

ComPlan USER'S MANUAL (Beta Version)

INTRODUCTION

The community-based planning model (ComPlan) estimates regional land development potential using prototypical community elements. This first version of the ComPlan is developed in a Microsoft Excel© spreadsheet with links to ARCVIEW© geographic information system (GIS) software. ComPlan is funded by a Transportation and Community and System Preservation (TCSP) grant from the Federal Highway Administration. The grant help fund the Eastern Area Planning Initiative conducted by the Thomas Jefferson Planning District Commission, located in Charlottesville, Virginia. This version of ComPlan is available through FHWA to Metropolitan Planning Organizations (MPOs) and other agencies.

This User's Manual presents an overview of ComPlan and instructions for its use. The Manual describes ComPlan's structure, how to input needed information, how to use the model to test alternatives and calibration steps. The manual also describes the linkages between the spreadsheet and ArcView.

MODEL STRUCTURE

ComPlan relies on prototypical community definitions (community elements) to create regional land development patterns and the resulting land use, building and socioeconomic characteristics of those patterns. Each community element is defined by a graphic illustration of a quarter-mile diameter area and by a set of land use, infrastructure and socioeconomic data. *Figure 1* illustrates an element graphic and *Figure 2* illustrates the associated data. The model includes a set of elements developed for the Eastern Area Planning Initiative, but the user is able to modify these elements or create new elements to match existing community types or to reflect desired community elements.

Community elements are assigned to subareas defined by the user. A combination of traffic analysis zones (TAZ's) and Census blocks are used for the Eastern Area Planning Initiative. ComPlan calculates the development potential for each subarea by multiplying each subarea's net developable acreage by the data associated with the subarea's assigned community element. To estimate alternative land development or redevelopment potential, users reassign the subarea's community element and the model calculates new totals.

Users calibrate ComPlan by comparing the actual land use acreage and socioeconomic totals with those estimated by the model. This calibration step is recommended if actual land use and/or socioeconomic data are available. Calibration is not required if existing data are not available.

This first version of ComPlan is available in a Microsoft Excel spreadsheet with macros that import and export dBASE files that link with ArcView so users can map and spatially summarize the data. These dBASE files are not necessary to use the ComPlan.



Figure 1
Community Element Plan

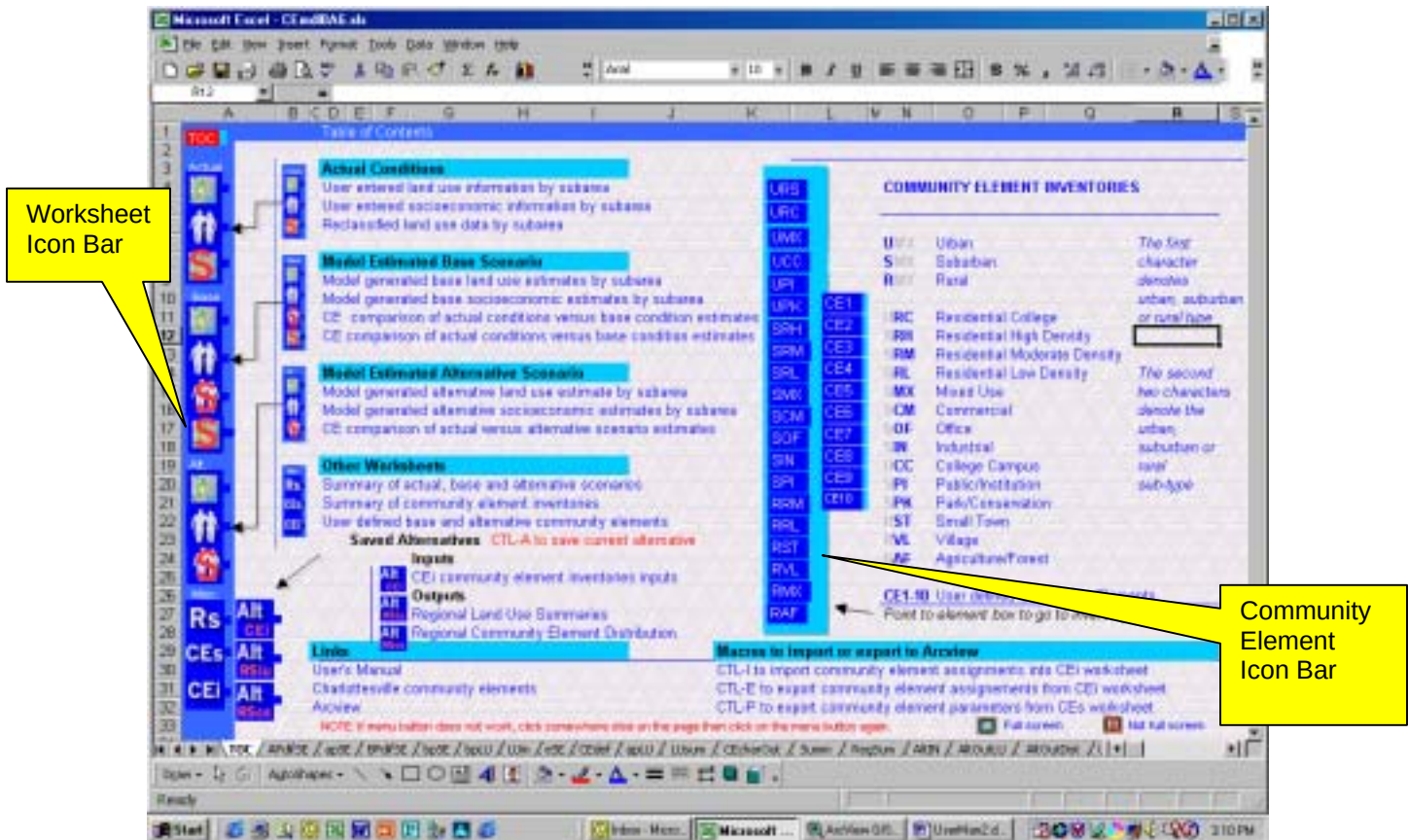


Figure 2
Community Element Inventory

GETTING STARTED

Step 1 – Go to the Table of Contents

ComPlan uses a number of pages (worksheets) in EXCEL. The file name is *ce.xls* and it should be located with other ComPlan related files in the Ce directory off of the root directory. The easiest way to navigate among the worksheets is to go to the Table of Contents worksheet (shown below).



The worksheet icon bar listed in column A of the Table of Contents worksheet is repeated on most of the other worksheets in the file. Users point and click on these icons to go to different worksheets. To get back to the Table of Contents from any of the worksheets, point and click on the red TOC box located at the top of the worksheet icon bar.

The community element icon bar includes all of the preset elements defined for the Charlottesville, Virginia region plus blank elements that can be defined by the user. Users point and click on these icons to go to the different community element inventories.

The spreadsheet includes several macros that add alternatives and import and export information to Arcview. Details of each of these macros are provided later in the manual.

Step 2 – Review the Available Community Element Information

Community elements are the building blocks of ComPlan. The model needs community element information before it can be calibrated or test alternatives.

ComPlan currently includes community element inventories for eastern part of the Thomas Jefferson Planning District (Charlottesville, Virginia and the Counties of Albemarle, Greene, Louisa and Fluvana). The community element summary worksheet (CEs on the worksheet icon bar) summarizes the characteristics for each of the Charlottesville-area elements, including the distribution of land uses among several land use types, socioeconomic characteristics and key ratios. Each inventory covers a quarter-mile diameter area, the maximum walking distance acceptable to most people.

Detailed information for each of the community elements is found by pointing and clicking on the boxes listed in the community element icon bar. It should be noted that users could modify any of the preset elements or create up to ten additional community elements (approximately 30 Community Elements) within the existing template. Users can add as many new elements as needed by copying a blank inventory template into new worksheets.

The screenshot displays the Microsoft Excel interface for the 'CEs88A3.xls' file. The 'Community Element Inventory Icon Bar' is located on the left side, listing various community elements (CE1 through CE10). The 'Worksheet Icon Bar' is also visible on the left. The main data area contains a table with columns for 'Preset community element types' and rows for 'Summaries of community element characteristics'. The table includes data for various land use types, socioeconomic characteristics, and ratios.

	CE1	CE2	CE3	CE4	CE5	CE6	CE7	CE8	CE9	CE10
Land Use Distribution										
Single family	0%	7%	43%	17%	7%	7%	52%	3%	18%	0%
Multifamily	0%	9%	13%	20%	0%	27%	2%	0%	6%	0%
Offices	0%	10%	3%	0%	0%	7%	0%	0%	9%	0%
Commercial retail	0%	20%	4%	4%	0%	15%	4%	0%	11%	0%
Cultural / Civic	0%	0%	2%	0%	0%	7%	0%	0%	0%	0%
Govt / Institutional	0%	10%	4%	30%	14%	4%	0%	0%	0%	0%
Industrial	0%	4%	3%	0%	0%	0%	0%	0%	0%	0%
Common parking	0%	5%	1%	7%	0%	0%	0%	0%	4%	0%
Streets	0%	20%	23%	16%	0%	21%	22%	10%	13%	18%
Public open	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Park/playfields	0%	3%	0%	1%	71%	3%	0%	0%	0%	0%
Agriculture / Forest	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total Area	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Socioeconomic										
Households	55	185	465	5	70	33	3	22	33	15
Population	188	237	374	0	162	81	4	53	55	38
Total Employment	711	84	309	7	81	16	18	520	380	528
Per capita Employment	280	16	12	0	24	2	0	26	283	8
Ratios										
Persons per HH	2.58	2.35	2.26	1.50	2.31	2.45	2.08	2.40	2.40	2.08
Workers per 1,000 sf	1.58	1.91	1.10	0.70	0.75	0.73	0.28	1.04	1.18	0.97
SF dwellings / acre	4.36	4.36	8.53	2.10	4.36	2.10	2.18	4.36	4.36	4.36
MF dwellings / acre	19.80	10.80	21.80	7.20	0.71	0.71	0.71	13.87	10.80	0.71

Step 3 – Review, Update and/or Create Community Element Inventories

Each community element includes an inventory that numerically describes the characteristics of the element. The inventories include land use types and areas, building types and areas, roadway and parking areas and socioeconomic ratios.

Each inventory automatically calculates areas and socioeconomic totals based on user entries in the blue shaded cells. For example, once a user enters the number of single-family dwelling units in cell K7 and the average floor area in cell L7, the spreadsheet calculates the total floor (footprint) area of single-family dwellings (cell M7). Entering the average number of floors in cell N7 calculates the total building area (cell O7). The total floor area in cell M7 becomes a key input for the land use area. The user enters the footprint/land area ratio in cell G7 to estimate the total square feet devoted to the land use (cell D7) and the percentage of the total element area devoted to that use (cell E7).

The inventory worksheet calculates total area as the user enters information. The totals must closely match the area of a quarter mile diameter circle (1,368,478 square feet or 31.42 acres). The worksheet calculates the difference between the estimated and target area in cell D28. An exact match is not necessary, but users should modify inputs until the calculated area is within five percent of the target (a difference of less than 68,000 square feet).

Microsoft Excel - CEtoolBAS.xls

Community Element Inventory Icon Bar

Community element type

User input areas (shaded in blue)

Estimated versus target area

		Land Use Areas						Buildings (Square Feet)				Infrastructure			
		Total		Allocation				No. of Units / Bldgs		Avg. Floor Area		Avg. Road Length / Width or Parking Spaces / Area			
		Square Feet	Acres	Pct. of Total Urban Area	Bldg. Footprint / Land Ratio	Buildings	Parking	Yards / Private Open Area			Total Footprint Area	Total Building Area			
Residential															
Single family		100,000	2.30	7.3%	10%	50,000	-	50,000	10	1,000	10,000	10,000	-	-	
Multifamily		122,222	2.81	8.9%	45.0%	55,000	4,000	63,222	80	1,000	55,000	4.0	228,000	40	200
Subtotal		222,222	5.10	16.3%	28.3%	105,000	4,000	113,222	90	1,000	65,000	3.6	232,000	40	200
Commercial															
Offices		133,333	3.06	9.8%	30.0%	40,000	40,000	80,333	8	10,000	40,000	3.0	128,000	200	300
Commercial retail		280,000	6.42	18.9%	30.0%	80,000	30,000	110,000	10	10,000	80,000	2.0	160,000	150	200
Cultural / Civic		60,000	1.37	4.8%	30.0%	20,000	8,000	28,000	2	10,000	20,000	2.0	40,000	40	200
Govt / Institutional		130,000	3.00	9.8%	30.0%	40,000	8,000	65,000	2	30,000	40,000	3.0	120,000	40	200
Industrial		50,000	1.15	3.7%	30.0%	15,000	4,000	24,000	1	15,000	15,000	1.0	15,000	20	200
Subtotal		650,000	14.92	47.8%	30.0%	195,000	90,000	385,000	23	11,000	195,000	2.3	455,000	480	260
Common Parking		75,000	1.72	5.8%											
Streets															
Major streets		370,000	8.58	27.7%											
Residential streets		-	-	0.0%											
Subtotal		370,000	8.58	27.7%											
Public/Open Spaces															
Public open		-	-	0.0%											
Parks/playfields		40,000	0.92	2.8%											
Subtotal		40,000	0.92	2.8%											
Agriculture/Pasture		-	-	0.0%											
Subtotal		-	-	0.0%											
Total Urban Area		1,368,222	31.34	89.8%	15.0%	260,000	94,000	354,000	80	1170.73	260,000	2.0	636,000	5,000	260
Calibration Adjuster		(5,756)													

To the right of the land use and building area columns, the user enters information about parking for each land use (on-site parking), common parking (parking not associated with a site) and roadways. The key parking inputs are the number of parking spaces (column P), the average area of each space (including access/driveway areas – column Q) and the number of parking floors (for parking garages – column S).

Socioeconomic characteristics are to the far right of the inventory table. The user enters the number of persons per dwelling unit (column U) and the ratio of employees per 1,000 square feet of gross building area (column W).

Users are not limited to entering information into the blue shaded cells of the inventory. However, information entered into the non-blue cells will replace a calculation, making it more difficult to update the tables.

Microsoft Excel - C:\msdcl\...

File Edit View Insert Format Tools Data Window Help

100%

D13 =M17M13

A B C L M N O P Q R S T

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Urban Mixed-use

Buildings (square feet)					Infrastructure (feet)					Socioeconomic	
	No. of Bldgs / Bridges	Avg. Floor Area	Total Floor Area	Avg. No. Floors	Total Building Area	Road Length or Parking Spaces	Avg. RWV Width or Parking Area	Total Floor Area	Pop. per 1,000	Res. density	Emp/1000 SF
Residential											
Single family	16	1,000	16,000	1.6	16,000	—	—	—	2.00	30	
Multi-family	55	1,000	55,000	4.0	220,000	40	290	4,000	2.00	121	
Subtotal	71	1000	71,000	3.6	236,000	40	290	4,000	2.32	151	
Nonresidential											
Offices	4	10,000	40,000	3.0	120,000	200	280	40,000	1.00		210
Commercial retail	8	10,000	80,000	2.0	160,000	100	280	30,000	1.00		240
Cultural / Civic	2	10,000	20,000	3.0	60,000	40	280	6,000	1.00		60
Gov't / Institutional	2	20,000	40,000	3.0	120,000	40	280	6,000	1.00		100
Industrial	5	10,000	50,000	1.0	50,000	30	280	4,000	1.00		15
Subtotal	21	11,421	236,000	2.3	495,000	410	280	80,000	1.00		771
Common Parking						1,500	280	75,000	4.0		
Streets						10,000	30	300,000			
Major streets											
Residential streets											
Public Open Space											
Public open											
Park/playfields											
Subtotal											
Agriculture/Forest											
Total Urban Area	92	1073.73	265,000	2.97	731,000	1,850	280	265,000	3.32	157	1.56

User input areas (shaded in blue)

Preset and Blank Inventories

As noted above, the current version of ComPlan includes community element inventories for the Charlottesville, Virginia region. These inventories can be used as is or modified to reflect conditions in different regions. ComPlan includes ten blank inventories that can be used to create additional community elements. Users can access these blank elements by pointing and clicking on one of the CE1 through CE10 icons on the community element icon bar.

File Edit View Input Output Data Window Help

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q		
1	File	CE1	User Defined CE 2															CE2	
2	Actual	LIT																	
3		LMI																	
4		LWS																	
5		LPI																	
6		ST	CE1																
7		SMX	CE2																
8		SRB	CE3																
9		SRN	CE4																
10		SOE	CE5																
11		SRT	CE6																
12		SPK	CE7																
13		SCV	CE8																
14		RAF	CE9																
15		RMI	CE10																
16		RRS																	
17		RST																	
18		RNL																	
19		RPK																	
20		RCV																	
21		CEs																	
22		CEI																	
23																			
24																			
25																			
26																			
27																			
28																			
29																			
30																			
31																			
32																			
33																			
34																			
35																			
36																			
37																			
38																			
39																			
40																			
41																			
42																			
43																			
44																			
45																			
46																			
47																			
48																			
49																			
50																			
51																			
52																			
53																			
54																			
55																			
56																			
57																			
58																			
59																			
60																			
61																			
62																			
63																			
64																			
65																			
66																			
67																			
68																			
69																			
70																			
71																			
72																			
73																			
74																			
75																			
76																			
77																			
78																			
79																			
80																			
81																			
82																			
83																			
84																			
85																			
86																			
87																			
88																			
89																			
90																			
91																			
92																			
93																			
94																			
95																			
96																			
97																			
98																			
99																			
100																			

Step 4 – Enter Area Information

To estimate base and alternative conditions, users must enter useable and vacant areas for each subarea (described in more detail on the next page). ComPlan also requires a conversion factor if the input areas are in units other than acres.

Area information is entered in the land use worksheet (point and click on the actual land use icon). The land use area data are entered in the white areas of the worksheet, beginning at column F. The user must convert the input land use categories to those used by the model if the categories differ. Entering the land use codes in the red cells above each column does this. The ComPlan land use categories and codes are listed on the next page.

The worksheet will calculate the useable, developed and vacant area from the entered land use areas. If land use areas are not available, then total area must be entered in column E of the worksheet. The model calculates useable and vacant area from the percent built (shaded in green) input, entered in the CEi worksheet described in the next section.

Enter model's land use categories if different from input data categories

The total land area of each subarea is a required input

User entered land use data (not a required input)

Subarea	Percent Built	CEi Code	TOTAL AREA	AGR	COM	CULT	ENV	IND	Misc	Misc	OPC
1	100%	UMK	54333.344	0	5171	0	0	2811	1505	1327	0
2	100%	UMK	45160.75	0	12547	744	0	4732	0	19992	0
3	100%	UMK	15079.656	0	625	0	0	0	0	4597	0
4	100%	UMK	19963.125	0	4981	542	0	0	0	2002	0
5	100%	UMK	20196.953	0	5938	266	0	5	205	0	0
6	100%	UMK	41384.626	0	2872	4084	0	7381	0	4905	0
7	100%	UMK	32760.620	0	1380	7759	0	0	0	12907	0
8	100%	UMK	59749.484	0	8122	1600	0	4542	328	578	0
9	100%	UMK	15307.703	0	4725	0	0	0	0	1438	0
10	100%	UMK	64678.609	0	9702	0	0	5	530	11342	0
11	100%	UMK	140489.797	0	4846	0	8145	860	36515	6730	0
12	100%	URS	417154.688	0	6676	0	76778	0	71629	2784	0
13	100%	URS	492136.25	0	4699	0	10908	0	16912	109963	0
14	100%	SRS	432572.172	0	9290	0	109015	0	0	0	0
15	100%	URS	211061.401	0	19500	0	42580	0	13755	0	0
16	100%	URS	557196.422	13685	634	0	62053	0	365	0	0
17	100%	URS	238474.266	0	1229	5376	571	0	430	0	0
18	100%	URS	438883.234	0	12419	3957	849	9410	6787	0	0
19	100%	URS	766371.125	0	62796	6383	21963	2743	30562	87171	0
20	100%	URS	1194168.937	0	55508	6789	99331	38706	42707	279068	0
21	100%	URS	539852.688	0	49784	1080	3617	0	44880	37876	0
22	100%	URS	47401.484	0	32310	0	23	611	0	554	0
23	100%	URS	404129.563	0	10633	0	3574	24946	3432	14084	0
24	100%	URS	477022.031	0	3977	13117	31171	79	0	13643	1031

Required Area Inputs

ComPlan requires area information for each of the defined subareas to estimate land consumption.

The user must provide the following information:

- Useable area (uAREA) – the total area that is suitable for land development in each subarea. This area nets out land unfit for development because of environmental, historical or policy reasons.
- Developed area (dAREA) – the amount of useable area currently developed (including area that is used for parks, public open space, agriculture and forestry). This information is calculated with user-entered land use data or with the % BUILT information entered in the CEi worksheet. If developed and vacant land use data are entered by the user for a subarea, the %BUILT input for that subarea must be 100 to avoid double counting vacant area.
- Vacant area (vAREA) – the amount of developable area that is not currently developed. This is the difference between useable area (uAREA) and developed area (dAREA). If actual vacant land data are not available, the model calculates vacant land using the reciprocal of the %BUILT estimate.
- Conversion factor – this factor converts the measurement units for the input data into acres. *The input areas are divided by the conversion factor, so the user must enter the factor accordingly.* The Charlottesville area inputs are measured in square meters and there are 4,079 square meters in an acre. The model divides the total square meters calculated from the Charlottesville input data by the conversion factor entered in cell B6 to calculate the uAREA, dAREA and vAREA results. If the input information had been square miles, the reciprocal of 640 (the number of acres in a square mile) would have been entered.

ComPlan Land Use Categories

ComPlan uses the following land use categories. Entered land use data must be translated into one of these categories:

- Single family residential (SF)
- Multifamily residential (MF)
- Offices (OFC)
- Commercial retail (COM)
- Cultural/Civic (CULT)
- Government/institutional (INST)
- Industrial (IND)
- Common parking (PRKing)
- Streets/right of way (ROW)
- Public open space (PuOPEN)
- Parks/playfields (PARK)
- Agriculture/forest (AGF)
- Vacant (VAC)
- Permanently vacant (ENV)
- Miscellaneous (Misc)

Specific definitions for these land use categories are up to the user. The only requirement is that definitions be consistent. For example, an office-retail building can be coded as either office or retail but once coded, it must be coded the same way throughout the model.

Reclassified Land-use – this worksheet calculates land areas by the land use categories used in the community element inventories and listed on the previous page. Areas by land use categories are not necessary to run the model nor is a complete set of data needed for calibration or to develop comparisons.

ComPlan requires a conversion factor if the input areas are in units other than acres (entered in cell B6 of the worksheet). The land use categories at the top of the worksheet are the ComPlan defined land uses and the totals in each column indicate how the input land use areas are aggregated by the model.

Actual Land Use Summary

Conversion Factor: 1.000 (User entered conversion factor (1 if input units are acres))

ComPlan compatible land use categories

Total useable, developed and vacant area (calculated by the model)

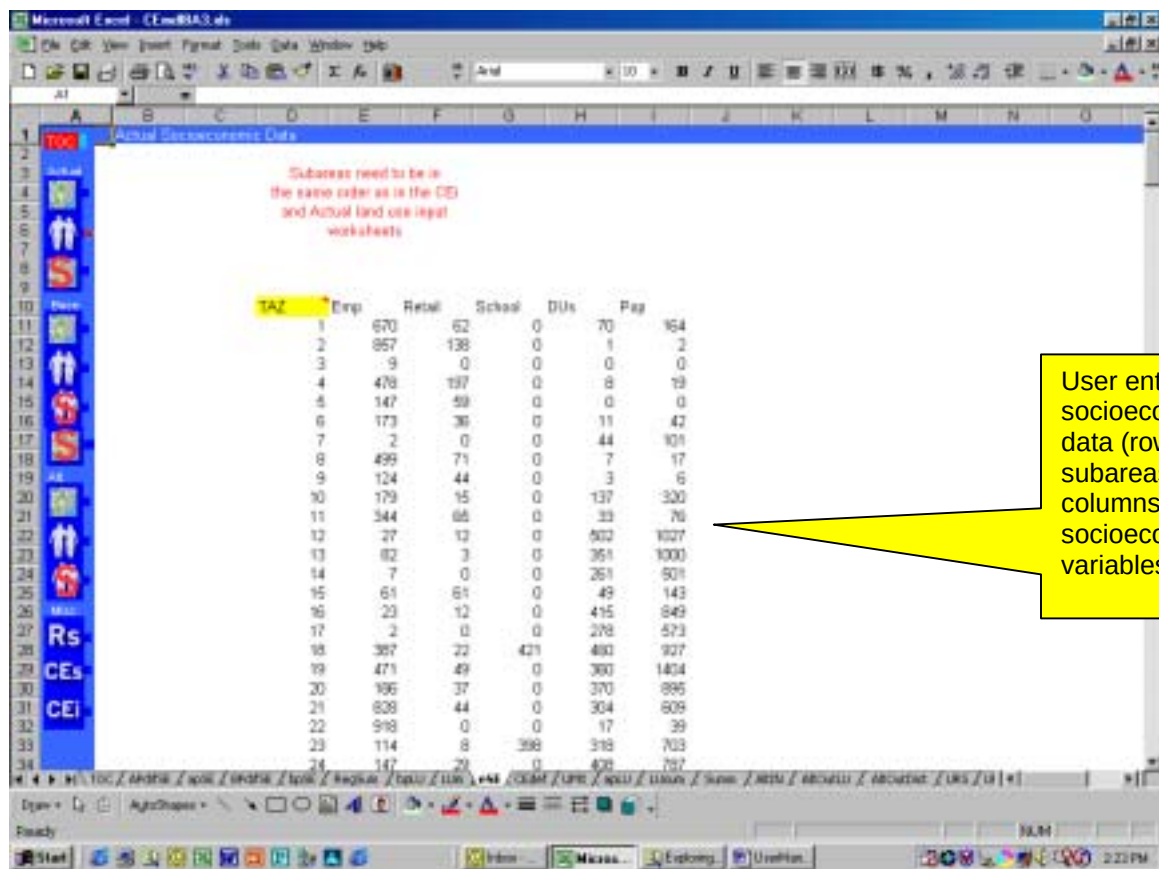
ComPlan generated land use data (rows are subareas columns are land use types)

Usable	Developed	Vacant	Perc Built	CEbase	TAZ_NUM	AGR	Pa	OP	PARK	ROW	PRKng	SF	MP	OPC	COM
13	13	0	100%	UNK	1	0	0	0	0	16704	5282	440	4640	16944	
11	11	0	100%	UNK	2	0	0	0	0	12252	1809	276	0	2009	
4	4	0	100%	UNK	3	0	0	0	0	7522	17	0	0	0	
5	5	0	100%	UNK	4	0	0	0	0	6143	572	0	0	0	
5	5	0	100%	UNK	5	0	0	0	0	7087	2254	0	0	0	
10	10	0	100%	UNK	6	0	0	0	0	8283	8701	0	0	0	
8	8	0	100%	UNK	7	0	0	0	0	5	0	0	0	0	
15	15	0	100%	UNK	8	0	0	0	0	696	17672	387	543	17809	7411
4	4	0	100%	UNK	9	0	0	0	0	2952	5724	0	0	1559	0
16	16	0	100%	UNK	10	0	0	0	0	15800	7456	4232	14103	471	
32	31	1	100%	UNK	11	0	0	0	0	47529	9328	15929	4220	3389	
83	83	1	100%	URS	12	0	0	0	0	70608	0	78336	96456	7854	
113	109	3	100%	URS	13	0	0	0	0	7943	71107	1052	164536	72672	0
53	43	10	100%	SRs	14	0	0	0	0	4414	18	0	160420	8278	0
31	27	3	100%	SRs	15	0	0	0	0	14882	0	61836	0	0	0
906	103	3	100%	URS	16	13685	0	39957	80424	509	218084	58059	0	0	0
58	56	2	100%	URS	17	0	0	0	0	70829	1767	123637	25794	0	0
107	104	3	100%	URS	18	0	0	0	0	115866	2827	126491	52215	6410	1
177	166	11	100%	URS	19	0	0	0	0	15284	175867	0	210824	67897	7916
244	235	10	100%	URS	20	0	0	0	0	23866	115491	620	330145	71455	2313
128	121	7	100%	URS	21	0	0	0	0	117181	7980	141944	38855	52190	4
12	12	0	100%	URS	22	0	0	0	0	6518	1652	2796	2015	721	3
97	95	2	100%	URS	23	0	0	0	0	83745	5852	158630	74584	13405	11
315	312	3	100%	URS	24	0	0	0	0	66338	8635	248559	51866	25904	

Step 5 – Enter Socioeconomic Information

This step is not required but highly recommended for model calibration and to establish a socioeconomic baseline for comparison. Users enter socioeconomic information as labeled in columns E through I. Total employment by work location (including retail employment) is entered in column E, retail employment by work location is entered in column F, school enrollment by school location is entered in column G, total dwelling units (single and multifamily) are entered in column H and population is entered in column I.

Often, socioeconomic information is available from trip generation input files (Z-data files) used by a region's travel demand forecasting model or from the Census Bureau.



Subareas need to be in the same order as in the CEI and Actual land use input worksheets

TAZ	Emp	Retail	School	DUs	Pop
1	670	62	0	70	164
2	857	138	0	1	2
3	9	0	0	0	0
4	478	197	0	8	19
5	147	59	0	0	0
6	173	36	0	11	42
7	2	0	0	44	101
8	499	71	0	7	17
9	124	44	0	3	6
10	179	15	0	137	320
11	344	66	0	33	76
12	27	12	0	502	1027
13	82	3	0	351	1000
14	7	0	0	251	501
15	61	61	0	49	143
16	23	12	0	415	849
17	2	0	0	278	573
18	387	22	421	480	927
19	471	49	0	380	1404
20	196	37	0	370	895
21	838	44	0	304	609
22	918	0	0	17	39
23	114	8	388	318	703
24	147	29	0	420	737

Step 6 - Enter Community Element Assumptions

Users must define community elements for the base condition in the community element input (CEi) worksheet. The user enters the subarea identifier in column D of the worksheet and the assumed community element in column E. The code for each community element is listed in the community element icon bar located to the left of the data entry area. The user enters a three-letter code, such as UMX for urban mixed-use, next to the subarea identifier and the model automatically calculates the base land use and socioeconomic conditions for that subarea.

To create an alternative scenario, the user enters a different three-letter code in column F of the worksheet where changes are expected. If the user wants to use actual data for a subarea in the alternative scenario rather than model-estimated information, SQ (status quo) is entered for that subarea.

Percent built information is entered in column G. These percentages calculate developed and vacant land area if actual land information is not entered into the model. The percent entered is an estimate of how much of the subarea is developed – its reciprocal is an estimate of vacant land. One hundred (100) percent is entered if actual vacant land data are entered into the model. *The model currently assumes that agricultural/forested areas are developed, so these areas should not be entered as vacant land.*

The screenshot shows the Microsoft Excel CEi worksheet. The worksheet has columns A through P. Column A contains the 'Community Element Icon Bar' with icons for various community elements. Column B contains the 'Community Element Inventory Icon Bar' with icons for various community elements. Column C contains the 'Subarea Identifier' (e.g., ATAZ001, ATAZ002, etc.). Column D contains the 'Existing (base) community element type by subarea -- entered by user' (e.g., UMX, UMX, etc.). Column E contains the 'Alternative community element type by subarea -- entered by user' (e.g., UMX, UMX, etc.). Column F contains the 'Percent of subarea developed (built) -- entered by user (100 percent if vacant land information is available)' (e.g., 100%, 100%, etc.).

Existing (base) community element type by subarea -- entered by user

Worksheet Icon Bar

Community Element Inventory Icon Bar

Alternative community element type by subarea -- entered by user

Percent of subarea developed (built) -- entered by user (100 percent if vacant land information is available)

Step 7 – Review Regional Summary

ComPlan presents information on three conditions: actual, base and alternative. The *actual* condition is an inventory of existing land use and/or socioeconomic conditions entered by the user. The model generates the *base* condition with user-defined assumptions about each subarea's current community element. This base information is compared against the actual information to calibrate the model (details about model calibration are provided in the **Calibration** section of this manual). If actual data are not available, the user can skip the calibration step and use the model for alternatives testing. The model can generate a number of *alternative* scenarios with user-defined assumptions about future community elements for each subarea.

The user can view a regional summary of these three conditions by pointing and clicking on the RS icon on the worksheet icon bar. The left hand table in the regional summary indicates how the region is proportioned among community elements under the base and alternative scenarios and the table to the right presents actual, base and alternative land use and socioeconomic totals.

Actual number of acres by land use type

ComPlan estimated number of acres by land use type for base condition

ComPlan estimated number of acres by land use type for alternative

Worksheet Icon Bar

Percent of region in each of the community elements under base and alternative scenarios

Actual inventory of population and housing

ComPlan estimate of population and housing under base scenario

ComPlan estimate of population and housing under alternative

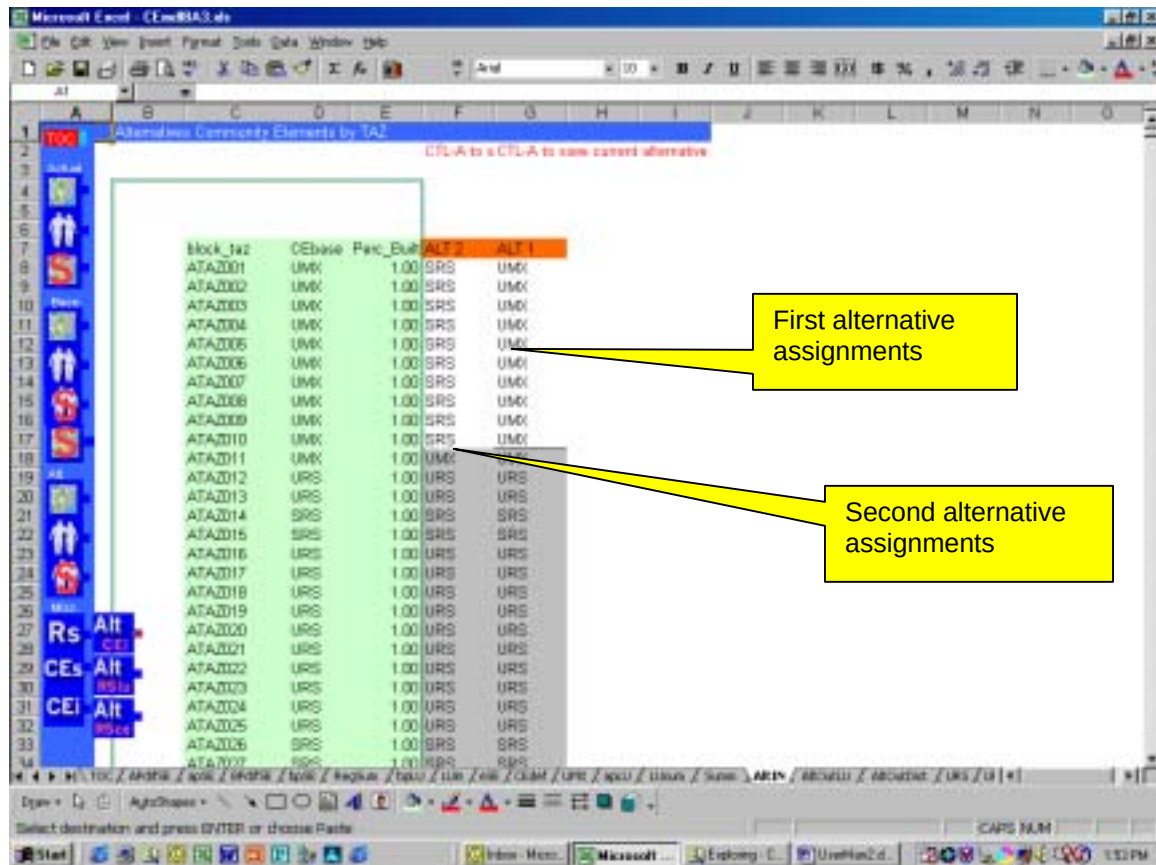
Step 8 – Create and Review Alternative Scenarios

To create an alternative land development scenario, enter a unique name for the scenario in cell F7 of the CEi worksheet (shaded in red). Then modify the community element codes by subarea in column F.

To create and compare multiple scenarios, press the CTRL and A keys simultaneously to invoke the macro that adds alternatives. This saves the results of the current scenario in other worksheets for comparisons. Enter a new name in cell F7 of the CEi worksheet and modify element codes in column F.

Point and click on the Alternative Assignments icon to review alternative assignment scenarios. In the example illustrated below, the initial alternative is labeled “ALT1.” The community element assignments for the second alternative are listed in the column labeled “ALT2.” Users can test an unlimited number of alternatives.

To delete an alternative from this worksheet, highlight the column of the alternative by pointing and clicking on the column header (in gray) and use Excel’s edit/delete command. In the example below, to delete the ALT1 alternative, click on the G column header, then click on Edit in the top left menu for the pull down menu, then click on Delete.



Block_142	CEbase	Pec_But	ALT2	ALT1
ATA001	UMX	1.00	SRS	UMX
ATA002	UMX	1.00	SRS	UMX
ATA003	UMX	1.00	SRS	UMX
ATA004	UMX	1.00	SRS	UMX
ATA005	UMX	1.00	SRS	UMX
ATA006	UMX	1.00	SRS	UMX
ATA007	UMX	1.00	SRS	UMX
ATA008	UMX	1.00	SRS	UMX
ATA009	UMX	1.00	SRS	UMX
ATA010	UMX	1.00	SRS	UMX
ATA011	UMX	1.00	SRS	UMX
ATA012	URS	1.00	URS	URS
ATA013	URS	1.00	URS	URS
ATA014	SRS	1.00	SRS	SRS
ATA015	SRS	1.00	SRS	SRS
ATA016	URS	1.00	URS	URS
ATA017	URS	1.00	URS	URS
ATA018	URS	1.00	URS	URS
ATA019	URS	1.00	URS	URS
ATA020	URS	1.00	URS	URS
ATA021	URS	1.00	URS	URS
ATA022	URS	1.00	URS	URS
ATA023	URS	1.00	URS	URS
ATA024	URS	1.00	URS	URS
ATA025	URS	1.00	URS	URS
ATA026	SRS	1.00	SRS	SRS
ATA027	SRS	1.00	SRS	SRS

Point and click on the Alternatives Review icon to review the results of the analysis. The spreadsheet automatically labels each alternative according to the name entered in the CEi worksheet. Comparisons can then be made among alternatives and to the existing and base conditions.

To delete an alternative from this worksheet, highlight the columns of the alternative by pointing and clicking on the column headers (in gray) and use Excel's edit/delete command. In the example below, to delete the ALT1 alternative, click on the L and M column headers, then click on Edit in the top left menu for the pull down menu, then click on Delete.

REGIONAL LAND USE DISTRIBUTION

Description	code	Existing	%	Base	%	ALT2	%	ALT1	%	
Single family	SF	25,947	3%	26,073	3%	39,801	5%	39,790	5%	
Multifamily	MF	1,387	0%	1,251	0%	1,881	0%	1,887	0%	
Offices	OFC	1,381	0%	1,369	0%	1,726	0%	1,735	0%	
Streets	ROW	49,489	6%	49,789	6%	65,862	8%	65,868	8%	
Cultural / Civic	CULT	4,378	1%	4,379	1%	5,585	1%	5,587	1%	
Golf / Institutional	INST	2,188	0%	2,348	0%	3,778	0%	3,779	0%	
Industrial	IND	1,442	0%	1,454	0%	2,219	0%	2,219	0%	
ROW	ROW	58,936	8%	59,015	8%	73,628	9%	73,633	9%	
Commercial retail	COM	4,508	1%	5,021	1%	6,842	1%	6,866	1%	
Public open	PaOPEN	300	0%	300	0%	379	0%	379	0%	
Park/playfields	PARK	18,337	2%	18,428	2%	23,803	3%	23,800	3%	
Total Urban	Urban	388,688	21%	388,409	22%	328,629	29%	328,603	29%	
Developable Vacant	VAC	171,070	22%	171,070	22%	-	0%	-	0%	
Agricultural / Forest	AGR	485,329	57%	485,434	57%	960,384	71%	960,304	71%	
Total Land	Total	785,086	100%	785,913	100%	785,913	100%	785,913	100%	
REGIONAL EMPLOYMENT										
Total Emp		82,653	-	82,848	0%	106,819	29%	108,830	32%	
Retail	Retail	20,339	-	20,610	1%	24,820	21%	25,307	24%	
REGIONAL POPULATION										
Dwelling Units (DU)		67,253	-	67,677	1%	86,475	51%	86,503	51%	
Population Pop		137,150	-	137,281	0%	206,882	51%	206,934	51%	
School Enrollment	School	18,961	-	15,640	-18%	23,586	24%	23,586	24%	
REGIONAL RATIOS										
Dwellings per Acre		0	2.09	-	2.11	1%	2.07	-1%	2.08	-1%
Emp. Per Acre		0	5.80	-	5.89	-2%	5.30	-9%	5.39	-7%
Pct. Developed		0	19%	0%	19%	0%	26%	34%	26%	34%

First alternative totals

Second alternative totals

Point and click on the Alternative Elements icon to review the allocation of useable land by community element for each alternative tested.

To delete an alternative from this worksheet, highlight the column of the alternative by pointing and clicking on the column header (in gray) and use Excel's edit/delete command. In the example below, to delete the ALT1 alternative, click on the H column header, then click on Edit in the top left menu for the pull down menu, then click on Delete.

Microsoft Excel - CEM03A3.xls

File Edit View Insert Format Tools Data Window Help

Alt

Alternatives Regional Community Element Distribution

description	code	Base	ALT 2	ALT 1
State's Glen	SG	0%	0%	0%
Rural AgriForest	RAF	75%	77%	77%
Rural Mixed-use	RMI	1%	1%	1%
Rural Residential	RRS	15%	15%	15%
Rural Small Town	RST	0%	0%	0%
Rural Village	RVL	1%	1%	1%
Rural Industrial	RRI	0%	0%	0%
Rural Parks/Recreation	RPK	0%	0%	0%
Rural Conservation	RCV	0%	0%	0%
Suburban Industrial	SI	0%	0%	0%
Suburban Institutional	SIT	0%	0%	0%
Suburban Mixed-use	SMU	0%	0%	0%
Suburban Office	SOF	0%	0%	0%
Suburban Residential	SRB	3%	4%	4%
Suburban Retail	SRT	0%	0%	0%
Suburban Parks	SPK	0%	0%	0%
Suburban Conservation	SCV	0%	0%	0%
Urban Institutional	UIT	0%	0%	0%
Urban Mixed-use	UMU	0%	0%	0%
Urban Residential	URB	0%	0%	0%
Urban Park	UPK	0%	0%	0%
0	0	0%	0%	0%
User Defined CE 2	CE2	0%	0%	0%
User Defined CE 3	CE3	0%	0%	0%
User Defined CE 4	CE4	0%	0%	0%
User Defined CE 5	CE5	0%	0%	0%
User Defined CE 6	CE6	0%	0%	0%
User Defined CE 7	CE7	0%	0%	0%

First alternative percentages

Second alternative percentages

MODEL CALIBRATION

The Community-Based Planning model is calibrated by comparing the base condition with actual information. Calibration adjustments are made to either the community elements assigned to each subarea or to the community element inventories. This section describes the calibration steps.

As described in the previous section, users can enter land use and socioeconomic information into ComPlan to reflect actual conditions. ComPlan estimates a base condition using assumptions about average land use and socioeconomic conditions in each community element, and how those elements are located in the study area. This estimate of development characteristics in the base condition is compared with actual information to determine the predictive accuracy of the ComPlan.

Calibration Caveats

Users should be aware of several calibration limitations. First, calibration is not meaningful at small geographic areas. Second, urban areas are complex and varied and attempting to apply averages is difficult. The goal of calibration is to develop a reasonably accurate reflection of urban characteristics so that future year estimates are within reason. Third, a region or locality may want completely new development patterns, not an extrapolation of past patterns. In such cases, calibration is useful only in comparing how a new pattern differs from a continuation of existing patterns.

Calibration and Scale

Each community element inventory reflects typical conditions of a 31-acre area. In nearly all cases, an area of this size includes a number of parcels, each having a unique building and use. Comparing a specific parcel within the 31-acre area to the average characteristics of the area will not yield meaningful insights. Therefore, calibration does not make sense for areas smaller than 31 acres.

Furthermore, because of the complexity of urban areas, comparisons of subareas are difficult even if they are the size of a community element (around 31 acres). If the study area is roughly equivalent to the size of a community element (31 acres), or the study area includes only one subarea of a given community element, then calibration is possible. However, if a study area includes several subareas of a given community element, then calibration becomes more difficult because of the nuances among similarly classified developments. A shopping center in one part of a region (classified as a suburban retail in the ComPlan's preset elements) will have similar, but not exactly the same characteristics as another shopping center located elsewhere in the region. If the differences between development types assumed to be the same community element are significant enough to cause calibration problems, then users might want to create another community element to distinguish between these areas.

Calibration Steps

To begin calibration, information for the actual condition is entered into the model. This includes both land use and socioeconomic information. The next step is assigning community elements to subareas for the base condition. Step three is reviewing

differences between the actual and base condition and making adjustments to minimize the differences. These model set-up steps are described in detail at the beginning of this manual.

ComPlan is calibrated by adjusting either community element inventory inputs or the community element assignments under the base condition. The Regional Summary (RS icon on the icon bar) compares actual to base conditions. *For calibration, make sure that a “d” is entered in cell J33 (highlighted in red in the bottom right of the Regional Summary worksheet). This calculates areas in the base condition using developed acreage (dAREA) rather than useable acreage (uAREA).* Entering a “u” in cell J33 changes the areas in the base calculation from developed acreage to useable acreage, which provides a baseline estimate of the development potential that may be of value for alternatives testing.

The land use distributions in the top right worksheet table and the socioeconomic totals in the lower right worksheet tables compare actual and base condition. ComPlan provides more detailed land use and socioeconomic comparisons (shown on the following pages) if the regional comparison indicates significant differences.

REGIONAL COMMUNITY ELEMENT DISTRIBUTION

Description	code	Base	Alt 1	Alt 2
Status Quo	SQ	0%	0%	0%
Rural Agriforest	RAF	79%	77%	77%
Rural Mixed-use	RMU	1%	1%	1%
Rural Residential	RDS	15%	15%	15%
Rural Small Town	RST	0%	0%	0%
Rural Village	RVL	1%	1%	1%
Rural Industrial	RIN	0%	0%	0%
Rural Parks/Recreation	RPR	0%	0%	0%
Rural Conservation	RCV	0%	0%	0%
Suburban Industrial	SEI	0%	0%	0%
Suburban Institutional	SEI	0%	0%	0%
Suburban Mixed-use	SMU	0%	0%	0%
Suburban Office	SOE	0%	0%	0%
Suburban Residential	SRS	3%	4%	4%
Suburban Retail	SRT	0%	0%	0%
Suburban Parks	SPR	0%	0%	0%
Suburban Conservation	SCV	0%	0%	0%
Urban Institutional	UII	0%	0%	0%
Urban Mixed-use	UMU	0%	0%	0%
Urban Residential	URS	0%	0%	0%
Urban Park	UPR	0%	0%	0%
User Defined CE 2	CE2	0%	0%	0%
User Defined CE 3	CE3	0%	0%	0%
User Defined CE 4	CE4	0%	0%	0%
User Defined CE 5	CE5	0%	0%	0%
User Defined CE 6	CE6	0%	0%	0%
User Defined CE 7	CE7	0%	0%	0%
User Defined CE 8	CE8	0%	0%	0%
User Defined CE 9	CE9	0%	0%	0%

REGIONAL LAND USE DISTRIBUTION

Description	code	Existing	%	Base	%	Alt 1	Alt 2
Single family	SF	25,847	3%	25,073	3%	39,831	
Multifamily	MF	1,357	0%	1,251	0%	1,891	
Offices	OFC	1,331	0%	1,359	0%	1,726	
Streets	ROW	49,485	6%	49,769	6%	65,852	
Cultural / Civic	CULT	4,376	1%	4,379	1%	5,583	
Govt / Institutional	INST	2,166	0%	2,340	0%	3,776	
Industrial	IND	1,442	0%	1,454	0%	2,218	
ROW	ROW	58,938	8%	59,015	8%	73,628	
Commercial retail	COM	4,808	1%	5,021	1%	6,842	
Public open	PuOPEN	300	0%	300	0%	379	
Parks/playfields	PARK	18,337	2%	18,428	2%	23,803	
Total Urban	Urban	158,858	27%	158,403	27%	205,528	
Developable Vacant	VAC	171,070	22%	171,070	22%	-	
Agricultural / Forest	AGR	445,329	57%	445,434	57%	560,384	
Total Land	Total	775,056	100%	775,913	100%	765,913	

REGIONAL EMPLOYMENT

	Base	%	Alt 1	%
Total Emp	82,853		82,846	0%
Retail Retail	20,209		20,610	1%

REGIONAL POPULATION

	Base	%	Alt 1	%
Dwelling Units DU	57,253		57,677	1%
Population Pop	137,150		137,261	0%
School Enrollment School	19,981		15,640	-18%

REGIONAL RATIOS

	Base	%	Alt 1	%
Dwellings per Acre	2.08		2.11	1%
Emp. Per Acre	5.60		5.69	-2%
Pct. Developed	19%		19%	0%

enter "d" below to use the base condition for calibration
enter "u" below to use the base condition for alternatives comparison

For calibration, make sure “d” is entered.

Calibration Step 1 – Entering Actual Information

To calibrate the model or compare alternative conditions to actual conditions, users enter land use and socioeconomic information by subareas. Details of entering data are provided in Steps 4 and 5 in the Getting Started section. Undevelopable, developable and vacant areas by subarea are required model inputs (described in more detail on page 9 of this manual).

Calibration Step 2 – Generating Base Conditions Estimates

As noted above, the model estimates a base condition based on the developable acreage in each subarea, the community element assigned to the subarea and the development characteristics for the community element. The base condition estimates calculated by ComPlan are:

Base Land-use Estimates – this worksheet calculates land use areas based on user-defined community element assumptions for each subarea. The model multiplies the community element land use inventory inputs by the net developable acreage in each subarea to calculate how the subarea is developed. For example, subarea one (row 11) is assumed to be an urban mixed-use (UMX) element. The UMX element assumes that a certain percentage of the total area is devoted to single-family (SF) uses. ComPlan multiplies this percentage by the total developable area (cell c11) to estimate the single family-area (in cell J11).

Assumed element type (entered in CEi worksheet)

Developable area (entered in Regional Summary worksheet)

ComPlan calculated areas by land use type (based on developable area and assumed community element)

	AREA	TAZ	AGR	FLUPEN	PASH	ROW	PRNG	SF	MF	OF	COM	CULT	WATER
10	UMX	13	ATAJXX	0	0	0	4	1	1	1	1	3	1
11	UMX	11	ATAJXX	0	0	0	3	1	1	1	1	2	1
12	UMX	4	ATAJXX	0	0	0	1	0	0	0	0	1	0
13	UMX	5	ATAJXX	0	0	0	1	0	0	0	0	1	0
14	UMX	5	ATAJXX	0	0	0	1	0	0	0	0	1	0
15	UMX	10	ATAJXX	0	0	0	3	1	1	1	1	2	0
16	UMX	8	ATAJXX	0	0	0	2	0	1	1	1	2	0
17	UMX	15	ATAJXX	0	0	0	4	1	1	1	1	2	0
18	UMX	4	ATAJXX	0	0	0	1	0	0	0	0	1	0
19	UMX	16	ATAJXX	0	0	0	4	1	1	1	1	2	0
20	UMX	31	ATAJXX	0	0	1	9	2	2	3	3	6	2
21	URS	83	ATAJXX	0	0	2	19	1	36	11	2	4	3
22	URS	109	ATAJXX	0	0	3	25	2	47	14	3	6	2
23	URS	43	ATAJXX	2	0	3	9	0	22	1	0	2	0
24	URS	27	ATAJXX	1	0	2	6	0	14	1	0	1	0
25	URS	103	ATAJXX	0	0	3	24	1	45	13	3	4	2
26	URS	56	ATAJXX	0	0	2	13	1	24	7	2	2	1
27	URS	104	ATAJXX	0	0	3	24	2	45	14	3	5	2
28	URS	166	ATAJXX	0	0	5	38	2	72	22	6	7	3
29	URS	235	ATAJXX	0	0	7	54	3	102	31	6	10	6
30	URS	121	ATAJXX	0	0	3	28	2	52	16	3	5	2
31	URS	12	ATAJXX	0	0	0	3	0	5	2	0	1	0
32	URS	95	ATAJXX	0	0	3	22	1	41	12	3	4	2
33	URS	102	ATAJXX	0	0	3	24	1	44	13	3	4	2

Base Socioeconomic Estimates – this worksheet calculates socioeconomic totals for subareas based on the assumed community element type (from the CEi worksheet), the amount of useable area in the subarea and socioeconomic ratios from the community element inventories (listed at the top of the worksheet). The worksheet also makes several comparisons. The first checks the reasonableness of input data by calculating the ratios of socioeconomic variables to useable land area. Users can enter ranges in the red cells above the comparisons to highlight subareas (in red) where ratios are higher than expected. For example, ComPlan highlights those instances where the actual employment exceeds the 40 employees per acre entered in cell P7. The ComPlan also compares the absolute and percentage differences between actual conditions and model estimates. Again, the user can set ranges at the top of each comparison column.

Developable area (entered in land use worksheet)

Assumed element type (entered in CEi worksheet)

Socioeconomic ratios from community element inventories

Actual conditions entered by the user

Base socioeconomic estimates calculated by the ComPlan

Ratio of actual information to model estimates

It should be noted that differences are expected when subareas are smaller than the areas assumed in the community element inventories (31 acres) or when the subarea is not completely developed. The Calibration Caveats section of this manual provides more information on why this is so. Because of this, the model also provides regional comparisons.

Base Socioeconomic Estimates by Community Element – this worksheet calculates socioeconomic totals by community elements rather than subareas. It provides a more reasonable basis for comparison and is a more appropriate scale for model calibration. It presents several summaries, the first being the ratio of socioeconomic characteristics to useable land. The user can enter a reasonableness range at the top of each column that highlights all elements exceeding the expected range. ComPlan also provides absolute and percent differences between actual and estimated socioeconomic characteristics, highlighting in red those elements where differences exceed reasonableness ranges (defined by the user). Actual totals and base estimates for community elements are shown to the right of the comparisons.

Community element inventory links (click and point to switch to elements inventories)

User defined reasonableness ranges

Actual totals by community element type (estimates are to the right)

Community element types

Ratio of actual socioeconomic totals to land area

Difference between actual information to model estimates

Percent difference between actual information and model estimates

Community Element		Area	Ratio	User defined reasonableness ranges										Difference		Percent		Actual	
Code	Type	Acres	Ratio	Emp	Retail	School	DUs	Pop	Emp	Retail	School	DUs	Pop	Emp	Retail	School	DUs	Pop	Emp
10	States	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Rural AgriForest	487922.4	0.0	0	0	0	0	0	-104	0	-899	814	1050	-1%	0%	-17%	6%	3%	0
12	Rural Mixed-use	3830.0	0.0	2	1	0	0	0	48	38	5	-2	-7	1%	1%	5%	-1%	-1%	0
13	Rural Residential	92735.1	0.0	0	0	0	0	0	-15	165	-2793	-472	-416	0%	6%	-63%	-7%	-3%	132
14	Rural Small Town	19461.6	0.0	3	0	0	1	1	0	0	0	60	160	0%	0%	0%	5%	6%	66
15	Rural Village	4749.9	0.0	0	0	0	0	0	0	0	0	-4	-10	0%	0%	0%	-2%	-2%	11
16	Rural Industrial	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
17	Rural Parks/Recreation	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
18	Rural Conservation	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
19	Suburban Industrial	134.9	0.0	17	1	0	1	2	10	0	26	2	7	0%	0%	0%	2%	3%	22
20	Suburban Institutional	819.2	0.0	1	0	0	0	0	33	0	11	2	4	9%	0%	0%	4%	4%	3
21	Suburban Mixed-use	1110.3	0.0	3	1	1	2	5	431	130	852	-84	-126	17%	18%	0%	-3%	-3%	25
22	Suburban Office	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
23	Suburban Residential	10826.0	0.0	0	0	0	1	3	-220	-27	-1150	210	305	-3%	-2%	-19%	1%	1%	80
24	Suburban Retail	769.9	0.0	12	8	0	1	2	-154	-157	154	20	-49	-2%	-3%	0%	4%	-4%	96
25	Suburban Parks	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
26	Suburban Conservation	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
27	Urban Institutional	1086.6	0.0	10	0	1	5	12	304	3	1010	130	130	3%	1%	230%	2%	1%	101
28	Urban Mixed-use	211.6	0.0	23	8	1	2	5	50	85	129	-22	-84	1%	6%	0%	-5%	-7%	47
29	Urban Residential	2214.0	0.0	3	0	1	3	8	-218	-46	-397	-220	-306	-3%	6%	-24%	-3%	-5%	68
30	Urban Park	401.9	0.0	0	0	0	0	0	6	-12	11	-4	-2	7%	-100%	0%	-6%	-2%	1
31	User Defined CE 1	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
32	User Defined CE 2	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
33	User Defined CE 3	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0
34	User Defined CE 4	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0%	0%	0%	0%	0%	0

Alternative (ComPlan Generated) Estimates

ComPlan also generates detailed comparisons of alternative scenarios with actual conditions. The subarea alternative information is used to generate the regional summaries. While these comparisons should not be used for calibration, they are available for review. Like the base condition, the model calculates alternative conditions based on the developable acreage in each subarea, the alternative community element assigned to the subarea (column F in the CEi worksheet) and the development characteristics for the community element. The alternative condition information calculated by ComPlan includes:

Alternative Land-use Estimates – this worksheet calculates land use estimates based on user-defined community element assumptions for each subarea. The model multiplies the community element land use inventory inputs by the net developable acreage in each subarea to estimate how the subarea is developed. For example, subarea one (row 11) is assumed to be an urban mixed use (UMX) community element type. The UMX element assumes that a certain percentage of the total area is devoted to single-family (SF) uses. The ComPlan multiplies this percentage by the total developable area (cell c11) to estimate the single family-area (cell j11).

Alternative element type (entered in CEi worksheet)

Developable area (entered in land use worksheet)

ComPlan calculated areas by land use type (based on developable area and alternative community element)

	Alternative	Area	AGP	INDEN	PAN	ROW	FFing	SF	MF	OPC	CORE	CHT	RES
11	UMX	13	1	0	0	0	4	1	1	1			
12	UMX	11	2	0	0	0	3	1	1	1			
13	UMX	4	3	0	0	0	1	0	0	0			
14	UMX	5	4	0	0	0	1	0	0	0			
15	UMX	5	5	0	0	0	1	0	0	0			
16	UMX	10	6	0	0	0	3	1	1	1			
17	UMX	8	7	0	0	0	2	0	1	1			
18	UMX	15	8	0	0	0	4	1	1	1			
19	UMX	4	9	0	0	0	1	0	0	0			
20	UMX	16	10	0	0	0	4	1	1	1			
21	UMX	32	11	0	0	1	9	2	3	3	6	2	3
22	URS	83	12	0	0	2	19	1	11	2	4	2	3
23	URS	113	13	0	0	3	26	2	49	15	3	5	5
24	SRS	53	14	2	0	3	9	0	30	8	0	2	3
25	SRS	31	15	1	0	1	6	0	18	2	0	1	2
26	URS	106	16	0	0	3	25	2	46	14	3	5	4
27	URS	58	17	0	0	2	13	1	25	7	2	3	2
28	URS	107	18	0	0	3	25	2	47	14	3	5	4
29	URS	177	19	0	0	5	41	3	77	23	5	8	7
30	URS	244	20	0	0	7	67	4	108	31	7	11	10
31	URS	128	21	0	0	4	30	2	56	16	3	6	5
32	URS	12	22	0	0	0	3	0	5	1	0	1	0
33	URS	57	23	0	0	3	73	1	47	13	3	4	4

Alternative Socioeconomic Estimates – this worksheet calculates socioeconomic totals for subareas based on the assumed community element type (from the CEi worksheet), the amount of useable area in the subarea and socioeconomic ratios from the community element inventories (listed at the top of the worksheet). The worksheet also makes several comparisons. The first checks the reasonableness of input data by calculating the ratios of socioeconomic variables to useable land area. Users can enter ranges in the red cells above the comparisons to highlight subareas (in red) where ratios are higher than expected. For example, the ComPlan highlights those instances where the actual employment exceeds the 40 employees per acre entered in cell P7. The ComPlan also compares the absolute and percentage differences between actual conditions and model estimates. Again, the user can set ranges at the top of each comparison column.

		AREA	CEi	Actual				Alternative potential				Ratios				Difference	
				Emp	Retail	Sched/DUs	Pop	Emp	Retail	Sched/DUs	Pop	Emp	Retail	Sched/DUs	Pop	Emp	Retail
1	UMX	0	1	670	82	0	70	164	0	0	0	0	0	0	0	0	0
2	UMX	0	2	857	138	0	1	2	0	0	0	0	0	0	0	0	0
3	UMX	0	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0
4	UMX	0	4	478	197	0	8	19	0	0	0	0	0	0	0	0	0
5	UMX	0	5	147	89	0	0	0	0	0	0	0	0	0	0	0	0
6	UMX	0	6	173	36	0	11	42	0	0	0	0	0	0	0	0	0
7	UMX	0	7	2	0	0	44	101	0	0	0	0	0	0	0	0	0
8	UMX	0	8	499	71	0	7	17	0	0	0	0	0	0	0	0	0
9	UMX	0	9	124	44	0	3	8	0	0	0	0	0	0	0	0	0
10	UMX	0	10	179	16	0	137	320	0	0	0	0	0	0	0	0	0
11	UMX	0	11	344	65	0	33	76	0	0	0	0	0	0	0	0	0
12	URS	0	12	27	12	0	502	1027	0	0	0	0	0	0	0	0	0
13	URS	0	13	82	3	0	351	1000	0	0	0	0	0	0	0	0	0
14	SRS	0	14	7	0	0	261	501	0	0	0	0	0	0	0	0	0
15	SRS	0	15	61	61	0	49	143	0	0	0	0	0	0	0	0	0
16	URS	0	16	23	12	0	415	849	0	0	0	0	0	0	0	0	0
17	URS	0	17	2	0	0	278	573	0	0	0	0	0	0	0	0	0
18	URS	0	18	387	22	421	480	927	0	0	0	0	0	0	0	0	0
19	URS	0	19	49	0	360	1404	0	0	0	0	0	0	0	0	0	0
20	URS	0	20	66	37	0	370	895	0	0	0	0	0	0	0	0	0
21	URS	0	21	628	44	0	304	609	0	0	0	0	0	0	0	0	0
22	URS	0	22	0	0	17	0	0	0	0	0	0	0	0	0	0	0

Alternative Socioeconomic Estimates by Community Elements – this worksheet calculates socioeconomic totals by community elements rather than subareas. It provides a more reasonable basis for comparison and should be used for calibrating the ComPlan. It presents several summaries, the first being the ratio of socioeconomic characteristics to useable land. The user can enter a reasonableness range at the top of each column that highlights all elements exceeding the expected range. The ComPlan also provides absolute and percent differences between actual and estimated socioeconomic characteristics, highlighting in red those elements where differences exceed reasonableness ranges (defined by the user). Actual totals and base estimates for community elements are shown to the right of the comparisons.

Community element inventory links (click and point to elements inventories)

User defined reasonableness ranges

Actual and alternative condition totals by community element type (estimates are to the right)

Community element types

Community element types	Ratio of actual socioeconomic totals to land area	Difference between actual information to alternative conditions model estimates		Percent difference between actual information and alternative condition model estimates	
		Actual	Alternative	Actual	Alternative
Rural Agri/Forest	4.4	0	0	0%	0%
Rural Mixed-use	0.1	0	0	0%	0%
Rural Residential	9.0	0	0	0%	0%
Rural Small Town	0.0	0	0	0%	0%
Rural Village	0.0	0	0	0%	0%
Rural Industrial	0.0	0	0	0%	0%
Rural Parks/Recreation	0.0	0	0	0%	0%
Rural Conservation	0.0	0	0	0%	0%
Suburban Industrial	0.0	30	0	100%	0%
Suburban Institutional	0.2	0	0	0%	0%
Suburban Mixed-use	0.4	0	0	0%	0%
Suburban Office	0.0	0	0	0%	0%
Suburban Residential	5.4	0	0	0%	0%
Suburban Retail	0.2	0	0	0%	0%
Suburban Parks	0.0	0	0	0%	0%
Suburban Conservation	0.0	0	0	0%	0%
Urban Institutional	0.4	2	0	100%	0%
Urban Mixed-use	0.1	0	0	0%	0%
Urban Residential	0.9	0	0	0%	0%
Urban Park	0.1	0	0	0%	0%
User Defined CE 1	0.3	12	4	100%	100%
User Defined CE 2	0.0	0	0	0%	0%
User Defined CE 3	0.0	0	0	0%	0%

Ratio of actual socioeconomic totals to land area

Difference between actual information to alternative conditions model estimates

Percent difference between actual information and alternative condition model estimates

Calibration Step 3 – Reducing Land Use Differences

The land use comparison worksheet presents actual and base condition differences by land use categories and by community elements. Each community element has two rows, the top or darker row indicating actual condition proportions and the bottom or lighter row indicating base condition proportions. If there are significant differences in the proportions for a community element, point and click on the community element code to go to the inventory worksheet.

For example, the figure below indicates the suburban residential element is over-representing right of way (ROW) and over-representing multifamily use (MF). To change these proportions in the community element inventory, click and point on the suburban residential code (SRS).

Microsoft Excel - C:\msdclab																
File Edit View Insert Format Tools Data Window Help																
A107 100% Arial 10																
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
76																
77																
78																
79																
80																
81																
82																
83																
84																
85																
86																
87																
88																
89																
90																
91																
92																
93																
94																
95																
96																
97																
98																
99																
100																
101																
102																
103																
104																
105																
106																
107																
108																
109																
Home Insert Format Painter Styles Window Help																
Font Paragraph Background Styles Tables Data Tools																
Ready																
Taskbar: Start, Run, My Computer, Internet Explorer, Microsoft Word, Microsoft Excel - C:\msdclab, 1:10 PM																

The proportions of land uses are shown in column F of the community element inventories. As shown in the summary on the previous page and in column F below, 17 percent of land in suburban residential elements is assumed to be right of way (higher than the actual proportion of 13 percent) and seven percent is assumed to be multifamily (lower than the actual proportion of 12 percent). The right of way proportion in this example is lowered by reducing either the street widths (column Q) or, more appropriately, shortening the length of streets (column P). Increasing the number of units (column K), the average floor area (column L) or the ratio of building area to land area (column G) are ways to increase the multifamily proportion.

Suburban Residential SRS																
		Land Use Areas						Buildings (square feet)					Infra			
		Total		Allocation								Road Length or Parking Spaces		Avg. ROW Width or Parking Area		
		Square Feet	Acres	Pct. of Total Urban Area	Blgd. Foot-print / Lot Ratio	Building Area	Parking Area	Yard / Private Open Area	No. of Units / Bldgs	Avg. Floor Area	Total Floor Area	Avg. No. Floors	Total Building Area			
Residential																
	Single family	715,862	17.81	86.7%	8.6%	48,000	-	730,862	30	1,800	48,000	2.0	80,000	-	-	
	Multifamily	108,000	2.30	7.3%	10.0%	18,000	12,000	77,000	15	1,800	10,000	2.0	20,000	50	250	
	Subtotal	823,862	20.11	94.0%	9.7%	66,000	12,000	808,862	45	1,779	58,000	2.0	110,000	50	250	
Nonresidential																
	Offices	-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-	
	Commercial retail	45,000	0.96	3.0%	12.0%	5,000	10,000	26,000	1	5,000	5,000	1.0	5,000	40	200	
	Cultural / Civic	-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-	
	Gov't / Institutional	68,000	1.53	4.9%	18.0%	10,000	10,000	48,000	1	10,000	10,000	1.0	10,000	40	200	
	Industrial	33,333	0.77	2.4%	18.0%	5,000	5,000	23,333	1	5,000	5,000	1.0	5,000	30	200	
	Subtotal	141,667	3.25	10.4%	14.1%	20,000	25,000	96,667	3	6,667	20,000	1.0	20,000	100	250	
Commons Parking																
	Streets	-	-	0.0%	-	-	-	-	-	-	-	-	-	-	-	
	Major streets	144,000	3.21	10.9%	-	-	-	-	-	-	-	-	-	1,000	80	
	Residential streets	90,000	2.07	6.6%	-	-	-	-	-	-	-	-	-	1,000	30	
	Subtotal	234,000	5.27	17.1%	-	-	-	-	-	-	-	-	-	-	-	
Public Open Space																
	Public open	-	-	0.0%	-	-	-	-	-	-	-	-	-	-	-	
	Park/playfields	66,000	1.52	4.0%	-	-	-	-	-	-	-	-	-	-	-	
	Subtotal	66,000	1.52	4.0%	-	-	-	-	-	-	-	-	-	-	-	
	Agriculture/forest	80,000	1.79	3.7%	-	-	-	-	-	-	-	-	-	-	-	
	Subtotal	80,000	1.79	3.7%	-	-	-	-	-	-	-	-	-	-	-	
	Total Urban Area	1,347,529	31.39	99.9%	9.7%	75,000	37,000	965,429	48	1,744.79	75,000	1.73	734,000	150	250	
	Off-urban Areas	1,000	0.02	0.0%	-	-	-	-	-	-	-	-	-	-	-	

Modifying the community element inputs for any of the land use categories will change the proportions for all categories (not just the target categories) and the overall useable area. Therefore, adjustments usually require several iterations. Also, changes to building areas not only influence land areas, they change socioeconomic results as well. For example, increasing the number of multifamily units will increase the multifamily population as well as the land allocated to the multifamily uses. *The first calibration steps should focus on modifying those community element inputs that isolate land use proportions (building to land area ratios and infrastructure inputs).*

The first adjustment in the example is to the building/land area ratio (changed from 10 to six percent). This adjustment increases total multifamily area from 2.3 to 3.83 acres and nears the target of 12 percent. However, it also increases the total useable area to 65,718 feet over the total element area target (shown in the red box at the bottom of the inventory). The next step is changing road widths to reduce both the right of way proportion and the overall useable area.

Microsoft Excel - Chasfield.xls

File Edit View Insert Format Tools Data Window Help

100%

Arial

00

6%

Suburban Residential SRS															
		Land Use Areas						Buildings (Square Feet)					Infra		
		Total		Allocation											
		Square Feet	Acres	Pct. of Total Urban Area	Buildg. Footprint / Land Ratio	Building Area	Parking Area	Private / Open Area	No. of Units / Bldgs	Avg. Floor Area	Total Floor Area	Avg. No. Floors	Total Building Area	Food Length or Parking Spaces	Avg. Street Width or Parking Area
Residential															
Single family		775,862	17.81	84.1%	6.0%	48,000	-	730,862	31	1,000	45,000	2.0	80,000	-	-
Multifamily		188,867	3.83	11.8%	6.0%	10,000	12,500	144,167	10	1,000	10,000	2.0	20,000	50	250
Subtotal		947,529	21.64	65.7%	6.0%	58,000	12,500	875,029	41	1,000	55,000	2.0	100,000	50	250
Nonresidential															
Offices		-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-
Commercial retail		41,667	0.96	2.9%	10.0%	5,000	10,000	26,667	1	5,000	5,000	1.0	5,000	40	200
Cultural / Civic		-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-
Govt. / Institutional		88,889	1.83	4.8%	10.0%	10,000	10,000	40,889	1	10,000	10,000	1.0	10,000	40	200
Industrial		33,333	0.77	2.3%	10.0%	5,000	-5,000	23,333	1	5,000	5,000	1.0	-5,000	30	150
Subtotal		147,667	3.25	3.9%	14.1%	20,000	25,000	80,667	3	5,000	20,000	1.0	25,000	100	250
Common Parking		-	-	0.0%											
Streets															
Major streets		144,000	3.31	13.0%										1,800	80
Residential streets		90,000	2.07	8.3%										5,000	30
Subtotal		234,000	5.37	18.3%											
Public Open Space															
Public open		-	-	0.0%											
Fields/parklands		88,000	1.82	4.0%											
Subtotal		88,000	1.82	4.0%											
Agriculture/Forest		80,000	1.82	3.6%											
Total Urban Area		1,434,195	32.82	84.8%	6.7%	78,000	37,500	875,695	43	1,000	75,000	1.7	100,000	190	250
Calibration Adjuster		65,718													

File Edit View Insert Format Tools Data Window Help

Ready

Microsoft Excel - Chasfield.xls

2017M

The second adjustment in the example is reducing the length of major streets in cell P19 from 1,800 feet to 1,000 feet. This adjustment brings the right of way proportion in line with the actual proportion and reduces the estimated useable area to within 2,000 square feet of the element target.

Microsoft Excel - ChandraH.xls

File Edit View Insert Format Tools Data Window Help

60 6%

A B C D E F G H I J K L M N O P Q

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

Suburban Residential SRS

		Land Use Areas					Buildings (square feet)					Infra			
		Total		Allocation											
		Square Feet	Acres	Pct. of Total Urban Area	Bldg. Footprint / Land Ratio	Building Area	Parking Area	Yard / Private Open Area	No. of Units / Bldgs	Avg. Floor Area	Total Floor Area	Avg. No. Floors	Total Building Area	Feet Length of Parking Spaces	Avg. Street Width or Parking Area
Residential															
Single family		775,862	17.81	54.1%	5.0%	45,000	-	730,862	30	1,600	45,000	2.0	80,000	-	-
Multifamily		166,857	3.83	11.6%	6.0%	10,000	12,500	144,167	10	1,000	10,000	2.0	20,000	50	250
	Subtotal	942,719	21.64	65.7%	5.0%	55,000	12,500	675,029	40	1,575	46,800	2.0	100,000	50	250
Nonresidential															
Offices		-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-
Commercial retail		41,667	0.96	2.9%	12.0%	5,000	10,000	26,667	1	5,000	5,000	1.0	5,000	40	250
Cultural / Civic		-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-
Govt./Institutional		88,889	1.93	4.6%	16.0%	10,000	10,000	40,889	1	10,000	10,000	1.0	10,000	40	250
Industrial		33,333	0.77	2.3%	10.0%	5,000	5,000	23,333	1	5,000	5,000	1.0	5,000	30	250
	Subtotal	141,667	3.25	8.9%	14.1%	20,000	25,000	86,667	3	8,667	20,800	1.0	26,800	100	250
Common Parking		-	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
Streets															
Major streets		144,000	3.31	10.0%	-	-	-	-	-	-	-	-	-	1,800	30
Residential streets		80,000	2.07	6.3%	-	-	-	-	-	-	-	-	-	3,000	30
	Subtotal	224,000	5.37	16.3%	-	-	-	-	-	-	-	-	-	-	-
Public Open Space															
Public open		-	-	0.0%	-	-	-	-	-	-	-	-	-	-	-
Park/playfields		66,000	1.53	4.6%	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	66,000	1.53	4.6%	-	-	-	-	-	-	-	-	-	-	-
Agriculture/Forest		60,000	4.78	3.6%	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	60,000	4.78	3.6%	-	-	-	-	-	-	-	-	-	-	-
Total Urban Area		1,434,195	32.82	94.8%	5.2%	75,000	37,500	875,000	43	1,544.19	75,600	1.73	226,800	190	250
Calibration Adjuster		65,719													

Ready

2:01 PM

After making the adjustment, point and click on the worksheet icon to review the land use comparison. In the example, the adjustments improve the land use proportions for the right of way and multifamily types.

It should be noted that modifications to any of the inventory inputs should be reasonable. For instance, building/land use ratios for multifamily uses typically range from five to twenty percent. Having to adjusting ratios beyond such reasonableness ranges suggests that another variable is the culprit for differences.

		AGR	P	OPEN	PARK	ROW	PRKng	SF	MF	OFC	COM	CULT	INST	IND
77	description													
78	code													
79	Status: Des	SO												
80														
81	Rural AgriForest	RAF	77%		3%	6%	11%	3%			0%	1%		
82			77%		3%	6%	11%	3%			0%	1%		
83	Rural Mixed-use	RMX	33%		4%	12%		12%		1%	26%	4%	1%	7%
84			33%		4%	12%		12%		1%	26%	4%	1%	7%
85	Rural Residential	RRS	25%		1%	12%		56%			1%	4%		
86			25%		1%	12%		56%			1%	4%		
87	Rural Small Town	RST												
88														
89	Rural Village	RVL												
90														
91	Rural Industrial	RIN												
92														
93	Rural Parks/Recreation	RPK												
94														
95	Rural Conservation	RCV												
96														
97	Suburban Industrial	SIN			3%	16%		6%		5%	5%			66%
98					3%	16%		6%		5%	5%			66%
99	Suburban Institutional	SIT		1%	3%	19%	19%	3%		2%	2%		55%	
100				1%	3%	19%	19%	3%		2%	2%		55%	
101	Suburban Mixed-use	SMX		3%	3%	20%		7%	29%	7%	15%	7%	4%	5%
102				3%	3%	20%		7%	29%	7%	15%	7%	4%	5%
103	Suburban Office	SOF												
104														
105	Suburban Residential	SRS	0%		4%	13%	0%	50%	12%	0%	2%	1%	6%	2%
106			0%		4%	13%	0%	50%	12%	0%	2%	1%	6%	2%
107	Suburban Retail	SRT			6%	18%	4%	0%	30%	3%	41%		0%	9%
108					6%	18%	4%	0%	30%	3%	41%		0%	9%
109	Suburban Parks	SPK												

Calibration Step 4 – Reducing Socioeconomic Differences

Calibrating the model to improve the differences between actual and base socioeconomic results is similar to the land use step described in the previous pages. The first step is reviewing the regional socioeconomic totals in the bottom right tables of the regional summary (RS) worksheet. If there are significant differences, then point and click on the base summary icon button to go to the base summary worksheet. The worksheet compares socioeconomic information (total employment, retail, school enrollment, dwelling units and population) at the community element level.

To modify community element inventory inputs so that base conditions more closely match actual conditions, point and click on the code of the community element to adjust. Focus on the percent rather than absolute differences during calibration. In the percent difference comparison below, model estimated suburban residential dwelling units are noticeably lower (-6%) than actual units. To reduce the difference, point and click on the SRS code.

Actual		Potential		Difference		Percent		Actual	
Emp	Potential	Emp	Potential	Absolute	Percent	Absolute	Percent	Emp	Potential
10	18053.7	0	0	-18053.7	-100%	0	0%	0	0
11	18053.7	0	0	-18053.7	-100%	0	0%	0	0
12	18053.7	0	0	-18053.7	-100%	0	0%	0	0
13	18053.7	0	0	-18053.7	-100%	0	0%	0	0
14	18053.7	0	0	-18053.7	-100%	0	0%	0	0
15	18053.7	0	0	-18053.7	-100%	0	0%	0	0
16	18053.7	0	0	-18053.7	-100%	0	0%	0	0
17	18053.7	0	0	-18053.7	-100%	0	0%	0	0
18	18053.7	0	0	-18053.7	-100%	0	0%	0	0
19	18053.7	0	0	-18053.7	-100%	0	0%	0	0
20	18053.7	0	0	-18053.7	-100%	0	0%	0	0
21	18053.7	0	0	-18053.7	-100%	0	0%	0	0
22	18053.7	0	0	-18053.7	-100%	0	0%	0	0
23	18053.7	0	0	-18053.7	-100%	0	0%	0	0
24	18053.7	0	0	-18053.7	-100%	0	0%	0	0
25	18053.7	0	0	-18053.7	-100%	0	0%	0	0
26	18053.7	0	0	-18053.7	-100%	0	0%	0	0
27	18053.7	0	0	-18053.7	-100%	0	0%	0	0
28	18053.7	0	0	-18053.7	-100%	0	0%	0	0
29	18053.7	0	0	-18053.7	-100%	0	0%	0	0
30	18053.7	0	0	-18053.7	-100%	0	0%	0	0
31	18053.7	0	0	-18053.7	-100%	0	0%	0	0
32	18053.7	0	0	-18053.7	-100%	0	0%	0	0
33	18053.7	0	0	-18053.7	-100%	0	0%	0	0
34	18053.7	0	0	-18053.7	-100%	0	0%	0	0
35	18053.7	0	0	-18053.7	-100%	0	0%	0	0
36	18053.7	0	0	-18053.7	-100%	0	0%	0	0
37	18053.7	0	0	-18053.7	-100%	0	0%	0	0
38	18053.7	0	0	-18053.7	-100%	0	0%	0	0
39	18053.7	0	0	-18053.7	-100%	0	0%	0	0
40	18053.7	0	0	-18053.7	-100%	0	0%	0	0
41	18053.7	0	0	-18053.7	-100%	0	0%	0	0
42	18053.7	0	0	-18053.7	-100%	0	0%	0	0
43	18053.7	0	0	-18053.7	-100%	0	0%	0	0
44	18053.7	0	0	-18053.7	-100%	0	0%	0	0
45	18053.7	0	0	-18053.7	-100%	0	0%	0	0
46	18053.7	0	0	-18053.7	-100%	0	0%	0	0
47	18053.7	0	0	-18053.7	-100%	0	0%	0	0
48	18053.7	0	0	-18053.7	-100%	0	0%	0	0
49	18053.7	0	0	-18053.7	-100%	0	0%	0	0
50	18053.7	0	0	-18053.7	-100%	0	0%	0	0
51	18053.7	0	0	-18053.7	-100%	0	0%	0	0
52	18053.7	0	0	-18053.7	-100%	0	0%	0	0
53	18053.7	0	0	-18053.7	-100%	0	0%	0	0
54	18053.7	0	0	-18053.7	-100%	0	0%	0	0
55	18053.7	0	0	-18053.7	-100%	0	0%	0	0
56	18053.7	0	0	-18053.7	-100%	0	0%	0	0
57	18053.7	0	0	-18053.7	-100%	0	0%	0	0
58	18053.7	0	0	-18053.7	-100%	0	0%	0	0
59	18053.7	0	0	-18053.7	-100%	0	0%	0	0
60	18053.7	0	0	-18053.7	-100%	0	0%	0	0
61	18053.7	0	0	-18053.7	-100%	0	0%	0	0
62	18053.7	0	0	-18053.7	-100%	0	0%	0	0
63	18053.7	0	0	-18053.7	-100%	0	0%	0	0
64	18053.7	0	0	-18053.7	-100%	0	0%	0	0
65	18053.7	0	0	-18053.7	-100%	0	0%	0	0
66	18053.7	0	0	-18053.7	-100%	0	0%	0	0
67	18053.7	0	0	-18053.7	-100%	0	0%	0	0
68	18053.7	0	0	-18053.7	-100%	0	0%	0	0
69	18053.7	0	0	-18053.7	-100%	0	0%	0	0
70	18053.7	0	0	-18053.7	-100%	0	0%	0	0
71	18053.7	0	0	-18053.7	-100%	0	0%	0	0
72	18053.7	0	0	-18053.7	-100%	0	0%	0	0
73	18053.7	0	0	-18053.7	-100%	0	0%	0	0
74	18053.7	0	0	-18053.7	-100%	0	0%	0	0
75	18053.7	0	0	-18053.7	-100%	0	0%	0	0
76	18053.7	0	0	-18053.7	-100%	0	0%	0	0
77	18053.7	0	0	-18053.7	-100%	0	0%	0	0
78	18053.7	0	0	-18053.7	-100%	0	0%	0	0
79	18053.7	0	0	-18053.7	-100%	0	0%	0	0
80	18053.7	0	0	-18053.7	-100%	0	0%	0	0
81	18053.7	0	0	-18053.7	-100%	0	0%	0	0
82	18053.7	0	0	-18053.7	-100%	0	0%	0	0
83	18053.7	0	0	-18053.7	-100%	0	0%	0	0
84	18053.7	0	0	-18053.7	-100%	0	0%	0	0
85	18053.7	0	0	-18053.7	-100%	0	0%	0	0
86	18053.7	0	0	-18053.7	-100%	0	0%	0	0
87	18053.7	0	0	-18053.7	-100%	0	0%	0	0
88	18053.7	0	0	-18053.7	-100%	0	0%	0	0
89	18053.7	0	0	-18053.7	-100%	0	0%	0	0
90	18053.7	0	0	-18053.7	-100%	0	0%	0	0
91	18053.7	0	0	-18053.7	-100%	0	0%	0	0
92	18053.7	0	0	-18053.7	-100%	0	0%	0	0
93	18053.7	0	0	-18053.7	-100%	0	0%	0	0
94	18053.7	0	0	-18053.7	-100%	0	0%	0	0
95	18053.7	0	0	-18053.7	-100%	0	0%	0	0
96	18053.7	0	0	-18053.7	-100%	0	0%	0	0
97	18053.7	0	0	-18053.7	-100%	0	0%	0	0
98	18053.7	0	0	-18053.7	-100%	0	0%	0	0
99	18053.7	0	0	-18053.7	-100%	0	0%	0	0
100	18053.7	0	0	-18053.7	-100%	0	0%	0	0

SRS																
Land Use Areas					Buildings (square feet)					Infrastructure (feet)				Socioeconomic		
Allocation														Population	Employment	
Pct. of Total Urban Area	Rtly Foot-print / Lot Area	Building Area	Parking Area	Yard / Private Open Area	No. of Units / Dblgs	Avg. Floor Area	Total Floor Area	Avg. No. Floors	Total Building Area	Road Length or Parking Space	Avg. Road Width or Parking Area	Total Floor Area	No. Pkg Floors	Total Area	Persons per Dw. Res. dnts	Emp/ 1000 SF
Units																
66.2%	9.9%	40,080	-	730,962	30	1,500	45,000	2.0	90,000	-	-	-	-	-	3.00	98
11.3%	9.9%	30,080	12,500	144,187	10	1,000	10,000	2.0	20,000	80	250	12,500	1.0	12,500	2.00	25
66.5%	9.9%	50,080	12,500	875,029	40	1,125	45,000	2.0	140,000	80	280	12,500	0.8	12,500	2.75	110
Buildings																
9.9%	9.9%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.3%	12.9%	5,000	10,000	26,067	1	5,000	5,000	1.0	5,000	40	250	10,000	1.0	10,000	0.50	3
9.9%	9.9%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.7%	19.9%	10,000	10,000	48,087	1	10,000	10,000	1.0	10,000	40	250	10,000	1.0	10,000	1.00	10
2.4%	19.9%	5,000	5,000	23,333	1	5,000	5,000	1.0	5,000	30	250	5,000	1.0	5,000	0.50	3
10.2%	14.1%	20,080	25,000	96,067	3	6,667	20,000	1.0	20,000	180	250	25,000	0.8	25,000	8.75	15
9.9%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.9%	-	-	-	-	-	-	-	-	-	1,500	80	12,500	-	-	-	-
8.4%	-	-	-	-	-	-	-	-	-	3,080	30	90,000	-	-	-	-
14.9%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parking Space Totals																
163.4%	9.9%	75,080	37,500	971,095	41	1744.19	75,000	2.71	130,000	250	250	37,500	2.0	37,500	3.75	170

The base estimate of dwelling units for the suburban residential element is eight percent lower than the actual number of units, so the number of dwelling units assumed by the element must be increased from 40 to 43. Because the multifamily land use proportion was low in the land use calibration step, it makes sense to add the units to the multifamily units category. This will increase the building area, which will increase the land area unless the building/land ratio is also increased. Increasing the number of multifamily units results in a multifamily land use proportion that is too high (14.8 percent versus a target of 12 percent) and a total useable area that is over 90,000 square feet too much.

Suburban Residential															SRS				
		Land Use Areas							Buildings (square feet)					Inflow					
		Total		Allocation															
		Square Feet	Acres	Pct. of Total Urban Area	Ratio	Building Area	Parking Area	Yield / Private Open Area	No. of Units / Bldgs	Avg. Floor Area	Total Floor Area	Avg. No. Floors	Total Building Area						
UT	CE1	Residential	775,862	17.81	63.1%	0.0%	40,000	-	730,862	30	1,600	48,000	2.0	80,000	-	-			
UM1	CE2	Single family	216,867	4.97	14.8%	0.0%	13,000	12,500	181,367	13	1,000	13,000	2.0	26,000	50	250			
URS	CE3	Multifamily	960,529	22.78	68.0%	0.0%	50,000	12,500	922,029	47	1,349	60,500	2.0	116,500	50	250			
UP1	CE4	Subtotal	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
SIT	CE5	Nonresidential	-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-			
SM1	CE6	Offices	-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-			
CE1	CE7	Commercial retail	41,667	0.96	2.9%	12.0%	5,000	10,000	36,667	1	5,000	5,000	1.0	5,000	40	250			
CE2	CE8	Cultural / Civic	-	-	0.0%	0.0%	-	-	-	-	-	-	-	-	-	-			
CE3	CE9	Govt. / Institutional	88,667	1.53	4.8%	16.0%	10,000	10,000	48,667	1	10,000	10,000	1.0	10,000	40	250			
CE4	CE10	Industrial	33,333	0.77	2.3%	15.0%	5,000	5,000	23,333	1	5,000	5,000	1.0	5,000	30	250			
CE5	CE11	Subtotal	147,667	3.25	8.7%	14.1%	20,000	25,000	85,667	3	6,667	25,000	1.0	25,000	100	250			
CE6		Common Parking	-	-	0.0%	-	-	-	-	-	-	-	-	-	-	-			
CE7		Streets	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
CE8		Major streets	120,000	2.75	8.2%	-	-	-	-	-	-	-	-	-	1,500	80			
CE9		Residential streets	80,000	2.07	8.2%	-	-	-	-	-	-	-	-	-	3,000	80			
CE10		Subtotal	200,000	4.82	14.4%	-	-	-	-	-	-	-	-	-	-	-			
CE11		Public Open Space	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
CE12		Public open	-	-	0.0%	-	-	-	-	-	-	-	-	-	-	-			
CE13		Park/playfields	88,000	1.53	4.5%	-	-	-	-	-	-	-	-	-	-	-			
CE14		Subtotal	88,000	1.53	4.5%	-	-	-	-	-	-	-	-	-	-	-			
CE15		Agriculture/Forest	60,000	1.38	3.8%	-	-	-	-	-	-	-	-	-	-	-			
CE16		Total Urban Area	1,400,195	31.52	106.7%	0.0%	73,000	37,500	1,075,895	46	1,349	76,000	1.72	131,000	150	250			
CE17		Calibration Adjuster	91,718																

Increasing the building to land ratio from six percent back to the 10 percent initially assumed compensates for the over-adjustment caused by the increase in multifamily units. The amount of useable area is now within 5,051 square feet (very close to the target), and the proportion of multifamily land is now around 10 percent (lower than the target but reasonable).

Microsoft Excel - Cleveland.xls

File Edit View Insert Format Tools Data Window Help

GB 10%

A B C D E F G H I J K L M N O P Q

1 **Suburban Residential SRS**

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

121

122

123

124

125

126

127

128

129

130

131

132

133

134

135

136

137

138

139

140

141

142

143

144

145

146

147

148

149

150

151

152

153

154

155

156

157

158

159

160

161

162

163

164

165

166

167

168

169

170

171

172

173

174

175

176

177

178

179

180

181

182

183

184

185

186

187

188

189

190

191

192

193

194

195

196

197

198

199

200

201

202

203

204

205

206

207

208

209

210

211

212

213

214

215

216

217

218

219

220

221

222

223

224

225

226

227

228

229

230

231

232

233

234

235

236

237

238

239

240

241

242

243

244

245

246

247

248

249

250

251

252

253

254

255

256

257

258

259

260

261

262

263

264

265

266

267

268

269

270

271

272

273

274

275

276

277

278

279

280

281

282

283

284

285

286

287

288

289

290

291

292

293

294

295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

362

363

364

365

366

367

368

369

370

371

372

373

374

375

376

377

378

379

380

381

382

383

384

385

386

387

388

389

390

391

392

393

394

395

396

397

398

399

400

401

402

403

404

405

406

407

408

409

410

411

412

413

414

415

416

417

418

419

420

421

422

423

424

425

426

427

428

429

430

431

432

433

434

435

436

437

438

439

440

441

442

443

444

445

446

447

448

449

450

451

452

453

454

455

456

457

458

459

460

461

462

463

464

465

466

467

468

469

470

471

472

473

474

475

476

477

478

479

480

481

482

483

484

485

486

487

488

489

490

491

492

493

494

495

496

497

498

499

500

501

502

503

504

505

506

507

508

509

510

511

512

513

514

515

516

517

518

519

520

521

522

523

524

525

526

527

528

529

530

531

532

533

534

535

536

537

538

539

540

541

542

543

544

545

546

547

548

549

550

551

552

553

554

555

556

557

558

559

560

561

562

563

564

565

566

567

568

569

570

571

572

573

574

575

576

577

578

579

580

581

582

583

584

585

586

587

588

589

590

591

592

593

594

595

596

597

598

599

600

601

602

603

604

605

606

607

608

609

610

611

612

613

614

615

616

617

618

619

620

621

622

623

624

625

626

627

628

629

630

631

632

633

634

635

636

637

638

639

640

641

642

643

644

645

646

647

648

649

650

651

652

653

654

655

656

657

658

659

660

661

662

663

664

665

666

667

668

669

670

671

672

673

674

675

676

677

678

679

680

681

682

683

684

685

686

687

688

689

690

691

692

693

694

695

696

697

698

699

700

701

702

703

704

705

706

707

708

709

710

711

712

713

714

715

716

717

718

719

720

721

722

723

724

725

726

727

728

729

730

731

732

733

734

735

736

737

738

739

740

741

742

743

744

745

746

747

748

749

750

751

752

753

754

755

756

757

758

759

760

761

762

763

764

765

766

767

768

769

770

771

772

773

774

775

776

777

778

779

780

781

782

783

784

785

786

787

788

789

790

791

792

793

794

795

796

797

798

799

800

801

802

803

804

805

806

807

808

809

810

811

812

813

814

815

816

817

818

819

820

821

822

823

824

825

826

827

828

829

830

831

832

833

834

835

836

837

838

839

840

841

842

843

844

845

846

847

848

849

850

851

852

853

854

855

856

857

858

859

860

861

862

863

864

865

866

867

868

869

870

871

872

873

874

875

876

877

878

879

880

881

882

883

884

885

886

887

888

889

890

891

892

893

894

895

896

897

898

899

900

901

902

903

904

905

906

907

908

909

910

911

912

913

914

915

916

917

918

919

920

921

922

923

924

925

926

927

928

929

930

931

932

933

934

935

936

937

938

939

940

941

942

943

944

945

946

947

948

949

950

951

952

953

954

955

956

957

958

959

960

961

962

963

964

965

966

967

968

969

970

971

972

973

974

975

976

977

978

979

980

981

982

983

984

985

986

987

988

989

990

991

992

993

994

995

996

997

998

999

1000

1001

1002

1003

1004

1005

1006

1007

1008

1009

1010

1011

1012

1013

1014

1015

1016

1017

1018

1019

1020

1021

1022

1023

1024

1025

1026

1027

1028

1029

1030

1031

1032

1033

1034

1035

1036

1037

1038

1039

1040

1041

1042

1043

1044

1045

1046

1047

1048

1049

1050

1051

1052

1053

1054

1055

1056

1057

1058

1059

1060

1061

1062

1063

1064

1065

1066

1067

1068

1069

1070

1071

1072

1073

1074

1075

1076

1077

1078

1079

1080

1081

1082

1083

1084

1085

1086

1087

1088

1089

1090

1091

1092

1093

1094

1095

1096

1097

1098

1099

1100

1101

1102

1103

1104

1105

1106

1107

1108

1109

1110

1111

1112

1113

1114

1115

1116

1117

1118

1119

1120

1121

1122

1123

1124

1125

1126

1127

1128

1129

1130

1131

1132

1133

1134

1135

1136

1137

1138

1139

1140

1141

1142

1143

1144

1145

1146

1147

1148

1149

1150

1151

1152

1153

1154

1155

1156

1157

1158

1159

1160

1161

1162

1163

1164

1165

1166

1167

1168

1169

1170

1171

1172

1173

1174

1175

1176

1177

1178

1179

1180

1181

1182

1183

1184

1185

1186

1187

1188

1189

1190

1191

1192

1193

1194

1195

1196

1197

1198

1199

1200

1201

1202

1203

1204

1205

1206

1207

1208

1209

1210

1211

1212

1213

1214

1215

1216

1217

1218

1219

1220

1221

1222

1223

1224

1225

1226

1227

1228

1229

1230

1231

1232

1233

1234

1235

1236

1237

1238

1239

1240

1241

1242

1243

1244

1245

1246

1247

1248

1249

1250

1251

1252

1253

1254

1255

1256

1257

1258

1259

1260

1261

1262

1263

1264

1265

1266

1267

1268

1269

1270

1271

1272

1273

1274

1275

1276

1277

1278

1279

1280

1281

1282

1283

1284

1285

1286

1287

1288

1289

1290

1291

1292

1293

1294

1295

1296

1297

1298

1299

1300

1301

1302

1303

1304

1305

1306

1307

1308

1309

1310

1311

1312

1313

1314

1315

1316

1317

1318

1319

1320

1321

1322

1323

1324

1325

1326

1327

1328

Point and click on the socioeconomic comparison icon to check the socioeconomic results of these changes. The estimated number of dwelling units for the suburban residential communities is now only one percent lower than the actual number of units, as compared to eight percent lower using the initial assumptions.

Microsoft Excel - C:\msdell.xls

File Edit View Insert Format Tools Data Window Help

100%

And

18

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

TOC

Actual

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Icons

Because of the changes to land use assumptions, now point and click on the land use comparison icon. The multifamily proportion is further from the target than before, but still within reason. Of course, if this result is not acceptable, additional adjustments can improve results even further.

Microsoft Excel - C:\msdell.xls

File Edit View Insert Format Tools Data Window Help

100%

And

10

A103

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
76								Existing					Goal					
77								description										
78								code										
79								Status Quo	SQ									
80																		
81								Rural Ag/Forest	RAF	77%	0%	3%	6%	11%	3%	0%	0%	0%
82										77%	0%	3%	6%	11%	3%	0%	0%	0%
83								Rural Mixed-use	RMX	33%	0%	4%	12%	0%	12%	0%	1%	26%
84										33%	0%	4%	12%	0%	12%	0%	1%	26%
85								Rural Residential	RRS	25%	0%	1%	12%	0%	58%	0%	0%	1%
86										25%	0%	1%	12%	0%	58%	0%	0%	1%
87								Rural Small Town	RST	0%	0%	0%	0%	0%	0%	0%	0%	0%
88										0%	0%	0%	0%	0%	0%	0%	0%	0%
89								Rural Village	RVL	0%	0%	0%	0%	0%	0%	0%	0%	0%
90										0%	0%	0%	0%	0%	0%	0%	0%	0%
91								Rural Industrial	RRI	0%	0%	0%	0%	0%	0%	0%	0%	0%
92										0%	0%	0%	0%	0%	0%	0%	0%	0%
93								Rural Parks/Recreation	RPK	0%	0%	0%	0%	0%	0%	0%	0%	0%
94										0%	0%	0%	0%	0%	0%	0%	0%	0%
95								Rural Conservation	RCV	0%	0%	0%	0%	0%	0%	0%	0%	0%
96										0%	0%	0%	0%	0%	0%	0%	0%	0%
97								Suburban Industrial	SRI	0%	0%	3%	16%	0%	6%	0%	5%	5%
98										0%	0%	3%	16%	0%	6%	0%	5%	5%
99								Suburban Institutional	SIT	0%	1%	3%	19%	19%	3%	0%	0%	55%
100										0%	1%	3%	19%	19%	3%	0%	0%	55%
101								Suburban Mixed-use	SMX	0%	3%	3%	20%	0%	7%	29%	7%	15%
102										0%	3%	3%	20%	0%	7%	29%	7%	15%
103								Suburban Office	SOF	0%	0%	0%	0%	0%	0%	0%	0%	0%
104										0%	0%	0%	0%	0%	0%	0%	0%	0%
105								Suburban Residential	SRS	0%	0%	4%	13%	0%	58%	12%	0%	2%
106										0%	0%	4%	13%	0%	58%	12%	0%	2%
107								Suburban Retail	SRT	0%	0%	6%	18%	4%	0%	30%	2%	41%
108										0%	0%	6%	18%	4%	0%	30%	2%	41%
109								Suburban Parks	SPK	0%	0%	0%	0%	0%	0%	0%	0%	0%
110										0%	0%	0%	0%	0%	0%	0%	0%	0%

Ready

Microsoft Excel - CL

9:21 PM

Calibration Step 5 -- Changing Assigned Elements

Yet another way to calibrate the ComPlan is to change community element assignments to subareas. For reasons described in the Calibration Caveats section, this adjustment may not be appropriate for subareas less than 31 acres. The adjustment may also be inappropriate for larger areas for reasons described in the Caveats section. Thus, this type of calibration adjustment is recommended as a last step.

To make the adjustment, point and click on the detailed base comparison icon and check results by subareas, focusing on percentage rather than absolute differences. In the example below, the actual number of dwelling units in all of the suburban residential subareas highlighted is higher than the base estimate. Because the suburban residential element is calibrated at a regional level, these results indicate other areas of the region have consistently lower densities. This is somewhat expected because the subareas highlighted below are relatively close to downtown Charlottesville.

Microsoft Excel - Chantrelle.xls

File Edit View Insert Format Tools Data Window Help

100%

And

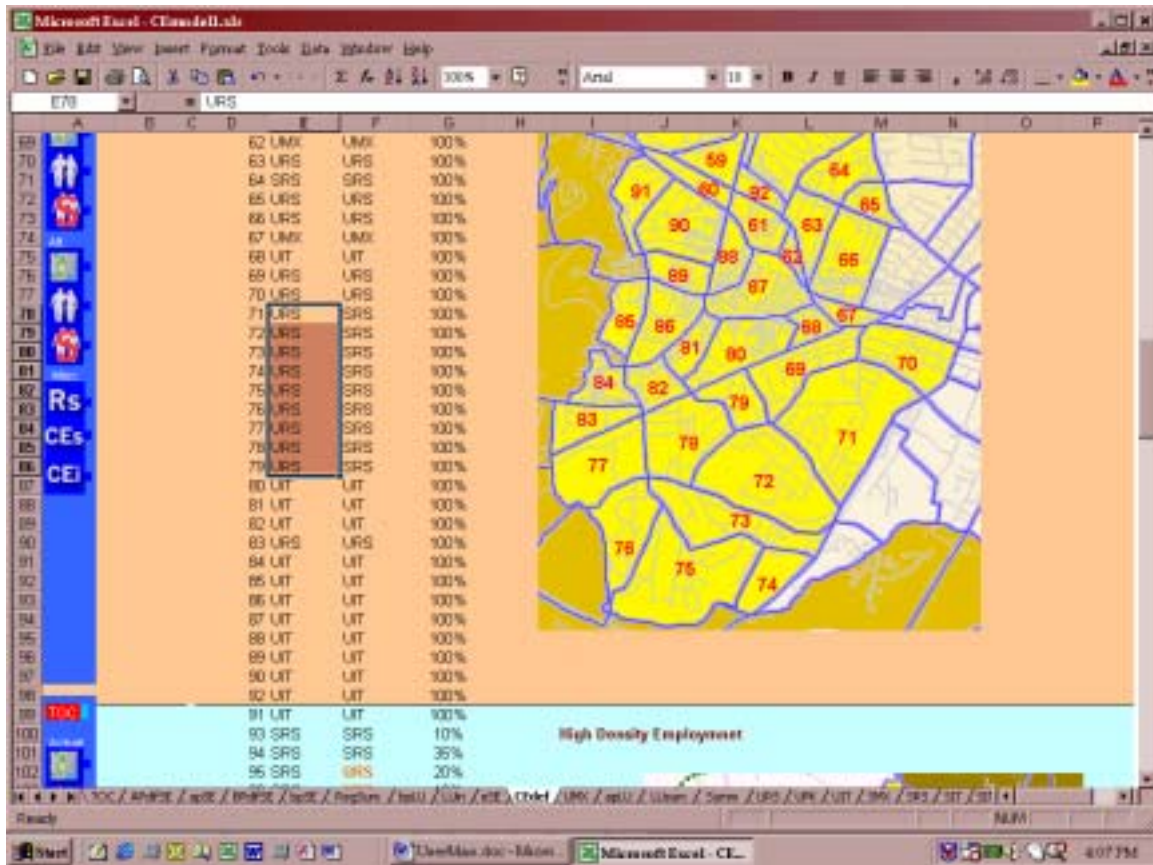
18

AB1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	
1	Base Potential Subelement Estimates																													
2	Students per Pop		from SUM		UMX	URS	UIT	UPK	SMX	SRS	SIT	SR	RAP	RCV	CE1	CE2														
3	0.114		ppdu		2.32	2.28	2.59	1.50	2.00	2.00	2.00	2.00	2.00	2.00	2.50	2.50														
4			DUPesAcres		2.07	3.18	5.09	0.16	2.39	1.37	0.06	0.13	0.03	3.18	6.37	0.00														
5			EMUPesAcres		22.63	2.66	9.83	0.22	2.39	0.48	0.51	23.87	0.02	137.17	165.95	0.00														
6			EMUPesAcres		7.64	0.43	0.38	0.00	0.64	0.09	0.00	0.64	0.00	4.77	15.91	0.00														
7	SqMeters to Acres																0.75													
8																														
9																														
10	Existing		gAREA		TAZ	Emp		Rental		Schol		DUs		Pop		Base potential		Emp		Rental		Schol		DUs		Pop		Percent		
81	SRS		152		71	67		41		647		749		1894		72		12		64		206		561		7%		-71%		
82	SRS		151		72	0		0		304		280		751		72		12		64		207		568		0%		-73%		
83	SRS		81		73	10		0		164		638		38		6		34		111		299		280%		0%		-32%		
84	SRS		41		74	16		15		0		0		0		20		3		18		57		154		25%		-80%		
85	SRS		144		75	12		0		399		444		1127		69		11		61		197		531		475%		-63%		
86	SRS		65		76	5		0		0		162		386		31		5		27		88		240		234%		0%		
87	SRS		49		77	1		0		0		189		442		24		4		21		68		183		2380%		0%		
88	SRS		81		78	0		0		0		567		614		36		6		34		110		297		0%		0%		
89	SRS		35		79	2		0		0		130		326		17		3		16		49		132		250%		0%		
90	UIT		70		80	19		0		0		620		968		686		27		105		355		921		3311%		0%		
91	UIT		29		81	4		0		0		217		571		288		11		44		148		396		7180%		0%		
92	UIT		35		82	7		6		0		344		730		340		13		52		175		457		4757%		117%		
93	URS		41		83	55		43		0		110		258		108		17		34		129		294		96%		-60%		
94	UIT		35		84	22		15		0		50		230		341		13		52		177		459		1450%		-13%		
95	UIT		39		85	15		0		0		883		3067		388		15		59		201		521		2487%		0%		
96	UIT		60		86	580		0		0		431		857		589		23		90		305		791		2%		-29%		
97	UIT		73		87	7000		0		0		64		118		715		20		109		370		980		30%		-67%		
98	UIT		33		88	311		0		0		175		380		321		12		49		166		431		3%		-5%		
99	UIT		33		89	310		0		0		670		1168		324		13		50		166		436		5%		-75%		
100	UIT		82		90	3		0		0		240		790		802		31		123		415		1076		26633%		0%		
101	UIT		20		92	0		0		0		101		384		193		7		30		100		259		0%		-1%		
102	UIT		47		91	167		0		427		80		130		461		18		71		239		620		176%		-28%		
103	SRS		81		93	0		0		0		21		73		38		6		34		111		288		0%		-2%		
104	SRS		452		94	25		6		0		290		620		216		36		190		618		1667		764%		500%		

M.F.R. W.DOC / APN: / W.D. / W

The urban residential element assumes higher densities than the suburban residential element, so the model's performance for subareas 71 through 79 may be improved by changing the assigned community element. To do this, point and click on the CEi icon and change the base codes (column E) for subareas 71 through 79 from SRS (suburban residential) to URS (urban residential) as shown on the screen below.



To check results, point and click on the detailed base comparison icon and review results for subareas 71 through 79. The differences between actual versus estimated dwelling units have decreased, but the differences between actual versus estimated employees have increased dramatically.

The screenshot shows a Microsoft Excel spreadsheet titled "Base Potential Socioeconomic Estimates". The spreadsheet is divided into several sections. The top section contains summary statistics for the entire area, including "Students per Pop" (0.114) and "SqMeters to Acres" (0.25). Below this, there are two main comparison tables: "Actual" and "Base potential". Each table has columns for "Emp", "Retail", "Schol", "DU", and "Pop". The "Actual" table shows data for subareas 71 through 79, while the "Base potential" table shows data for the same subareas. The "Actual" table shows a significant increase in employee estimates for subareas 71 through 79, while the "Base potential" table shows a decrease in employee estimates. The "Actual" table also shows a decrease in dwelling unit estimates for subareas 71 through 79, while the "Base potential" table shows an increase in dwelling unit estimates. The "Actual" table shows a decrease in retail estimates for subareas 71 through 79, while the "Base potential" table shows an increase in retail estimates. The "Actual" table shows a decrease in school estimates for subareas 71 through 79, while the "Base potential" table shows an increase in school estimates. The "Actual" table shows a decrease in population estimates for subareas 71 through 79, while the "Base potential" table shows an increase in population estimates.

Subarea	Actual Emp	Actual Retail	Actual Schol	Actual DU	Actual Pop	Base potential Emp	Base potential Retail	Base potential Schol	Base potential DU	Base potential Pop
71	66	322	140	248	591	208	34	65	248	598
72	67	83	65	0	0	438	145	10	38	91
73	22	68	0	0	26	212	8	32	112	285
74	64	64	0	0	270	171	38	63	204	408
75	60	70	83	42	0	160	25	90	192	438
76	152	71	67	41	647	403	65	125	483	1101
77	151	72	0	0	304	401	65	125	480	1094
78	81	73	10	0	184	215	35	67	257	586
79	41	74	18	15	0	110	18	34	132	301
80	144	75	12	0	358	382	62	118	457	1047
81	65	76	8	0	162	173	38	64	207	472
82	48	77	1	0	188	131	21	41	157	368
83	81	78	0	0	352	214	35	67	257	586
84	35	79	2	0	132	94	15	29	113	258
85	70	80	19	0	620	688	27	105	355	920
86	29	81	4	0	217	288	11	44	148	388
87	35	82	7	8	344	340	13	52	176	457
88	41	83	65	43	0	108	17	34	129	294
89	35	84	22	15	0	341	13	52	177	459
90	39	85	15	0	893	388	15	59	201	521
91	60	86	580	0	431	589	23	90	305	791
92	73	87	7000	0	64	715	28	109	370	980
93	33	88	311	0	175	321	12	49	166	431
94	33	89	310	0	670	324	13	50	168	436

This suggests that subareas 71 through 79 are comparable to the urban residential element in some ways and to the suburban residential element on others. To improve calibration results, a new community element could be created for these subareas; however, there is a trade-off between improving calibration results and model complexity to consider.

Calibrating with Incomplete Data

Calibration is possible if only some of the actual land use or socioeconomic data are available. In Metropolitan Planning Organization (MPO) areas, population and employment data are available by subareas (traffic analysis zones). Population and dwelling unit information is also available from the Census. Therefore, socioeconomic data are available to all areas and provide a reasonable basis for calibration.

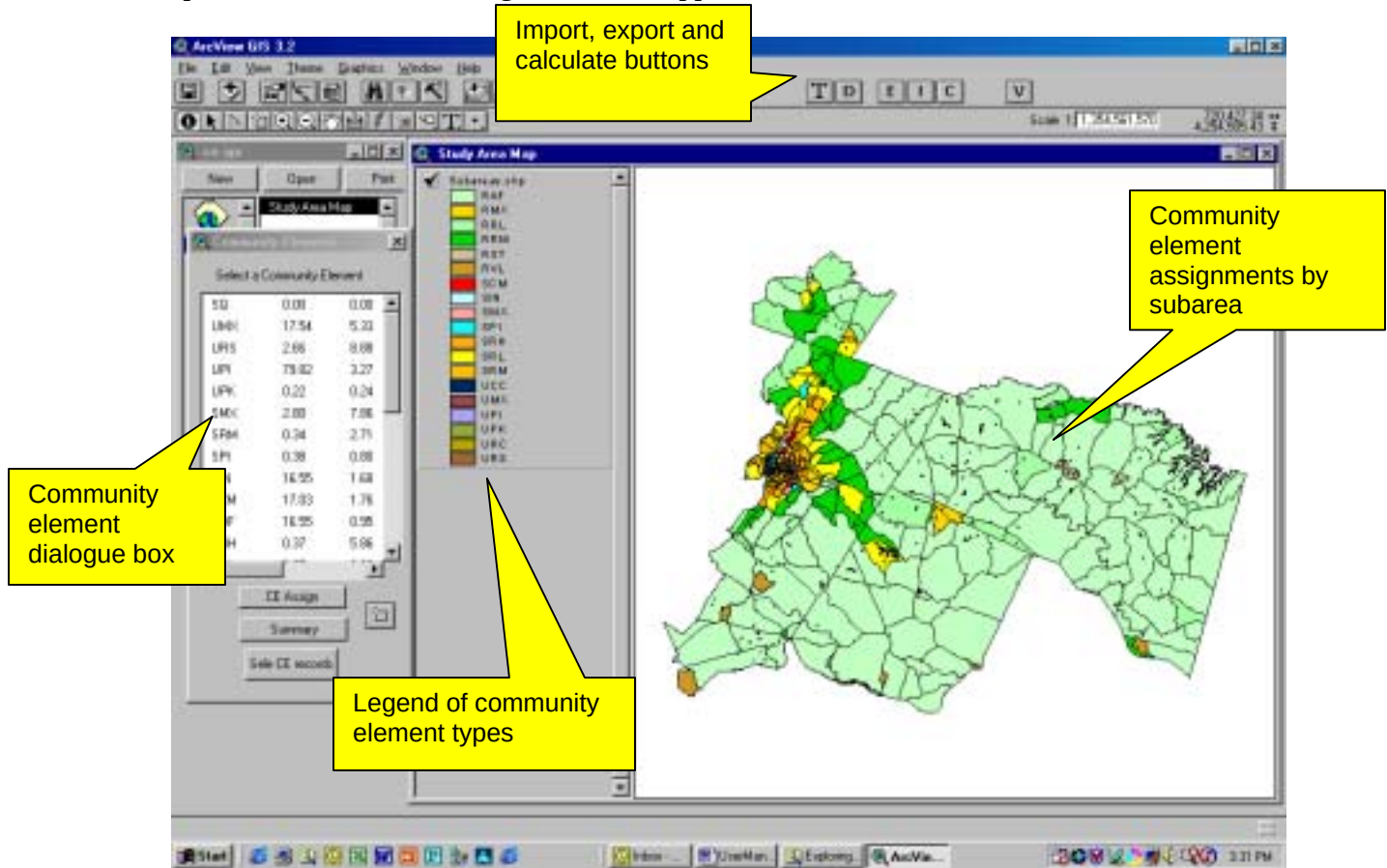
Land use data are not as readily available. In the Charlottesville region, land use data are only available from the City of Charlottesville, yet the study area extended far beyond the city's boundaries. Nevertheless, calibration was possible for those elements assigned to subareas within Charlottesville.

If no land use data are available for calibration, the model will input base condition estimates in the actual condition. If data are available for only portions of the study area, the model will use actual data where available and base condition estimates for the remaining areas. Thus, actual results will automatically match base results where no data are available and approximate base results when limited data are available. The more available data there is the greater the likelihood that there are differences between the actual and base conditions.

ARCVIEW

ArcView is a proprietary geographic information system (GIS) software package that integrates electronic maps with databases. While the ComPlan spreadsheet is designed to work with or without the ArcView GIS software package, it is helpful to make community element assignments using ArcView. To use ArcView, you must have the ArcView software installed and the ComPlan files located in the CE directory.

To invoke the ArcView information for the Eastern Planning Initiative in the Charlottesville region, double click on the *ce.apr* file icon in Windows Explorer software or on the ArcView link at the bottom of the table of contents page in the ComPlan spreadsheet. The following screen will appear.



The Community Elements dialogue box to the left of the screen lists all available community elements in the leftmost column, the average number of employees per acre in the second column and the average number of people per acre in the third column. Several buttons below the element data are available to select and assign elements to the subarea map on the right of the screen. The legend in the middle of the screen indicates the color for each community element. The map on the right of the screen shows the community element assignments. The buttons above the map help import, export and update community element assignments and parameters.

Exchanging Information between ComPlan spreadsheet and ArcView

The following macros are available in the ComPlan spreadsheet to exchange information with ArcView:

CTL E – press the control and E keys simultaneously to invoke a macro that exports the list of subareas (traffic analysis zones and block aggregate areas) and community assignment codes in the CEi worksheet to ArcView. This macro stores this information in a file named *cei2dbf.dbf* that is read by a script in ArcView that imports this information (described later). There will be several prompts from Excel about saving the file. Answer yes to each prompt to export the information.

CTL I – press the control and I keys simultaneously to invoke a macro that imports the list of subareas and community assignment codes from ArcView to the CEi worksheet. This macro looks for the *cei2xls.dbf* file that is created by the export script in ArcView (described later).

CTL P – press the control and P keys simultaneously to invoke a macro that exports the community element employment and population density parameters from the CEs worksheet to the *ce_def.dbf* file read by a script in ArcView that imports the parameters (described later). Answer yes to each of the file save prompts from Excel as it completes the macro steps.

Each of these macros is listed at the bottom of the ComPlan table of contents.

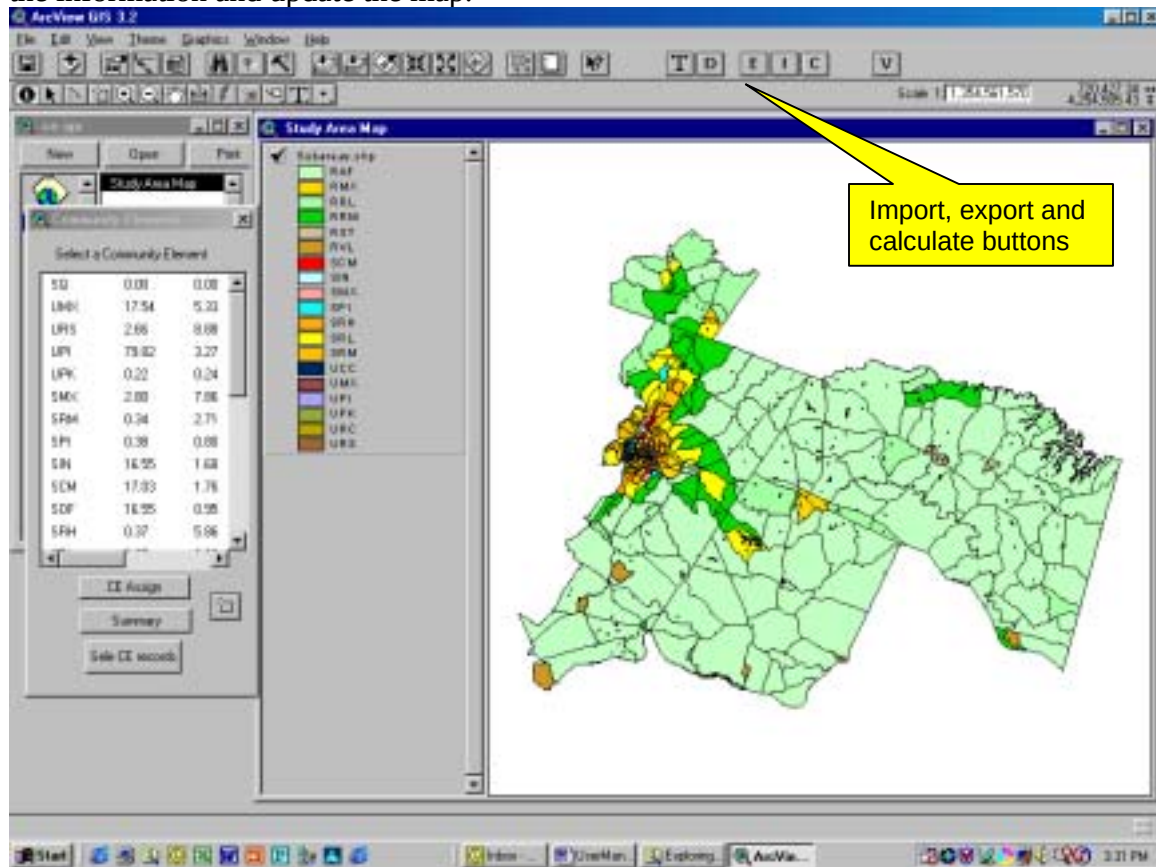
The following scripts are available in ArcView to exchange information with the ComPlan spreadsheet:

E – press the E button at the top of the screen to invoke an ArcView script that exports a list of subareas and community element assignments to a file named *ce2xls.dbf*. This file is read by the community element import function in the ComPlan spreadsheet (the CTL I macro).

I – press the I button at the top of the screen to invoke a script that imports a list of subareas and community element assignments from a file named *ce2dbf.dbf*. This file is created by the community element export function in the ComPlan spreadsheet (the CTL E macro).

V – press the V button at the top of the ArcView screen to invoke a script that imports the population and employment densities (listed in Community Elements toolbox to the left of the map) from a file named *ce_def.dbf*. This file is created by the community element parameter export function in the ComPlan spreadsheet (the CTL P macro).

C – press the C button after importing any new information into ArcView to recalculate the information and update the map.



T – this button does not import or export files, rather it turns on or off the table of contents (legend) that lists the colors of the community element to the left of the map.

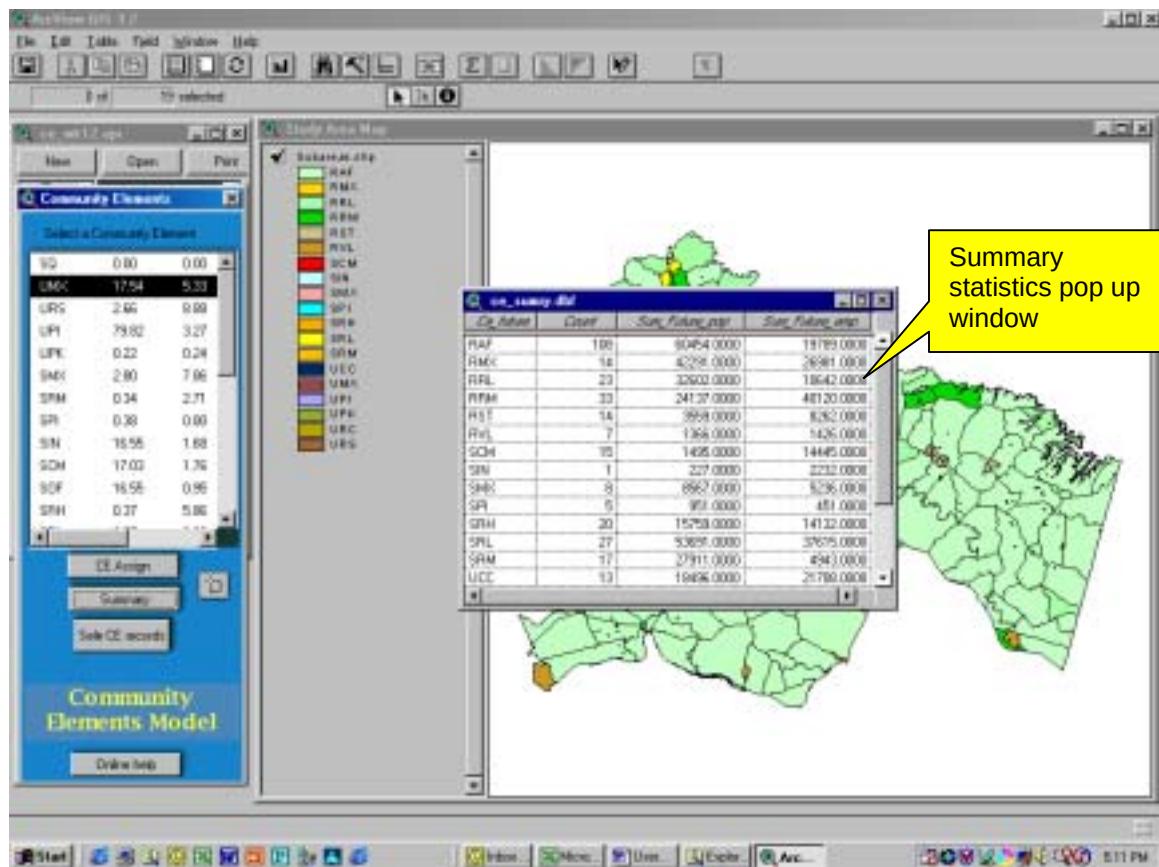
Community Element Dialogue Box

The Community Element dialogue box located to the left of the screen provides a list of the currently available community elements in the window at the top of the box and the following buttons that invoke scripts at the bottom of the box.

CE Assign – this button assigns a highlighted record in the toolbox window to a selected subarea (or subareas) on the map. Before pressing this button, point and click on the *select* button to the right of the *CE Assign* button (denoted with a box graphic) and select one or more subareas to change. To select more than one subarea, hold the shift key down as you point on each subarea. Next point and click on one of the elements listed in the toolbox window. Finally, point and click on the *CE Assign* button. The selected areas should now be in the same color (shown on the legend) as the selected element.

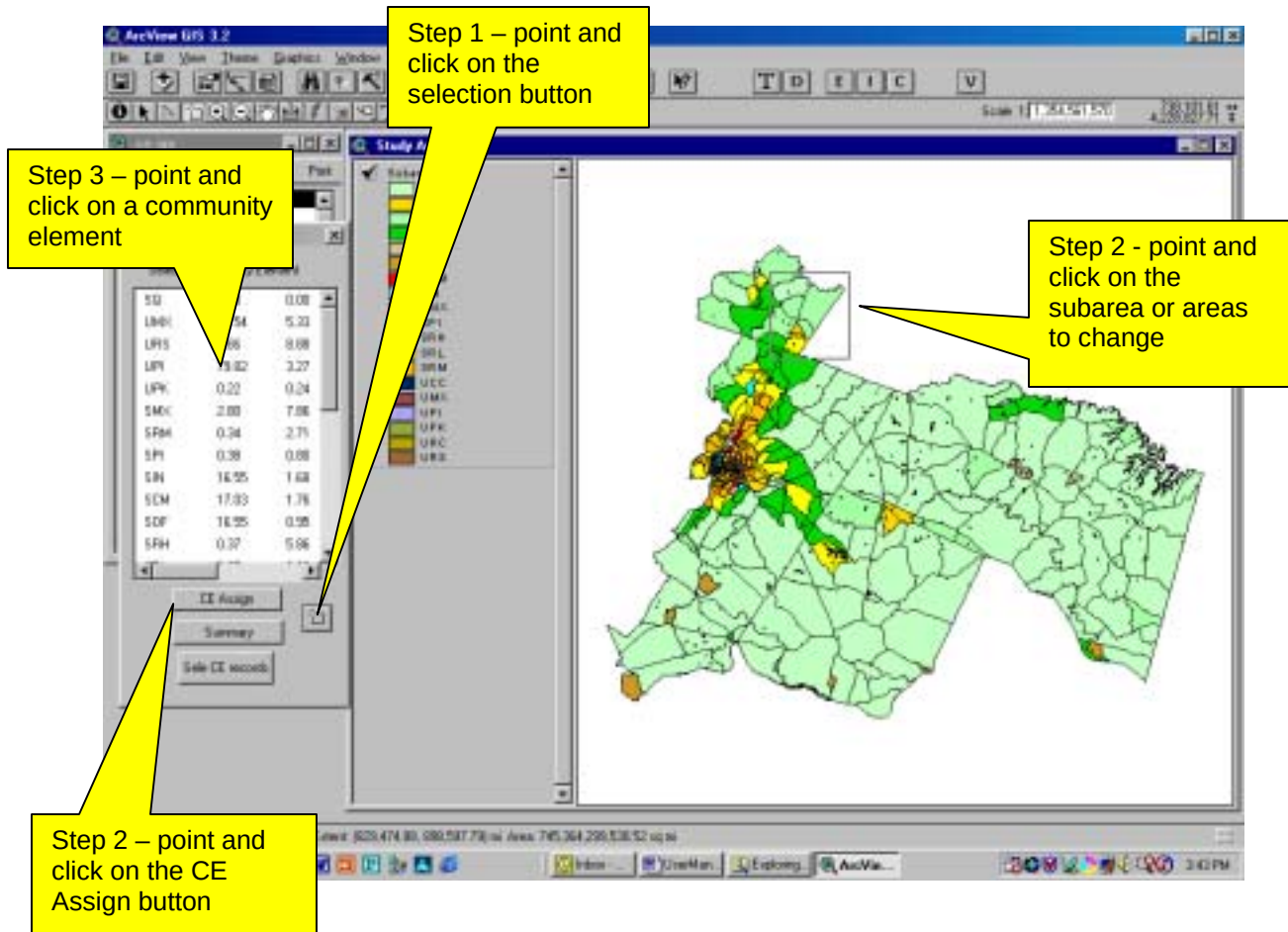
Summary – this button presents summary statistics for the region or a selected set of subareas. A summary pop window lists the community elements in the selected subareas and the total population and employment for the selected area.

Select CE records – this button selects all subareas for a community type. To use the button, select one of the community elements in the window, then point and click on the button. The map then highlights all subareas of the selected type.



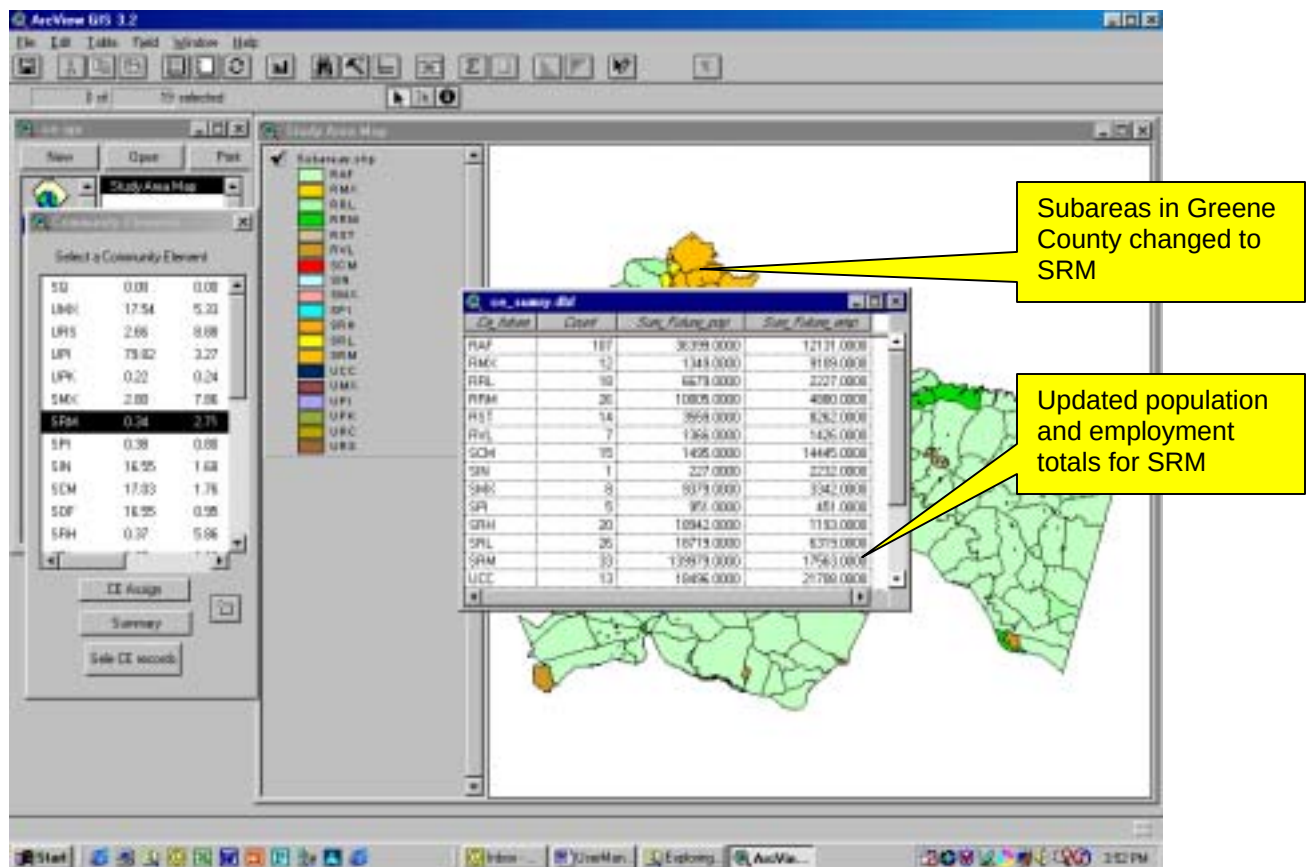
Creating Alternatives in ArcView

To change any of the community elements, point and click on the selection button (with a square icon) in the community dialogue box. Next, point and click on any one of the subareas in the region, or to select a group of subareas, use the mouse to create a box around those subareas to change. Point and click on one of the community elements in the dialogue box, then point and click on the *CE Assign* button. The selected subareas will change to the color of the new community element.



In the example below, several of the subareas in Greene County are changed to the suburban residential, moderate density element and now have a burnt orange color. The change updated the supporting database, which can be checked by pointing and clicking on the *Summary* button in the community element dialogue box.

In the base case of the community element assignments (shown in the screen on page 43), there are 17 suburban residential moderate (SRM) elements in the region, with a total population of 27,911 and employment of 4,943. In the modified version shown below, there are now 33 SRM subareas with a total population of 139,979 and employment of 17,563.



The screenshot displays a Microsoft Excel spreadsheet with a list of data points, likely census tracts, organized in columns. The data includes various attributes such as population, income, and education levels. Two maps are overlaid on the spreadsheet: one in the top right showing a larger geographic area with colored regions, and another in the bottom right showing a more detailed map of a specific area with colored regions. The spreadsheet data includes columns for various attributes, and the maps show geographic boundaries and color-coded regions.

Regional summaries and comparisons can then be made of alternatives in the spreadsheet by pressing the CTL and A keys. The Test alternative in the screen below reflects the changes made in Greene County using ArcView. The regional population potential increases from nearly 190,000 under the Base case to over 297,000 in the Test alternative and the total employment potential increases from around 110,000 to around 118,000. The changes upgraded rural residential and agricultural subareas in Greene County to moderate suburban residential development, so the increases in population and employment potentials are as expected.

Microsoft Excel - CE.xls

FileEditViewInsertFormatToolsDataWindowHelp

Alt

12345678910111213141516171819202122232425262728293031323334

Alternatives Regional Land Use Distribution

REGIONAL LAND USE DISTRIBUTION

Description	code	Existing	%	Base	%	Test	%
Single family	SF	119,662	12%	119,800	15%	129,761	17%
Multifamily	MF	1,366	0%	1,574	0%	1,574	0%
Offices	OFC	862	0%	939	0%	791	0%
Streets	ROW	56,152	6%	56,390	7%	59,804	8%
Cultural / Civic	CULT	6,086	1%	6,103	1%	7,867	1%
Golf / Institutional	INST	2,727	0%	2,797	0%	4,321	1%
Industrial	IND	1,291	0%	1,240	0%	1,166	0%
ROW	ROW	67,225	7%	67,266	9%	66,911	9%
Commercial retail	COM	6,696	1%	6,783	1%	7,300	1%
Public open	PaOPEN	1,736	0%	1,657	0%	3,366	0%
Parks/playfields	PARK	21,118	2%	21,088	3%	22,213	3%
Total Urban	Urban	284,933	30%	285,939	36%	306,231	39%
Developable Vacant	VAC	177,450	18%	-	0%	-	0%
Agricultural / Forest	AGR	499,804	52%	499,873	64%	490,661	61%
Total Land	Total	962,218	100%	786,813	100%	796,893	100%

REGIONAL EMPLOYMENT

			%	%	%	
Total Emp	83,330	-	108,069	30%	117,706	59%
Retail Retail	21,041	-	29,576	41%	30,134	63%

REGIONAL POPULATION

			%	%	%	
Dwelling Units (DUs)	57,100	-	70,862	31%	121,600	117%
Population Pop	136,521	-	189,950	39%	297,362	122%
School Enrollment School	19,574	-	21,652	14%	33,896	98%

REGIONAL RATIOS

			%	%	%	
Dwellings per Acre	0	0.47	-	0.65	0.93	52%
Emp. Per Acre	0	4.71	-	6.05	5.46	-11%
Pct. Developed	0	27%	0%	33%	36%	40%

3207503772 786370.1

Ready

Start

4:35 PM

WHERE TO GET HELP

The Renaissance Planning Group developed this beta version of ComPlan. E-mail questions about the model to:

gduke@ciesthatwork.com