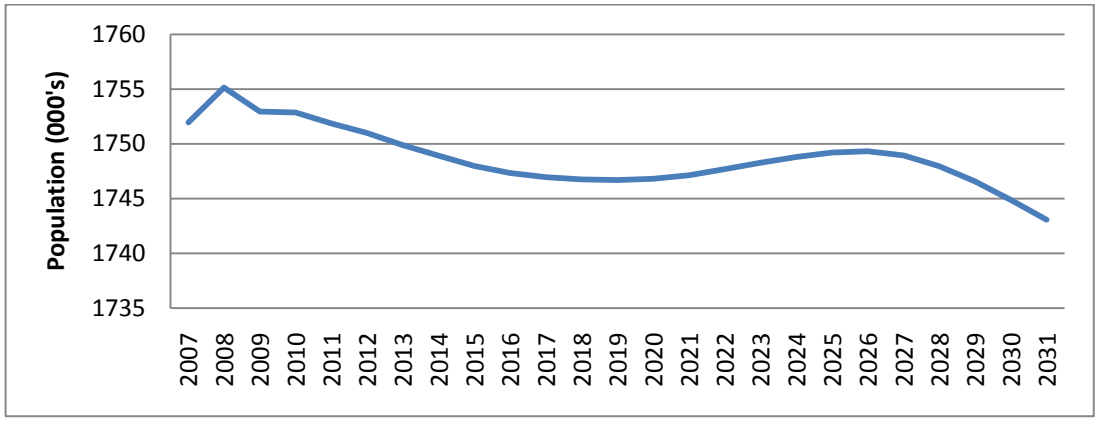
Table 3 GROS Demographic Forecast for Scotland and Glasgow and the Clyde Valley (2008 based).

		2008	2013	2018	2023	2028	2033
Scotland	Households	2,331,250	2,440,440	2,549,930	2,645,300	2,731,760	2,812,520
	Population	5,168,500	5,271,006	5,359,837	5,442,289	5,505,283	5,544,410
	Children	913,534	905,527	922,576	933,003	917,949	899,785
	Working Age	3,238,035	3,307,587	3,363,798	3,353,842	3,373,974	3,307,888
	Retirees	1,016,931	1,057,892	1,073,463	1,155,444	1,213,360	1,336,737
Glasgow and Clyde Valley	Households	795,410	824,500	853,120	875,360	893,410	909,790
	Population	1,755,310	1,766,589	1,772,094	1,773,932	1,768,547	1,756,005
	Children	315,002	310,727	313,791	312,068	299,854	286,690
	Working Age	1,167,785	1,166,166	1,147,611	1,120,052	1,086,610	1,051,811
	Retirees	272,523	289,696	310,692	341,812	382,083	417,504

The Oxford Economics data provided a forecast of population for Glasgow and Clyde Valley. This is shown in Figure 2. It projects a decline in population of 0.51% between 2007 and 2031 (compared to an increase in the GROS forecast 2008-2033 of 0.04%).

The Oxford Economics forecast did not provide estimates of households and persons by type. DSC therefore required to provide an estimate of these. For this DSC have assumed the same persons per household ratio, and split of population by type (i.e. children working age and retirees) as in the GROS forecast for the Glasgow and Clyde Valley area.

Figure 2 Oxford Economics Population Forecast for Glasgow and the Clyde Valley



'Scenario C' Demographic Scenario

The Scenario C demographic forecast is a forecast for the Glasgow and Clyde Valley area only. In applying this forecast DSC have assumed that the level of population growth across the rest of Scotland should match the GROS projection.

As before in order to calculate the targets which should be used when calibrating this scenario it was necessary to take the GROS projection for Scotland, and then subtract the GROS projection for the Glasgow and Clyde Valley Area and then finally adding in the Scenario C projection for Glasgow and Clyde Valley.

Figure 3 shows the Scenario C population projection for Glasgow and the Clyde Valley, overall population is forecast to increase by 3.80% between 2008 and 2025. This is a faster rate of growth than either the Oxford Economics demographic forecasts or the GROS forecast. Figure 4 shows the Scenario C Household projection.

The Scenario C population projection was only available to 2025; DSC had therefore to extrapolate the forecast forward to provide targets for the model calibration.

Figure 3 Scenario C Population by Type Forecast for Glasgow and the Clyde Valley

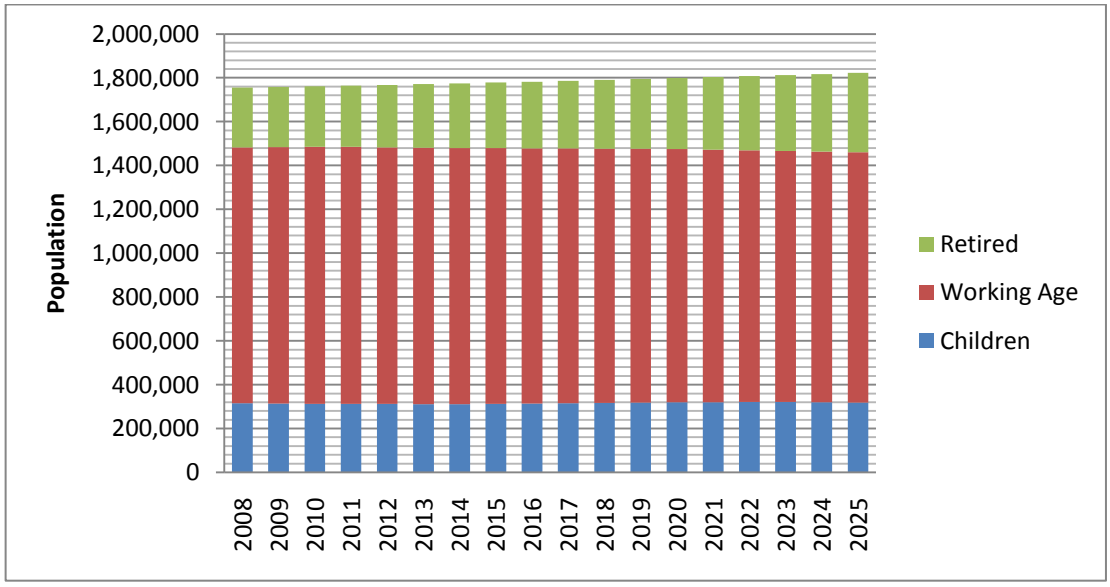
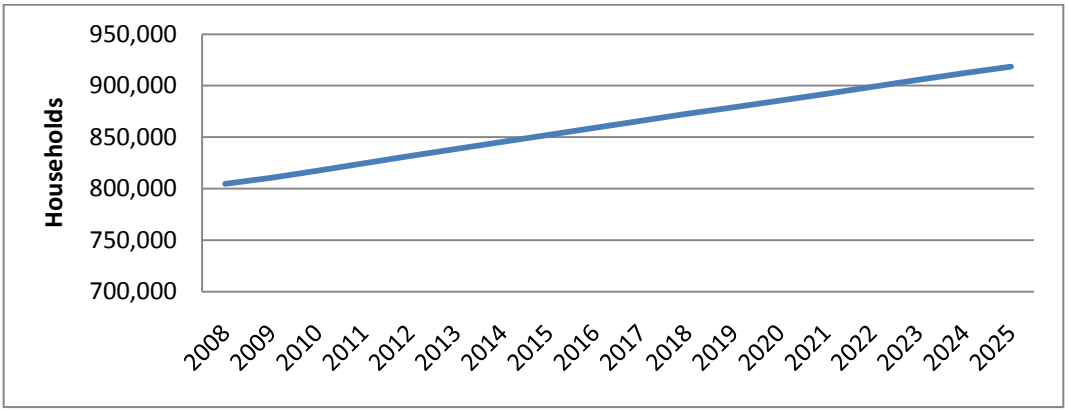


Figure 4 Scenario C Household Forecast for Glasgow and the Clyde Valley



Application of the Scenarios to SITLUM

DSC then had the process of adjusting the SITLUM economic and demographic forecasts. This was done in two stages. Firstly an adjustment to ensure that SITLUM's national population and economic forecasts were consistent with the external scenario(s). Secondly an adjustment to ensure that SITLUM's total forecasts for the Glasgow and Clyde valley area were consistent with the external scenario. Without this second adjustment there was a risk that the model replicates the external scenario at the national level but that all the additional growth/decline occurs in other parts of Scotland and not in Glasgow and Clyde Valley.

National Level: Economic Scenario

The SITLUM regional economic model was calibrated so that, changes in model output employment and GVA through time match the changes in employment and GVA projected in the Oxford Economics forecasts.

Figure 5 and Figure 6 compare modelled and Oxford Economics change in employment and GVA. There were some discrepancies in the early years of the modelled period; this was because the REM has been calibrated in 5 year steps whereas for the 2007-12 period the forecast changes fairly dramatically from year to year. From 2012 onwards the match to the projected growth was considered good.

Test HH was Oxford Economics economic scenario combined with "Scenario C" demographic scenario. This is later described as Scenario IG in the SITLUM model.

Test HJ was Oxford Economics economic and demographic scenarios. This is later described as **Scenario IF** in the SITLUM model**.**

Figure 5 Changes in Employment

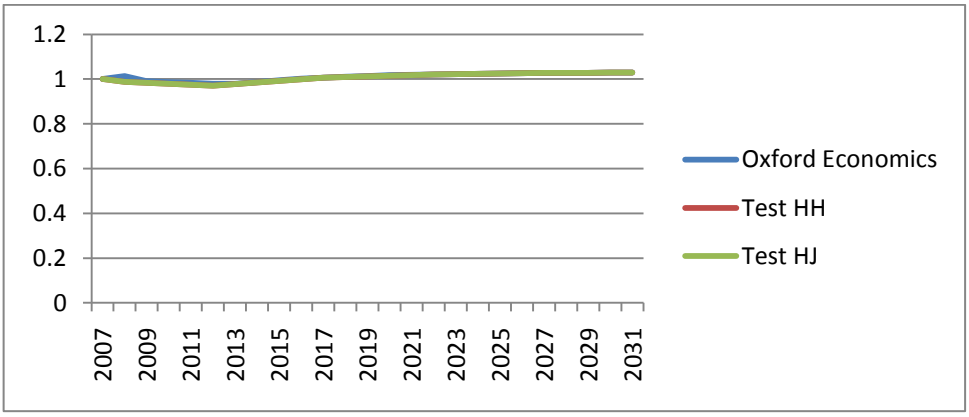


Figure 6 Changes in GVA

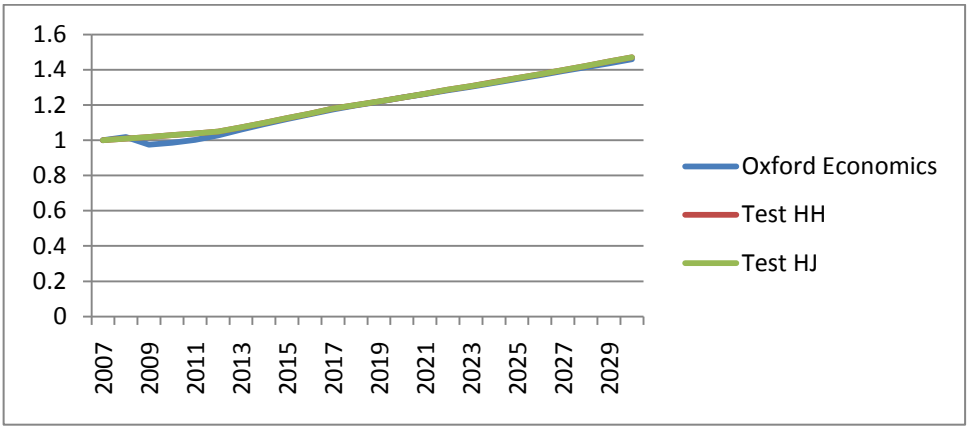


Table 4 shows the employment by REM sector which is forecast by the model.

Table 4 Employment by REM Sector: Model Output

Sector	Sector Name	2007	2012	2017	2022	2027	2031
101	Agriculture, forestry and fishing	45,881	46,371	43,083	39,953	36,577	34,036
102	Mining	23,807	22,434	20,648	18,542	16,211	14,519
103	Manufacturing	220,659	186,169	166,374	147,549	130,910	119,157
104	Energy and water	18,990	18,719	17,211	15,601	13,795	12,482
105	Construction	160,699	150,539	160,748	164,840	167,105	168,204
106	Distribution and catering	415,289	411,139	434,571	443,547	447,179	448,856
107	Transport and communications	160,160	150,455	157,237	159,576	160,130	160,005
108	Finance and business	418,677	420,860	484,369	509,824	529,592	541,081
109	Public administration	672,618	660,178	657,748	671,151	683,838	692,400
110	Other services	124,301	127,800	133,554	137,333	136,907	135,787
	Total	2,261,081	2,194,665	2,275,544	2,307,917	2,322,244	2,326,527

National Level: Demographic Scenario

The demographic scenarios were adjusted so as to match the growth in households and population by type described above. Within DELTA, the calibration process involved DSC adjusting the household formation, transition and dissolution rates used in the Transition model (program MT12), as well as some adjustments to average persons per household, by type used within the Employment Status Model (program ME12).

Table 5 below shows the model output households, population and persons by type for the two scenarios. In test HH, (later Scenario IF), where the demographic scenario has been calibrated to match the Oxford Economics projection within Glasgow and Clyde Valley and GROS elsewhere, Scotland's population increases by 326,484 or 6% between 2007 and 2031. In test HJ,(later Scenario IG), where the demographic scenario has been calibrated to match the higher Scenario C projection within Glasgow and Clyde Valley and GROS elsewhere, Scotland's population increases by 431,701 or 9% between 2007 and 2031.

Table 5 Demographic Model Outputs

		2007	2012	2017	2022	2027	2031
Test HH (Scenario IF): GROS/Oxford Economics	Households	2,310,836	2,411,442	2,507,422	2,606,085	2,705,168	2,768,932
	Population	5,048,791	5,132,963	5,210,302	5,283,160	5,346,905	5,375,276
	Children	910,191	900,056	910,074	921,387	912,545	899,292
	Working Age	3,222,432	3,283,267	3,334,758	3,337,174	3,354,430	3,321,084
	Retirees	916,166	949,639	965,472	1,024,602	1,079,928	1,154,900
Test HJ (Scenario IG): GROS/Scenario C	Households	2,310,836	2,428,476	2,545,678	2,650,608	2,759,788	2,844,186
	Population	5,048,791	5,148,129	5,247,465	5,340,651	5,426,649	5,480,492
	Children	910,191	902,611	915,921	933,964	934,007	933,552
	Working Age	3,222,432	3,296,484	3,362,028	3,376,263	3,408,775	3,390,342
	Retirees	916,166	949,034	969,517	1,030,422	1,083,867	1,156,598

Glasgow and the Clyde Valley Adjustments

Once the model was calibrated at a national level two adjustments were made by DSC to match the economic and demographic scenarios within the Glasgow and Clyde Valley area.

Firstly, in order to match the economic scenario changes were made, within DELTA's Regional Economic Model to the economic capacity of the DELTA areas which make up the Glasgow and the Clyde Valley have been constrained[1]. These adjustments, at industrial sector level, worked through to the number of people employed within different industrial sectors.

[1] DELTA models processes at two spatial levels, the strategic or area level where economic and long distance migration movements are modelled and the finer zone level where location, relocation and quality are modelled. The Areas are based upon the 2001 Travel to Work Areas. The Zones nest within Areas.

Secondly, in order to obtain the correct levels of population growth within Glasgow and Clyde Valley, changes were made to the Migration Model's 'push' and 'pull' factors which draw people to and from Glasgow and Clyde Valley.

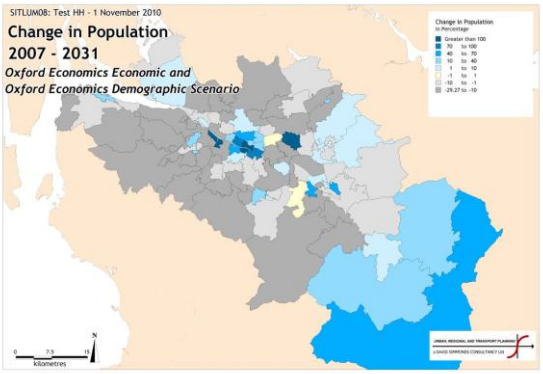
The target and model output for employment and population, for the Glasgow and Clyde Valley area, for Test HH, (later Scenario IF) was tested. This test was based upon both the Oxford Economics economic and Oxford Economic demographic scenarios. The result was Model output population was within -0.1% and +0.4% of the target.

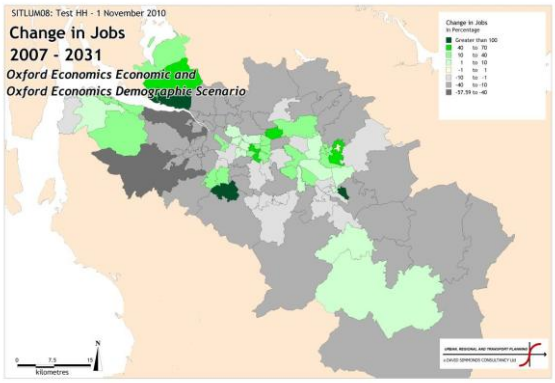
The target and model output Glasgow and the Clyde Valley employment in test HJ, (later Scenario IG) where the Oxford Economics economic and Scenario C demographic scenario had been implemented, were tested and compared to target and model output population. The model output for employment was within -0.5% and +0.5% of the target. Model output population was within -0.6% and +0.5% of the target.

Zone level distribution of change

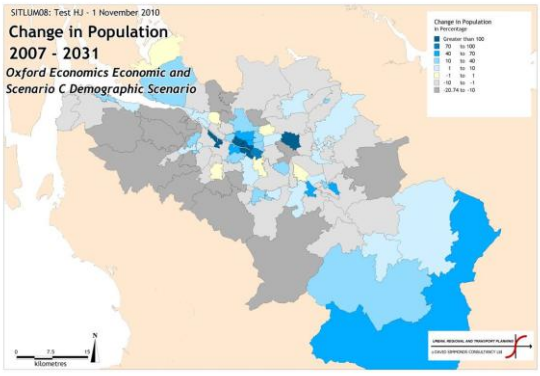
Figures 7 and Figure 8 show the zone-level change for Test HH, (later Scenario IF) (Oxford Economic and Demographic Scenario).

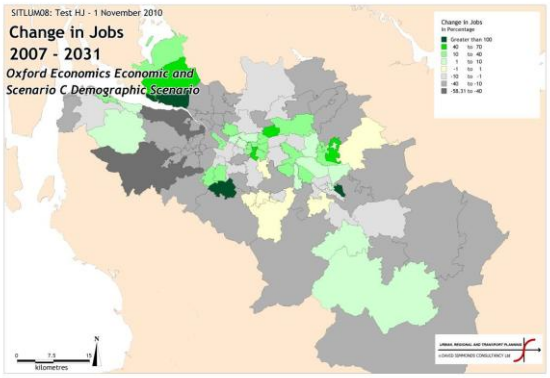
Figure 7 Percentage change in Population at Zone Level and Figure 8 Percentage change in Jobs at Zone Level





Figures 9 and Figure 10 show the zone-level change in population and employment for Test HJ, (later Scenario IG) (Oxford Economics Economic Scenario and Scenario C population)





In conclusion this section has described the processes which was undertaken to create two new SITLUM07 reference cases, HH, (later Scenario IF) and HJ,(later Scenario IG) which were constrained at the Glasgow and Clyde Valley level.

It should be noted that there was some tension between the demographic and economic scenarios in these two tests.

The first, test HH, (later Scenario IF) involved the implementation of the Oxford Economics economic scenario which suggested an increase in the Glasgow and Clyde Valley Area's jobs of 39,300 between 2007 and 2031 whilst the Oxford Economics demographic scenario suggested a 8,900 population decrease in the same area over the same period. With more jobs and fewer people this could have impacts upon both the proportion of the people of working age in employment and upon commuting flows from adjacent areas.

The second, test HJ, (later Scenario IG) combined the Oxford Economics economic scenario projection of a 39,300 increase in employment with Scenario C population growth of 95,000 within Glasgow and the Clyde Valley. This could result in a smaller proportion of the working age population in employment and a different pattern of commuting flows.

C. The New "Re-Balancing Scenario" for SITLUM07

In December 2010 DSC were commissioned by Glasgow and Clyde Valley Strategic Development Planning Authority (GCVSDPA) to generate a new demographic and economic scenario for Scotland in total, and then to constrain the scenarios at the Glasgow and the Clyde Valley Strategic Development Plan Area to match the projections in the Oxford Economic "Rebalancing Scenario" Forecast.

The new model was created based on population and employment growth rates in the Oxford Economics "re-balanced" forecast data provided by Glasgow and Clyde Valley Strategic Development Planning Authority (GCVSDPA) to DSC.

A new reference case was developed: Test HW (later **Scenario IA**): has constrained demographic and economic scenarios matching the projections in the "Rebalancing Scenario".

Test HW (later Scenario IA) was run as a full land-use transport interaction model.

The following section, in a similar process as to how model tests Scenario IF and Scenario IG were developed, first describes the elements of these scenarios, at the Scotland-wide and Glasgow and the Clyde Valley level, before describing the implementation of the scenarios in the Model test HW (Scenario IA).

The elements of the new scenario

In this section the "Rebalancing Scenarios" used as target are described. They were:

- The Oxford Economics Employment Scenario for the whole of Scotland.
- The Oxford Economics Demographic Scenario for the Glasgow and Clyde Valley area;

These scenarios were provided to DSC by Glasgow and Clyde Valley Strategic Development Planning Authority and reflect the set of forecasts that they had commissioned from Oxford Economics.

In applying these scenarios there were two broad steps undertaken by DSC. Firstly and where appropriate, to adjust the scenario so that they cover the whole of

SITLUMs Fully Modelled Area (i.e. the whole of Scotland). Secondly the adjusting of SITLUM‟s regional demographic and economic scenarios so that the rate of change (growth) is consistent with the targets.

Oxford Economics 'Re-balancing' Employment Scenario

Oxford Economics projections of employment and Gross Value Added (GVA) have been used to calibrate the SITLUM economic scenario.

Table 6 shows the Oxford Economics projection for total employment in Scotland by sector. Between 2008 and 2031 employment is forecast to increase by 12.5%. The largest employment increase is in Business Services and the largest decline is in Public administration and defence.

Table 6 Oxford Economics Employment in Scotland ('000)

Industrial Sector	**2008**	**2013**	**2018**	**2023**	**2028**	**2031**
AB - Agriculture	69	67	67	67	67	68
CC - Extraction	31	30	31	32	33	34
DD - Manufacturing	235	215	213	214	219	224
EE - Electricity, gas & water supply	19	18	18	18	18	18
FF - Construction	197	178	187	192	195	197
G - Distribution	403	398	419	429	436	440
H - Hotels	185	194	219	239	258	269
II - Transport & Communications	144	141	145	147	147	147
J - Financial Services	97	93	97	99	101	101
K - Business services	408	425	478	498	515	523
LL - Public admin & defence	151	140	139	138	138	137
M - Education	198	195	197	200	203	205
N - Health	410	402	412	427	441	449
OO - Other personal services	162	175	196	215	230	239
Total	2,711	2,671	2,818	2,916	3,001	3,050

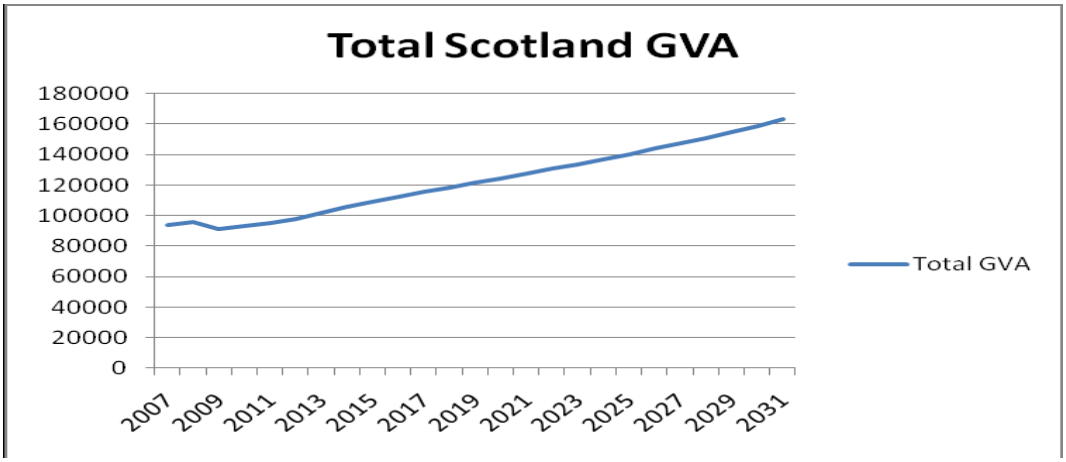
Table 7 contains the same data for the Glasgow and Clyde Valley Strategic Development Planning Area. Within this area total employment is forecast to increase by 11.8% between 2008 and 2031.

Table 7 Oxford Economics' 'Rebalancing' Forecast: Glasgow and the Clyde Valley Employment

Industrial Sector	**2008**	**2013**	**2018**	**2023**	**2028**	**2031**
AB - Agriculture	5,423	5,220	5,258	5,295	5,338	5,363
CC - Extraction	936	814	762	739	731	725
DD - Manufacturing	76,102	70,560	70,328	71,231	73,369	75,225
EE - Electricity, gas & water supply	7,150	6,679	6,752	6,650	6,469	6,354
FF - Construction	67,137	60,867	63,958	65,817	67,337	68,132
G - Distribution	139,286	137,921	145,519	149,301	152,211	154,001
H - Hotels	55,089	57,499	64,475	70,240	75,648	78,866

Figure 11 plots total GVA for Scotland as a whole between 2007 and 2031; overall GVA is forecast to increase by 70.7% over the 24 year period.

Figure 11 Scotland GVA (£2005 m) Source: Oxford Economics



Oxford Economics' 'Re-balancing' Demographic Scenario

For this scenario DSC have assumed that the Oxford Economics Demographic scenario would be applied within the Glasgow and Clyde Valley area whilst the GROS population projection would be applied across the rest of Scotland.

In order to calculate the targets which should be used when calibrating this scenario it was necessary firstly to take the GROS projection for Scotland, then to subtract the GROS projection for the Glasgow and Clyde Valley area and finally to add in the Oxford Economics projection for Glasgow and Clyde Valley.

Table 8 contains the GROS demographic projections for Scotland and for Glasgow and the Clyde Valley.

Table 8 GROS Demographic Forecast for Scotland and Glasgow and the Clyde Valley (2008 based).

		2008	2013	2018	2023	2028	2031
Scotland	Households	2,331,240	2,440,450	2,549,920	2,645,280	2,731,800	2,780,220
	Population	5,168,500	5,271,006	5,359,837	5,442,289	5,505,283	5,528,759
	Children	913,534	905,527	922,576	933,003	917,949	907,050
	Working Age	3,238,035	3,307,587	3,363,798	3,353,842	3,373,974	3,334,322
	Retirees	1,016,931	1,057,892	1,073,463	1,155,444	1,213,360	1,287,386
Glasgow and Clyde Valley	Households	795,410	824,500	853,120	875,360	893,410	893,410
	Population	1,755,310	1,766,589	1,772,094	1,773,932	1,768,547	1,768,547
	Children	314,970	308,075	310,061	308,783	298,102	298,102
	Working Age	1,167,667	1,156,213	1,133,976	1,108,236	1,080,262	1,080,262
	Retirees	272,523	289,696	310,692	341,812	382,083	382,083

Table 9 shows the Oxford Economics-based demographic forecasts for person types in the Glasgow and Clyde Valley area based on the SITLUM07 base year data.

Table 9 Forecast demographic data based on Oxford Economics forecast rates for the Glasgow and Clyde Valley Area

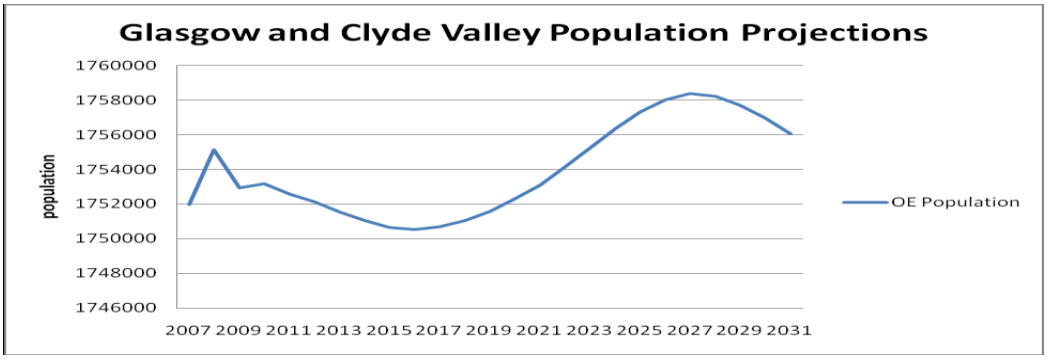
		2008	2013	2018	2023	2028	2031
Glasgow and Clyde Valley	Households	795,410	824,500	853,120	875,360	893,410	893,410
	Population	1,755,132	1,751,511	1,751,034	1,755,260	1,758,215	1,756,073
	Children	314,970	308,075	310,062	308,783	298,102	291,135
	Working Age	1,167,667	1,156,213	1,133,973	1,108,263	1,080,262	1,062,736
	Retirees	272,495	287,223	307,000	338,214	379,851	402,202

The Oxford Economics data provided a forecast of population for Glasgow and Clyde Valley. This is shown in Table 8 and 9. It projects an increase in population of 0.23% between 2007 and 2031 (compared to an increase in the GROS forecast of 0.45%).

The Oxford Economics forecast did not provide estimates of households and persons by type. It was therefore necessary for SDC to estimate these. For this SDC have assumed the same persons per household ratio and split of population by type (i.e. children working age and retirees) as in the GROS forecast for the Glasgow and Clyde Valley area.

Figure 12 shows the total household population targets for the Glasgow and Clyde Valley area based on the Oxford Economics forecasts.

Figure 12 Oxford Economics Population Forecast for Glasgow and the Clyde Valley



APPLICATION OF THE SCENARIO TO SITLUM07

DSC then undertook the process of adjusting the SITLUM economic and demographic forecasts. This was done in two stages. Firstly an adjustment to ensure that SITLUM‟s national population and economic forecasts were consistent with the projections described above (i.e. a new national demographic scenario where the GCV area is based on OE projections and everywhere else on GROS projections) and also the national economic scenario based on OE projections. Secondly an adjustment to ensure that SITLUM's total forecasts for the Glasgow and Clyde valley area were consistent entirely with the OE rebalancing scenario. The second adjustment was a constraining process to make sure the additional growth/decline of the rebalancing scenario introduced in the model occurs only in Glasgow and Clyde Valley area and not in other parts of Scotland.

National Level: Economic Scenario

The SITLUM regional economic model was then calibrated so that, changes in model output employment and GVA through time matched the changes in employment and GVA projected in the Oxford Economics forecasts.

Figure 13 and Figure 14 compare modelled and Oxford Economics change in employment and GVA. (Test HW later Scenario IA).

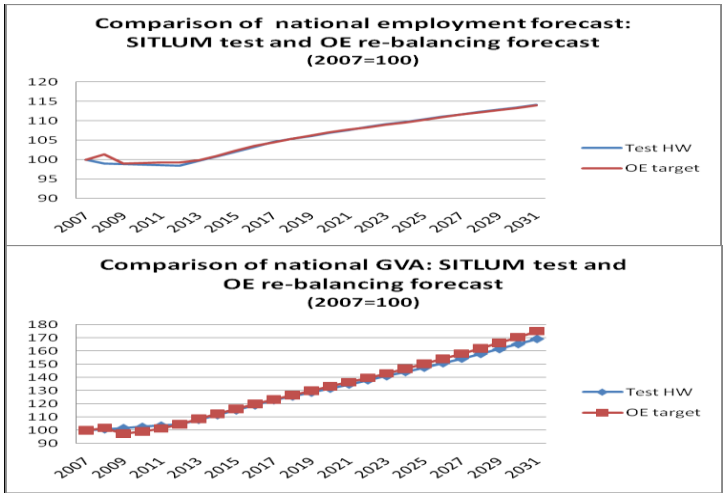


Table 10 shows the employment by REM sector which is forecast by the model.

Table 10 Employment by REM Sector at the National Level: Model Output

Sector	Sector Name	2008	2013	2018	2023	2028	2031
101	Agriculture, forestry and fishing	46,404	49,193	49,666	49,890	49,991	50,047
102	Mining	23,700	24,366	25,372	26,130	26,825	27,227
103	Manufacturing	214,858	197,390	197,336	198,945	203,631	207,914
104	Energy and water	19,087	19,963	20,257	20,228	19,803	19,535
105	Construction	158,137	153,404	163,544	168,248	171,381	172,904
106	Distribution and catering	413,519	425,786	460,710	483,673	502,706	513,862
107	Transport and communications	155,814	152,079	158,344	160,572	161,248	161,350

National Level: Demographic Scenario

The demographic scenarios were adjusted so as to match the growth in households and population by type described above. Within DELTA, the calibration process involved adjusting the household formation, transition and dissolution rates used in the Transition model (program MT12), as well as some adjustments to average persons per household, by type used within the Employment Status Model (program ME12).

Table 11 shows the model output households, population and persons by type for the scenario. In test HW (later Scenario IA) the demographic scenario was calibrated to match the Oxford Economic projection within Glasgow and Clyde Valley and GROS elsewhere.

Table 11 National Demographic Model Outputs in Test HW (later Scenario IA)

		2008	2013	2018	2023	2028	2031
Test HW (later Scenario IA): GROS/Oxford Economics	Household	2,335,330	2,430,032	2,525,724	2,632,383	2,714,441	2,778,325
	Population	5,069,367	5,153,545	5,233,205	5,314,971	5,383,826	5,411,815
	Children	908,861	898,703	914,476	926,570	914,028	905,452
	Working Age	3,237,018	3,297,842	3,349,507	3,346,071	3,374,285	3,343,205
	Retirees	923,488	957,003	969,223	1,042,331	1,095,513	1,163,159

Glasgow and the Clyde Valley Adjustments

Once the model was calibrated at a national level two adjustments were made to match the economic and demographic scenarios within the Glasgow and Clyde Valley area.

Firstly, in order to match the economic scenario, changes were made within DELTA's Regional Economic Model to the economic capacity of the DELTA areas which comprise the Glasgow and the Clyde Valley. This involved making small changes to the capacity of the industrial sectors within the area and then compensating for the change by adjusting the capacity across the other parts of Scotland (i.e. outwith Glasgow and Clyde Valley). In this way the economic scenario for GCV was adjusted affecting the total National economic scenario. These adjustments, at industrial sector level, had a corresponding effect on the number of people employed within different industrial sectors.

Secondly, in order to obtain the correct levels of population growth within Glasgow and Clyde Valley, changes were made to the Migration Model's "push" and "pull" factors which draw people to and from Glasgow and Clyde Valley.

Figure 15 illustrates the target and model output population for the Glasgow and Clyde Valley area in the model Test HW (later Scenario IA). This test is based on the "Rebalancing scenario" which is the Oxford Economics employment and Oxford Economic demographic scenarios.

Figure 15 Glasgow and the Clyde Valley: Comparison of Test HW and Oxford Economics Population Projection

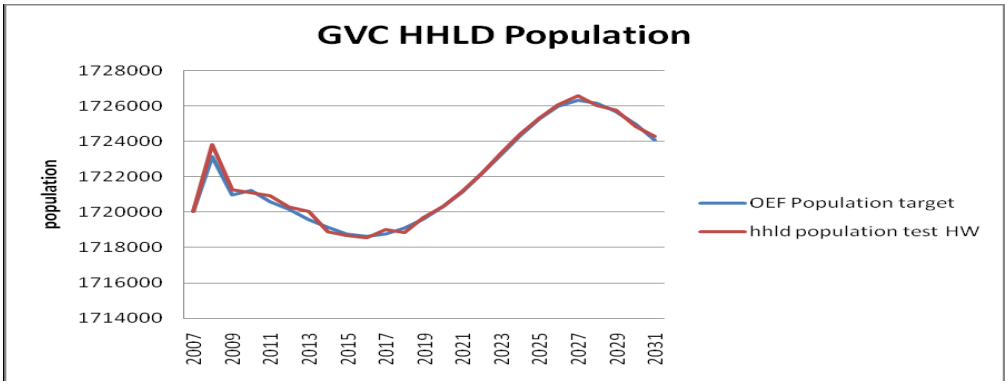
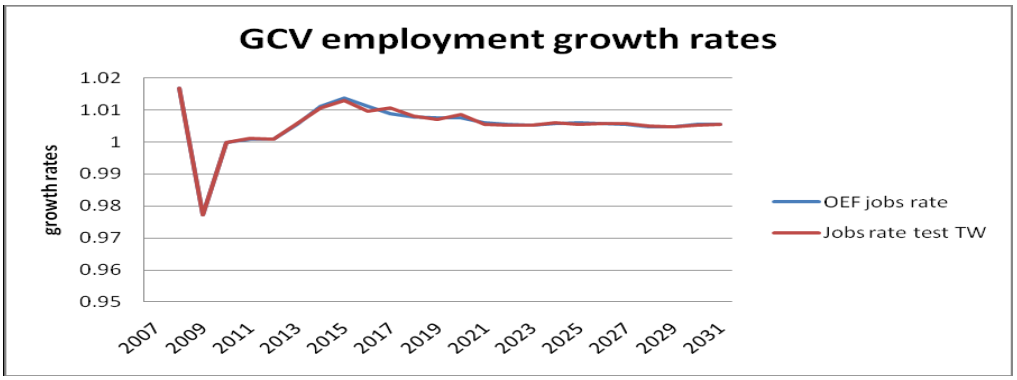


Figure 16 illustrates the target and model output employment for the Glasgow and Clyde Valley area in the model Test HW. This test is based on the "Rebalancing scenario".

Figure 17 and Figure 18 show the Oxford Economics‟ growth rates and model output rates for Glasgow and the Clyde Valley employment and population respectively in test HW (later Scenario IA).



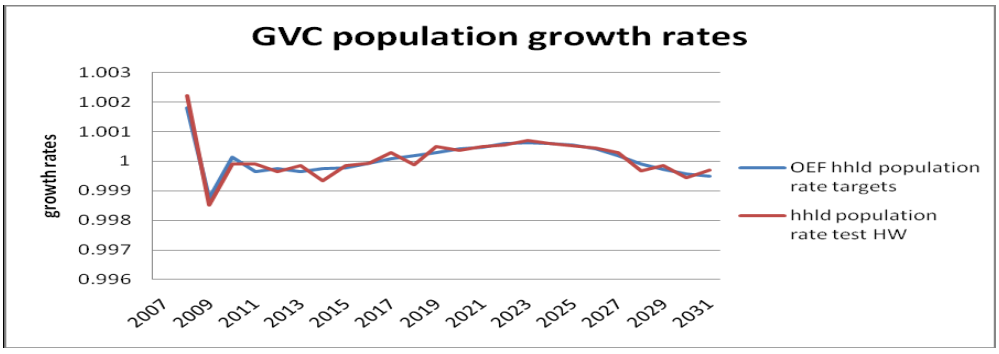
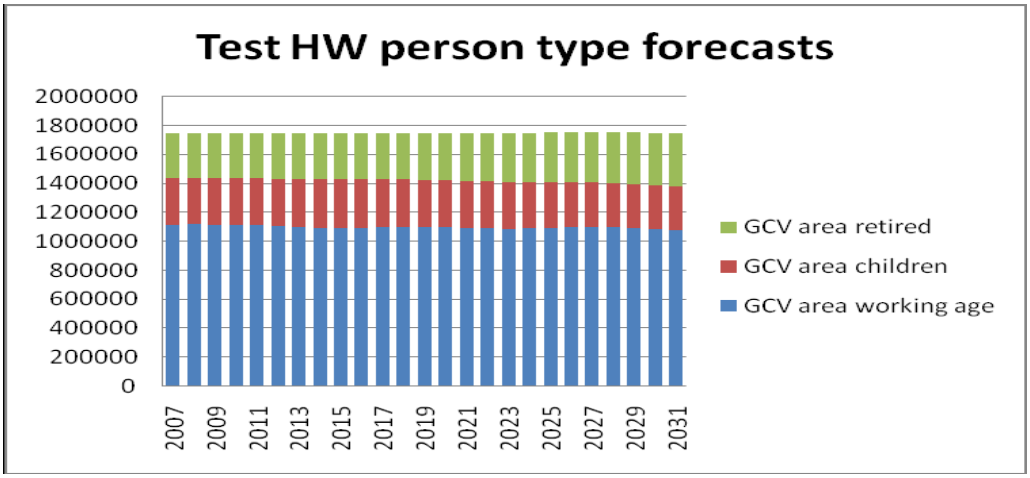
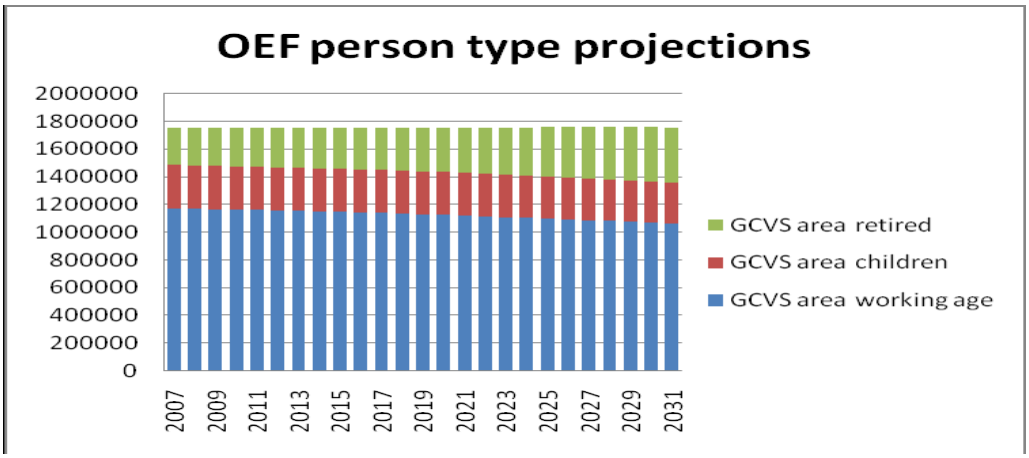


Figure 19 shows the trends in population person types (children, working age and retired people) in the Glasgow and Clyde Valley Area for test HW (later Scenario IA) and the Oxford Economics‟ Projections.

Figure 19 Person type (children, retired & working age) projections for OEF and test HW.





Zone level distribution of employment and population change

Figures 20 and 21 show the zone-level percentage change in employment and population. These were based upon the overall "Re-balancing" scenarios applied at the Glasgow and Clyde Valley level, the planning policy inputs (describing the future scale and distribution of permissible development) and the current transport scenario.

Figure 20 Change in employment 2007 to 2031 (Test HW later Scenario IA)

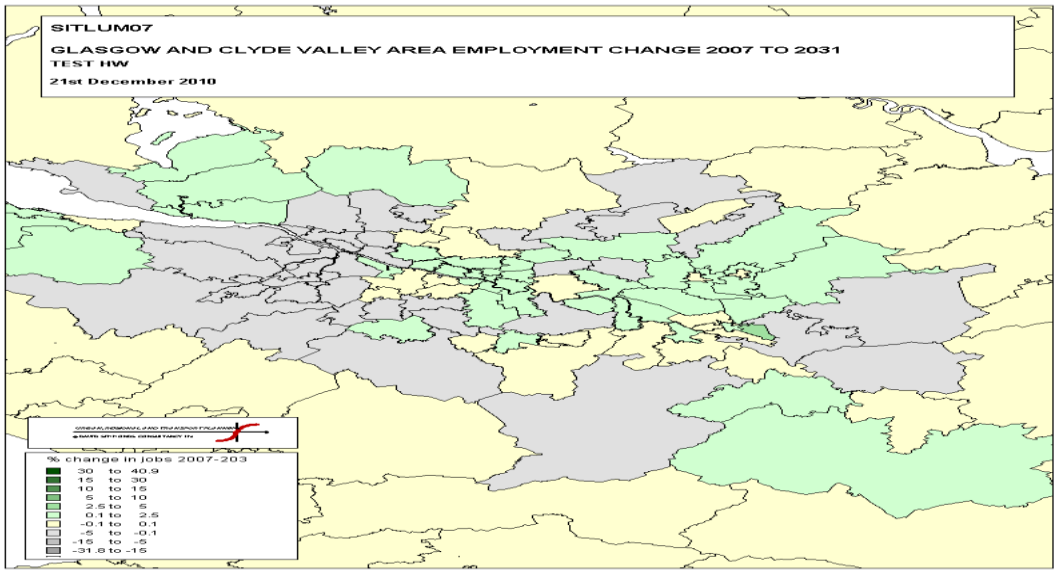
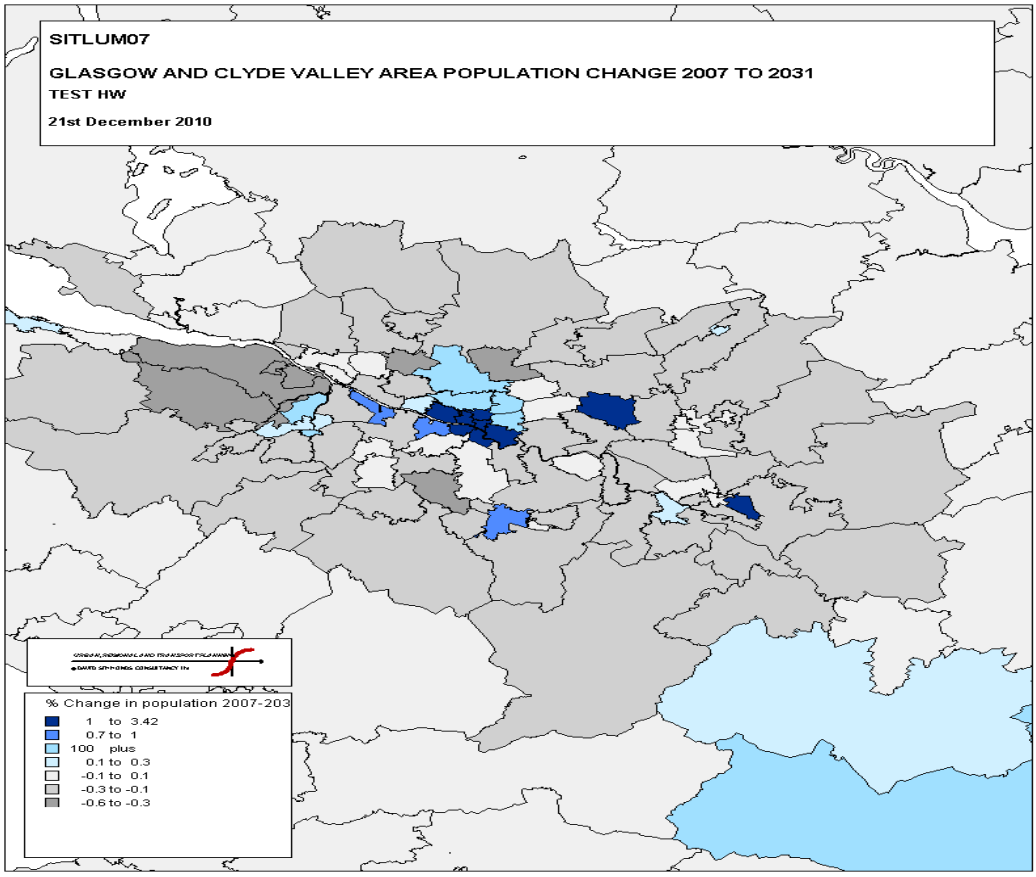


Figure 21 Change in population 2007 to 2031 (Test HW later Scenario IA)



In **conclusion** this section has described the processes which was undertaken to create a new SITLUM07 reference cases, HW, (later Scenario IA) which was constrained at the Glasgow and Clyde Valley level.

D. Process of Integrating Future Transport Proposals (WSPTCS) into the Strathclyde Integrated Transport Model (SITM4A Model)

The work described above was undertaken on the DELTA land use element of the SITLUM07 model. The land-use model forecasts changes in both land use and the population and employment associated with different land uses (i.e. residential, office, industrial, retail etc). This information is passed to the transport model where it is used to generate travel demand and forecasts of traffic flows within and between zones. Information on the ease of travel between different zones is fed back from the transport model to the land use model where it is used to calculate an indicator of each zones' accessibility. This in turn influences the modelling of the location choices of businesses and households in terms of where to locate and where to live.

However this is based on the models understanding of the Public Transport network within the transport model element known as the Strathclyde Integrated Transport Model (SITM4A model). The SITM4A transport model would require to be updated to consider at a strategic level the potential implications on accessibility and land use patterns of future proposed improvements to public transport within the conurbation up to 2031.

To achieve this, a representation of public transport improvements over the next 20 years was required to be coded into the Strathclyde Integrated Transport Model (SITM4A).

The GCVSDPA and Strathclyde Partnership for Transport (SPT) had a discussion with Transport Scotland in November 2010 and Transport Scotland advised that they could not support the strategic transport infrastructure proposals presented in the GCVSDP Main Issues Report (MIR) as they were based on SPT's West of Scotland Conurbation Public Transport Study (WSCPTS) rather than the Strategic Transport Projects Review (STPR) which outlines Scottish Minister's future strategic transport priorities. Transport Scotland's concern related primarily to the rail interventions proposed in the WSCPTS. Transport Scotland advised that there were no current plans to deliver many of the proposals contained in the WSCPTS, although the findings of the study was likely to inform the development of STPR intervention 24 – West of Scotland Strategic Rail Enhancements, full details of which were unlikely to become clear for some time.

It was agreed however that Transport Scotland and GCVSDPA would work with SPT to assist in identifying heavy rail and/ or light rail (LRT) proposals emerging as part of the overall STPR Intervention 24 – West of Scotland Strategic Rail Enhancements that could be modelled in place of the heavy rail and LRT proposals suggested in the West of Scotland Strategic Rail Enhancement. Proxies would require to be developed to represent possible Public Transport improvements.

In February 2011 SPT commissioned Jocobs consultants to help define and code high-level representations of a number of potential public transport improvements for inclusion into the SITM4A transport model.

Jacobs scope to provide definite outcomes were limited but it was agreed that where the definition of improvements was not defined in detail, potential schemes need only to be representative of the scale of the intended improvements and did not need to consider the detailed operational aspects of introducing either an individual or combination of interventions. As such, issues arising from the need for enabling works, operational constraints, timetable conflicts and detailed feasibility could be ignored at this stage. The purpose of the tests coded was to assist with the

prioritisation of improvements and quantify the magnitude of responses to improvements.

It was agreed that once preferred interventions were identified, it would be necessary to undertake more detailed analysis of the engineering feasibility of new infrastructure and the operational issues arising from new services and potential conflicts with existing services. Such studies would consider line and terminal capacity issues, conflicts between modes and variations to routes and be used to refine the coding assumed at this stage in scheme development.

Jacobs on taking up the commission agreed that whilst the detailed practicalities of implementing the options coded will not be assessed in detail, the concepts were broadly achievable in respect of journey times and changes in accessibility.

Jocobs set out the alternative STPR based measures and interventions were coded separately for the five test scenarios indicated in Figure 28 of the GCVSDPA, Main Issues Report (MIR):

- Heavy Rail; 15 minute frequency on routes indicated;
- Subway; 4 minute frequency;
- Light Rail (LRT); 10 minute frequency;
- Bus Rapid Transit; 10 minute frequency; and
- Core (10 minute frequency) and Circular or Orbital (15 minute frequency) Bus Services.

The purpose of the test scenarios was to indicate the potential changes in travel times and consequent changes in demand, accessibility and therefore land use that may arise from implementing each strategy.

The Strategic Transport Projects Review

Heavy Rail

Jacobs identified the key rail improvements identified in the STPR which were most relevant. This included further electrification of the Scottish rail network, the Edinburgh to Glasgow (Rail) Improvement Project (EGIP) and the West of Scotland Strategic Rail Enhancement Scheme (WoSSRES).

Network Rail's Route Plan (2010) for the West of Scotland set out a timeframe for the STPR proposal for additional electrification of the suburban rail network around Glasgow. This identified electrification of the following services:

- Glasgow Central to Whifflet December 2016;
- Glasgow Central to Paisley Canal December 2017; and
- Glasgow Central to East Kilbride and Barrhead December 2018.

Although electrification of these lines would have permit timetable changes due to differences in the performance characteristics of diesel and electric rolling stock, no changes were proposed by Jacobs in connection with the coding of these services. Electrification of the Whifflet line could also have resulted in services being diverted to Glasgow Central Low Level to free platform capacity at Glasgow Central High Level, although full details of operating changes will not be clear for some time.

The Edinburgh to Glasgow (Rail) Improvement Project (EGIP) incorporates a number of improvements between Glasgow and Edinburgh:

- an additional two trains per hour between Glasgow Queen Street High Level and Edinburgh Waverley via Falkirk High; and
- additional trains between Glasgow Central and Edinburgh Waverley via Motherwell and Shotts filling gaps in the existing service provision.

Jacobs noted that there were also aspirations to implement a Glasgow Queen Street to Croy local service as part of EGIP. To create the necessary capacity at Glasgow Queen Street High Level, it would be necessary to electrify and divert existing services from Falkirk Grahamston and Cumbernauld to Glasgow Queen Street Low Level. This would be achieved by construction of the Garngard Chord. Again, electrification of these lines would permit timetable changes due to differences in the performance characteristics of diesel and electric rolling stock. However, Jacobs proposed no changes to the coding of these services beyond a frequency enhancement of existing services as full details of all operating changes would not be clear for some time.

Jacobs advised that The West of Scotland Strategic Rail Enhancement Scheme (WoSSRES) was to improve service frequencies and capacity on services to Ayrshire and Inverclyde. During the preparation of the STPR, it was envisaged that this would necessitate additional line capacity between Paisley Gilmour Street and Glasgow Central and additional platform capacity at Glasgow Central High Level. One option of achieving this would be the conversion of the Cathcart Circle, Newton and Neilston services from Glasgow Central High Level to a segregated light rail (LRT) network.

However Jacobs advised that, the cancellation of the Glasgow Airport Rail Link (GARL) means that four paths per hour per direction created by the Paisley Corridor Improvement by 2013 will become available for improvement to Ayrshire and Inverclyde services. The following additional services were proposed:

- Glasgow Central to Gourock. One additional train per hour per direction
- Glasgow Central to Wemyss Bay. One additional train per hour per direction
- Glasgow Central to Ayr. Two additional trains per hour per direction

The WoSSRES also envisaged a further two trains per hour per direction to Kilmarnock although this was not dependent on the Paisley Corridor Improvements.

The LRT proposals outlined in the WoSSRES include the creation of a new St Enoch terminus in central Glasgow, conversion of the Cathcart Circle, Newton and Neilston services to light rail and the construction of a new spur to serve Newton Mearns via the A77.

Full details of the scheme that Transport Scotland may progress will not become clear for some time, but the following services are proposed:

- Glasgow to Newton. One service per hour per direction via Maxwell Park and Three services per hour per direction via Mount Florida
- Glasgow to Neilston. Four services per hour per direction
- Glasgow to Newton Mearns. Four services per hour per direction
- Cathcart Circle. Four services per hour per direction

Jacobs note that although the WoSSRES acknowledges that the network could be enlarged at a later date to serve destinations like Castlemilk and East Kilbride (as indicated in the GCVSDP MIR) these and other potential extensions are unlikely to be progressed before 2025. The LRT scenario defined in this context was therefore based largely on the WoSSRES definition.

Jacobs then went on to examine the frequency of heavy rail services in the Greater-Glasgow area. Details of which are included in the Appendix of this report. Jacobs then look at the improvements likely to be taken forward as part of either EGIP or the WoSSRES, concluding that most stations on the Glasgow suburban network will have at least the four trains per hour service frequency to central Glasgow indicated in the GCVSDP MIR. Jacobs advise on the exceptions to this which are also included in the Appendix to this report.

Jacobs conclude that increasing service frequencies to at least four trains per hour per direction at all points on the suburban network would require substantial additional capacity, particularly terminal capacity at Glasgow Queen Street and Glasgow Central. Consequently, it would be necessary to undertake enabling works (such as implementing a light rail scheme on the Cathcart Circle, Newton and Neilston lines) to produce the capacity required. For the purposes of the test Jacobs advised that the Cathcart Circle, Newton and Neilston services will remain coded as heavy rail services as a proxy for alternative ways of catering for the existing heavy rail demand. These services were however removed as part of the light rail scenario. Jacobs advised that a number of additional services would be considered under this scenario and the details of which are listed in the Appendix to this report.

Subway

The following assumptions were made in relation to this test:

- No change to station locations or network extents
- No changes to existing fares or fare structure
- Service frequency increased to a four-minute headway in each direction throughout the day (not just at peak times).

(This affects service numbers 1 and 2 in the SITM4A model.)

Light Rail

The following assumptions were made in relation to this test:

- The proposed LRT network is limited to the current proposals set out in the draft West of Scotland Strategic Rail Enhancements Study under consideration by Transport Scotland;
- The following new light rail track infrastructure is required;
    - On street running on A77 from a Newton Mearns terminus at Mearns Cross (near The Avenue Shopping Centre) to existing heavy rail line northeast of Whitecraigs railway station (including two new intermediate on-street stops on the A77 at Broomvale Drive and Whitecraigs).
    - New connection between the existing Cathcart Circle at Muirhouse Junction and the existing City Union Line (Glasgow crossrail) with new on-rail stops at West Street (for interchange to subway) and Gorbals served by all LRT services (as per Glasgow Crossrail).
    - New tram terminus at St Enoch for all light rail routes.

- Fares will be in line with First Bus bus fares.
- A number of heavy rail services needed to be removed from the model to create sufficient capacity. Service numbers removed in the SITM4A model are listed in the Appendix to this report.

New service patterns were then assumed, generally with a fifteen-minute frequency and with a number of intermediate stops on each route. These new service patterns are listed in the Appendix to this report. The timetables to be coded were as per the timetables coded in TMfS:07 during testing for the West of Scotland Strategic Rail Enhancement Study. This test did not include potential long-term extensions to East Kilbride, Castlemilk, Cumbernauld or Stobhill Hospital as indicated in the GCVSDP MIR, as these were considered unlikely to be deliverable before 2025. Service frequency was assumed to be less than a ten-minute-headway to the south of Williamwood and east of Cathcart towards Neilston, Newton Mearns and Newton.

Bus Rapid Transit

The following assumptions were made in relation to this test:

- Network is a combination of the routes set out in the 'vision for Fastlink' combined with elements of the former Glasgow Tram proposals;
- The physical proposals will comprise a combination of physical segregation, dedicated bus lanes and signal priorities with limited stops. It will therefore be represented as a new mode, similar to light rail and therefore only represented in the public transport model.
- Fares will be in line with First Bus bus fares.
- All BRT-infrastructure is new coding following the new service pattern routes.

New service patterns were assumed with a ten-minute frequency with a number of intermediate stops on each route. The new assumed service pattern is shown in the Appendix to this report. The resultant timetables are also shown in the Appendix to this report. The times indicated are service start times and will be followed by repeat services at ten minute frequencies.

Core and Circular or Orbital Bus Service

The following assumptions were made in relation to this test:
Services on the following routes will have a minimum frequency of ten-minutes in each direction:

- Faifley – Clydebank – Glasgow city centre
- Thornliebank / Darnley – Nitshill – Glasgow city centre
- Castlemilk – Glasgow city centre - Milton
- East Kilbride – Glasgow city centre
- Newton – Cambuslang – Bridgton – Glasgow city centre
- Cumbernauld – Glasgow city centre
- Croy – Glasgow city centre
- Bearsden / Milngavie – Glasgow city centre

Services on the following routes will have a minimum frequency of 15-minutes in each direction:

- Neilston – Paisley – Renfrew – Govan (Renfrewshire Orbital)
- Airdrie – Coatbridge – Motherwell – East Kilbride

The service frequencies of existing services were increased to achieve the desired outcome in preference to coding completely new additional services.

The existing services to be enhanced under this test were:

- Faifley – Clydebank – Glasgow city centre
  Enhance the frequencies of service numbers 2407, 2408 and 2409 to achieve the desired ten-minute service frequency in each direction.
- Thornliebank / Darnley – Nitshill – Glasgow city centre
  Enhance the frequencies of service numbers 2410, 2411, 2412, 241 and, 2414 to achieve the desired ten-minute service frequency in each direction.
- Castlemilk – Glasgow city centre – Milton
  Enhance the frequencies of service numbers 2929 and 2933 to achieve the desired ten-minute service frequency in each direction. Other services between Castlemilk and Glasgow city centre (services 2105, 2292, 2293, 2352, 2353 and 2600) will remain unaltered giving a higher frequency on this section of the route.
- East Kilbride – Glasgow city centre
  Enhance the frequencies of service numbers 2947, 2949 and 2950 to achieve the desired ten-minute service frequency in each direction.
- Newton – Cambuslang – Bridgeton – Glasgow city centre
  Infill service numbers1704 and 1708 with a variant truncated northwest of Blantyre.
- Cumbernauld – Glasgow city centre
  Code a new route with a ten-minute service frequency based on service numbers 1215 and 1216. These existing services operate via the M80 Stepps Bypass. The new route will be identical to services 1215 and 1216 between Cumbernauld and Crow Wood Roundabout, but will then operate via the A80 through Stepps, Millerston and Hogganfield and then via the A8 Cumbernauld Road and Alexandra Parade.
- Croy – Glasgow city centre
  Code a new route with a ten-minute service frequency based on service numbers 1176, 1177, 1189 and 1346 but truncated at Croy with a loop added from the A803 through Kirkintilloch to serve Lenzie railway station.
- Bearden / Milngavie – Glasgow city centre
  Enhance the frequencies of service numbers 2883, 2885 and 2888 to achieve the desired ten-minute service frequency in each direction.
- Neilston – Paisley – Renfrew – Govan (Renfrewshire Orbital)
  Enhance the frequencies of service numbers 1356, 1357, 2124, 2125, 2480 and 2482 (existing Neilston to Paisley services) and 1549, 1553, 1554 and 1555 (existing Paisley to Govan services via Renfrew) to achieve the desired 15-minute service frequencies on all parts of the route in each direction.
- Airdrie – Coatbridge – Motherwell – East Kilbride
  Enhance the frequencies of service numbers 2759, 2766, 2770 and 2771 to achieve the desired 15-minute service frequencies in each direction.

E. New File Paths

Once these descriptions were agreed by SPT/ TS and GCVSDPA, these tests were coded by Jacobs and the coded files supplied to SPT and thereafter to GCVSDPA for running and analysing in SITM4A and then through SITLUM07.

The purpose of the new revised Public Transport test scenarios was to indicate the potential changes in travel times and consequent changes in demand paths between

zones affecting accessibility and therefore land use that may arise from implementing each strategy.

With the new file paths available in SITM4A the model was recalibrated using the proxy code files to emulate as far as was possible STPR Intervention 24 - West of Scotland Strategic Rail Enhancements. However, one element remained and that was the setting of the policy changes into the SITLUM07 Model. This would require resetting the policy elements in SITLUM07 to reflect the new path file codes produced by Jacobs. This was an aspect that SPT required to undertake but with the loss of key modelling personal from their organisation this very specialist aspect could not be completed as detailed judgements were required to ascertain the index range of policy alterations. With the proviso of this missing element the SITLUM07 was now available to analyse the three Scenarios identified through the MIR as now classified as Scenario IF, Scenario IG and Scenario IA.

3. Economic and Demographic Framework to be tested through SITLUM07

Within the City Region it is largely economic activity and population changes that determine future demand for development. There is therefore a close relationship between economic activity and population changes and the relationship resolves upon the future performance of the city-region economy. A stronger growing economy provides both the basis for attracting and retaining population – a strong economy to attract in-migrants and retain potential out-migrants. If a scenario occurs where there is high migration but with a stagnant or slow-growing economy this can result in an in-balance with increased unemployment and more reliance upon the welfare system and with social housing implications.

A number of economic futures were modelled for the city-region by Oxford Economics. These are described in more detail within Background Report 1.

Scenario IF describes a baseline future which suggests an economic scenario of reinforcement and continuation of the current service-based city-region economy. Based on Oxford Economics low migration assessment and based upon the General Register's Office for Scotland (GROS) 2006-based principle projection but with updated but relatively low migration assumptions. Described as Scenario 1 Lower Migration within paragraph 5.5 of the Main Issues Report. This was the least optimistic scenario in terms of population growth (in-migration) and economic activity to be tested through SITLUM07 to ascertain if this assumption held when compared to other economic futures.

Scenario IG describes a future which also suggests an economic scenario of reinforcement and continuation of the current service-based city-region economy. Based on Oxford Economics high migration assessment and based upon the *Agenda for Sustainable Growth* from the Joint Structure Plan 2000 and Third Alteration 2006 but with updated but relatively high migration assumptions. Described as Scenario 2 Higher Migration and Planning Scenario within paragraphs 5.5 to 5.9 within the Main Issues Report.

However, it was anticipated that the resulting economy may generate insufficient economic activity to support the in-migration levels previously associated with the 2006 Structure Plan's *Agenda for Sustained Growth* and updated for the SDP. This assumption can be tested through SITLUM07 to ascertain of this is indeed the case against other economic futures.

The Scottish Government's *A Low Carbon Economic Strategy for Scotland* was published in December 2010. The philosophy of the GCVSDPA is to pursue a higher migration population projection in conjunction with a low carbon sustainable economy for the city-region. This approach, The Scottish Government's *A Low Carbon Economic Strategy for Scotland* and is entirely in line with that philosophy. The Scottish Government's *Low Carbon Economic Strategy for Scotland* identifies the potential for some 60,000 new jobs in Scotland by 2020 associated with the green low carbon economy of which perhaps 24,000 new jobs could have potential for the GCVSPDA area.

Scenario IA describes an economic future with a distinct alternative economic future for the city-region, which is focused upon a *rebalancing* economic scenario. This would result in a shift, away from the dominance of a service economy towards a growth in specialist high-value products and related services associated with green energy technology sectors, green environmental sectors, tourism and leisure.

This rebalanced economic profile (described as Scenario IA) for the city-region appears to meet the demands of the Scottish Government's low carbon strategy. It is anticipated that the resultant levels of economic activity, Gross Value Added (GVA) and employment growth could provide the economic foundation for the SDP's higher migration demographic planning scenario. This assumption can be tested through SITLUM07 to ascertain of this is indeed the case against other economic futures.

Through the SITLUM 07 model each of the possible economic futures can be compared against each other to assess the differences in terms of absolute figures but also relative % differences. These differences can be modelled spatially to show the relative differences between each transport zone and an assessment made as to the spatial effect at the conurbation or strategic level of each of the demographic or economic activity change. The SITLUM model was specifically weighted to operate at the strategic level as is therefore an extremely powerful strategic tool to provide guidance at a conurbation scale.

The assessment undertaken sets one scenario as the Base Model and the other scenario as the Forecast Model. The scenarios are based on the Permissible mode (as different from the Exogenous mode) which determines that it is market forces which determines the allocation of a land use type and when such a land use would be taken up by the development market. In these terms it is the rental level aspects which are significant determining factors in the allocation of development land.

The SITLUM07 model can provide data for each year between 2001 and 2031. To simplify this process snapshots of the models results are examined in years 2011, 2021 and 2031. This provides similar 10 year intervals. This occasionally can show abnormalities where peaks in activity are out of time phase. The SITLUM07 model is aligned to the best match transport zones relating to be SDPA area.

The SITLUM07 model provides demographic comparisons:

- Total Population
- Children
- Retired People

The SITLUM07 model provides economic comparisons:

- Total Jobs
- Working Adults
- Non-Working Adults
- Nominal Employment
- Rent

The SITLUM07 model provides land use comparisons:

- Total Floorspace
- Vacant Floorspace
- Brownfield Development

The SITLUM07 model provides environmental comparisons:

- CO2

The assessment undertook six separate scenario comparisons – assessing each as a Base Model and as a Forecast Model.

The six assessment tests were:

A. Scenario IF vs Scenario IG:

Scenario IF – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration) Vs Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario)

Scenario IG is the Base Model and Scenario IF is the Forecast Model (Both Permissible**)**

B. Scenario IG vs Scenario IA:

Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs Scenario IA – Rebalanced Economy +M74 Network

Scenario IA is the Base Model and Scenario IG is the Forecast Model (Both Permissible)

C. Scenario IA vs Scenario IF:

Scenario IA – Rebalanced Economy +M74 Network Vs Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration)

Scenario IF is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

D. Scenario IG vs Scenario IF:

Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs Scenario IF – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration)

Scenario IF is the Base Model and Scenario IG is the Forecast Model (Both Permissible)

E. Scenario IA vs Scenario IG:

Scenario IA – Rebalanced Economy +M74 Network Vs Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario)

Scenario IG is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

F. Scenario IF vs Scenario IA:

Scenario IF – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration) Vs Scenario IA – Rebalanced Economy +M74 Network

Scenario IA is the Base Model and Scenario IF is the Forecast Model (Both Permissible)

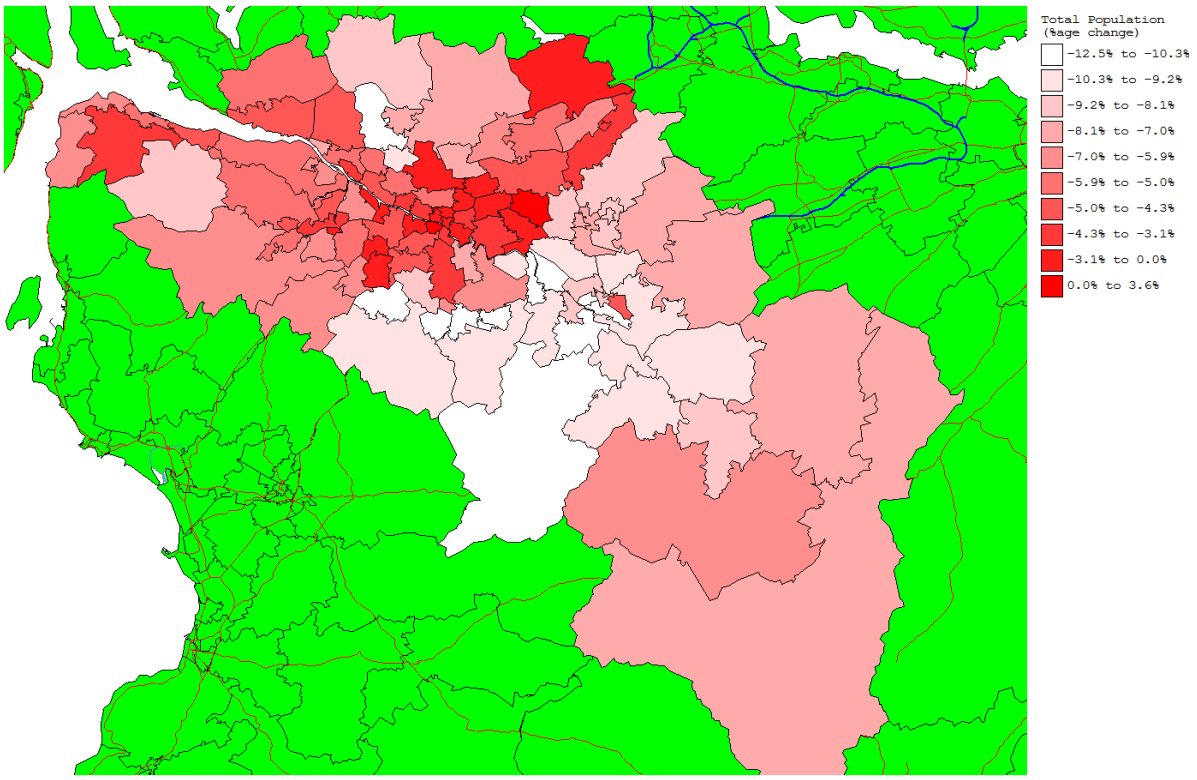
3A. IF v IG at 2021 and 2031

Scenario IF – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration) Vs Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario)

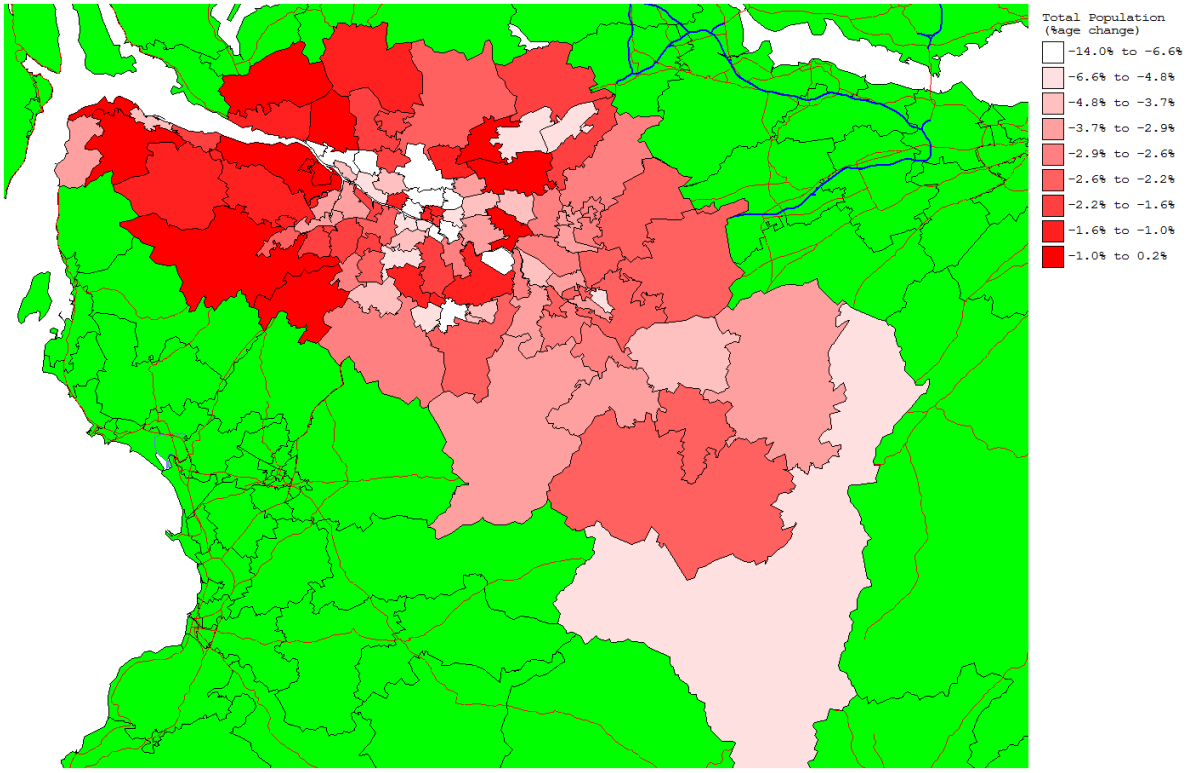
Scenario IG is the Base Model and Scenario IF is the Forecast Model (Both Permissible)

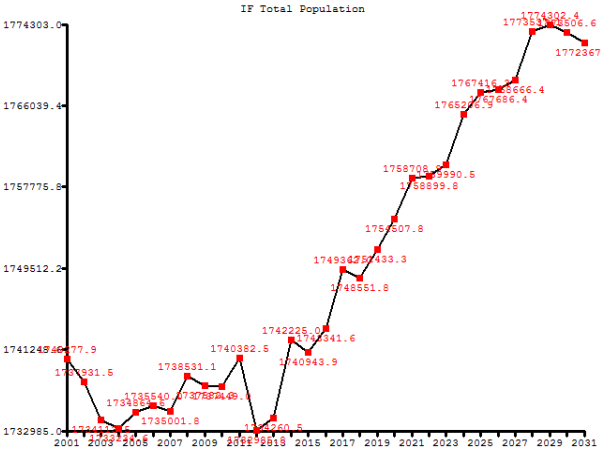
IF v IG Total Population

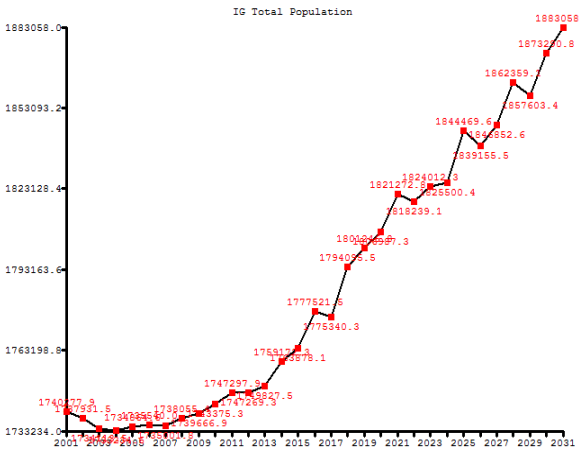
2031



2021







Total Populaton	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	1732985	1758708	25723	1772367	39382
Scenario IG	1747297	1821272	73975	1883058	135761
Scenario IA	1735246	1762727	27481	1770972	35726

Comment: This Scenario comparison sets Scenario IG OE Higher Migration (Planning 2) scenario as the Base Model and set against Scenario IF OE Lower Migration (Planning 1) scenario as the Forecast Model. With Scenario IF's lower population growth forecast it would be anticipated that mostly negative growth outcomes compared to the higher growth Scenario IG would be produced. While Graphs show similar pattern both scenarios show total population growth in absolute numbers - IF shows +25,723 at 2021 from 2011 and +39,382 to 2031 while the higher growth IG shows + 73,975 at 2021 from 2011 and

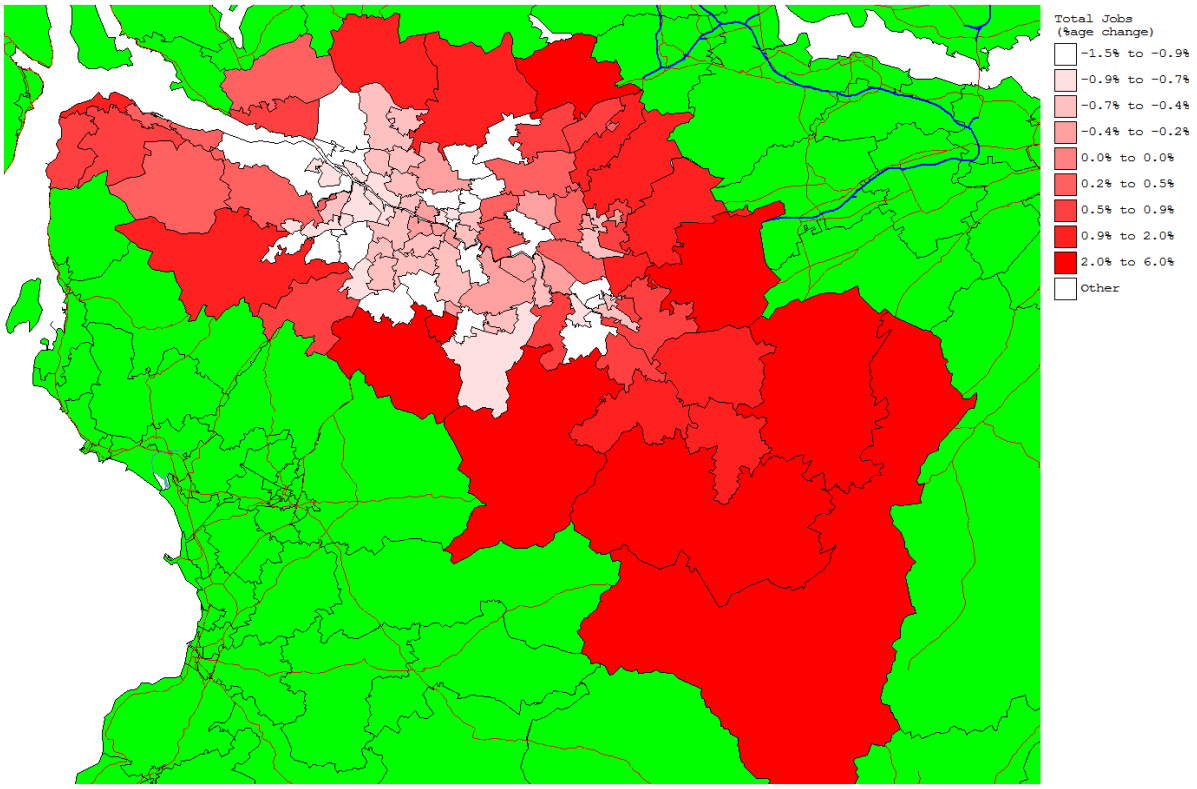
+135,761 at 2031. Scenario IF will have 95,000 less population by 2031 compared to Scenario IG.

Spatial Pattern: The maps show how SITLUM models the relative % change in spatial terms at snapshot in time 2021 and 2031. In other words the 2021 map shows the difference between +25,723 and +73,975 (+48,252) and the Model allocates the IF negative 48,252 people spatially and shows the relative change to each transport zone area which in this case is a -14.0% to a +0.2% growth. We are looking for spatial patterns at a SPDA scale which shows how one scenario spatially differs from another scenario. In this case the IF v IG scenario differences for population shows IF's lower population growth creating a new spatial pattern against IG as a base. With negative outcomes produced by Scenario IF against IG it is often the lighter colours (white and light reds that indicate where the population is being directed. The stronger reds show where the population is being directed from.

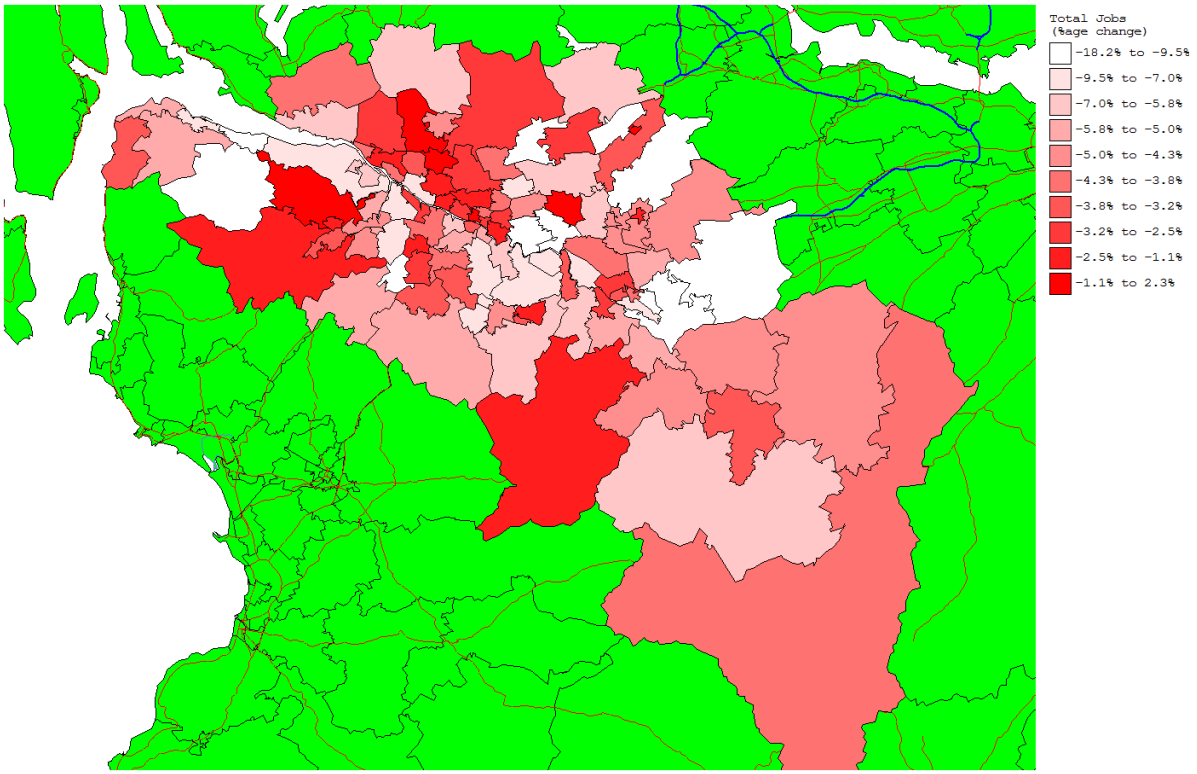
At a conurbation level the 2021 snapshot shows Scenario IG's additional population growth around the City Centre and to the south of the conurbation. Clearly the north and west of the conurbation misses out on this growth in population (Renfrewshire, West Dunbartonshire and Inverclyde) under this scenario. The 2031 snapshot shows the distribution of the additional Scenario IG 95,000 people in % terms. All areas benefit but there is a concentration of additional population around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). East End regeneration area gets little additional population. The reason for this spatial pattern will be a combination of where the jobs are located, accessibility and rental opportunities. The effect of the opening of the M74 in June 2011 may be the reason for the increase in accessibility for the south of Glasgow.

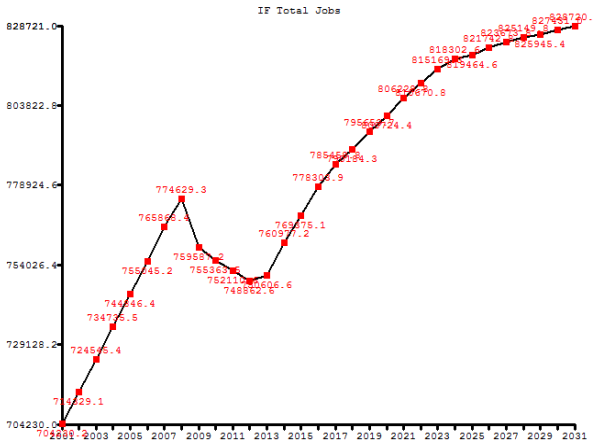
IF v IG Total Jobs

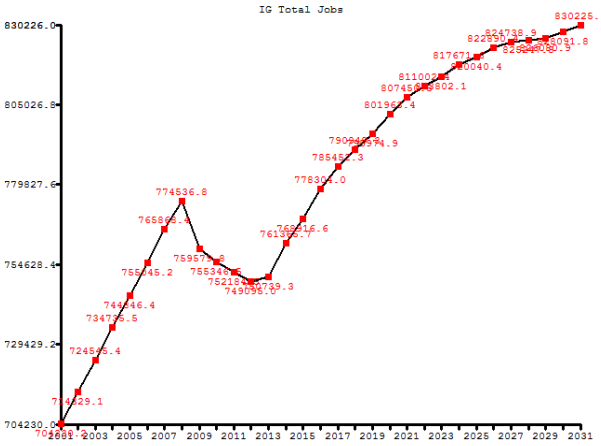
2031



2021







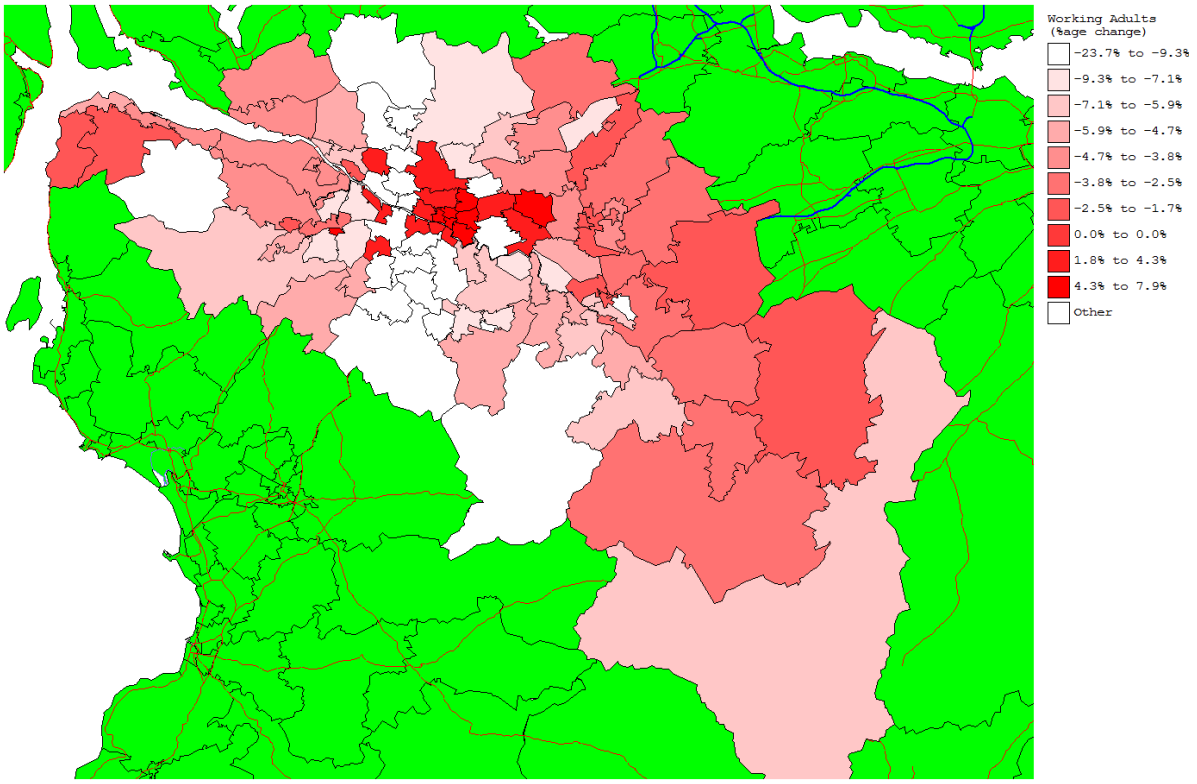
Total Jobs	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806228	50865	828721	73358
Scenario IG	755346	807450	52104	830226	74880
Scenario IA	759008	847510	88502	910633	151625

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Both scenarios show very similar graphs with absolute numbers very similar and both growing from 2013 onward. Only Scenario IF produces a difference of 1,239 less jobs at 2021 and 1,522 less jobs at 2031. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher absolute jobs than Scenario IF but this is clearly not the case. IG does not produce the number of jobs to justify the population growth. Scenario IF with 95,000 less population virtually produces the same number of jobs as Scenario IG.

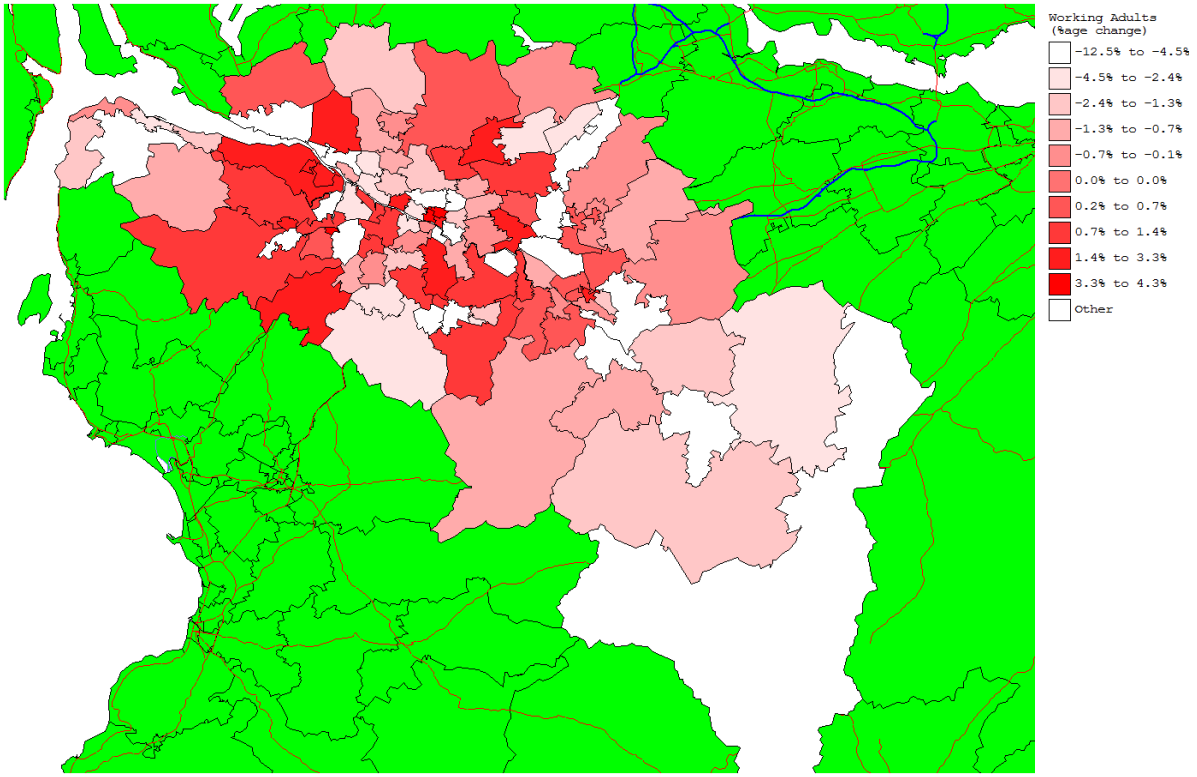
Spatial Analysis: The absolute numbers are very small differences and therefore the spatial distribution of this small number is probably not particularly significant but it does indicate that these small number of additional jobs produced by Scenario IG are distributed away from the south and east towards the north and west of the conurbation. The 2031 distribution shows additional Scenario IG jobs along the Clyde Waterfront. Again caution as these are small absolute numbers.

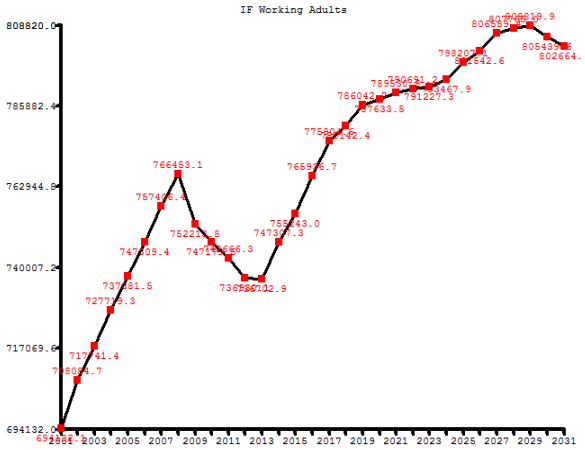
IF v IG Working Adults

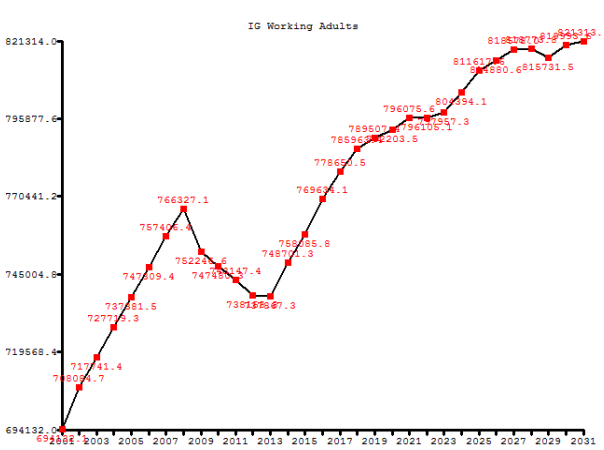
2031



2021







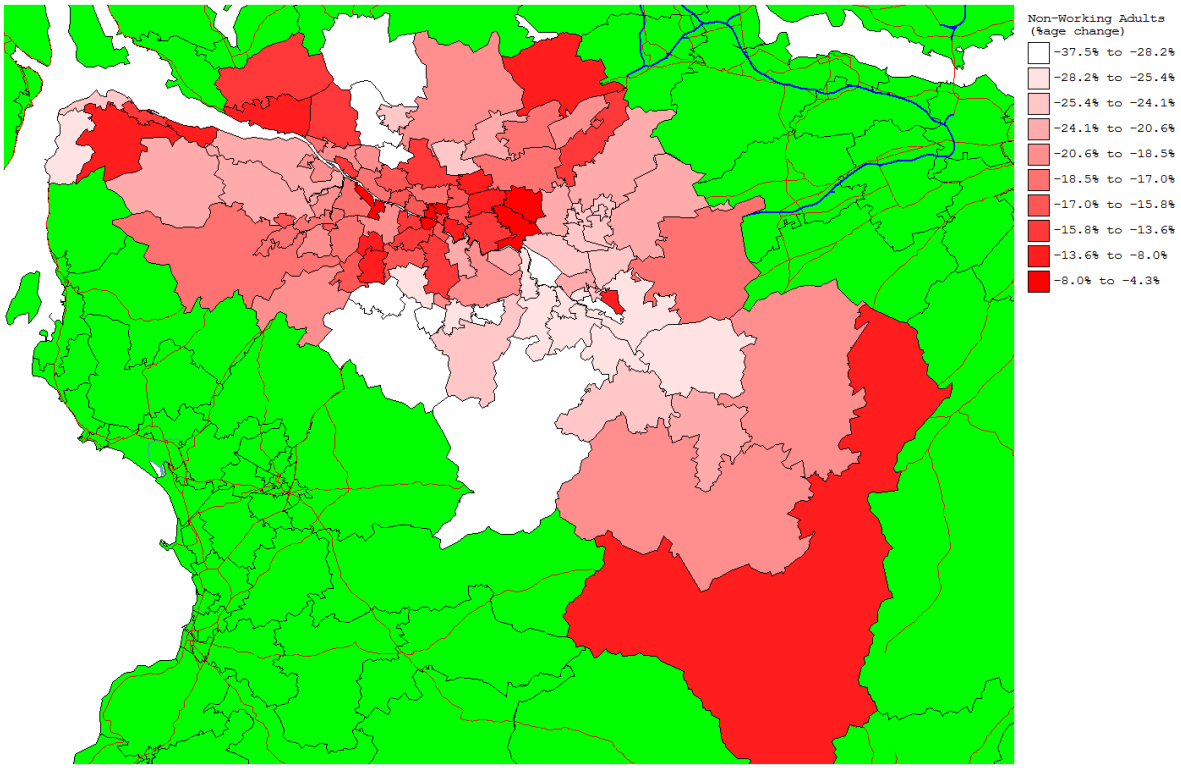
Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	747175	789530	42355	802664	55489
Scenario IG	747480	796075	48595	821314	73591
Scenario IA	748723	831005	82282	879140	130417

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Both Graphs show a very similar growth pattern with IG showing a slight increase in absolute numbers, + 5,240 by 2021 and +18,102 by 2031 compared to Scenario IF. Scenario IG does not generate a huge growth in Working Adults given the 95,000 additional population overall.

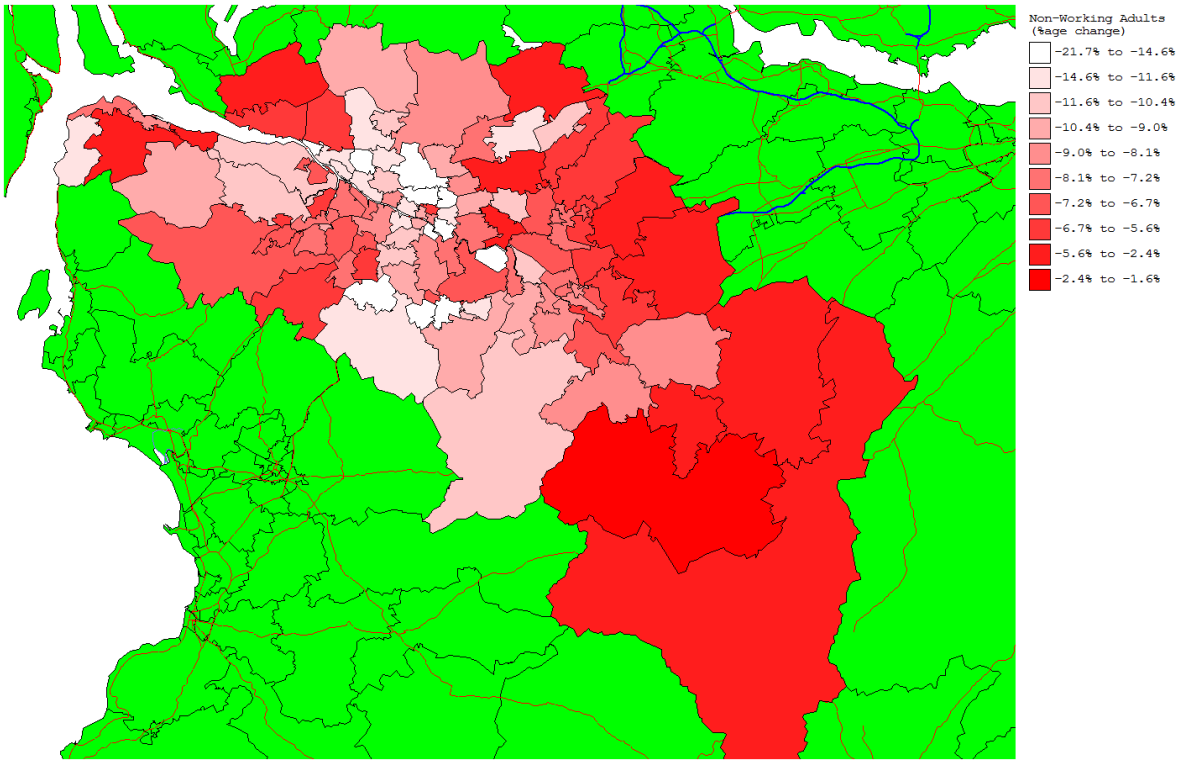
Spatial Analysis: The Scenario IG additional 5,240 Working Adults by 2021 are distributed by SITLUM very similar to the overall population growth pattern i.e towards the south and east. The 2031 spatial pattern allocating Scenario IG's additional 18,100 Working Adults in a fairly distinctive pattern of suburban expansion with few Working Adults directed to the City Centre or East End.

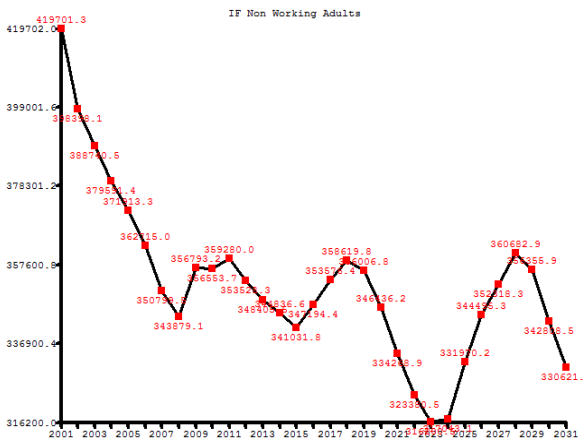
IF v IG Non-Working Adults

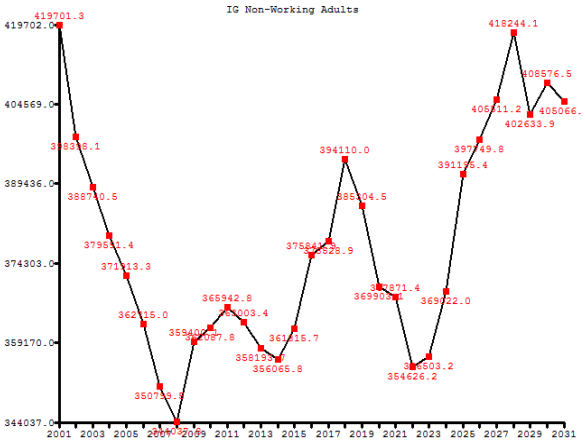
2031



2021







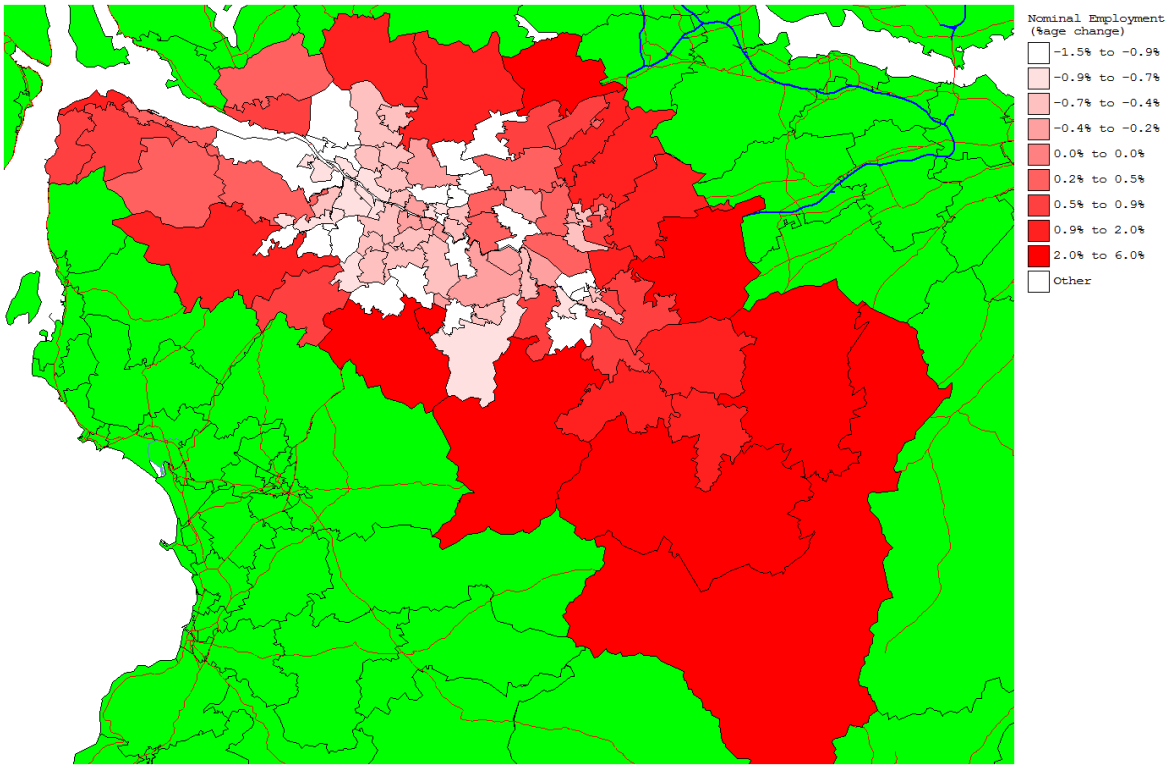
Non-Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	359280	334248	-25032	303621	-55659
Scenario IG	365942	369903	3961	405066	39124
Scenario IA	348329	296298	-52031	246899	-101430

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Perhaps one of the most important differences between Scenario IF and IG is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IF shows a general decline in the absolute number of “unemployed” - 25,000 less by 2021 and 55,000 + less by 2031. Scenario IG on the other hand shows “unemployment” increasing - + 3,900 by 2021 and + almost 40,000 by 2031. This produces an astonishing difference between the two scenarios. + 30,000 more “unemployed “ by 2021 and +95,000 by 2031. The implications are that while IG is successful in attracting in additional population of 95,000 by 2031 compared to Scenario IF these additional people are not in employment. Scenario IF while producing less population overall does provide jobs for the incoming population sufficient to gradually reduce unemployment. The implications are that IG generates population growth but not the required jobs to employ them with the result that this will simply add to the welfare budget and not to economic growth. Scenario IF on the other hand appears to better align population growth and job growth.

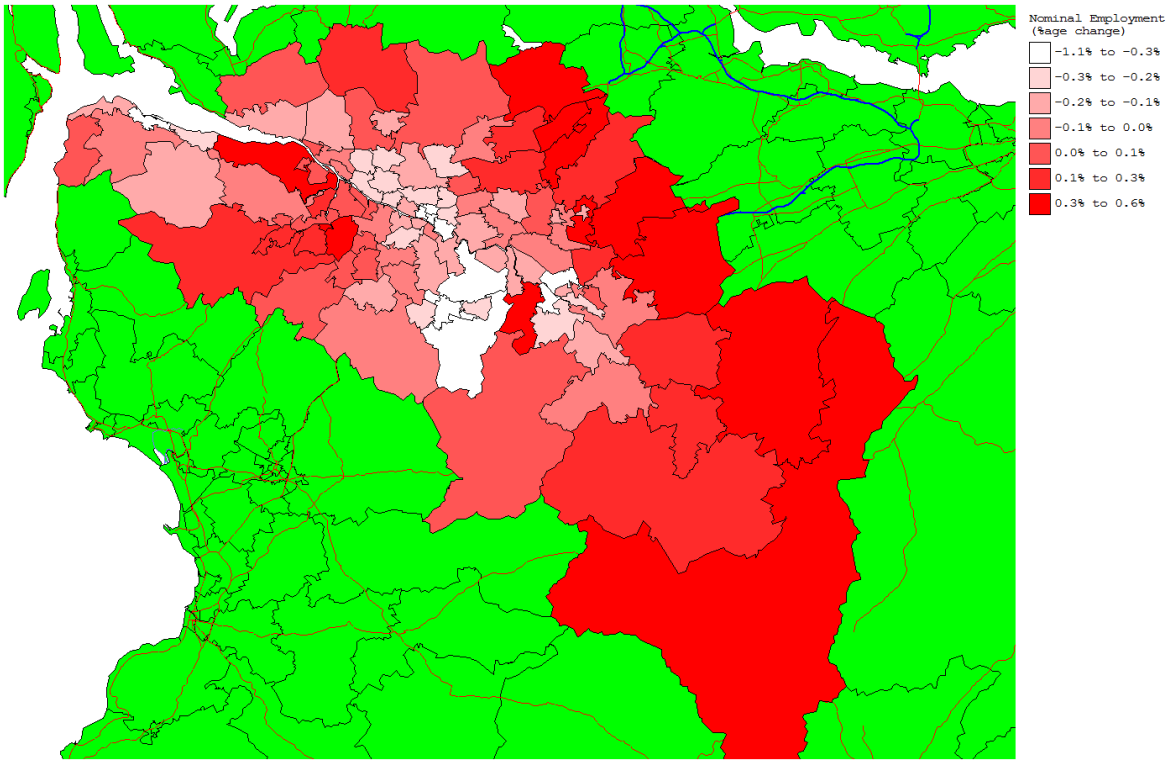
Spatial Analysis: The overall numbers between Scenario IF and Scenario IG are significant at + 30,000 at 2021 and +95,000 at 2031 more non- working adults. SITLUM allocates them it would be assumed on the basis of rental – where social rented housing is available. The pattern for 2021 shows these additional “unemployed” strong attraction to the Glasgow and the east end but by 2031 the pattern reflects the overall population distribution with the non working population concentrating around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). East End regeneration area gets little additional population.

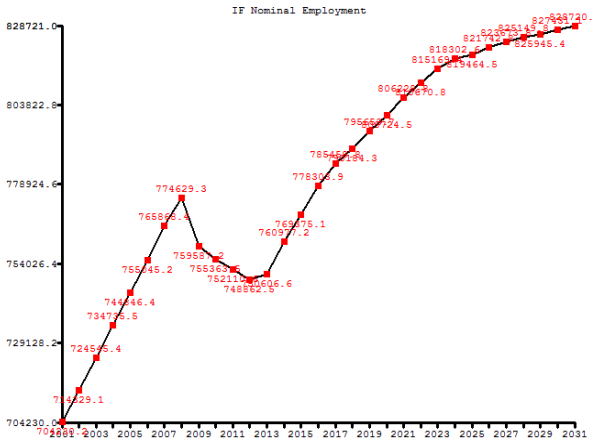
IF v IG Nominal Employment

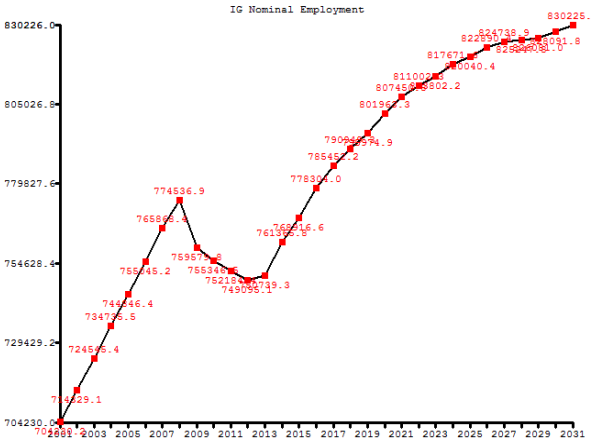
2031



2021







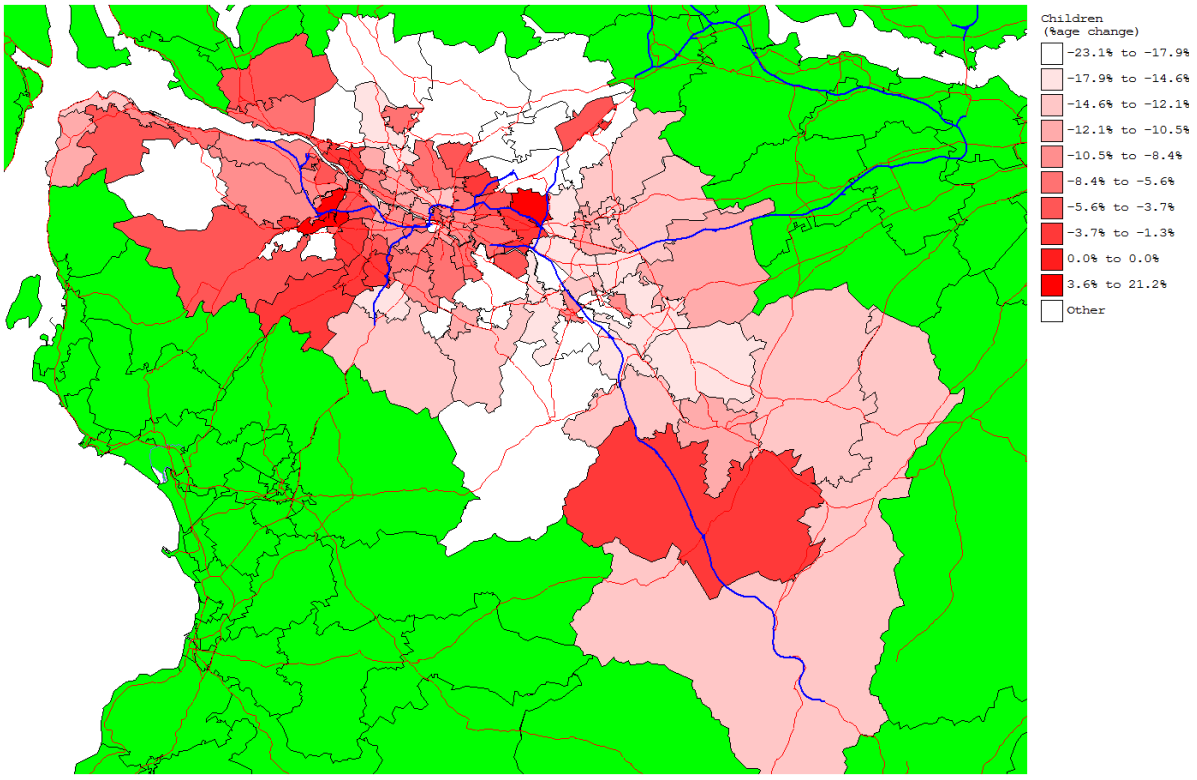
Nominal Employment	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806220	50857	828721	73358
Scenario IG	755346	807456	52110	830226	74880
Scenario IA	759008	847510	88502	910633	151625

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. This comparison of nominal employment reflects the overall jobs evaluation. Both scenarios show very similar graphs with absolute numbers very similar and both growing from 2013 onward. Only a difference of Scenario IF producing 1,253 less employment at 2021 and 1,522 less employment at 2031. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher employment absolute number than Scenario IF but this is clearly not the case. Again IG does not produce the employment numbers to justify the much higher population growth.

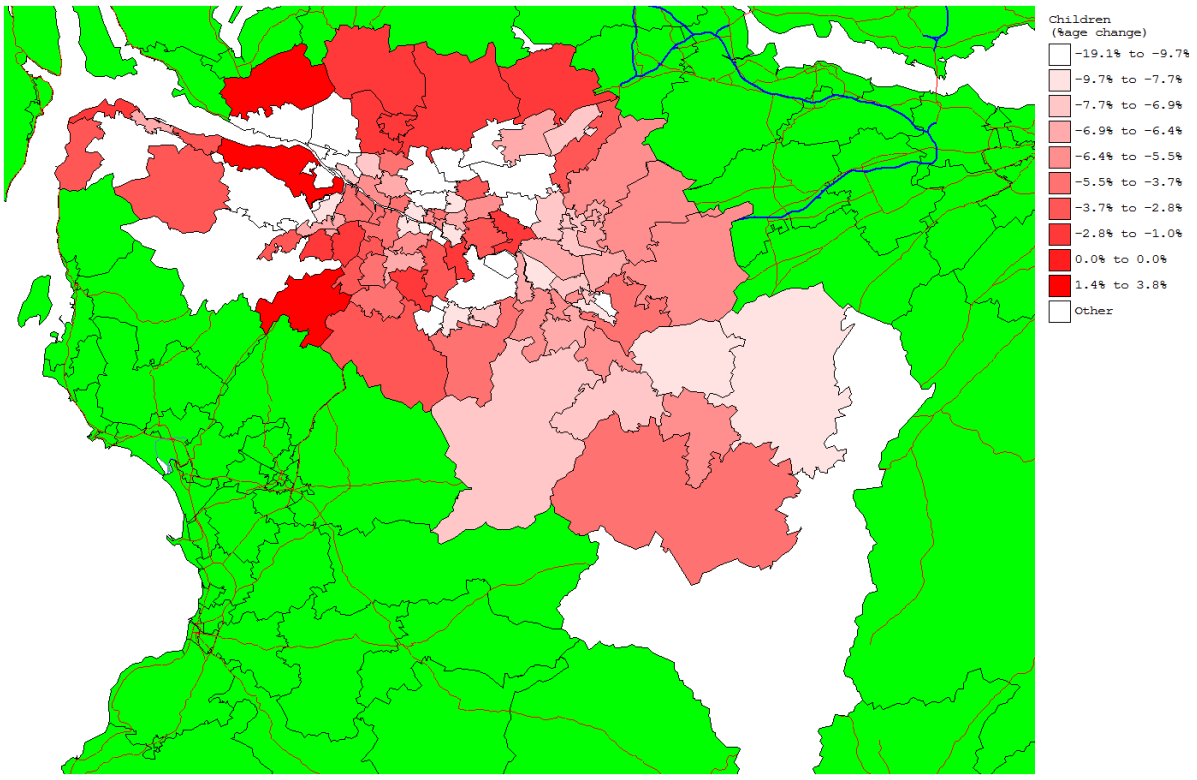
Spatial Analysis: The absolute numbers are very small differences and therefore the spatial distribution of this small number is probably not particularly significant but it does indicate that these additional Scenario IG employment are distributed from the south and east towards the north and west of the conurbation. The 2031 spatial distribution shows additional Scenario IG employment along the Clyde Waterfront. Again caution as these are small absolute numbers.

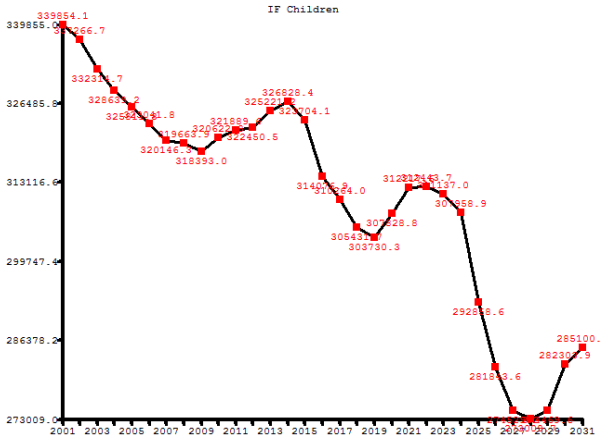
IF v IG Children

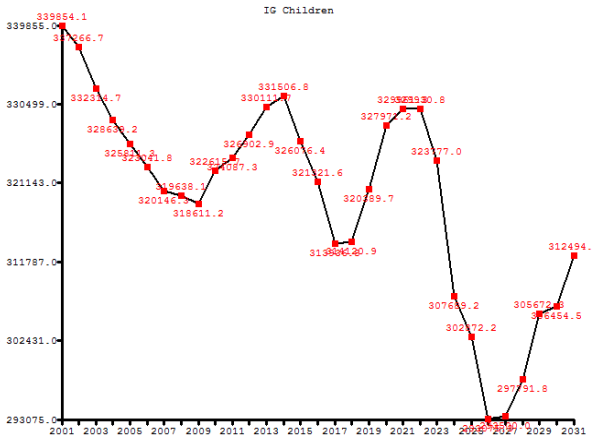
2031



2021







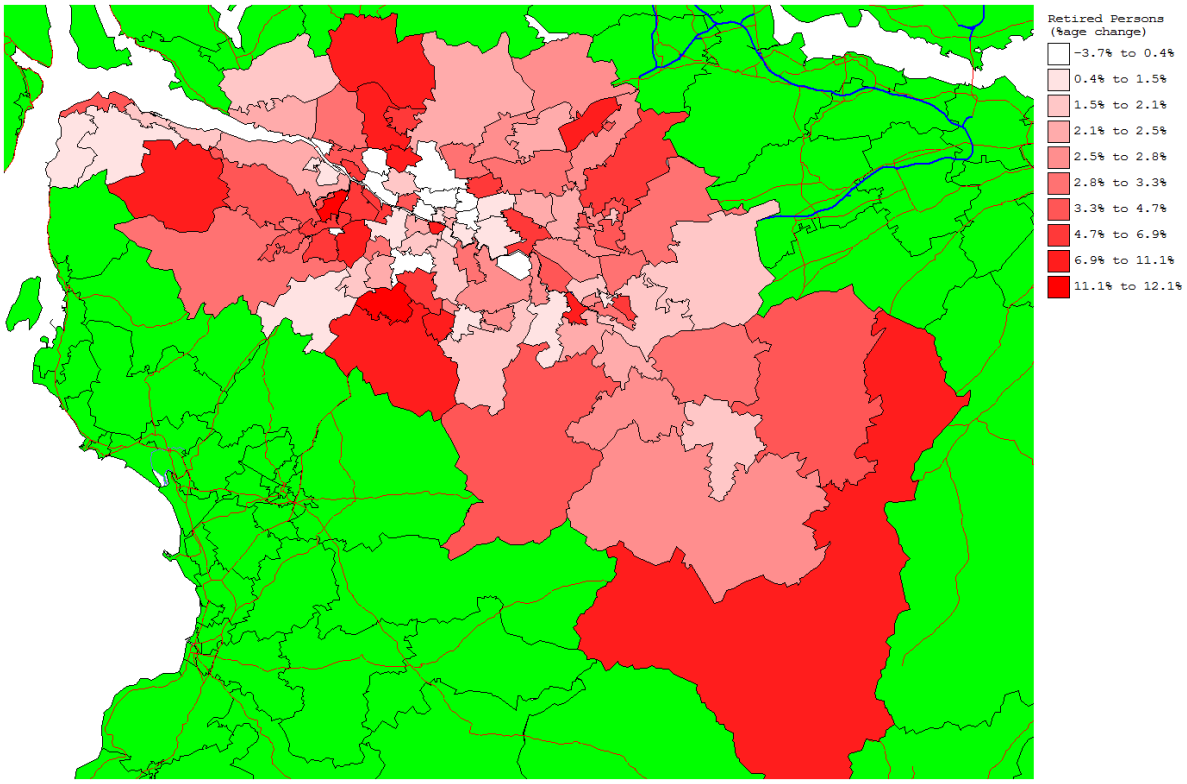
Children	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	321889	312214	-9675	285100	-36789
Scenario IG	322615	327971	5346	312494	-10121
Scenario IA	319909	309768	-10141	282737	-37172

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Both Graphs show a similar overall downward pattern in the number of children. However this has to be related to an overall growth in both scenarios in total populations with the simple conclusion that while overall populations grow under both scenarios the number of children continue to decrease. This is a general demographical feature (reduced fertility rates) but there are patterns within each scenario. Scenario IF shows a 10,000 fall by 2021 and a 37,000 fall by 2031. IG shows a slight increase at 2021 by 5,000 and a fall by 10,000 by 2031. This results in a difference of some 26,000 additional children in Scenario IG compared to Scenario IF by 2031 and obviously implications for social welfare and schooling.

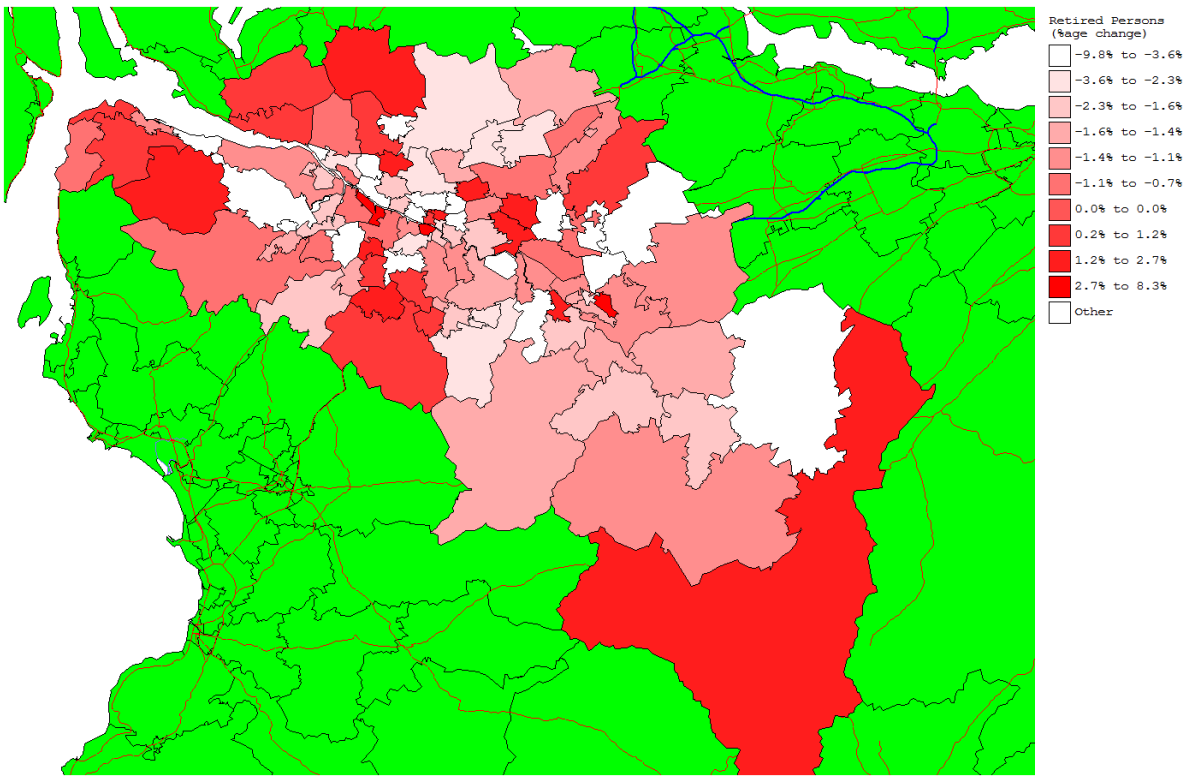
Spatial analysis: The overall numbers difference of +15,000 at 2021 and +26,000 at 2031 have been allocated by the SITLUM model very much reflecting the overall population distribution as would be expected. The 2021 pattern shows additional IG generated numbers of children located in and around the City centre and south of Glasgow while the 2031 pattern shows Glasgow City growth and growth in North and South Lanarkshire.

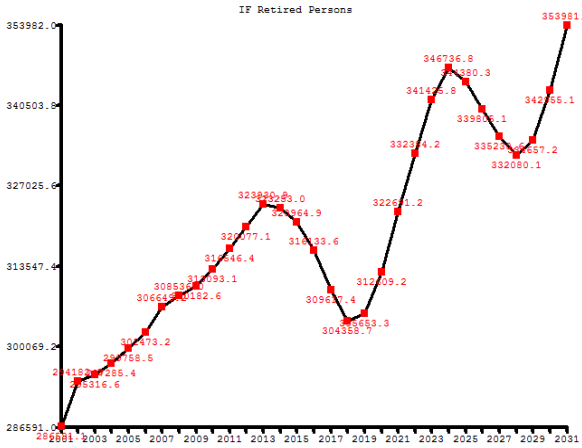
IF v IG Retired Persons

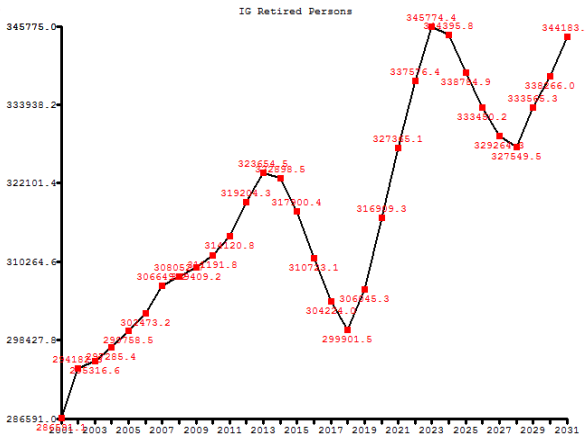
2031



2021







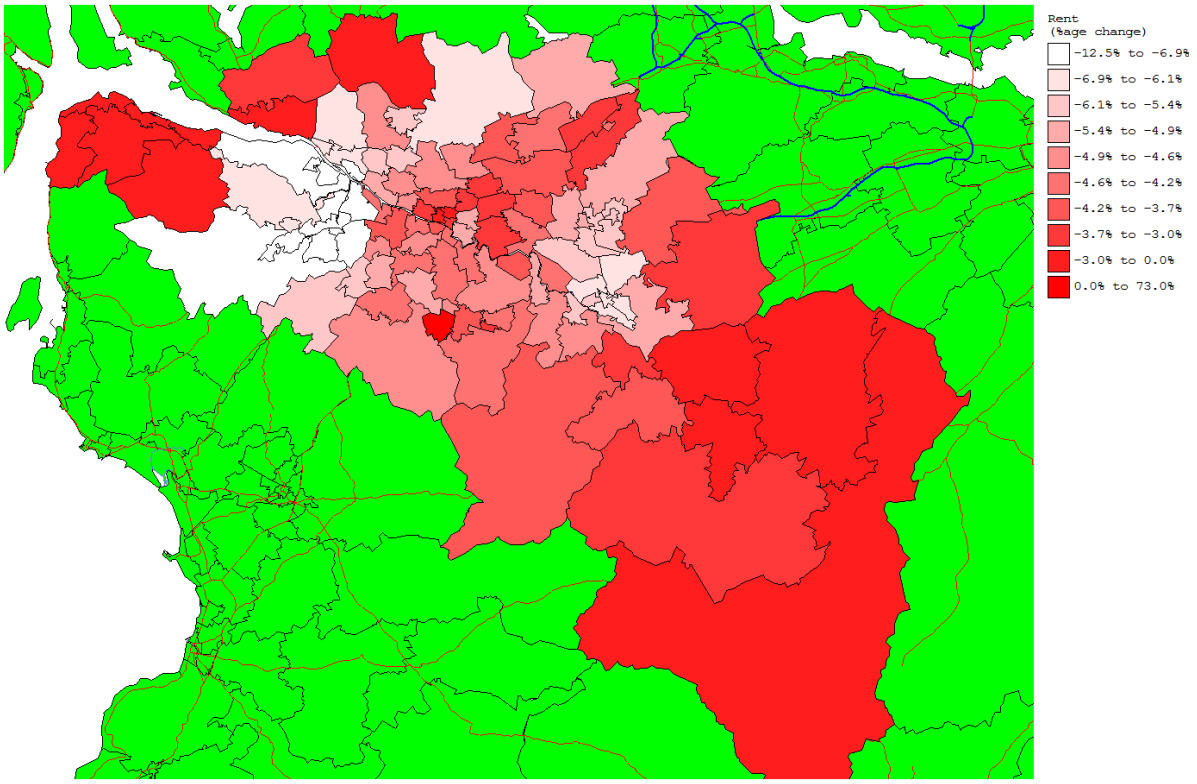
Retired	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	319546	322611	3065	353981	34435
Scenario IG	314120	327345	13225	344183	30063
Scenario IA	318284	325656	7372	362193	43909

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Both Graphs show a similar overall upward growth pattern in the number of retired people. However this has to be related to an overall growth in both scenarios in total populations with the simple conclusion that while overall populations grow under both scenarios the number of retired people continue to increase. Scenario IF increases by 3,000 by 2021 and by 34,500 by 2031 while Scenario IG increases by 13,000 by 2021 but only to 30,000 by 2031.

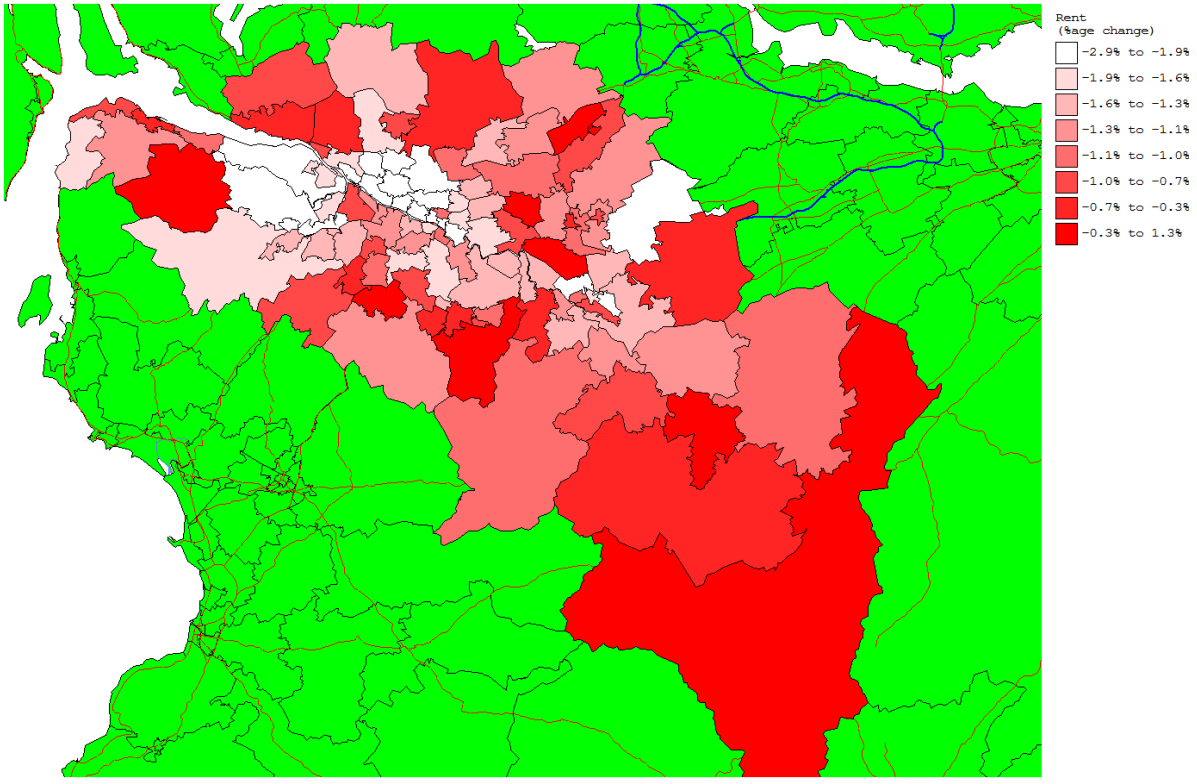
Spatial Analysis: The overall differences between the two scenarios – Scenario IG producing +10,000 at 2021 and - 4,500 at 2031 are relatively modest numbers but rental levels will be important in attracting more retired to an area (rather than the pull of job opportunities and accessibility to these jobs). The 2031 pattern shows an overall positive (IF higher than IG) with additional retired people attracted by IF towards the City Centre, Clyde Waterfront, East Dunbartonshire and South Lanarkshire. (IG would be the reverse of this pattern).

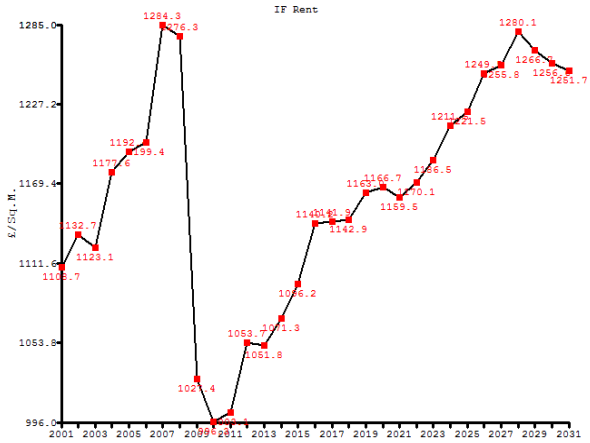
IF v IG Rent

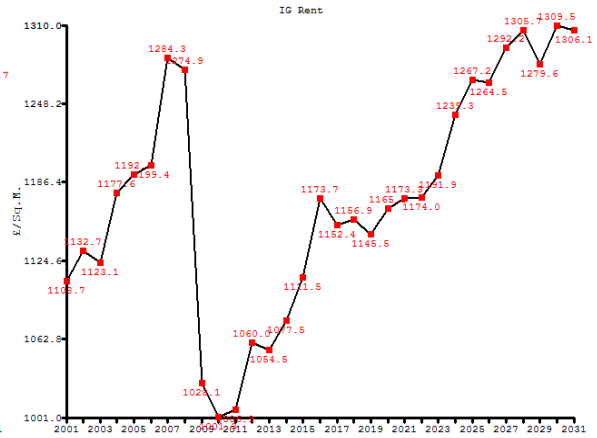
2031



2021







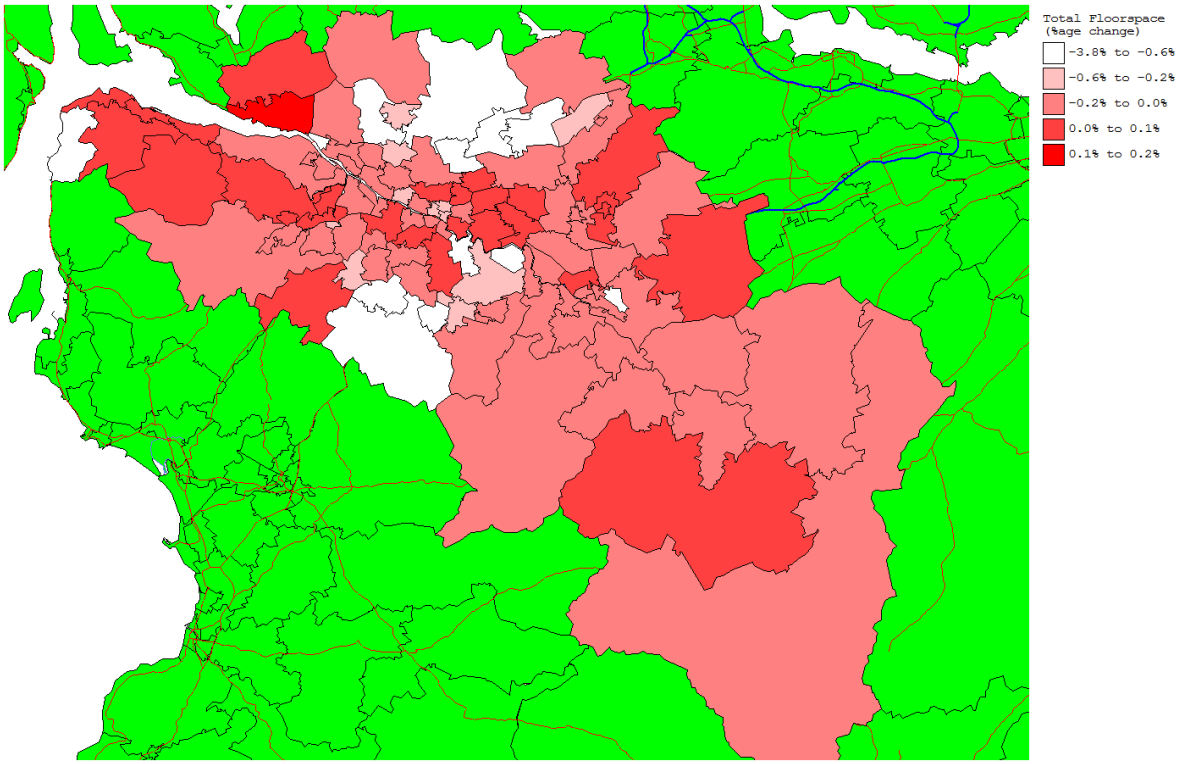
Rent £	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	996	1159	163	1251	255
Scenario IG	1001	1173	172	1306	305
Scenario IA	1012	1211	199	1378	366

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Both Graphs show a strong increase in rental values from 2011 but differences are marginal. Scenario IG generates an additional +£9 per m2 at 2021 and an additional +£50 per m2 at 2031 against Scenario IF. Not particularly significant rental improvement by IG given the much higher population and perhaps reinforces that IG creates less economic growth than the additional population justifies.

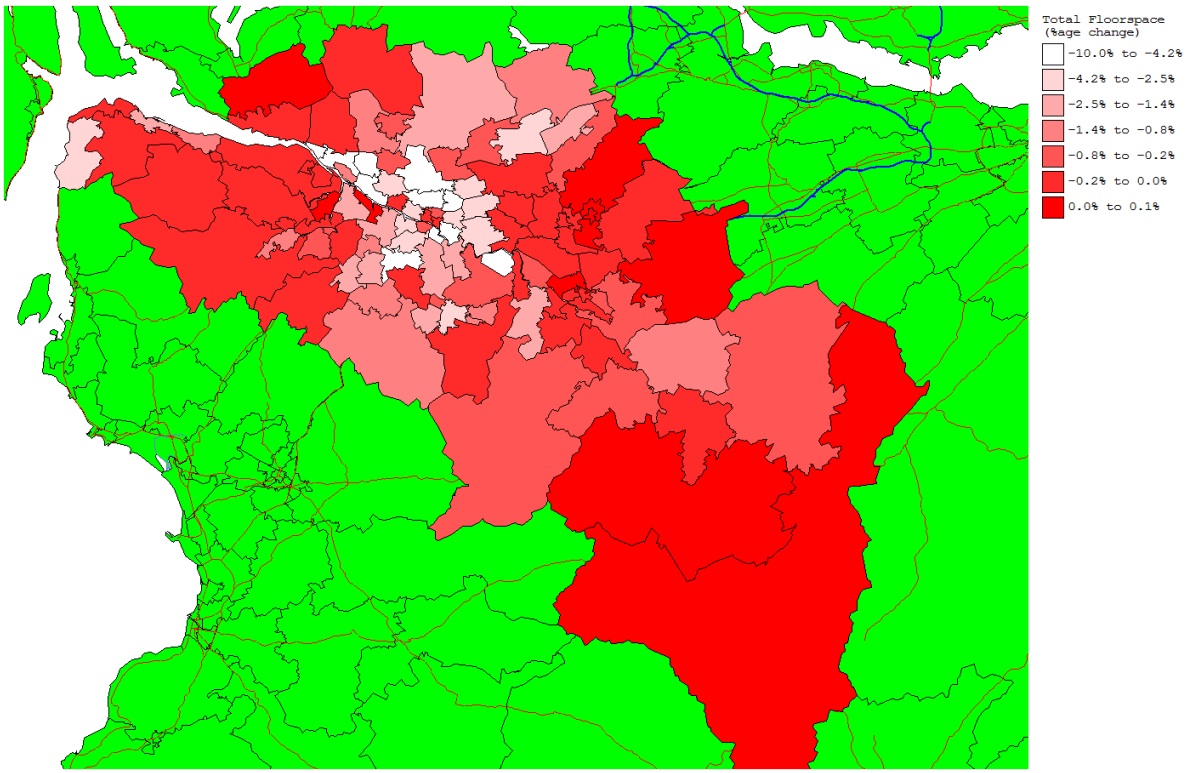
Spatial Analysis: The SITLUM model allocates the additional £9 per m2 at 2021 and £50 per m2 at 2031 generated by Scenario IG compared to Scenario IF. Relatively small numbers are involved but the pattern shows at 2021 additional rentals slightly higher along the Clyde Waterfront at Renfrewshire and West Dunbartonshire. The 2031 pattern again focuses on higher Scenario IG rental values along the Clyde Waterfront, Renfrewshire and West Dunbartonshire.

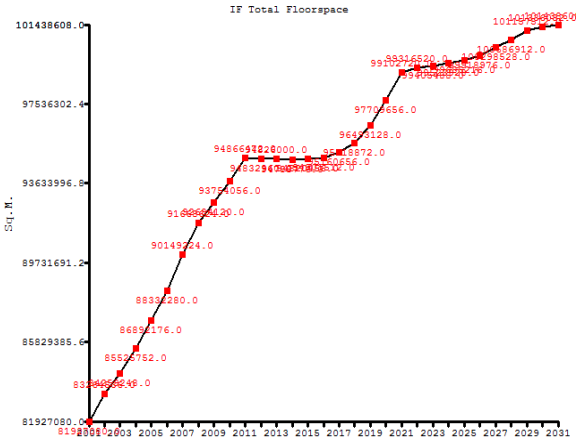
IF v IG Total Floorspace

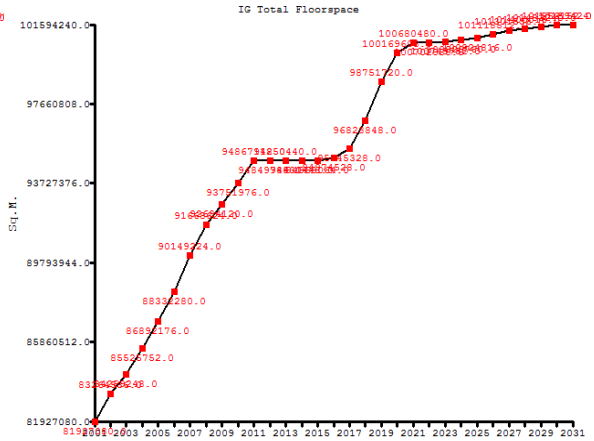
2031



2021







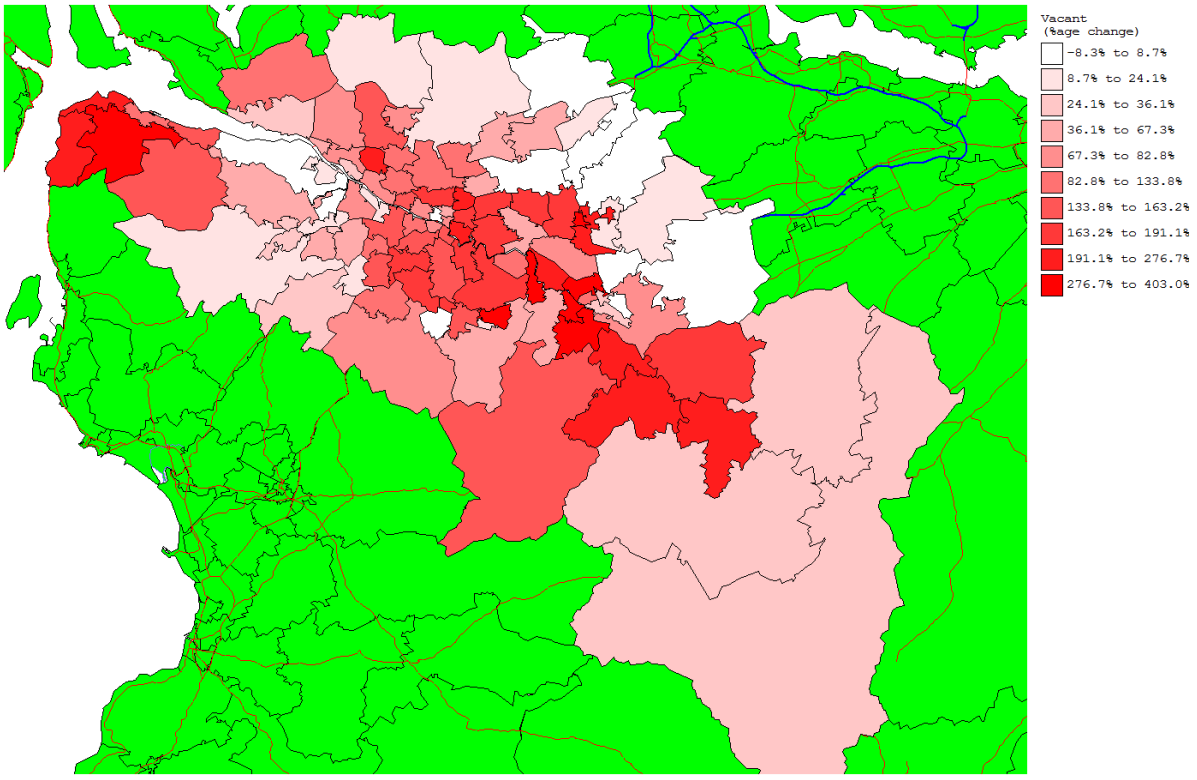
Total Floorspace m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	94866871	99102720	4235849	101438608	6571737
Scenario IG	94867944	100680480	5812536	101594240	6726296
Scenario IA	94851916	98318421	3466505	101611560	6759644

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. The Graphs show similar growth patterns with floorspace growth flat between 2011 and 2018 and then strong growth after that up to 2031. In terms of absolute growth figures both scenarios are very similar. Scenario IF shows growth of 4.24 million m2 at 2021 and growth of 6.57 million m2 at 2031. Similarly Scenario IG shows growth of 5.81 million m2 at 2021 and 6.72 million m2 at 2031. Scenario IG therefore generates a modest increase in floorspace compared to Scenario IF of + 2.33 million m2 at 2031 and 0.91 million m2 at 2031.

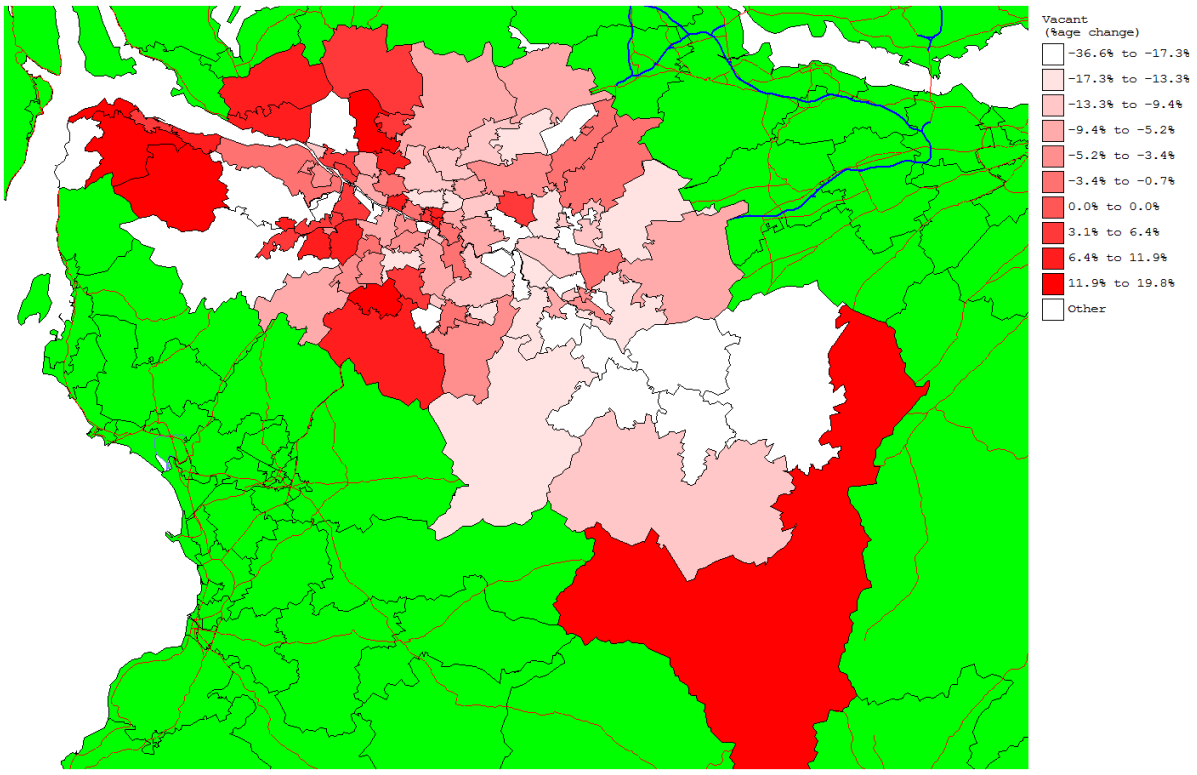
Spatial Analysis: SITLUM allocates spatially the additional floorspace generated by Scenario IG at 2.33 million m2 at 2021 and 0.91 million at 2031 compared to Scenario IF. Relatively modest % change up to 2021 – only -10% maximum change and only -3.8% maximum change by 2031. The spatial pattern at 2021 shows Scenario IG increase floorspace capacity around Glasgow East End, the Clyde Waterfront and East Dunbartonshire. The 2031 pattern focuses this additional floorspace to the north of Glasgow – East Dunbartonshire and to the south of Glasgow – East Renfrewshire. The relative growth figures are modest and caution is required and perhaps more relevant is not new floorspace but the effect on existing floorspace occupation between the two scenarios.

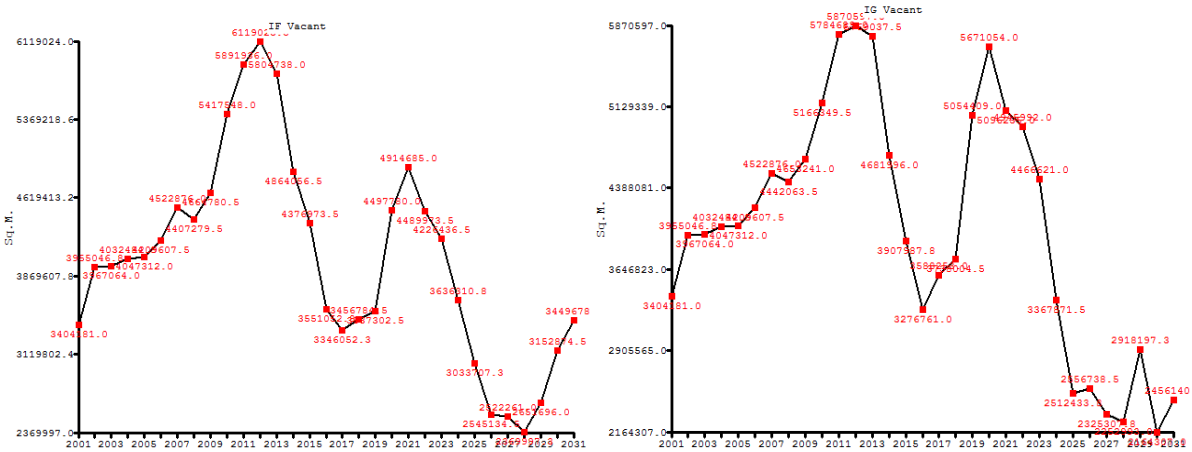
IF v IG Vacant Floorspace

2031



2021





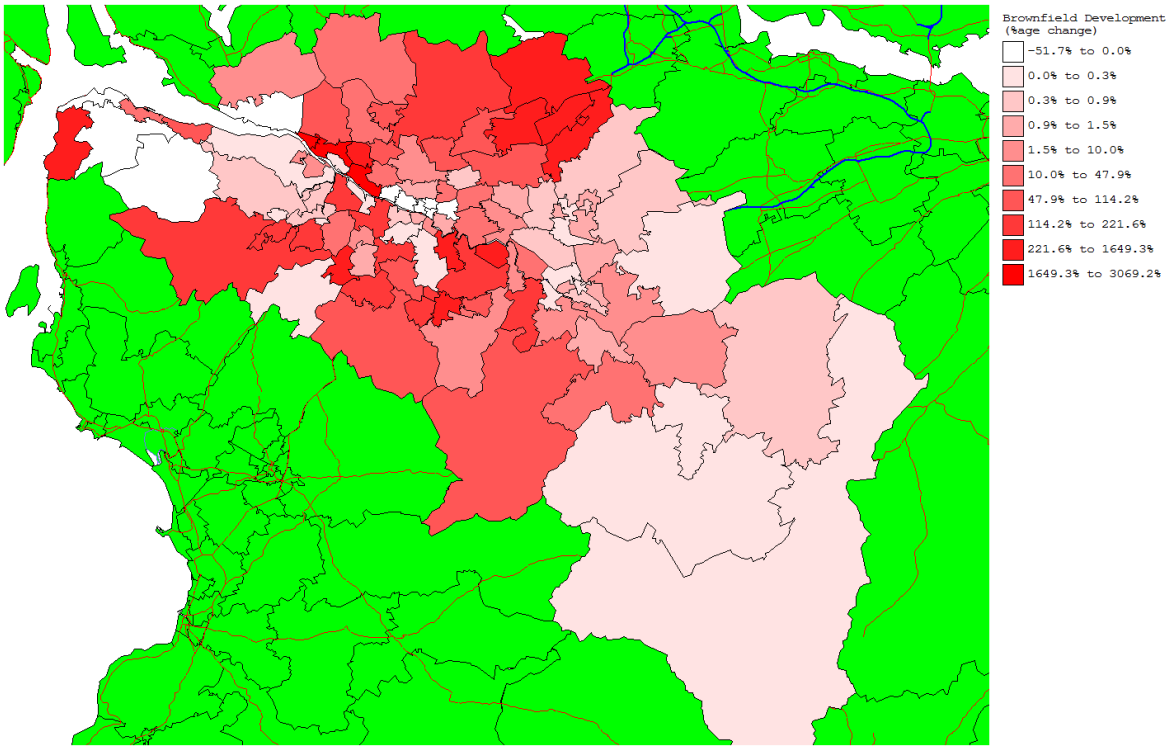
Vacant (M2)	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	5891986	4497780	-1394206	3449678	-2532308
Scenario IG	5784632	5671054	-113578	2456140	-3328492
Scenario IA	5903429	3943055	-1960374	2649724	-3152705

Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. The graphs show similar patterns with a peak of vacant floorspace at 2011 a fall in 2016 and a further peak in 2021 followed by a further fall to 2031. Our snapshots at 2011, 2021 and 2031 pick up on the peaks at 2011 and 2021. At 2011 both scenarios have a similar peak in absolute numbers - IF at 5.89 million m2 and IG at 5.78 million m2. The 2021 peaks however show that scenario IG generates a higher amount of extra vacant floorspace of 1.18 million m2. At 2031 the position is reversed with Scenario IF generating higher vacant floorspace of 0.79 million m2.

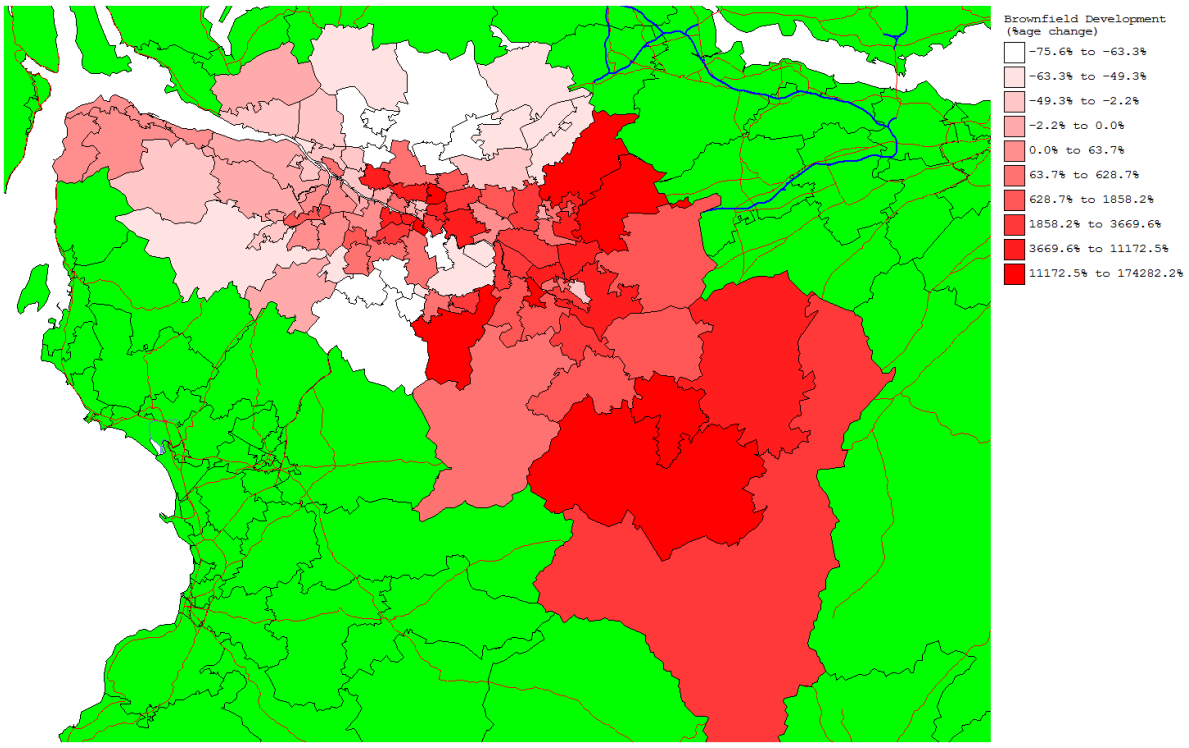
Spatial Analysis: SITLUM allocates the extra 1.18 million vacant floorspace at 2021 generated by IG and shows the spatial effect of the two scenarios different peaks – It would be North and South Lanarkshire, the East End and East Dunbartonshire i.e. the east of the conurbation which would have higher vacancy rates under Scenario IG. The 2031 spatial effect is quite different and has to be seen as a reverse where Scenario IF would generate higher vacancy rates and allocates the relatively modest 0.79 million extra vacancy towards the darker red shaded areas on the map i.e. East End, parts of North and South Lanarkshire and Inverclyde. Again caution as we are dealing with relatively small absolute numbers.

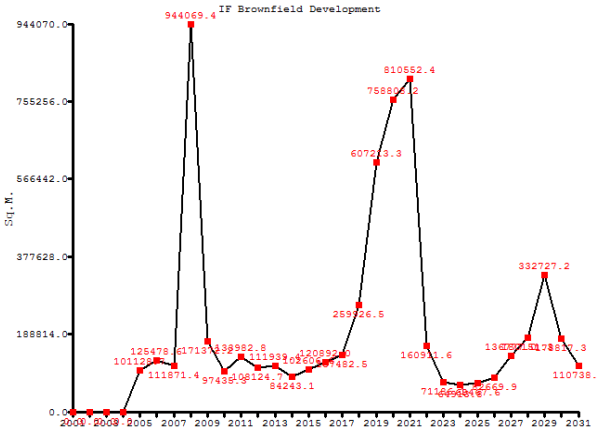
IF v IG Brownfield Development

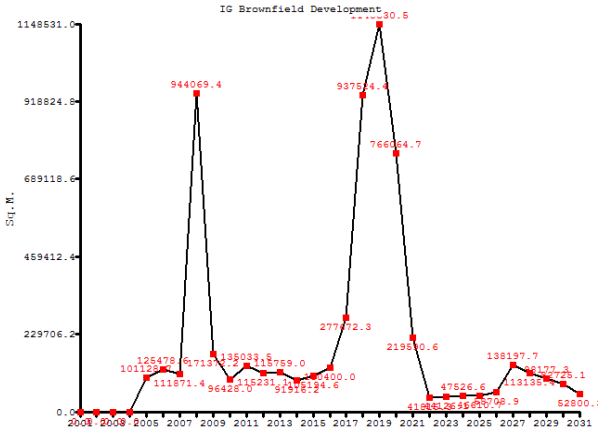
2031



2021





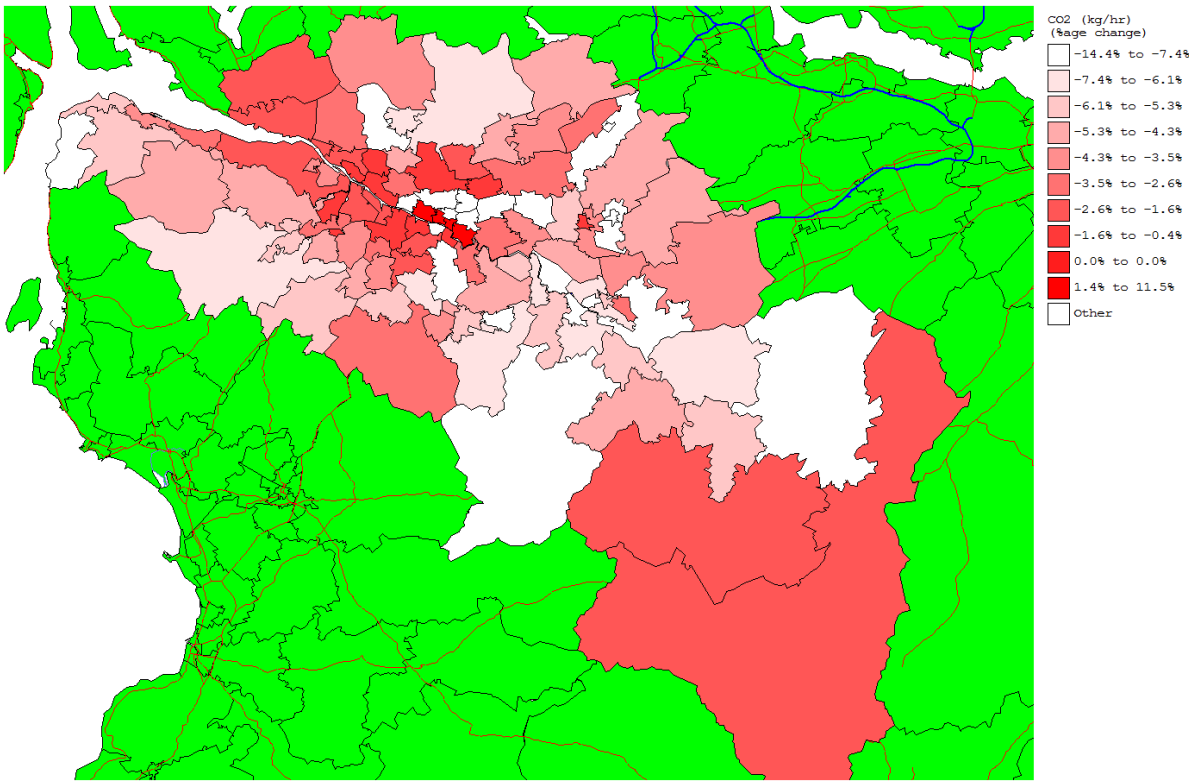


Brownfield Development m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	136982	810552	673570	101738	-35244
Scenario IG	135033	219920	84917	52800	-82233
Scenario IA	128163	276215	148052	169653	41490

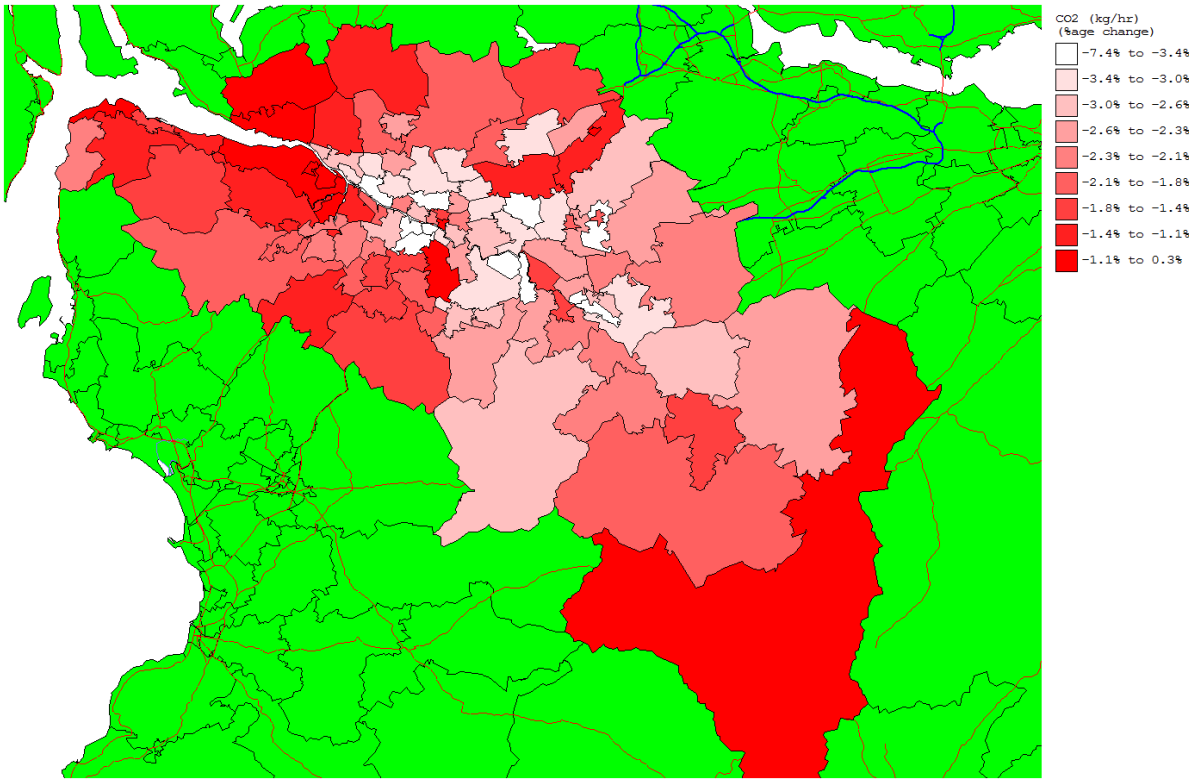
Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. The graphs show a similar pattern but the relative peaks are different in scale. Both 2011 positions are similar following the crash of 2008 and both show a peak of brownfield development occurring in 2020/21. These are very dynamic graphs with large volatility. The Scenario IG peaks at 2019 while the Scenario IF peaks at 2021. This creates a very distorted picture at our snapshot view at 2021. In general IG peak at 2019 is higher than the IF 2021 peak and there is probably little extra to be learned from this graph. The spatial analysis of the snapshot positions at 2021 and 2031 are distorted and therefore little use in detecting a spatial pattern.

IF v IG CO2

2031



2021



Comment: This Scenario comparison sets the OE Higher Migration (Planning 2) scenario as the Base and set against the OE Lower Migration (Planning 1) scenario as the Forecast. Absolute value graphs are not available for CO2 figures but as a guide we have the relative % changes between the two scenarios. The 2021 position is that Scenario IF generates a relative smaller amount of CO2 of between 0.3% to - 7.5% compared to Scenario IG. The 2031 position is that Scenario IF generates between 11.5% to - 14.4% CO2 compared to Scenario IF.

Spatial Analysis: At 2021 Scenario IG generates more CO2 than Scenario IF and this additional CO2 is distributed and centralised along the central conurbation corridor. The 2031 situation is slightly different as the extra CO2 generated by Scenario IG is more widely distributed in all areas with the exception of the City Centre and focused on the East End corridor and North and South Lanarkshire.

Overall Conclusion on comparing**: Scenario IF** – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration) Vs **Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario).

Scenario IF has a more pessimistic population forecast assumption compared to Scenario IG and therefore it would be anticipated all thing being equal that it would generate more negative outputs especially in terms of economic growth and future development levels. The additional 95,000 people attracted to the area by Scenario IG compared to Scenario IF at 2031 should produce a noticeable impact. Scenario IG's additional population is allocated by the SITLUM model and concentrated around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). The effect of the opening of the M74 in June 2011 may be the reason for the increase in accessibility for the south of Glasgow.

Of greatest interest is that Scenario IG only creates a difference of + 1,239 jobs at 2021 and + 1,522 jobs at 2031 compared to Scenario IF. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher jobs but this is clearly not the case. IG does not produce the number of jobs which would reflect and justify the population growth. The additional jobs are focused to the North and West of the conurbation. However the working population only grows by 18,000 by 2031 and that is a very poor return for an additional 95,000 population. It is the Non-Working Adults that shows the real difference between these two scenarios. This produces an astonishing difference between the two scenarios. IF generates 30,000 less "unemployed " by 2021 and 95,000 less by 2031. The implications are that while IG is successful in attracting in additional population of 95,000 by 2031 compared to IF these additional people are not in employment. Scenario IF while producing less population overall does provide jobs for the incoming population sufficient to gradually reduce unemployment. The implications are that IG generates population growth but not the required economic activity and therefore jobs to employ them with the result that this will simply add to the welfare budget and not to economic growth. Scenario IF on the other hand appears to better align population growth and job growth and keeps rentals similarly positive while avoiding the higher peaks of vacant floorspace.

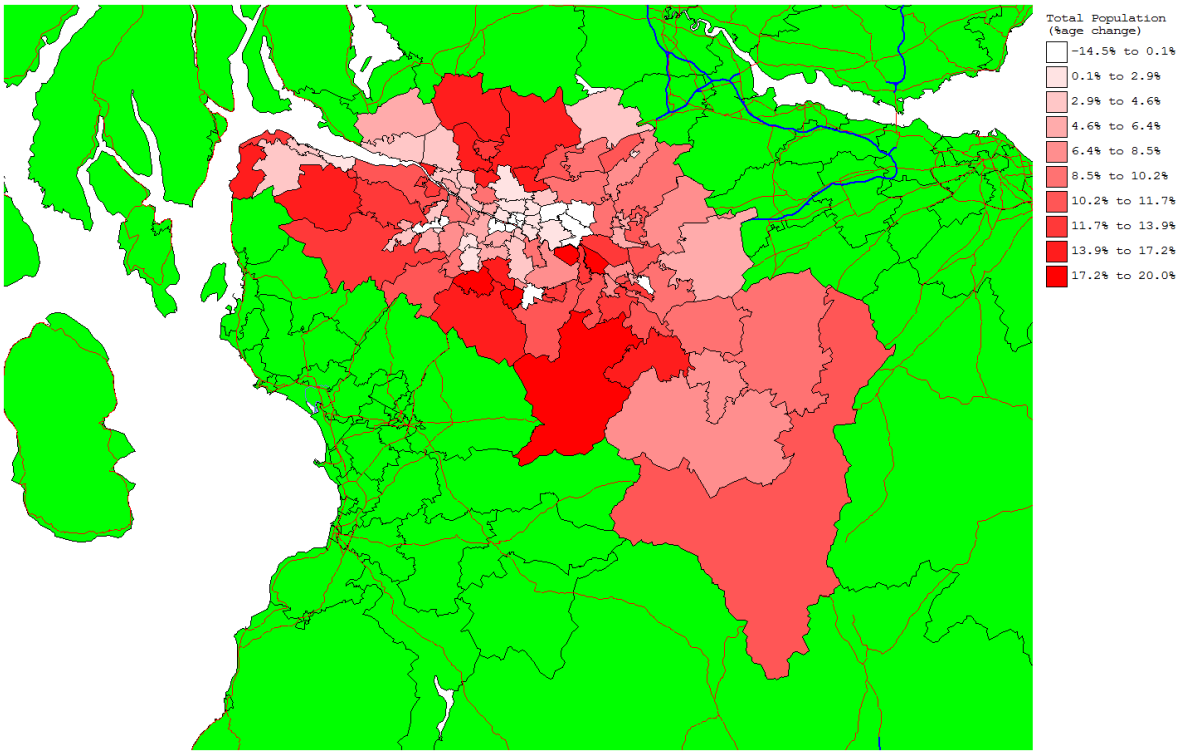
3B. IG v IA at 2021 and 2031

Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs Scenario IA – Rebalanced Economy +M74 Network

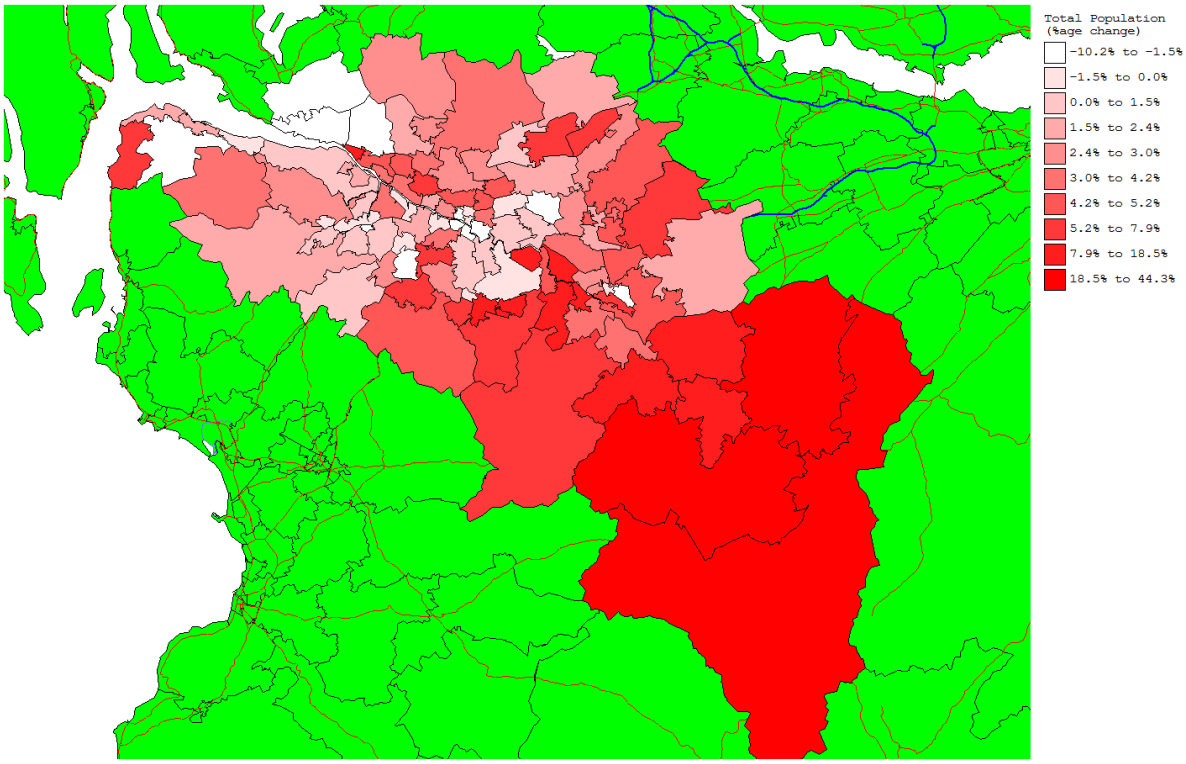
Scenario IA is the Base Model and Scenario IG is the Forecast Model (Both Permissible)

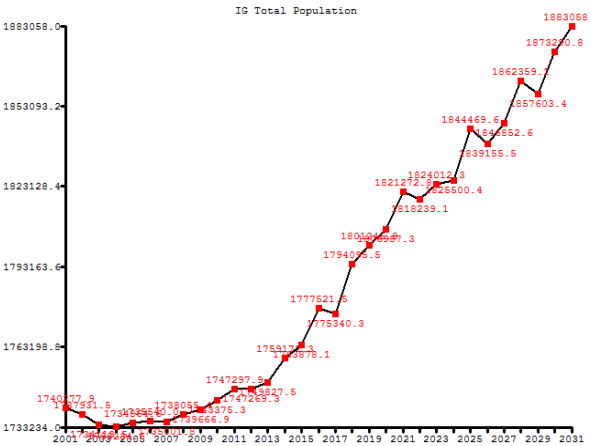
IG v IA Total Population

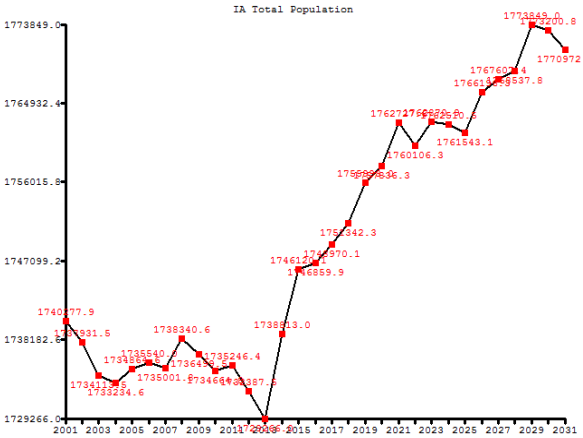
2031



2021







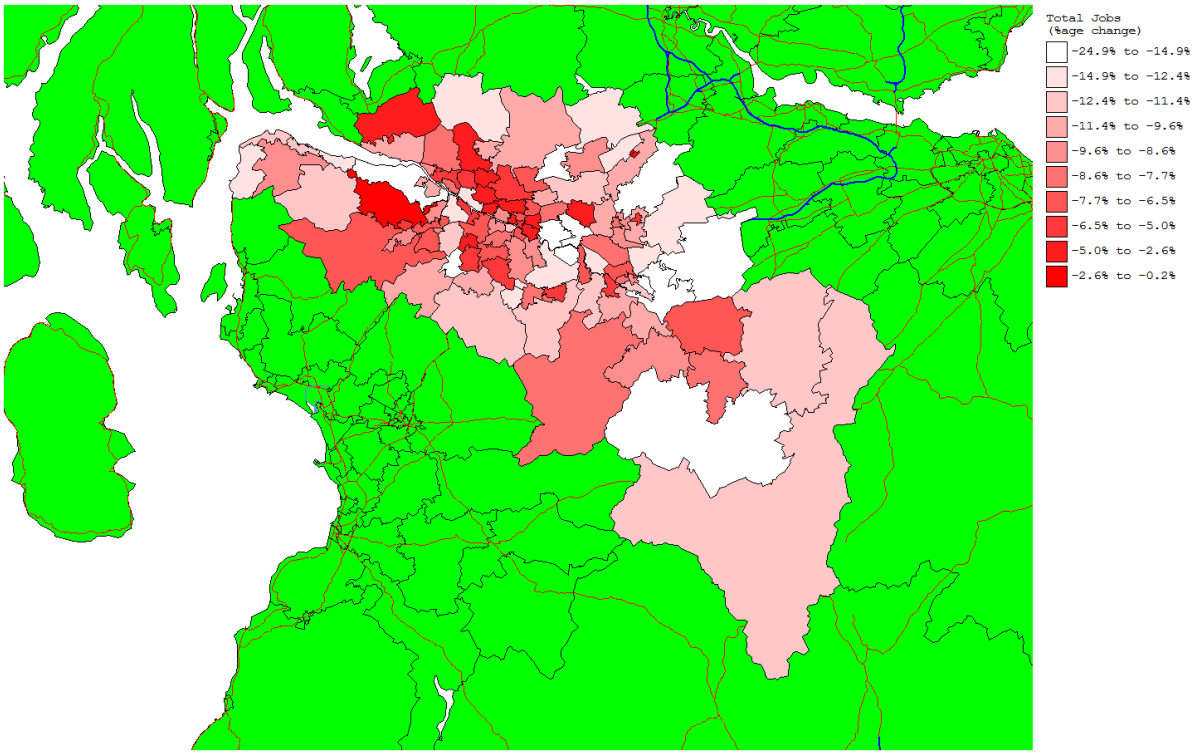
Total Populaton	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	1732985	1758708	25723	1772367	39382
Scenario IG	1747297	1821272	73975	1883058	135761
Scenario IA	1735246	1762727	27481	1770972	35726

Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graphs show both scenarios with a strong positive population growth pattern up to 2031. Scenario IG forecasts an increase of 73,975 by 2021 and by 135,761 by 2031. Scenario IA's forecasts are not quite as strong – an increase of 27,481 by 2021 and by 35,726 by 2031. The difference being that Scenario IG forecasts a higher growth of an additional 46,494 by 2021 and a difference of 100,000 by 2031.

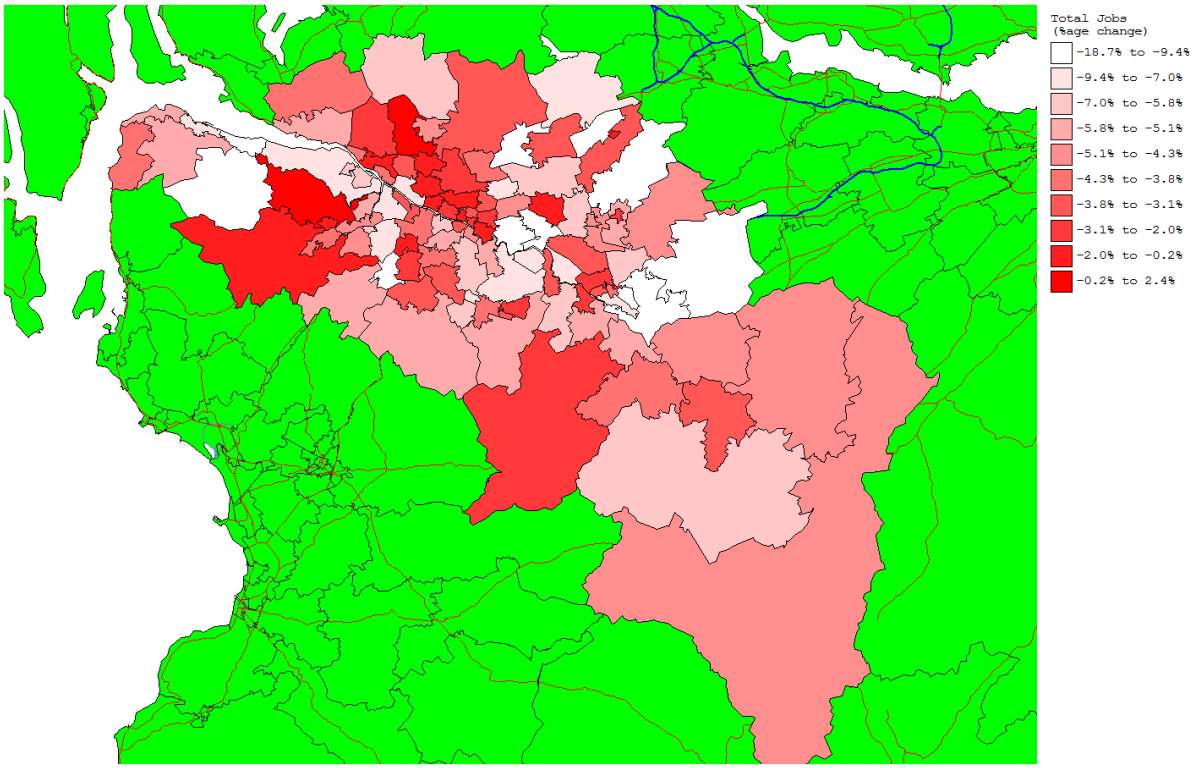
Spatial Analysis: The SITLUM model distributes the additional 46,494 generated by Scenario IG at 2021. Scenario IA is the base and is compared to the forecast Scenario IG. The new pattern shows that the additional population produced by Scenario IG will flow from the negative white areas on the map to the positive dark red areas. The south and east of the conurbation will see increasing population growth. At 2031 the additional 100,000 population generated by Scenario IG will focus on all areas but especially the zones surrounding Glasgow City. Glasgow City seeing a flow out to the surrounding areas.

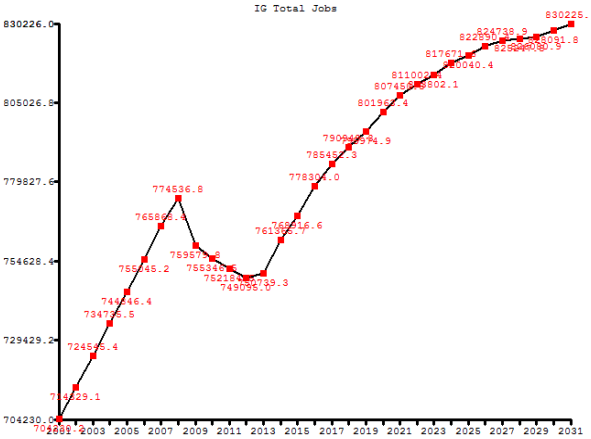
IG v IA Total Jobs

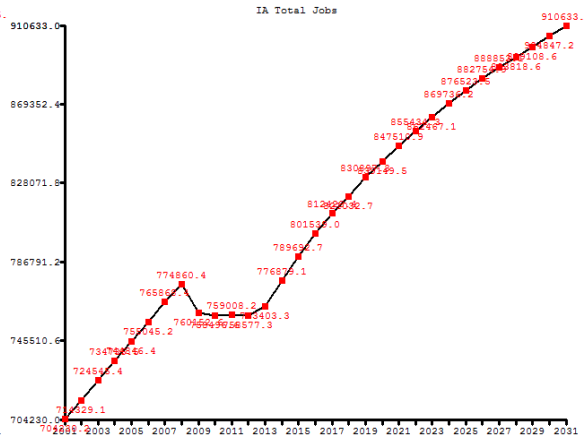
2031



2021







Total Jobs	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806228	50865	828721	73358
Scenario IG	755346	807450	52104	830226	74880
Scenario IA	759008	847510	88502	910633	151625

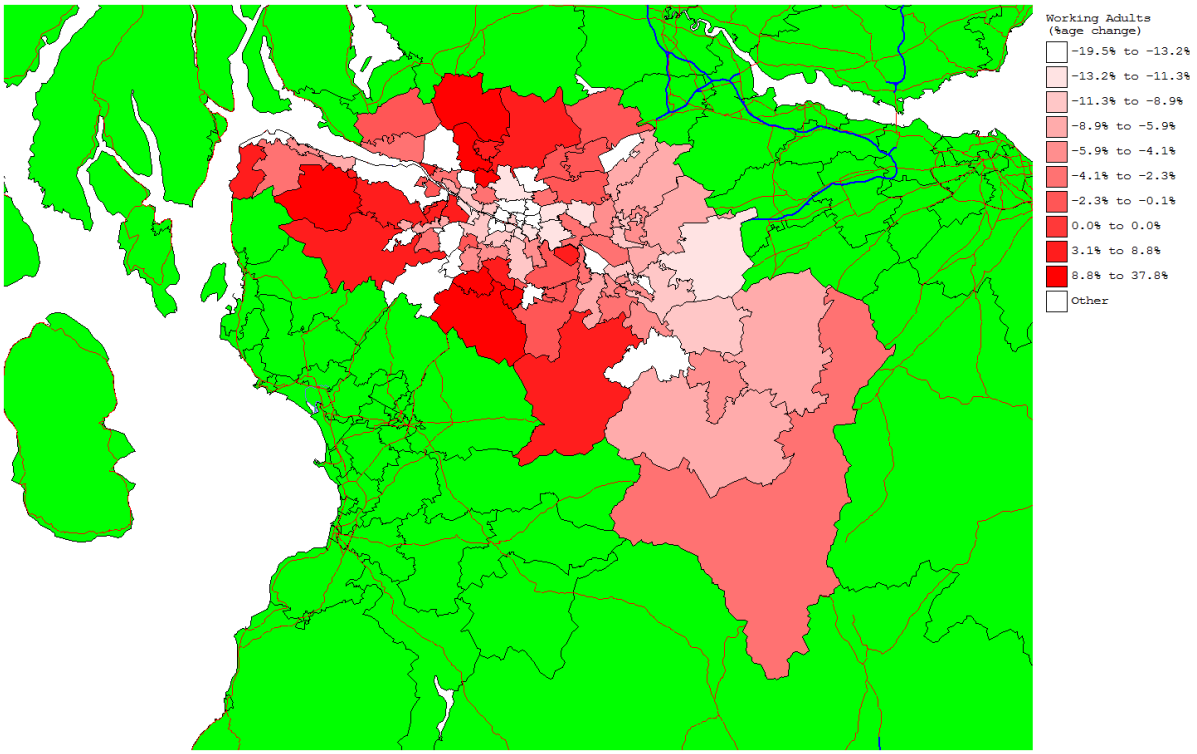
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graphs show a similar growth pattern and positive job growth forecasts. However there are notable absolute figure differences. Scenario IG forecasts growth of an additional 52,000 jobs by 2021 and by an additional 74,800 jobs by 2031. Scenario IA produces even more optimistic forecasts of

+88,500 jobs by 2021 and 151,625 jobs by 2031. The difference between these two forecasts is that Scenario IA generates 36,398 additional jobs by 2021 compared to Scenario IG and an additional 76,745 jobs by 2031.

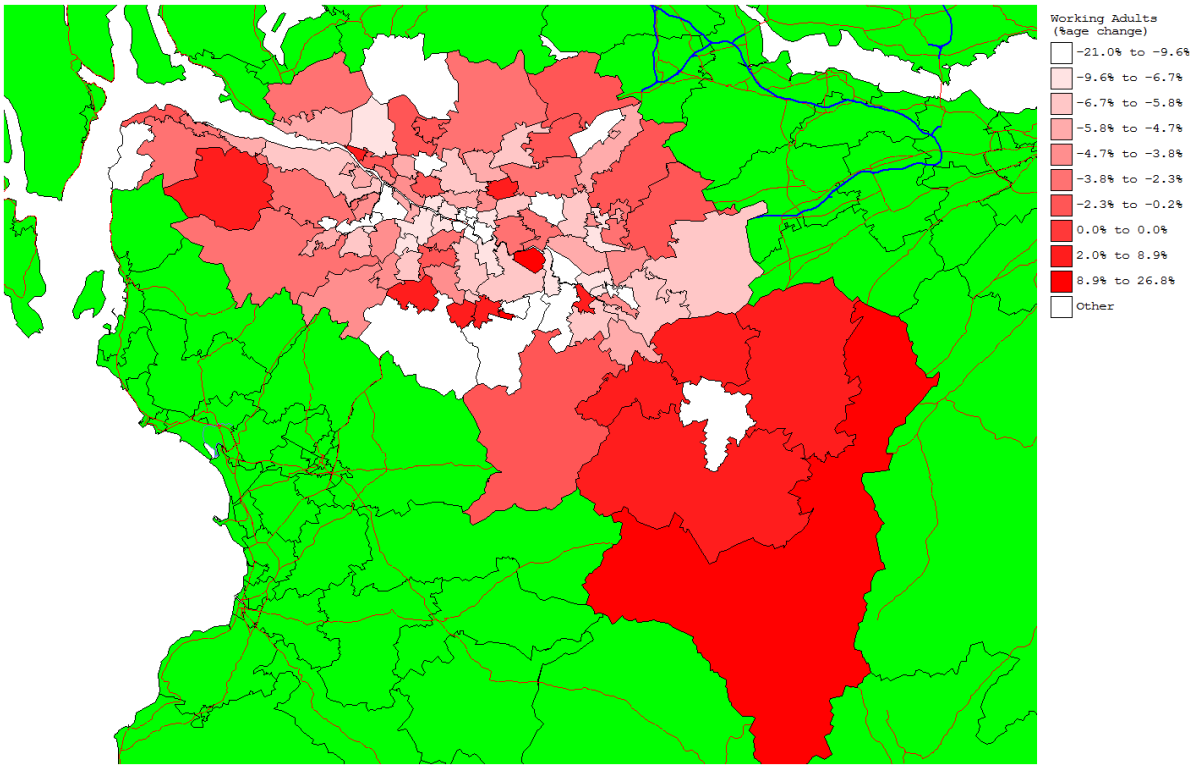
Spatial Analysis: The SITLUM model distributes the additional 36,398 at 2021. This time Scenario IA is positive and therefore the flow is generally positive – from dark red to white on the map. At 2021 Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde. At 2031 the additional 76,745 jobs generated by Scenario IA benefit virtually all areas in the conurbation area and intensify in those areas described in the 2021 assessment and again the flow is from dark red zones to white.

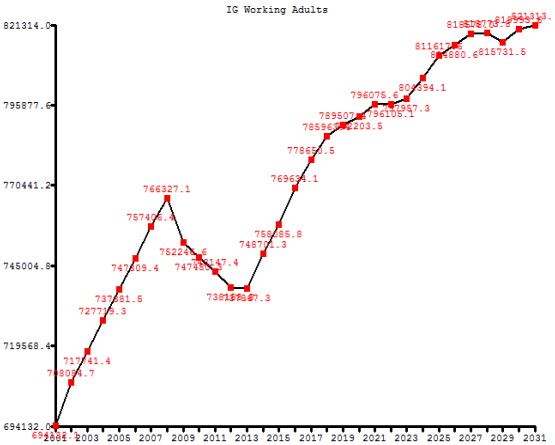
IG v IA Working Adults

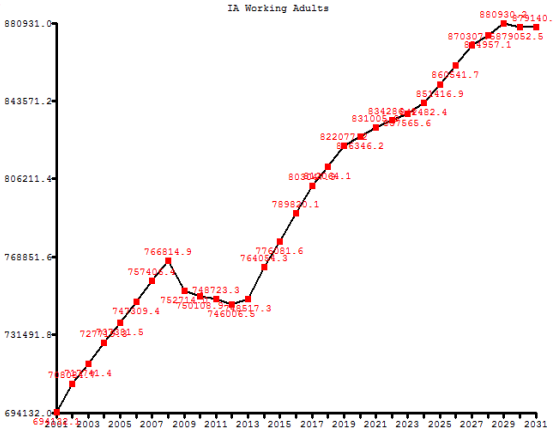
2031



2021







Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	747175	789530	42355	802664	55489
Scenario IG	747480	796075	48595	821314	73591
Scenario IA	748723	831005	82282	879140	130417

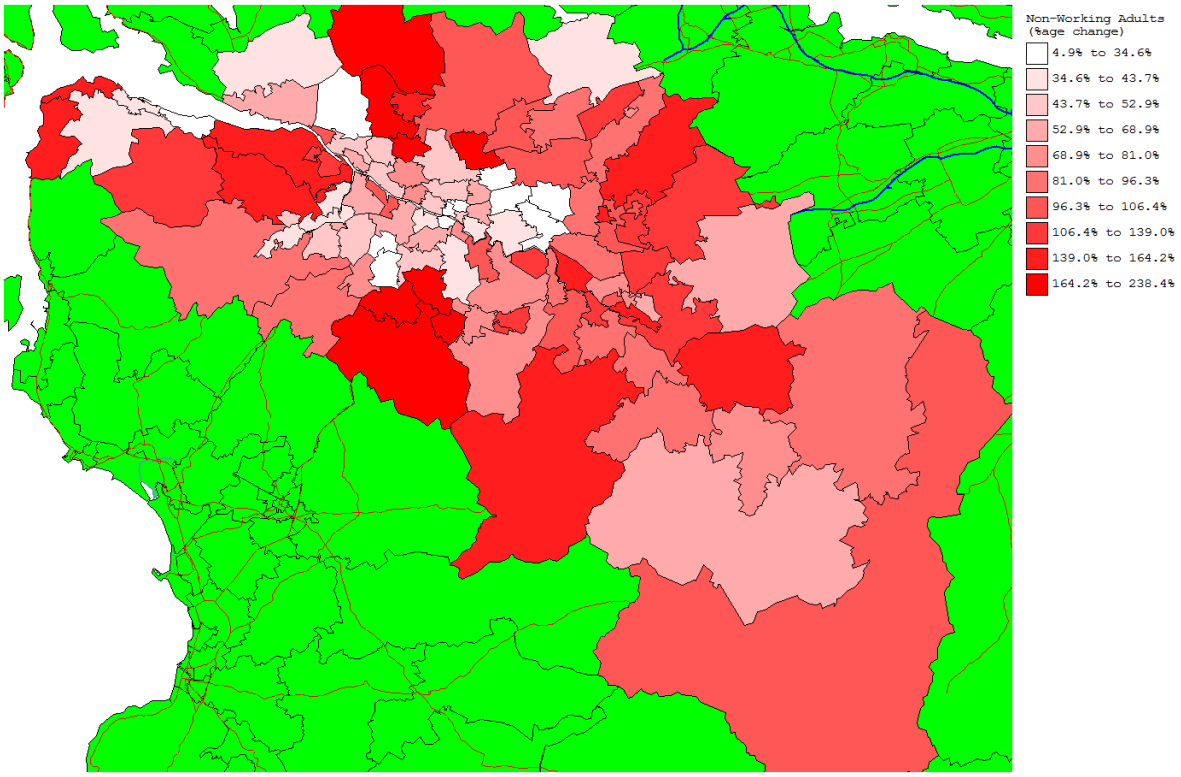
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graphs again show a positive and

similar pattern forecast by each scenario. The difference is in the scale of the absolute figures. Scenario IG forecasts an additional 48,595 working adults by 2021 and an additional 73,591 working adults by 2031. However, Scenario IA's forecast is even more optimistic with 82,282 additional working adults by 2021 and 130,417 by 2031. The difference between the two scenarios is that Scenario IA forecasts an additional 33,687 working adults by 2021 and an additional 56,826 by 2031 compared to Scenario IG. (These are similar in scale to the forecast difference in Total Jobs).

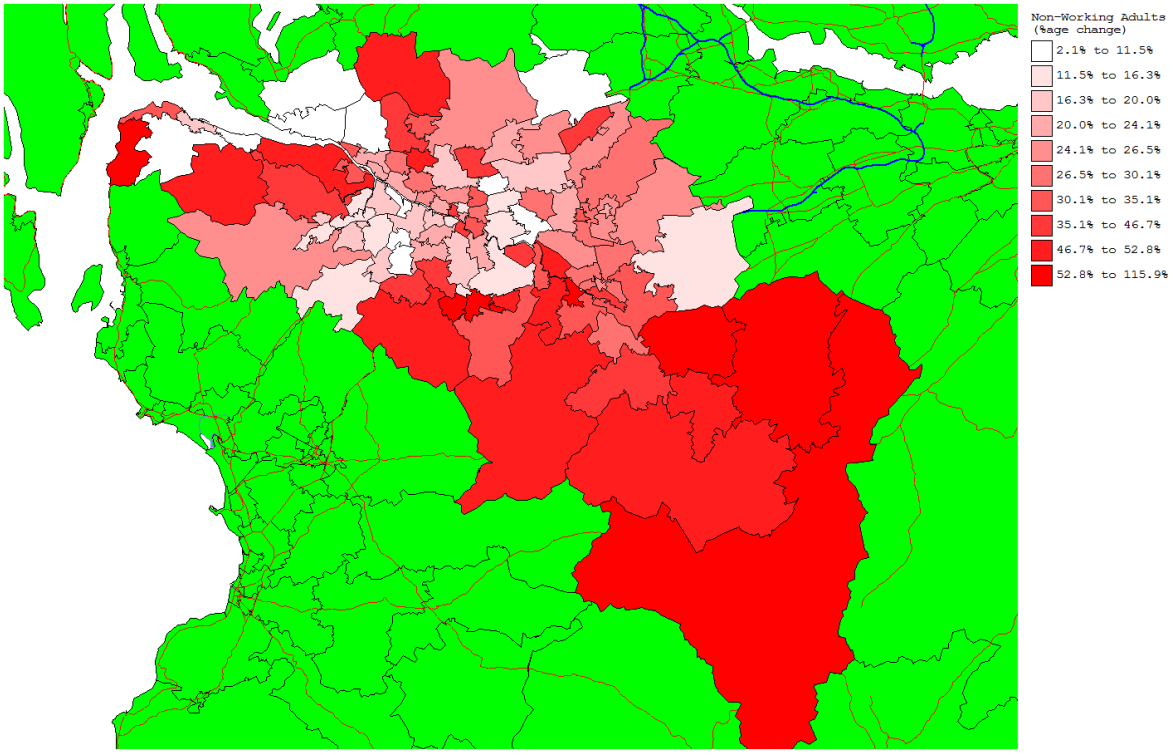
Spatial Analysis: The SITLUM model distributes the additional 33,687 working adults at 2021. Generally the flow is from south east towards the north west of the conurbation (from dark red to white). The 2031 position shows an additional 56,826 working adults distributed in a slightly different pattern with Glasgow City, East Dunbartonshire and North Lanarkshire benefiting this time at the expense of the north and west. (Again dark red to white flow).

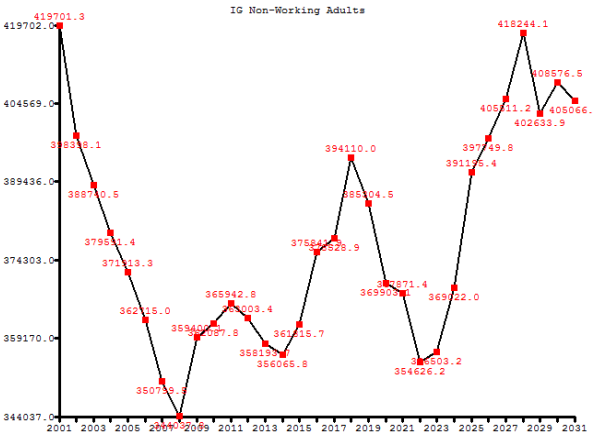
IG v IA Non-Working Adults

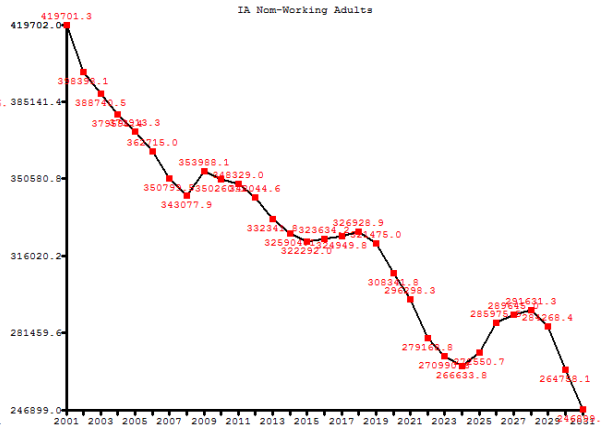
2031



2021







Non-Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	359280	334248	-25032	303621	-55659
Scenario IG	365942	369903	3961	405066	39124
Scenario IA	348329	296298	-52031	246899	-101430

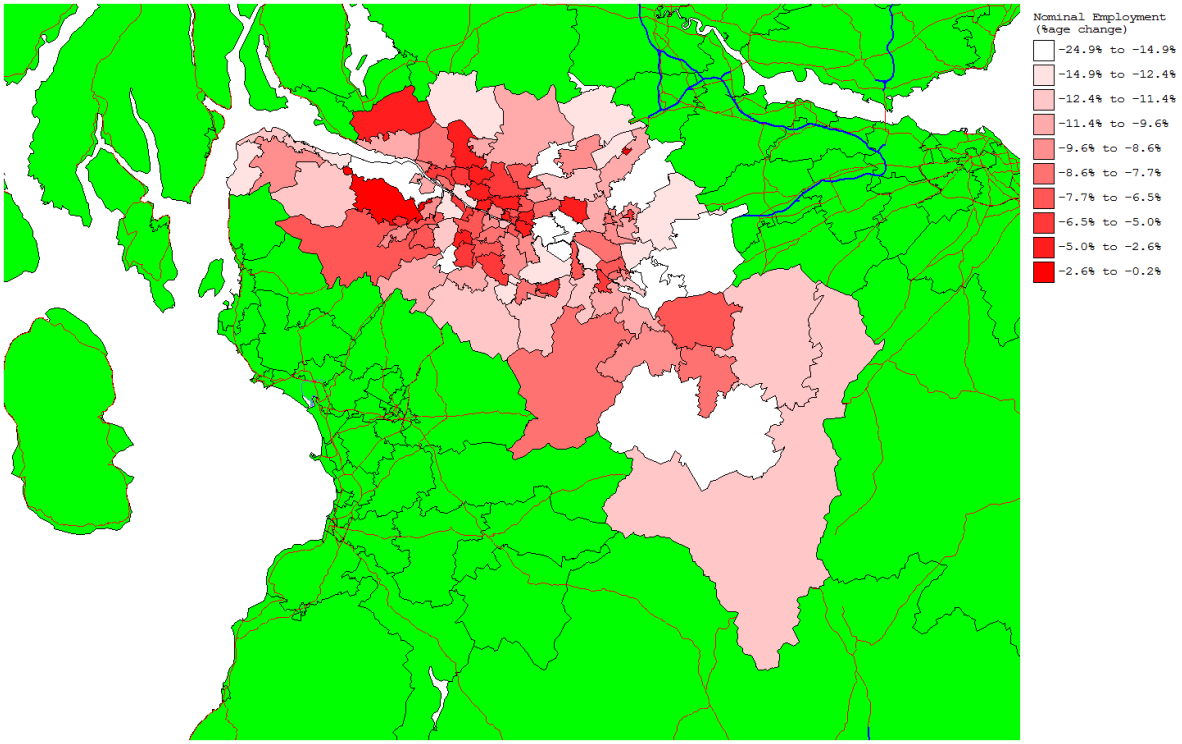
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IA forecasts a general fall in the number of non-working

adults up to 2031 while Scenario IG forecasts a rise in the number of non-working adults up to 2031. Scenario IA shows a general decline in the absolute number of “unemployed” – up to 52,000 less by 2021 and 101,400 less by 2031. Scenario IG on the other hand shows “unemployment” increasing + 3,900 by 2021 and almost 40,000 higher by 2031. This produces an astonishing difference between the two scenarios. A difference of + 56,000 more “unemployed“ by 2021 and a difference of 140,554 by 2031!

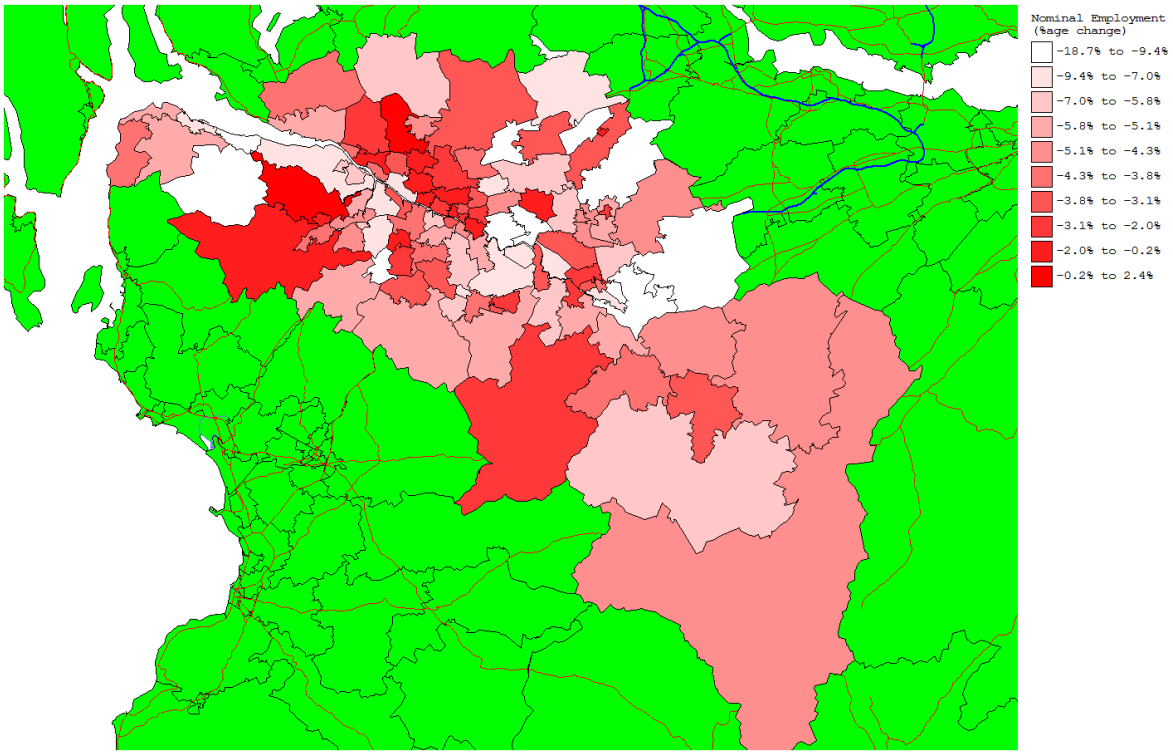
Spatial Analysis: The SITLUM model distributes the difference between the two model forecasts. As Scenario IA is the base model the result will be positive in relation to the greater negative figures from Scenario IA. In this case the flow is from dark red to white on the map. The additional 56,000 non – working adults are a migration effect attracted not by job location but by the availability of social housing and rental levels. At 2021 the additional non-working adults are attracted to the north and west of the conurbation - Glasgow City, parts of Renfrewshire, parts of Inverclyde and West Dunbartonshire and parts of East Dunbartonshire and North Lanarkshire. By 2031 this spatial pattern is consolidated with the distribution of the extra 140, 500 non-working adults generated by Scenario IG.(Again dark red to white flow on the map). This will of course result in greater welfare resource implication for these authorities.

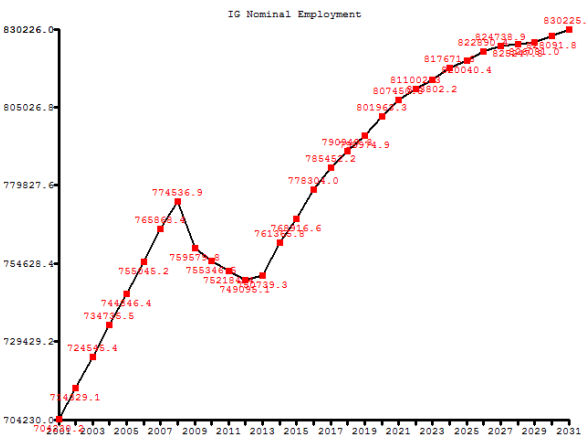
IG v IA Nominal Employment

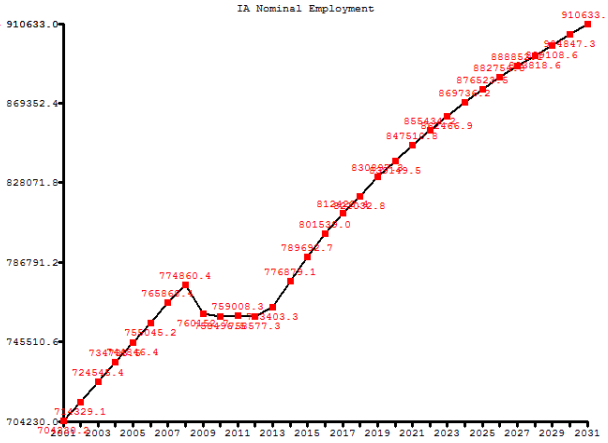
2031



2021







Nominal Employment	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806220	50857	828721	73358
Scenario IG	755346	807456	52110	830226	74880
Scenario IA	759008	847510	88502	910633	151625

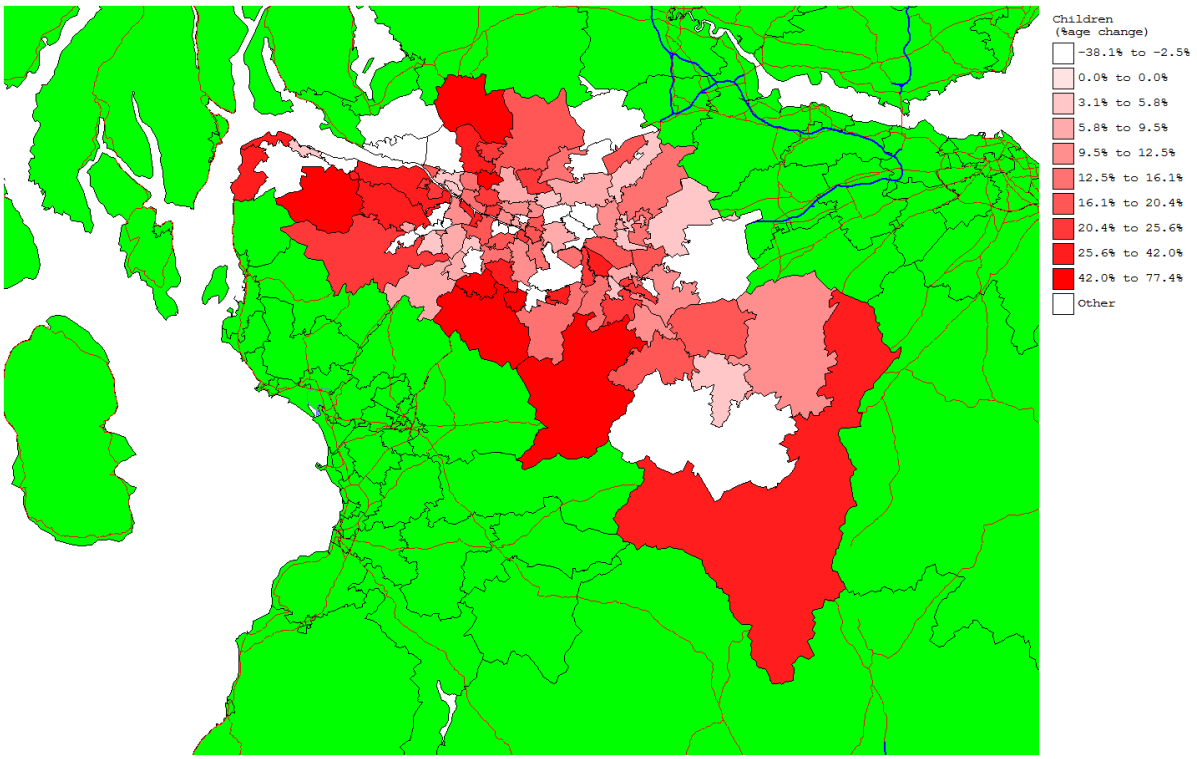
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graph indicates positive growth in nominal employment up to 2031 in both scenarios. The difference between the growth rates shows that Scenario IA forecasts an additional 36,393 employment by 2021 and an

additional 76,745 employment by 2031. There are almost exactly the same figures as in the Total Jobs analysis.

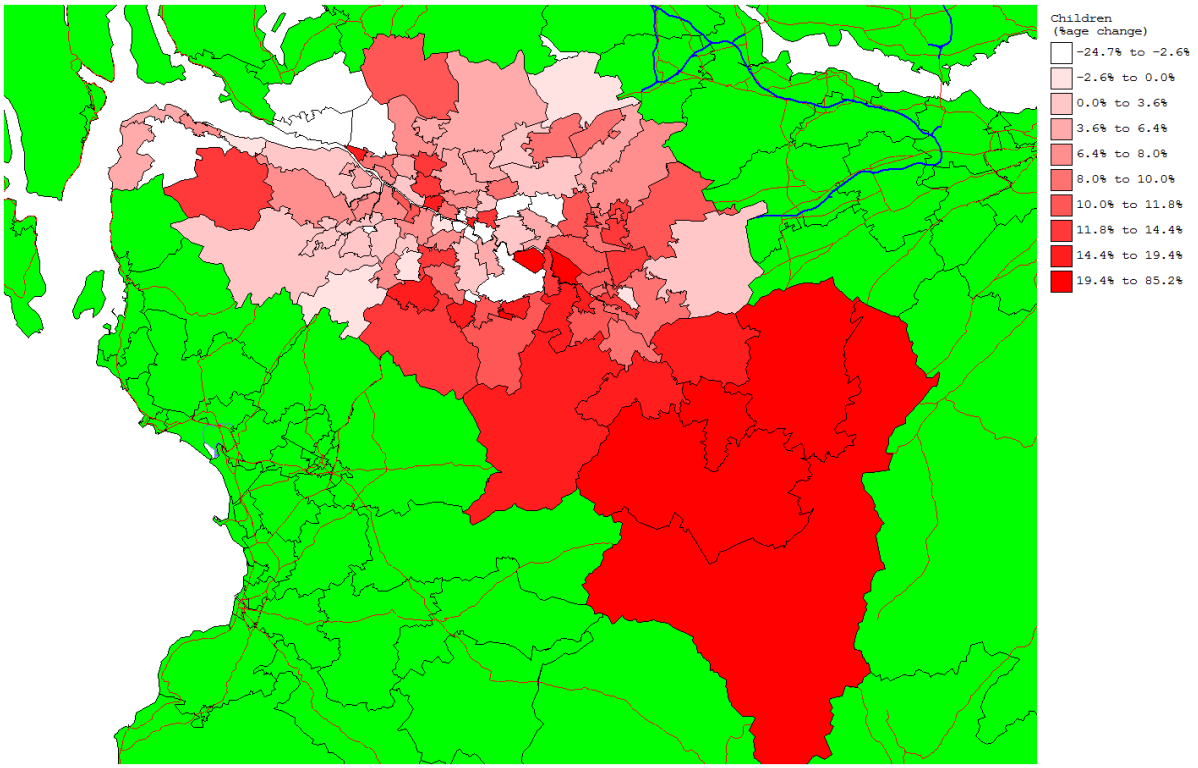
Spatial Analysis: The SITLUM model distributes the additional 36,393 at 2021 generated by Scenario IA. At 2021 Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde. At 2031 the additional 76,745 jobs generated by Scenario IA benefit virtually all areas in the conurbation area and intensify in those areas described in the 2021 assessment. This is exactly the same spatial pattern as in Total Jobs. Again the flow is shown on the map from dark red to white.

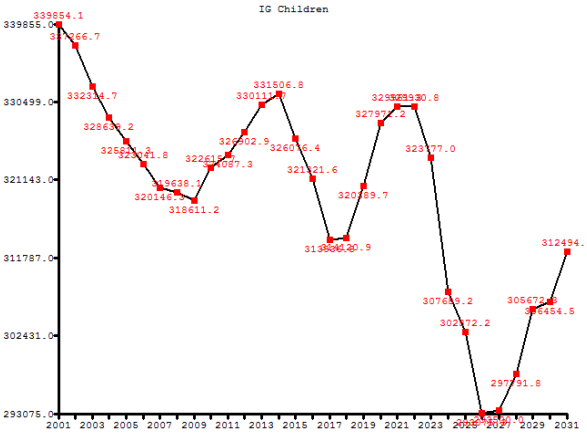
IG v IA Children

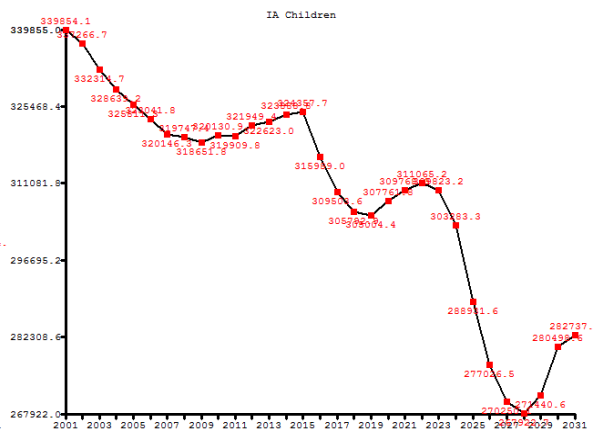
2031



2021







Children	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	321889	312214	-9675	285100	-36789
Scenario IG	322615	327971	5346	312494	-10121
Scenario IA	319909	309768	-10141	282737	-37172

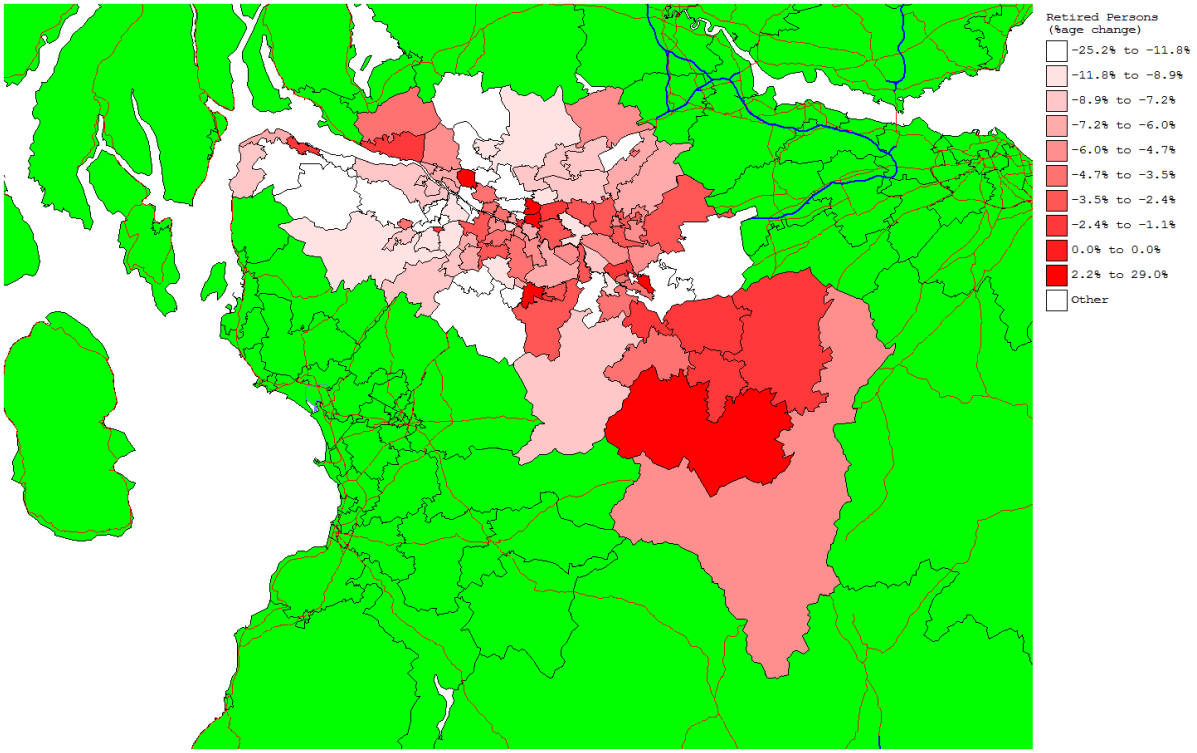
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. Both Graphs show a similar overall downward pattern in the number of children. However this has to be related to an overall growth in both scenarios in total populations with the simple conclusion that while overall populations grow under both scenarios the number of children continue to decrease. This is

a general demographical feature (reduced fertility rates) but there are patterns within each scenario. Scenario IG forecasts a small rise in the number of children at 2021 by 5,346 but a fall by 2031 of 10,121. Scenario IA forecasts a fall in the number of children at 2021 of 10,141 and a fall at 2031 of 37,172. The difference between the two scenarios results in 15,487 more children forecast by Scenario IG at 2021 and Scenario IA forecasting 27,051 less children at 2031.

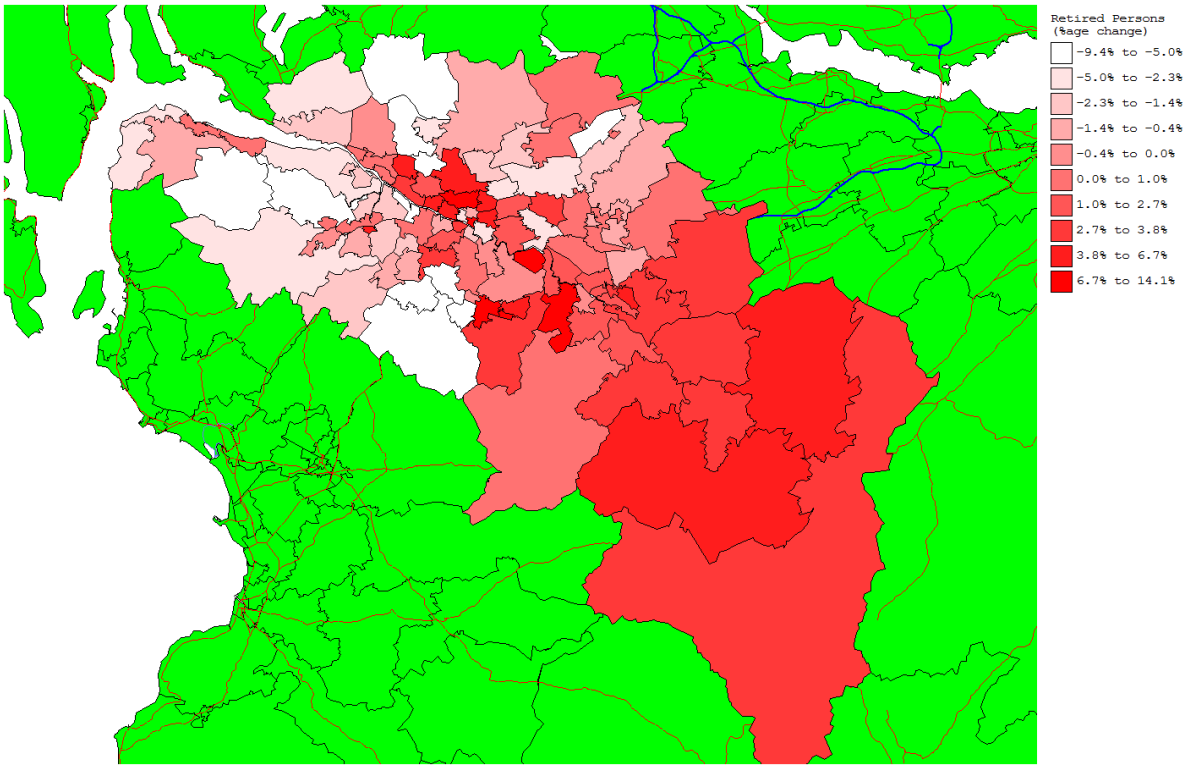
Spatial Analysis: The general trend is in a fall in the number of children up to 2031 but the differing intensity of the peaks at 2021 present a complex picture. At 2021 Scenario IG's additional children will be distributed from the white parts of the map to the dark red zones and therefore generally from the north west to the south east of the conurbation. The 2031 pattern is different as the model distributes the 27,051 more children predicted by Scenario IG which in this case locates them more in parts of Renfrewshire, parts of Glasgow City and parts of East Dunbartonshire.

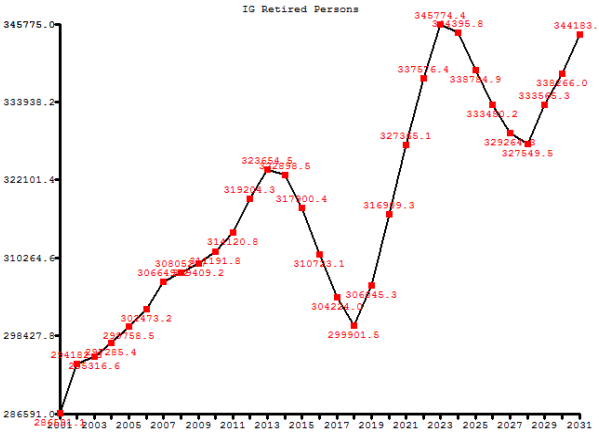
IG v IA Retired Persons

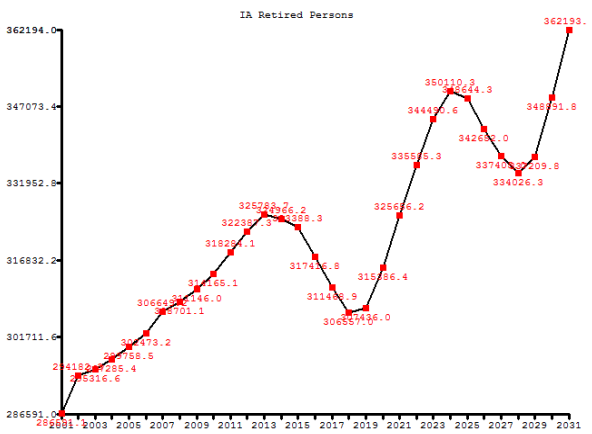
2031



2021







Retired	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	319546	322611	3065	353981	34435
Scenario IG	314120	327345	13225	344183	30063
Scenario IA	318284	325656	7372	362193	43909

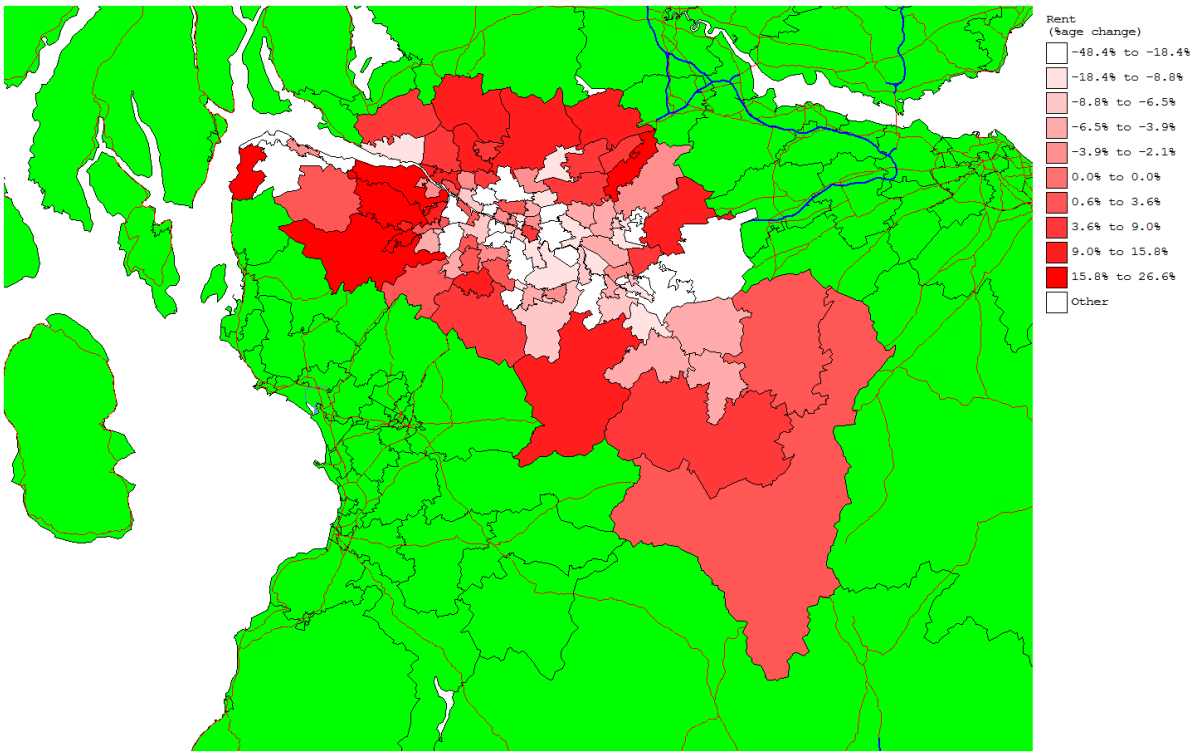
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The Graphs of the two scenarios again show that the overall demographics are very similar. In both scenarios the numbers of retired people continue to increase over time. The difference between the two scenarios shows that at 2021 Scenario IG increases by an additional 5,853 retirees compared to Scenario IA.

However this is reversed by 2031 where Scenario IG generates a lower increase – the difference now being – 13,846 retirees compared to Scenario IA.

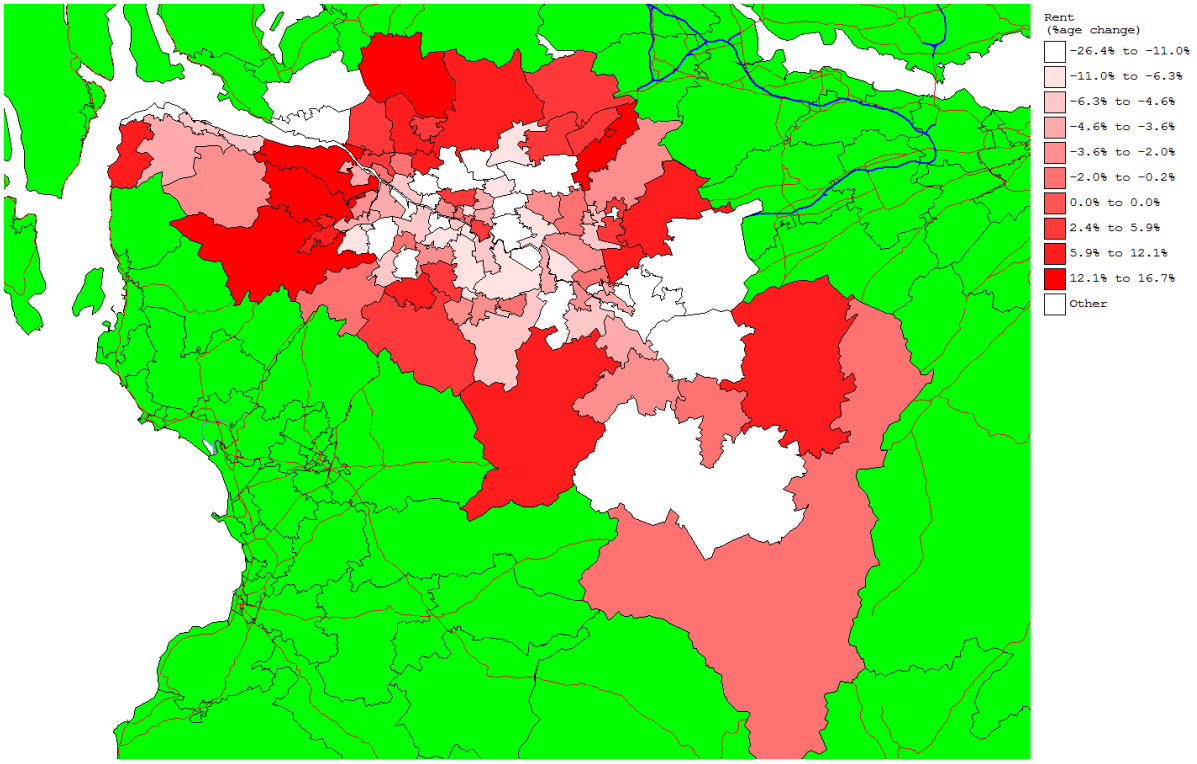
Spatial Analysis: At 2021 the additional 5,800 retirees generated by Scenario IG are distributed by the SITLUM model and generally the flow is from the south and east towards the north and west of the conurbation. At 2031 the spatial pattern is consolidated with a similar pattern a flow from south and east towards the north and west.

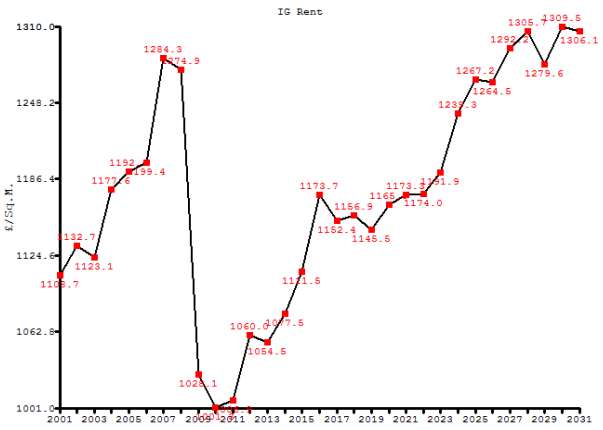
IG v IA Rent

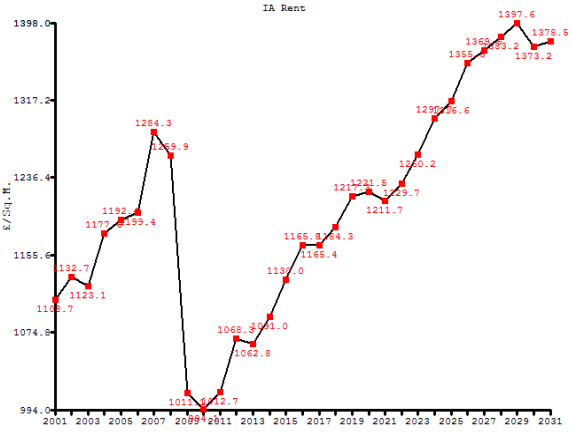
2031



2021







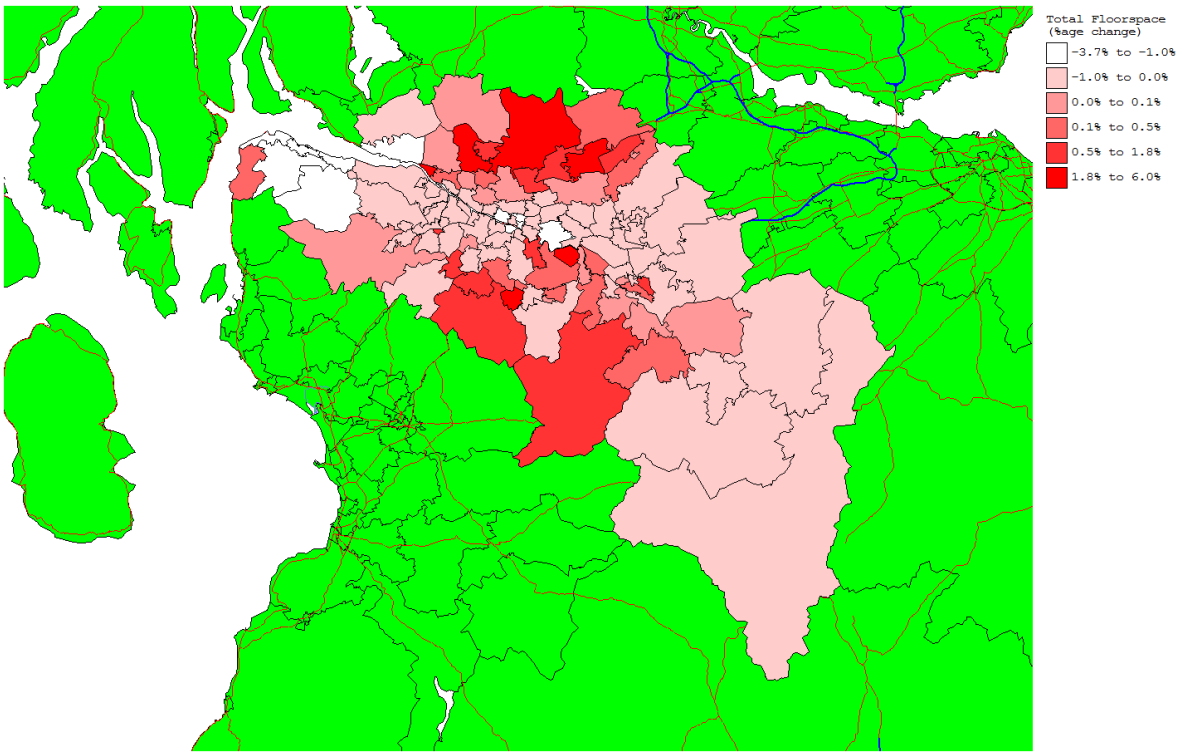
Rent £	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	996	1159	163	1251	255
Scenario IG	1001	1173	172	1306	305
Scenario IA	1012	1211	199	1378	366

Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graphs indicate from 2011 onwards both scenarios increase the rental values. Scenario IG rental increases by £172 by 2021 and £305 by 2031. The differences between the two rental growths are fairly small in absolute numbers terms. Scenario IA increases the difference by £27 per m2 at 2021 and by £61 per m2 by 2031 compared to Scenario IG.

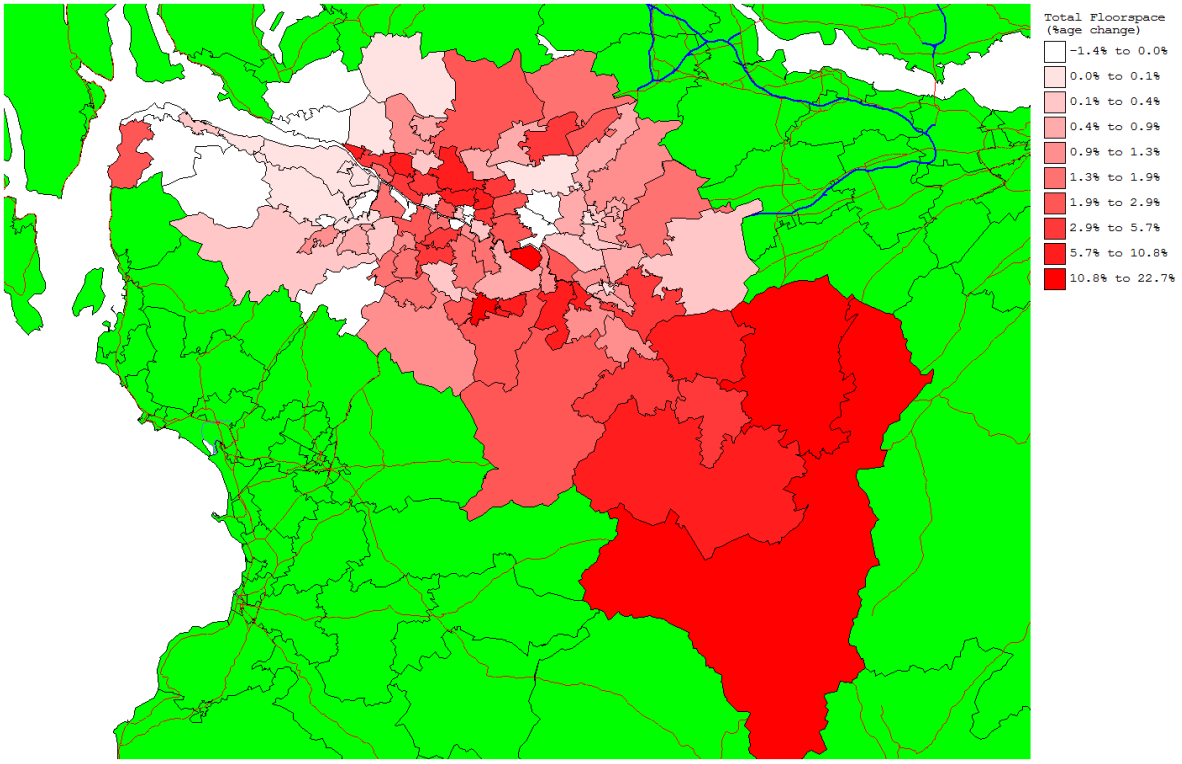
Spatial Analysis: The slight increases in rentals generated by Scenario IA are distributed along very similar pattern to Total Jobs. The flow is from dark red to white. At 2021 it is parts of North and South Lanarkshire, Glasgow City, East End, Clyde Waterfront, parts of Renfrewshire, parts of Inverclyde and parts of West Dunbartonshire that show increased rentals generated by Scenario IA. By 2031 this pattern is consolidated with similar areas benefiting from slightly higher rental growth as at 2021. Again these figures are marginal but do relate to the areas where job growth is also being created by Scenario IA.

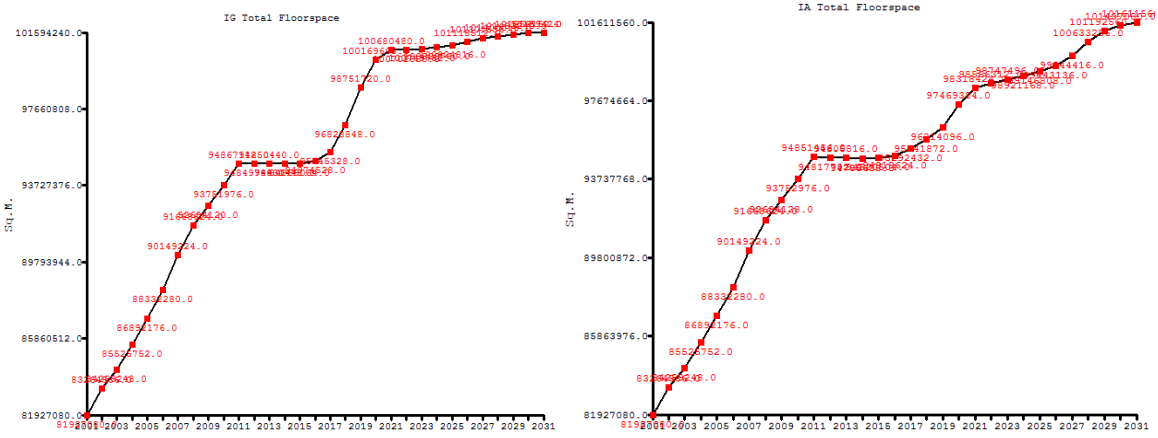
IG v IA Total Floorspace

2031



2021





Total Floorspace m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	94866871	99102720	4235849	101438608	6571737
Scenario IG	94867944	100680480	5812536	101594240	6726296
Scenario IA	94851916	98318421	3466505	101611560	6759644

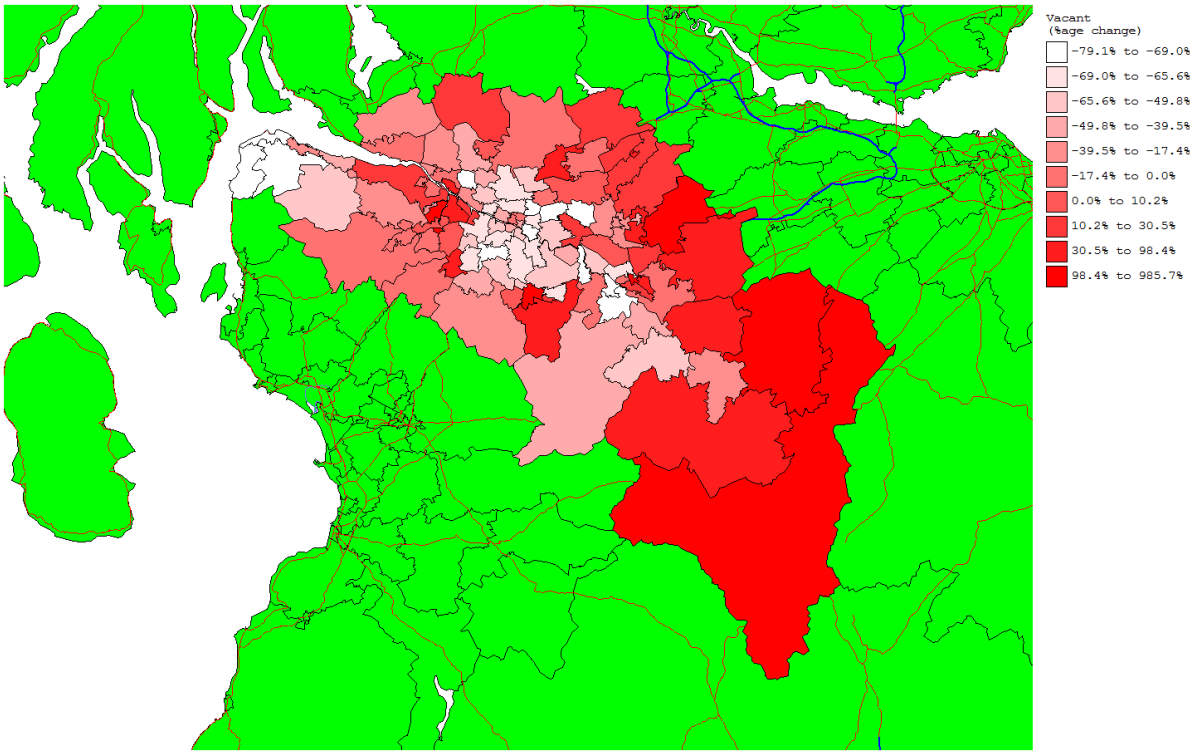
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The two graphs again show a very similar pattern in absolute numbers. Both scenarios predict total floorspace growth in a very similar growth pattern. The absolute differences are small. Scenario IA will produce slightly less floorspace than Scenario IG by 2021 of 3.46 million m2 compared to 5.81 million m2. IA produced 2.35 million m2 less floorspace than Scenario IG. By 2031 the situation is slightly

reversed Scenario IA produces slightly more floorspace at 6.75 million m2 compared to 6.72 million m2 produced by Scenario IG. The difference is only + 0.03 million m2. While the 2021 figure of 2.35 million m2 is perhaps significant the difference at 2031 is very marginal. Obviously where this is a good thing and meets demand will only be known when vacancy rates are examined.

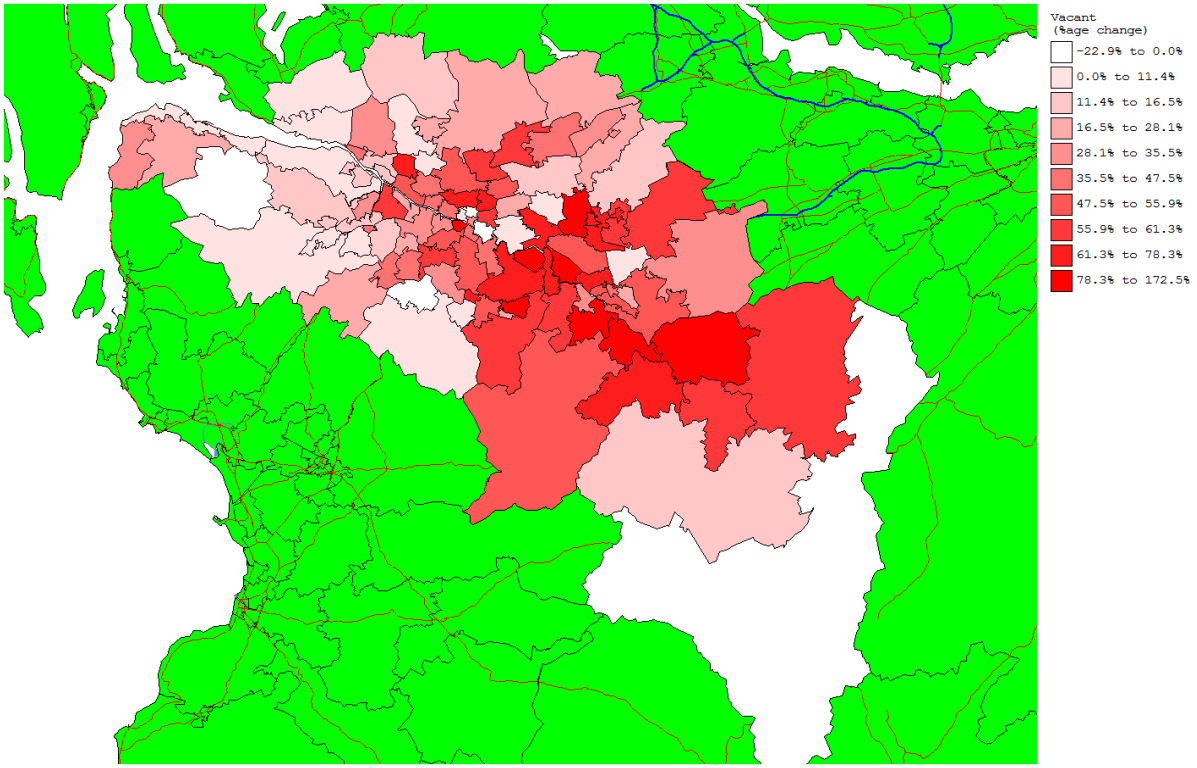
Spatial Analysis: At 2021 Scenario IG's positive figures result in the SITLUM model distributing this additional floorspace towards parts Glasgow City and towards the south and east of the conurbation. However of most note is that Inverclyde and West Dunbartonshire receive the least of the additional floorspace. At 2031 the absolute figures differences are very small and little perhaps can be read into this except that both Inverclyde and West Dunbartonshire continue to receive the least amount of this additional floorspace.

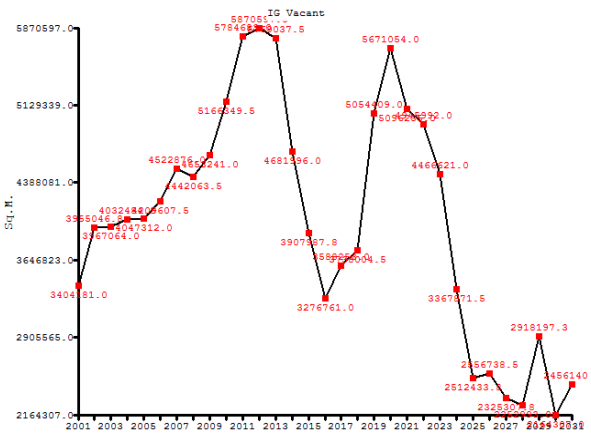
IG v IA Vacant Floorspace

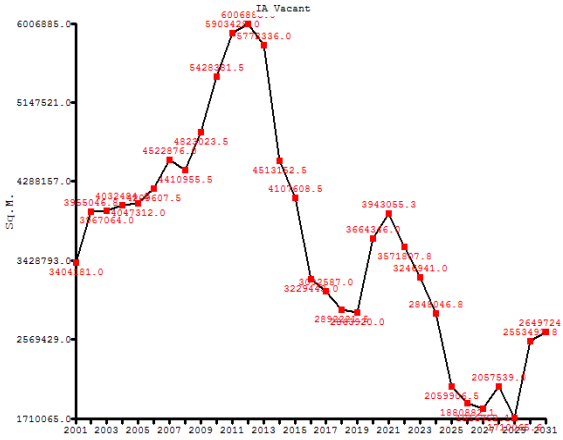
2031



2021







Vacant (M2)	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	5891986	4497780	-1394206	3449678	-2532308
Scenario IG	5784632	5671054	-113578	2456140	-3328492
Scenario IA	5903429	3943055	-1960374	2649724	-3152705

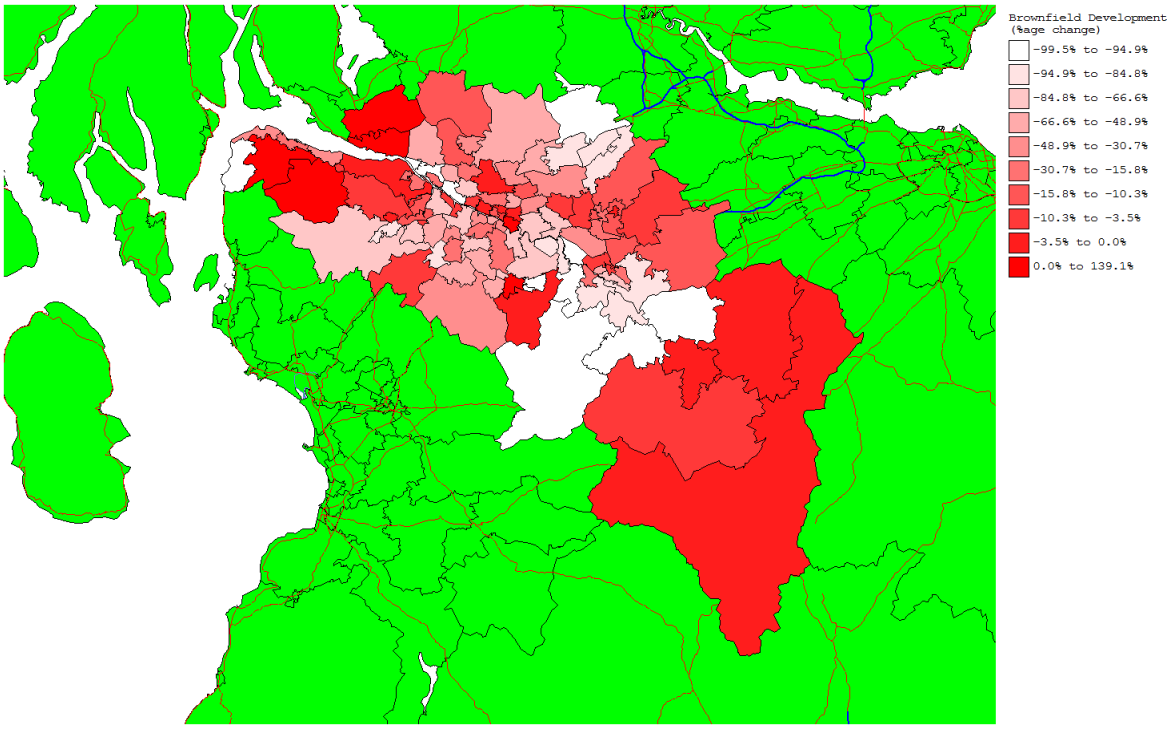
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graphs indicate that after the peak of vacancy levels in 2011 that vacancy levels fall to 2031 under both scenarios and in a very similar pattern. However the major difference is in the forecasts are the relative levels at the 2021 peaks. The 2021 picture may be a bit of a distortion and perhaps the 2031 picture presents a more accurate picture of the differences. At 2021 the difference is that Scenario

IA forecasts a larger fall in vacant floorspace by some 1.73 million m2. By 2031 however both scenarios forecast very similar falls in vacancy levels Scenario IG by 3.32 million and Scenario IA by 3.15 million. The difference being only 0.17 million m2 greater generated by Scenario IG.

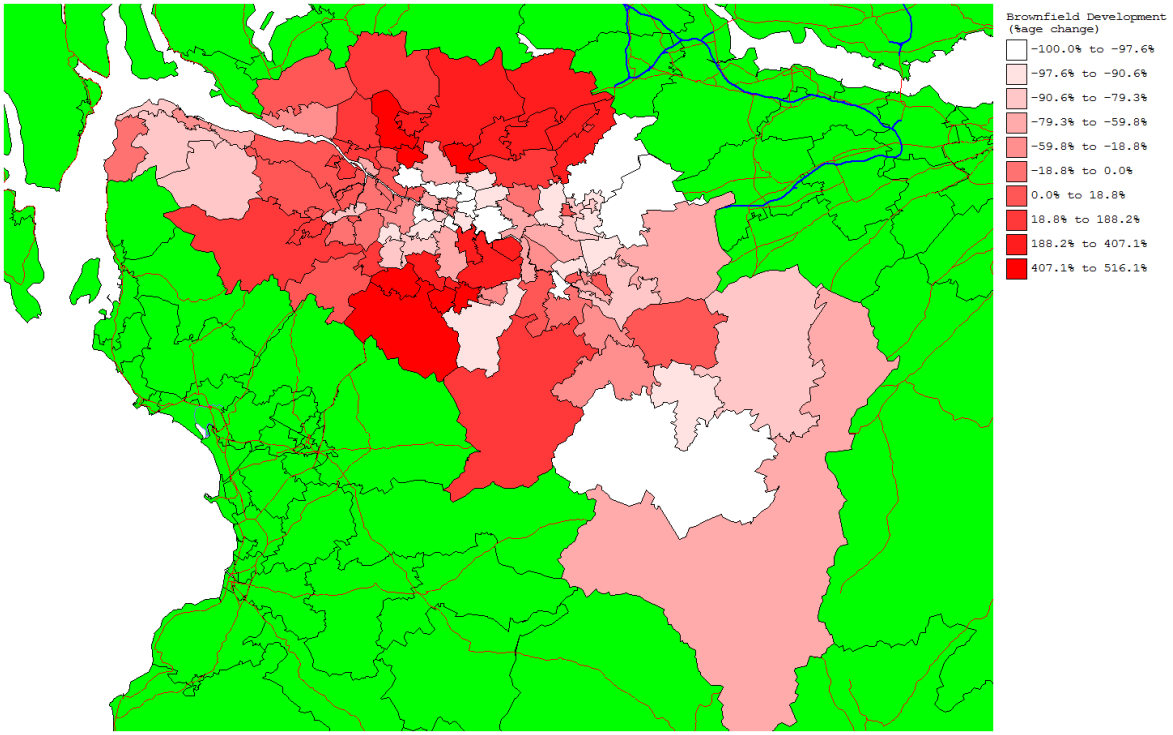
Spatial Analysis: The snapshot at 2021 shows a peak at this point in both forecasts but indicated Scenario IA generates a larger fall in vacancy levels than Scenario IG. In this case there is a flow from dark red to white with white areas having less vacant floorspace. The white areas will have greater vacant floorspace at 2021 – parts of South Lanarkshire to the south and east but also large areas to the north and west of the conurbation. At 2031 the difference in vacancy rate is very small but indicates marginally higher rates around Glasgow City and Inverclyde

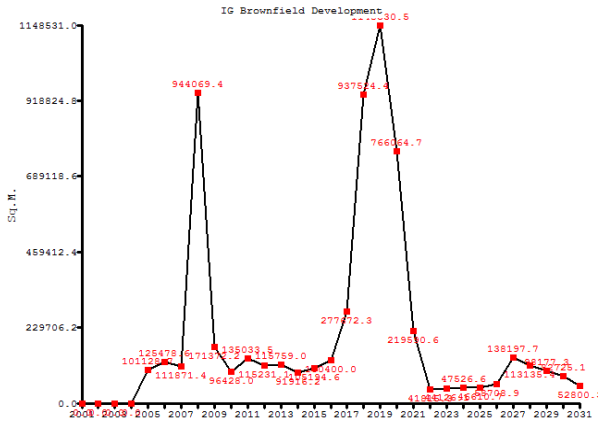
IG v IA Brownfield Development

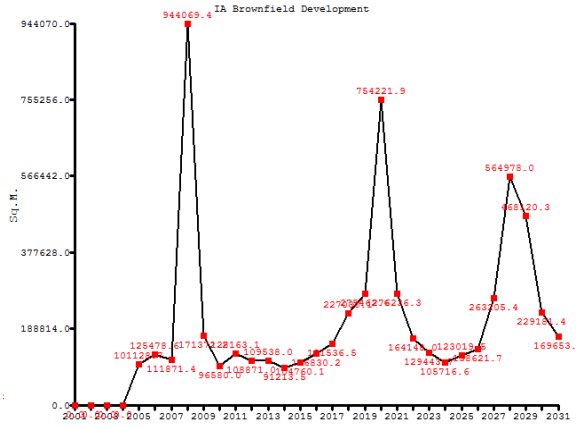
2031



2021







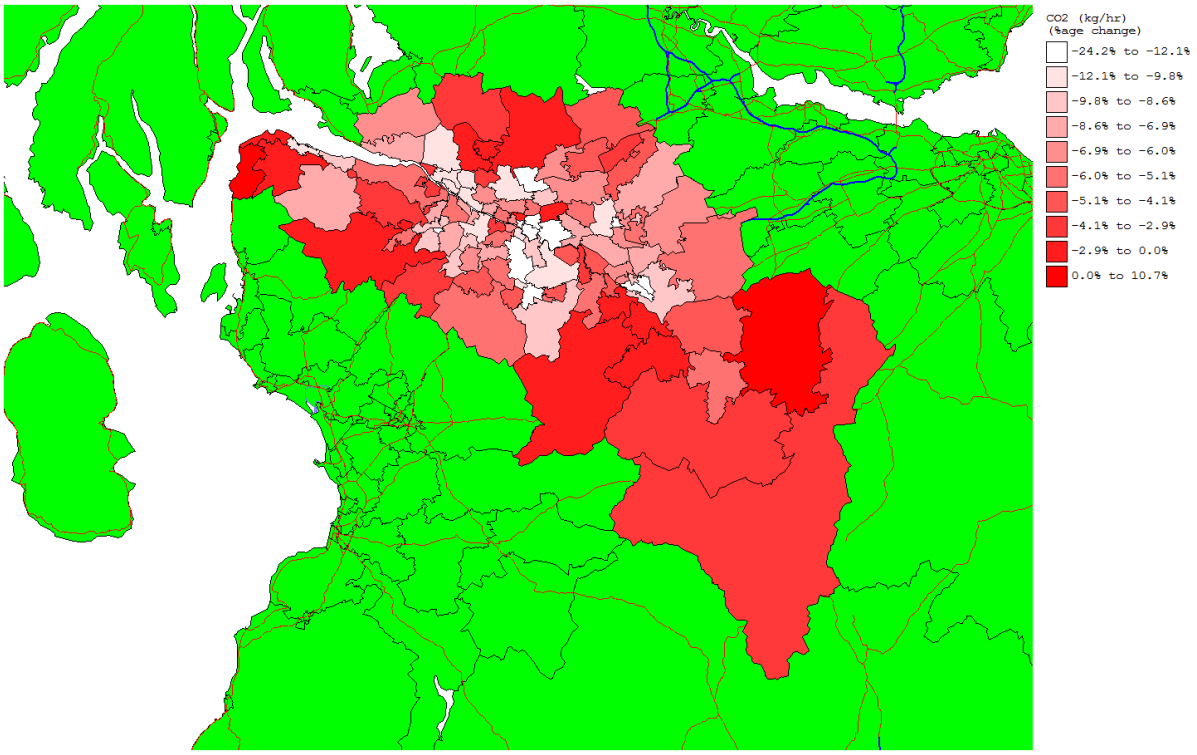
Brownfield Development m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	136982	810552	673570	101738	-35244
Scenario IG	135033	219920	84917	52800	-82233
Scenario IA	128163	276215	148052	169653	41490

Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. The graphs again indicate a very similar pattern with only the intensity of the peaks being significantly different. The 2021 position fits into a peak in both scenarios with scenario IA peaking at 2020 while Scenario IF peaking a year later at 2021. This makes a huge difference to the absolute numbers and spatial impact making the 2021 position less relevant in this situation – as a statistical blimp. The 2031 position may be worth noting with scenario IA producing slightly higher final

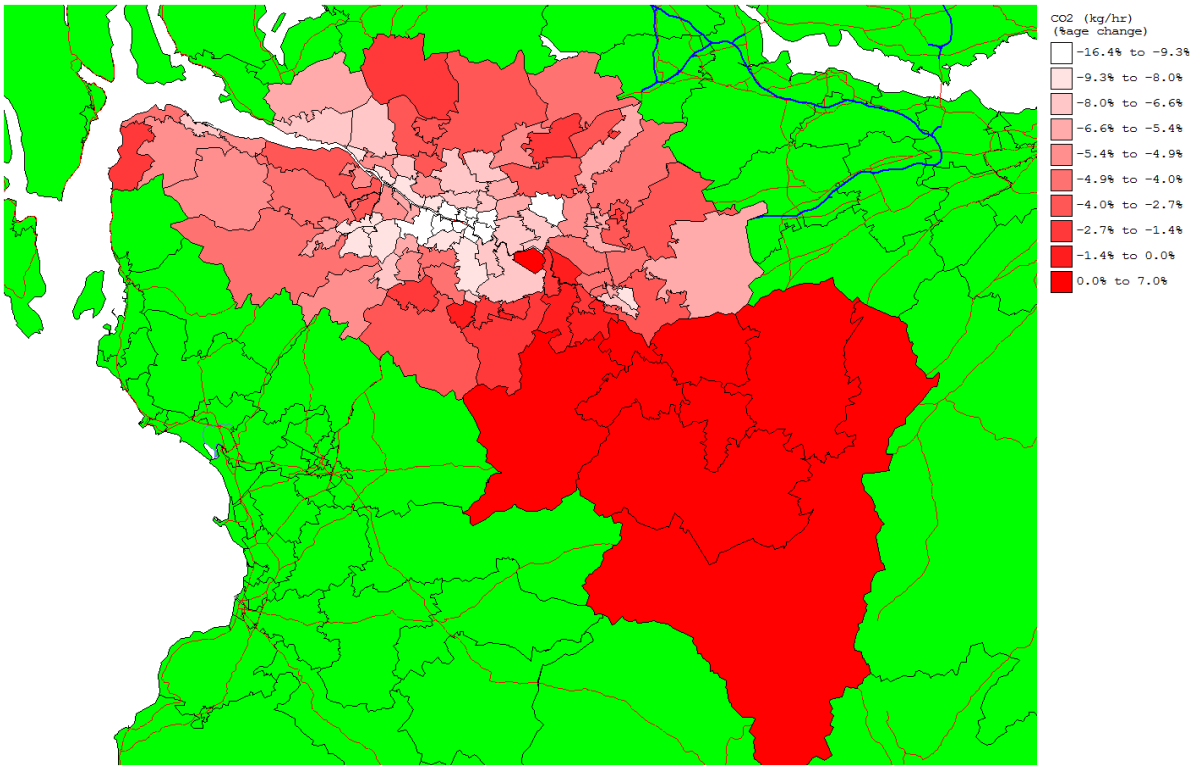
floorspace but given the volatile nature of these graphs the resultant spatial analysis is meaningless. Best to note the similarity in both graphs rather than any marginal differences.

IG v IA CO2

2031



2021



Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model while Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Forecast Model. Absolute value graphs are not available for CO2 figures but as a guide we have the relative % changes between the two scenarios. The 2021 position is that Scenario IG generates a relative smaller amount of CO2 of between: -16.4% to 7.0%. The 2031 position is that Scenario IG again generates a relatively smaller amount of CO2 of between: -24.2% to 10.7%. Scenario IA provides greater jobs and therefore greater movement and economic activity compared to Scenario IG.

Spatial Analysis: At 2021 Scenario IA produces a higher amount of CO2 to the north and west of the conurbation and especially around the City Centre and along the Clyde Waterfront. The 2031 position under Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

Overall Conclusions on comparing: **Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs **Scenario IA** – Rebalanced Economy +M74 Network

Scenario IA is Base Model and Scenario IG is Forecast Model (Both Permissible).

Both scenarios show a strong positive population growth pattern up to 2031. Scenario IG forecasts a final population of 1.883 million at 2031 while Scenario IA forecasts a slightly less optimistic figure of 1.770 million by 2031. The difference being that Scenario IG forecasts a higher growth of an additional 46,494 by 2021 and a difference of 100,000 more population by 2031. At 2021 it is the south and east of the conurbation which will see increasing population growth generated by Scenario IG. By 2031 in general it is all zones surrounding Glasgow City which sees the extra population growth generated by Scenario IG.

Both scenarios have similar job growth pattern and positive job growth forecasts. However there are notable absolute figure differences. Scenario IG forecasts growth of an additional 52,000 jobs by 2021 and by an additional 74,800 jobs by 2031. However, Scenario IA produces even more optimistic forecasts of +88,500 jobs by 2021 and +151,625 jobs by 2031. The difference between these two forecasts is that Scenario IA generates 36,398 additional jobs by 2021 compared to Scenario IG and an additional 76,745 jobs by 2031. While Scenario IG produces +100,000 extra population attracted (immigration) into the area it only forecasts an additional 74,800 jobs. Scenario IA on the other hand forecasts slightly less population but provides an additional 151,600 jobs. As a result Scenario IA forecasts an additional 33,687 working adults by 2021 and an additional 56,826 by 2031 compared to scenario IG. Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde.

Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IA forecasts a general fall in the number of non-working adults up to 2031 while Scenario IG forecasts a rise in the number of non-working adults up to 2031. Scenario IA shows a general decline in the absolute number of “unemployed” – up to 52,000 less by 2021 and 101,400 less by

2031. Scenario IG on the other hand shows “unemployment” increasing + 3,900 by 2021 and almost 40,000 higher by 2031. This produces an astonishing difference between the two scenarios. A difference of + 56,000 more “unemployed“ by 2021 and a difference of 140,554 by 2031! The additional non-working adults are attracted to the north and west of the conurbation - Glasgow City, parts of Renfrewshire, parts of Inverclyde and West Dunbartonshire and parts of East Dunbartonshire and North Lanarkshire. Attracted, no doubt, by social housing availability and perhaps lower rental levels rather than job accessibility issues. The additional “unemployed” in these areas will obviously have additional welfare implications in these areas.

Both scenarios forecast an increase in the rental values. The differences between the two rental growths are fairly small in absolute numbers terms but Scenario IA increases the difference by £27 per m2 at 2021 and by £61 per m2 by 2031 compared to Scenario IG. The increased rentals generated by Scenario IA are distributed along very similar pattern to Total Jobs. It is parts of North and South Lanarkshire, Glasgow City, East End, Clyde Waterfront, parts of Renfrewshire, parts of Inverclyde and parts of West Dunbartonshire that have slightly higher rental levels under Scenario IA.

Both scenarios predict total floorspace growth in a very similar growth pattern but Scenario IA’s positive figures result in the model distributing this additional floorspace strongest towards Inverclyde and West Dunbartonshire. In Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

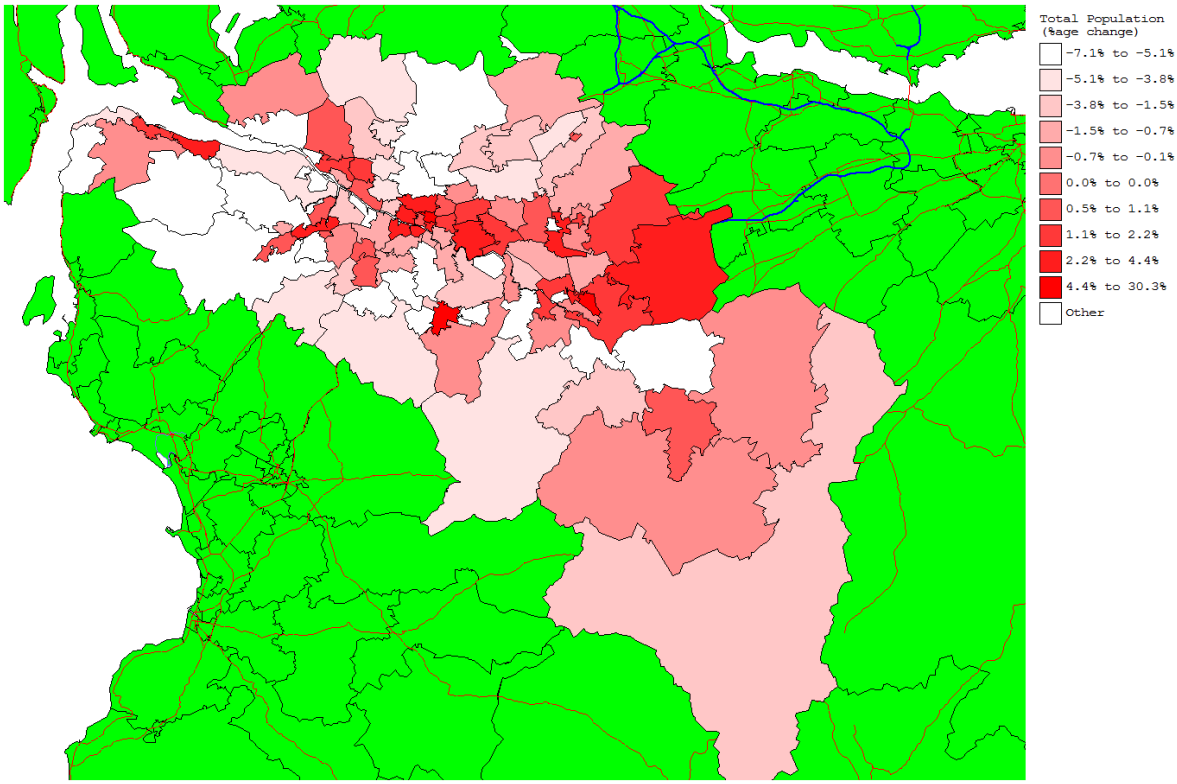
3C. IA v IF at 2021 and 2031

Scenario IA – Rebalanced Economy +M74 Network Vs Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration)

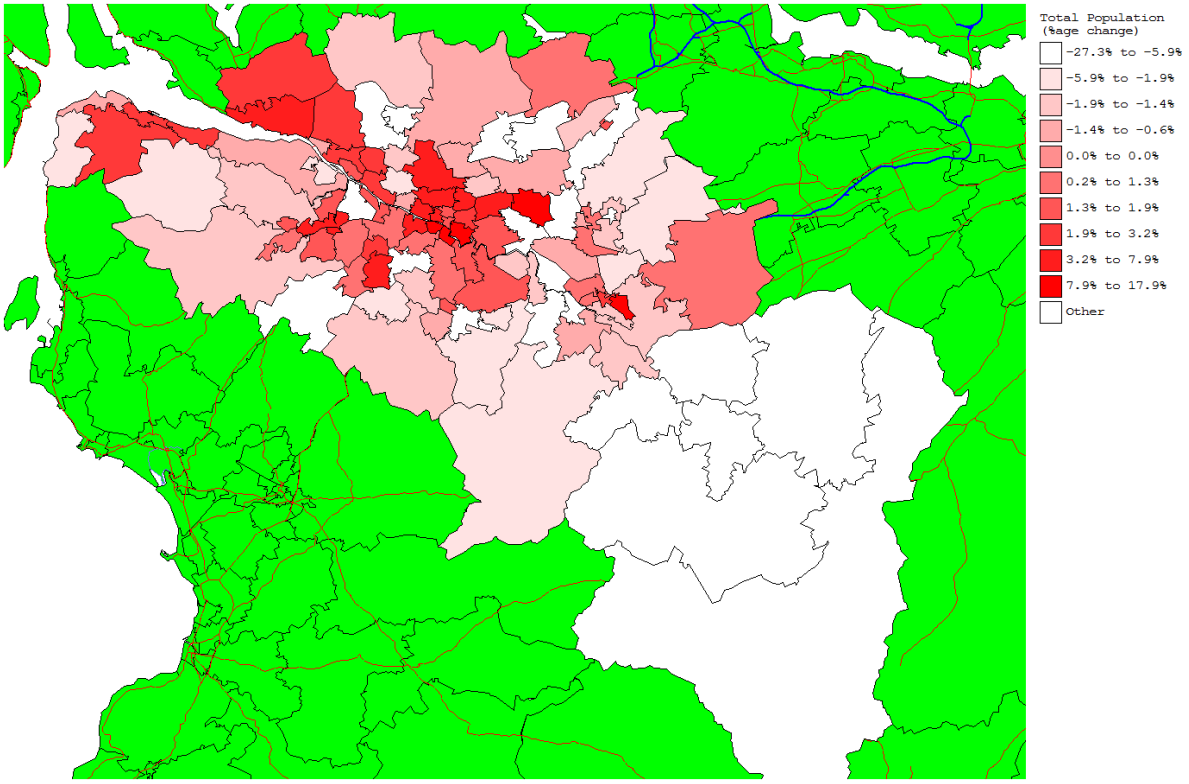
Scenario IF is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

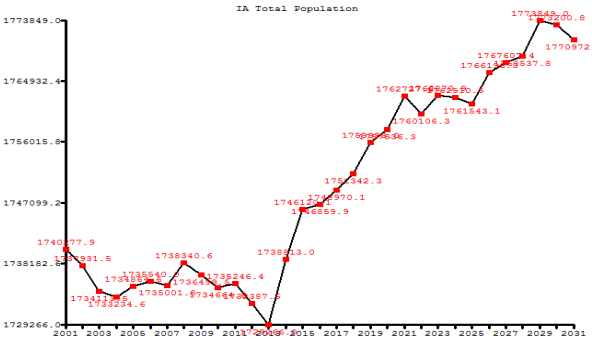
IA v IF Total Population

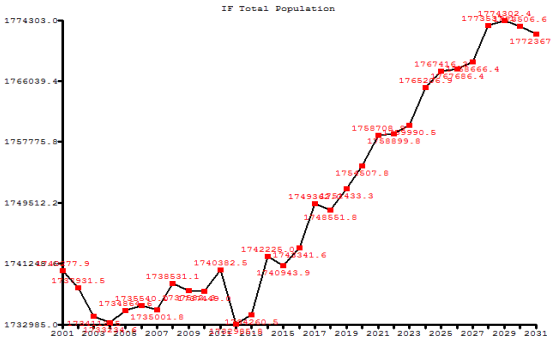
2031



2021







IA Forecast

IF Base

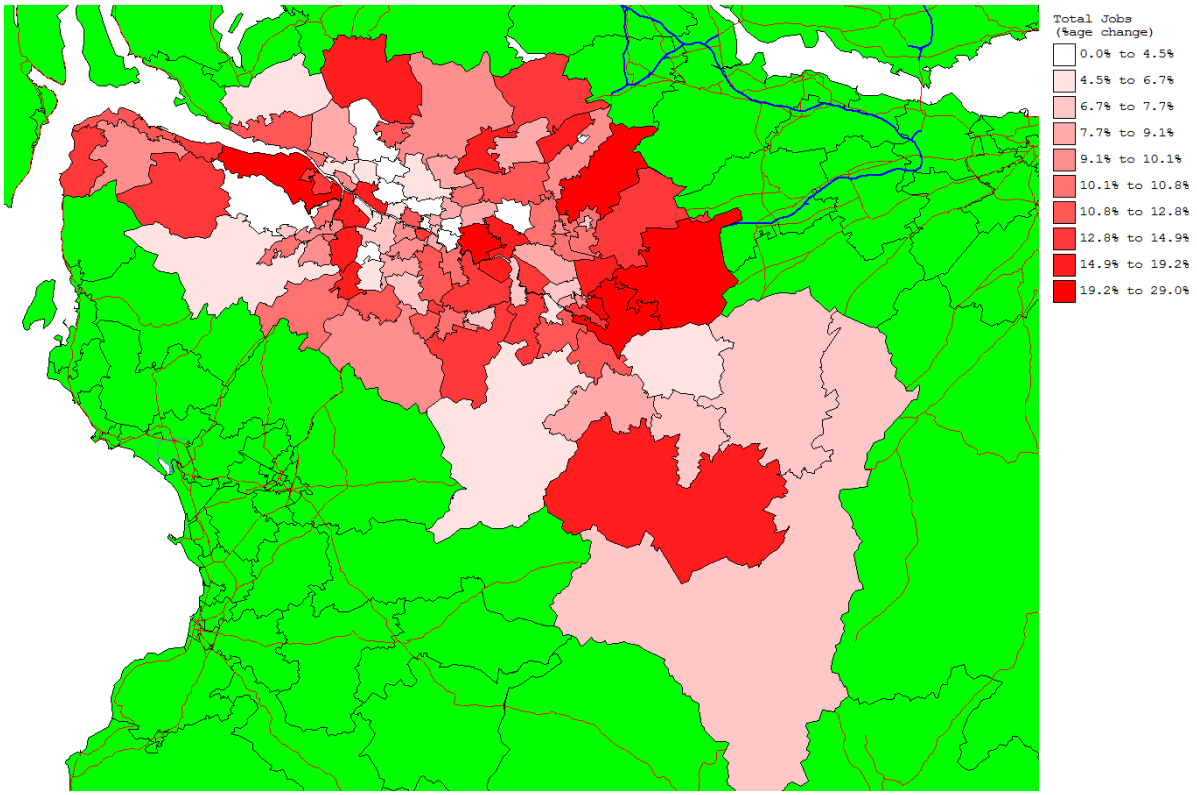
Total Populaton	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	1732985	1758708	25723	1772367	39382
Scenario IG	1747297	1821272	73975	1883058	135761
Scenario IA	1735246	1762727	27481	1770972	35726

Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The Graphs show a similar upward positive total population growth for both scenarios and indeed very similar absolute figures. Scenario IF shows +25,723 at 2021 from 2011 and a +39,382 growth to 2031. Scenario IA shows a +27,481 at 2021 from 2011 and a + 35,726 growth to 2031. The population differences between these two scenarios are therefore very small in absolute numbers terms. Scenario IA is + 1,758 at 2021 compared to Scenario IF and IA is– 3,656 at 2031 compared to IF.

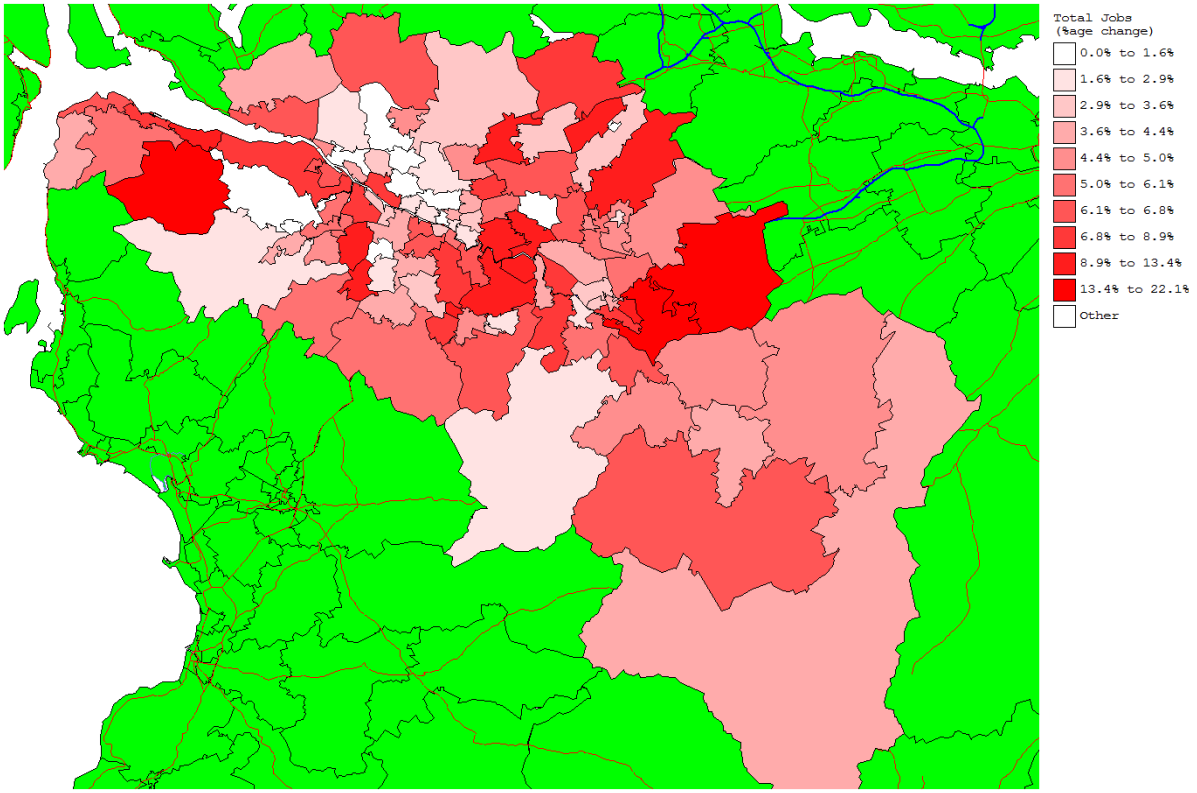
Spatial Analysis: The SITLUM model distributes the additional 1,758 at 2021 and the new pattern moves population from the south and east of the conurbation towards the north and west. Glasgow City, Clyde Waterfront, West Dunbartonshire, Renfrewshire and Inverclyde all gain some additional population under Scenario IA. At 2031 the position is different as in that IA generates a negative population change against Scenario IF. Population therefore flows from the dark red towards the white areas on the map. At 2031 the position is different in that IF generates a positive population change against Scenario IA. Population therefore flows from the white/lighter red zones towards the dark red zones on the map. However again it is the north and west of the conurbation that gains this additional population. However caution should be noted as the differences between the two scenarios is very small in absolute numbers. The important issue to note is that they both have very similar positive population growth projections.

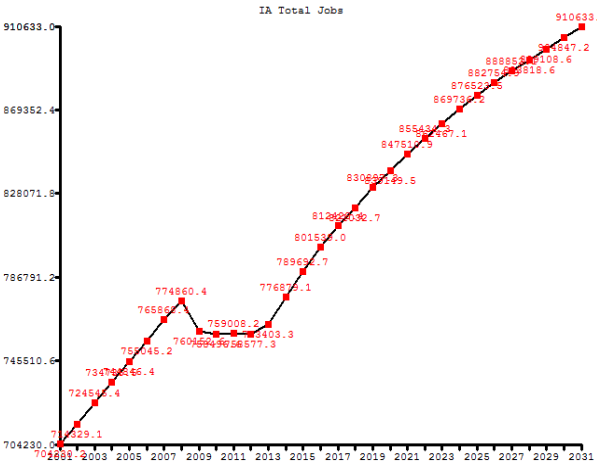
IA V IF Total Jobs

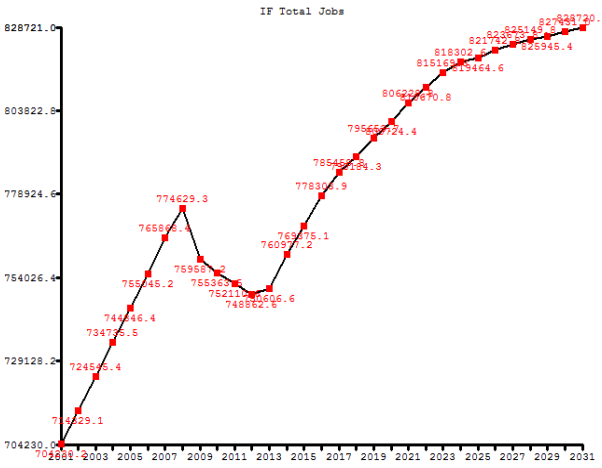
2031



2021







Total Jobs	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806228	50865	828721	73358
Scenario IG	755346	807450	52104	830226	74880
Scenario IA	759008	847510	88502	910633	151625

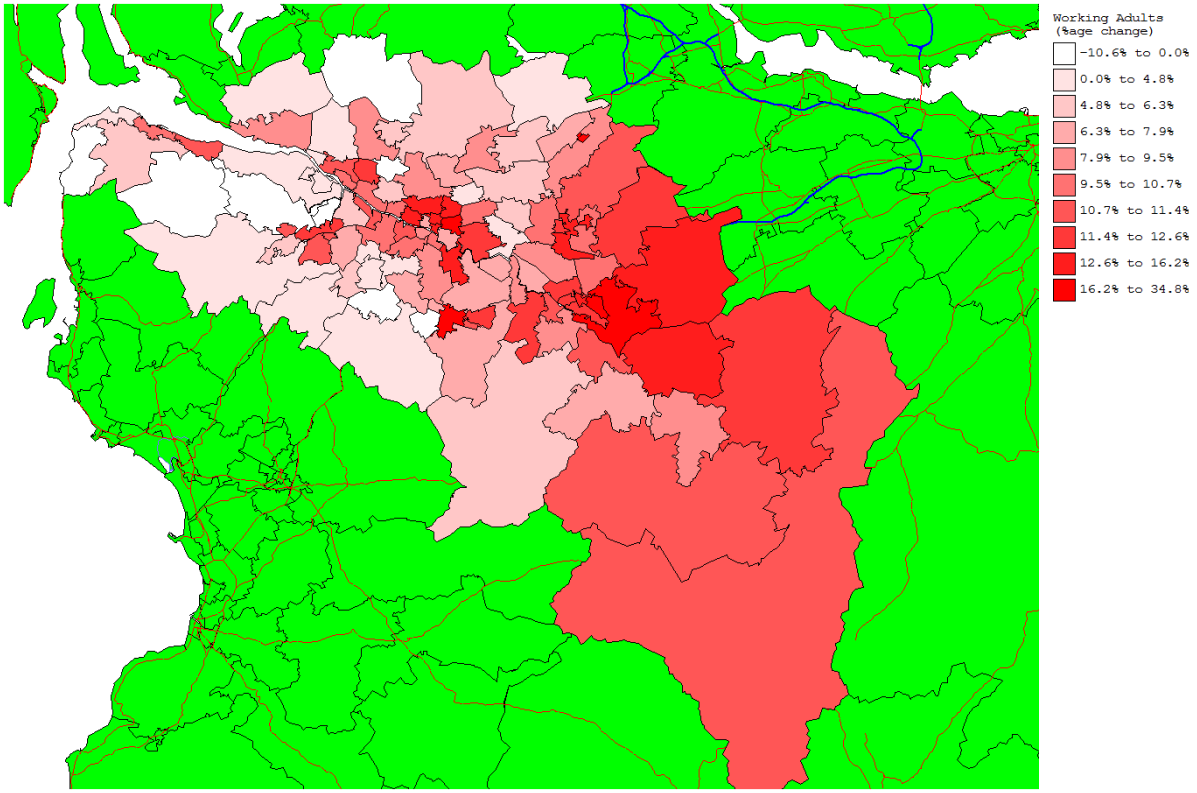
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs are similar showing job growth but Scenario A shows considerable growth in job numbers – an additional 88,500 jobs by 2021 and an additional 151,162 by 2021. Compared to Scenario IF, Scenario IA creates +37,637

additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures.

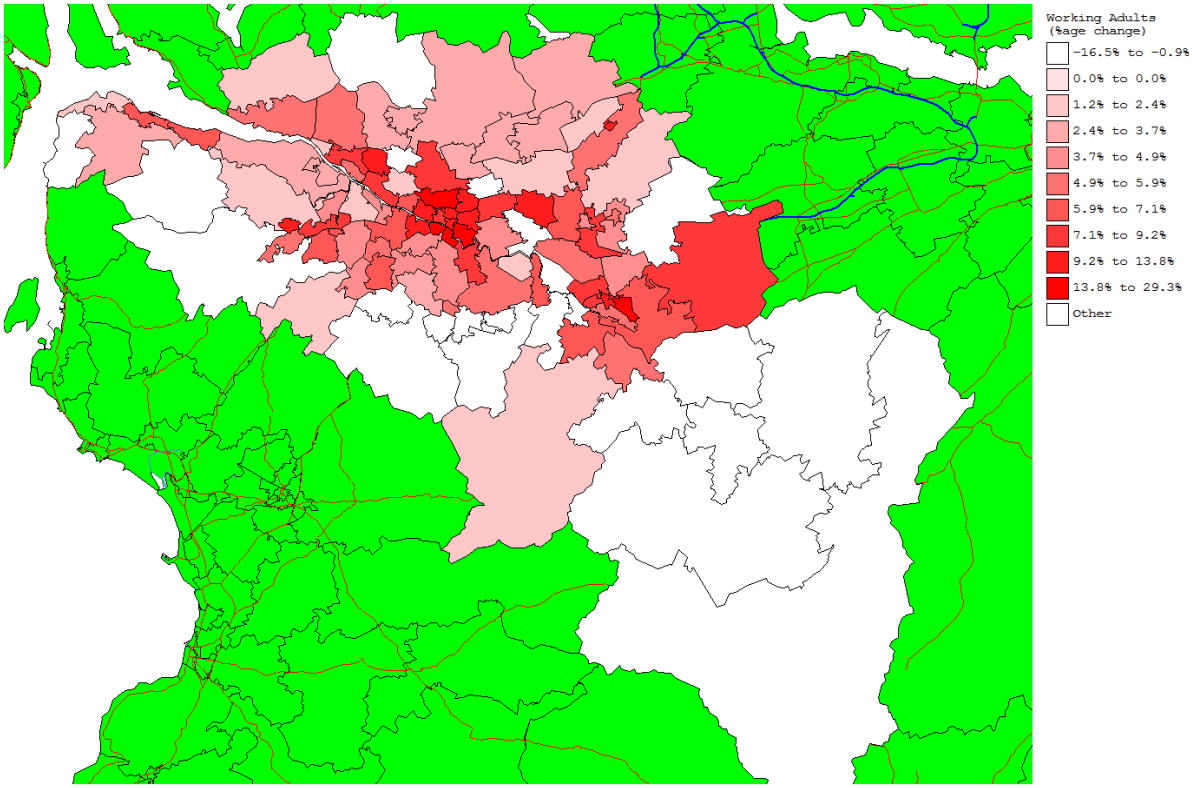
Spatial Analysis: The SITLUM model distributes the additional 37,600 jobs created by Scenario IA at 2021 and all areas of the conurbation benefit from additional jobs but the East End, parts of South and North Lanarkshire, East Dunbartonshire, Parts of Renfrewshire and Inverclyde all have notable job improvements. By 2031 the benefits of Scenario IA result in even greater growth of the additional 78,300 jobs and again all areas benefit and in a similar spatial way to the 2021 with similar areas particularly benefiting.

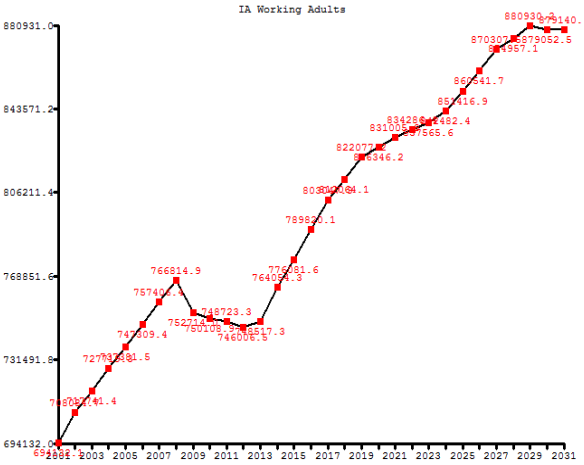
IA v IF Working Adults

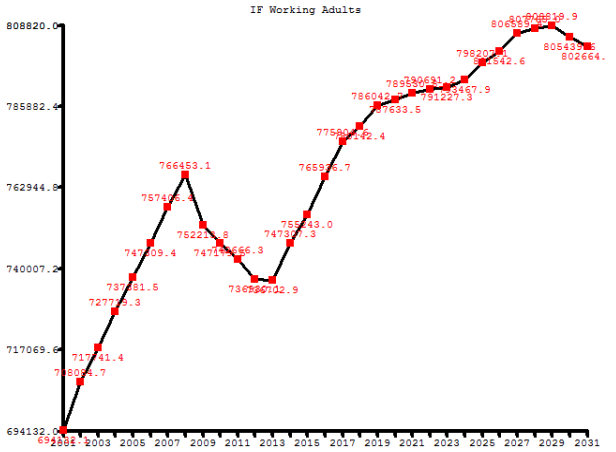
2031



2021







Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	747175	789530	42355	802664	55489
Scenario IG	747480	796075	48595	821314	73591
Scenario IA	748723	831005	82282	879140	130417

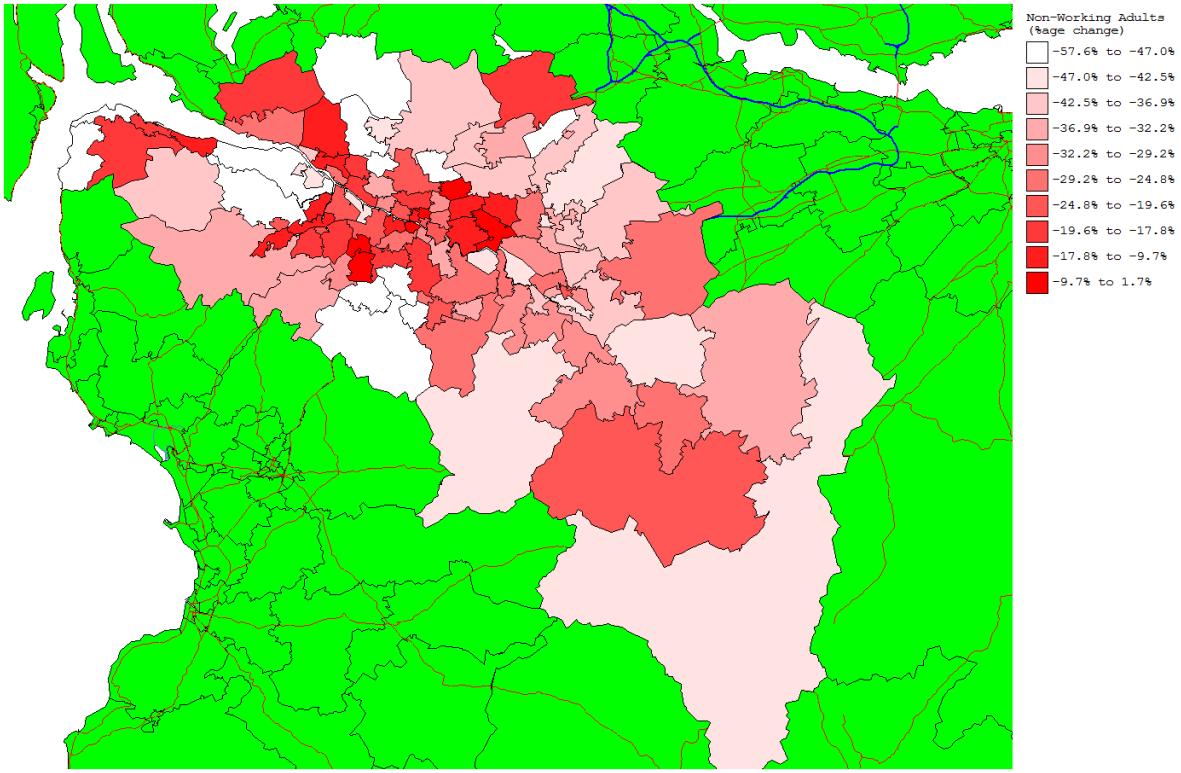
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs indicate a similar pattern with growth in the number of working adults under both scenarios. However, similar to the Total Jobs, the number of Working Adults increases very strongly under Scenario IA. Scenario IA generates

+82,282 by 2021 and + 130,417 by 2031 against Scenario IF. This creates a difference of + 40,000 by 2021 and + 75,000 by 2031 additional Working Adults created by Scenario IA. Similar in overall numbers to the additional Total Jobs numbers.

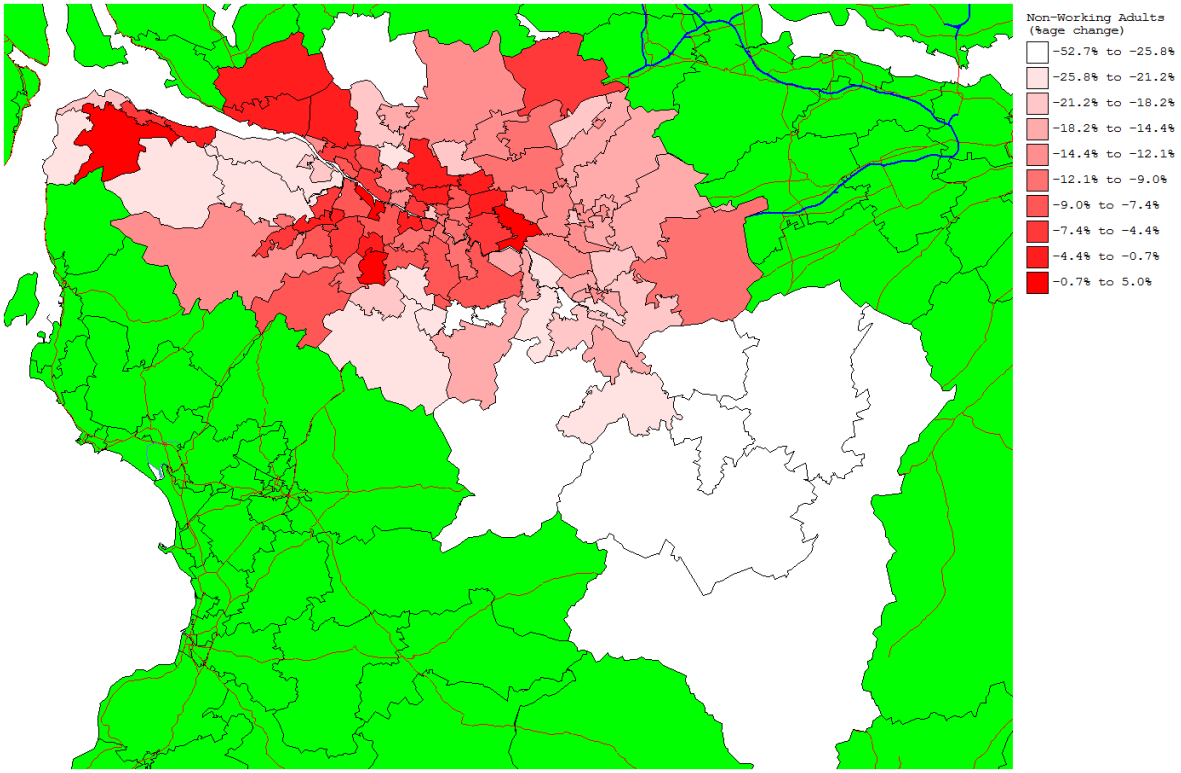
Spatial Analysis: The SITLUM model distributes the additional 40,000 working population at 2021. The central band of the conurbation – City Centre, East End, Clyde Waterfront, East Dunbartonshire and parts of North Lanarkshire show the greatest growth in Working Adults. This in many ways reflects where IA also creates the additional jobs. However, the 2031 spatial distribution is quite different. The additional 75,000 Working Adults are locating towards the South and West of the conurbation especially East Dunbartonshire, North and South Lanarkshire and the East End. This does not reflect always where the additional jobs are being created under this scenario and implies greater transport movement south east to north west to access jobs. This may be explained by the M74 extension providing greater access for workers.

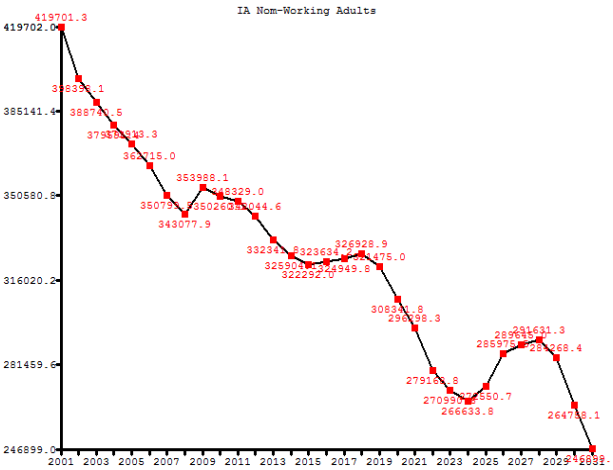
IA v IF Non- Working Adults

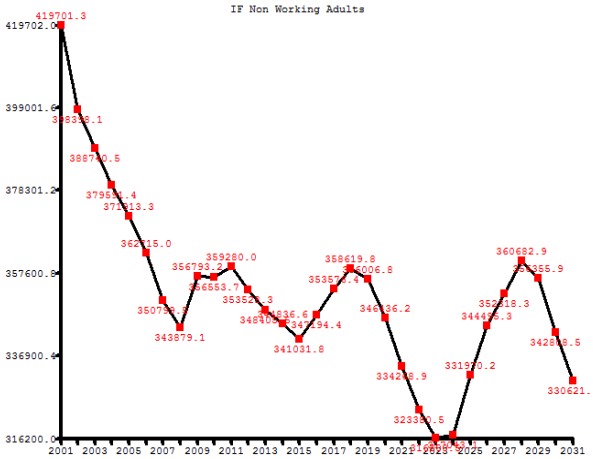
2031



2021







Non-Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	359280	334248	-25032	303621	-55659
Scenario IG	365942	369903	3961	405066	39124
Scenario IA	348329	296298	-52031	246899	-101430

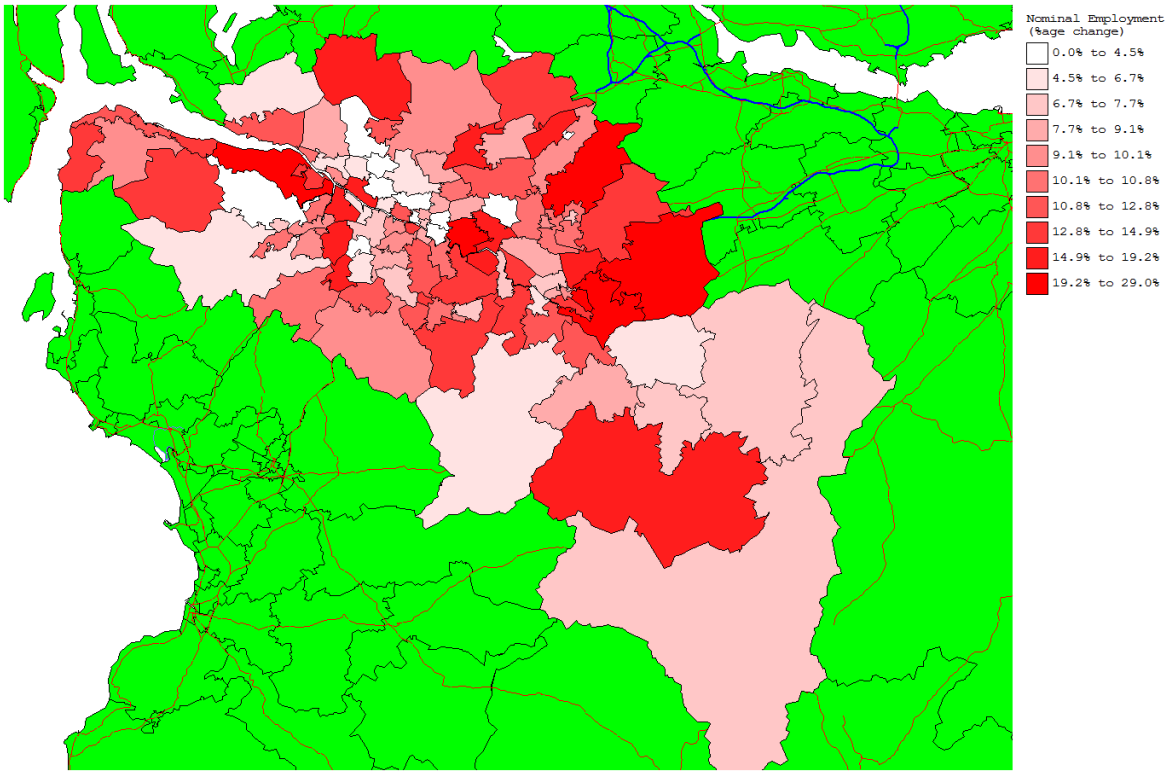
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. Both Scenarios are successful in reducing the number of non –working adults over time. Scenario IA reduces “unemployment” by 52,000 by 2021 and an astonishing 101,500 by 2031. In comparative terms both Scenarios are successful but

Scenario IA reduces “unemployment” by an additional 27,000 by 2021 and an additional 46,000 by 2031 against Scenario IF.

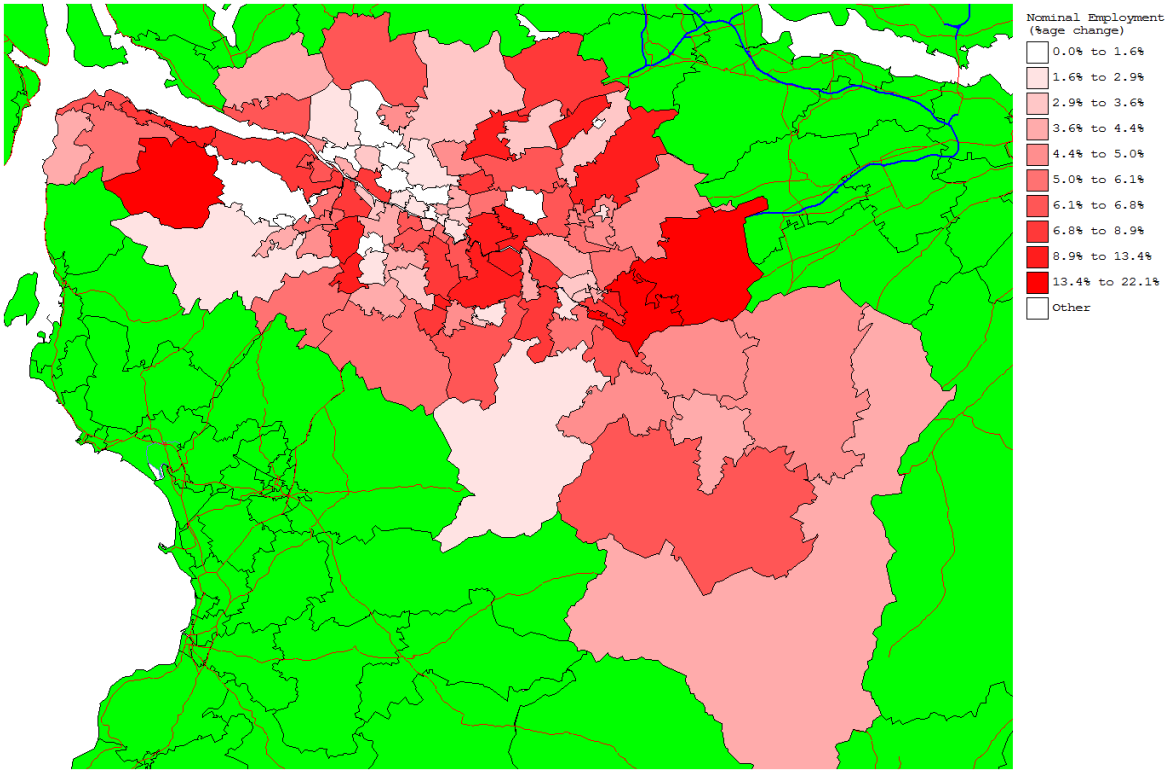
Spatial Analysis: The SITLUM model distributes these additional “unemployed”. The maps show the Scenario IA as being negative against Scenario IF but in the case of “unemployment” a negative is a good thing. All parts of the conurbation benefit from Scenario IA but it is the south and east of the conurbation that have less non working adults at 2021. By 2031 the additional 46,000 less non working population are distributed widely with pockets in Renfrewshire West Dunbartonshire and Inverclyde benefiting especially well.

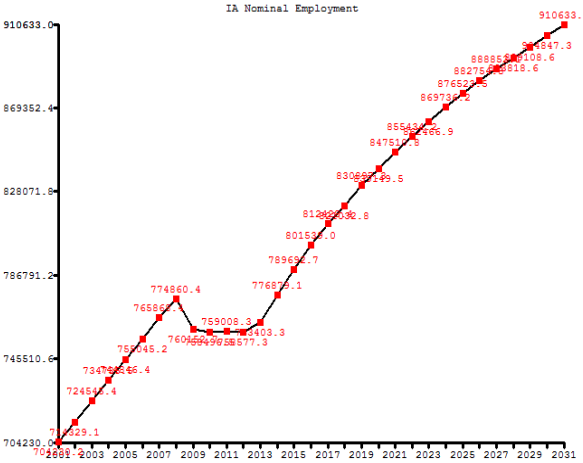
IA v IF Nominal Employment

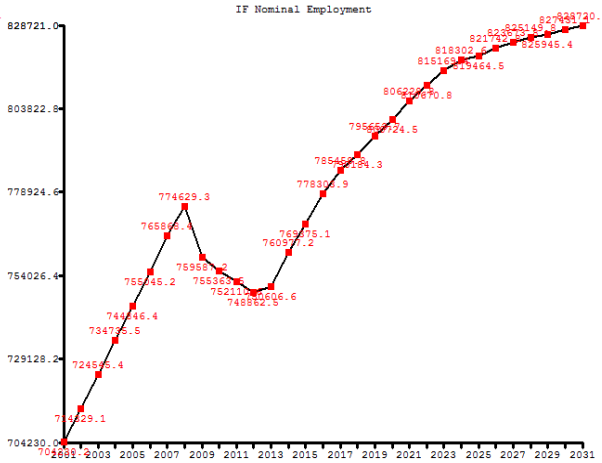
2031



2021







Nominal Employment	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806220	50857	828721	73358
Scenario IG	755346	807456	52110	830226	74880
Scenario IA	759008	847510	88502	910633	151625

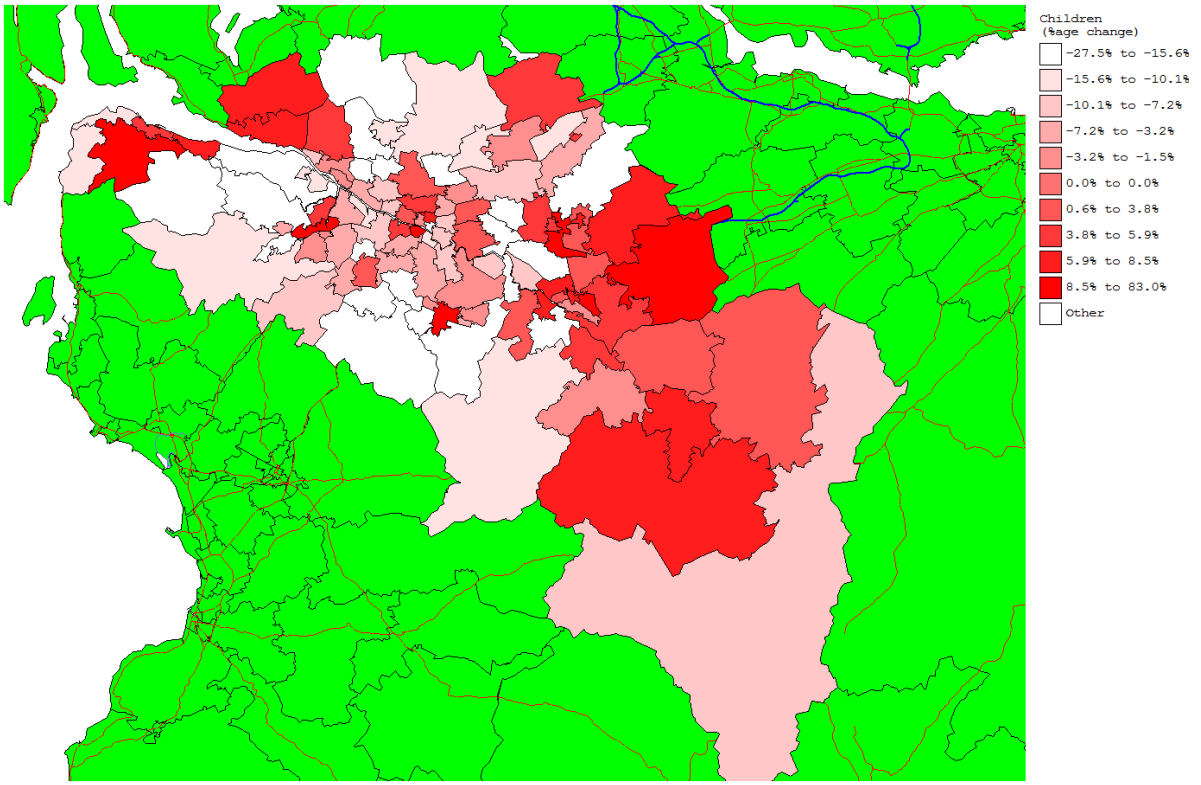
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs are similar showing strong Nominal Employment growth but Scenario A shows considerable growth in employment numbers – an additional

88,500 jobs by 2021 and an additional 151,165 by 2021. Compared to Scenario IF, Scenario IA creates +37,645 additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures. The figures for the Nominal Employment and Total Jobs are virtually identical

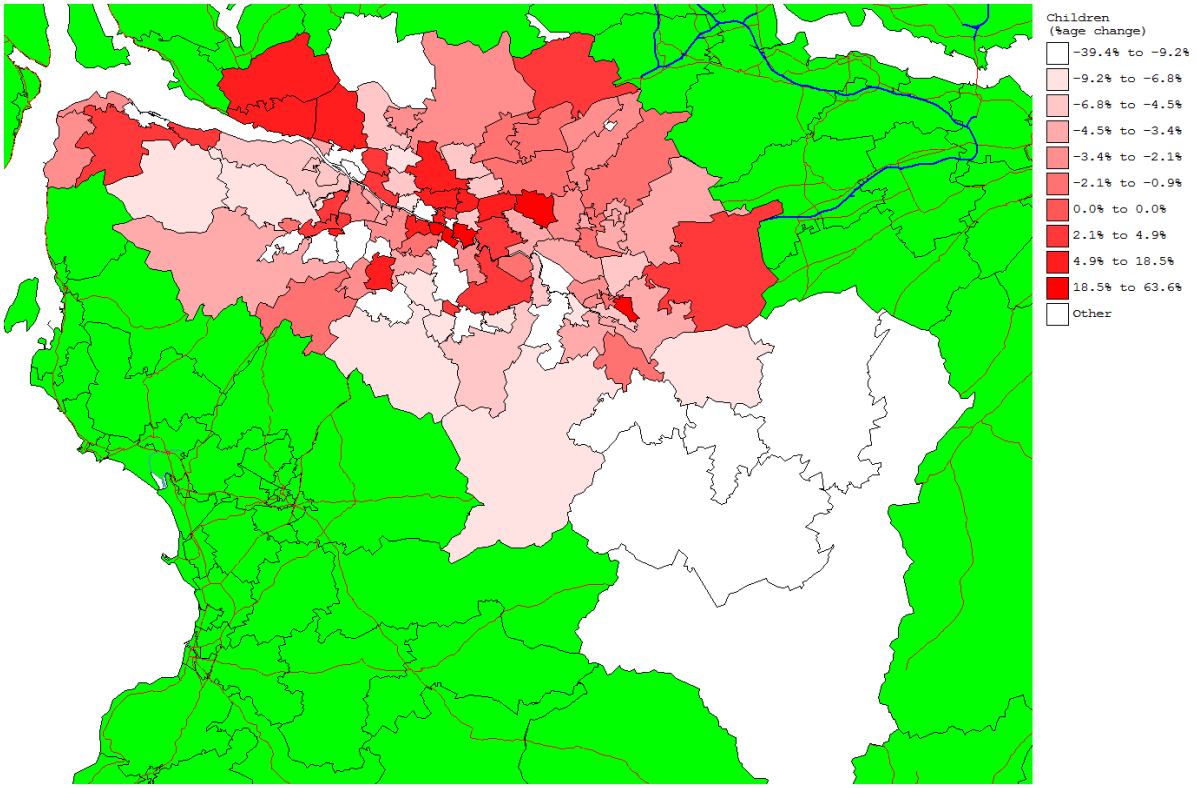
Spatial Analysis: The SITLUM model distributes the additional 37,600 employment created by Scenario IA at 2021 and all areas of the conurbation benefit from additional jobs but the East End, parts of South and North Lanarkshire, East Dunbartonshire, Parts of Renfrewshire and Inverclyde all have notable job improvements. By 2031 the benefits of Scenario IA result in even greater growth of 78,300 and again all areas benefit and in a similar spatial way to the 2021 with similar areas particularly benefiting. This is almost exactly the same spatial result as for Total Jobs.

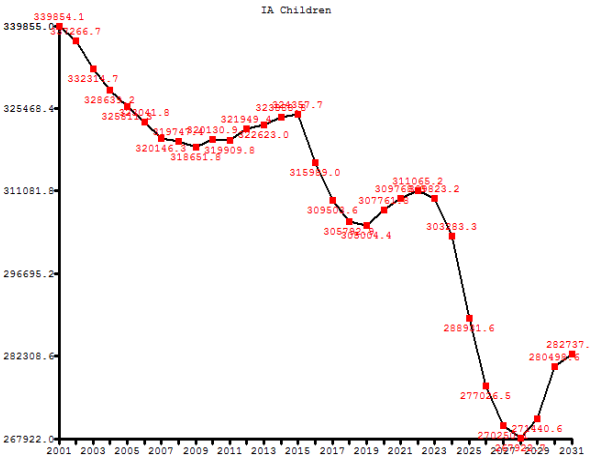
IA v IF Children

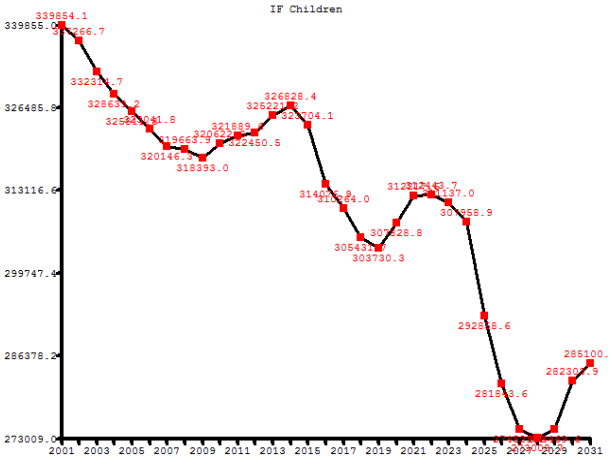
2031



2021







Children	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	321889	312214	-9675	285100	-36789
Scenario IG	322615	327971	5346	312494	-10121
Scenario IA	319909	309768	-10141	282737	-37172

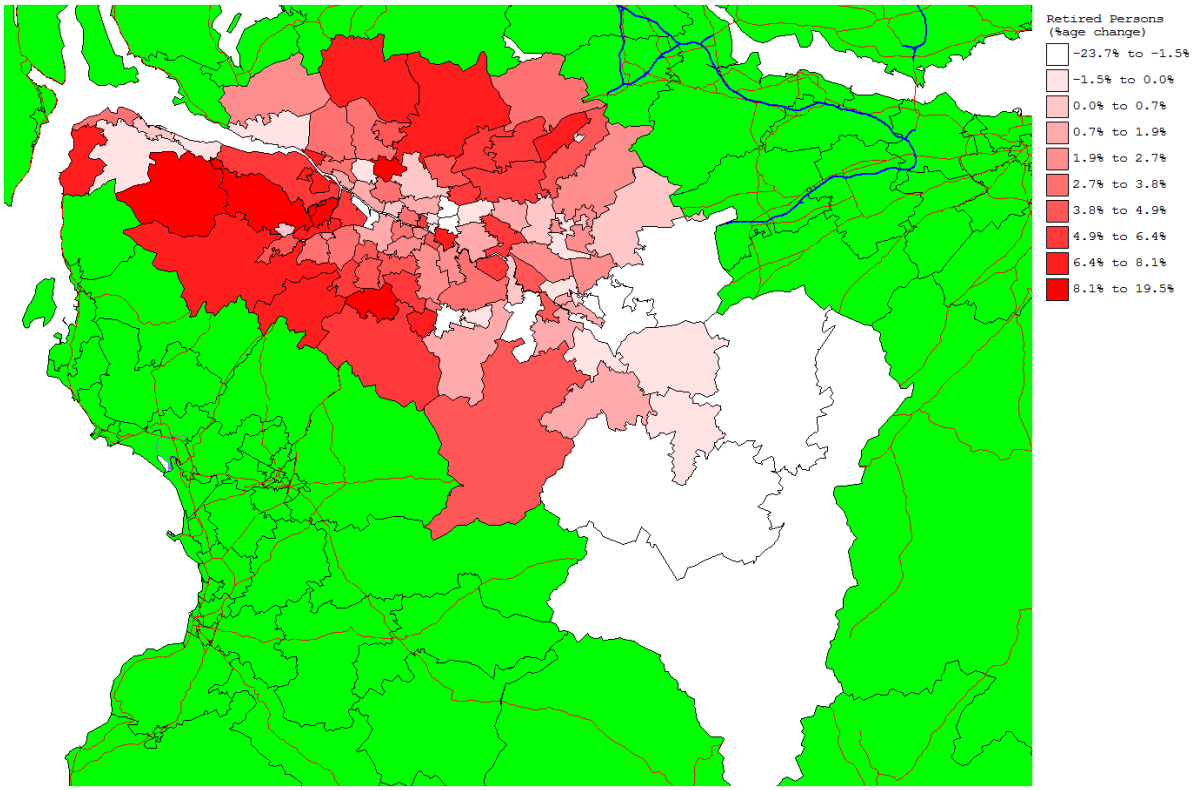
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs are very similar with an overall reduction in the number of children over time which reflects and overall demographic trend. The differences between the two scenarios are very small in absolute number terms. IA has 466 less

children by 2021 and 282 less by 2031. These are very small absolute numbers and for all purposes essentially identical.

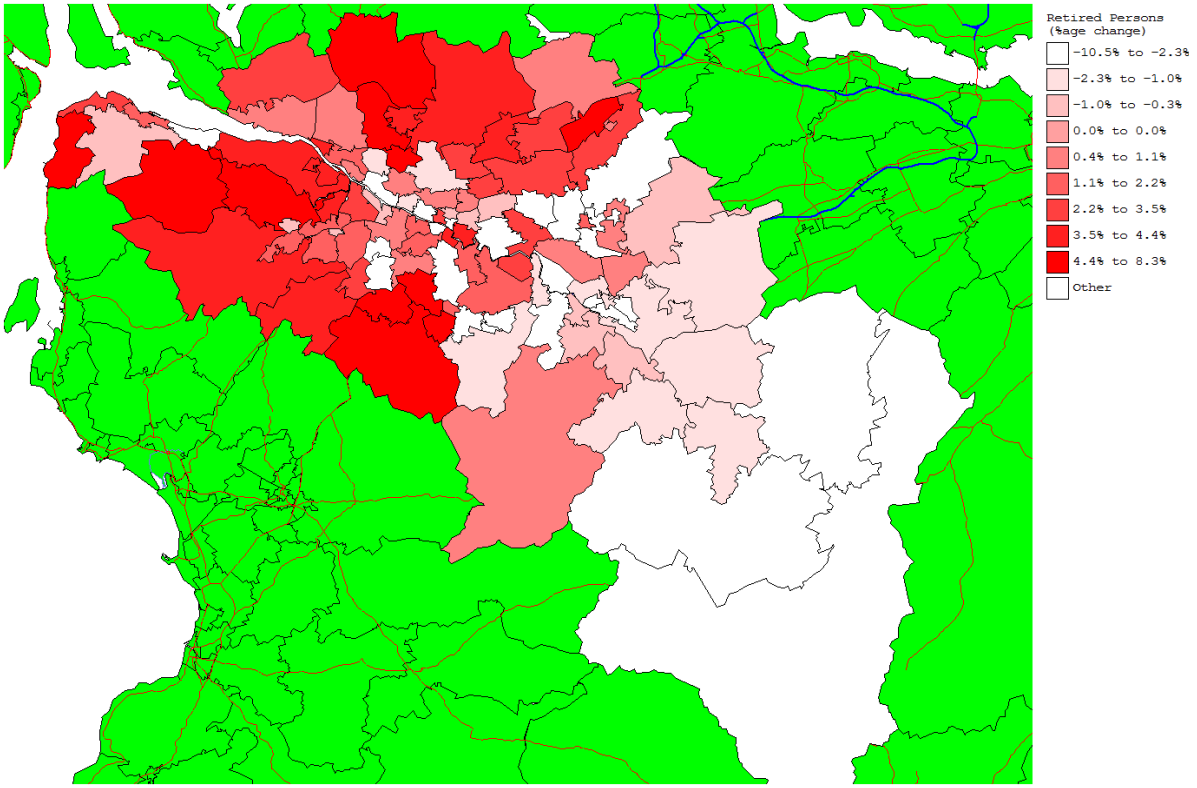
Spatial Analysis: The differences between the two scenarios produce very small absolute numbers so the spatial distribution of this will not be statistically or spatially significant.

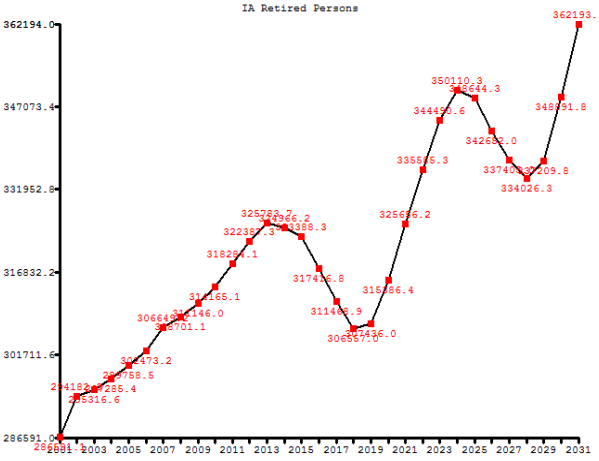
IA v IF Retired Persons

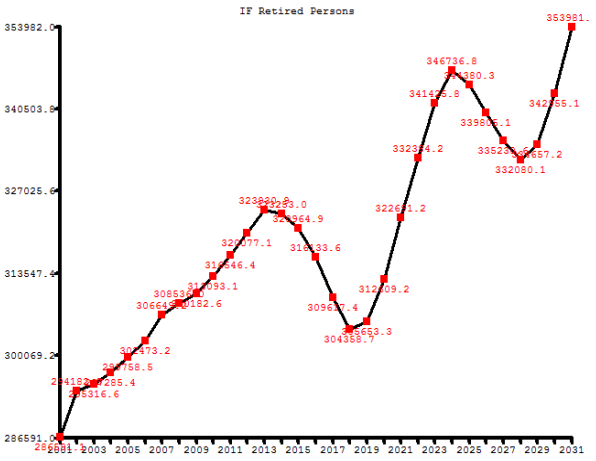
2031



2021







Retired	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	319546	322611	3065	353981	34435
Scenario IG	314120	327345	13225	344183	30063
Scenario IA	318284	325656	7372	362193	43909

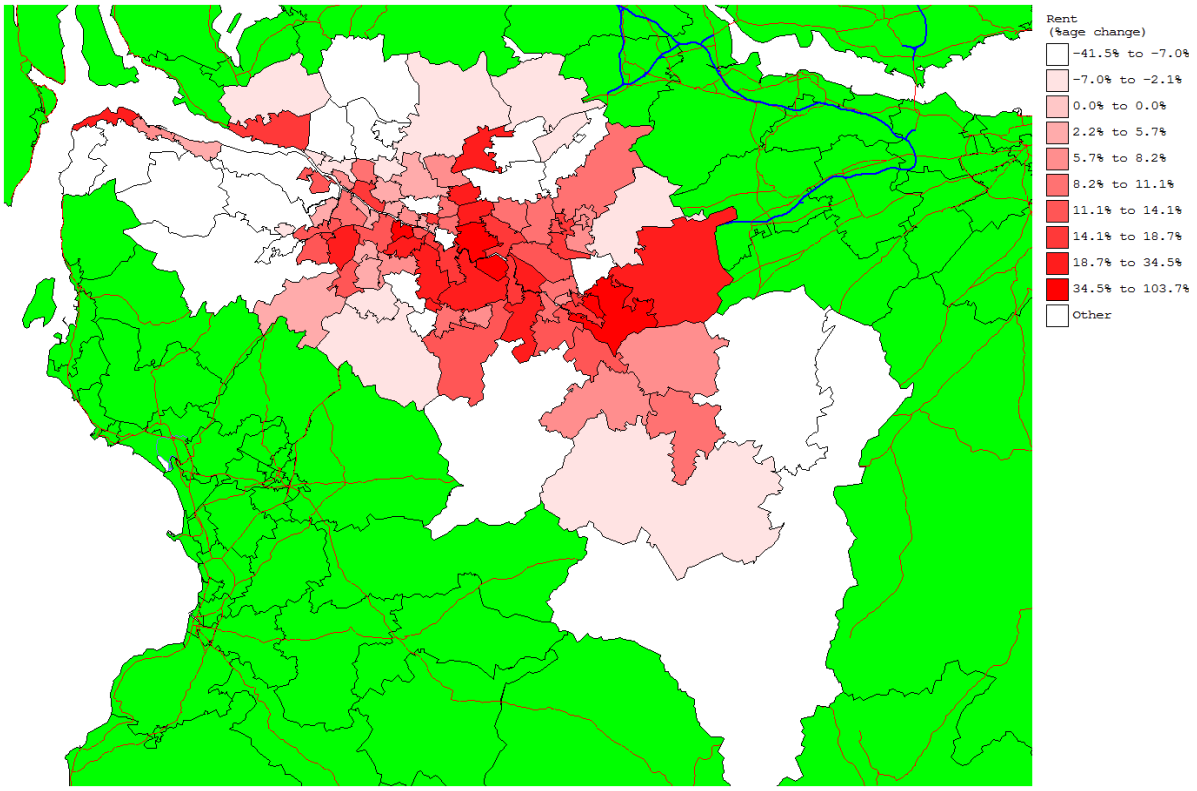
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The Graphs of the two scenarios again show that the overall

demographics are virtually identical. The numbers of retired people continue to increase over time. Scenario IA predicts that the difference with Scenario IF will produce an additional 4,307 retirees at 2021 and an additional 9,500 at 2031.

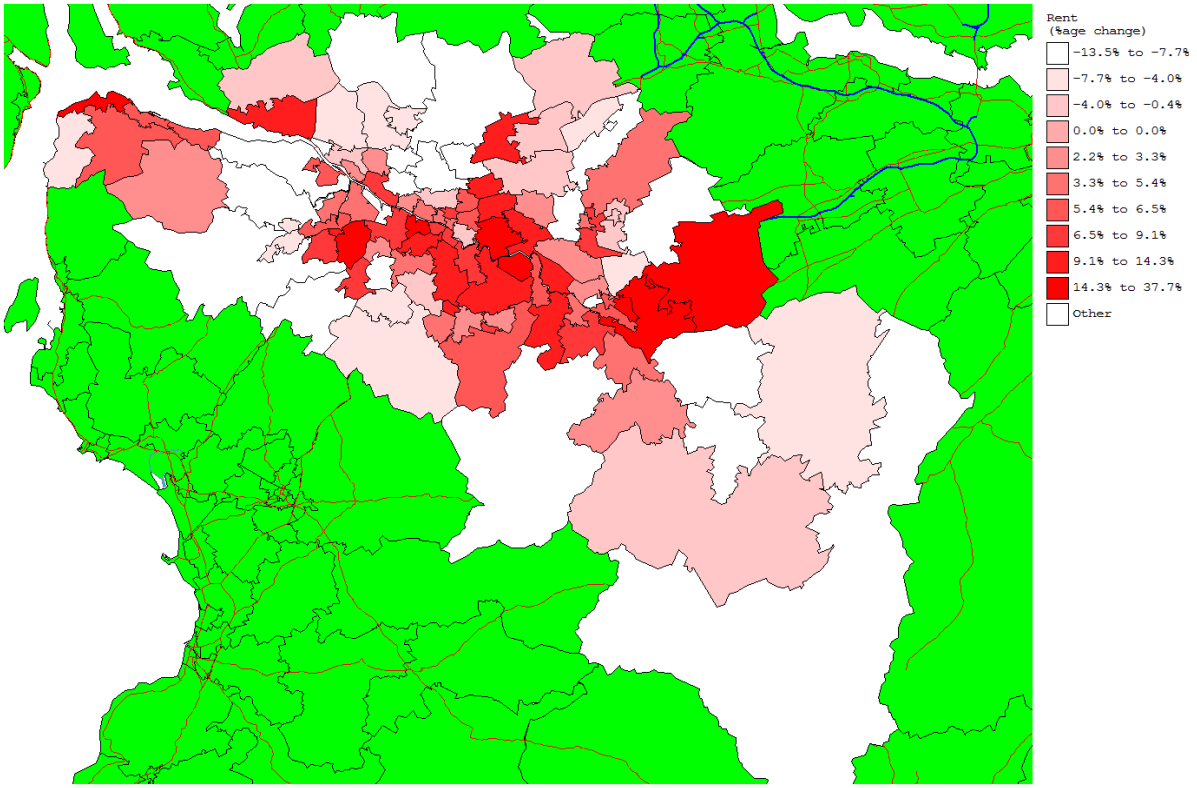
Spatial Analysis: Again absolute figure differences are not great but what emerges is that at 2021 IA's additional retirees flow from South and east of the conurbation towards the north and west. This spatial pattern is also evident at 2031 position. Competition in the south and east from the growing working populations may drive retired towards the north and west.

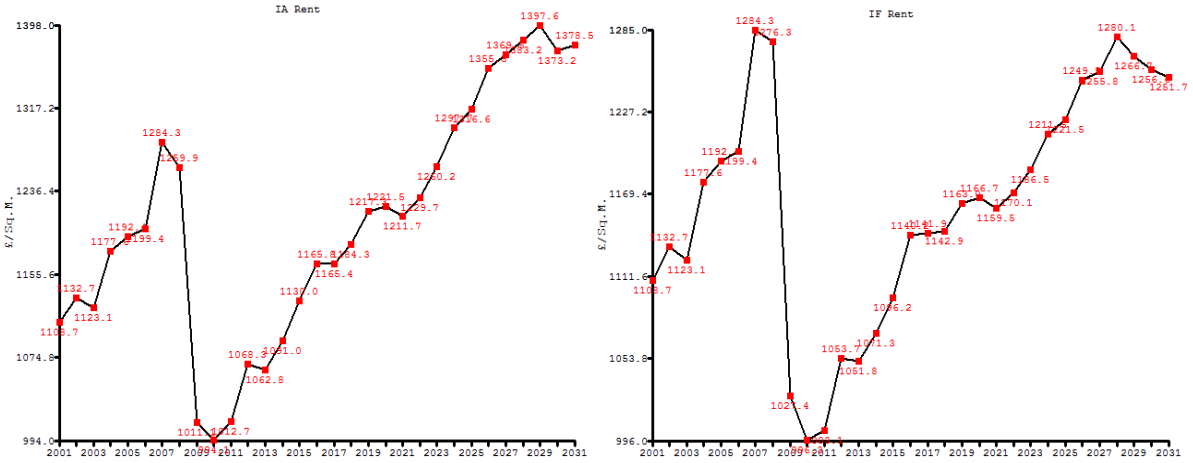
IA v IF Rent

2031



2021





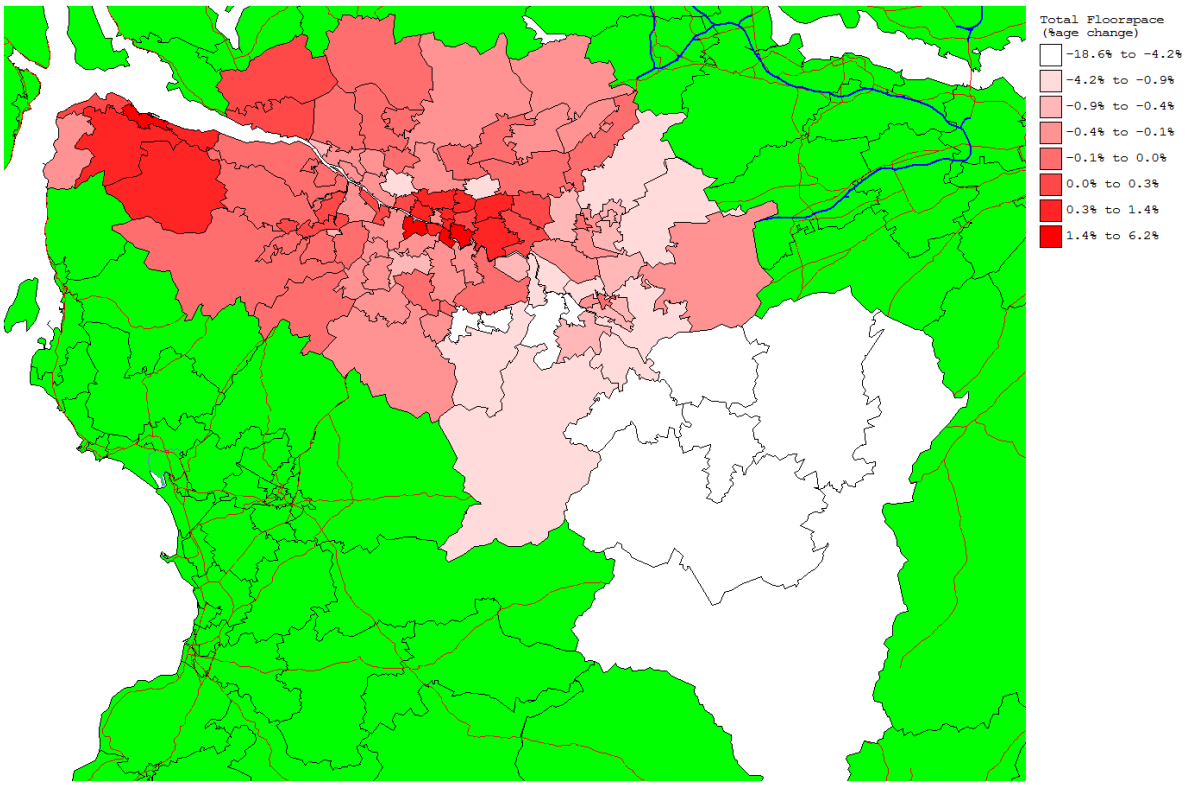
Rent £	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	996	1159	163	1251	255
Scenario IG	1001	1173	172	1306	305
Scenario IA	1012	1211	199	1378	366

Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs indicate from 2011 onwards both scenarios increase the rental values. Scenario IA rental increases by £199 by 2021 and £366 by 2031. The differences between the two rental growths are fairly small in absolute numbers terms. Scenario IA increases the difference by £36 per m2 at 2021 and by £110 per m2 by 2031.

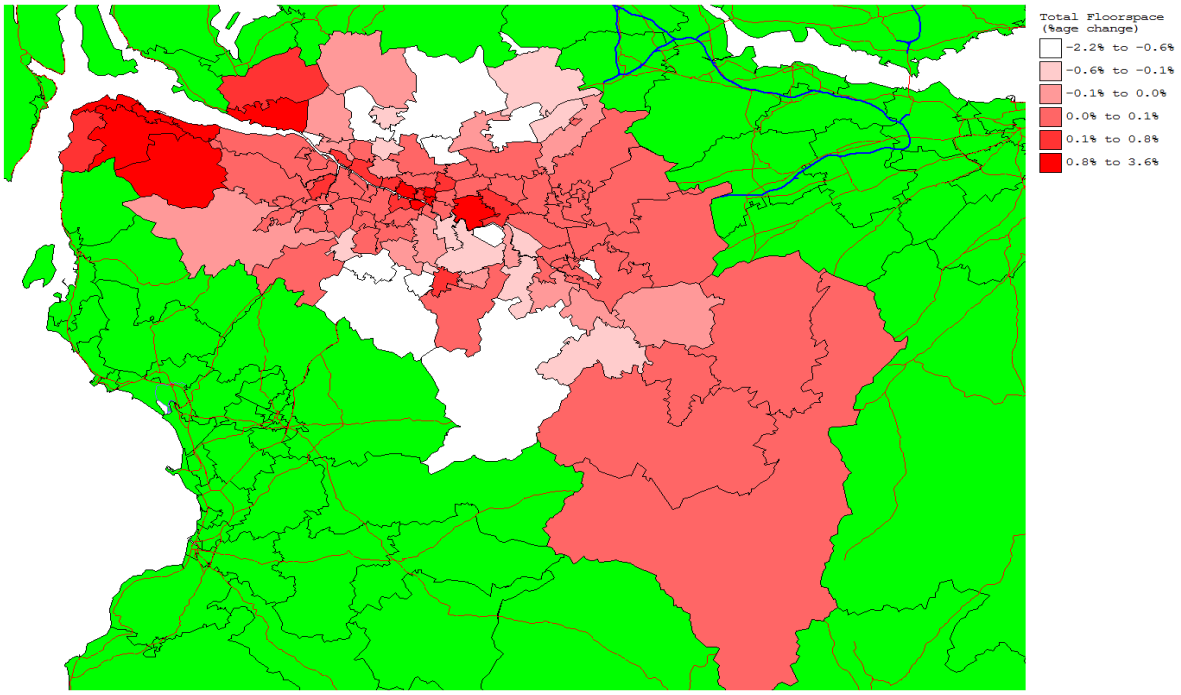
Spatial Analysis: Perhaps reflecting where Scenario IA creates Total Jobs it also appears to increase rentals in these same areas. At 2021 Scenario IA predicts strong rental growth around Glasgow east end and south Glasgow, parts of East Dunbartonshire, parts of North Lanarkshire, parts of Renfrewshire, Inverclyde and parts of West Dunbartonshire. At 2031 Scenario IA predicts a consolidation of this spatial pattern with similar areas continuing to benefit from additional rental growth.

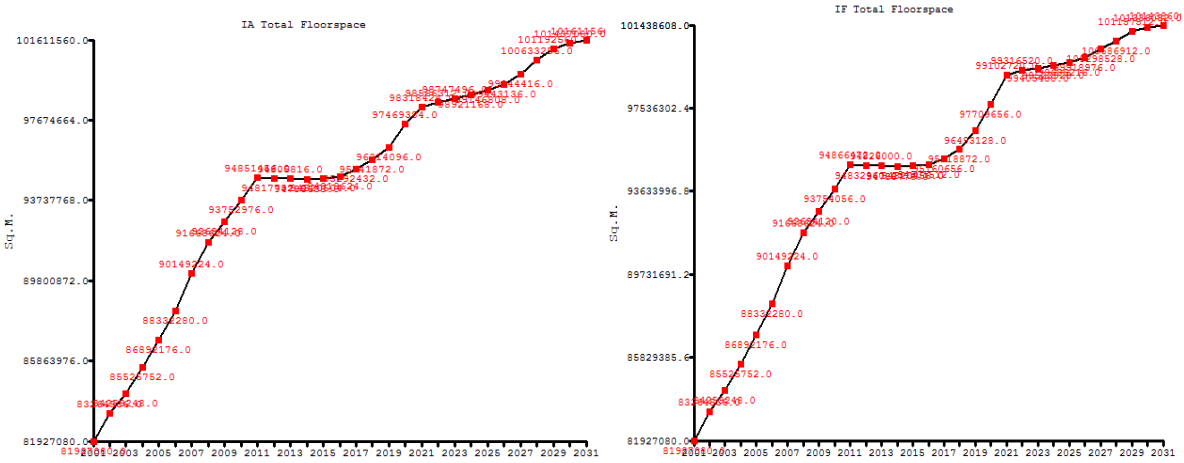
IA v IF Total Floorspace

2031



2021





Total Floorspace m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	94866871	99102720	4235849	101438608	6571737
Scenario IG	94867944	100680480	5812536	101594240	6726296
Scenario IA	94851916	98318421	3466505	101611560	6759644

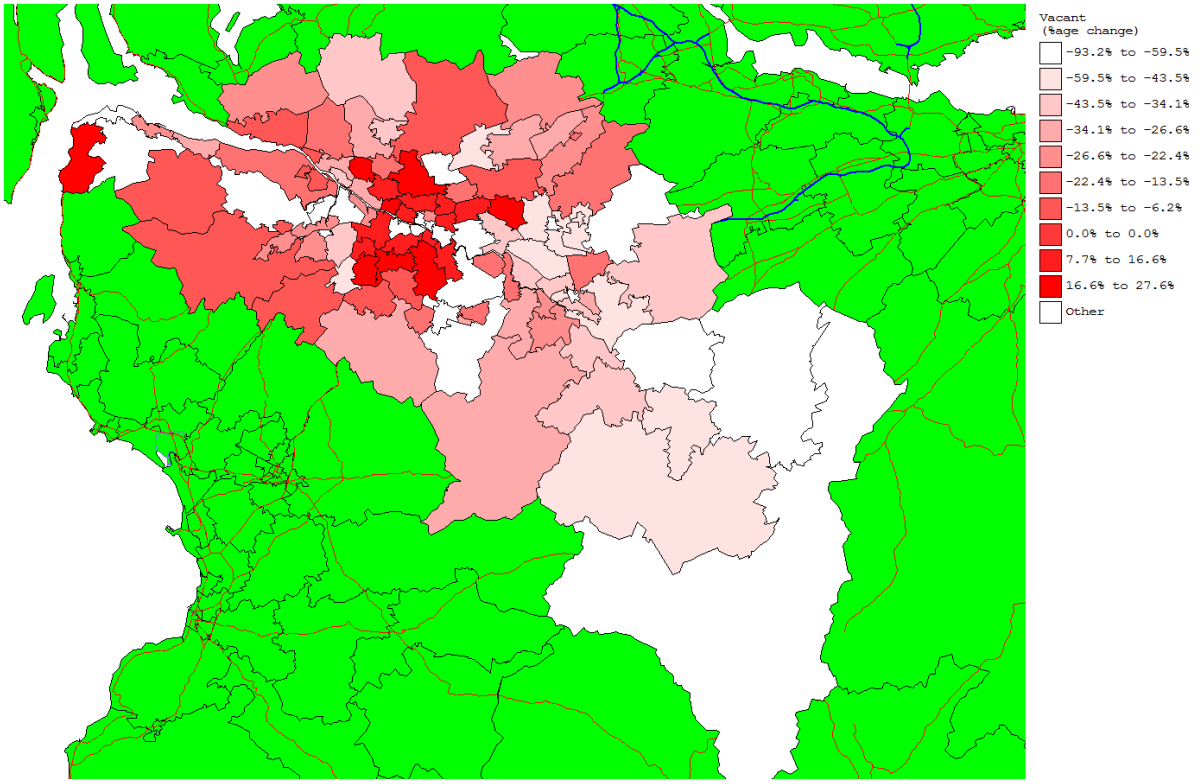
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The two graphs again show a very similar pattern in absolute numbers. Both scenarios predict total floorspace growth in a very similar pattern. The

absolute differences are small. Scenario IA will produce slightly less floorspace than Scenario IF by 2021 of 3.46 million m2 compared to 4.23 million m2. IA produced 0.77 million m2 less floorspace. At 2031 Scenario IA produces slightly more floorspace at 6.75 million m2 compared to 6. 57 million produced by Scenario IF. A difference of only + 0.18 million m2. Obviously where this is a good thing and meets demand will only be known when vacancy rates are examined.

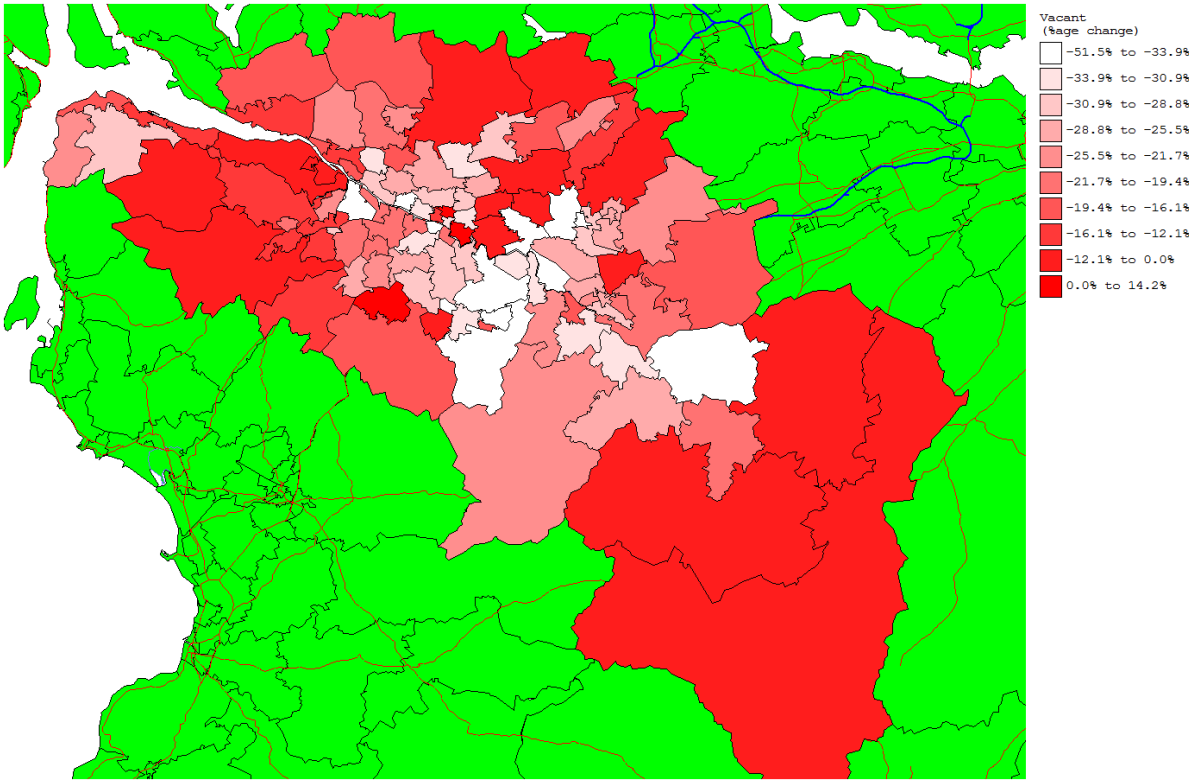
Spatial Analysis: Again we are comparing relatively small differences in absolute terms between these scenarios and therefore the spatial implications are not particularly significant. However at 2021 scenario IA's positive figures result in the SITLUM model distributing this additional floorspace towards parts of the East End and parts of the Clyde Waterfront. However Inverclyde and West Dunbartonshire receive the greatest additional floorspace. 2031 position reverses with IA having very slightly more floorspace which is directed to Glasgow City.

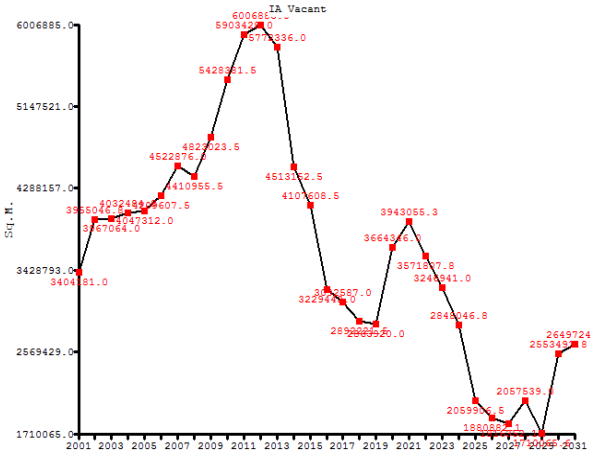
IA v IF Vacant Floorspace

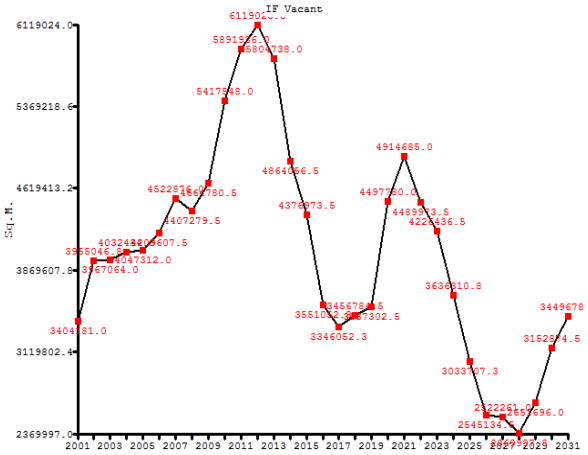
2031



2021







Vacant (M2)	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	5891986	4497780	-1394206	3449678	-2532308
Scenario IG	5784632	5671054	-113578	2456140	-3328492
Scenario IA	5903429	3943055	-1960374	2649724	-3152705

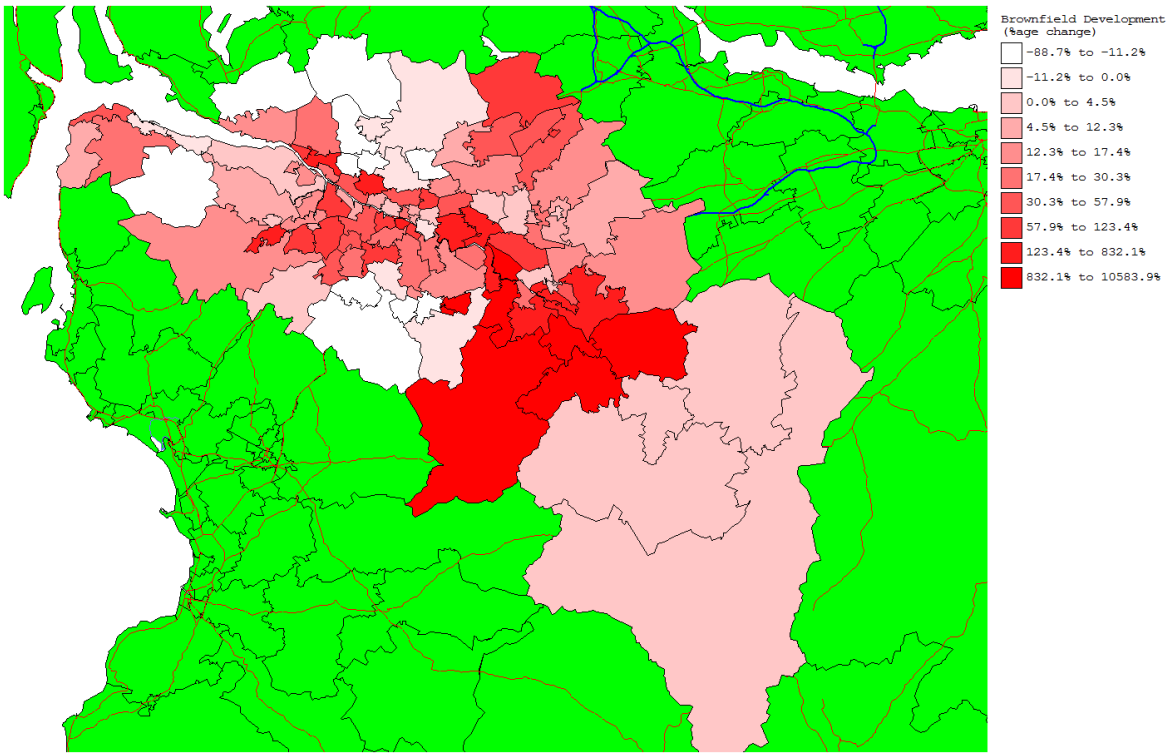
Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs indicate that after the peak of vacancy levels in 2011 that vacancy levels fall to 2031 under both scenarios and in a very similar pattern. In absolute numbers terms the differences between the two scenarios are relatively small. By 2021 Scenario IA shows the greatest fall in vacancy levels – by 0.57 million m2 compared to

Scenario IF. At 2031 Scenario IA again produces the greater fall in vacancy by 0.62 million m2.

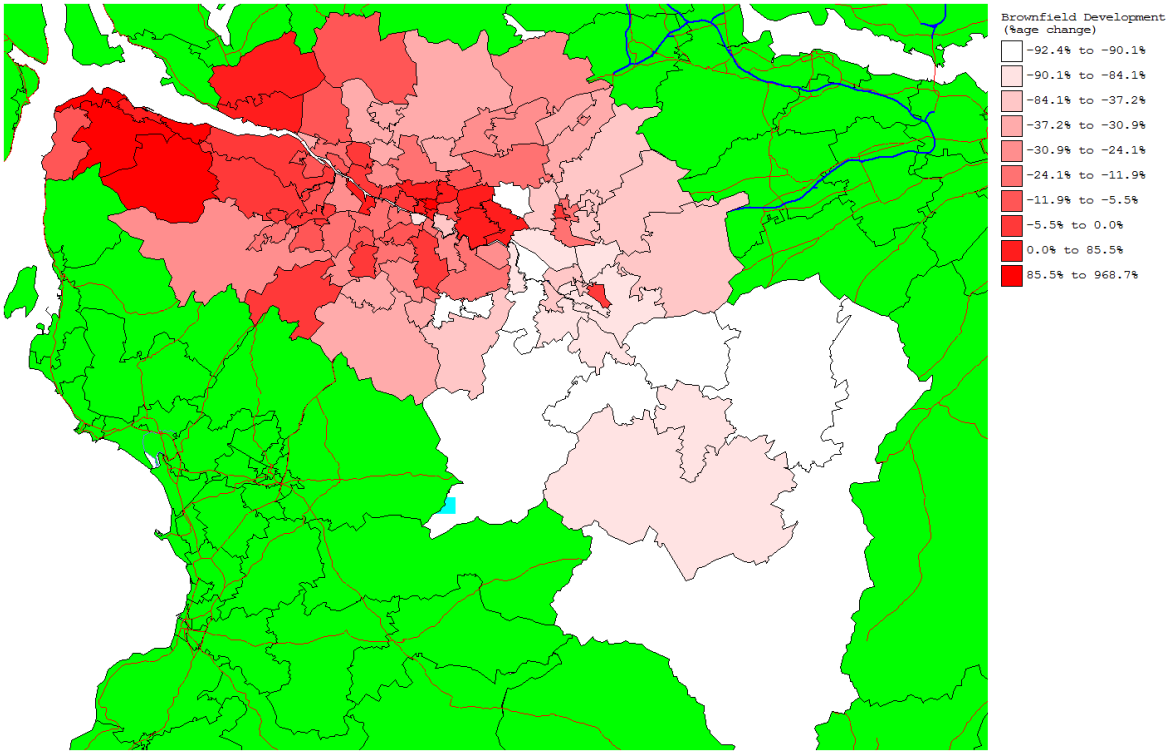
Spatial Analysis: SITLUM distributes this relative different negative falls in vacancy levels. At 2021 it is the lighter areas that show the greatest falls in vacancy under Scenario IA. All areas benefit in a fall in vacancy levels under Scenario IA but it is generally Glasgow City and parts of North and South Lanarkshire that benefit most. At 2031 it is again the lighter areas on the map that benefit most from the drop in vacancy levels to the benefit most of all areas except this time around parts of Glasgow City. Again caution as we are distributing relatively small absolute figures.

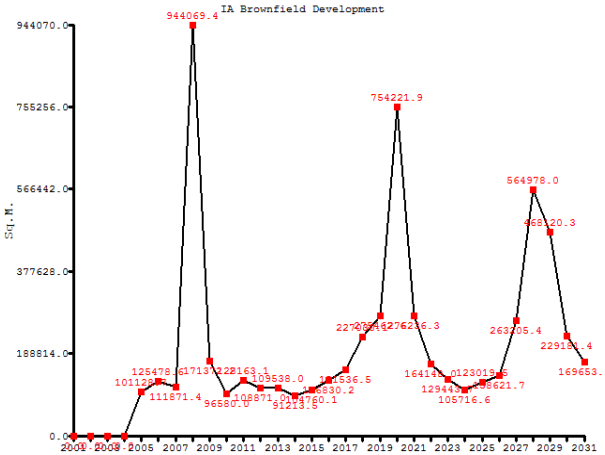
IA v IF Brownfield Development

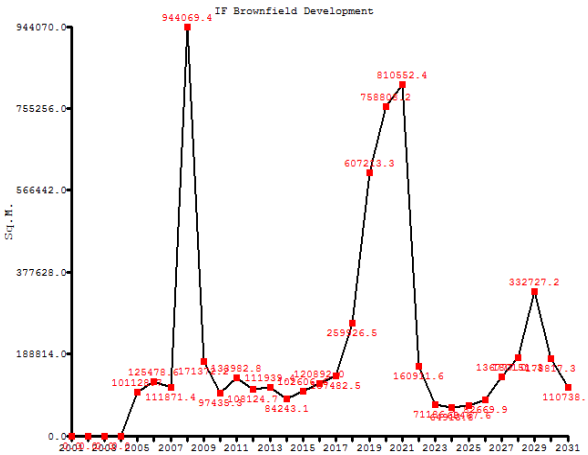
2031



2021







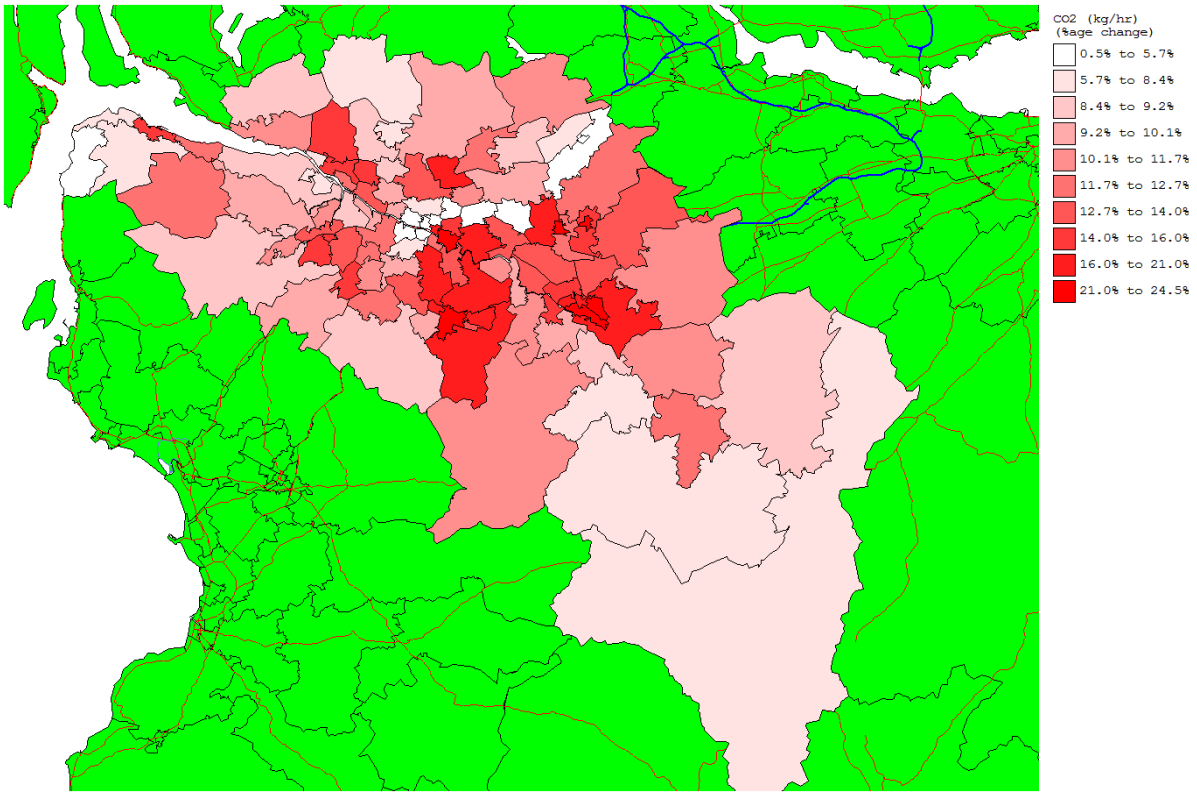
Brownfield Development M2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	136982	810552	673570	101738	-35244
Scenario IG	135033	219920	84917	52800	-82233
Scenario IA	128163	276215	148052	169653	41490

Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs again indicate a very similar pattern with only the intensity of the peaks being significantly different. The 2021 position fits into a peak in both scenarios with scenario IA peaking at 2020 while Scenario IF peaking a year later at 2021. This makes a huge difference to the absolute numbers and spatial impact making the 2021

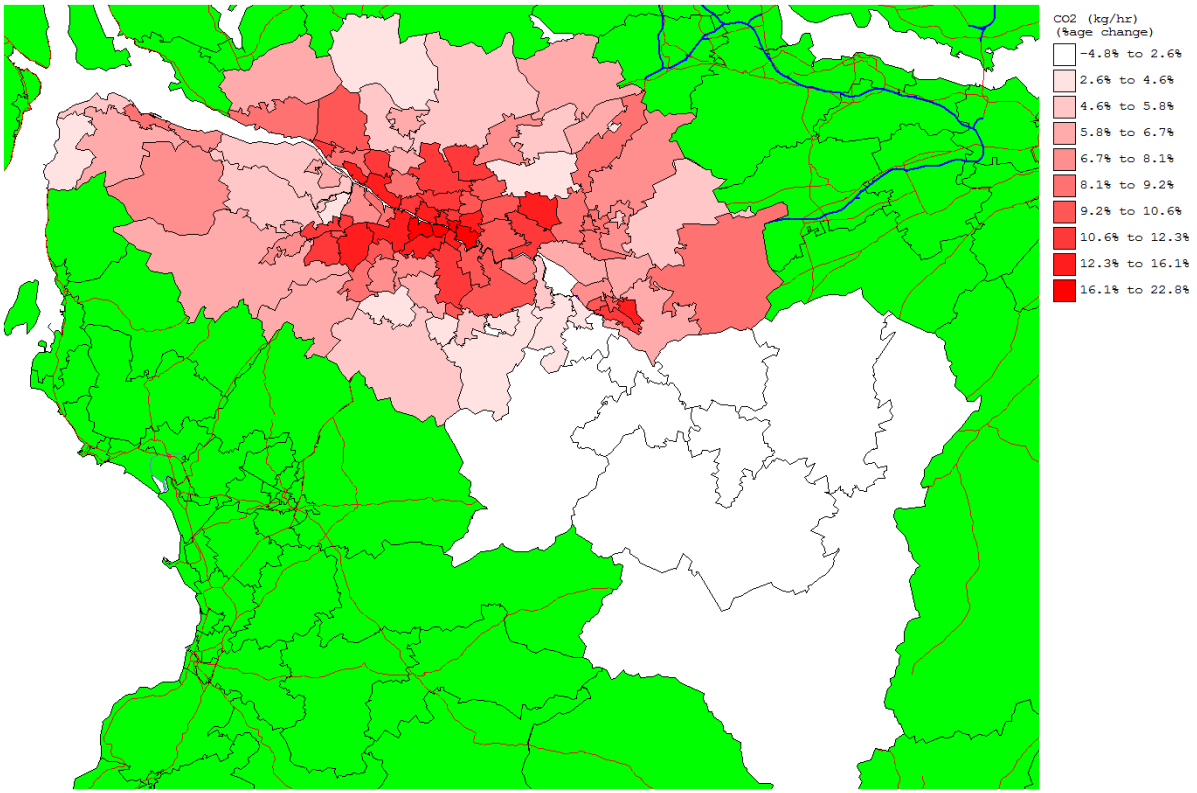
position less relevant in this situation – as a statistical blimp. The 2031 position may be worth noting with scenario IA producing slightly higher final floorspace but given the volatile nature of these graphs the resultant spatial analysis is meaningless. Best to note the similarity in both graphs rather than any marginal differences.

IA v IF CO2

2031



2021



Comment: Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Base Model and Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. Absolute value graphs are not available for CO2 figures but as a guide we have the relative % changes between the two scenarios. The 2021 position is that Scenario IA generates a relative greater amount of CO2 of between -4.0% to 22.8%. The 2031 position is that Scenario IA again generates a relatively greater amount of CO2 of between 0.5% to 24.5%.

Spatial Analysis: At 2021 Scenario IA produces a higher amount of CO2 to the north and west of the conurbation and especially around the City Centre and along the Clyde Waterfront. The 2031 position under Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

Overall Conclusion on comparing**: Scenario IA** – Rebalanced Economy +M74 Network **Vs Scenario IF** – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration).

Scenario IF is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

Scenario IF and Scenario IA have very similar demographics. Both have a similar upward positive total population growth and very similar absolute figures. The population differences between these two scenarios are therefore very small in absolute numbers terms. Scenario IA is + 1,758 at 2021 compared to Scenario IF and IA is - 3,656 at 2031 compared to IF. Again similar absolute figures for Children and Retired People. Perhaps one significant difference is Scenario IA shows considerable growth in job numbers – an additional 88,500 jobs by 2021 and an additional 151,162 by 2021. Compared to Scenario IF, Scenario IA

creates +37,637 additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures. All areas of the conurbation benefit from the additional jobs created by Scenario IA but the East End, parts of South and North Lanarkshire, East Dunbartonshire, Parts of Renfrewshire and Inverclyde all have notable job improvements. Of note is the 2031 spatial distribution of the additional 75,000 Working Adults generated by Scenario IA which are locating towards the South and West of the conurbation especially East Dunbartonshire, North and South Lanarkshire and the East End. This does not reflect always where the additional jobs are being created under this scenario and implies greater transport movement south east towards the north west to access jobs. This may be explained by the M74 extension providing greater access for workers.

Both Scenarios are successful in reducing the number of non –working adults over time. Scenario IA reduces “unemployment” by 52,000 by 2021 and an astonishing 101,500 by 2031. In comparative terms both Scenarios are successful but Scenario IA reduces “unemployment” by an additional 27,000 by 2021 and an additional 46,000 by 2031 against Scenario IF. All parts of the conurbation benefit from Scenario IA but it is the south and east of the conurbation that have less non working adults generally.

The differences between the two rental growths are fairly small in absolute numbers terms. Scenario IA increases the difference by £36 per m2 at 2021 and by £110 per m2 by 2031. Where Scenario IA creates Total Jobs it also appears to increase rentals in these same areas. Scenario IA predicts strong rental growth around Glasgow east end and south Glasgow, parts of East Dunbartonshire, parts of North Lanarkshire, parts of Renfrewshire, Inverclyde and parts of West Dunbartonshire. Scenario IA produces a higher amount of CO2 to the north and west of the conurbation and especially around the City Centre and along the Clyde Waterfront.

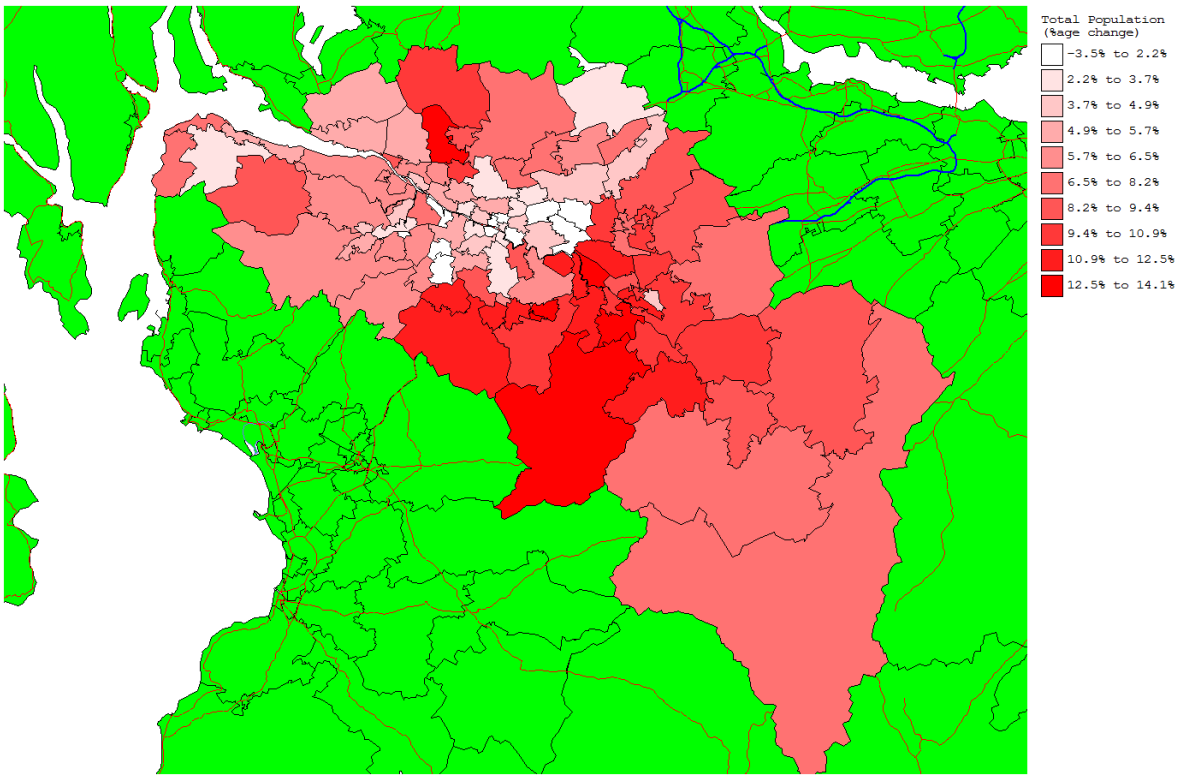
3D. IG v IF at 2021 and 2031

Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs Scenario IF – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration

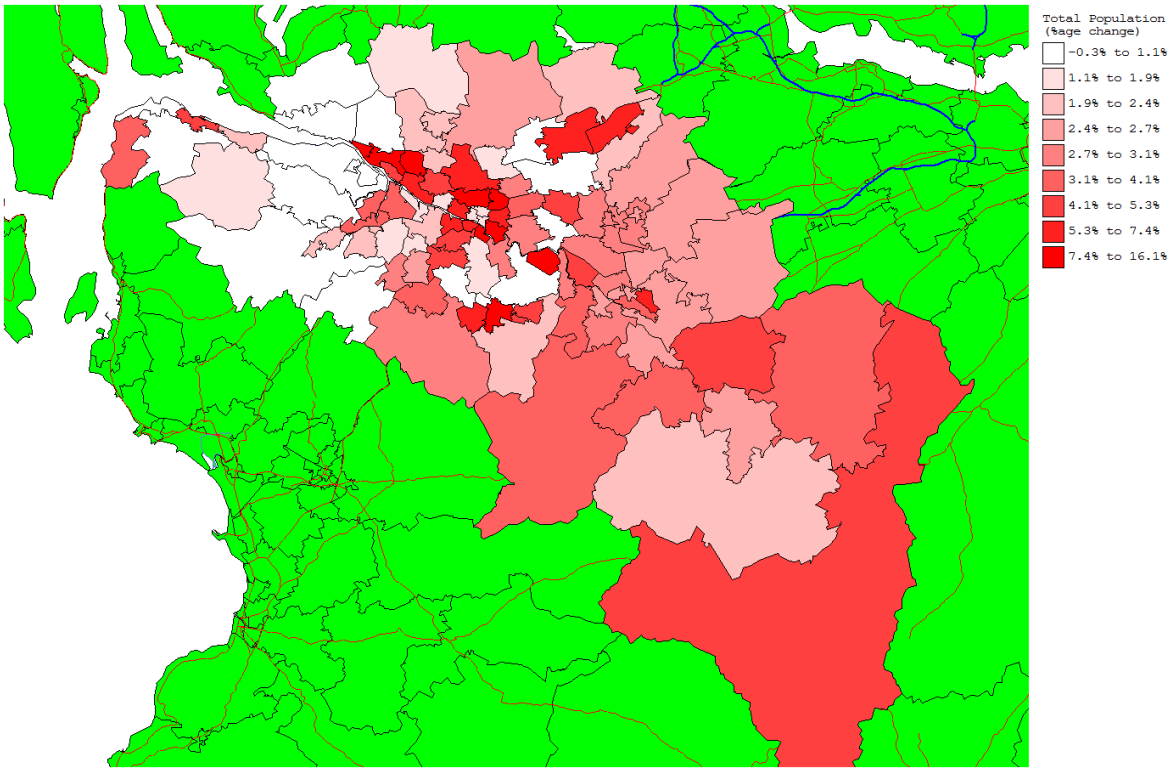
Scenario IF is the Base Model and Scenario IG is the Forecast Model (Both Permissible)

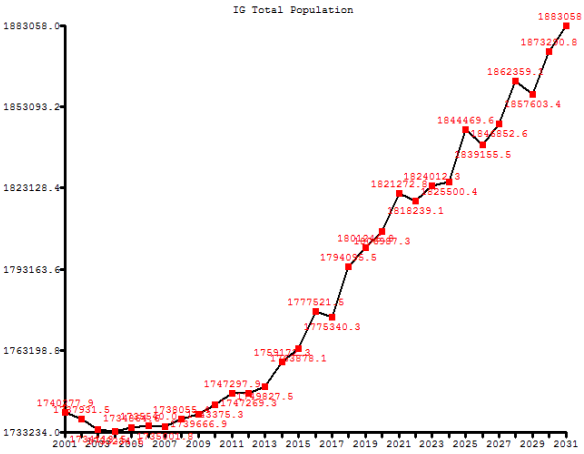
IG v IF Total Population

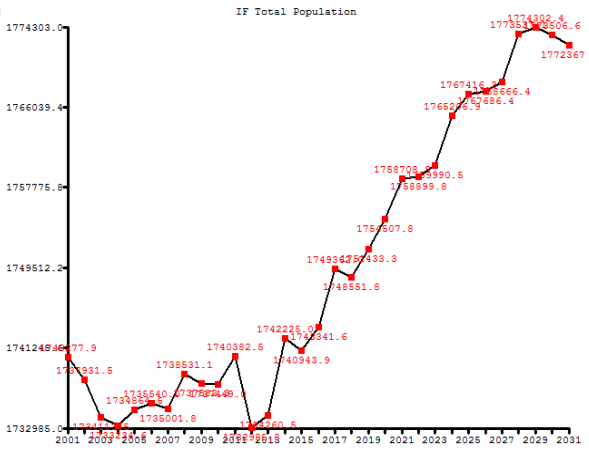
2031



2021







Total Populaton	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	1732985	1758708	25723	1772367	39382
Scenario IG	1747297	1821272	73975	1883058	135761
Scenario IA	1735246	1762727	27481	1770972	35726

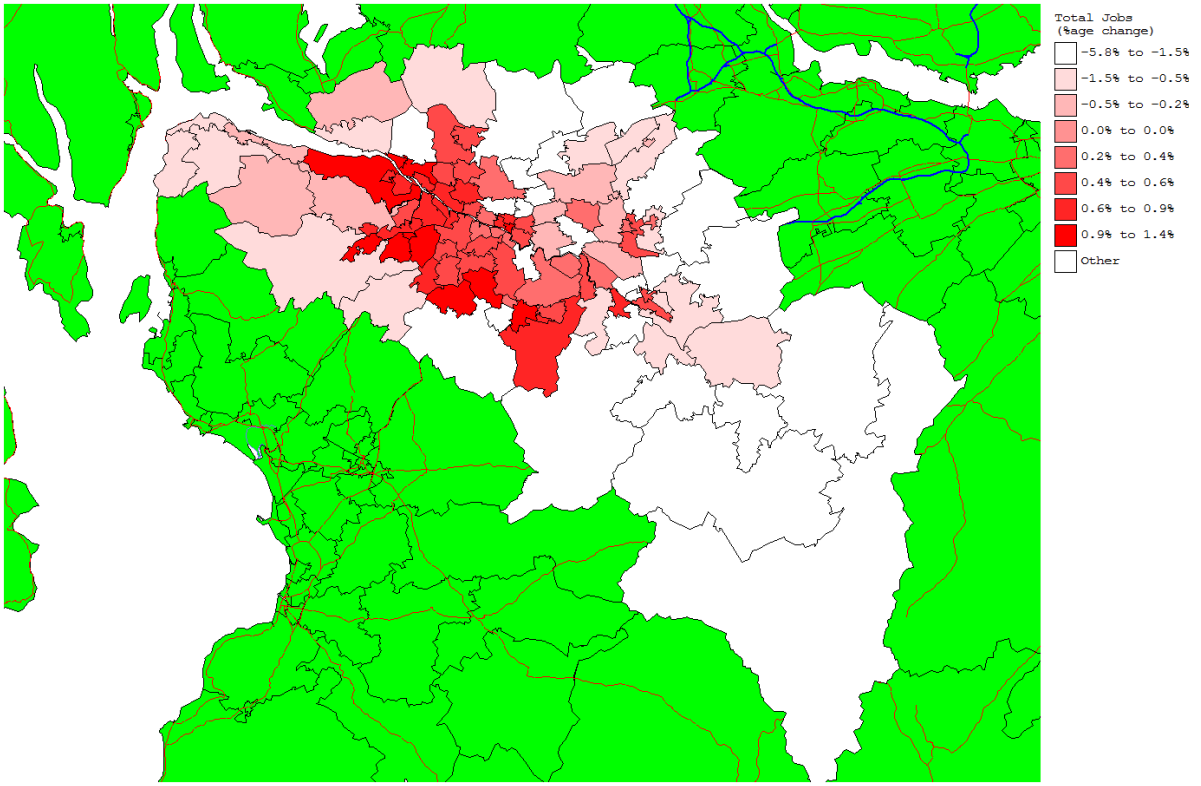
Comment: This Scenario comparison sets Scenario IF the OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG the OE Higher Migration (Planning 2) scenario as the Forecast Model. Higher population growth forecast would anticipate mostly positive growth outcomes. While both scenarios show total population growth in absolute numbers - IF shows +25,723 at 2021 from 2011 and +39,382 to 2031 while the higher growth IG shows + 73,975 at 2021 from 2011 and +135,761 at 2031. The maps show

how SITLUM models the relative % change in spatial terms at snapshot in time 2021 and 2031. In other words the 2021 map shows the difference between +25,723 and +73,975 (+48,252) and the Model allocates the additional 48,252 people spatially and shows the relative change to each transport zone area which in this case is a -0.3% to a 16.1% growth. We are looking for spatial patterns at a SPDA scale which shows how one scenario spatially differs from another scenario. In this case the IG v IF scenario differences for population shows IG higher population growth creating a new spatial pattern against IF as a base.

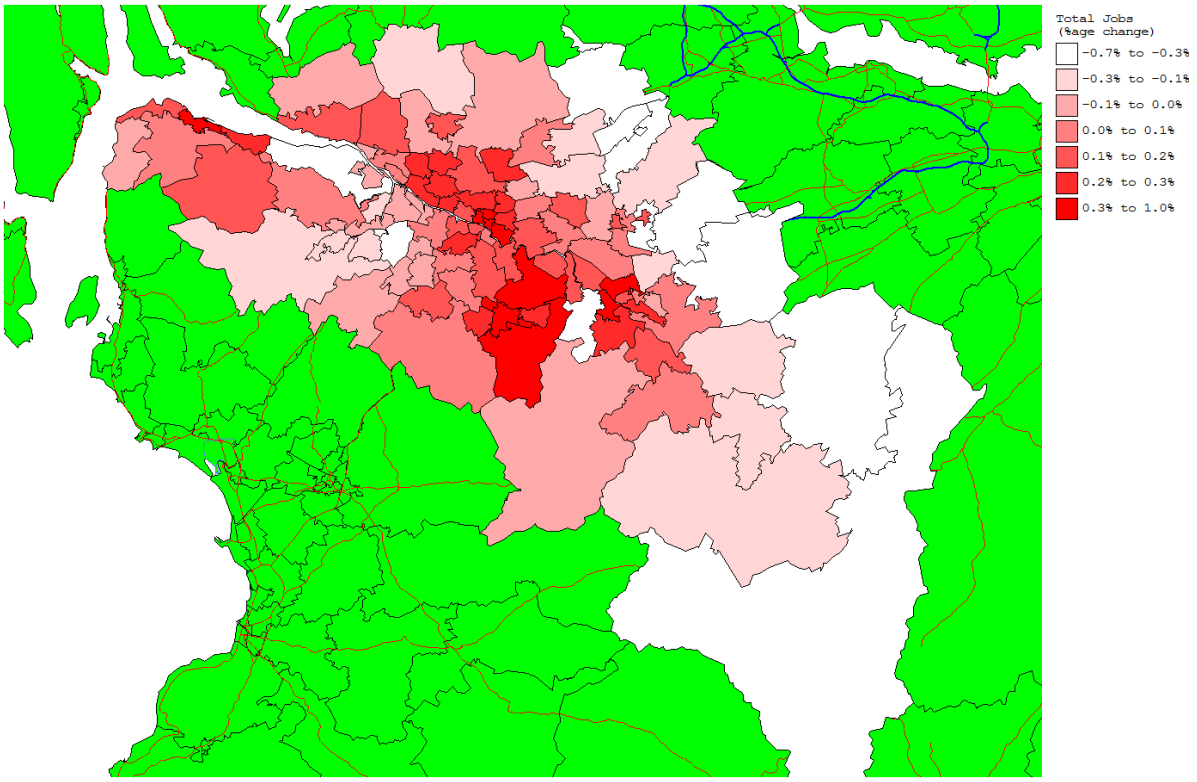
Spatial Pattern: At a conurbation level the 2021 snapshot shows additional population growth around the City Centre and to the south of the conurbation. Clearly the north/west of the conurbation misses out on this growth in population (Renfrewshire, West Dunbartonshire and Inverclyde). The 2031 snapshot shows the distribution of the additional 95,000 people in % terms. All areas benefit but there is a concentration of additional population around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). East End regeneration area gets little additional population. The reason for this spatial pattern will be a combination of where the jobs are located, accessibility and rental opportunities. The effect of the opening of the M74 in June 2011 may be the reason for the increase in accessibility for the south of Glasgow.

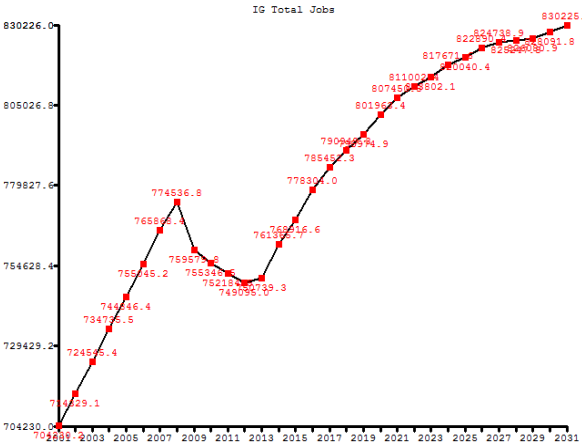
IG v IF Total Jobs

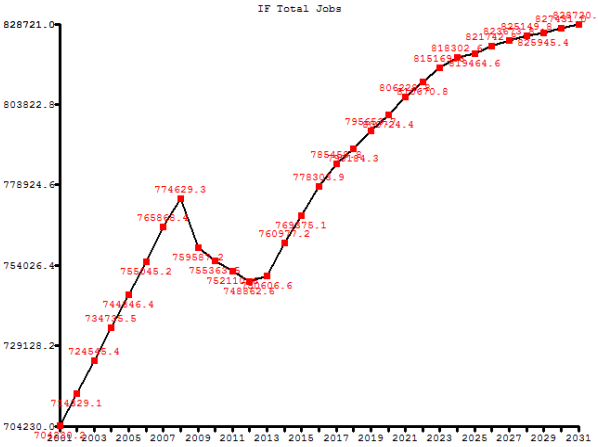
2031



2021







Total Jobs	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806228	50865	828721	73358
Scenario IG	755346	807450	52104	830226	74880
Scenario IA	759008	847510	88502	910633	151625

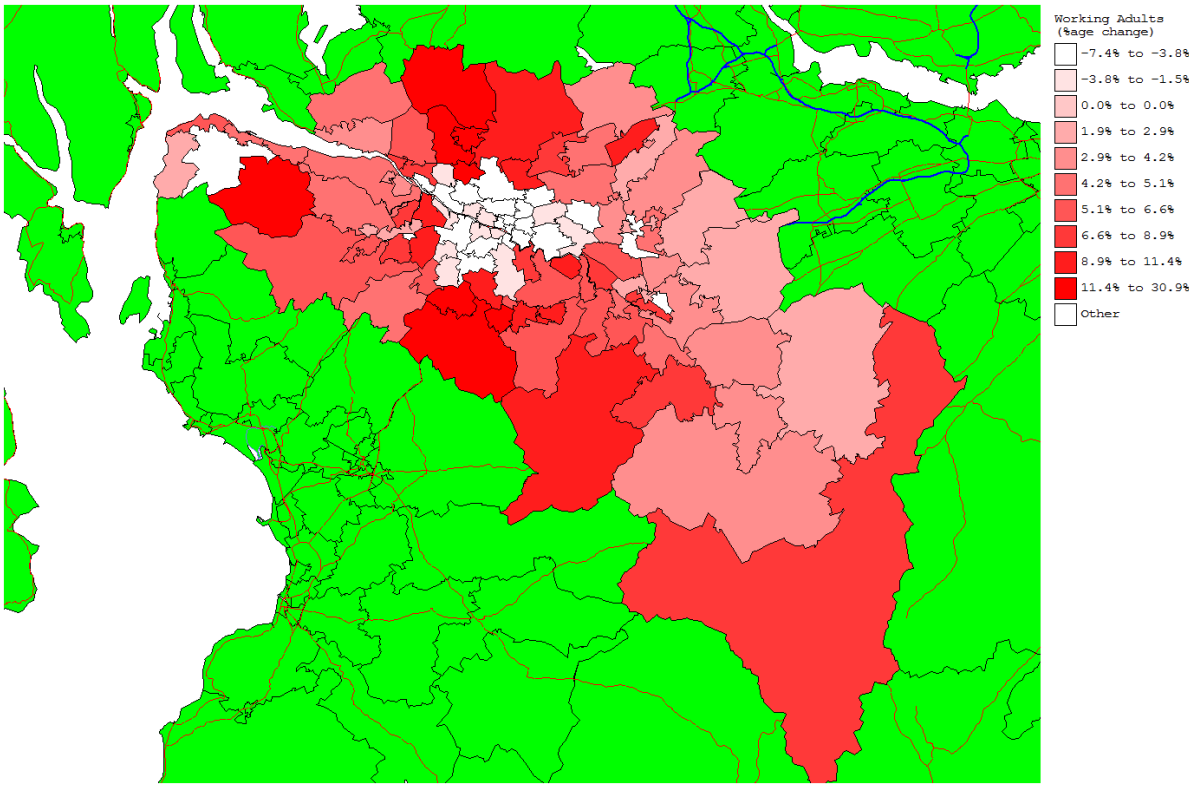
Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast Model. Both scenarios show very similar graphs with absolute numbers very similar and both growing from 2013 onward. Only a difference of 1,239 jobs at 2021 and 1,522 jobs at 2031. Given the much higher population figures for Scenario IG it

would be expected that IG would also produce significantly higher jobs but this is clearly not the case. IG does not produce the number of jobs to justify the population growth.

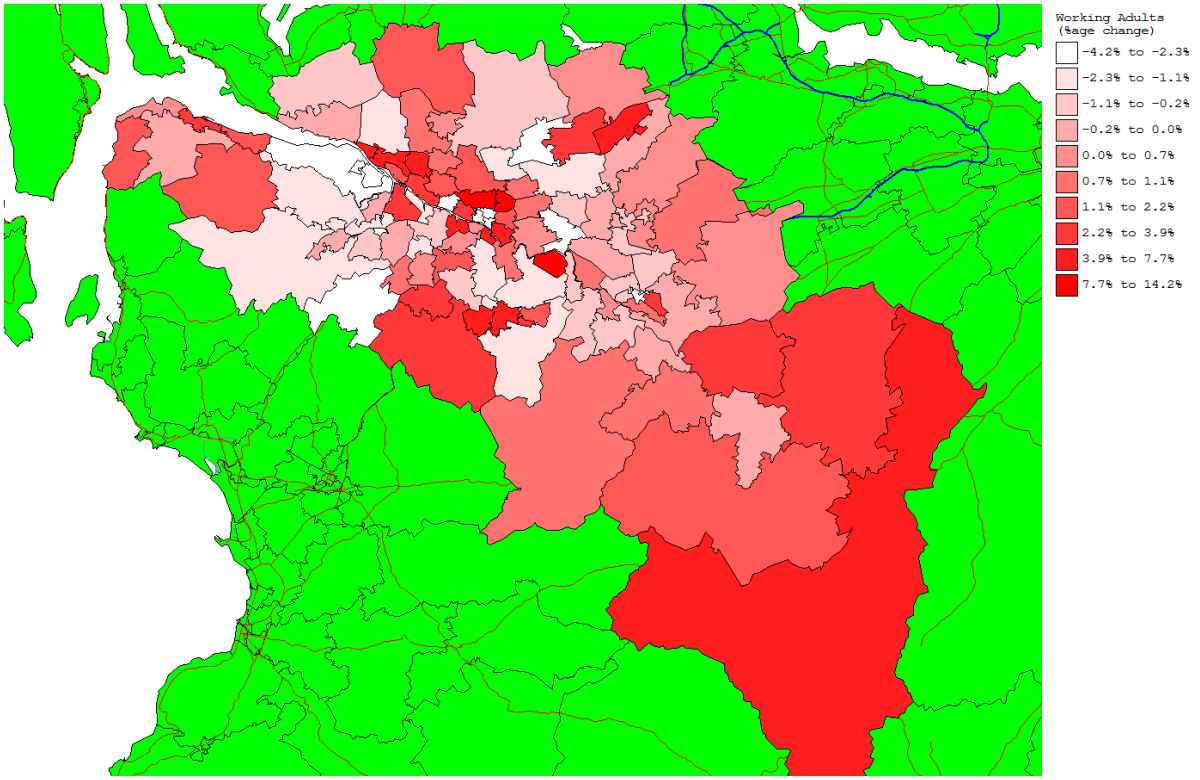
Spatial Analysis: The absolute numbers are very small differences and therefore the spatial distribution of this small number is probably not particularly significant but it does indicate that these additional jobs are distributed from the south and east towards the north and west. The 2031 distribution shows additional jobs along the Clyde Waterfront. Again caution as these are small absolute numbers.

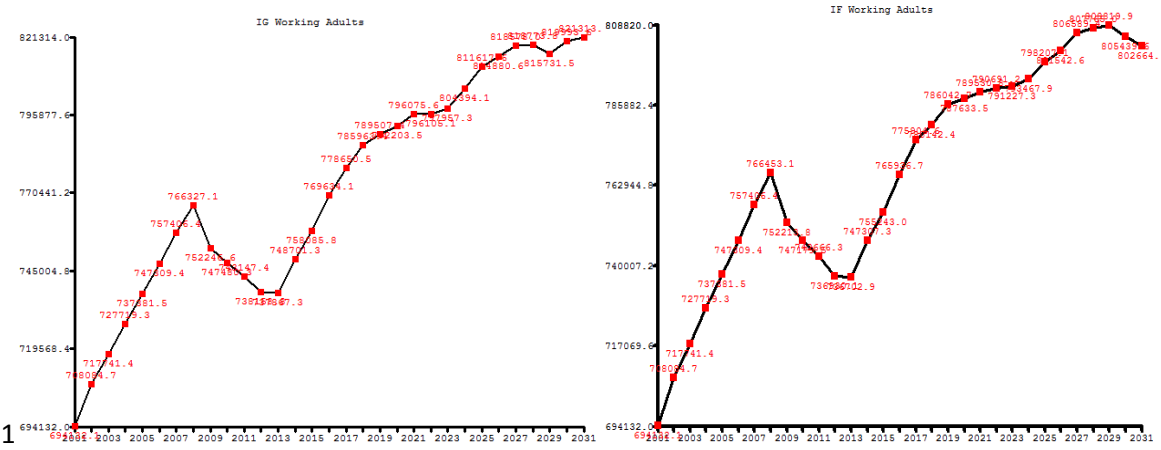
IG v IF Working Adults

2031



2021





2031

Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	747175	789530	42355	802664	55489
Scenario IG	747480	796075	48595	821314	73591
Scenario IA	748723	831005	82282	879140	130417

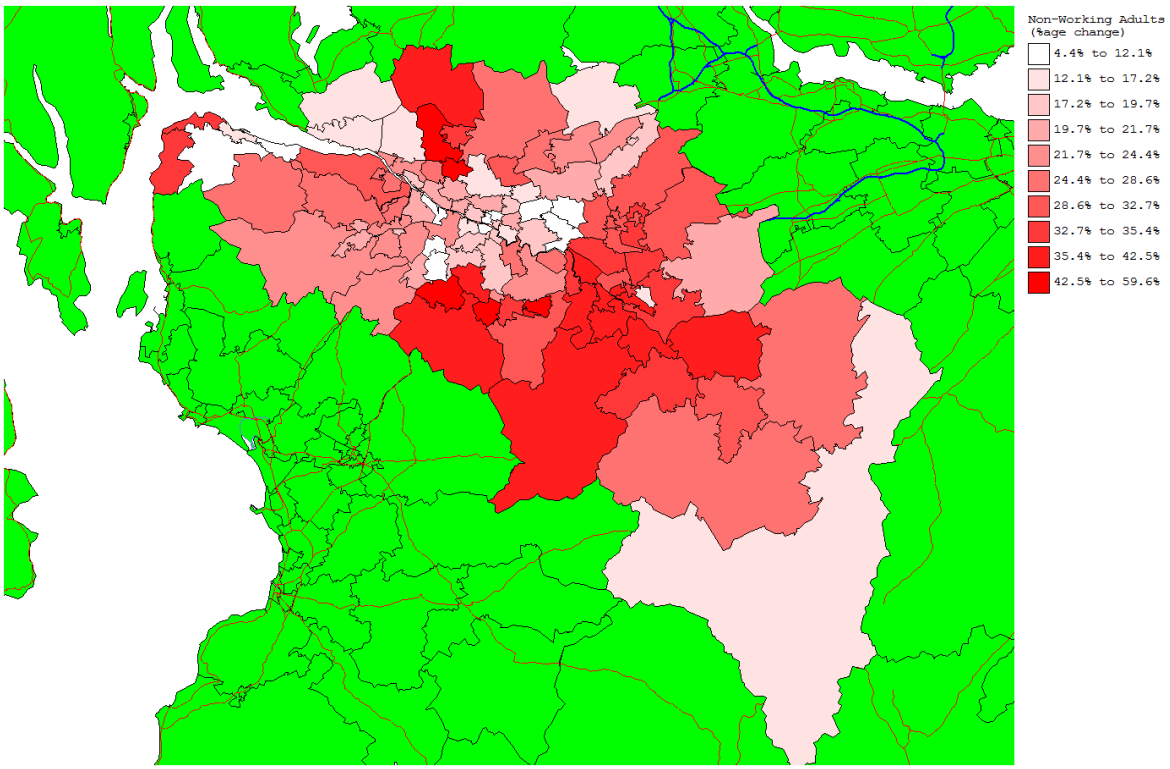
Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast. Both Graphs show a very similar growth pattern with IG showing a

slight increase in absolute numbers - + 5,240 by 2021 and +18,102 by 2031. Not a huge growth in Working Adults given the 95,000 additional population overall.

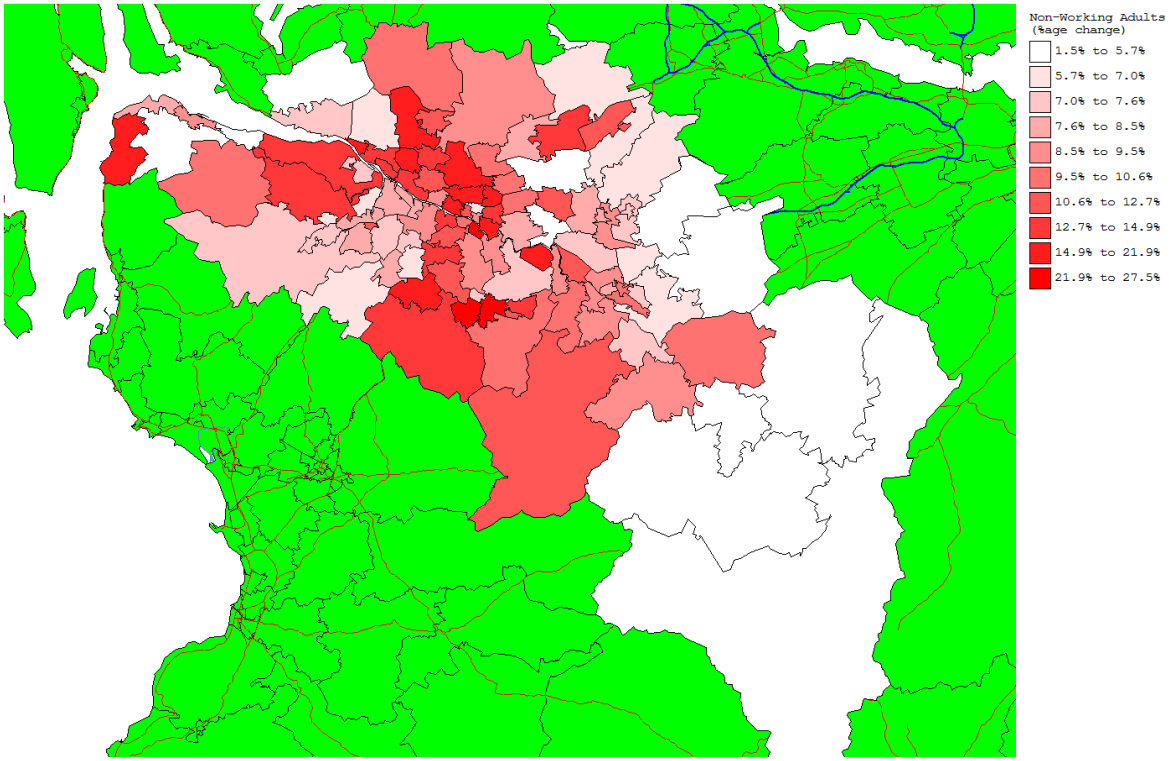
Spatial Analysis: The additional 5,240 Working Adults by 2021 are distributed by SITLUM very similar to the overall population growth pattern i.e towards the south and east. The 2031 spatial pattern allocating additional 18,100 Working Adults in a fairly distinctive pattern of suburban expansion with few Working Adults directed to the City Centre or East End.

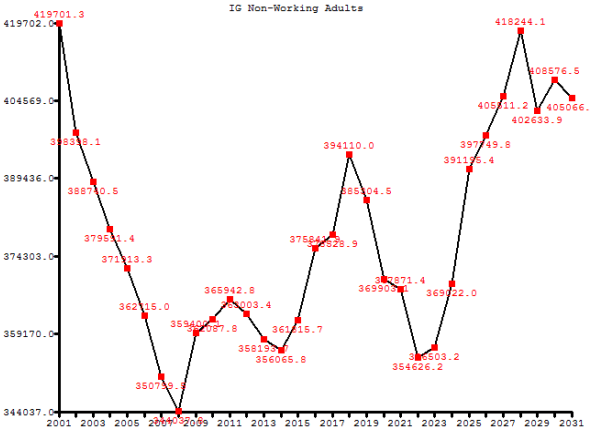
IG v IF Non-Working Adults

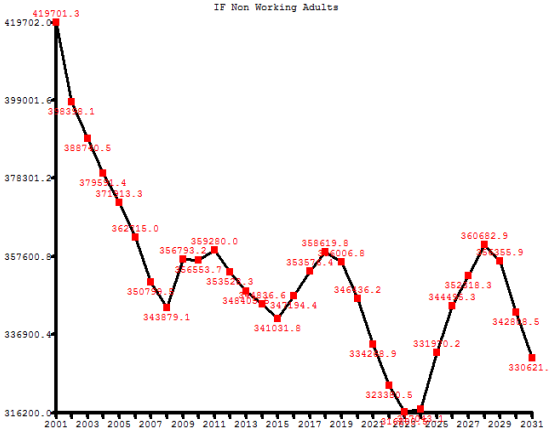
2031



2021







Non-Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	359280	334248	-25032	303621	-55659
Scenario IG	365942	369903	3961	405066	39124
Scenario IA	348329	296298	-52031	246899	-101430

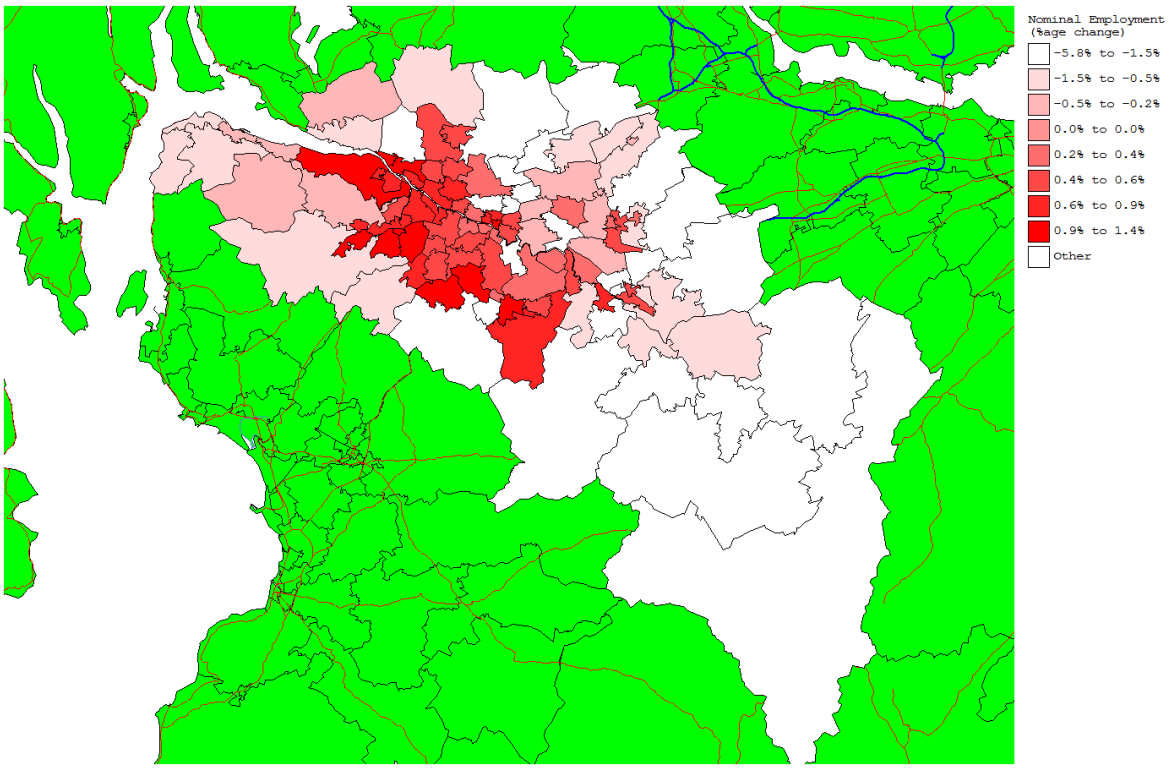
Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast. Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IF shows a general decline in the absolute number of "unemployed" -

25,000 less by 2021 and 55,000 + less by 2031. Scenario IG on the other hand shows "unemployment" increasing - + 3,900 by 2021 and + almost 40,000 by 2031. This produces an astonishing difference between the two scenarios. + 30,000 more "unemployed " by 2021 and +95,000 by 2031! The implications are that while IG is successful in attracting in additional population of 95,000 by 2031 compared to IF these additional people are not in employment. Scenario IF while producing less population overall does provide jobs for the incoming population sufficient to gradually reduce unemployment. The implications are that IG generates population growth but not the required jobs to employ them with the result that this will simply add to the welfare budget and not to economic growth. This will also have an impact on social housing and transport movements (additional unemployed travel pattern will be different from employed – less travel overall, less commuting, more use of Public Transport, more travel off peak).

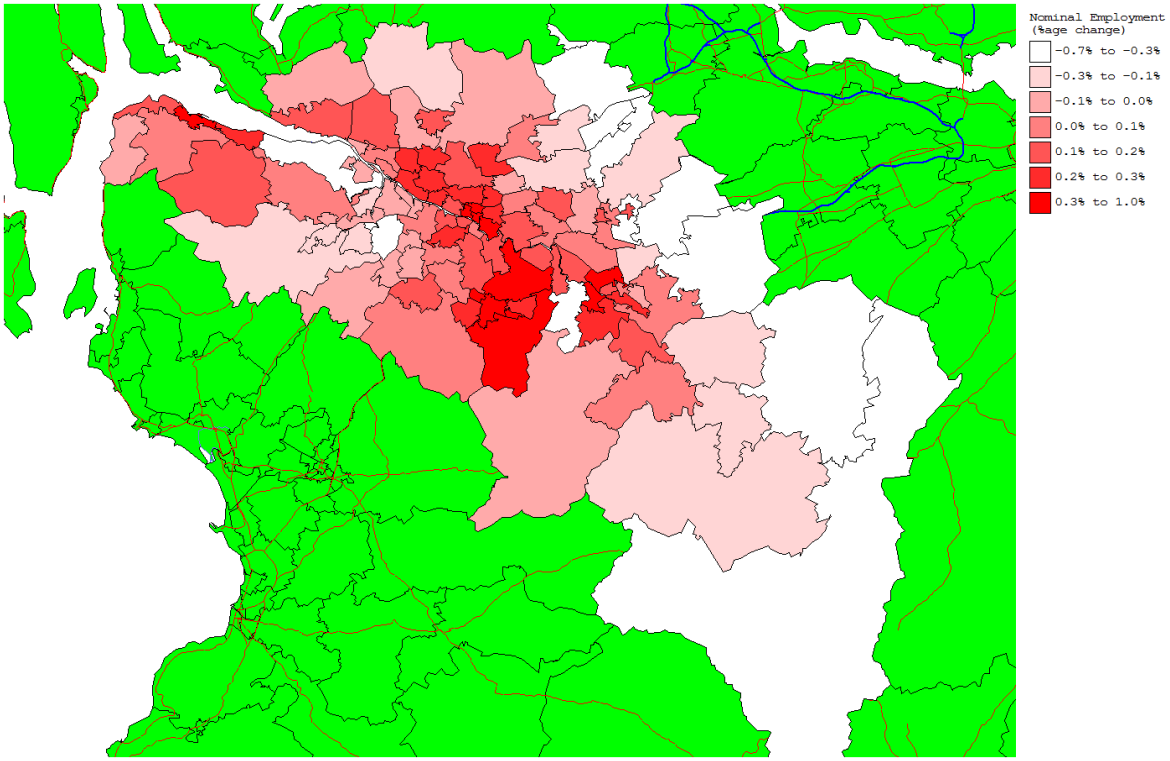
Spatial Analysis: The overall numbers are significant + 30,000 at 2021 and +95,000 at 2031. SITLUM allocates them it would be assumed on the basis of rental – where social rented housing is available. The pattern for 2021 shows strong attraction to the Glasgow and the east end but by 2031 the pattern reflects the overall population distribution with the non working population concentrating around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). East End regeneration area gets little additional population.

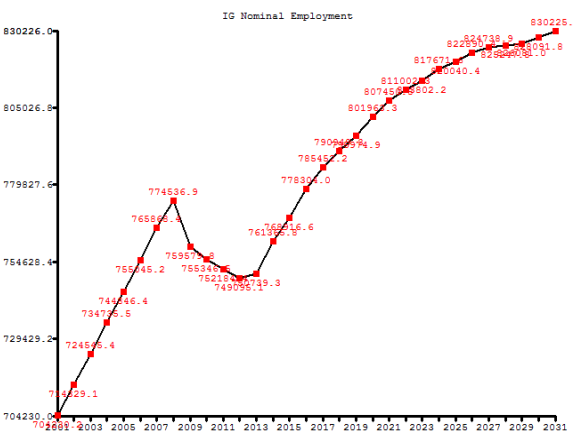
IG v IF Nominal Employment

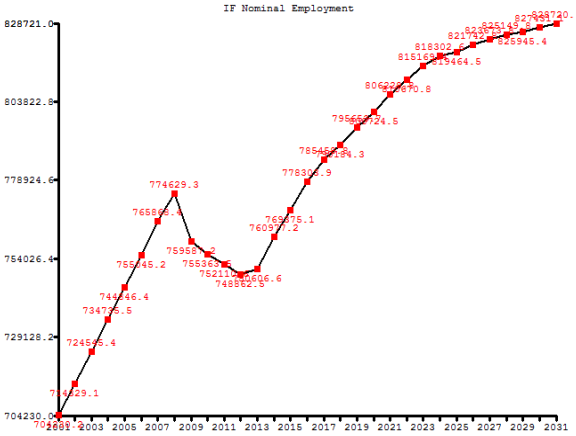
2031



2021







Nominal Employment	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806220	50857	828721	73358
Scenario IG	755346	807456	52110	830226	74880
Scenario IA	759008	847510	88502	910633	151625

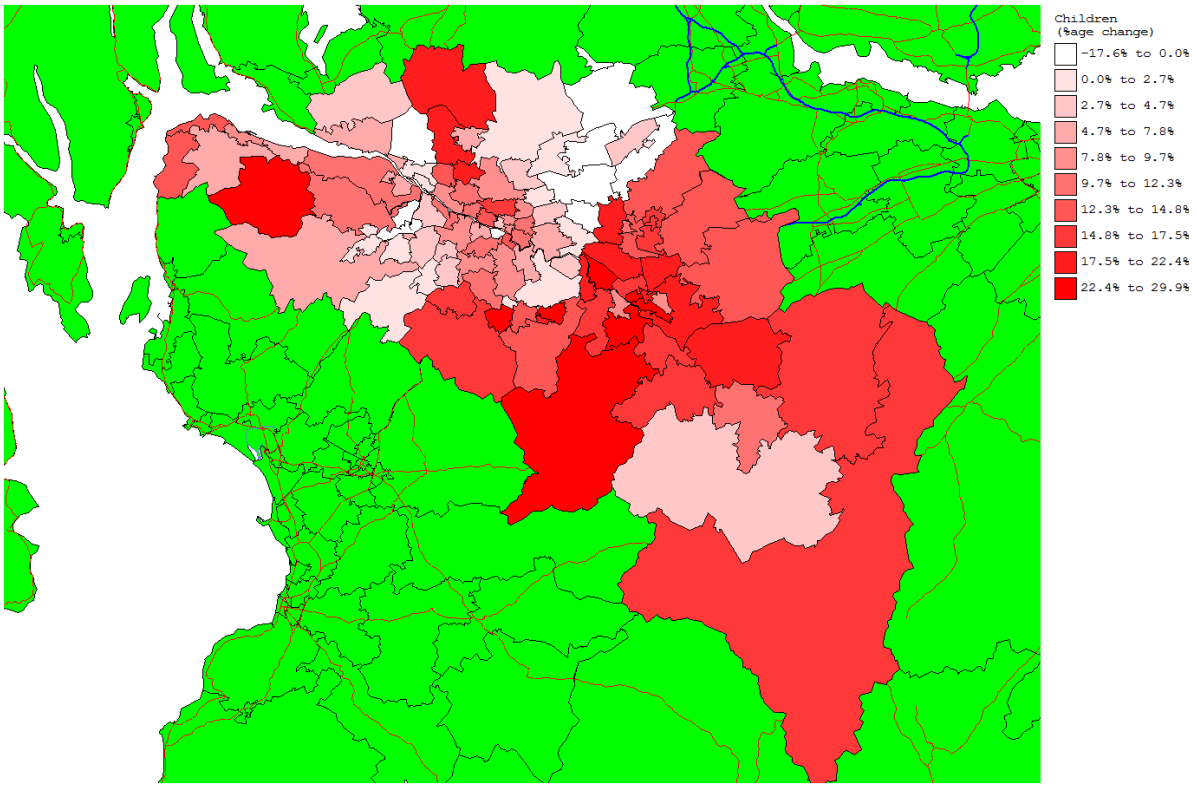
Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast Model. This comparison of nominal employment reflects the overall jobs evaluation. Both scenarios show very similar graphs with absolute numbers very similar and both growing from 2013 onward. Only a difference of 1,253 employment at 2021 and 1,522 employment at 2031. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher employment but this is

clearly not the case. Again IG does not produce the number of jobs to justify the population growth.

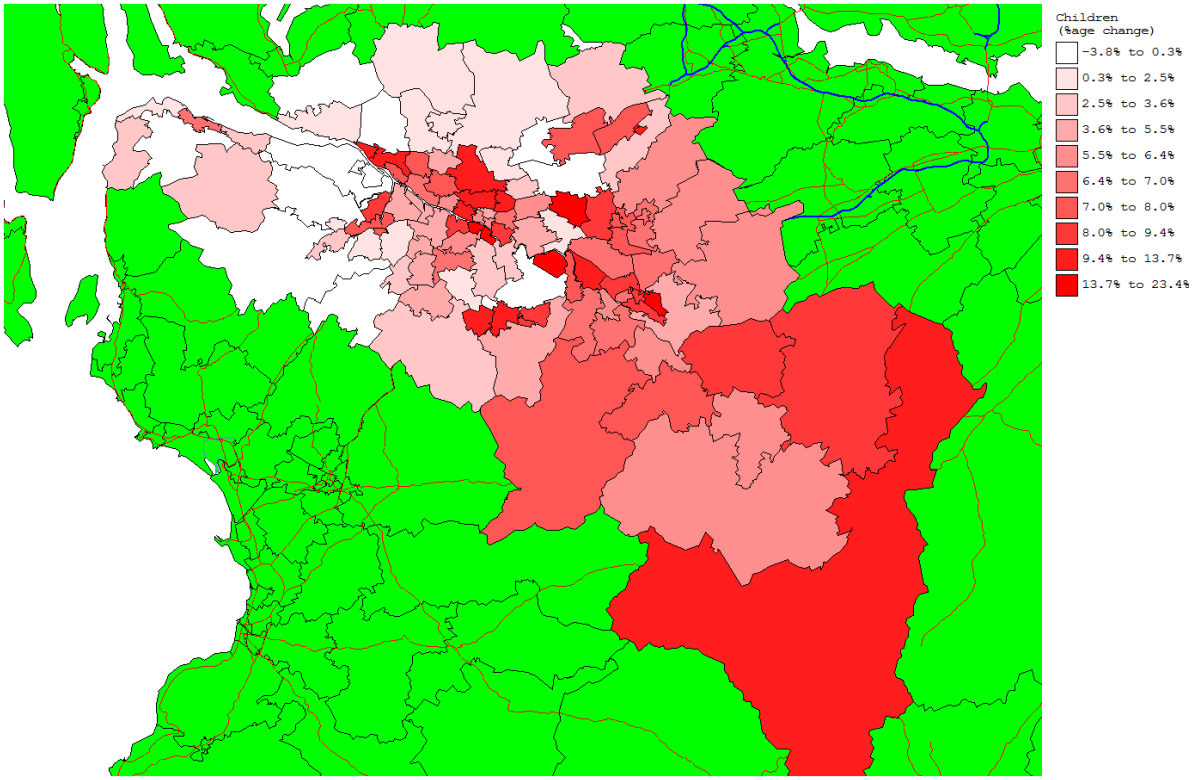
Spatial Analysis: The absolute numbers are very small differences and therefore the spatial distribution of this small number is probably not particularly significant but it does indicate that these additional jobs are distributed from the south and east towards the north and west. The 2031 distribution shows additional jobs along the Clyde Waterfront. Again caution as these are small absolute numbers.

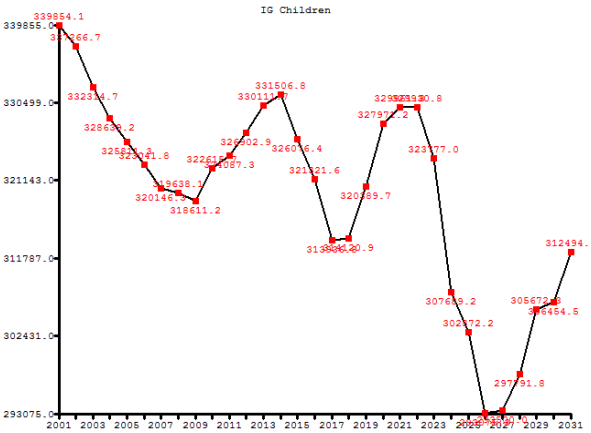
IG v IF Children

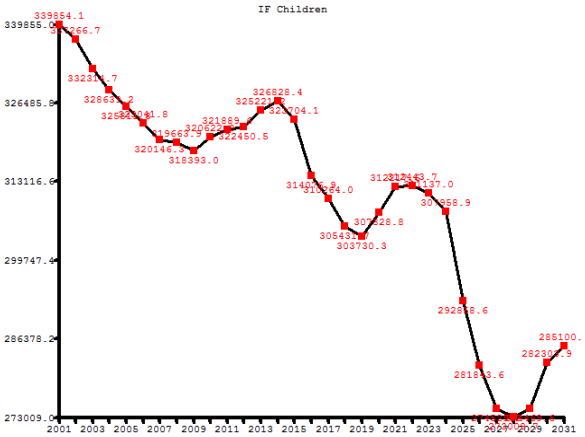
2031



2021







Children	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	321889	312214	-9675	285100	-36789
Scenario IG	322615	327971	5346	312494	-10121
Scenario IA	319909	309768	-10141	282737	-37172

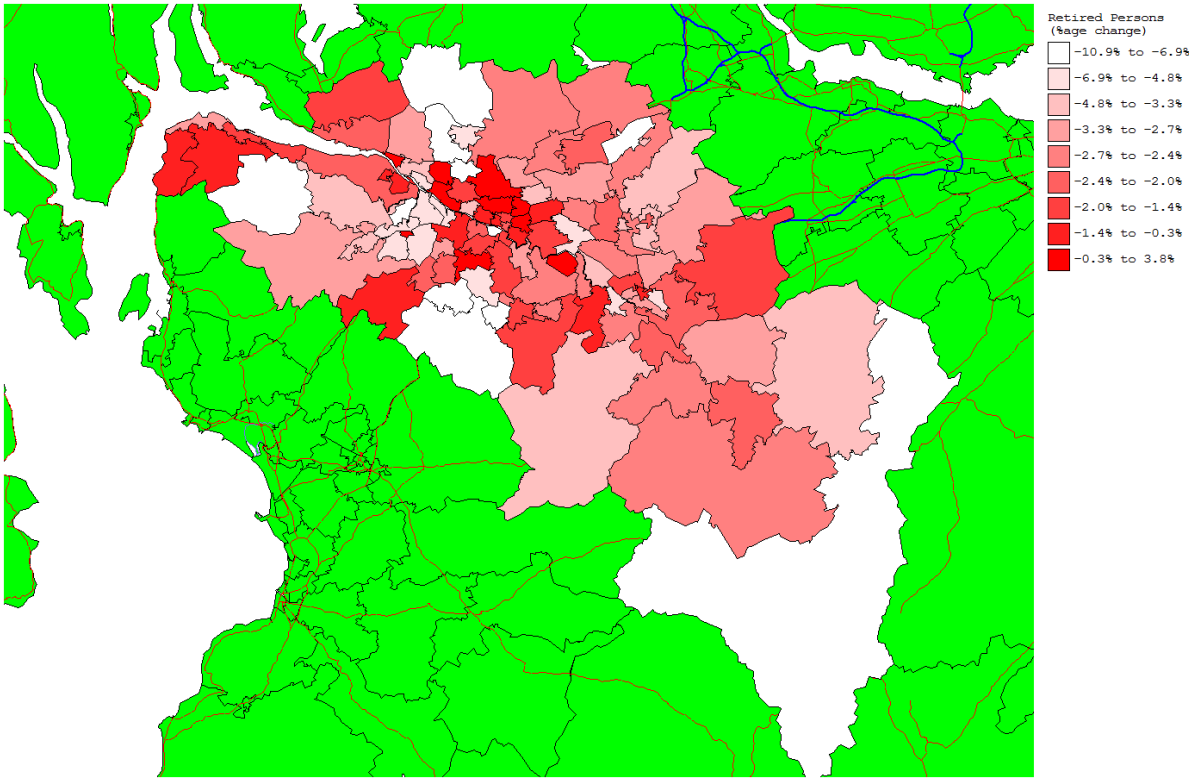
Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast Model. Both Graphs show a similar overall downward pattern in the number of children. However this has to be related to an overall growth in both scenarios in total populations with the simple conclusion that while overall populations grow under both scenarios the number of children continue to decrease. This is a general demographical feature (reduced fertility rates) but there are patterns within each scenario. Scenario IF

shows a 10,000 fall by 2021 and a 37,000 fall by 2031. Scenario IG shows a slight increase at 2021 by 5,000 and a fall by 10,000 by 2031. This results in a difference of some 26,000 additional children in Scenario IG by 2031 and obviously implications for social welfare and schooling.

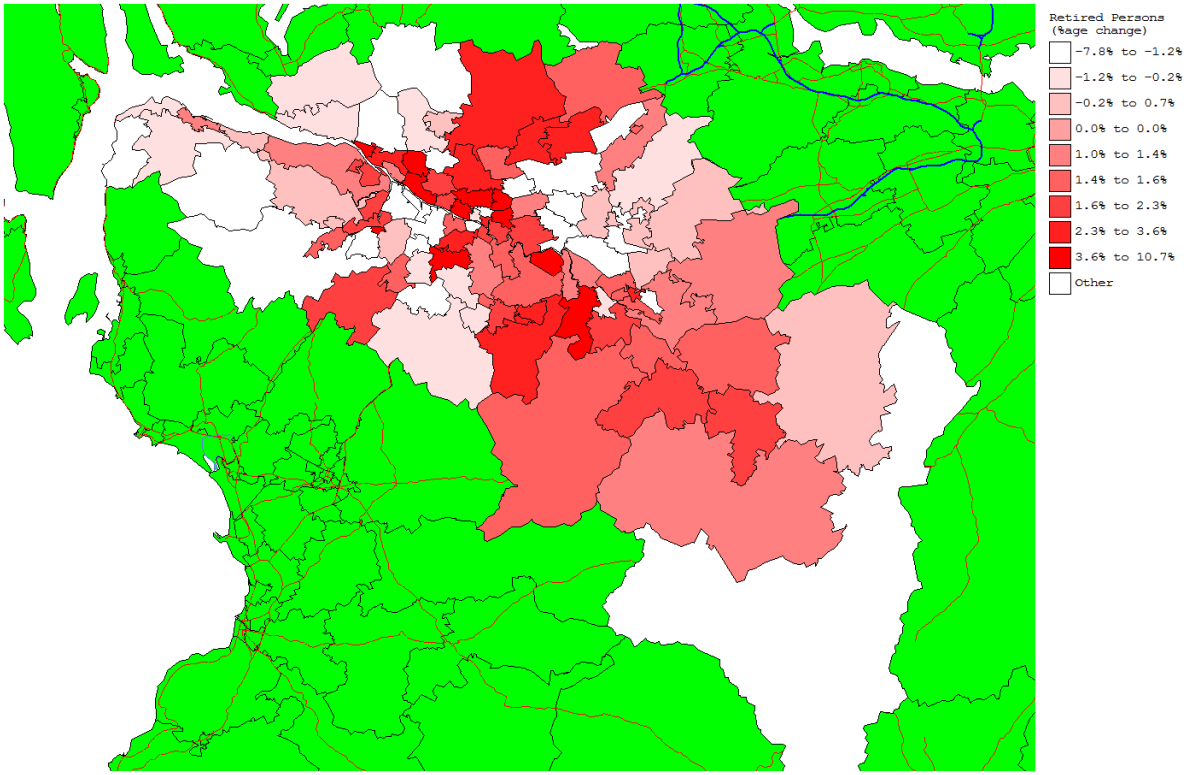
Spatial analysis: The overall numbers of +15,000 at 2021 and +26,000 at 2031 have been allocated by the SITLUM model very much reflecting the overall population distribution as would be expected. The 2021 pattern shows additional in children located in and around the City centre and south of Glasgow while the 2031 pattern shows Glasgow City growth and growth in North and South Lanarkshire.

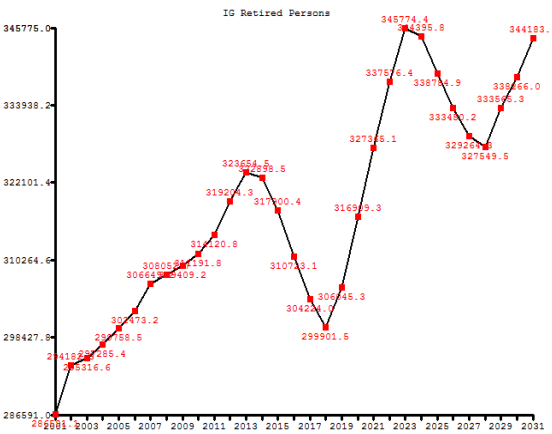
IG v IF Retired Persons

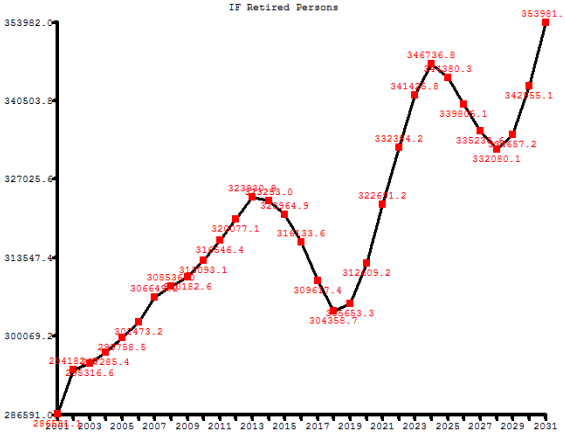
2031



2021







Retired	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	319546	322611	3065	353981	34435
Scenario IG	314120	327345	13225	344183	30063
Scenario IA	318284	325656	7372	362193	43909

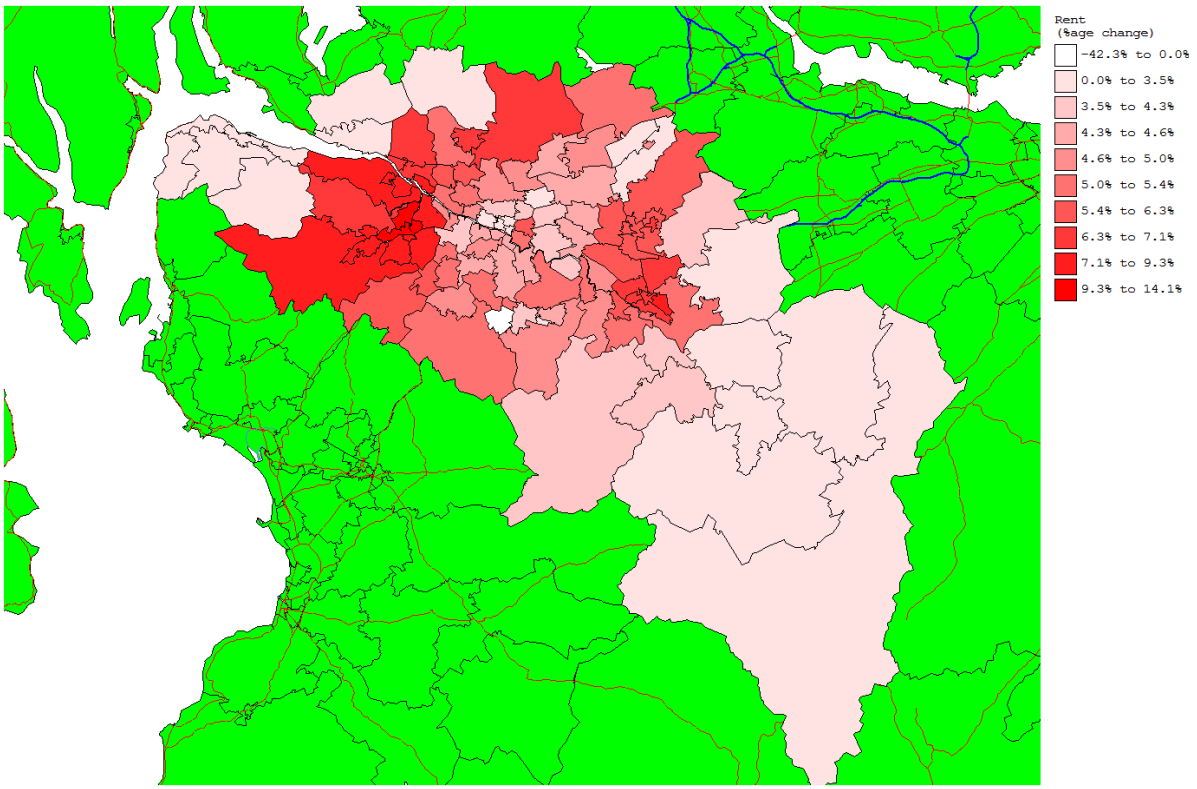
Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast Model. Both Graphs show a similar overall upward growth pattern in the number of retired people. However this has to be related to an overall growth in both

scenarios in total populations with the simple conclusion that while overall populations grow under both scenarios the number of retired people continue to increase. Scenario IF increases by 3,000 by 2021 and by 34,500 by 2031 while Scenario IG increases by 13,000 by 2021 but only to 30,000 by 2031.

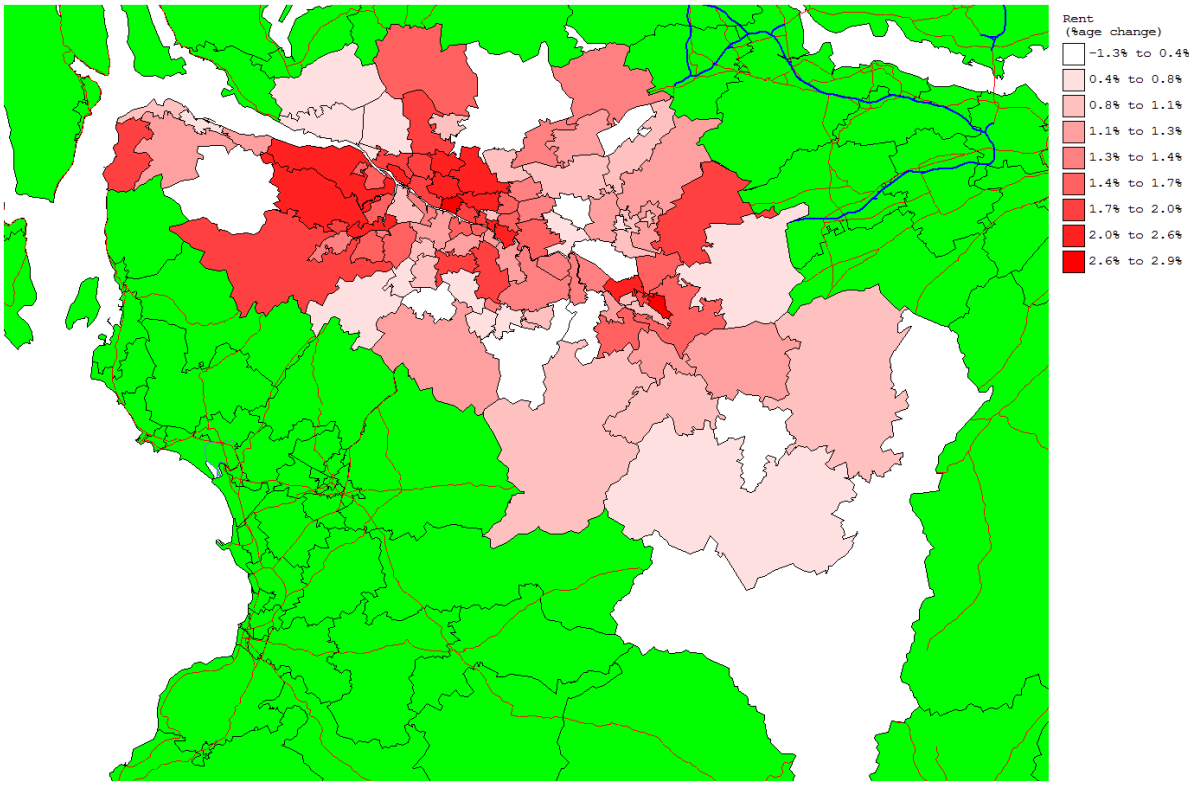
Spatial Analysis: The overall differences +10,000 at 2021 and - 4,500 at 2031 are relatively modest numbers but rental levels will be important in attracting more retired to an area (rather than the pull of job opportunities and accessibility to these jobs). The 2031 pattern shows an overall negative (IF higher than IG) with additional retired people attracted by IF towards the City Centre, Clyde Waterfront, East Dunbartonshire and South Lanarkshire. (IG would be the reverse of this pattern).

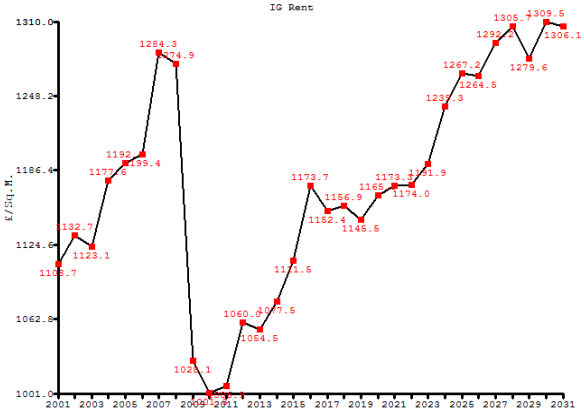
IG v IF Rent

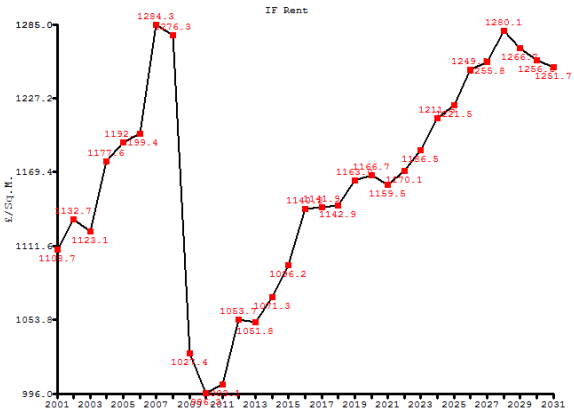
2031



2021







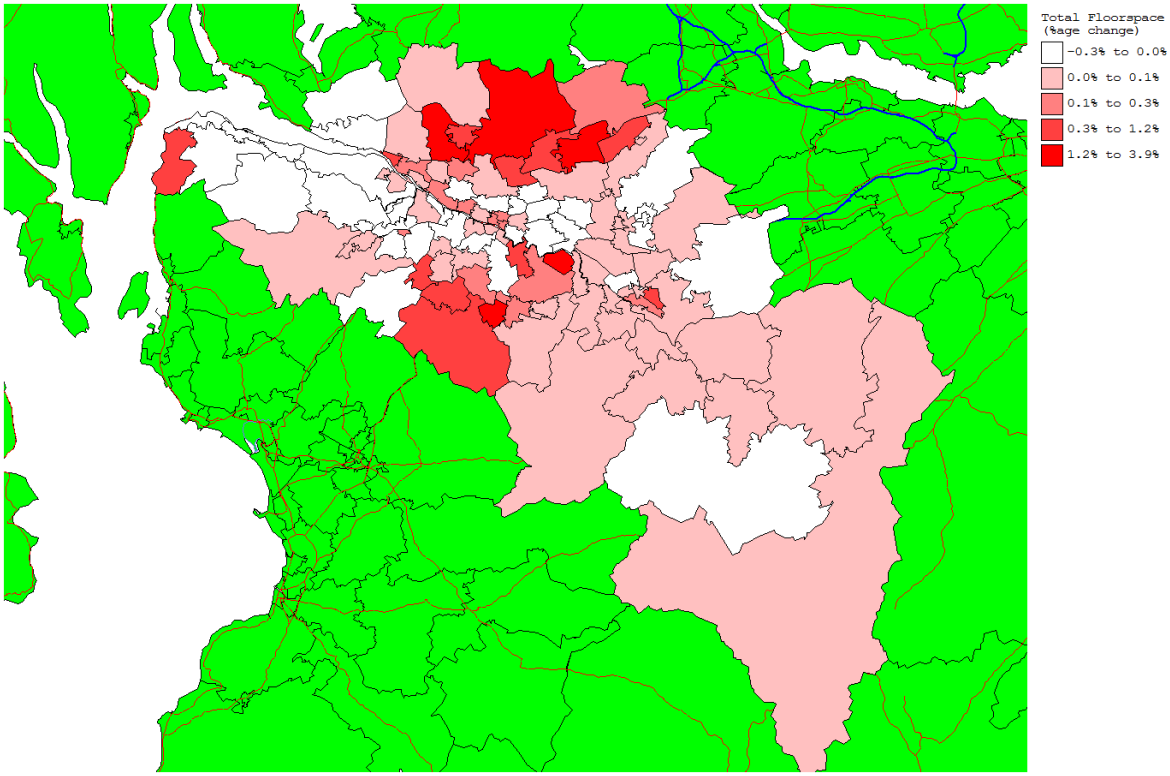
Rent £	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	996	1159	163	1251	255
Scenario IG	1001	1173	172	1306	305
Scenario IA	1012	1211	199	1378	366

Comment: This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast Model. Both Graphs show a strong increase in rental values from 2011 but differences are marginal. Scenario IG generates an additional +£9 per m2 at 2021 and an additional +£50 per m2 at 2031. Not particularly significant improvement by Scenario IG given the much higher population and perhaps reinforces that IG creates less economic growth than the additional population justifies.

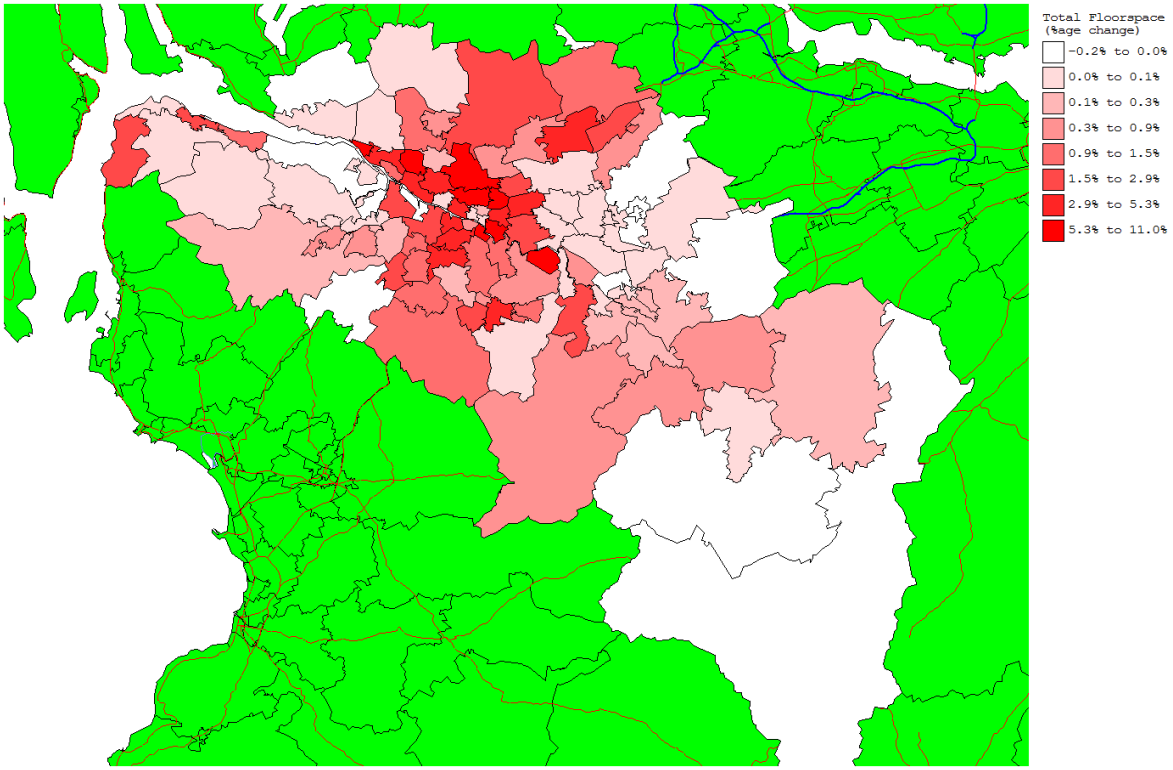
Spatial Analysis: The SITLUM model allocates the additional £9 per m2 at 2021 and £50 per m2 at 2031 generated by Scenario IG. Relatively small numbers but the pattern shows at 2021 additional rentals along the Clyde Waterfront at Renfrewshire and West Dunbartonshire. The 2031 pattern again focuses on higher rental values along the Clyde Waterfront, Renfrewshire and West Dunbartonshire.

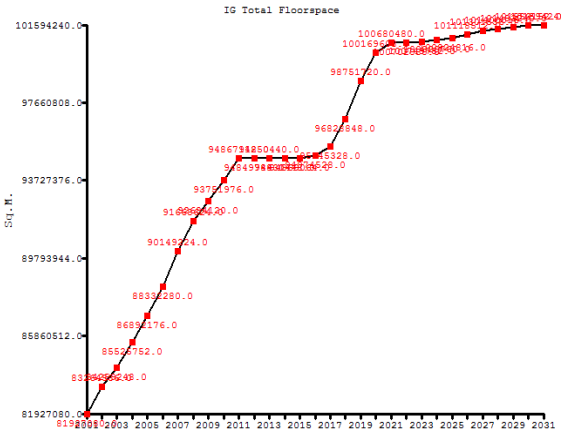
IG v IF Total Floorspace

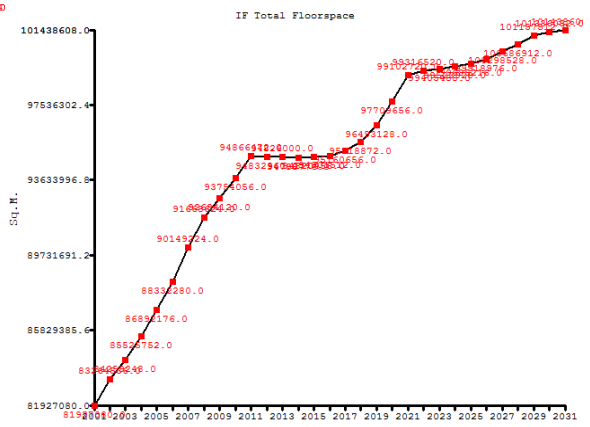
2031



2021







Total Floorspace m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	94866871	99102720	4235849	101438608	6571737
Scenario IG	94867944	100680480	5812536	101594240	6726296
Scenario IA	94851916	98318421	3466505	101611560	6759644

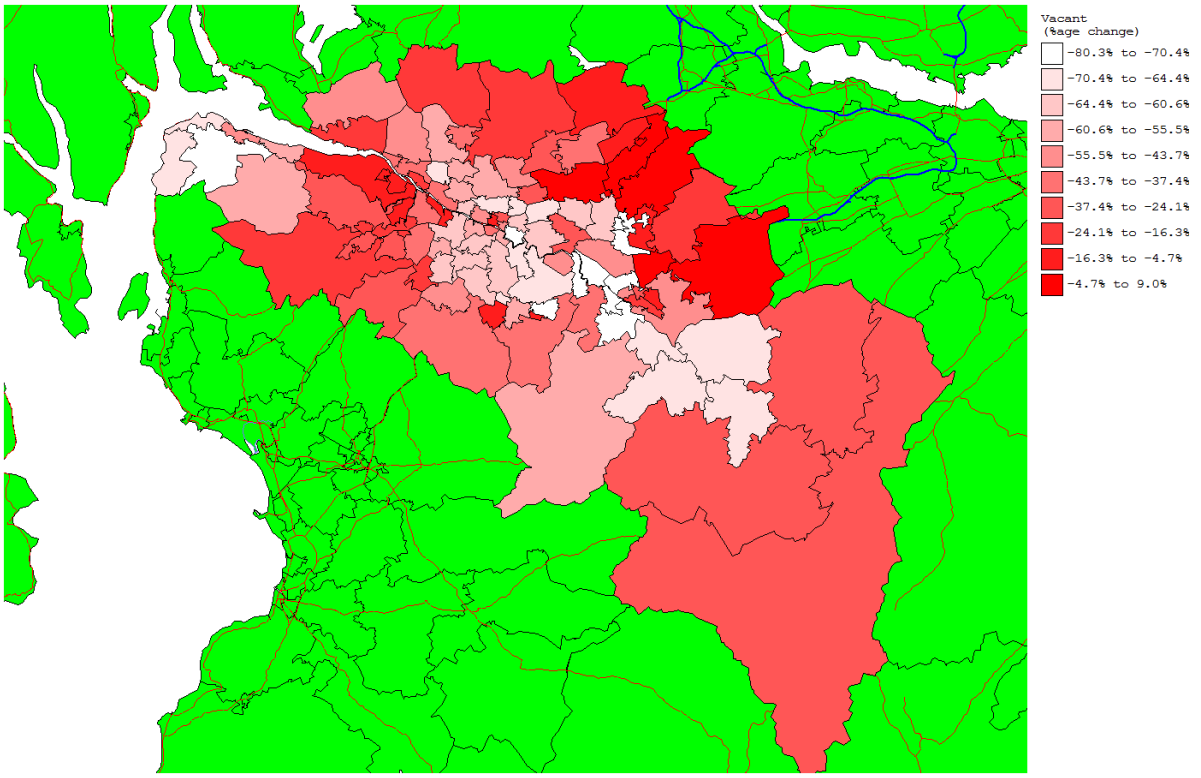
Comment: : This Scenario comparison sets Scenario IF OE Lower Migration (Planning 1) scenario as the Base Model and set against Scenario IG OE Higher Migration (Planning 2) scenario as the Forecast Model. The Graphs show similar patterns with floorspace growth flat between 2011 and 2018 and then strong growth after that up to 2031. In terms of absolute growth figures both scenarios are very similar. Scenario IF shows growth of 4.24 million m2 at 2021 and growth of 6.57 million m2 at 2031. Similarly Scenario IG shows growth of 5.81 million m2 at 2021 and 6.72 million m2 at 2031. Scenario IG therefore

generates a modest increase in floorspace compared to Scenario IF of + 2.33 million m2 at 2031 and 0.91 million m2 at 2031.

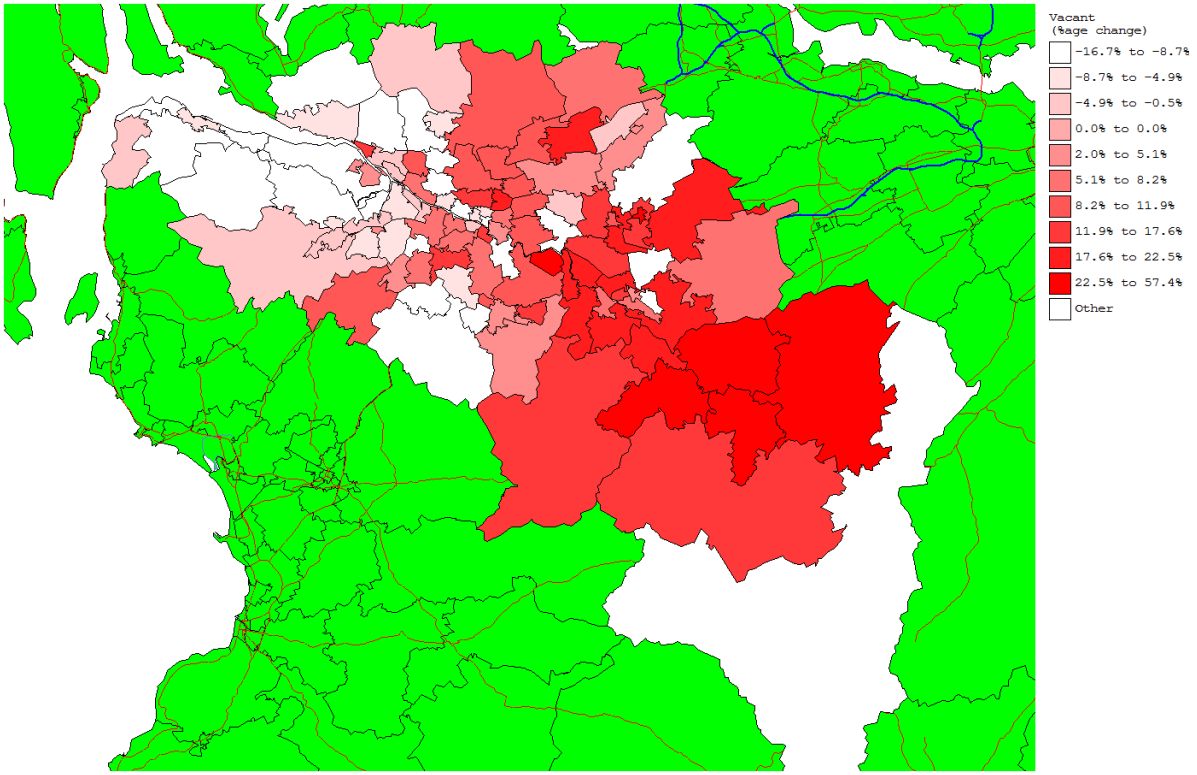
Spatial Analysis: SITLUM allocates spatially the additional floorspace generated by IG at 2.33 million m2 at 2021 and 0.91 million at 2031. Relatively modest % change up to 2021 – only 11% maximum change and only 4% maximum change by 2031. The spatial pattern at 2021 shows Scenario IG increase floorspace capacity around Glasgow East End, the Clyde Waterfront and East Dunbartonshire. The 2031 pattern focuses this additional floorspace to the north of Glasgow – East Dunbartonshire and to the south of Glasgow – East Renfrewshire. The relative growth figures are modest and caution is required and perhaps more relevant is not new floorspace but the effect on existing floorspace occupation between the two scenarios.

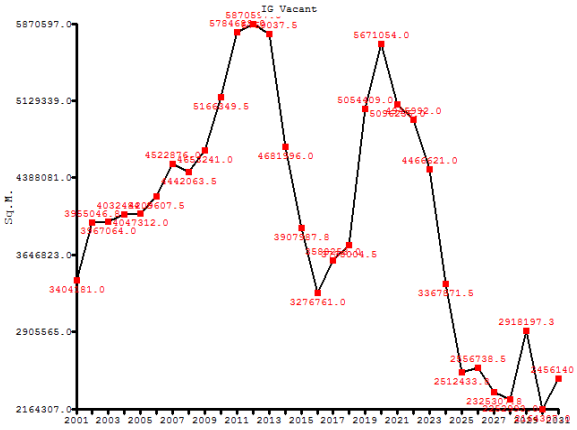
IG v IF Vacant Floorspace

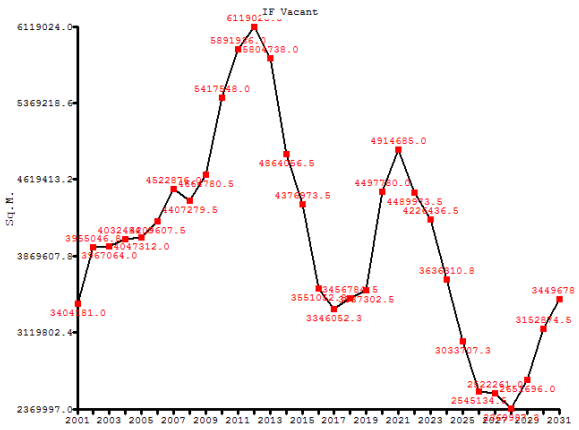
2031



2021







Vacant (M2)	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	5891986	4497780	-1394206	3449678	-2532308
Scenario IG	5784632	5671054	-113578	2456140	-3328492
Scenario IA	5903429	3943055	-1960374	2649724	-3152705

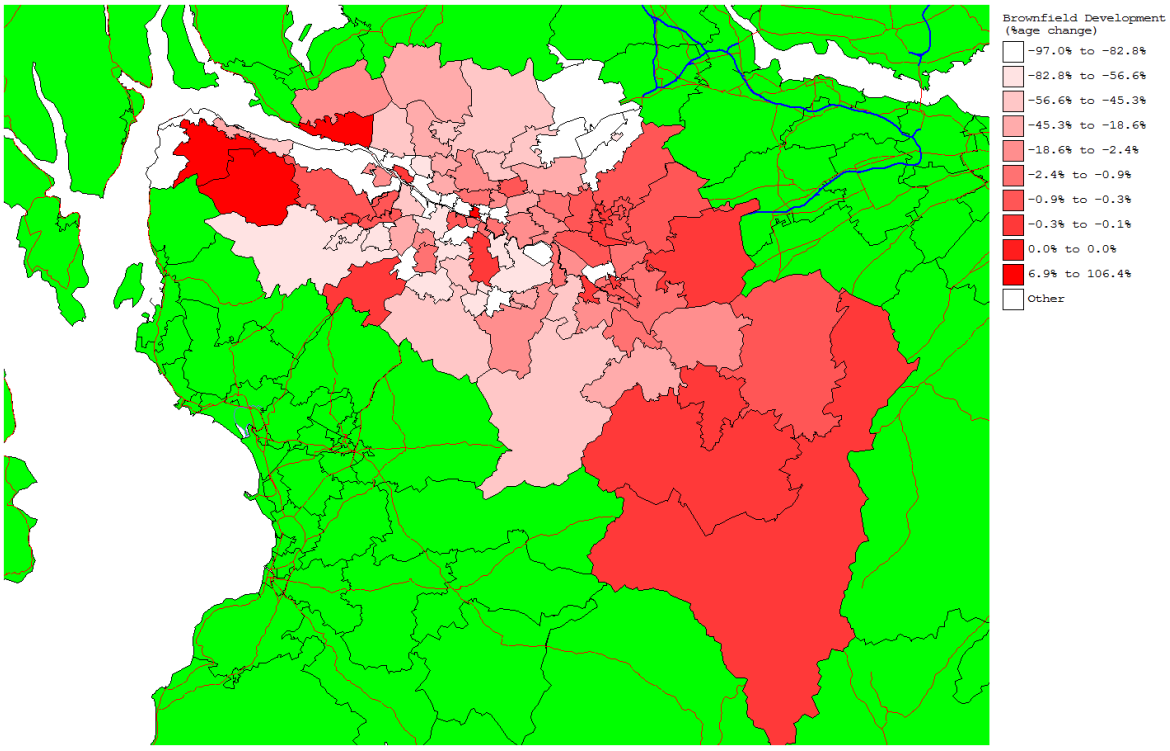
Comment: This Scenario comparison sets the OE Lower Migration (Planning 1) scenario as the Base and set against the OE Higher Migration (Planning 2) scenario as the Forecast. The graphs show similar patterns with a peak of vacant floorspace at 2011 a fall in 2016 and a further peak in 2021 followed by a further fall to 2031. Our snapshots at 2011, 2021 and 2031 pick up on the peaks at 2011 and 2021. At 2011 both scenarios have a similar peak in absolute numbers - IF at 5.89 million m2 and IG at 5.78 million m2. The 2021 peaks however show that scenario IG generates a higher amount of extra vacant floorspace of 1.18 million

m2. At 2031 the position is reversed with Scenario IF generating higher vacant floorspace of 0.79 million m2.

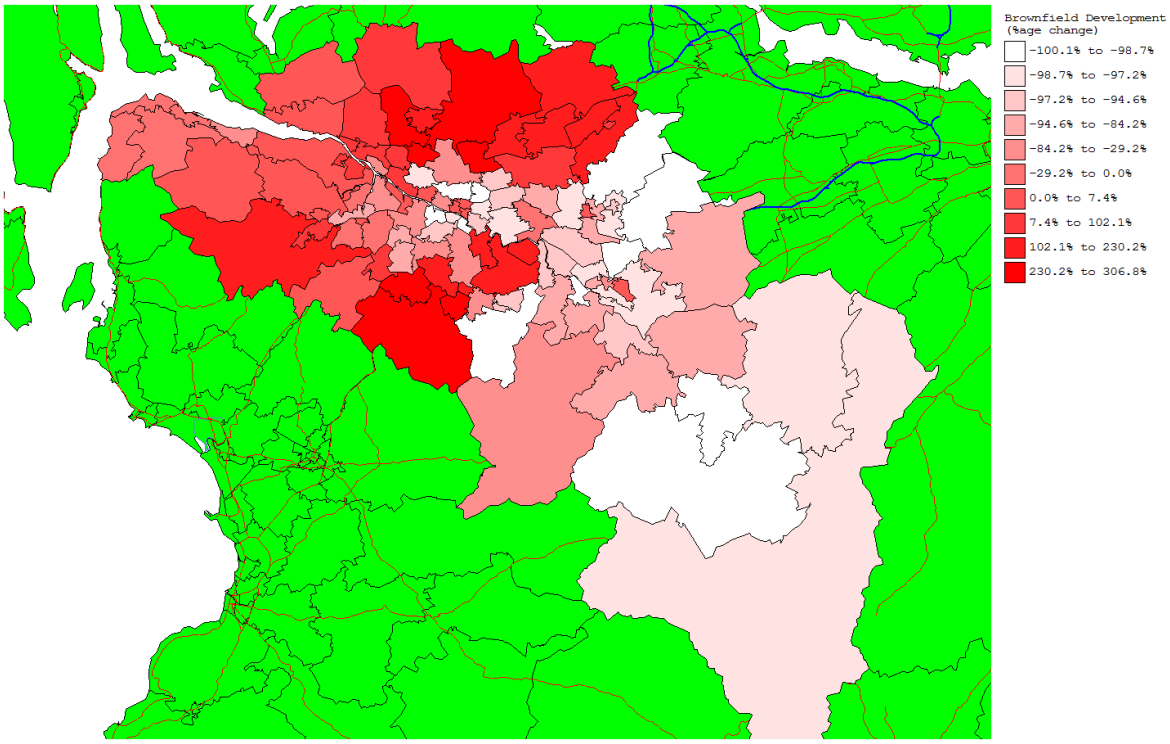
Spatial Analysis: SITLUM allocates the extra 1.18 million vacant floorspace at 2021 generated by IG and shows the spatial effect of the two scenarios different peaks – It would be North and South Lanarkshire, the East End and East Dunbartonshire i.e. the east of the conurbation which would have higher vacancy rates under Scenario IG. The 2031 spatial effect is quite different and has to be seen as a reverse where Scenario IF would generate higher vacancy rates and allocates the relatively modest 0.79 million extra vacancy towards the lighter shaded areas on the map i.e. East End, parts of North and South Lanarkshire and Inverclyde. Again caution as we are dealing with relatively small absolute numbers.

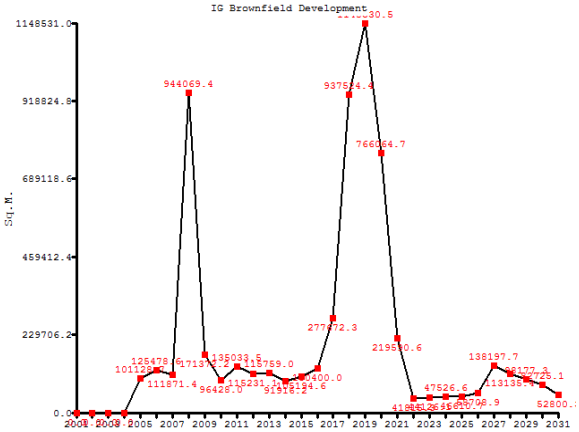
IG v IF Brownfield Development

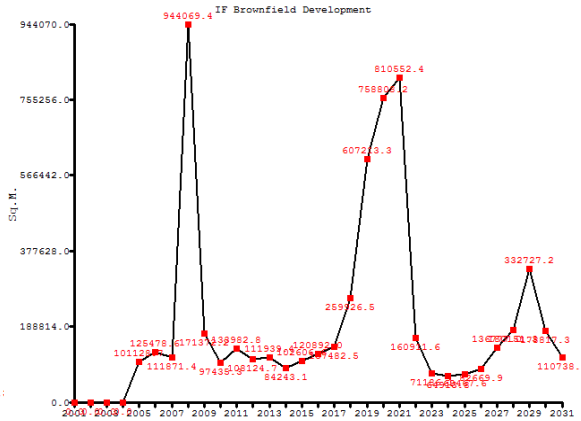
2031



2021







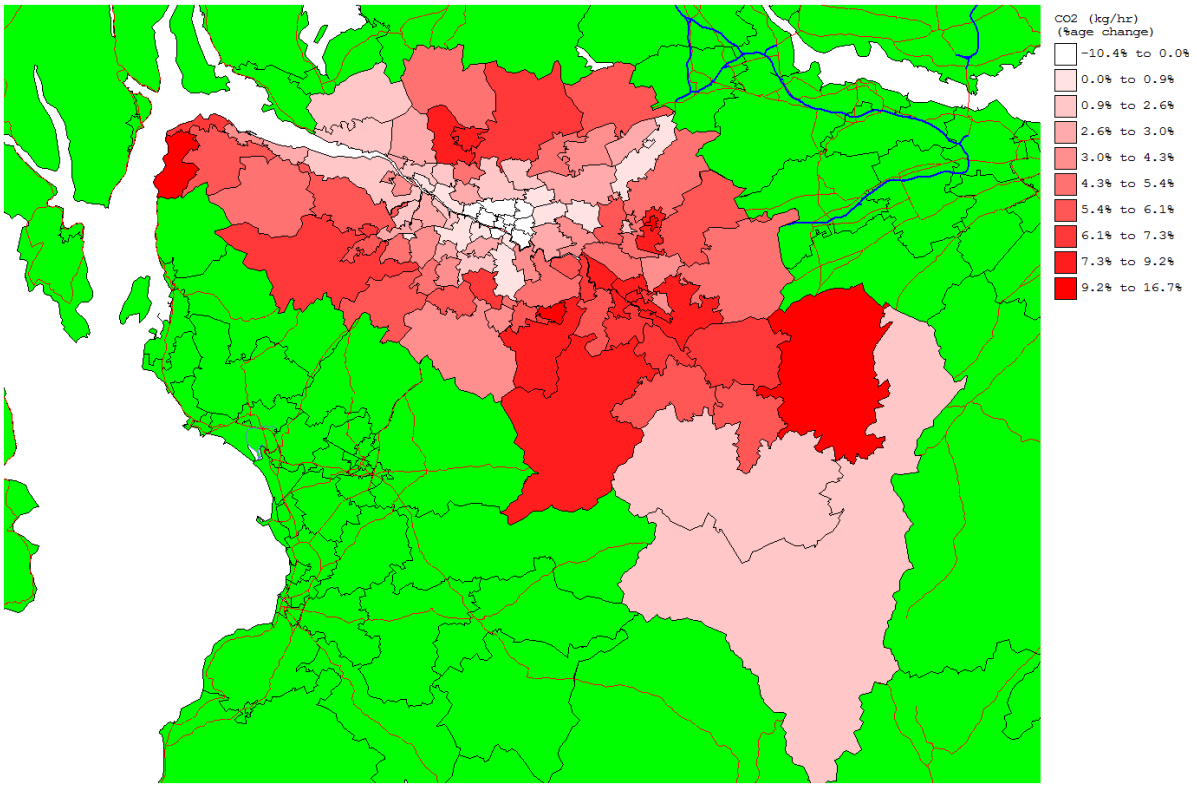
Brownfield Development m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	136982	810552	673570	101738	-35244
Scenario IG	135033	219920	84917	52800	-82233
Scenario IA	128163	276215	148052	169653	41490

Comment: This Scenario comparison sets the OE Lower Migration (Planning 1) scenario as the Base and set against the OE Higher Migration (Planning 2) scenario as the Forecast. The graphs show a similar pattern but the relative peaks are different in scale. Both 2011 positions are similar following the crash of 2008 and both show a peak of brownfield development occurring in 2020/21. These are very dynamic graphs with large volatility. The Scenario IG peaks at 2019 while the Scenario IF peaks at 2021. This creates a very

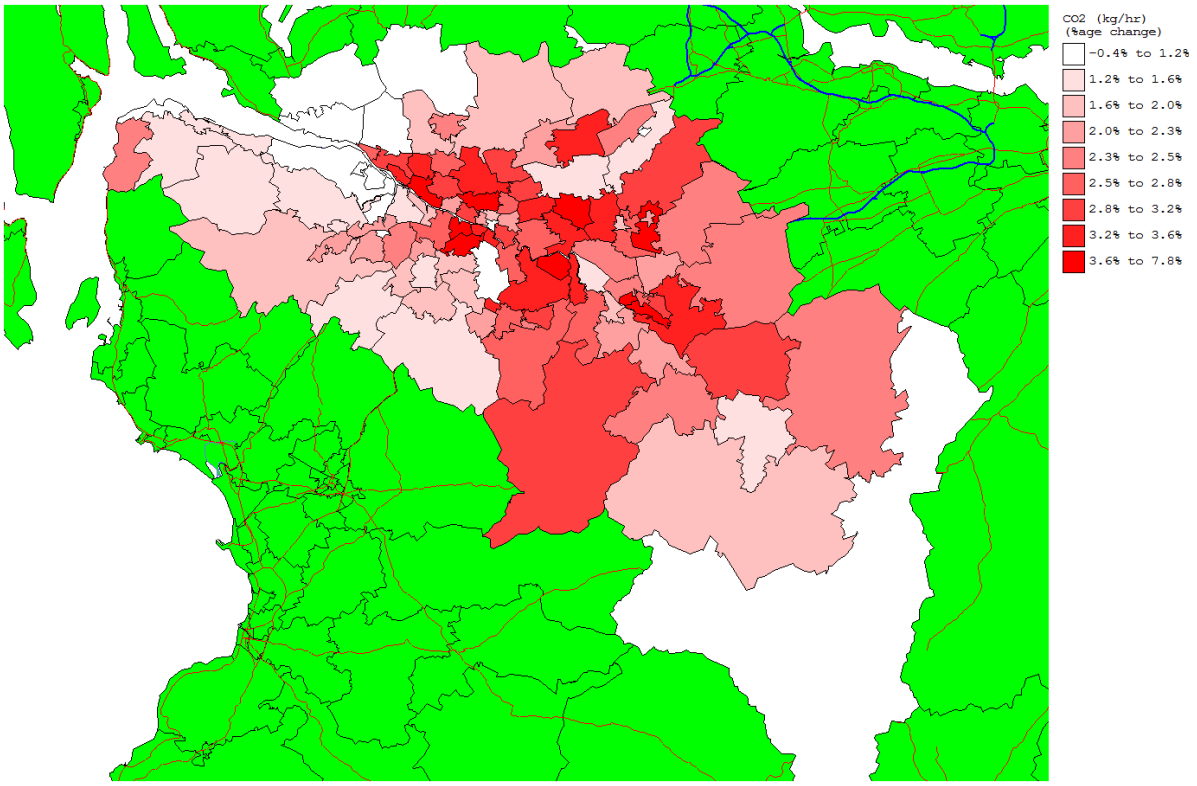
distorted picture at our snapshot view at 2021. In general IG peak at 2019 is higher than the IF 2021 peak and there is probably little extra to be learned from this graph. The spatial analysis of the snapshot positions at 2021 and 2031 are distorted and therefore little use in detecting a spatial pattern.

IG v IF CO2

2031



2021



Comment: : This Scenario comparison sets the OE Lower Migration (Planning 1) scenario as the Base and set against the OE Higher Migration (Planning 2) scenario as the Forecast. Absolute value graphs are not available for CO2 figures but as a guide we have the relative % changes between the two scenarios. The 2021 position is that Scenario IG generates a relative greater amount of CO2 of between -0.4% to 7.8%. The 2031 position is that Scenario IG generates between -10.4% to 16.7%.

Spatial Analysis: At 2021 Scenario IG generates more CO2 than Scenario IF and this additional CO2 is distributed and centralised along the central conurbation corridor. The 2031 situation is slightly different as the extra CO2 generated by Scenario IG is more widely distributed in all areas with the exception of the City Centre and focused on the East End corridor and North and South Lanarkshire.

Overall Conclusion on comparing**: Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs **Scenario IF** – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration).

Scenario IF is the Base Model and Scenario IG is the Forecast Model (Both Permissable)

Scenario IG has at it's base a more optimistic population forecast compared to Scenario IF and therefore it would be anticipated all thing being equal that it would generate more positive outputs especially in terms of economic growth and future development levels. The additional 95,000 people attracted to the area by Scenario IG benefit all parts of the conurbation but there is a concentration of additional population around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). The effect of the opening of the M74 in June 2011 may be the reason for the increase in accessibility for the south of Glasgow. Of greatest interest is that Scenario IG only creates a difference of

1,239 jobs at 2021 and 1,522 jobs at 2031. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher jobs but this is clearly not the case. IG does not produce the number of jobs which would reflect and justify the population growth. These additional jobs are focused to the North and West of the conurbation. However the working population only grows by 18,000 by 2031 and that is a very poor return for an additional 95,000 population. It is the Non-Working Adults that shows the real difference between these two scenarios. This produces an astonishing difference between the two scenarios. IG generates + 30,000 more “unemployed “ by 2021 and +95,000 by 2031! The implications are that while IG is successful in attracting in additional population of 95,000 by 2031 compared to IF these additional people are not in employment. Scenario IF while producing less population overall does provide jobs for the incoming population sufficient to gradually reduce unemployment. The implications are that IG generates population growth but not the required economic activity and therefore jobs to employ them with the result that this will simply add to the welfare budget and not to economic growth. This will also have an impact on social housing and transport movements (additional unemployed travel pattern will be different from employed – less travel overall, less commuting, more use of Public Transport, more travel off peak). However the small amount of extra economic activity/ jobs that Scenario IG generates as also shown by the increased rentals is focused along the Clyde Waterfront, Renfrewshire and West Dunbartonshire.

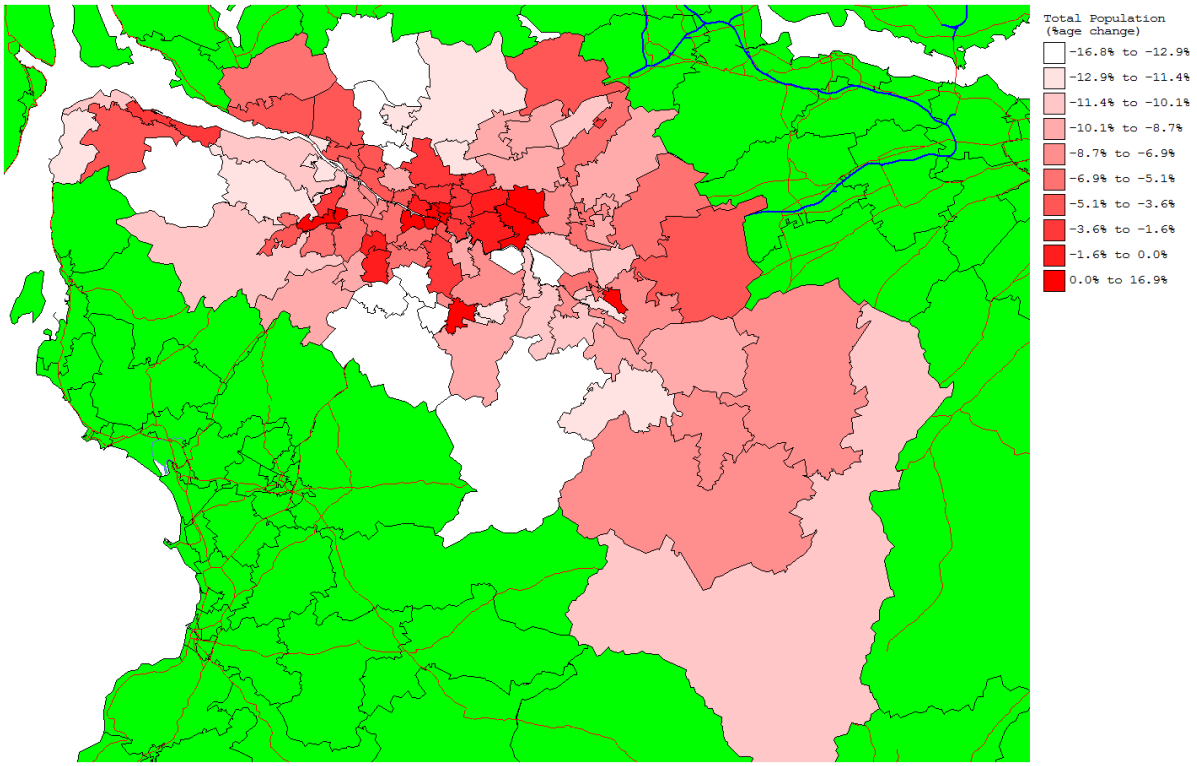
3E. IA v IG at 2021 and 2031

Scenario IA – Rebalanced Economy +M74 Network Vs Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario)

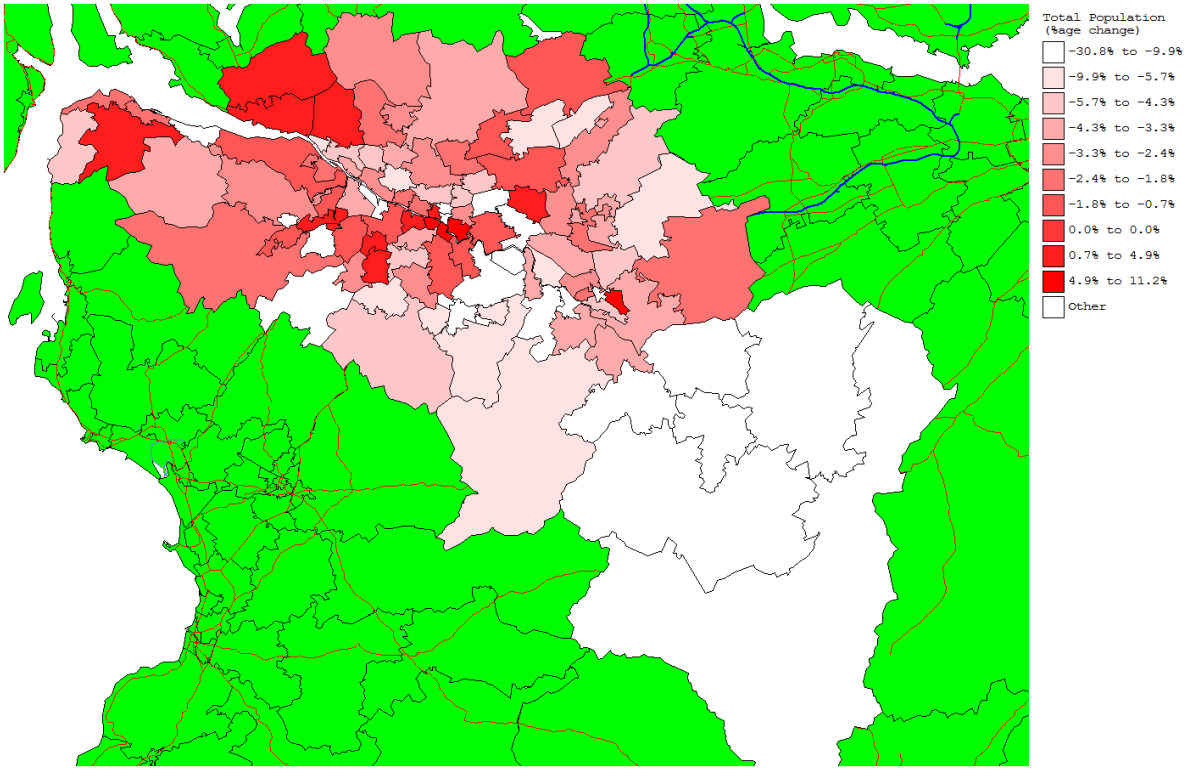
Scenario IG is Base Model and Scenario IA is Forecast Model (Both Permissible)

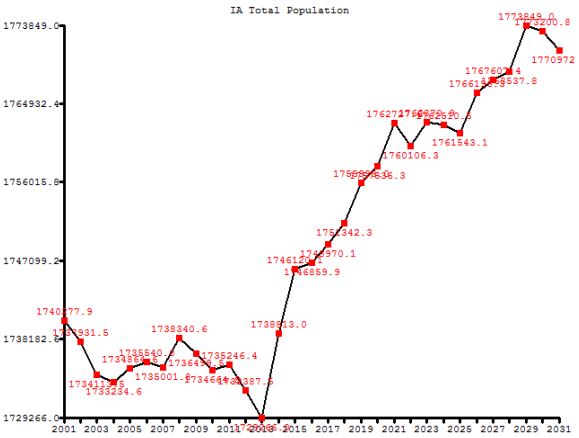
IA v IG Total Population

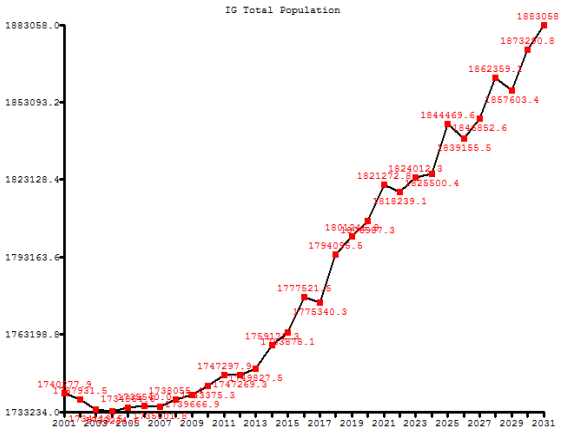
2031



2021







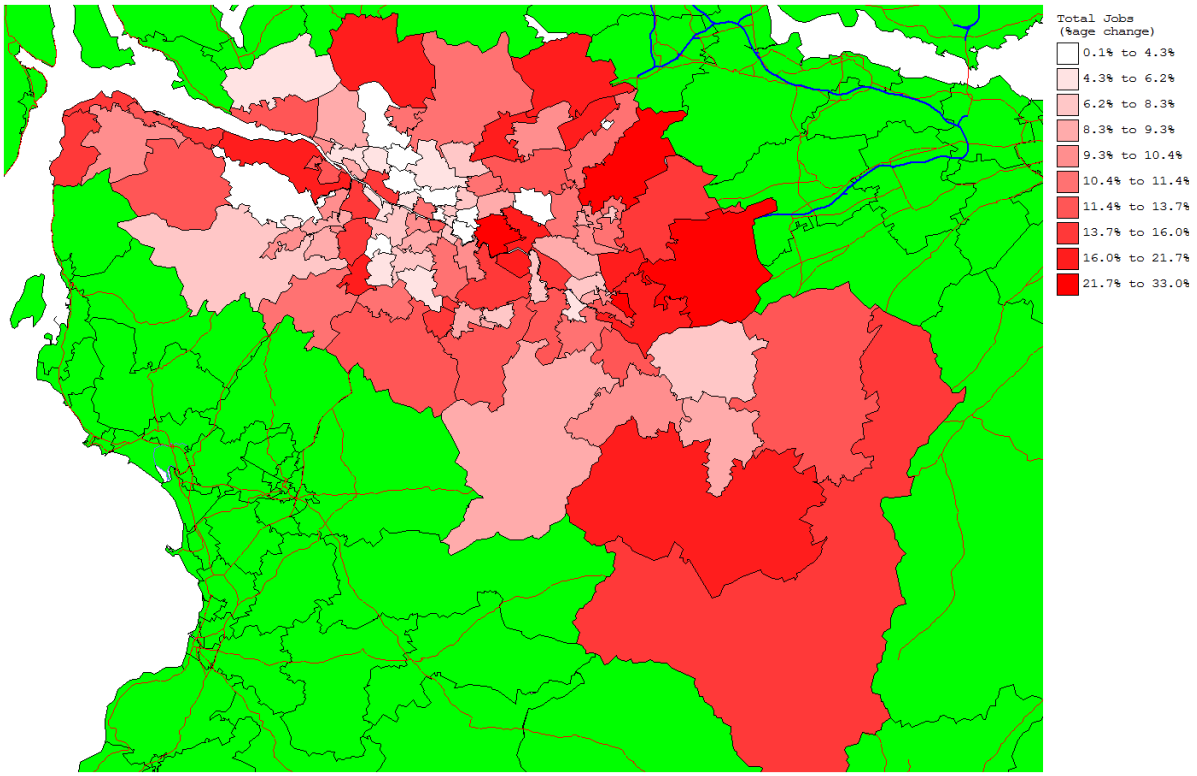
Total Populaton	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	1732985	1758708	25723	1772367	39382
Scenario IG	1747297	1821272	73975	1883058	135761
Scenario IA	1735246	1762727	27481	1770972	35726

Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs show both scenarios with a strong positive population growth pattern up to 2031. Scenario IG forecasts an increase of 73,975 by 2021 and by 135,761 by 2031. Scenario IA's forecasts are not quite as strong – an increase of 27,481 by 2021 and by 35,726 by 2031. The difference being that Scenario IG forecasts a higher growth of an additional 46,494 by 2021 and a difference of 100,000 by 2031.

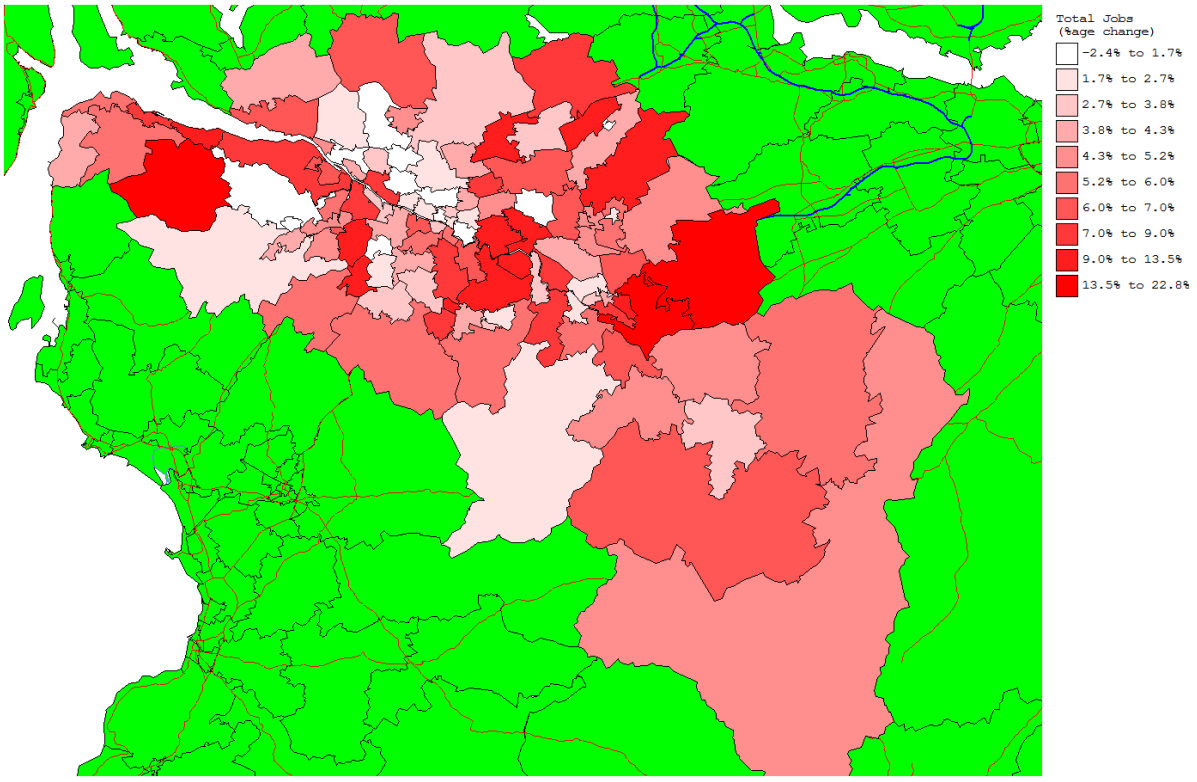
Spatial Analysis: The SITLUM model distributes the additional 46,494 generated by Scenario IG at 2021. Scenario IG is the base and is compared to the forecast Scenario IA. In this case Scenario IA will be negative in relation to the more positive Scenario IG figures. The new pattern shows that the additional population produced by Scenario IG will flow from the north and west of the conurbation towards the south and east which will see increasing population growth. At 2031 the additional 100,000 population generated by Scenario IG will focus into all areas but especially the zones surrounding Glasgow City. Glasgow City seeing a population flow out to the surrounding areas.

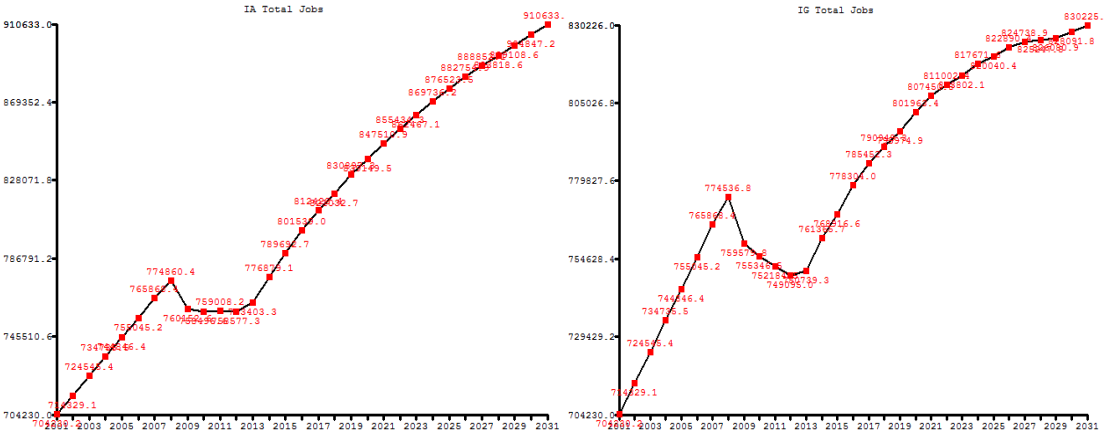
IA v IG Total Jobs

2031



2021





Total Jobs	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806228	50865	828721	73358
Scenario IG	755346	807450	52104	830226	74880
Scenario IA	759008	847510	88502	910633	151625

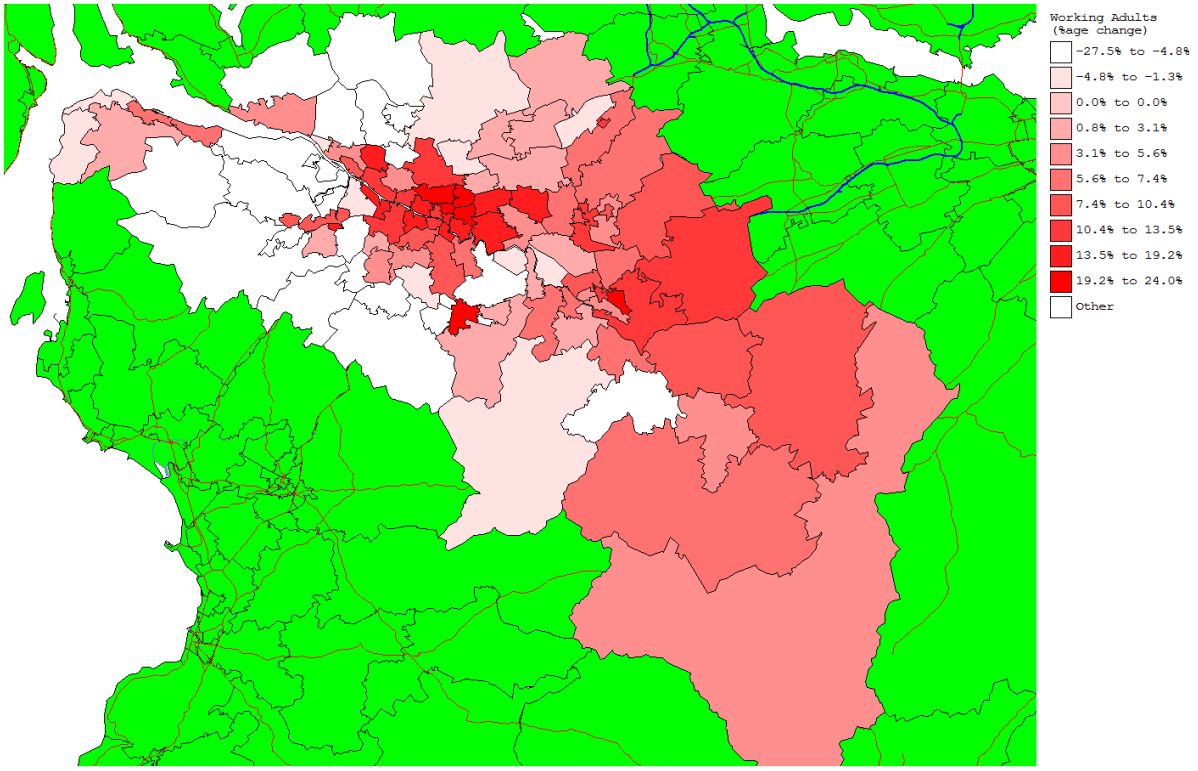
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs show a similar growth pattern and positive job growth forecasts. However there are notable absolute figure differences. Scenario IG forecasts growth of an additional 52,000 jobs by 2021 and by an additional 74,800 jobs by 2031. Scenario IA produces even more optimistic forecasts of +88,500 jobs by 2021 and 151,625 jobs by 2031. The difference between these two forecasts is that Scenario IA

generates 36,398 additional jobs by 2021 compared to Scenario IG and an additional 76,745 jobs by 2031.

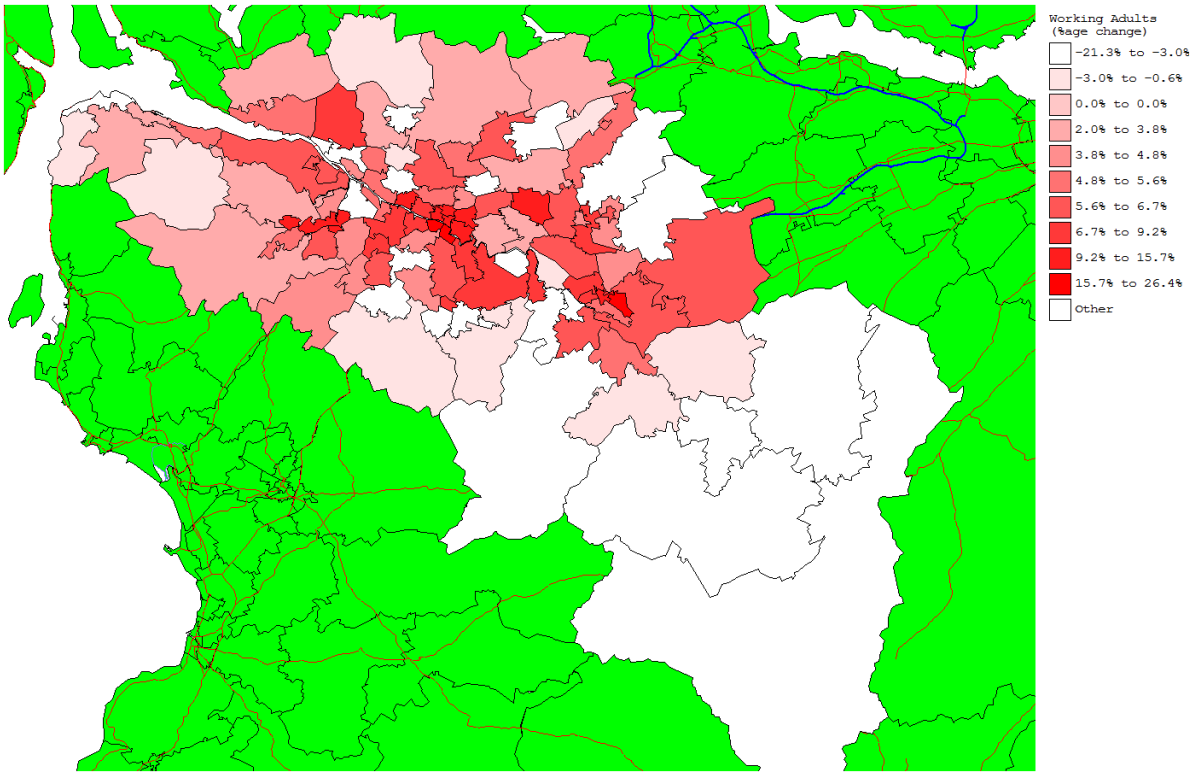
Spatial Analysis: The SITLUM model distributes the additional 36,398 at 2021. This time Scenario IA is positive and therefore the flow is generally positive – from white to dark red on the map. At 2021 Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde. At 2031 the additional 76,745 jobs generated by Scenario IA benefit virtually all areas in the conurbation area and intensify in those areas described in the 2021 assessment.

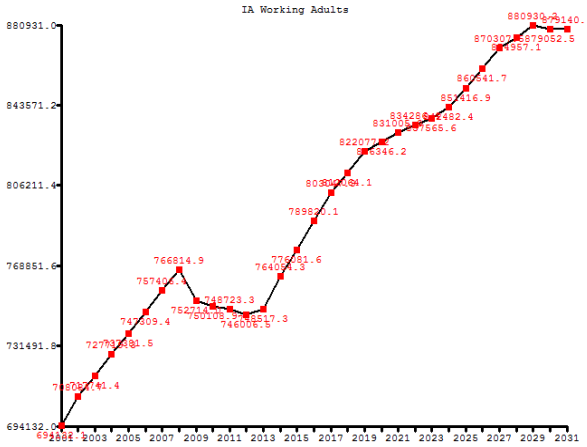
IA v IG Working Adults

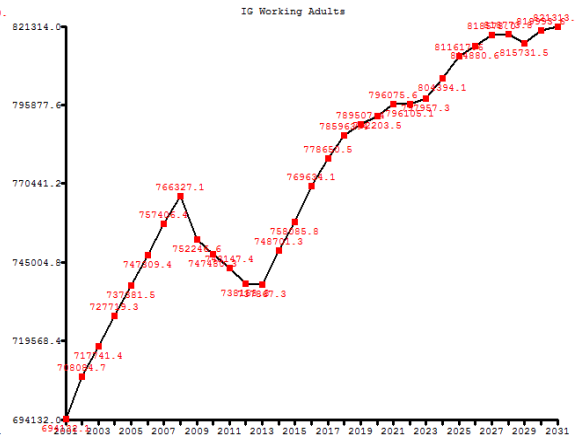
2031



2021







Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	747175	789530	42355	802664	55489
Scenario IG	747480	796075	48595	821314	73591
Scenario IA	748723	831005	82282	879140	130417

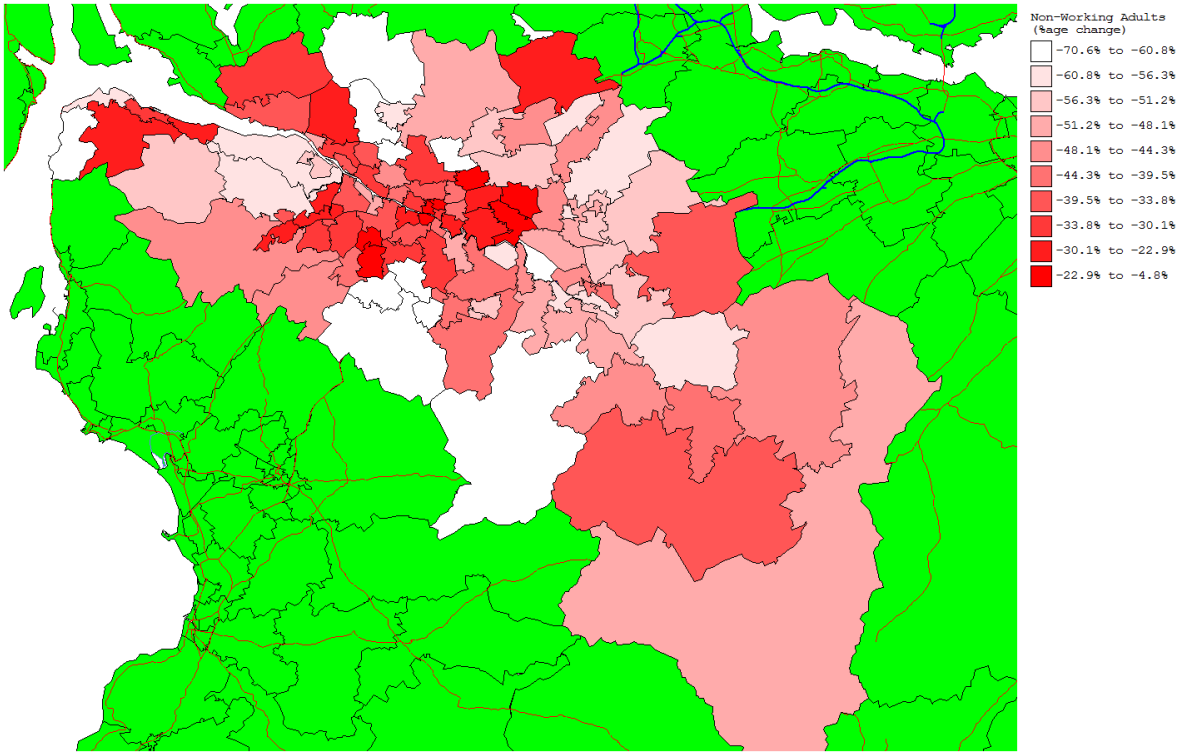
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs again show a positive and similar forecast by each scenario. The difference is in the scale of the absolute figures. Scenario IG forecasts an additional 48,595 working adults by 2021 and an additional 73,591 working

adults by 2031. Scenario IA's forecast is more optimistic with 82,282 additional working adults by 2021 and 130,417 by 2031. The difference between the two scenarios is that Scenario IA forecasts an additional 33,687 working adults by 2021 and an additional 56,826 by 2031. (These are similar in scale to the forecast difference in Total Jobs).

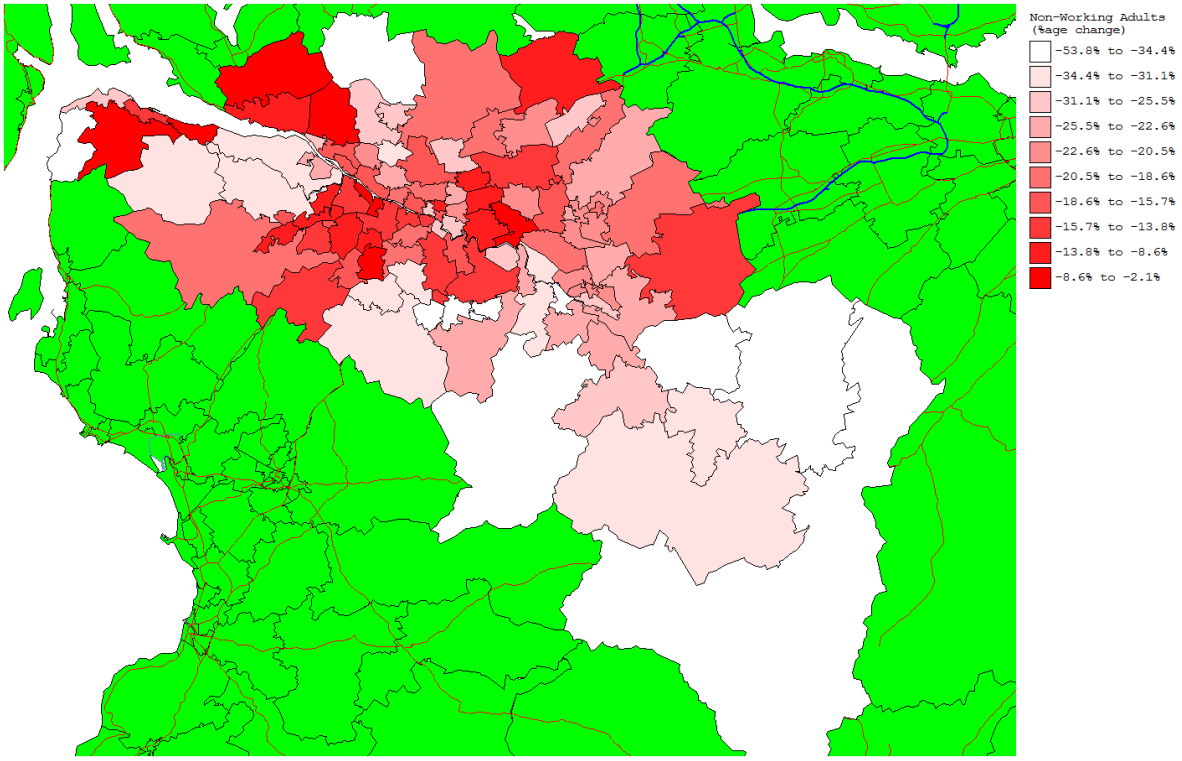
Spatial Analysis: The SITLUM model distributes the additional 33,687 working adults at 2021. Generally the flow is from south east towards the north west of the conurbation. The 2031 position shows an additional 56,826 working adults distributed in a slightly different pattern with Glasgow City, East Dunbartonshire and North Lanarkshire benefiting this time at the expense of the north and west.

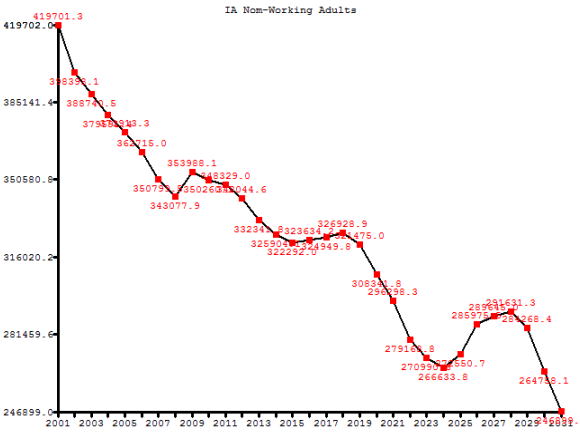
IA v IG Non-Working Adults

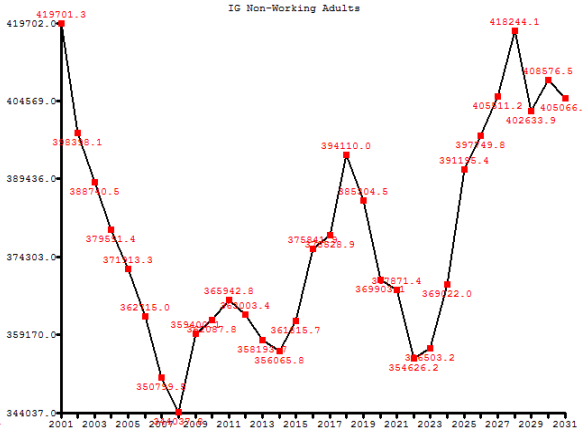
2031



2021







Non-Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	359280	334248	-25032	303621	-55659
Scenario IG	365942	369903	3961	405066	39124
Scenario IA	348329	296298	-52031	246899	-101430

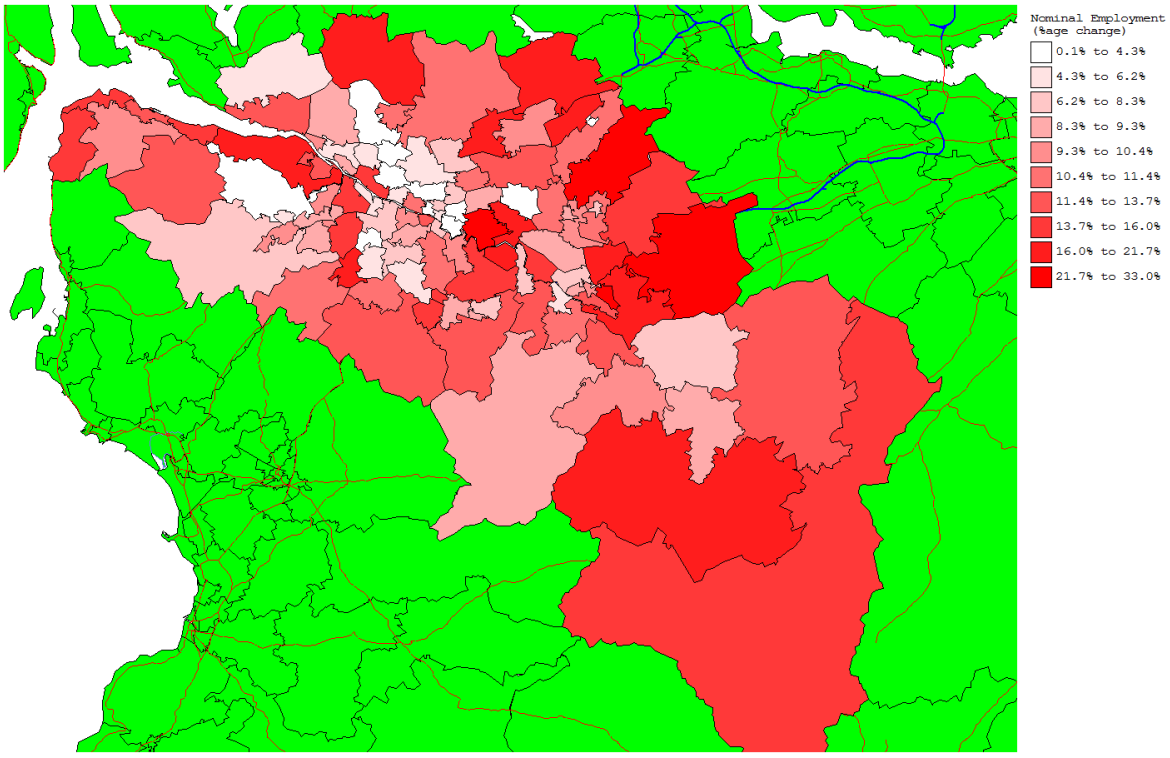
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IA forecasts a general fall in the number of non-working adults up to 2031 while Scenario IG forecasts a rise in the number of non-working adults up to 2031. Scenario IA shows a general decline in the absolute number of “unemployed” – up

to 52,000 less by 2021 and 101,400 less by 2031. Scenario IG on the other hand shows "unemployment" increasing + 3,900 by 2021 and almost 40,000 higher by 2031. This produces an astonishing difference between the two scenarios. A difference of + 56,000 more "unemployed" by 2021 and a difference of 140,554 by 2031!

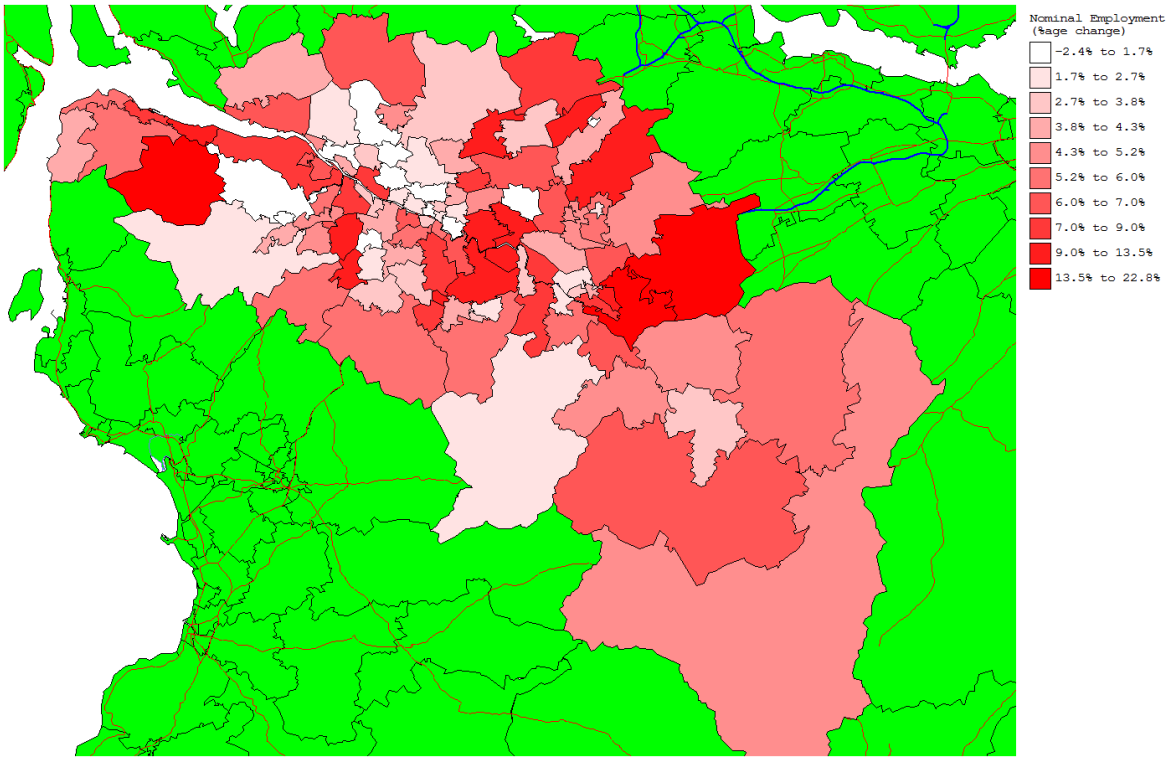
Spatial Analysis: The SITLUM model distributes the difference between the two model forecasts. As Scenario IG is the base model the result will be negative in relation to the positive figures from Scenario IA. The additional 56,000 non – working adults are a migration effect attracted not by job location but by the availability of social housing and rental levels. At 2021 the additional non-working adults are attracted to the north and west of the conurbation - Glasgow City, parts of Renfrewshire, parts of Inverclyde and West Dunbartonshire and parts of East Dunbartonshire and North Lanarkshire. By 2031 this spatial pattern is consolidated with the distribution of the extra 140, 500 non-working adults generated by Scenario IG. This will of course result in greater welfare resource implication for these authorities.

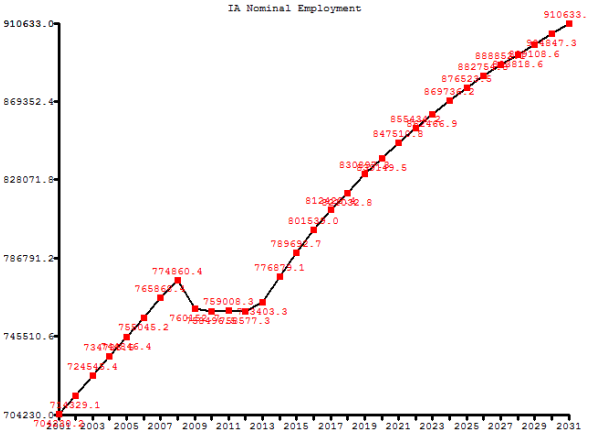
IA v IG Nominal Employment

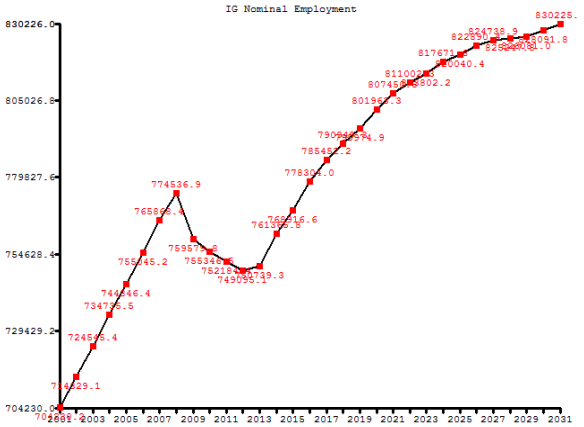
2031



2021







Nominal Employment	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806220	50857	828721	73358
Scenario IG	755346	807456	52110	830226	74880
Scenario IA	759008	847510	88502	910633	151625

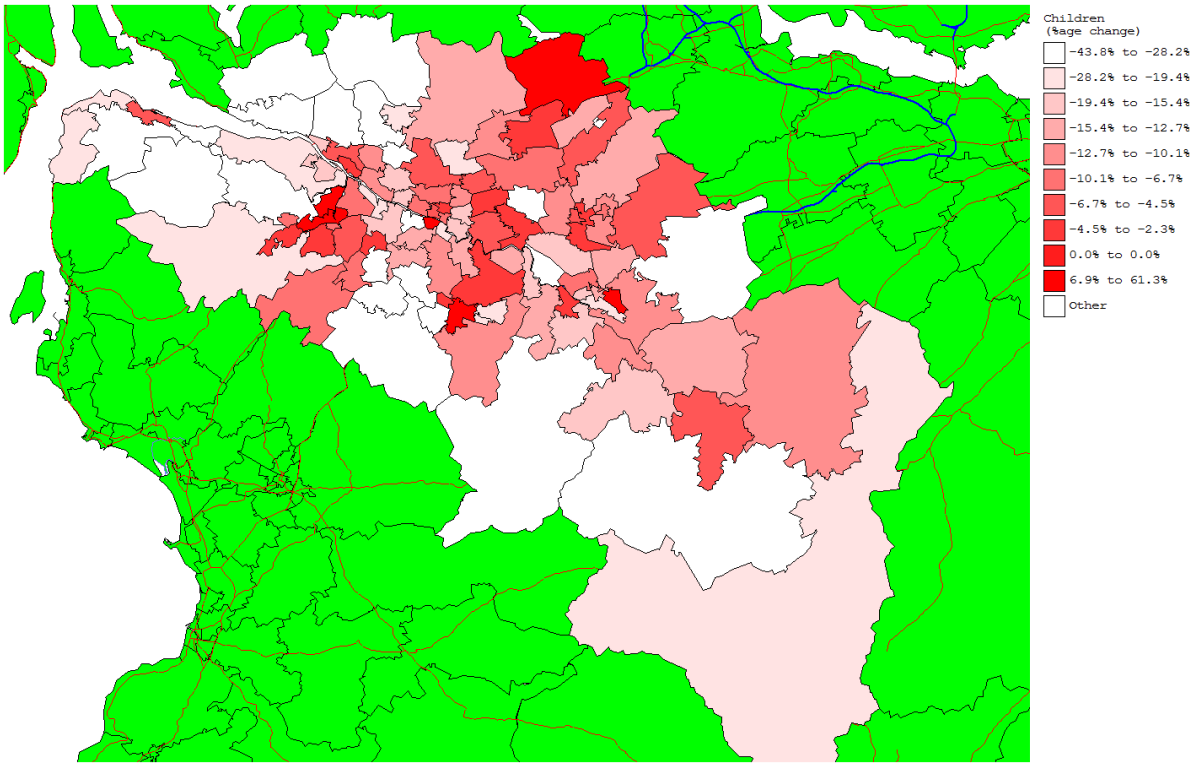
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graph indicates positive growth in nominal employment up to 2031 in both scenarios. The difference between the growth rates shows that Scenario IA forecasts an additional 36,393 employment by 2021 and an additional

76,745 employment by 2031. There are almost exactly the same figures as in the Total Jobs analysis.

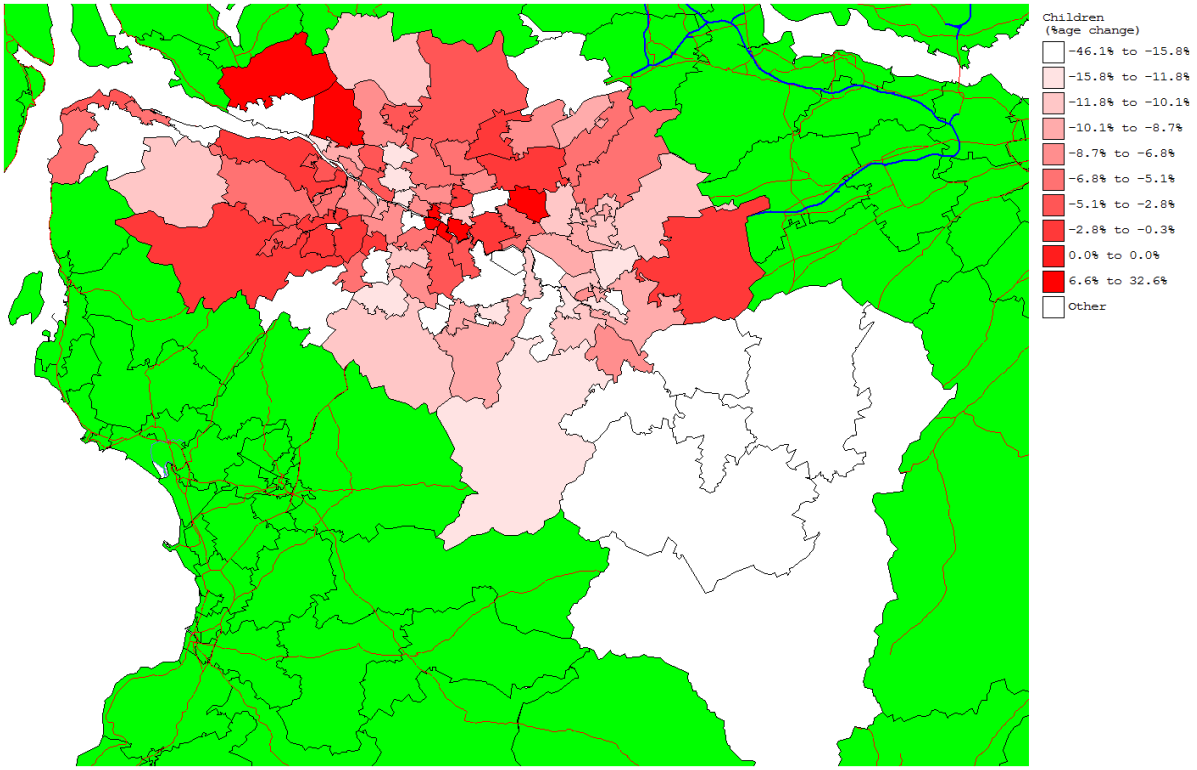
Spatial Analysis: The SITLUM model distributes the additional 36,393 at 2021. At 2021 Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde. At 2031 the additional 76,745 jobs generated by Scenario IA benefit virtually all areas in the conurbation area and intensify in those areas described in the 2021 assessment. This is exactly the same spatial pattern as in Total Jobs.

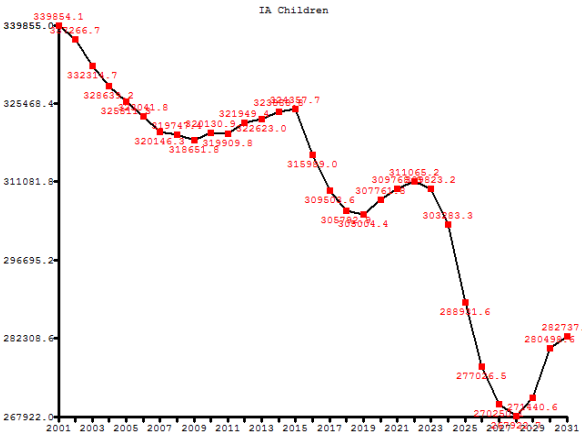
IA v IG Children

2031



2021





Children	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	321889	312214	-9675	285100	-36789
Scenario IG	322615	327971	5346	312494	-10121
Scenario IA	319909	309768	-10141	282737	-37172

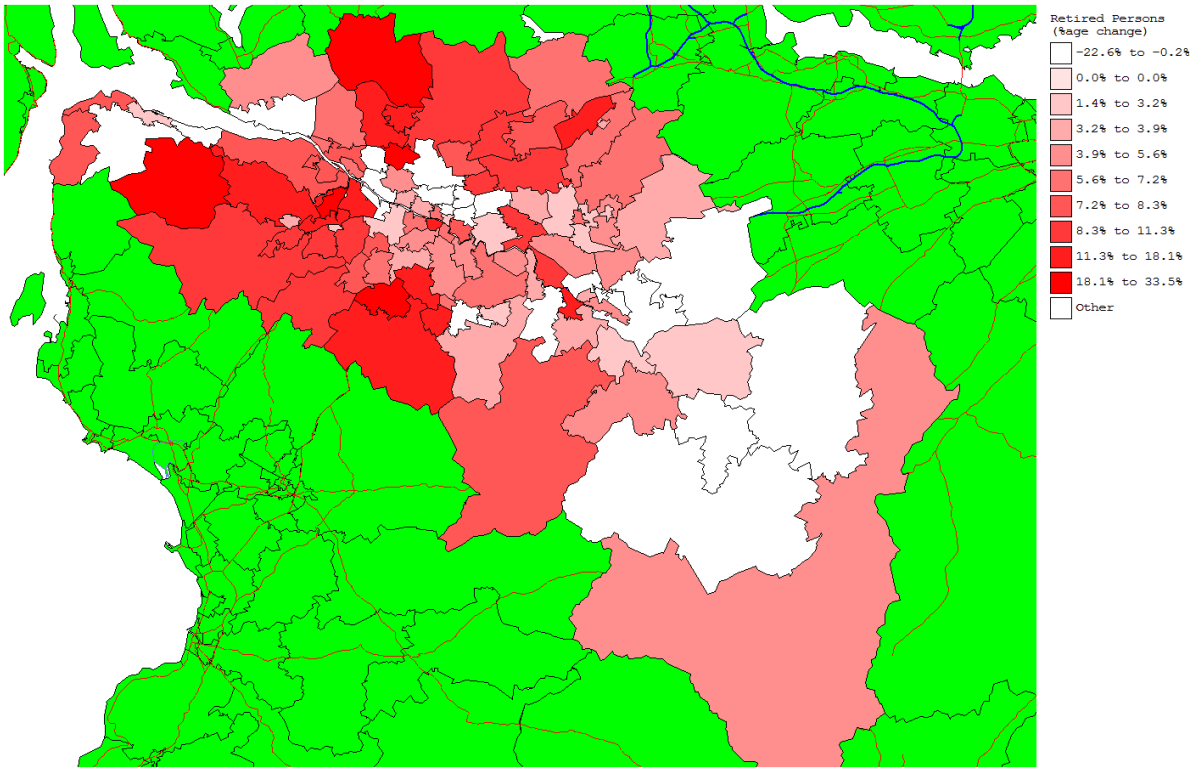
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. Both Graphs show a similar overall downward pattern in the number of children. However this has to be related to an overall growth in both scenarios in total populations with the simple conclusion that while overall populations grow under both scenarios the number of children continue to decrease. This is a general demographical feature (reduced fertility rates) but there are patterns within each scenario.

Scenario IG forecasts a small rise in the number of children at 2021 by 5,346 but a fall by 2031 of 10,121. Scenario IA forecasts a fall in the number of children at 2021 of 10,141 and a fall at 2031 of 37,172. The difference between the two scenarios results in 15,487 more children forecast by Scenario IG at 2021 and Scenario IA forecasting 27,051 less children at 2031.

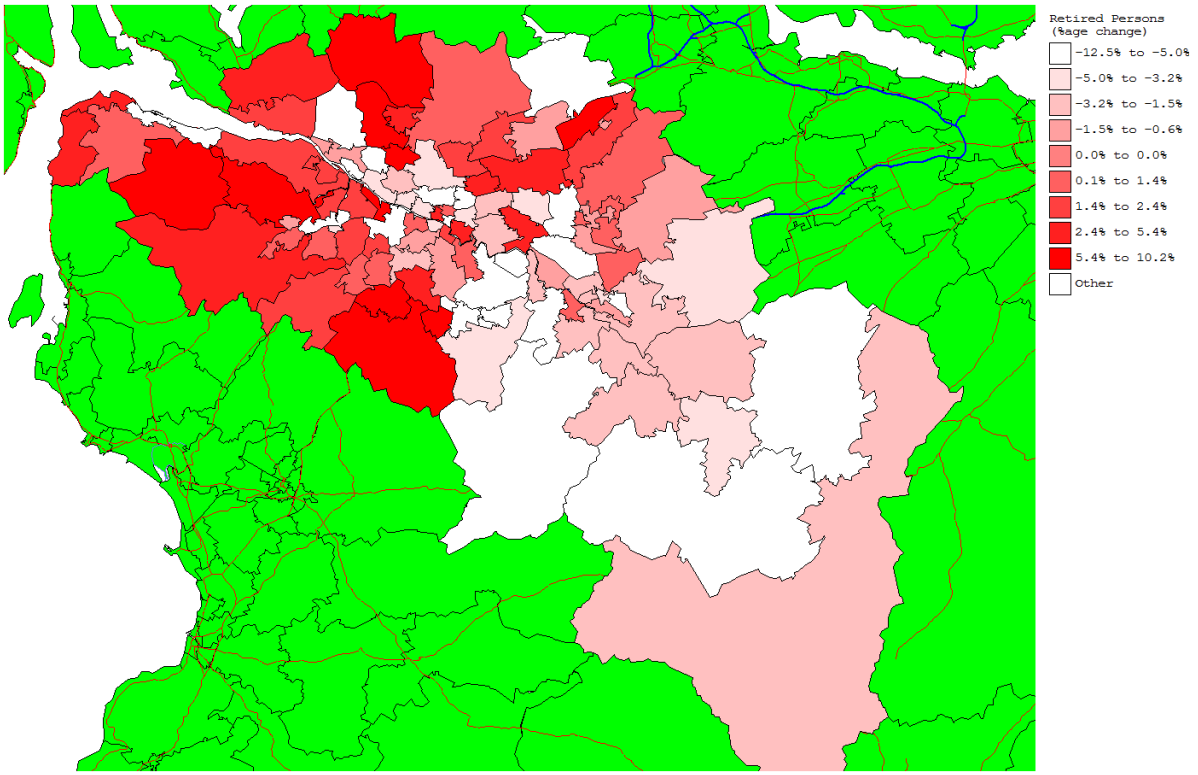
Spatial Analysis: The general trend is in a fall in the number of children up to 2031 but the differing intensity of the peaks at 2021 present a complex picture. At 2021 Scenario IG's additional children will be distributed from the dark red parts of the map to the white zones and therefore generally from the north west to the south east of the conurbation. The 2031 pattern is different as the model distributes the 27,051 more children predicted by Scenario IG which in this case locates them more in parts of Renfrewshire, parts of Glasgow City and parts of East Dunbartonshire.

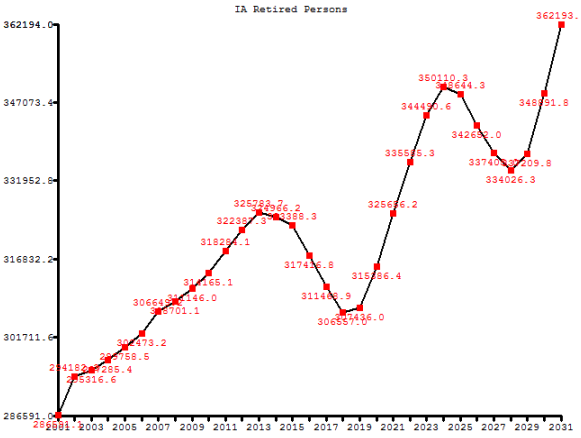
IA v IG Retired Persons

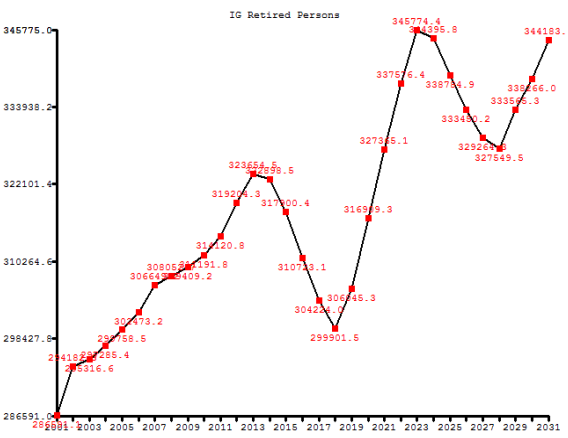
2031



2021







Retired	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	319546	322611	3065	353981	34435
Scenario IG	314120	327345	13225	344183	30063
Scenario IA	318284	325656	7372	362193	43909

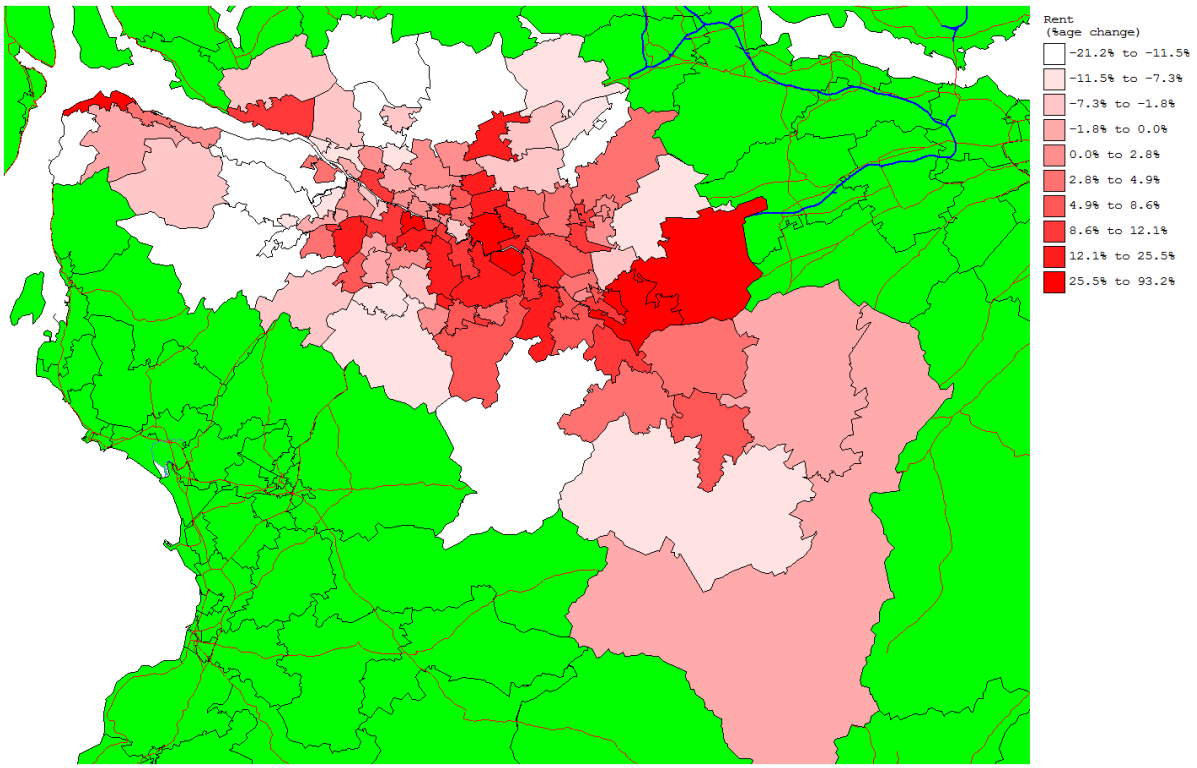
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The Graphs of the two scenarios again show that the overall demographics are very similar. In both scenarios the numbers of retired people continue to increase over time. The difference between the two scenarios shows that at 2021 Scenario IG increases by an additional 5,853 retirees compared to Scenario IA.

However this is reversed by 2031 where Scenario IG generates a lower increase – the difference now being – 13,846 retirees compared to Scenario IA.

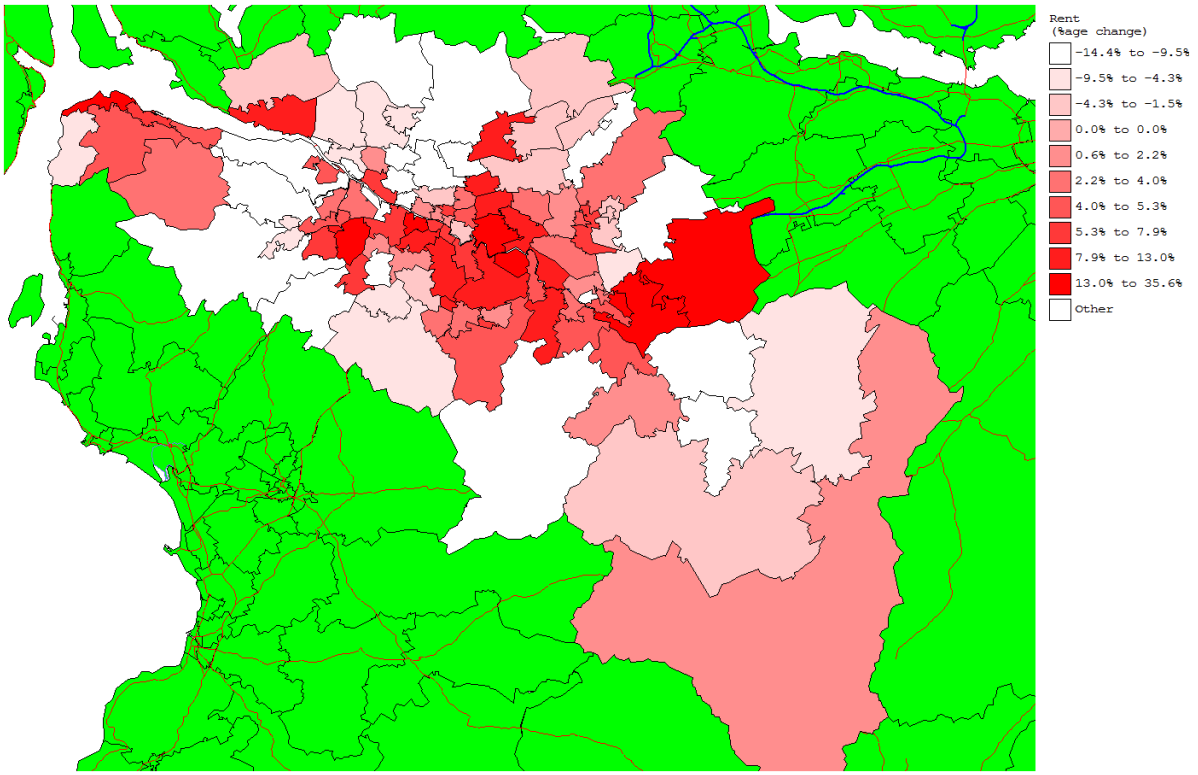
Spatial Analysis: At 2021 the additional 5,800 retirees generated by Scenario IG are distributed by the SITLUM model and generally the flow is from the south and east towards the north and west of the conurbation. At 2031 the spatial pattern is consolidated with a similar pattern a flow from south and east towards the north and west.

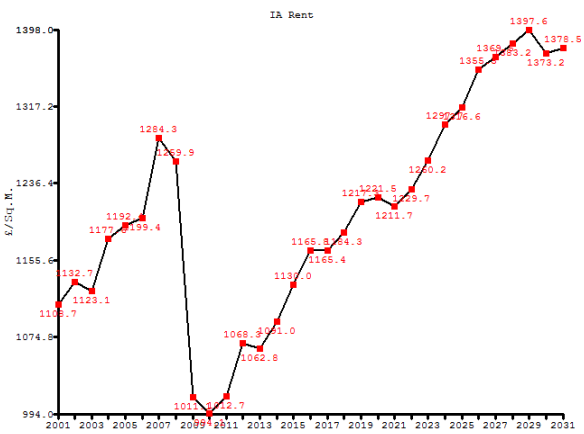
IA v IG Rent

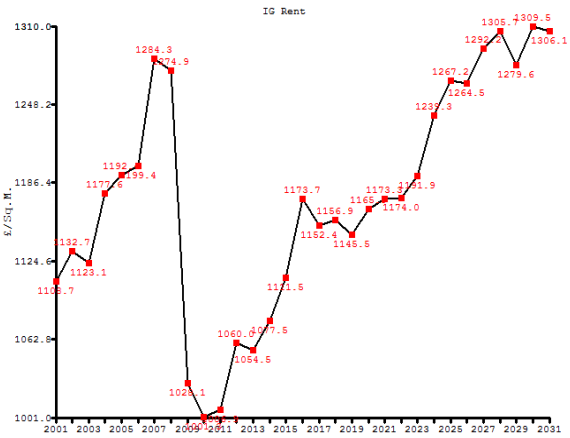
2031



2021







Rent £	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	996	1159	163	1251	255
Scenario IG	1001	1173	172	1306	305
Scenario IA	1012	1211	199	1378	366

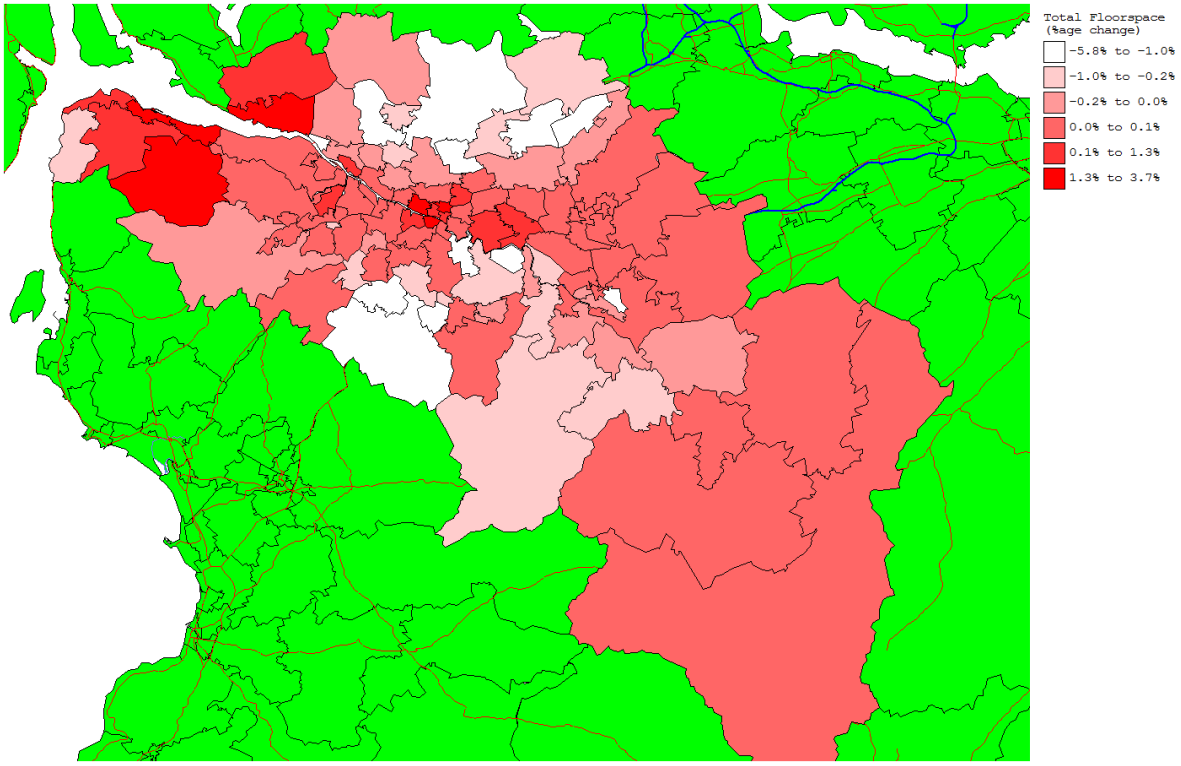
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs indicate from 2011 onwards both scenarios increase the rental values. Scenario IG rental increases by £172 by 2021 and £305 by 2031. The differences between the two rental growths are fairly small in absolute

numbers terms. Scenario IA increases the difference by £27 per m2 at 2021 and by £61 per m2 by 2031 compared to Scenario IG.

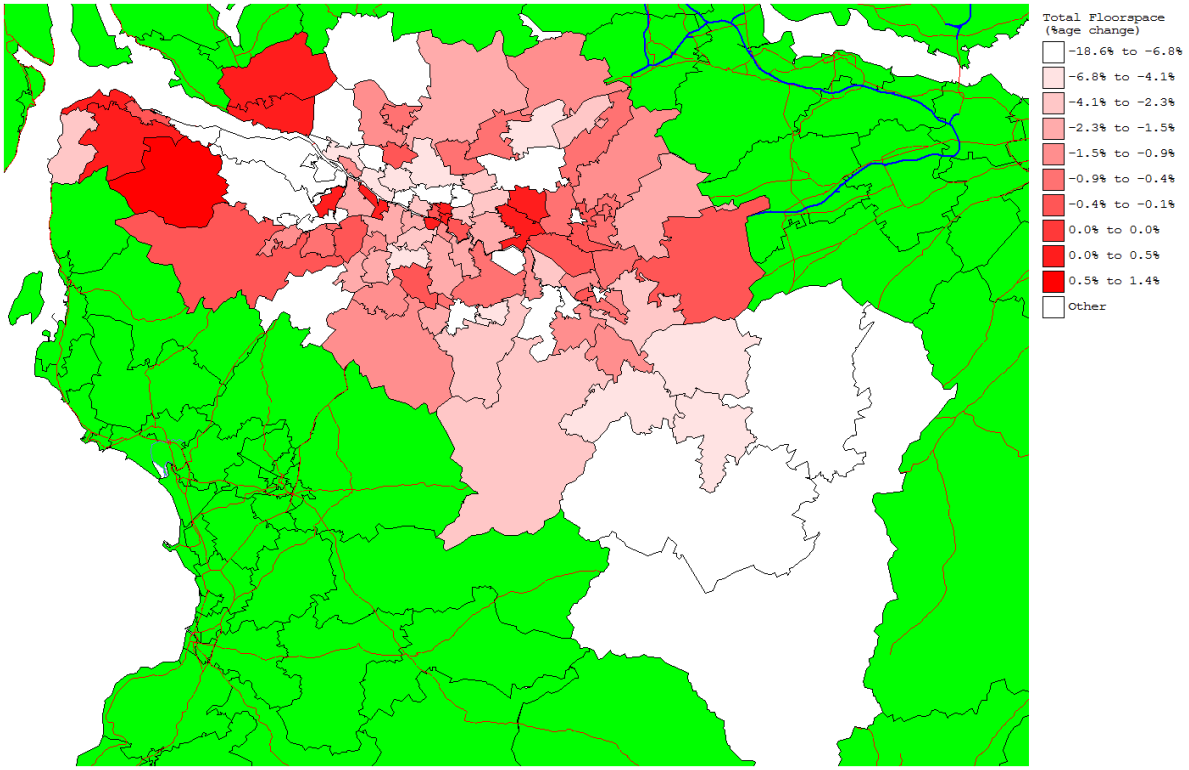
Spatial Analysis: The slight increases in rentals generated by Scenario IA are distributed along very similar pattern to Total Jobs. At 2021 it is parts of North and South Lanarkshire, Glasgow City, East End, Clyde Waterfront, parts of Renfrewshire, parts of Inverclyde and parts of West Dunbartonshire that show increased rentals generated by Scenario IA. By 2031 this pattern is consolidated with similar areas benefiting from slightly higher rental growth as at 2021. Again these figures are marginal but do relate to the areas where job growth is also being created by Scenario IA.

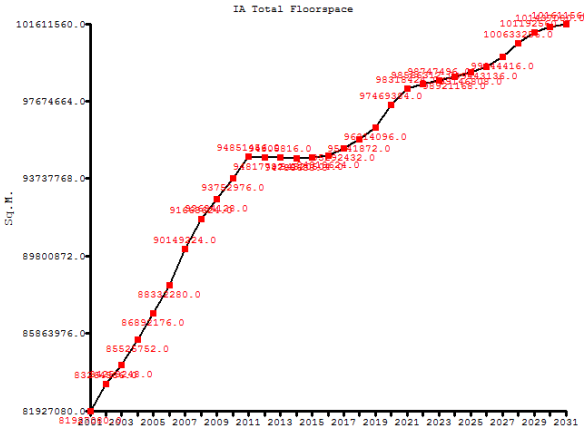
IA v IG Total Floorspace

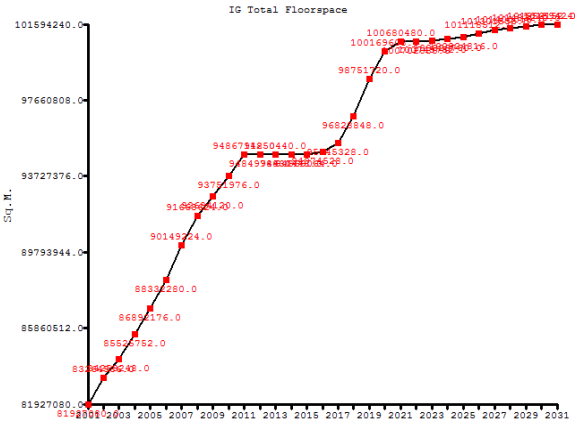
2031



2021







Total Floorspace m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	94866871	99102720	4235849	101438608	6571737
Scenario IG	94867944	100680480	5812536	101594240	6726296
Scenario IA	94851916	98318421	3466505	101611560	6759644

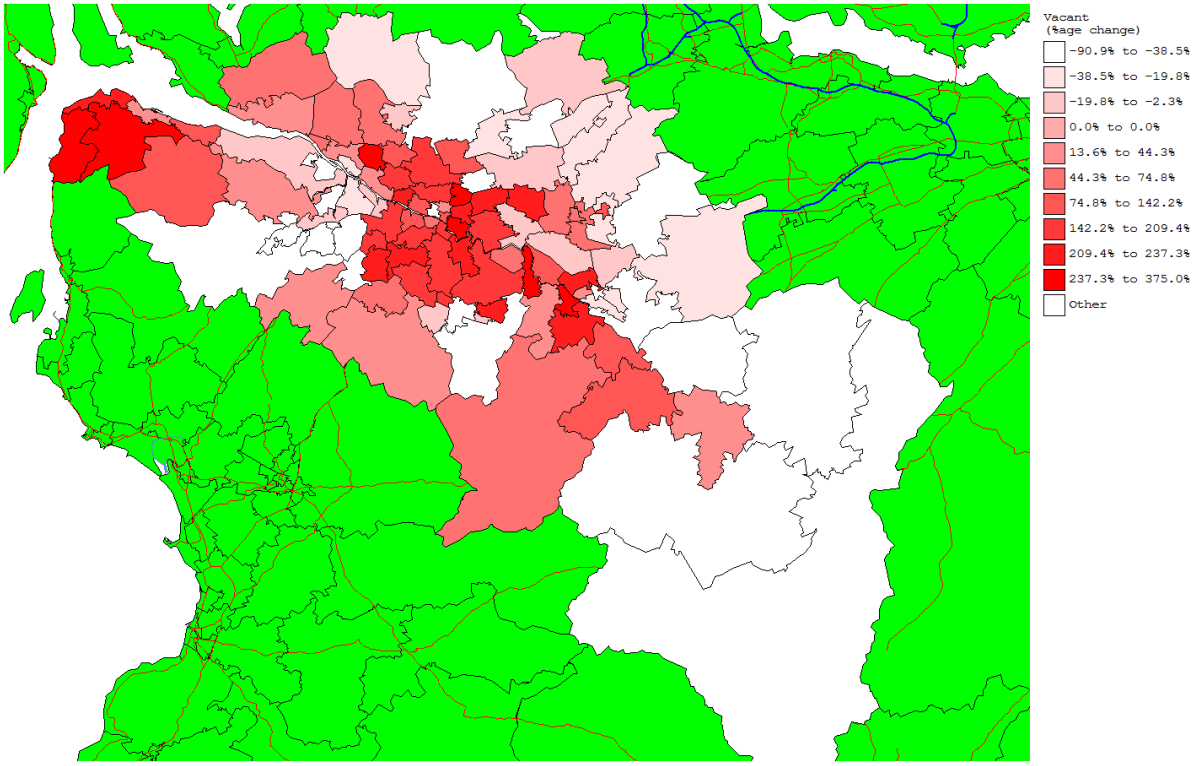
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The two graphs again show a very similar pattern in absolute numbers. Both scenarios predict total floorspace growth in a very similar growth pattern. The absolute differences are small. Scenario IA will produce slightly less floorspace

than Scenario IG by 2021 of 3.46 million m2 compared to 5.81 million m2. IA produced 2.35 million m2 less floorspace than Scenario IG. By 2031 the situation is slightly reversed Scenario IA produces slightly more floorspace at 6.75 million m2 compared to 6.72 million m2 produced by Scenario IG. A difference of only + 0.03 million m2. While the 2021 figure of 2.35 million m2 is perhaps significant the difference at 2031 is very marginal. Obviously where this is a good thing and meets demand will only be known when vacancy rates are examined.

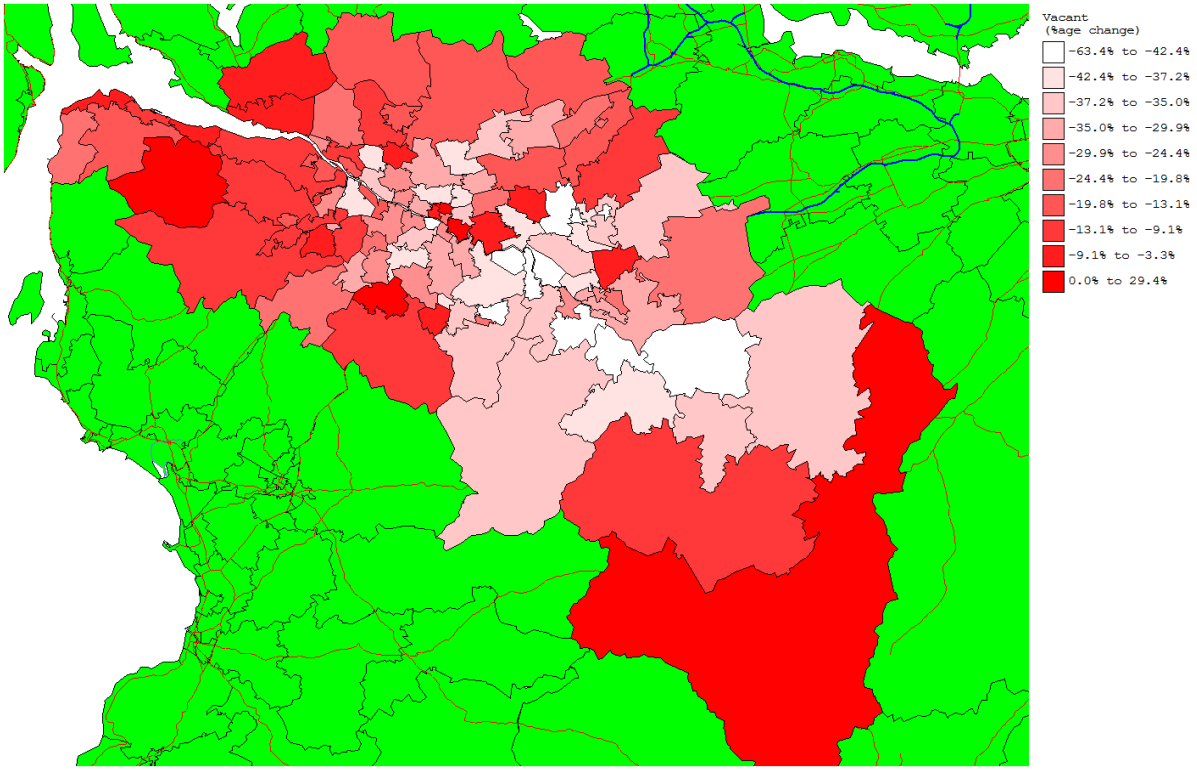
Spatial Analysis: At 2021 Scenario IG's positive figures result in the SITLUM model distributing this additional floorspace towards parts Glasgow City and towards the south and east of the conurbation. However of most note is that Inverclyde and West Dunbartonshire receive the least of the additional floorspace. At 2031 the absolute figures differences are very small and little perhaps can be read into this except that both Inverclyde and West Dunbartonshire continue to receive the least amount of this additional floorspace.

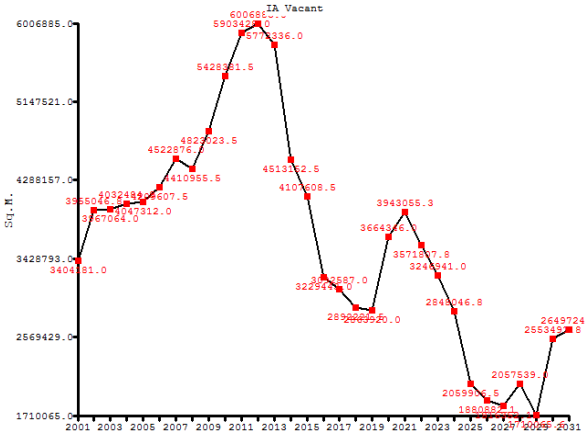
IA v IG Vacant Floorspace

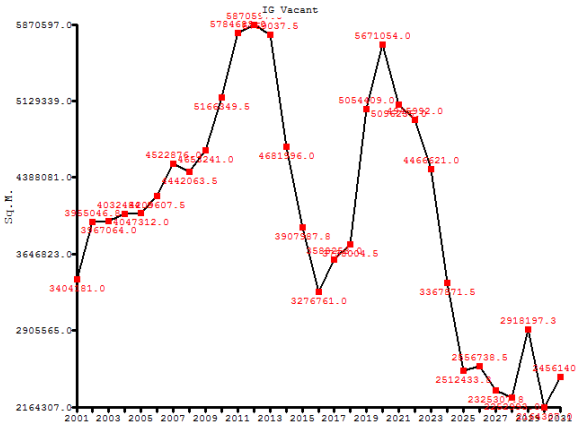
2031



2021







Vacant (M2)	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	5891986	4497780	-1394206	3449678	-2532308
Scenario IG	5784632	5671054	-113578	2456140	-3328492
Scenario IA	5903429	3943055	-1960374	2649724	-3152705

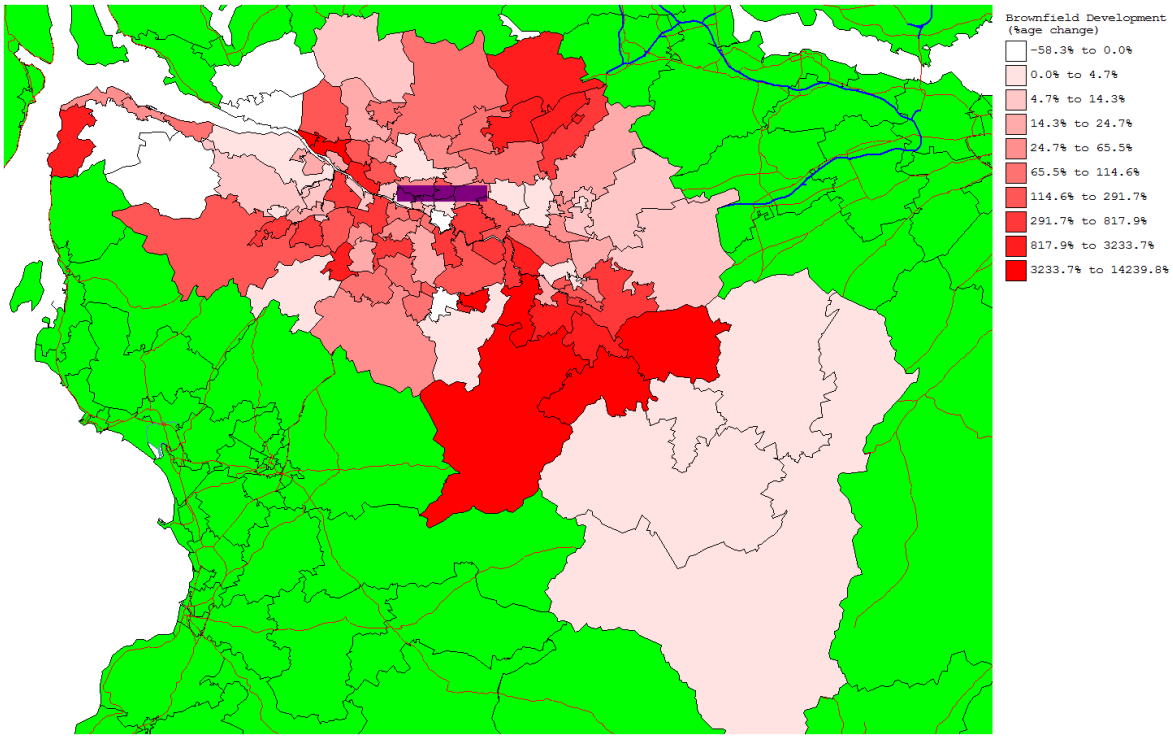
Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs indicate that after the peak of vacancy levels in 2011 that vacancy levels fall to 2031 under both scenarios and in a very similar pattern. However the major difference is in the forecasts are the relative levels at the 2021 peaks. The 2021 picture may be a bit of a distortion and perhaps the 2031 picture presents a more accurate picture of the differences. At 2021 the difference is that Scenario IA forecasts

a larger fall in vacant floorspace by some 1.73 million m2. By 2031 however both scenarios forecast very similar falls in vacancy levels Scenario IG by 3.32 million and Scenario IA by 3.15 million. The difference being only 0.17 million m2 greater generated by Scenario IG.

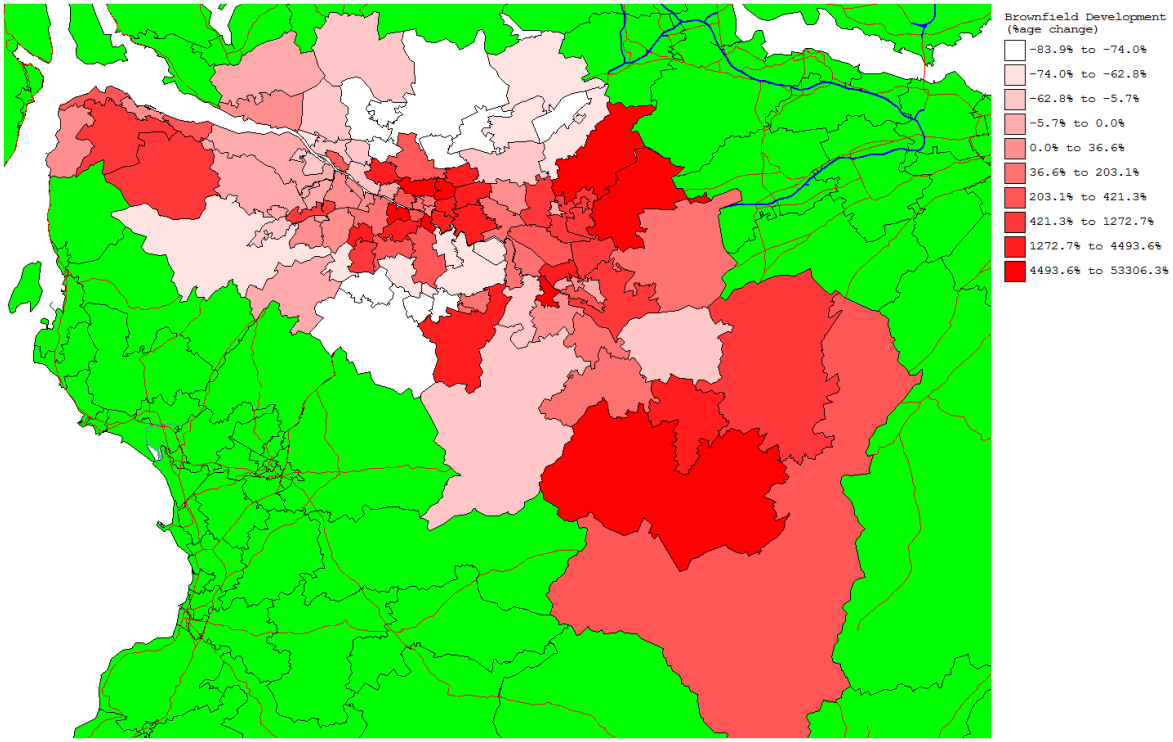
Spatial Analysis: The snapshot at 2021 shows a peak at this point in both forecasts but indicated Scenario IA generates a larger fall in vacancy levels than Scenario IG. In this case there is a flow from white to dark red with white areas having less vacant floorspace. The dark red areas will have greater vacant floorspace at 2021 – parts of South Lanarkshire to the south and east but also large areas to the north and west of the conurbation. At 2031 the difference in vacancy rate is very small but indicates marginally higher rates around Glasgow City and Inverclyde.

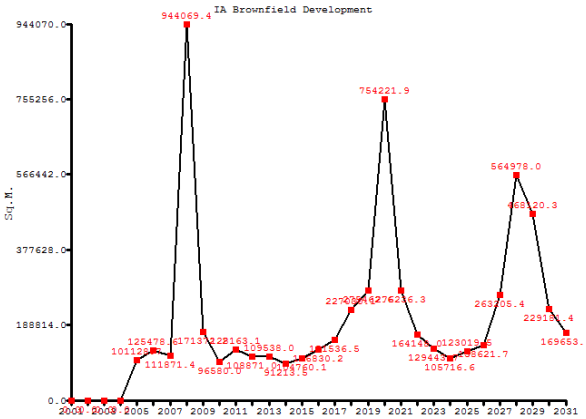
IA v IG Brownfield Development

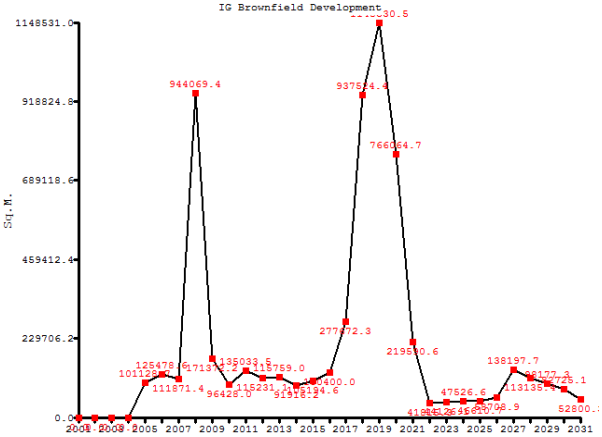
2031



2021







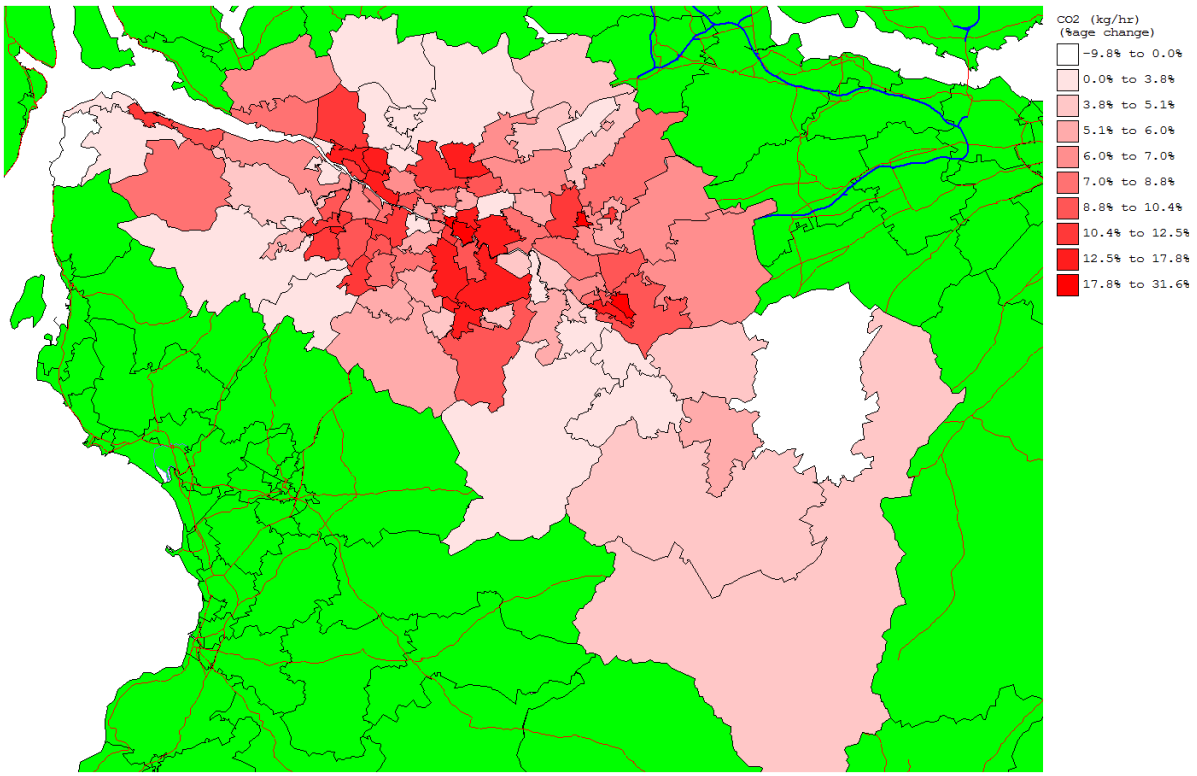
Brownfield Development M2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	136982	810552	673570	101738	-35244
Scenario IG	135033	219920	84917	52800	-82233
Scenario IA	128163	276215	148052	169653	41490

Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. The graphs again indicate a very similar pattern with only the intensity of the peaks being significantly different. The 2021 position fits into a peak in both scenarios with scenario IA peaking at 2020 while Scenario IF peaking a year later at

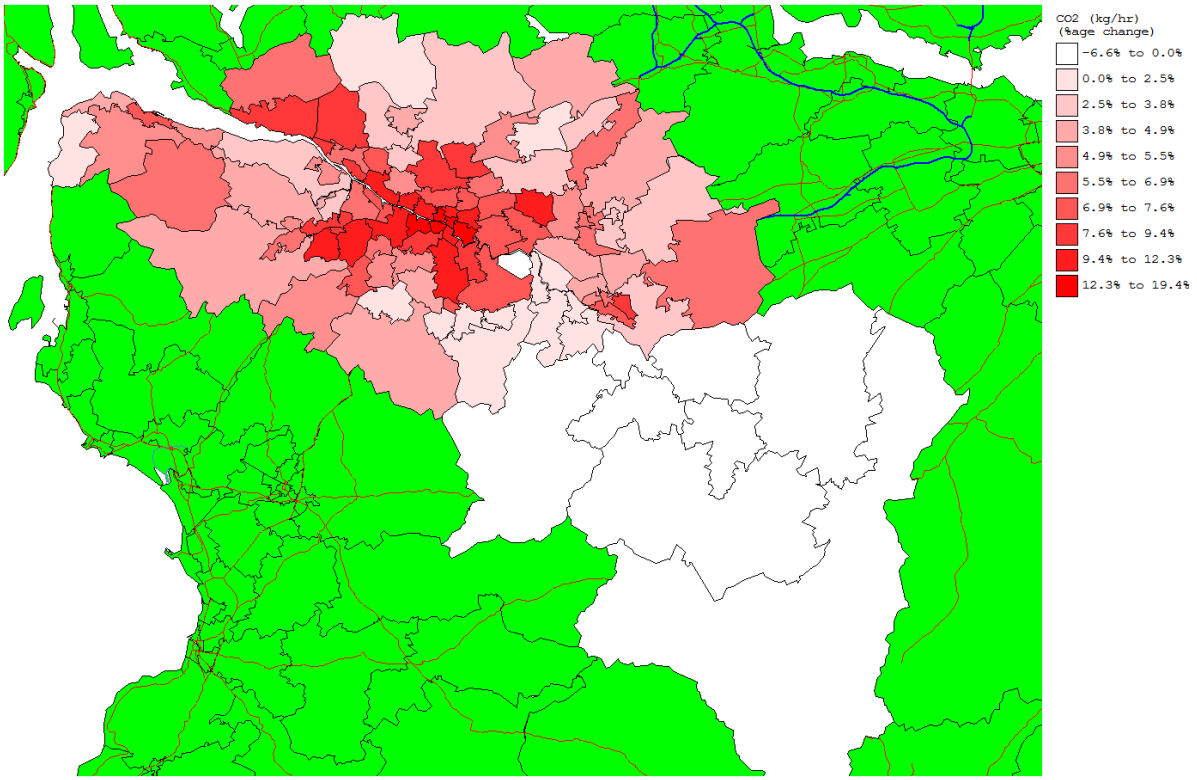
2021. This makes a huge difference to the absolute numbers and spatial impact making the 2021 position less relevant in this situation – as a statistical blimp. The 2031 position may be worth noting with scenario IA producing slightly higher final floorspace but given the volatile nature of these graphs the resultant spatial analysis is meaningless. Best to note the similarity in both graphs rather than any marginal differences.

IA v IG CO2

2031



2021



Comment: Scenario IG - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) is the Base Model while Scenario IA – Rebalanced Economy +M74 Network is the Forecast Model. Absolute value graphs are not available for CO2 figures but as a guide we have the relative % changes between the two scenarios. The 2021 position is that Scenario IA generates a relative greater amount of CO2 of between: -6.6% to 19.4%. The 2031 position is that Scenario IA again generates a relatively greater amount of CO2 of between: -6.6% to 19.4%. Scenario IA provides greater jobs and therefore greater movement and economic activity.

Spatial Analysis: At 2021 Scenario IA produces a higher amount of CO2 to the north and west of the conurbation and especially around the City Centre and along the Clyde Waterfront. The 2031 position under Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

Overall Conclusions on comparing: **Scenario IA** – Rebalanced Economy +M74 Network Vs **Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario).

Scenario IG is Base Model and Scenario IA is Forecast Model (Both Permissible).

Both scenarios show a strong positive population growth pattern up to 2031. Scenario IG forecasts a final population of 1.883 million at 2031 while Scenario IA forecasts a slightly less optimistic figure of 1.770 million by 2031. The difference being that Scenario IG forecasts a higher growth of an additional 46,494 by 2021 and a difference of 100,000 more

population by 2031. In general it is the all zones surrounding Glasgow City which sees population growth generated by Scenario IG.

Both scenarios have similar job growth pattern and positive job growth forecasts. However there are notable absolute figure differences. Scenario IG forecasts growth of an additional 52,000 jobs by 2021 and by an additional 74,800 jobs by 2031. Scenario IA produces even more optimistic forecasts of +88,500 jobs by 2021 and +151,625 jobs by 2031. The difference between these two forecasts is that Scenario IA generates 36,398 additional jobs by 2021 compared to Scenario IG and an additional 76,745 jobs by 2031. While Scenario IG produces +100,000 extra population (immigration) into the area it only forecasts an additional 74,800 jobs. Scenario IA on the other hand forecasts slightly less population but provides an additional 151,600 jobs. As a result Scenario IA forecasts an additional 33,687 working adults by 2021 and an additional 56,826 by 2031 compared to scenario IG. Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde.

Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IA forecasts a general fall in the number of non-working adults up to 2031 while Scenario IG forecasts a rise in the number of non-working adults up to 2031. Scenario IA shows a general decline in the absolute number of “unemployed” – up to 52,000 less by 2021 and 101,400 less by 2031. Scenario IG on the other hand shows “unemployment” increasing + 3,900 by 2021 and almost 40,000 higher by 2031. This produces an astonishing difference between the two scenarios. A difference of + 56,000 more “unemployed“ by 2021 and a difference of 140,554 by 2031! The additional non-working adults are attracted to the north and west of the conurbation - Glasgow City, parts of Renfrewshire, parts of Inverclyde and West Dunbartonshire and parts of East Dunbartonshire and North Lanarkshire. Attracted, no doubt, by social housing availability and perhaps lower rental levels rather than job accessibility issues. The additional “unemployed” in these areas will obviously have additional welfare implications in these areas.

Both scenarios forecast an increase in the rental values. The differences between the two rental growths are fairly small in absolute numbers terms but Scenario IA increases the difference by £27 per m2 at 2021 and by £61 per m2 by 2031 compared to Scenario IG. The increased rentals generated by Scenario IA are distributed along very similar pattern to Total Jobs. It is parts of North and South Lanarkshire, Glasgow City, East End, Clyde Waterfront, parts of Renfrewshire, parts of Inverclyde and parts of West Dunbartonshire that have slightly higher rental levels under Scenario IA.

Both scenarios predict total floorspace growth in a very similar growth pattern but Scenario IA’s positive figures result in the model distributing this additional floorspace strongest towards Inverclyde and West Dunbartonshire. In Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

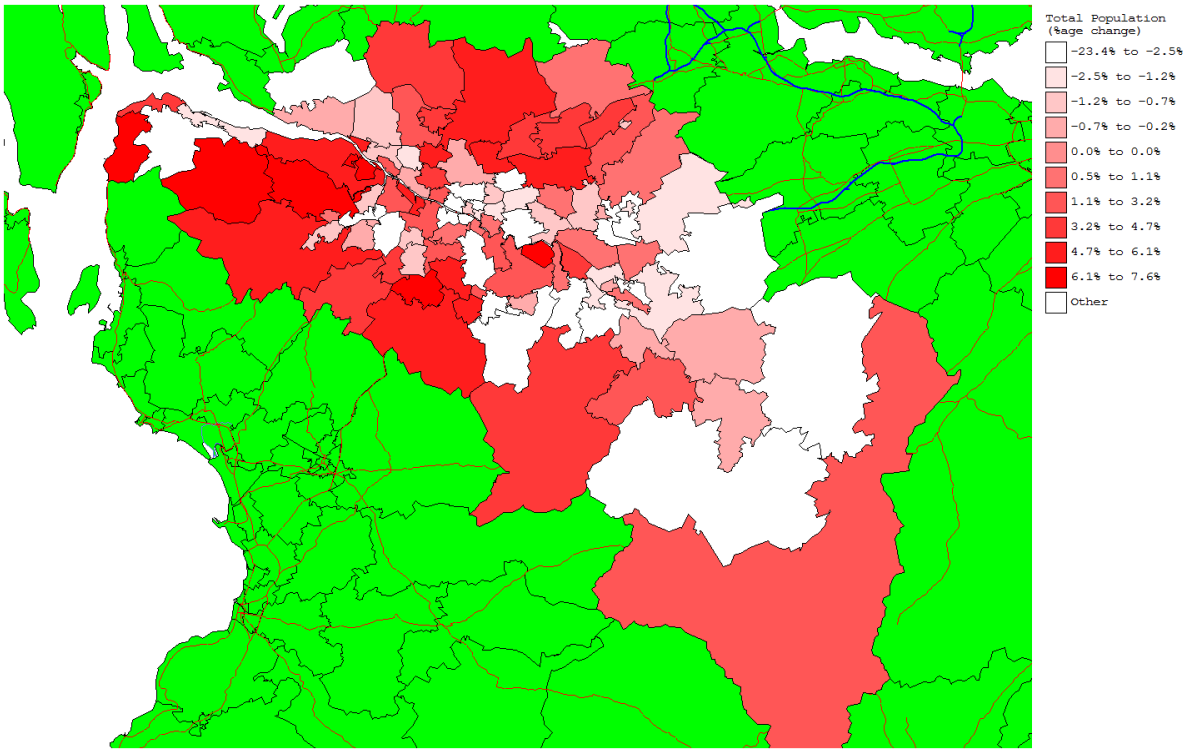
3F. IF V IA at 2021 and 2031

Scenario IF – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration) Vs Scenario IA – Rebalanced Economy +M74 Network

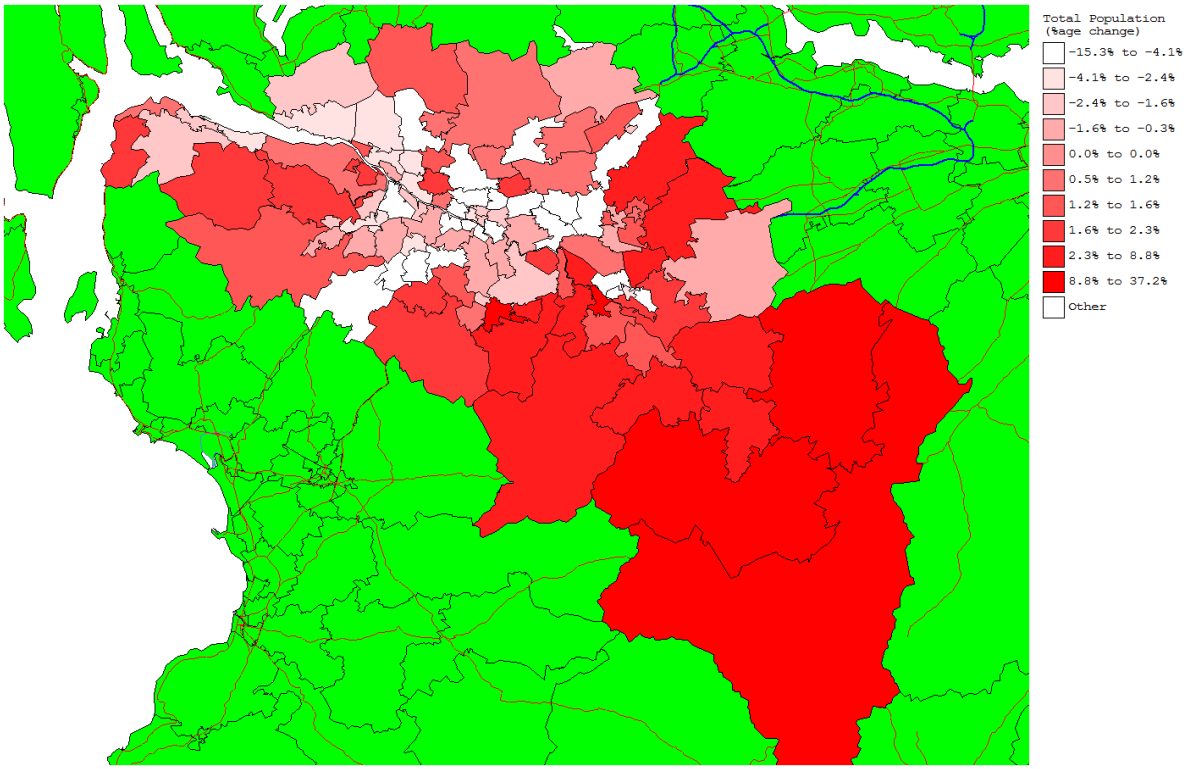
Scenario IA is the Base Model and Scenario IF is the Forecast Model (Both Permissible)

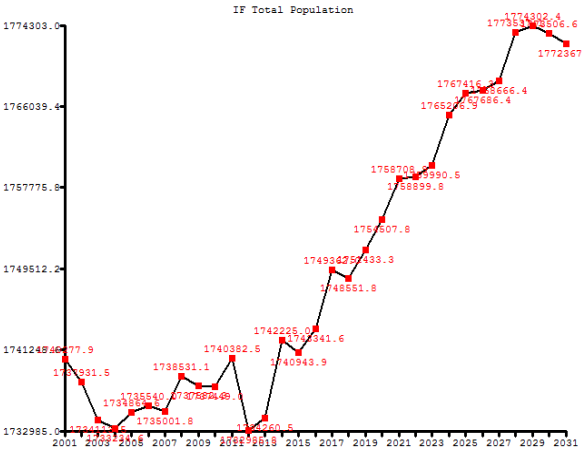
IF v IA Total Population

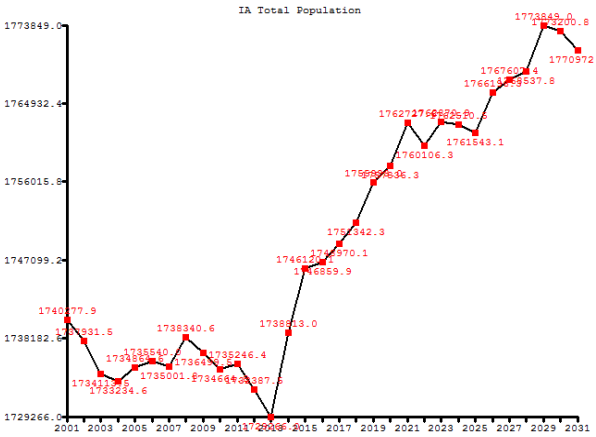
2031



2021







Total Populaton	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	1732985	1758708	25723	1772367	39382
Scenario IG	1747297	1821272	73975	1883058	135761
Scenario IA	1735246	1762727	27481	1770972	35726

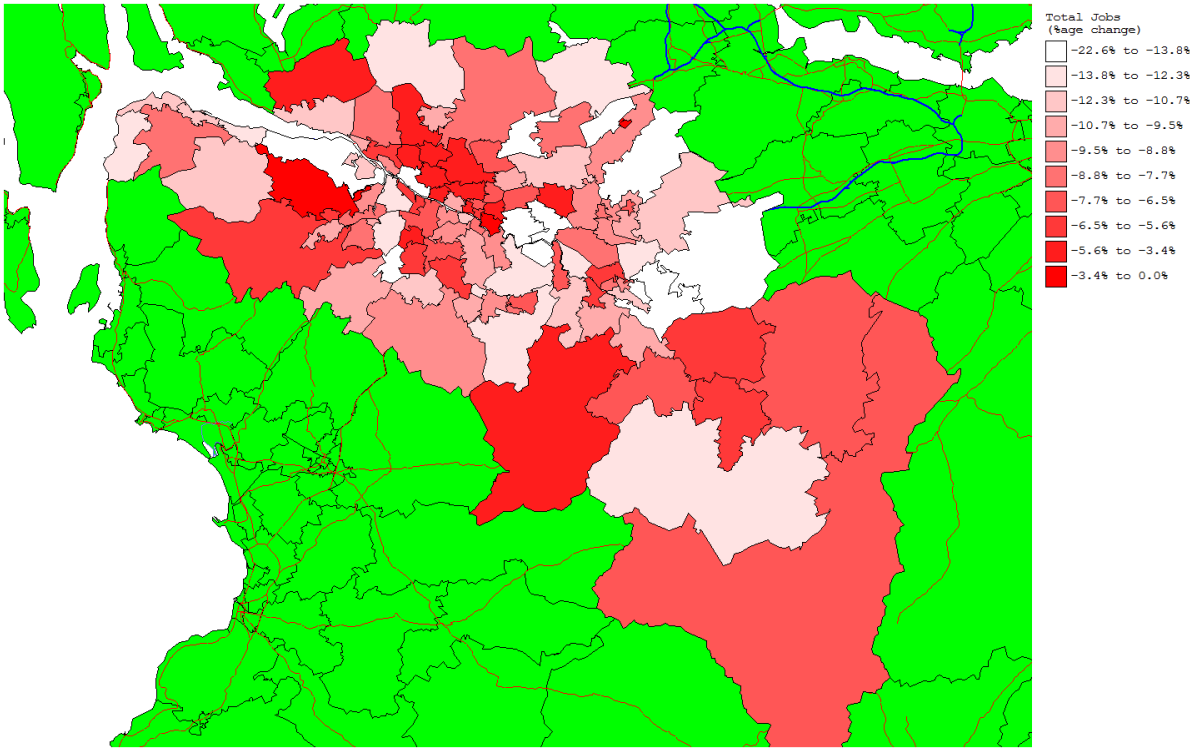
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The Graphs show a similar upward positive total population growth for both scenarios and indeed very similar absolute figures. Scenario IA shows a +27,481 at 2021 from 2011 and a + 35,726 growth to 2031. Scenario IF shows +25,723 at 2021 from 2011 and a +39,382 growth to 2031. The population differences between these

two scenarios are therefore very small in absolute numbers terms. Scenario IA is + 1,758 at 2021 compared to Scenario IF and IA is– 3,656 at 2031 compared to IF.

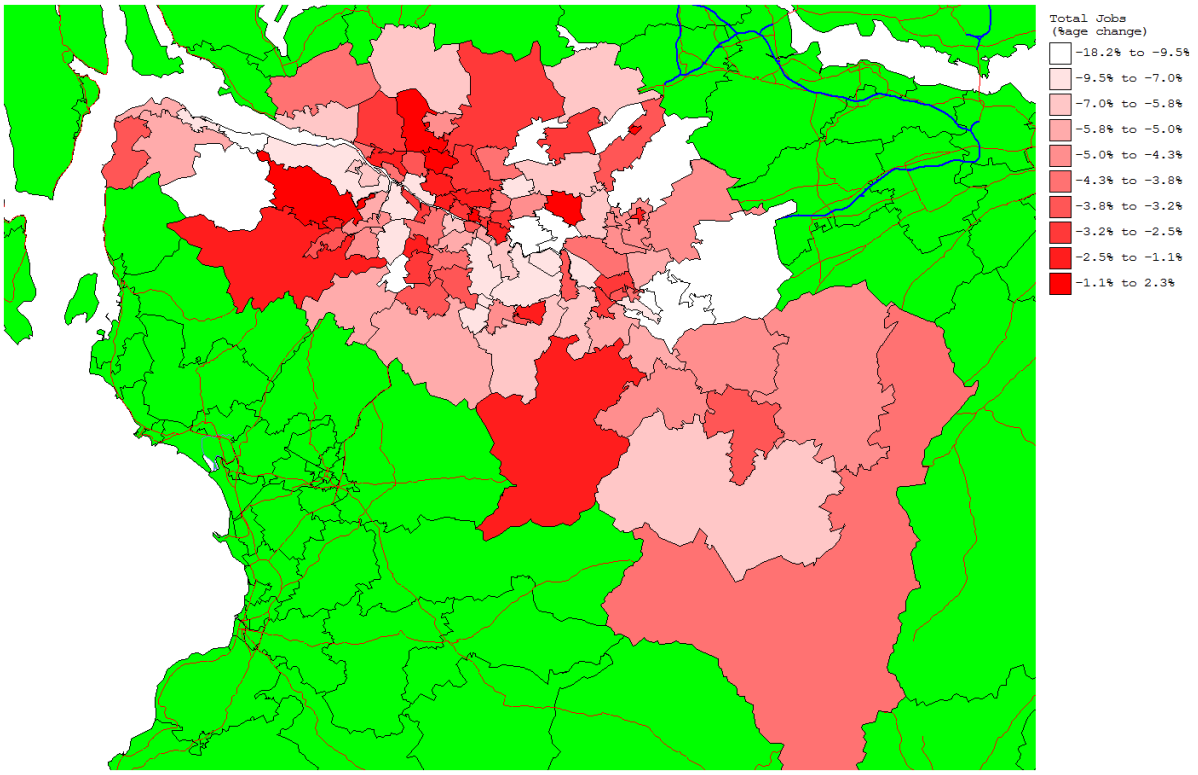
Spatial Analysis: The SITLUM model distributes the additional Scenario IA population 1,758 at 2021 and the new pattern moves population from the south and east of the conurbation towards the north and west. In terms of Scenario IF this is a negative flow - Population therefore flows from the dark red towards the white areas on the map. Glasgow City, Clyde Waterfront, West Dunbartonshire, Renfrewshire and Inverclyde all gain some additional population under Scenario IA. At 2031 the position is different in that IF generates a positive population change against Scenario IA. Population therefore flows from the white/lighter red zones towards the dark red zones on the map. However again it is the north and west of the conurbation that gains this additional population. However caution should be noted as the differences between the two scenarios is very small in absolute numbers. The important issue to note is that they both have very similar positive population growth projections.

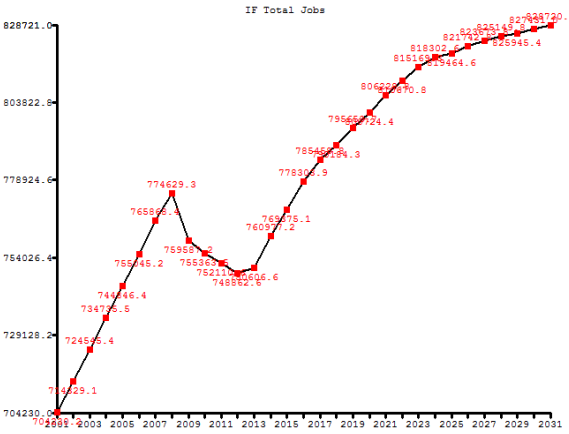
IF v IA Total Jobs

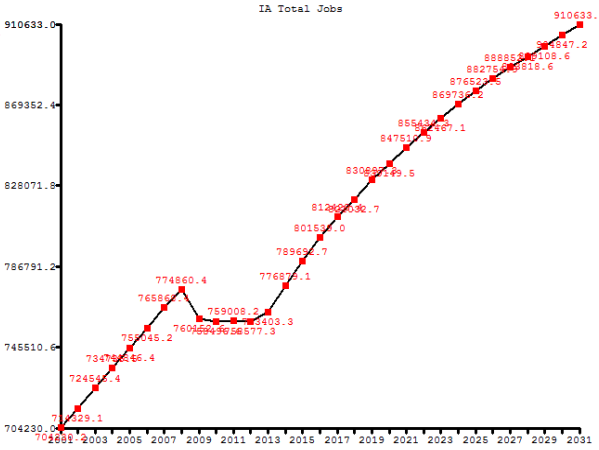
2031



2021







Total Jobs	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806228	50865	828721	73358
Scenario IG	755346	807450	52104	830226	74880
Scenario IA	759008	847510	88502	910633	151625

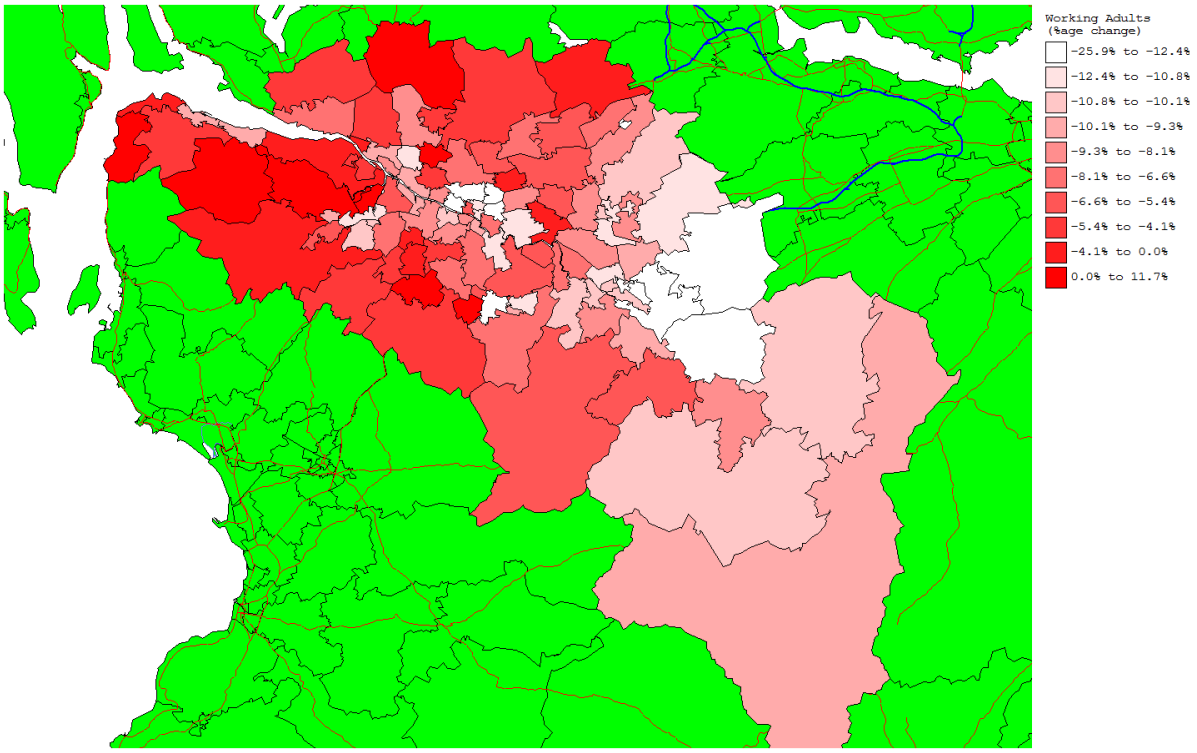
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The graphs are similar showing job growth but Scenario IA shows considerable growth in job numbers – an additional 88,500 jobs by 2021 and an additional 151,162 by 2021. Compared to Scenario IF, Scenario IA creates +37,637

additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures.

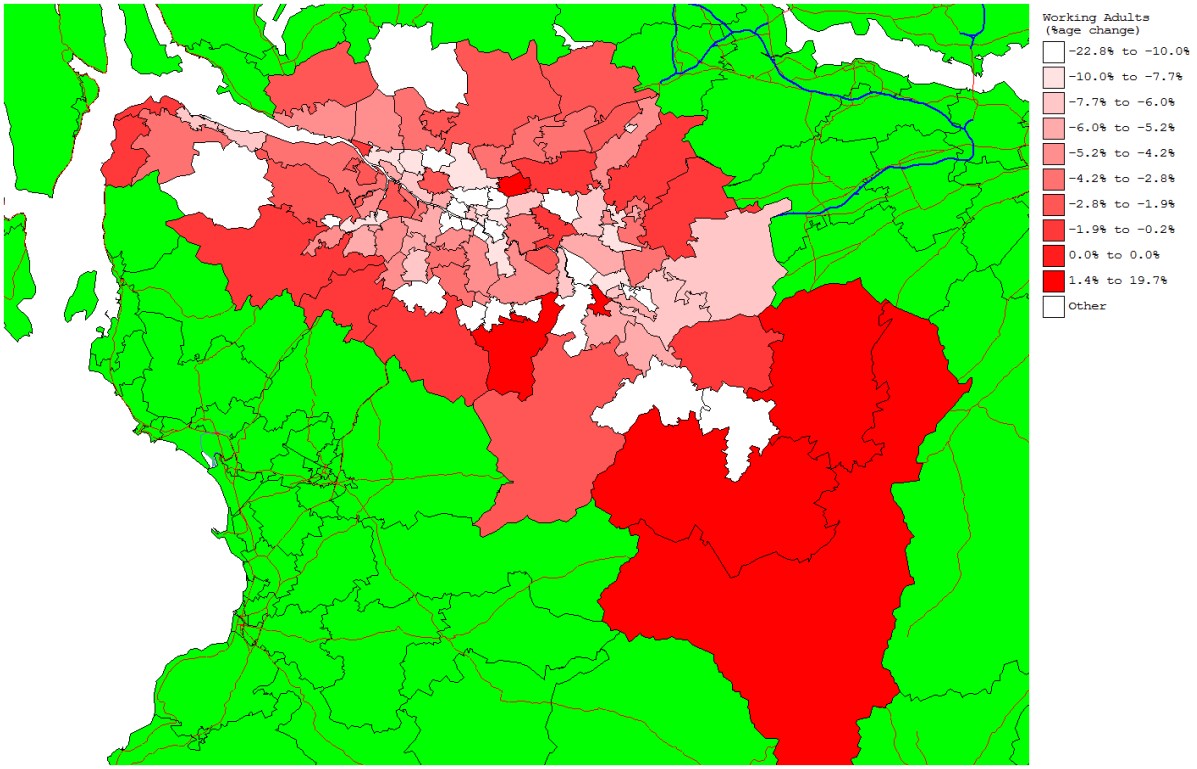
Spatial Analysis: The SITLUM model distributes the additional 37,600 jobs created by Scenario IA at 2021. In terms of Scenario IF this is seen as a negative flow – from dark red towards white on the map. All areas of the conurbation benefit from additional jobs created by Scenario IA but the East End, parts of South and North Lanarkshire, East Dunbartonshire, Parts of Renfrewshire and Inverclyde all have notable job improvements. By 2031 the benefits of Scenario IA result in even greater growth of the additional 78,300 jobs and again this is seen as a negative flow from the IF Scenario – dark red to white on the map and show all areas benefit and in a similar spatial way to the 2021 with similar zones particularly benefiting from these additional jobs.

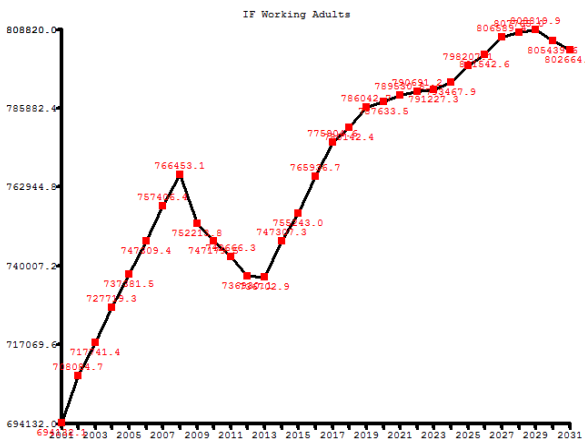
IF v IA Working Adults

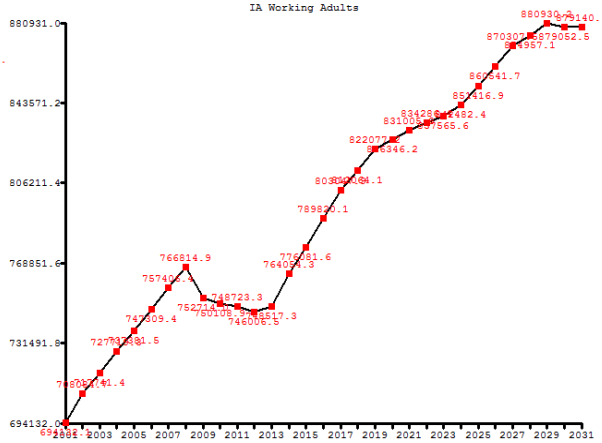
2031



2021







Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	747175	789530	42355	802664	55489
Scenario IG	747480	796075	48595	821314	73591
Scenario IA	748723	831005	82282	879140	130417

Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The graphs indicate a similar pattern with growth in the

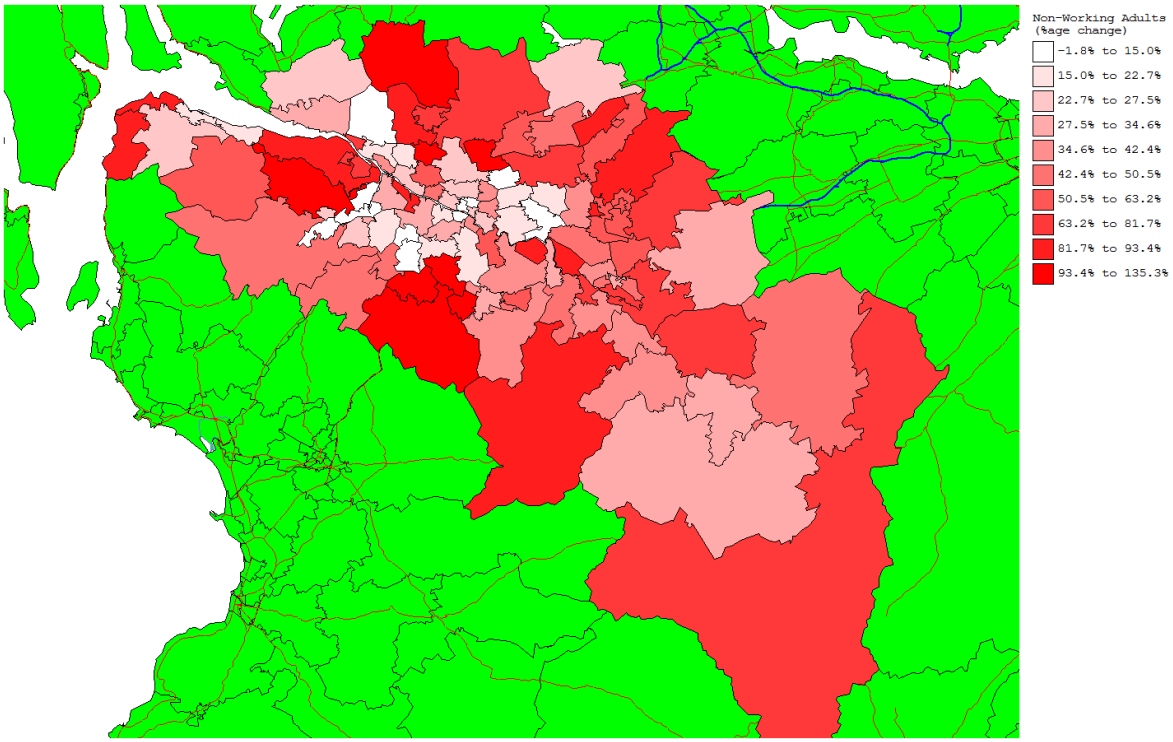
number of working adults under both scenarios. However, similar to the Total Jobs, the number of Working Adults increases even stronger under Scenario IA. Scenario IA generates +82,282 by 2021 and + 130,417 by 2031. Against Scenario IF this creates a difference of + 40,000 by 2021 and + 75,000 by 2031 additional Working Adults created by Scenario IA. Similar in overall numbers terms to the additional Total Jobs numbers.

Spatial Analysis: The positive additional working adults created by Scenario IA has to be seen as a negative flow in terms of Scenario IF. The flow is from dark red to white on the map. The SITLUM model distributes the additional 40,000 working population at 2021. The central band of the conurbation – City Centre, East End, Clyde Waterfront, East Dunbartonshire and parts of North and South Lanarkshire show the greatest growth in Working Adults. This in many ways reflects where IA also creates the additional jobs.

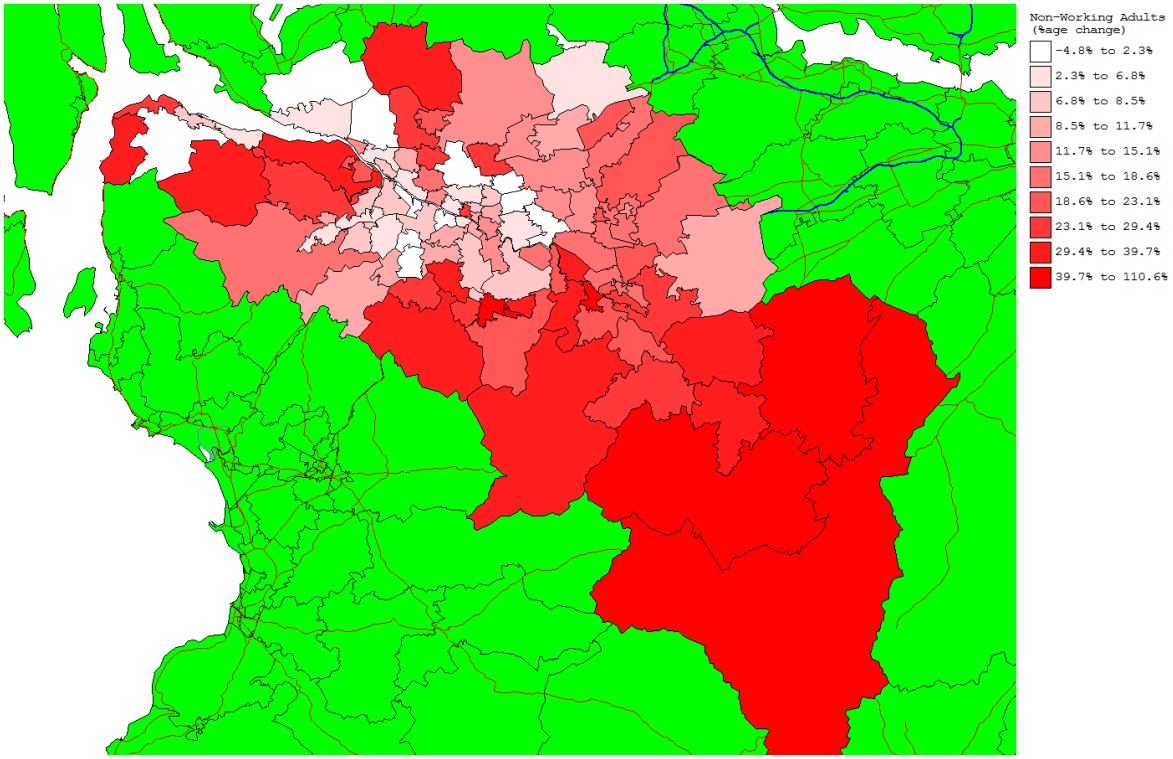
However, the 2031 spatial distribution is quite different. Again Scenario IF sees this as a negative flow from dark red to white on the map. The additional Scenario IA generated 75,000 Working Adults are locating towards the South and West of the conurbation especially East Dunbartonshire, North and South Lanarkshire and the East End. This does not reflect always where the additional jobs are being created under this scenario and implies greater transport movement south east to north west to access jobs. This may be explained by the M74 extension providing greater access for workers.

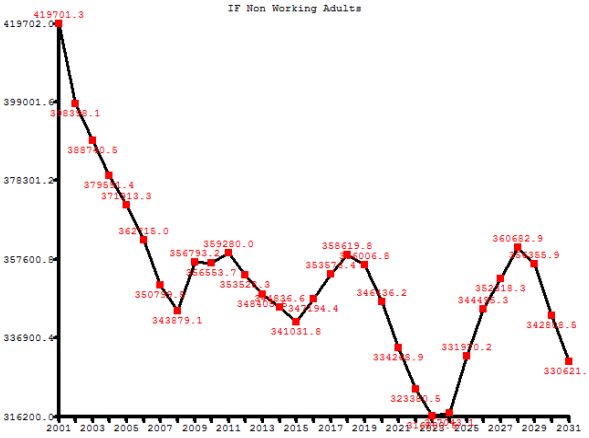
IF v IA Non-Working Adults

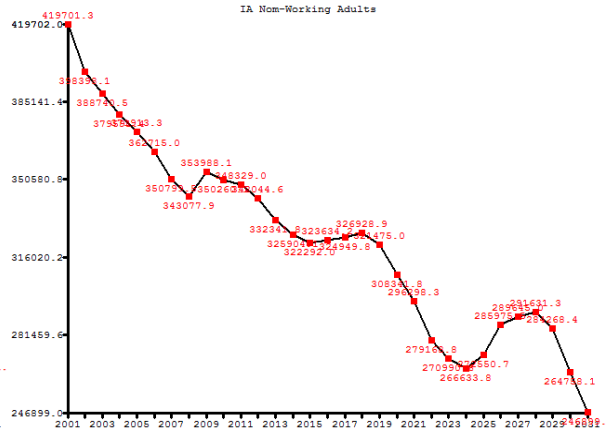
2031



2021







Non-Working Adults	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	359280	334248	-25032	303621	-55659
Scenario IG	365942	369903	3961	405066	39124
Scenario IA	348329	296298	-52031	246899	-101430

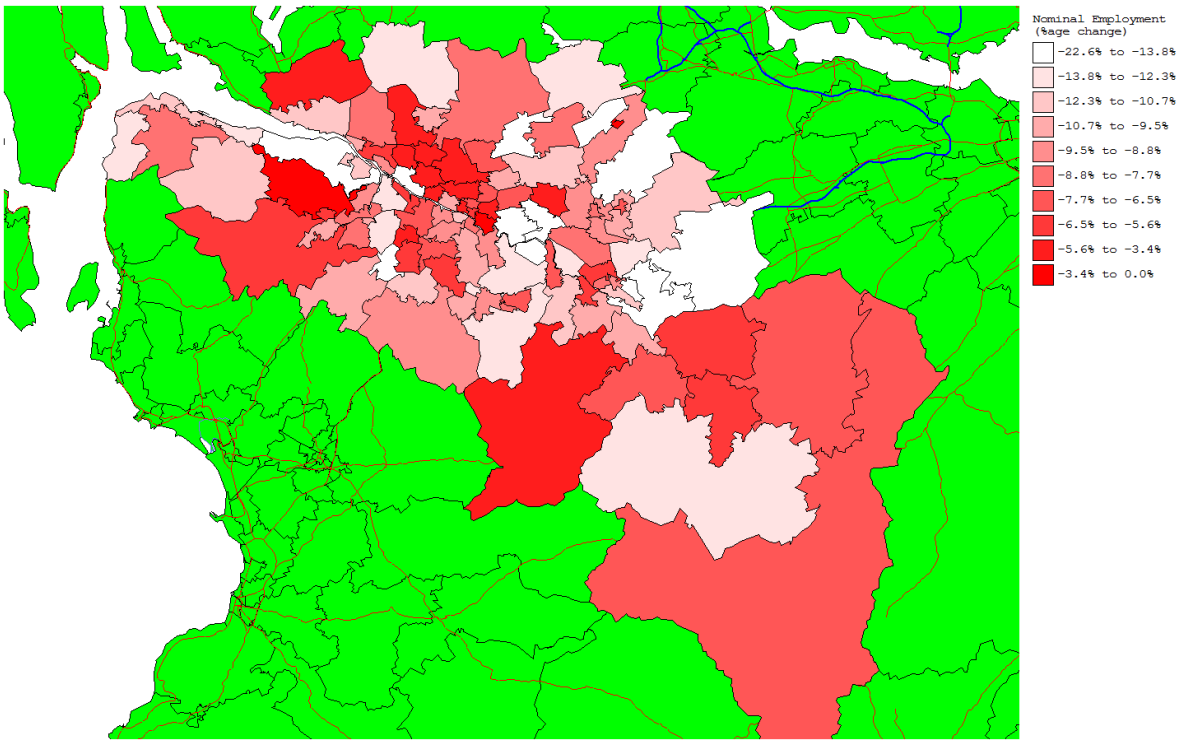
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. Both Scenarios are successful in reducing the number of non –working adults over time. Scenario IF reduces “unemployment” by 25,000 by 2021 and a credible 55,500 by 2031. In comparative terms both Scenarios are successful but Scenario

IA reduces “unemployment” by an even greater extent by an additional 27,000 by 2021 and an additional 46,000 by 2031 against Scenario IF.

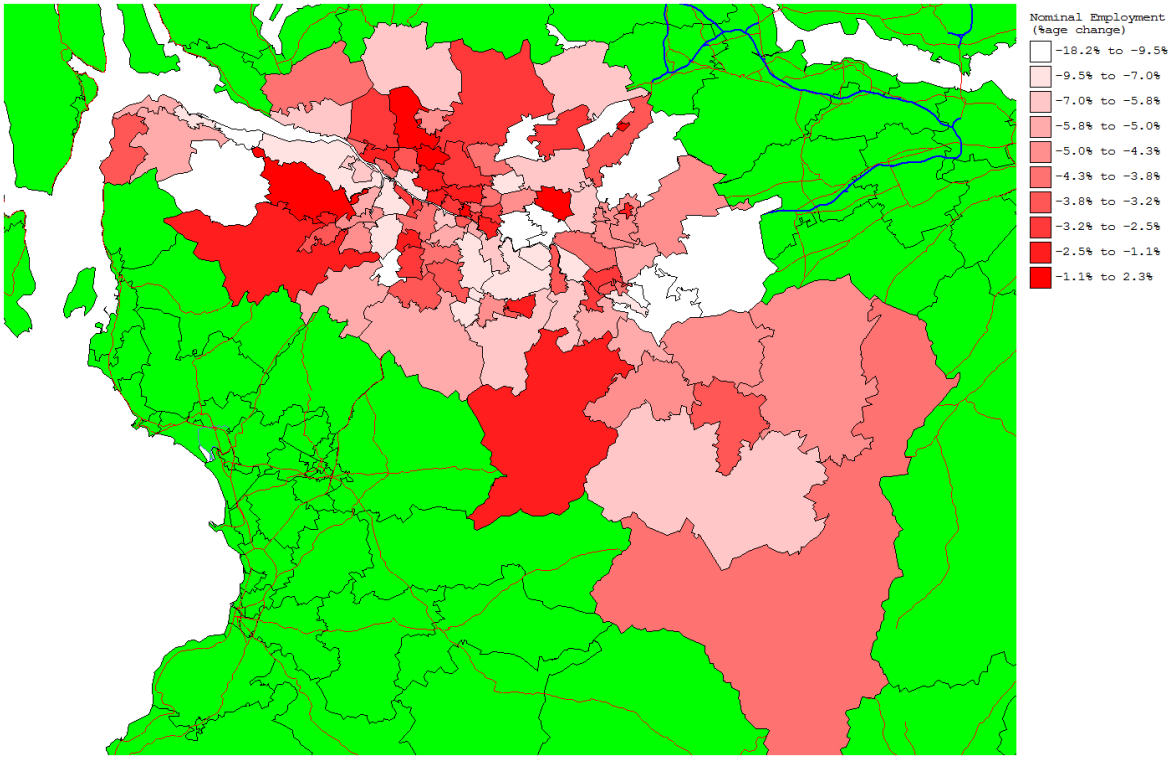
Spatial Analysis: The SITLUM model distributes these additional “unemployed”. The maps show the Scenario IF as being positive against Scenario IA but in the case of “unemployment” a negative is a good thing. The map has to be read carefully – dark red has less reduction in unemployed under Scenario IF. All parts of the conurbation benefit from Scenario IA but it is the south and east of the conurbation that have less non working adults at 2021. By 2031 the additional 46,000 less non working population are distributed widely with pockets in Renfrewshire West Dunbartonshire and Inverclyde benefiting especially well.

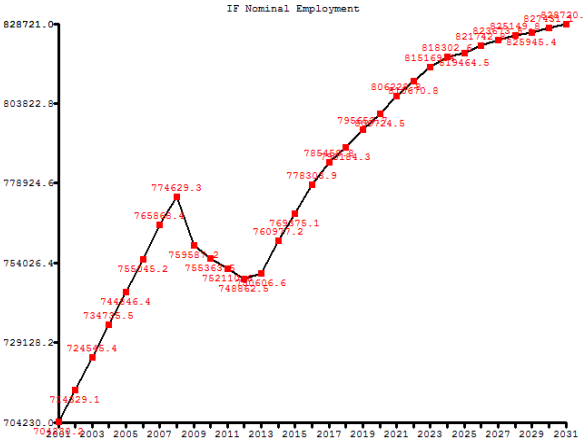
IF v IA Nominal Employment

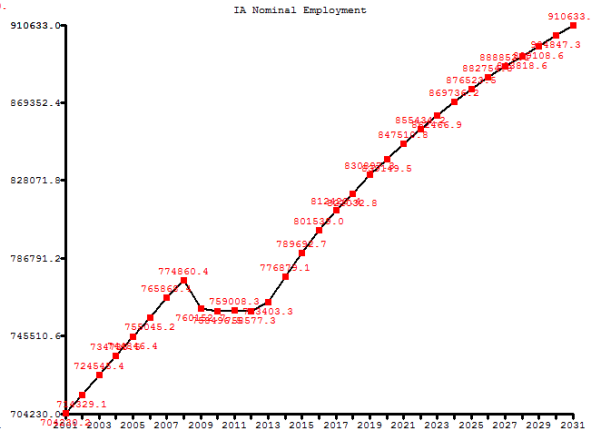
2031



2021







Nominal Employment	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	755363	806220	50857	828721	73358
Scenario IG	755346	807456	52110	830226	74880
Scenario IA	759008	847510	88502	910633	151625

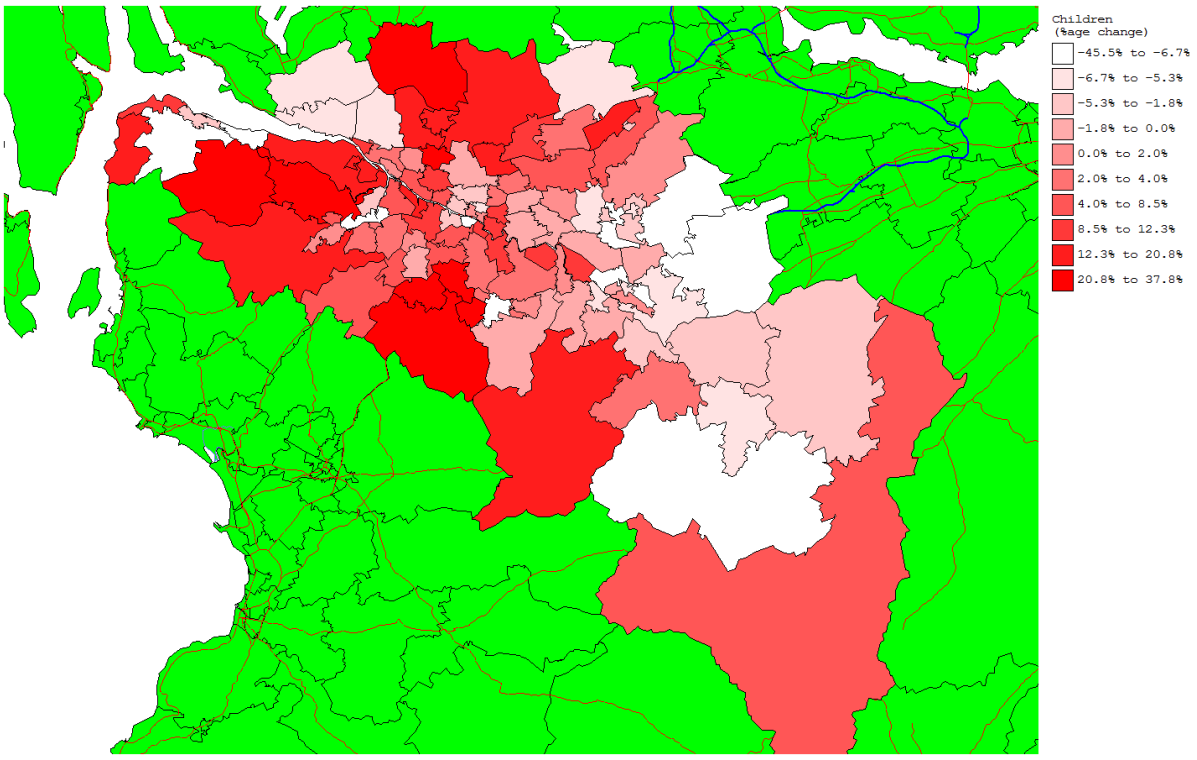
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The graphs are similar showing strong Nominal Employment growth but Scenario IA shows considerable growth in employment numbers – an additional 88,500 jobs by 2021 and an additional 151,165 by 2021. Compared to Scenario IF, Scenario IA creates +37,645 additional jobs by 2021 and an additional 78,267

jobs by 2031. These are very strong and significant job creation figures. The figures for the Nominal Employment and Total Jobs are virtually identical.

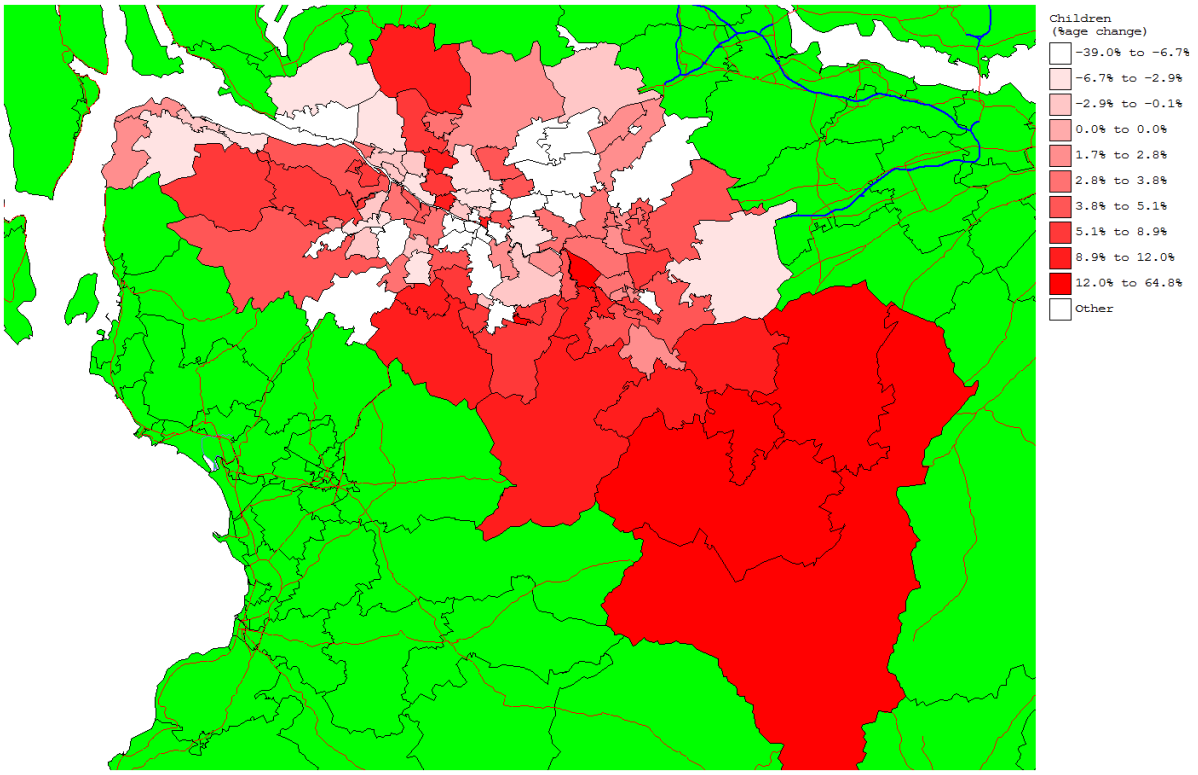
Spatial Analysis: Again Scenario IF sees the flow as negative and the map should be interpreted as a flow from dark red to white. The SITLUM model distributes the additional 37,600 employment created by Scenario IA at 2021 and all areas of the conurbation benefit from additional jobs but the East End, parts of South and North Lanarkshire, East Dunbartonshire, Parts of Renfrewshire and Inverclyde all have notable job improvements. By 2031 the benefits of Scenario IA result in even greater growth of 78,300 and again all areas benefit and in a similar spatial way to the 2021 with similar areas particularly benefiting. This is almost exactly the same spatial result as for Total Jobs.

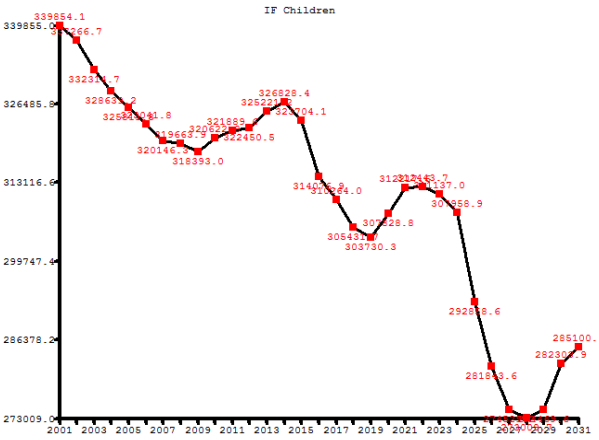
IF v IA Children

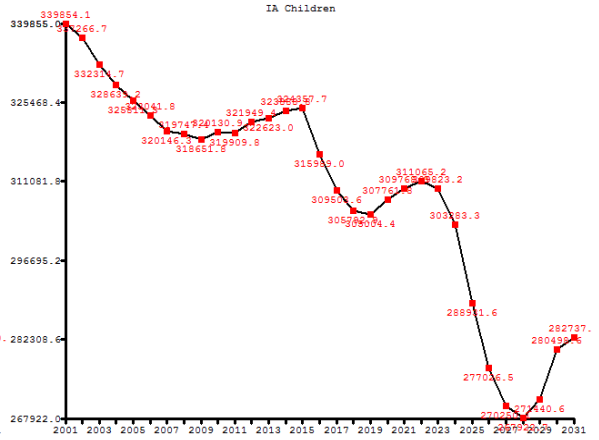
2031



2021







Children	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	321889	312214	-9675	285100	-36789
Scenario IG	322615	327971	5346	312494	-10121
Scenario IA	319909	309768	-10141	282737	-37172

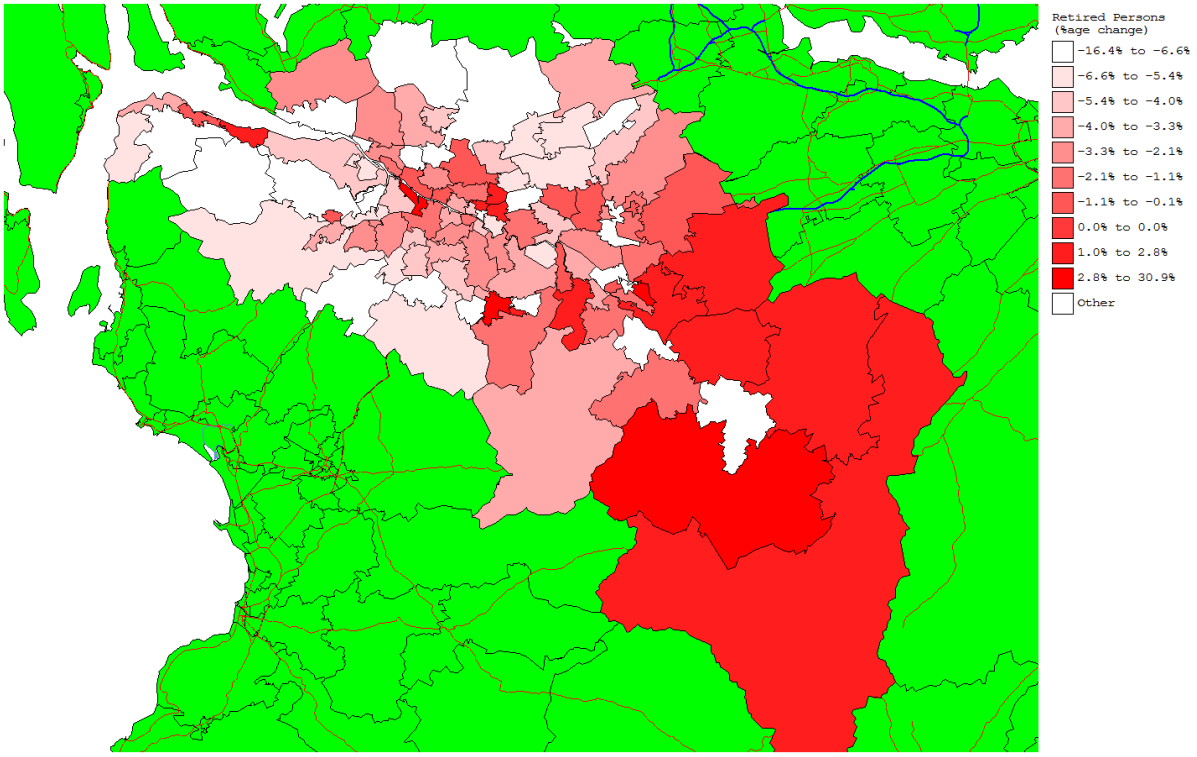
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The graphs are very similar with an overall reduction in the number of children over time which reflects and overall demographic trend. The differences between the two scenarios are very small in absolute number terms. IF has 466 more

children by 2021 and IF has 282 more by 2031. These are very small absolute numbers and for all purposes essentially identical.

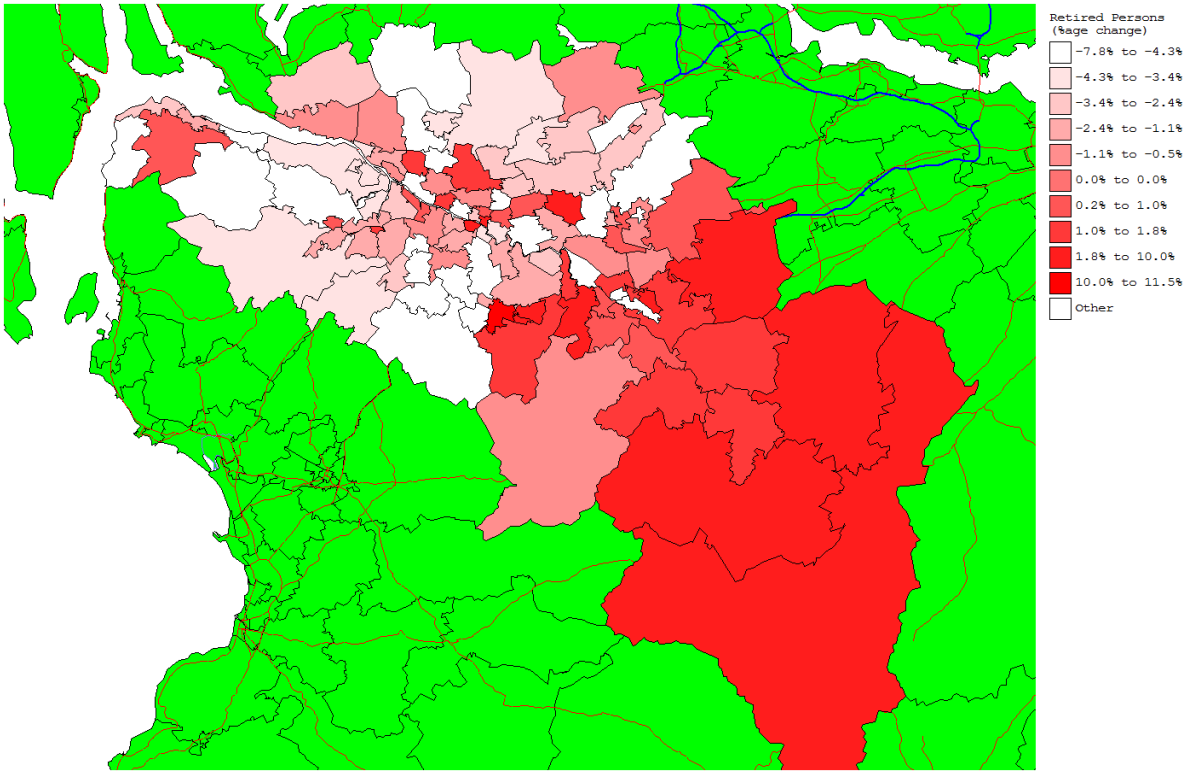
Spatial Analysis: The differences between the two scenarios produce very small absolute numbers so the spatial distribution of this will not be statistically or spatially significant.

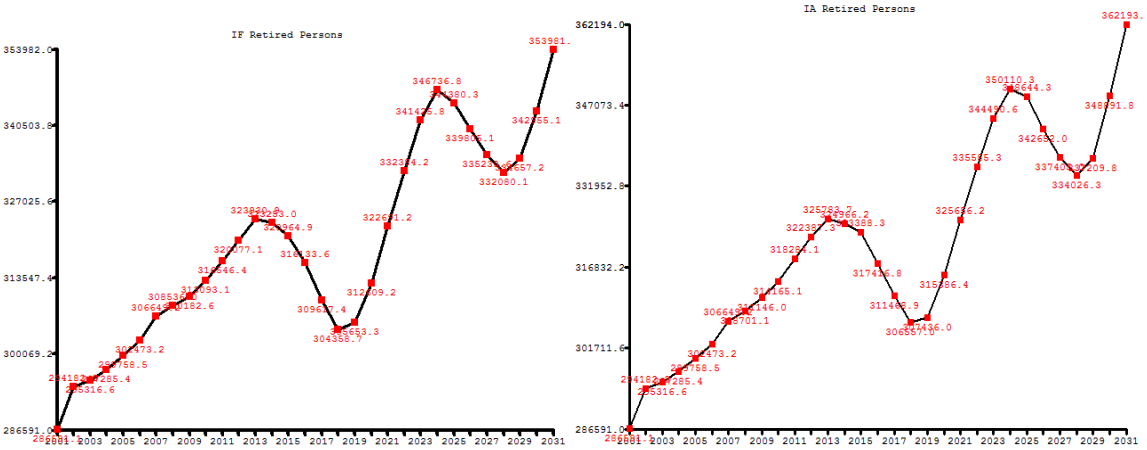
IF v IA Retired Persons

2031



2021





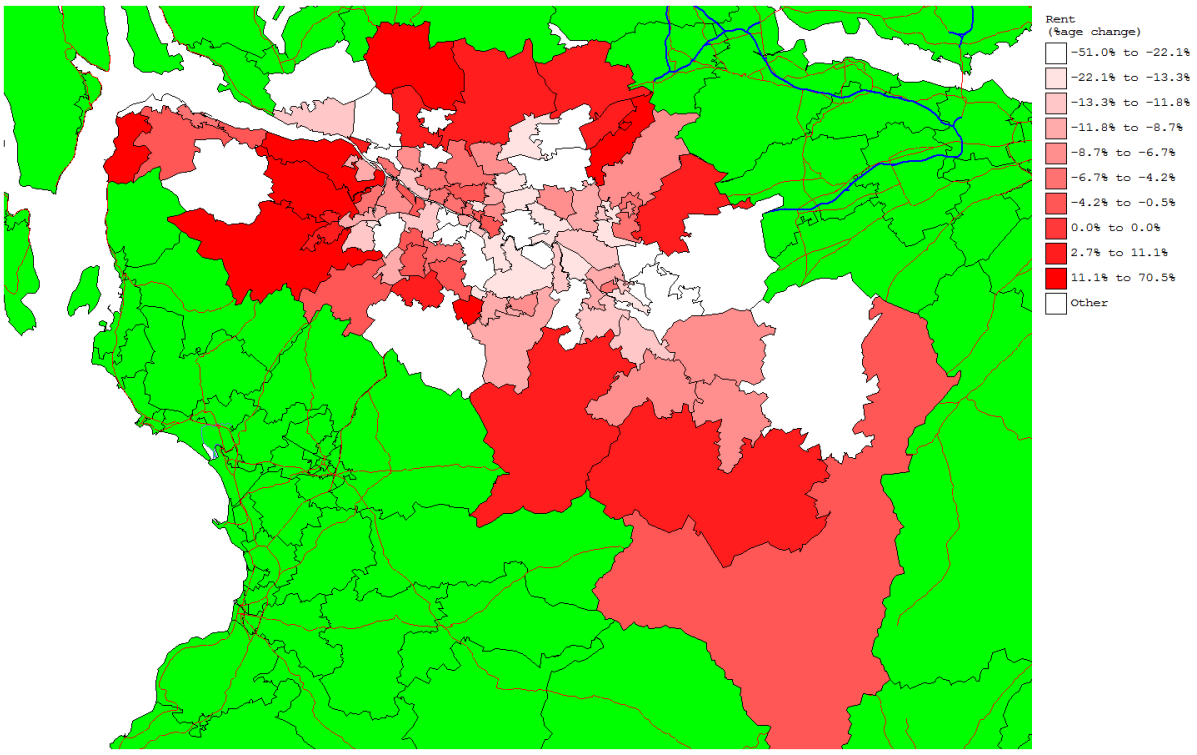
Retired	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	319546	322611	3065	353981	34435
Scenario IG	314120	327345	13225	344183	30063
Scenario IA	318284	325656	7372	362193	43909

Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The Graphs of the two scenarios again show that the overall demographics are virtually identical. The numbers of retired people continue to increase over time. Scenario IF predicts that the difference with Scenario IA will produce 4,307 less retirees at 2021 and 9,500 less at 2031.

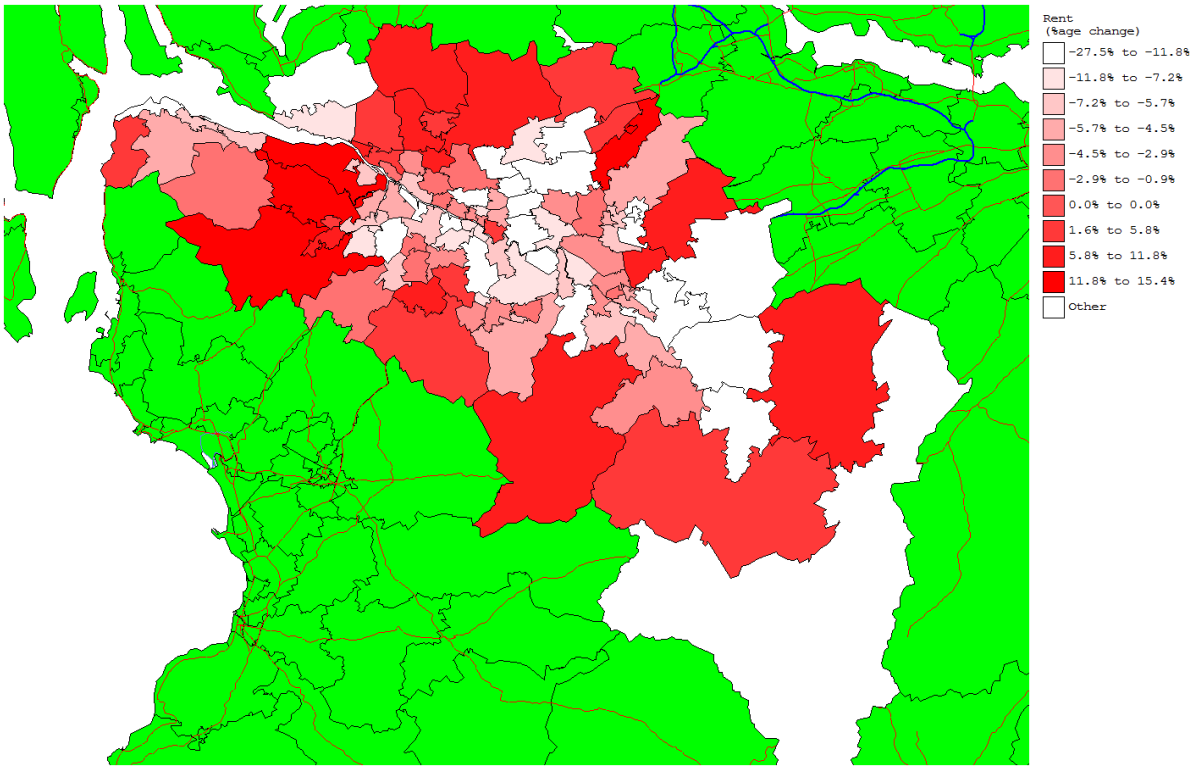
Spatial Analysis: IF Scenario generates a negative flow so map has to be seen as a flow from dark red to white. Again absolute figure differences are not great but what is evident is that at 2021 IA's additional retirees flow from South and east of the conurbation towards the north and west. This spatial pattern is also evident at 2031 position. Competition in the south and east from the growing working populations may drive retired towards the north and west.

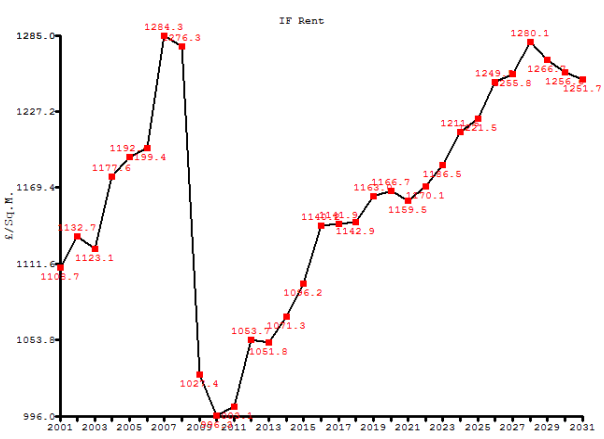
IF v IA Rent

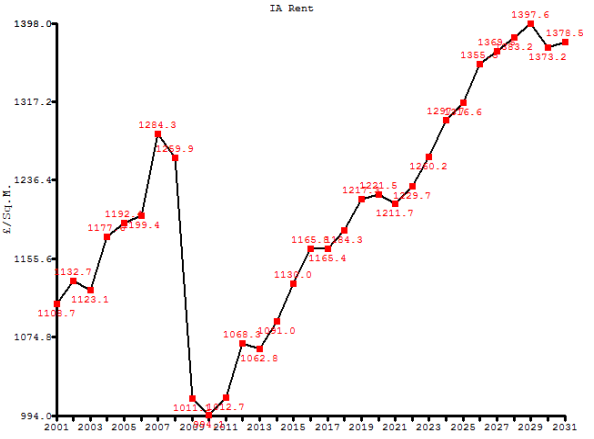
2031



2021







Rent £	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	996	1159	163	1251	255
Scenario IG	1001	1173	172	1306	305
Scenario IA	1012	1211	199	1378	366

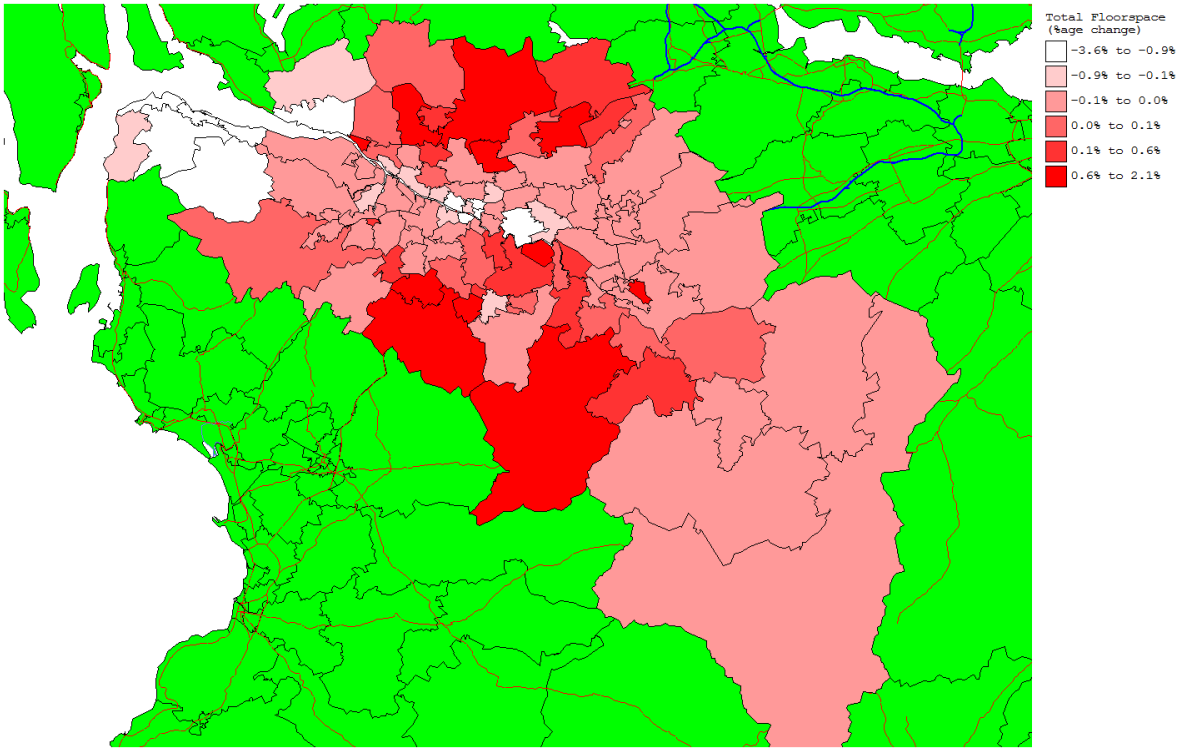
Comment Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model: The graphs indicate from 2011 onwards both scenarios increase the rental values. Scenario IF rental increases by £163 by 2021 and £255 by 2031. The differences between the two rental growths are fairly small in absolute numbers terms

however Scenario IA increases at a higher rate and the difference is £36 per m2 at 2021 and by £110 per m2 by 2031.

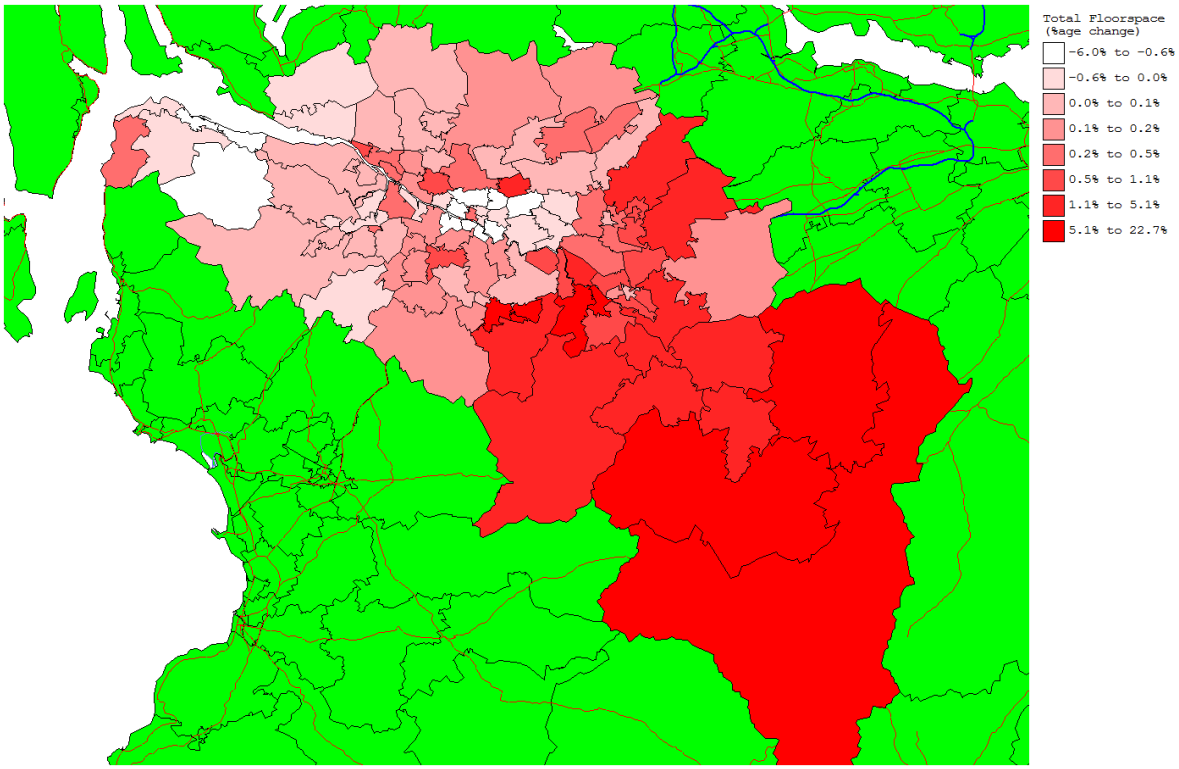
Spatial Analysis: Again the IF Scenario generates a negative flow so map has to be seen as a flow from dark red to white. Perhaps reflecting where Scenario IA creates additional Total Jobs it also appears to increase rentals in these same areas compared to Scenario IF. At 2021 Scenario IA predicts strong rental growth around Glasgow east end and south Glasgow, parts of East Dunbartonshire, parts of North Lanarkshire, parts of Renfrewshire, Inverclyde and parts of West Dunbartonshire. At 2031 Scenario IA predicts a consolidation of this spatial pattern with similar areas continuing to benefit from additional rental growth.

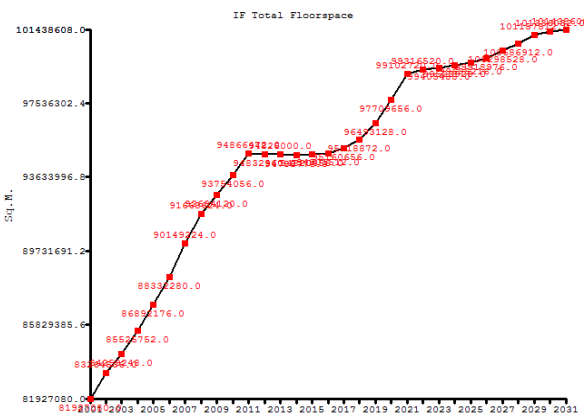
IF v IA Total Floorspace

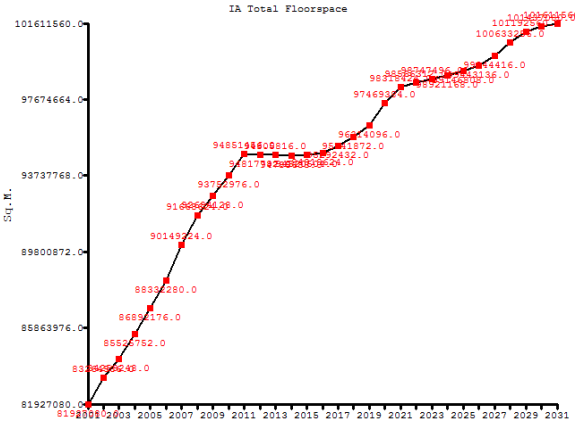
2031



2021







Total Floorspace m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	94866871	99102720	4235849	101438608	6571737
Scenario IG	94867944	100680480	5812536	101594240	6726296
Scenario IA	94851916	98318421	3466505	101611560	6759644

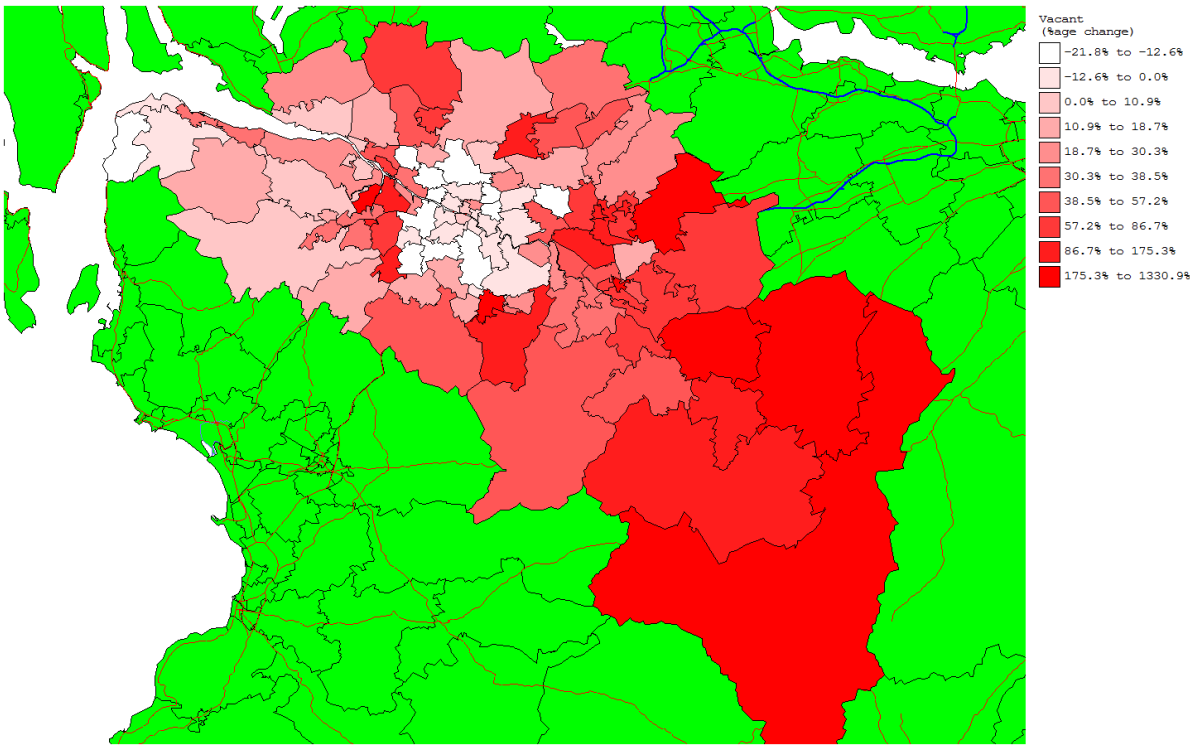
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model: The two graphs again show a very similar pattern in absolute numbers. Both scenarios predict total floorspace growth in a very similar pattern. The absolute differences are small. Scenario IF will produce slightly more floorspace than Scenario IA by 2021 of 4.23 million m2 compared to

3.46 million m2. Scenario IF produced 0.77 million m2 more floorspace. At 2031 Scenario IF produces slightly less floorspace at 6.57 million m2 compared to 6. 75 million m2 produced by Scenario IF. A difference of only + 0.18 million m2. Obviously where this is a good thing and meets demand will only be known when vacancy rates are examined but the noticeable feature is the similarity in their growth predictions.

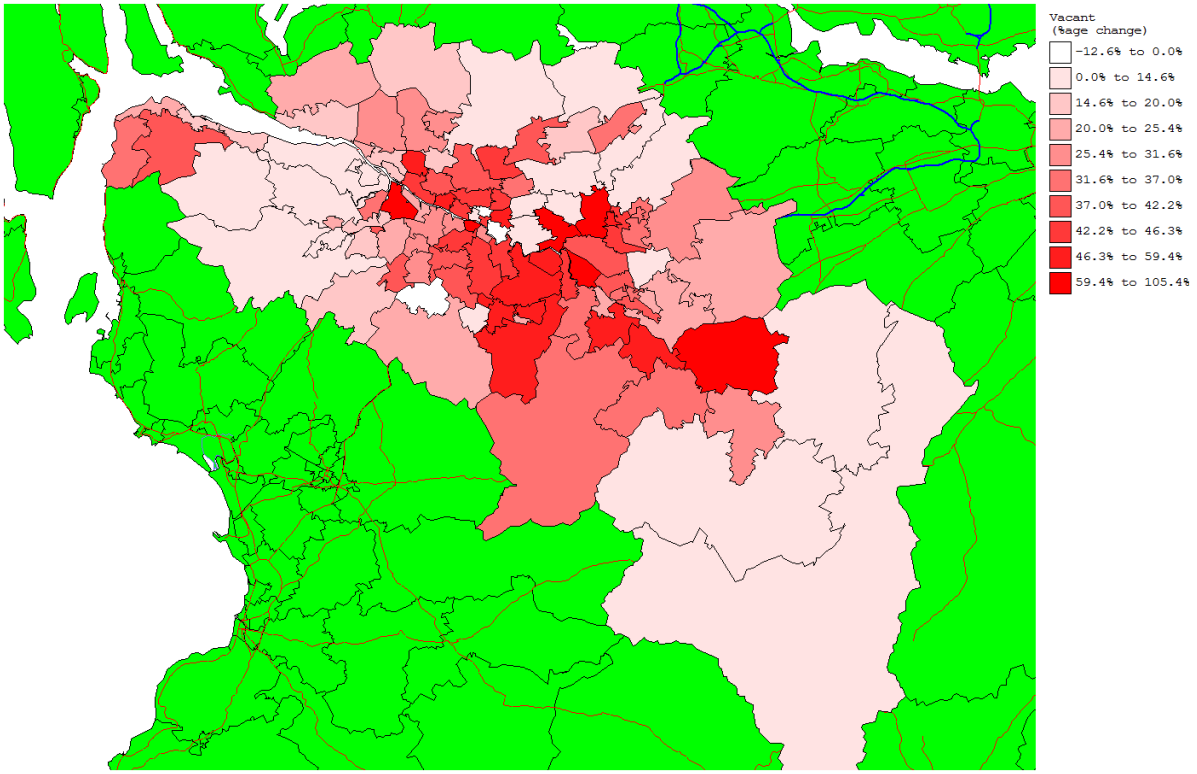
Spatial Analysis: Again we are comparing relatively small differences in absolute terms between these scenarios and therefore the spatial implications are not particularly significant. However, at 2021 scenario IF's more positive figures result in the SITLUM model distributing this additional floorspace towards the south and east of the conurbation. The 2031 position changes as Scenario IF turns negative compared to Scenario IA – the additional floorspace is directed to Glasgow City.

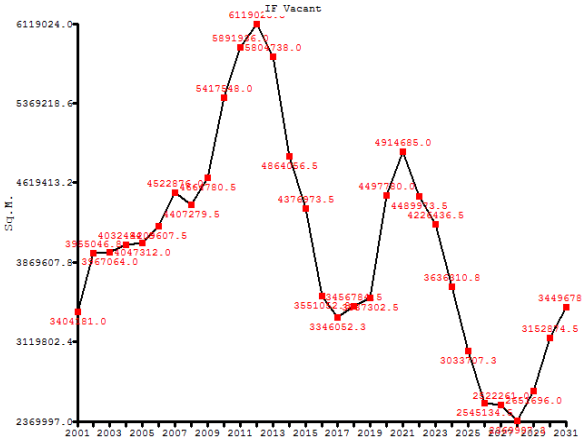
IF v IA Vacant Floorspace

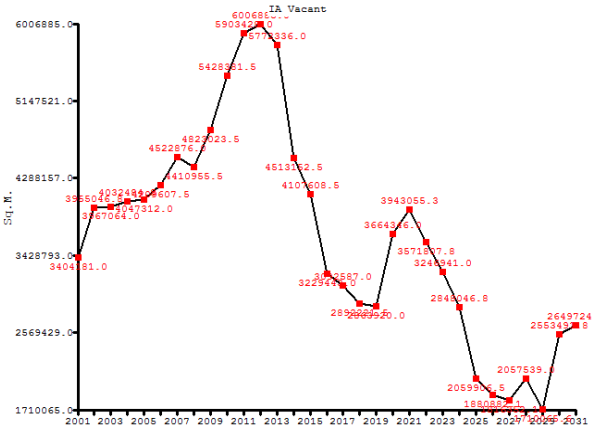
2031



2021







Vacant (M2)	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	5891986	4497780	-1394206	3449678	-2532308
Scenario IG	5784632	5671054	-113578	2456140	-3328492
Scenario IA	5903429	3943055	-1960374	2649724	-3152705

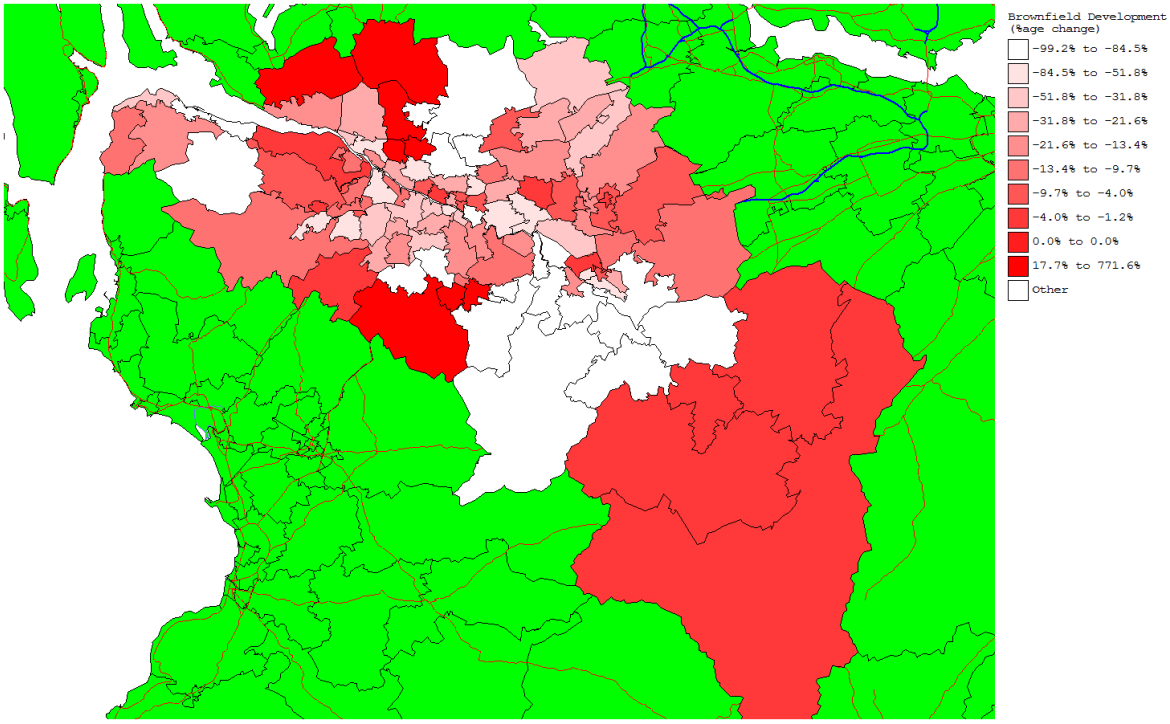
Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The graphs indicate that after the peak of vacancy levels in 2011 that vacancy levels fall to 2031 under both scenarios and in a very similar pattern. In absolute numbers terms the differences between the two scenarios are relatively small. By 2021 Scenario IA shows the greater fall in vacancy levels – by 0.57 million m2 compared to

Scenario IF. At 2031 Scenario IA again produces the greater fall in vacancy by 0.62 million m2.

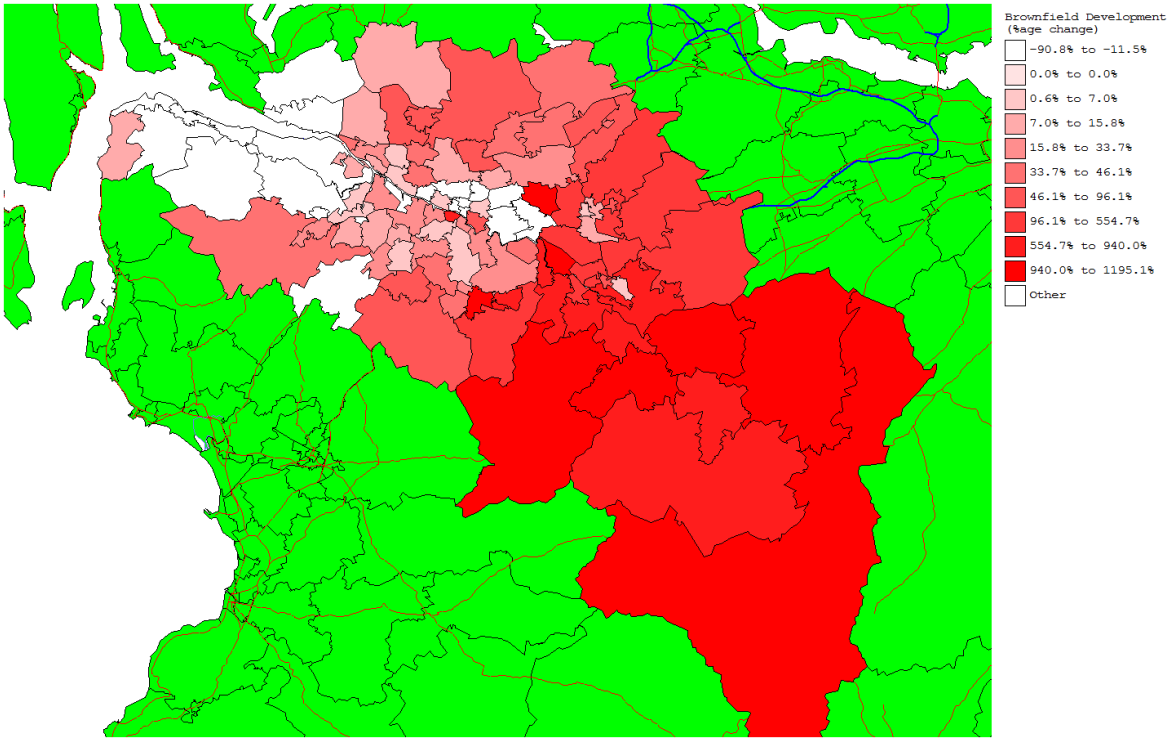
Spatial Analysis: SITLUM distributes this relative different negative falls in vacancy levels between the two scenarios. At 2021 Scenario IF shows that while all areas benefit in a fall in vacancy levels under Scenario IA but it is generally Glasgow City and parts of North and South Lanarkshire that benefit most. At 2031 it is again the dark red areas on the map that benefit most from the drop in vacancy levels to the benefit most of all areas except this time around parts of Glasgow City. Again caution as we are distributing relatively small absolute figures.

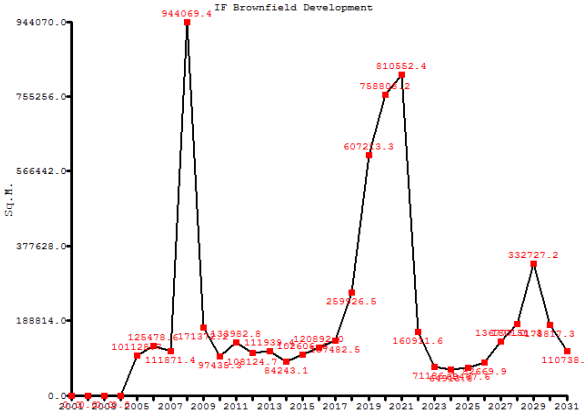
IF v IA Brownfield Development

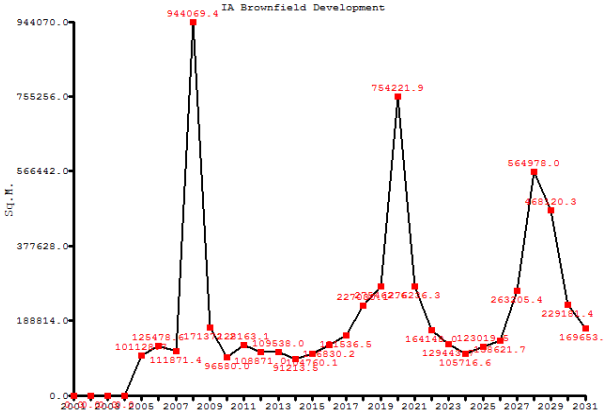
2031



2021







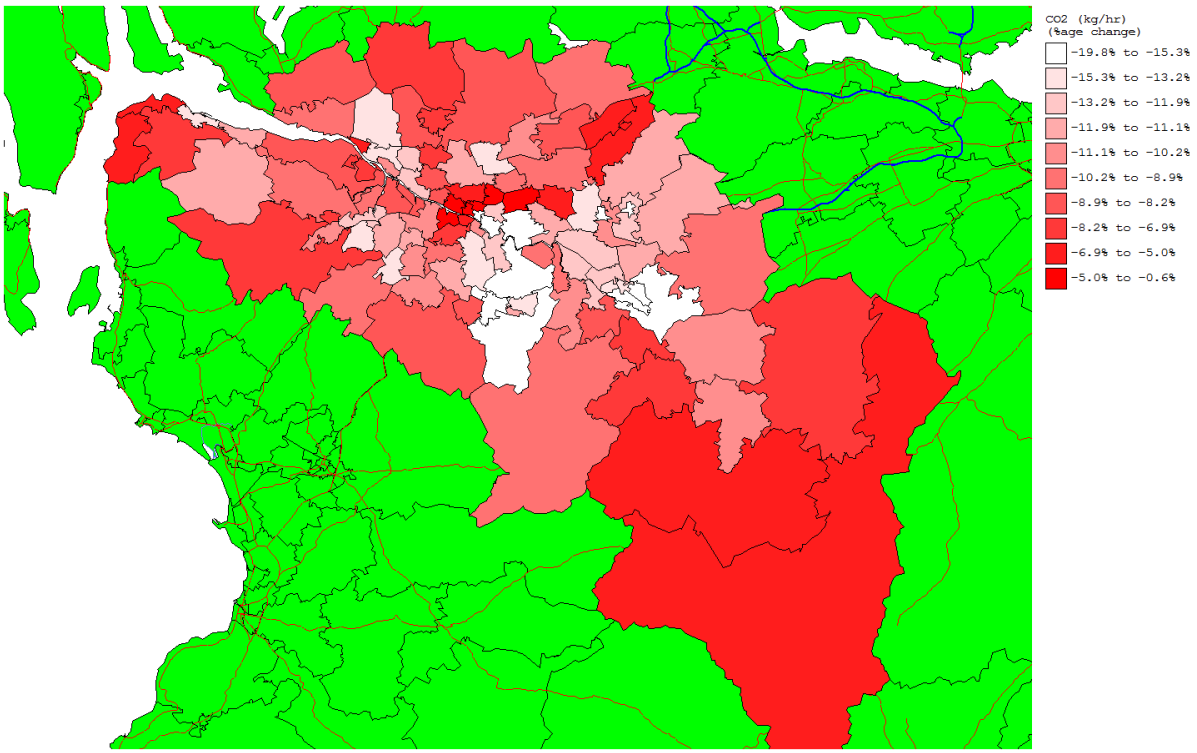
Brownfield Development m2	2011	2021	increase/decrease	2031	Increase/decrease
Scenario IF	136982	810552	673570	101738	-35244
Scenario IG	135033	219920	84917	52800	-82233
Scenario IA	128163	276215	148052	169653	41490

Comment: Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. The graphs again indicate a very similar pattern with only the intensity of the peaks being significantly different. The 2021 position fits into a peak in both scenarios with scenario IA peaking at 2020 while Scenario IF peaking a year later at 2021. This makes a huge difference to the absolute numbers and spatial impact making the 2021 position less relevant in this situation – as a statistical blimp. The 2031 position may be worth noting with scenario IA producing slightly higher final floorspace but given the volatile

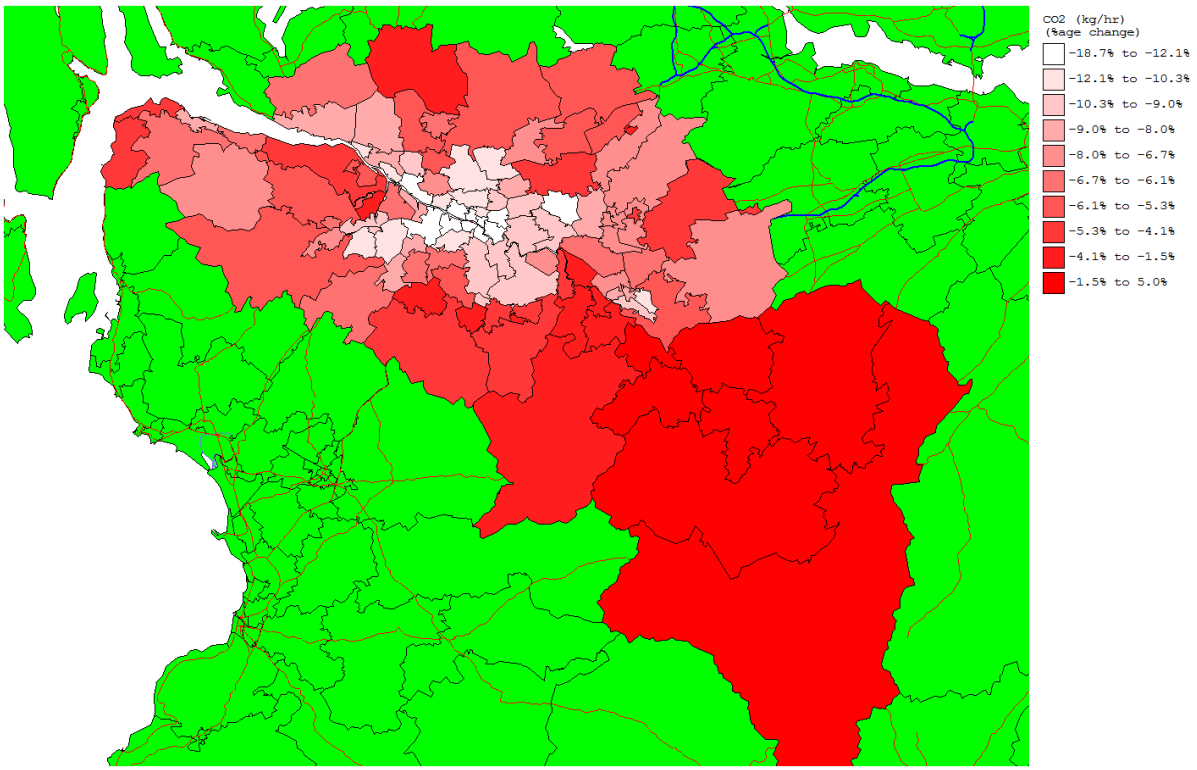
nature of these graphs the resultant spatial analysis is meaningless. Best to note the similarity in both graphs rather than any marginal differences.

IF v IA CO2

2031



2021



Scenario IA – Rebalanced Economy +M74 Network is the Base Model and Scenario IF – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) is the Forecast Model. Absolute value graphs are not available for CO2 figures but as a guide we have the relative % changes between the two scenarios. The 2021 position is that Scenario IF generates a relative less amount of CO2 of between 5.0 % to -18.7%. The 2031 position is that Scenario IF again generates a relatively smaller amount of CO2 of between -0.6% to -19.8%.

Spatial Analysis: Scenario IF generates a negative flow and therefore map has to be seen as flow from dark red to white. At 2021 Scenario IF produces a smaller amount of CO2 to the south and east of the conurbation with Scenario IA producing higher CO2 levels especially around the City Centre and along the Clyde Waterfront. The 2031 position under Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

Overall Conclusion on comparing**: Scenario IF** – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) Vs **Scenario IA** – Rebalanced Economy +M74 Network

Scenario IF is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

Scenario IF and Scenario IA have very similar demographics. Both have a similar upward positive total population growth and very similar absolute figures. The population differences between these two scenarios are therefore very small in absolute numbers terms. Scenario IA is + 1,758 at 2021 compared to Scenario IF and IA is - 3,656 at 2031 compared to IF. Again similar absolute figures also for Children and for Retired People. Perhaps one significant difference between the scenarios is Scenario IA shows considerable growth in job numbers – an additional 88,500 jobs by 2021 and an additional 151,162 by 2021. Compared to Scenario IF, Scenario IA creates +37,637 additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures and while Scenario IF also produces strong growth it is not quite at the levels of Scenario IA. All areas of the conurbation benefit from the additional jobs created by Scenario IA but the East End, parts of South and North Lanarkshire, East Dunbartonshire, parts of Renfrewshire and Inverclyde all have notable job improvements. Of note is the 2031 spatial distribution of the additional 75,000 Working Adults generated by Scenario IA which are locating towards the South and West of the conurbation especially East Dunbartonshire, North and South Lanarkshire and the East End. This does not reflect always where the additional jobs are being created under this scenario and implies greater transport movement south east towards the north west to access jobs. This may be explained by the M74 extension providing greater access for workers.

Both Scenarios are successful in reducing the number of non –working adults over time. Scenario IA reduces “unemployment” by 52,000 by 2021 and an astonishing 101,500 by 2031. In comparative terms both Scenarios are successful but Scenario IA reduces “unemployment” by an additional 27,000 by 2021 and an additional 46,000 by 2031 against Scenario IF. All parts of the conurbation benefit from Scenario IA but it is the south and east of the conurbation that have less non working adults generally.

The differences between the two rental growths are fairly small in absolute numbers terms. Scenario IA increases the difference by £36 per m2 at 2021 and by £110 per m2 by 2031. Where Scenario IA creates Total Jobs it also appears to increase rentals in these same areas. Scenario IA predicts strong rental growth around Glasgow east end and south Glasgow, parts of East Dunbartonshire, parts of North Lanarkshire, parts of Renfrewshire, Inverclyde and parts of West Dunbartonshire. Scenario IF produces a lower amount of CO2 to the south and east of the conurbation with Scenario IA producing greater CO2 especially around the City Centre and along the Clyde Waterfront.

4. Summary and Conclusions

Overall Conclusion on comparing**: Scenario IF** – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration) Vs **Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario).

Scenario IF has a more pessimistic population forecast assumption compared to Scenario IG and therefore it would be anticipated all things being equal that it would generate more negative outputs especially in terms of economic growth and future development levels. The additional 95,000 people attracted to the area by Scenario IG compared to Scenario IF at 2031 should produce a noticeable impact. Scenario IG's additional population is allocated by the SITLUM model and concentrated around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). The effect of the opening of the M74 in June 2011 may be the reason for the increase in accessibility for the south of Glasgow.

Of greatest interest is that Scenario IG only creates a difference of + 1,239 jobs at 2021 and + 1,522 jobs at 2031 compared to Scenario IF. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher jobs but this is clearly not the case. IG does not produce the number of jobs which would reflect and justify the population growth. The additional jobs are focused to the North and West of the conurbation. However the working population only grows by 18,000 by 2031 and that is a very poor return for an additional 95,000 population. It is the Non-Working Adults that shows the real difference between these two scenarios. This produces an astonishing difference between the two scenarios. IF generates 30,000 less "unemployed " by 2021 and 95,000 less by 2031. The implications are that while IG is successful in attracting in additional population of 95,000 by 2031 compared to IF these additional people are not in employment. Scenario IF while producing less population overall does provide jobs for the incoming population sufficient to gradually reduce unemployment. The implications are that IG generates population growth but not the required economic activity and therefore jobs to employ them with the result that this will simply add to the welfare budget and not to economic growth. Scenario IF on the other hand appears to better align population growth and job growth and keeps rentals similarly positive while avoiding the higher peaks of vacant floorspace.

Overall Conclusions on comparing: **Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs **Scenario IA** – Rebalanced Economy +M74 Network

Scenario IA is Base Model and Scenario IG is Forecast Model (Both Permissible).

Both scenarios show a strong positive population growth pattern up to 2031. Scenario IG forecasts a final population of 1.883 million at 2031 while Scenario IA forecasts a slightly less optimistic figure of 1.770 million by 2031. The difference being that Scenario IG forecasts a higher growth of an additional 46,494 by 2021 and a difference of 100,000 more population by 2031. At 2021 it is the south and east of the conurbation which will see increasing population growth generated by Scenario IG. By 2031 in general it is all zones surrounding Glasgow City which sees the extra population growth generated by Scenario IG.

Both scenarios have similar job growth pattern and positive job growth forecasts. However there are notable absolute figure differences. Scenario IG forecasts growth of an additional 52,000 jobs by 2021 and by an additional 74,800 jobs by 2031. However, Scenario IA produces even more optimistic forecasts of +88,500 jobs by 2021 and +151,625 jobs by 2031. The difference between these two forecasts is that Scenario IA generates 36,398 additional jobs by 2021 compared to Scenario IG and an additional 76,745 jobs by 2031. While Scenario IG produces +100,000 extra population attracted (immigration) into the area it only forecasts an additional 74,800 jobs. Scenario IA on the other hand forecasts slightly less population but provides an additional 151,600 jobs. As a result Scenario IA forecasts an additional 33,687 working adults by 2021 and an additional 56,826 by 2031 compared to scenario IG. Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde.

Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IA forecasts a general fall in the number of non-working adults up to 2031 while Scenario IG forecasts a rise in the number of non-working adults up to 2031. Scenario IA shows a general decline in the absolute number of “unemployed” – up to 52,000 less by 2021 and 101,400 less by 2031. Scenario IG on the other hand shows “unemployment” increasing + 3,900 by 2021 and almost 40,000 higher by 2031. This produces an astonishing difference between the two scenarios. A difference of + 56,000 more “unemployed“ by 2021 and a difference of 140,554 by 2031! The additional non-working adults are attracted to the north and west of the conurbation - Glasgow City, parts of Renfrewshire, parts of Inverclyde and West Dunbartonshire and parts of East Dunbartonshire and North Lanarkshire. Attracted, no doubt, by social housing availability and perhaps lower rental levels rather than job accessibility issues. The additional “unemployed” in these areas will obviously have additional welfare implications in these areas.

Both scenarios forecast an increase in the rental values. The differences between the two rental growths are fairly small in absolute numbers terms but Scenario IA increases the difference by £27 per m2 at 2021 and by £61 per m2 by 2031 compared to Scenario IG. The increased rentals generated by Scenario IA are distributed along very similar pattern to Total Jobs. It is parts of North and South Lanarkshire, Glasgow City, East End, Clyde Waterfront, parts of Renfrewshire, parts of Inverclyde and parts of West Dunbartonshire that have slightly higher rental levels under Scenario IA.

Both scenarios predict total floorspace growth in a very similar growth pattern but Scenario IA’s positive figures result in the model distributing this additional floorspace strongest towards Inverclyde and West Dunbartonshire. In Scenario IA all areas gain greater CO2 but

that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

Overall Conclusion on comparing**: Scenario IA** – Rebalanced Economy +M74 Network **Vs Scenario IF** – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration).

Scenario IF is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

Scenario IF and Scenario IA have very similar demographics. Both have a similar upward positive total population growth and very similar absolute figures. The population differences between these two scenarios are therefore very small in absolute numbers terms. Scenario IA is + 1,758 at 2021 compared to Scenario IF and IA is - 3,656 at 2031 compared to IF. Again similar absolute figures for Children and Retired People. Perhaps one significant difference is Scenario IA shows considerable growth in job numbers – an additional 88,500 jobs by 2021 and an additional 151,162 by 2021. Compared to Scenario IF, Scenario IA creates +37,637 additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures. All areas of the conurbation benefit from the additional jobs created by Scenario IA but the East End, parts of South and North Lanarkshire, East Dunbartonshire, Parts of Renfrewshire and Inverclyde all have notable job improvements. Of note is the 2031 spatial distribution of the additional 75,000 Working Adults generated by Scenario IA which are locating towards the South and West of the conurbation especially East Dunbartonshire, North and South Lanarkshire and the East End. This does not reflect always where the additional jobs are being created under this scenario and implies greater transport movement south east towards the north west to access jobs. This may be explained by the M74 extension providing greater access for workers.

Both Scenarios are successful in reducing the number of non –working adults over time. Scenario IA reduces “unemployment” by 52,000 by 2021 and an astonishing 101,500 by 2031. In comparative terms both Scenarios are successful but Scenario IA reduces “unemployment” by an additional 27,000 by 2021 and an additional 46,000 by 2031 against Scenario IF. All parts of the conurbation benefit from Scenario IA but it is the south and east of the conurbation that have less non working adults generally.

The differences between the two rental growths are fairly small in absolute numbers terms. Scenario IA increases the difference by £36 per m2 at 2021 and by £110 per m2 by 2031. Where Scenario IA creates Total Jobs it also appears to increase rentals in these same areas. Scenario IA predicts strong rental growth around Glasgow east end and south Glasgow, parts of East Dunbartonshire, parts of North Lanarkshire, parts of Renfrewshire, Inverclyde and parts of West Dunbartonshire. Scenario IA produces a higher amount of CO2 to the north and west of the conurbation and especially around the City Centre and along the Clyde Waterfront.

Overall Conclusion on comparing**: Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario) Vs **Scenario IF** – Oxford Economics with GRO Population + M74 Network (Scenario 1 Lower Migration).

Scenario IF is the Base Model and Scenario IG is the Forecast Model (Both Permissible)

Scenario IG has at it's base a more optimistic population forecast compared to Scenario IF and therefore it would be anticipated all thing being equal that it would generate more positive outputs especially in terms of economic growth and future development levels. The additional 95,000 people attracted to the area by Scenario IG benefit all parts of the conurbation but there is a concentration of additional population around the south side of Glasgow and east conurbation (E Renfrewshire, North and South Lanarkshire). The effect of the opening of the M74 in June 2011 may be the reason for the increase in accessibility for the south of Glasgow. Of greatest interest is that Scenario IG only creates a difference of 1,239 jobs at 2021 and 1,522 jobs at 2031. Given the much higher population figures for Scenario IG it would be expected that IG would also produce significantly higher jobs but this is clearly not the case. IG does not produce the number of jobs which would reflect and justify the population growth. These additional jobs are focused to the North and West of the conurbation. However the working population only grows by 18,000 by 2031 and that is a very poor return for an additional 95,000 population. It is the Non-Working Adults that shows the real difference between these two scenarios. This produces an astonishing difference between the two scenarios. IG generates + 30,000 more "unemployed " by 2021 and +95,000 by 2031! The implications are that while IG is successful in attracting in additional population of 95,000 by 2031 compared to IF these additional people are not in employment. Scenario IF while producing less population overall does provide jobs for the incoming population sufficient to gradually reduce unemployment. The implications are that IG generates population growth but not the required economic activity and therefore jobs to employ them with the result that this will simply add to the welfare budget and not to economic growth. This will also have an impact on social housing and transport movements (additional unemployed travel pattern will be different from employed – less travel overall, less commuting, more use of Public Transport, more travel off peak). However the small amount of extra economic activity/ jobs that Scenario IG generates as also shown by the increased rentals is focused along the Clyde Waterfront, Renfrewshire and West Dunbartonshire.

Overall Conclusions on comparing: **Scenario IA** – Rebalanced Economy +M74 Network Vs **Scenario IG** - Oxford Economics + Scenario C +M74 Network (Scenario 2 Higher Migration/Planning Scenario).

Scenario IG is Base Model and Scenario IA is Forecast Model (Both Permissible).

Both scenarios show a strong positive population growth pattern up to 2031. Scenario IG forecasts a final population of 1.883 million at 2031 while Scenario IA forecasts a slightly less optimistic figure of 1.770 million by 2031. The difference being that Scenario IG forecasts a higher growth of an additional 46,494 by 2021 and a difference of 100,000 more population by 2031. In general it is the all zones surrounding Glasgow City which sees population growth generated by Scenario IG.

Both scenarios have similar job growth pattern and positive job growth forecasts. However there are notable absolute figure differences. Scenario IG forecasts growth of an additional 52,000 jobs by 2021 and by an additional 74,800 jobs by 2031. Scenario IA produces even more optimistic forecasts of +88,500 jobs by 2021 and +151,625 jobs by 2031. The difference between these two forecasts is that Scenario IA generates 36,398 additional jobs by 2021 compared to Scenario IG and an additional 76,745 jobs by 2031. While Scenario IG produces +100,000 extra population (immigration) into the area it only forecasts an

additional 74,800 jobs. Scenario IA on the other hand forecasts slightly less population but provides an additional 151,600 jobs. As a result Scenario IA forecasts an additional 33,687 working adults by 2021 and an additional 56,826 by 2031 compared to scenario IG. Scenario IA generates additional jobs in virtually all parts of the conurbation but especially in parts of East End, East Dunbartonshire, parts of North and South Lanarkshire, Renfrewshire and Inverclyde.

Perhaps one of the most important differences between the two scenarios is how they deal with Non-Working Adults. This could be seen as a proxy for unemployment. Of immediate notable concern is that the two graphs are diametrically opposed. Scenario IA forecasts a general fall in the number of non-working adults up to 2031 while Scenario IG forecasts a rise in the number of non-working adults up to 2031. Scenario IA shows a general decline in the absolute number of "unemployed" – up to 52,000 less by 2021 and 101,400 less by 2031. Scenario IG on the other hand shows "unemployment" increasing + 3,900 by 2021 and almost 40,000 higher by 2031. This produces an astonishing difference between the two scenarios. A difference of + 56,000 more "unemployed" by 2021 and a difference of 140,554 by 2031! The additional non-working adults are attracted to the north and west of the conurbation - Glasgow City, parts of Renfrewshire, parts of Inverclyde and West Dunbartonshire and parts of East Dunbartonshire and North Lanarkshire. Attracted, no doubt, by social housing availability and perhaps lower rental levels rather than job accessibility issues. The additional "unemployed" in these areas will obviously have additional welfare implications in these areas.

Both scenarios forecast an increase in the rental values. The differences between the two rental growths are fairly small in absolute numbers terms but Scenario IA increases the difference by £27 per m2 at 2021 and by £61 per m2 by 2031 compared to Scenario IG. The increased rentals generated by Scenario IA are distributed along very similar pattern to Total Jobs. It is parts of North and South Lanarkshire, Glasgow City, East End, Clyde Waterfront, parts of Renfrewshire, parts of Inverclyde and parts of West Dunbartonshire that have slightly higher rental levels under Scenario IA.

Both scenarios predict total floorspace growth in a very similar growth pattern but Scenario IA's positive figures result in the model distributing this additional floorspace strongest towards Inverclyde and West Dunbartonshire. In Scenario IA all areas gain greater CO2 but that this is concentrated strongest towards the East End, South Glasgow, parts of North and South Lanarkshire, parts of East Dunbartonshire and along the Clyde Waterfront.

Overall Conclusion on comparing**: Scenario IF** – Oxford Economics with GRO Population +M74 Network (Scenario 1 Lower Migration) Vs **Scenario IA** – Rebalanced Economy +M74 Network

Scenario IF is the Base Model and Scenario IA is the Forecast Model (Both Permissible)

Scenario IF and Scenario IA have very similar demographics. Both have a similar upward positive total population growth and very similar absolute figures. The population differences between these two scenarios are therefore very small in absolute numbers terms. Scenario IA is + 1,758 at 2021 compared to Scenario IF and IA is - 3,656 at 2031 compared to IF. Again similar absolute figures also for Children and for Retired People. Perhaps one significant difference between the scenarios is Scenario IA shows considerable growth in job

numbers – an additional 88,500 jobs by 2021 and an additional 151,162 by 2021. Compared to Scenario IF, Scenario IA creates +37,637 additional jobs by 2021 and an additional 78,267 jobs by 2031. These are very strong and significant job creation figures and while Scenario IF also produces strong growth it is not quite at the levels of Scenario IA. All areas of the conurbation benefit from the additional jobs created by Scenario IA but the East End, parts of South and North Lanarkshire, East Dunbartonshire, parts of Renfrewshire and Inverclyde all have notable job improvements. Of note is the 2031 spatial distribution of the additional 75,000 Working Adults generated by Scenario IA which are locating towards the South and West of the conurbation especially East Dunbartonshire, North and South Lanarkshire and the East End. This does not reflect always where the additional jobs are being created under this scenario and implies greater transport movement south east towards the north west to access jobs. This may be explained by the M74 extension providing greater access for workers.

Both Scenarios are successful in reducing the number of non –working adults over time. Scenario IA reduces "unemployment" by 52,000 by 2021 and an astonishing 101,500 by 2031. In comparative terms both Scenarios are successful but Scenario IA reduces "unemployment" by an additional 27,000 by 2021 and an additional 46,000 by 2031 against Scenario IF. All parts of the conurbation benefit from Scenario IA but it is the south and east of the conurbation that have less non working adults generally.

The differences between the two rental growths are fairly small in absolute numbers terms. Scenario IA increases the difference by £36 per m2 at 2021 and by £110 per m2 by 2031. Where Scenario IA creates Total Jobs it also appears to increase rentals in these same areas. Scenario IA predicts strong rental growth around Glasgow east end and south Glasgow, parts of East Dunbartonshire, parts of North Lanarkshire, parts of Renfrewshire, Inverclyde and parts of West Dunbartonshire. Scenario IF produces a lower amount of CO2 to the south and east of the conurbation with Scenario IA producing greater CO2 especially around the City Centre and along the Clyde Waterfront.

Conclusions

Within the City Region it is largely economic activity and population changes that determine future demand for development. There is therefore a close relationship between economic activity and population changes and the relationship resolves upon the future performance of the city-region economy. A stronger growing economy provides both the basis for attracting and retaining population – a strong economy to attract in-migrants and retain potential out-migrants. If a scenario occurs where there is high migration but with a stagnant or slow-growing economy this can result in an in-balance with increased unemployment and more reliance upon the welfare system and with social housing implications.

A number of economic futures were modelled for the city-region by Oxford Economics. These are described in more detail within Background Report 1. The SITLUM07 model tested three different economic futures against each other.

Scenario IF describes a baseline future which suggests an economic scenario of reinforcement and continuation of the current service-based city-region economy. Based on Oxford Economics low migration assessment and based upon the General Register's Office for Scotland (GROS) 2006-based principle projection but with updated but relatively low migration assumptions. Described as Scenario 1 Lower Migration within paragraph 5.5 of the Main Issues Report. This was the least optimistic scenario in terms of population growth (in-

migration) and economic activity to be tested through SITLUM07 to ascertain if this assumption held when compared to other economic futures.

Scenario IG describes a future which also suggests an economic scenario of reinforcement and continuation of the current service-based city-region economy. Based on Oxford Economics high migration assessment and based upon the *Agenda for Sustainable Growth* from the Joint Structure Plan 2000 and Third Alteration 2006 but with updated but relatively high migration assumptions. Described as Scenario 2 Higher Migration and Planning Scenario within paragraphs 5.5 to 5.9 within the Main Issues Report.

Scenario IA describes an economic future with a distinct alternative economic future for the city-region, which is focused upon a *rebalancing* economic scenario. This would result in a shift, away from the dominance of a service economy towards a growth in specialist high-value products and related services associated with green energy technology sectors, green environmental sectors, tourism and leisure.

Scenario IG generates a high level of population growth through in migration but does not provide jobs for these incomers. As a result Scenario IG generates an additional 95,000 unemployed with the result of added welfare payments and social housing implications. These additional unemployed will locate in area where rentals are low and will present a different transport pattern for Public Transport provision.

Scenario IA the rebalanced economic profile for the city-region appears to best meet the demands of the Scottish Government's *Low Carbon Economic Strategy for Scotland*. The tests show that the resultant levels of economic activity, Gross Value Added (GVA) and employment growth could provide an economic basis for a higher migration demographic planning scenario. Scenario IA while having a similar demographic structure to the other scenarios tested but changes the sectorial profile with an emphasis back towards manufacturing. In effect, Scenario IA has the potential to raise economic activity and employment generation – add 101,000 jobs and pick up the spare capacity in unemployment. Scenario IA may in the short-term absorb current unemployment rather than attract in new in-migrants, but it is likely to reduce potential employment-seeking out-migration and in the medium and longer-term generate increased levels of in-migration.

These Scenario tests seek how best to maximise the relationship between land-use and sustainable transport within the city-region. The *West of Scotland Public Transport Conurbation Study (WSPTCS,)* while only a proxy version in this assessment and only reflected in changed path files is however a good example of the type of integrated public transport network that could be developed to achieve a step-change in provision. However further collaboration work on the Strategic Transport Projects Review and its Project 24 component will be required to allow the finalised package of interventions to be assessed through the SITLUM07 Model.

Appendix

Heavy Rail
The frequency of heavy rail services in the Greater-Glasgow area, are typically as follows (existing service frequencies and Transport Scotland proposals):

Glasgow Central to / from Wemyss Bay and Gourock:
o One train per hour in each direction to / from Wemyss Bay (existing)
o Three trains per hour in each direction to / from Gourock (existing)
This gives four trains per hour per direction as far west as Port Glasgow
o One train per hour in each direction to / from Wemyss Bay (proposed post 2013)
o One train per hour in each direction to / from Gourock (proposed post 2013)
This will give four trains per hour per direction as far west as Gourock
Glasgow Central to / from Ardrossan, Largs and Ayr
o One train per hour in each direction to / from Ardrossan Harbour
o One train per hour in each direction to / from Largs
o Two trains per hour in each direction to / from Ayr
This gives four trains per hour per direction as far west as Kilwinning
o Two trains per hour in each direction to / from Ayr (proposed post 2013)
This will give four trains per hour per direction as far south as Ayr
Glasgow Central to / from Barrhead and Kilmarnock
o Two trains per hour in each direction to / from Barrhead
o Two trains per hour in each direction to / from Kilmarnock (running non-stop to Barrhead)
This gives four trains per hour per direction at Barrhead only
o Two trains per hour in each direction to / from Kilmarnock (proposed under WoSSRES)
This will give four trains per hour per direction at all stations
Glasgow Central to / from East Kilbride
o Two trains per hour in each direction to / from east Kilbride
Glasgow Central to / from Whifflet
o Two trains per hour in each direction to / from Whifflet
Glasgow Central to / from Shotts
o One train per hour in each direction calling at all stations
o One semi-fast train per hour in each direction calling at Shotts and Bellshill only
Glasgow Low Level services (Queen Street and Central)
o Two trains per hour in each direction between Airdrie and Helensburgh (via Glasgow Queen Street Low Level)
o Two trains per hour in each direction between Airdrie and Balloch (via Glasgow Queen Street Low Level)
o Two trains per hour in each direction between Larkhall and Dalmuir (via Glasgow Central Low Level)
o Two trains per hour in each direction between Lanark and Dalmuir (via Glasgow Central Low Level)
o Two trains per hour in each direction between Airdrie and Milngavie (via Glasgow Queen Street Low Level)
o Two trains per hour in each direction between Motherwell and Milngavie (via Glasgow Central Low Level)
This gives four trains per hour per direction as far east as Airdrie, to the termini at Milngavie and Dalmuir and as far as Dalreoch to the northwest. To the southeast, this gives four trains per hour per direction to Hamilton Central.
Glasgow Queen Street to/ from Anniesland
o Two trains per hour in each direction to / from Anniesland
Glasgow Queen Street to / from Stirling via Croy
o One train per hour in each direction to / from Dunblane
o One train per hour in each direction to / from Alloa
o Two trains per hour to / from Edinburgh serve Croy each hour (but not Bishopbriggs or

Lenzie)
This gives four trains per hour per direction to Croy only
o Two additional trains per hour to / from Edinburgh (proposed as part of EGIP) may or may not serve Croy
o Two trains per hour to/from Croy (potentially delivered under EGIP)
This will give four trains per hour per direction to Bishopbriggs, Lenzie and Croy
Motherwell to Cumbernauld (via Coatbridge)
o One train per hour in each direction

Following the improvements likely to be taken forward as part of either EGIP or the WoSSRES,most stations on the Glasgow suburban network will have at least the four trains per hour service frequency to central Glasgow indicated in the GCVSDP MIR. The **exceptions** will be:

Services to the southwest from Glasgow Central (High Level)
Wemyss Bay branch: Whinhill, Drumfrochar, Branchton, IBM, Inverkip and Wemyss Bay
Largs branch: Stevenston, Saltcoats, Ardrossan (South Beach, Town and Harbour), West Kilbride, Fairley and Largs
Paisley Canal branch: Dumbreck, Corkerhill, Mosspark, Crookston, Hawkhead and Paisley Canal
Services to the southeast from Glasgow Central (High Level)
Whifflet branch: Carmyle, Mount Vernon, Baillieston, Bargeddie, Kirkwood and Whifflet
Services to the southeast from Glasgow Central (Low Level)
Larkhall branch: Chatelherault, Merryton and Larkhall
Lanark branch: Airbles, Motherwell, Sheildmuir, Wishaw, Carluke and Lanark
Shotts line: Uddingston, Bellshill, Holytown, Carfin, Clelland, Hartwood and Shotts
Services to the east from Queen Street (Low Level)
Springburn branch: Duke Street, Alexandra Parade, Barnhill and Springburn
Services to the north from Glasgow Queen Street (High Level)
Anniesland branch: Ashfield, Possilpark and Parkhouse, Gilshochill, Summerston, Maryhill, Kelvindale and Anniesland
Cumbernauld / Falkirk Grahamston services: Springburn, Stepps, Gartcosh, Greenfaulds, Cumbernauld, Camelon, Falkirk Grahamston
Services to the northwest from Low Level stations (Glasgow Central or Glasgow QueenStreet)
Helensburgh Central branch: Cardross, Craigendoran and Helensburgh Central.
Balloch branch: Renton, Alexandria and Balloch.

Increasing service frequencies to at least four trains per hour per direction at all points on the suburban network would require substantial additional capacity, particularly terminal capacity at Glasgow Queen Street and Glasgow Central. Consequently, it would be necessary to undertake enabling works (such as implementing a light rail scheme on the Cathcart Circle, Newton and Neilston lines) to produce the capacity required. For the purposes of this test, Cathcart Circle, Newton and Neilston services will remain coded as heavy rail services as a proxy for alternative ways of catering for the existing heavy rail demand.

These services will however be **removed** as part of the light rail scenario.

The following **additional services** are therefore considered under this scenario:

Increase the frequency of Glasgow Central to Gourock services from three trains per hour per direction to four trains per hour per direction (coded services 100, 101, 103, 104,105, 106, 107 and 108)

Increase the frequency of Glasgow Central to Wemyss Bay services from one train per hour per direction to two trains per hour per direction (coded services 120, 121, 122, 123, 124, 125, 126 and 127)

Increase the frequency of Glasgow Central to Ayr services from two trains per hour per direction to four trains per hour per direction (coded services 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143 and 144)

Add two new trains per hour per direction between Glasgow Central and Kilmarnock calling at all stations.

This would supplement the existing Kilmarnock semi-fast (coded services 162, 163, 175, 182 and 183) and Barrhead local services (coded services 173 and 181) to provide four trains per hour at all stations (and six per hour at Barrhead).

All of these services would be representative of improvements undertaken as part of the WoSSRES. Journey times between Glasgow Central and Barrhead will be based on the local service coding, with the extension between Barrhead and Kilmarnock based on the semi-fast services.

Increase the frequency of Glasgow Queen Street to Edinburgh services via Falkirk High from four trains per hour per direction to six trains per hour per direction (coded services 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480 and 485).

Add two new trains per hour per direction between Glasgow Queen Street and Croy calling at all stations.

These services would be representative of the improvements undertaken as part of EGIP. The timetable for the Croy local services will be based on the timetable for the existing Glasgow Queen Street to Dunblane and Alloa services (coded services 440, 441, 450, 451, 481, 482 and 483)

Amend the current Glasgow Queen Street to Cumbernauld / Falkirk Grahamston Services (coded services 430, 431, 433 and 434) to operate via Queen Street Low Level.

A new rail link (the Garngard chord) will have to be coded connecting the existing heavy rail routes between Alexandra Parade and Barrhill railway stations with the line between Springburn and Stepps. The chord is constructed on land adjacent to Darnick Street. The timetable for these services will be unaltered east of Stepps. To the west of Stepps the timetable will be based on travel times of services along the existing Springburn branch (coded services 201, 227, 230, 237, 241 and 257). These modified services to / from Falkirk Grahamston and Cumbernauld (430, 431, 433 and 434) will terminate at Charing Cross.

Light Rail

The following heavy rail services would need to be removed from the model to create sufficient capacity for Light Rail. Service numbers in the SITM4A model are:

Neilston to / from Glasgow Central
Services 262, 266, 269, 270 and 271
Newton to / from Glasgow Central
Services 263, 264, 265, 267, 268, 272 and 273
Cathcart Circle services to / from Glasgow Central
Services 260 and 261

The following new service patterns are assumed, generally with a fifteen-minute frequency (except where indicated) with the following intermediate stops on each route:

Neilston (□) to St Enoch (LRT) (and reverse)
Via Patterton (□); Whitecraigs (□); Williamwood (□); Muirend (□); Cathcart (□); Mount Florida (□); Crosshill (□); Queen's Park (□); Pollokshields East (□); West Street (new LRT stop); and Gorbals (new LRT stop).
Newton Mearns (LRT) to St Enoch (LRT) (and reverse)
Via Broomvale Drive (new LRT stop); Whitecraigs (new LRT stop); Williamwood (□); Muirend (□); Cathcart (□); Mount Florida (□); Crosshill (□); Queen's Park (□); Pollokshields East (□); West Street (new LRT stop); and Gorbals (new LRT stop).
Newton (□) to St Enoch (LRT) via Maxwell Park (and reverse) – three services per hour
Via Kirkhill (□); Burnside (□); Croftfoot (□); King's Park (□); Cathcart (LRT); Langside (□); Pollokshaws East (□); Shawlands (□); Maxwell Park (□); Pollokshields West (□); West Street (new LRT stop); and Gorbals (new LRT stop).
Newton (□) to St Enoch (LRT) via Mount Florida (and reverse) – one service per hour
Via Kirkhill (□); Burnside (□); Croftfoot (□); King's Park (□); Cathcart (□); Mount Florida (□); Crosshill (□); Queen's Park (□); Pollokshields East (□); West Street (new LRT stop); and Gorbals (new LRT stop).
St Enoch (LRT) to St Enoch (LRT) – Outer (clockwise)
Via Gorbals (new LRT stop); West Street (new LRT stop); Pollokshields East (□); Queen's Park (□); Crosshill (□);Mount Florida (□); Cathcart (□); Langside (□); Pollokshaws East (□); Shawlands (□); Maxwell Park (□); Pollokshields West (□); West Street (new LRT stop); and Gorbals (new LRT stop).
St Enoch (LRT) to St Enoch (LRT) – Inner (anticlockwise)
Via Gorbals (new LRT stop); West Street (new LRT stop); Pollokshields West (□); Maxwell Park (□); Shawlands (□); Pollokshaws East (□); Langside (□); Cathcart (□); Mount Florida (□); Crosshill (□); Queen's Park (□); Pollokshields East (□); West Street (new LRT stop); and Gorbals (new LRT stop).

The timetables to be coded will be as per the timetables coded in TMfS:07 during testing for the West of Scotland Strategic Rail Enhancement Study.

This test does not include potential long-term extensions to East Kilbride, Castlemilk, Cumbernauld or Stobhill Hospital as indicated in the GCVSDP MIR, as these are unlikely to be deliverable before 2025. Service frequency will be less than a ten-minute-headway to the south of Williamwood and east of Cathcart towards Neilston, Newton Mearns and Newton.

Bus Rapid Transit

The following service patterns are assumed with a ten-minute frequency with the following intermediate stops on each route:

Renfrew (BRT) to Carmyle (BRT)
Via Renfrew Yoker Ferry (BRT); Renfrew Riverside (BRT); Braehead (BRT); South Glasgow Hospital (BRT); Linthouse (BRT); Govan Central (BRT); Govan Town Hall (BRT); Science Centre (BRT); Pacific Quay (BRT); Lancefield Quay (BRT); Broomielaw (BRT); Glasgow Central (BRT); St Enoch (BRT); People's Palace (BRT); Bridgeton (BRT); Parkhead (BRT); and Fullarton (BRT).
Clydebank (BRT) to St Enoch (BRT)
Via Whitecrook (BRT); Yoker (BRT); Scotstoun (BRT); Whiteinch (BRT); Glasgow Harbour (BRT); Yorkhill (BRT); SECC (BRT); Lancefield Quay (BRT); Broomielaw (BRT); and Glasgow Central (BRT).

Faifley (BRT) to Easterhouse (BRT)
Via Duntocher Hardgate (BRT); Kilbowie (BRT); St Columba's (BRT); Drumry (BRT); Great Western Retail Park (BRT); Blairdardie (BRT); Knightswood (BRT); Anniesland (BRT); Gartnavel Hospital (BRT); Botanic Gardens (BRT); Kelvinbridge (BRT); St George's Cross (BRT); Cowcaddens (BRT); Blythswood Square (BRT); Broomielaw (BRT); Glasgow Central (BRT); St Enoch (BRT); People's Palace (BRT); Bridgeton (BRT); Forge Retail Park (BRT); Forge Shopping Centre (BRT); Carntyne (BRT); Lightburn (BRT); Queenslie (BRT); and Glasgow Fort (BRT)

Drumchapel Hospital to St Enoch (BRT)
Via Stonedyke (BRT); Drumchapel Community Centre (BRT); Drumchapel Centre (BRT); Great Western Retail Park (BRT); Blairdardie (BRT); Knightswood (BRT); Anniesland (BRT); Gartnavel Hospital (BRT); Botanic Gardens (BRT); Kelvinbridge (BRT); St George's Cross (BRT); Cowcaddens (BRT); Blythswood Square (BRT); Broomielaw (BRT); and Glasgow Central (BRT).

GLASGOW and
the CLYDE VALLEY
strategic development
planning authority

Glasgow and the Clyde Valley Strategic Development Planning Authority
Lower ground floor, 125 West Regent Street, Glasgow G2 2SA
t 0141 229 7730 | **e** proposedplan@gcvsdpa.gov.uk | **w** www.gcvsdpa.gov.uk