

Chapter 4 Land Supply and Demand Analysis



4. LAND SUPPLY AND DEMAND ANALYSIS

4.1 Introduction

Most growing towns and cities eventually confront the issue of the ultimate limits of their growth. This is the case for Cary, which has a finite supply of land into which it may expand. Cary is geographically land-locked, either by other municipalities or by topographical barriers. Cary is bounded to the north by Morrisville, Research Triangle Park, RDU International Airport, Durham County, and the City of Raleigh, to the east by Raleigh, and to the south by Apex, Holly Springs, and Fuquay-Varina, and to the west by Jordan Lake. Although not bounded by a municipality to the southeast, Cary is bounded by the Swift Creek Land Management Area. As mentioned in Chapter 1, Section 1.3, the *Land Use Plan Study Area* addressed by this Plan covers the entire geographic area that is available for possible future expansion, making it in effect a “buildout” plan for Cary.¹

Yet, despite limits to Town expansion, there is an ample supply of developable land within the Planning Area -- certainly enough to meet Cary’s needs for the next twenty years. Nevertheless, it is crucial to understand these long-term limits to growth in order to manage developable land prudently, thus ensuring the long-term viability and sustainability of the community.

This chapter examines the supply of available land in the Land Use Plan Study Area, existing patterns of land consumption, and the anticipated future demand for land. The ultimate buildout population is also projected. This chapter does not, however, provide target dates for buildout or year-by-year population projections. Specific 5, 10, 15, and 20-year population projections are available in a separate publication from the Town of Cary’s Planning & Zoning Division.

For the purposes of this analysis, it is useful to consider land supply and demand within specific “subareas” of the Land Use Plan Study Area. The Plan Study Area consists of five separate “subareas,” as described in Chapter 1, Section 1.3, namely:

- The area within Cary’s current town limits;
- The area within Cary’s Extraterritorial Planning Jurisdiction (ETJ);
- The areas in Cary’s Perimunicipal Planning Area (PPA);
- The Upper Middle Creek Study Area;
- The Chatham County Study Area.

¹ “Buildout” refers to the point at which the entire Land Use Plan Study Area has finally been developed.

For the land supply and demand analysis, the perimunicipal planning areas are categorized into two subareas:²

- Perimunicipal areas west of Davis Drive;
- Perimunicipal areas east of Davis Drive and South of US1/64.

And, the Chatham County Study Area is considered as two subregions:

- Chatham County Study Area outside the municipal service boundary (“unserved”);³
- Chatham County Study Area inside the municipal service boundary (“served”).

And lastly, the Upper Middle Creek Study Area is also considered as two subareas:

- The portion of the Middle Creek Study Area south of Optimist Farm Road and designated as *Very Low Density Residential*, with an alternate use of *Low-Density Cluster Residential* (see Land Use Plan Map). (This area will be referred to as “unserved or cluster.”)
- The remainder of the Middle Creek Study Area. (This area will be referred to as “served.”)

The total area in these regions, and the total for the entire Land Use Plan Study Area, are as follows:

Subarea	Total Land Area (in acres)
Town of Cary, municipal limits ⁴	24,228
Cary’s Extraterritorial Jurisdiction, exclusive of Town Limits	14,589
PPA West of Davis Drive	2,820
PPA South of US1	2,230
Chatham Study Area, unserved	5,667
Chatham Study Area, served ⁵	5,369
Upper Middle Creek Study Area, unserved or cluster	1,318
Upper Middle Creek Study Area, served	4,326
Total, Entire Planning Area:	60,547
Total, Serviceable Plan Study Area: ⁶	53,562

Table 4.1: Total Plan Areas (as of June 1996)

² There is also a limited amount of perimunicipal area at the northwest quadrant of the I-40 and N. Harrison Avenue interchange. However, a third of that area is part of RDU Airport, and the remainder is a mining operation unsuitable for future development for many years to come, and so that area is ignored in this Chapter.

³ The unserved area is that portion of Chatham Co. designated as *Very Low Density Residential* on the Land Use Plan Map. Areas outside the urban services boundary would not be provided with municipal water or sewer.

⁴ Does not include any municipal areas in Chatham County.

⁵ Includes Cary municipal areas within Chatham County.

⁶ This is the total acreage in the entire Plan Study Area except for the “Chatham Study Area, unserved” and the “Upper Middle Creek Study Area, unserved or cluster.”

4.2 Existing Land Use Patterns and Land Supply

The existing pattern of land use is given by the following table (Table 4.2), which indicates the total acreage for different categories of land use, for each of the subareas.

Town of Cary Land Use Plan

Land Use Category	Area, in Acres, by Subarea							
	Town Limits Only ⁷	Town Limits + ETJ ⁸	PPA, West of Davis Dr.	PPA, South of US1	Chatham, served ⁹	Chatham not served ¹⁰	Middle Creek, served	Middle Creek, unserved or cluster
Agriculture, Forestry	1,744	5,629	1,121	353			1,709	565
Commercial	796	823	12	1			21	
Industrial	557	633					11	
Institutional	873	992	5	21			212	48
Lake, water bodies	717	808						
Office	720	736						2
Park, Open Space, Golf	2,698	2,857		37				
Residential, High Density ¹¹	718	718						
Residential, Medium Density ¹²	1,467	1,468		15			15	
Residential, Low Density ¹³	7,366	8,559	9	227			839	23
Residential, Very Low Density ¹⁴	126	1,033	327	811			263	94
Residential, Estate ¹⁵	289	2,502	667	284			583	344
Vacant	4,660	8,759	555	403	5,369	5,667	549	243
Public Rights-Of-Way (ROW)	2,106	3,300	125	79			125	
Total, net ROW: ¹⁶	22,729	35,516	2,696	2,151	5,369	5,667	4,201	1,318
Total, with ROW: ¹⁷	24,228	38,816	2,820	2,230	5,369	5,667	4,326	1,318
Urban ROW Overhead %: ¹⁸	6.6%	9.29%	4.62%	3.69%	n/a	n/a	2.97%	n/a

Table 4.2: Acreage in Various Land Uses, by Subarea (as of June 1996)

⁷ Does not include any municipal area in Chatham County.

⁸ Does not include any municipal area in Chatham County.

⁹ Land use data is not available for Chatham County. However, since the study area is largely vacant or rural, the total acreage has been assigned to the vacant category. Figure includes Cary municipal areas in Chatham County.

¹⁰ Land use data is not available for Chatham County. However, since the study area is largely vacant or rural, the total acreage has been assigned to the vacant category.

¹¹ Defined as 8 or more dwellings per acre for this analysis, to conform with limitations in the source data.

¹² Defined as 3-8 dwellings per acre for this analysis, to conform with limitations in the source data.

¹³ Defined as 1-3 dwellings per acre for this analysis, to conform with limitations in the source data.

¹⁴ Defined as large-lot residential subdivisions with lot sizes of 1-5 acres, conforming to definitions in the source data.

¹⁵ Defined as single-family rural residential lots of 5 acres or more, conforming to definitions in the source data.

¹⁶ Total of all land use categories shown in the table, not including land in public street and railroad rights-of-way.

¹⁷ Total of all land use categories shown in the table, plus the amount in public street and railroad rights-of-way.

¹⁸ This is the percentage of gross land area in public rights-of-way (streets and railroad).

For the purposes of this analysis, the supply of developable land is considered to be the total of the vacant land, plus the agricultural/forestry land and the residential estate land. Using these figures, the actual supply of developable land is as follows:

	Town Limits + ETJ	PPA, West of Davis Dr.	PPA, South of US1	Chatham, served	Chatham not served	Middle Creek, served	Middle Creek, unserved or cluster
Developable Land Supply: (in acres)	16,891	2,342	1,039	5,369	5,667	2,841	1,318

Table 4.3: Total Developable Land Supply, by Subarea

4.3 Future Land Demand

Future land demand is defined as the amount of land that the market will demand for each land use category over a certain time period. The time period of concern in this analysis is from the present day to that future date when the entire Plan Study Area is completely “built out,” and all undeveloped land has been developed. (Note that this analysis does not consider the effects of possible future redevelopment of previously developed land)

While it is impossible to precisely predict future patterns of land demand, reasonable estimates can be made based on prior experience and anticipated future land use trends and patterns, including those embodied in the Land Use Plan. Using the figures for total acreage by land use within today’s town limits (given in Table 4.2, above) and the official estimate of current population within those town limits, we can develop ratios that describe the number of acres of land that are required for each category of land use, for every 1,000 people. By using population and acreage data within the town limits, we can establish ratios that are typical of Cary’s past and current pattern of urbanization. Using these ratios, we can then estimate the future land use demands, by land use category, that can be expected for each 1,000-person increase in population.

Using this basic method, two possible future land use demand scenarios can be examined. In the first scenario, termed the ***Business as Usual Scenario***, the future land demand ratios are constructed exactly as described above, with no alteration. The limitation in this method is that it assumes that future patterns of development will be roughly the same as past patterns in Cary. In the second scenario, termed the ***Compact Development Scenario***, the future land demand ratios are modified to reflect changes in the anticipated character of future development. Specifically, for this scenario the ratios are mathematically modified to reflect the following future development assumptions:

1. 20 percent more land per capita will be demanded for office and industrial space, as Cary continues to evolve into a community with a greater share of regional employment.

2. 20 percent less land per capita will be needed for commercial development, as commercial development becomes more compact, with higher floor-area ratios and less parking.
3. While today almost 60 percent of all housing is low density (as defined in Table 4.2), in the future only 40 percent of all housing will be low density, both with an average density of 2.4 dwellings/acre.
4. While today about 19 percent of all housing in Cary is medium density (as defined in Table 4.2), with an average medium density of 4 dwellings/acre, about 30 percent of future housing will be medium density, with an average density of 4.5 dwellings/acre.
5. While today about 23 percent of all housing in Cary is high density (as defined in Table 4.2), with an average density of 9.6 dwellings/acre, about 30 percent of future housing will be high density, with an average density of 12 dwellings/acre.

Table 4.4 shows the ratios that are obtained based on this data:

Land Use Category	Table 4.4: Land Usage Demand per Capita (in acres per 1,000 pop.)	
	Business as Usual Scenario (based on 1996 land use & population data)	Compact Development Scenario
Commercial	10.47	8.37
Industrial	7.33	8.80
Institutional	11.49	11.49
Lake, water bodies	8.05	8.05
Office	9.47	11.36
Park, Open Space, Golf	31.55	31.55
Residential, High Density	9.44	10.04
Residential, Medium Density	19.3	26.77
Residential, Low Density	96.92	66.42
Residential, Very Low Density	1.65	1.65

Table 4.4: Land Demand Ratios by Land Use Category

Note that land demand ratios are not calculated for agriculture/forestry, vacant, or residential estate land, since these are the categories of land use being developed.

Using these ratios, we can estimate future land demand and the likely total population for Cary once all the available undeveloped land has been developed -- that is, at "buildout." The results of this analysis for the *Business as Usual Scenario* are given in Tables 4.5, 4.6, and 4.7. Table 4.5 shows the maximum population increase that can be supported in each of the serviceable portions of the *Plan Study Area*, and the future amounts of developed land, by land use category, that can be expected for that population increase. Table 4.6 shows the buildout population that can be expected in the unserviceable region of the *Chatham County Study Area* and in the *Very Low Density Residential/Low Density Cluster Residential* region of the *Upper*

Middle Creek Study Area. Table 4.7 summarizes the population data from Tables 4.5 and 4.6, to arrive at a final total buildout population estimate for the Town, and for the entire Plan Study Area.

The results of a similar analysis for the *Compact Development Scenario* are given in Tables 4.8, 4.9, and 4.10.

Future Land Demand in Serviceable Areas (by land use category, in acres) <i>Business as Usual Scenario</i>						
	Town Limits + ETJ ¹⁹	PPA west of Davis Drive	PPA south of US1	Middle Creek, served	Chatham Co., served	Total
Developable Land Supply (acres):	16,891	2,342	1,039	2,841	5,369	28,482
Supportable pop. increase:	73,892	10,246	4,546	12,429	23,486	124,600
Future Land Demand:						
Commercial	773	107	48	130	246	1,304
Industrial	542	75	33	91	172	914
Institutional	849	118	52	143	270	1,432
Lakes, Water Bodies	595	82	37	100	189	1,003
Office	700	97	43	118	222	1,180
Parks, Open Space, Golf	2,331	323	143	392	741	3,931
Residential, High Density	698	97	43	117	222	1,177
Residential, Medium Density	1,426	198	88	240	453	2,405
Residential, Low Density	7,161	993	441	1,205	2,276	12,076
Residential, Very Low Density	122	17	8	21	39	206
Public Rights of Way ²⁰	1,689	234	104	284	537	2,848
Remaining Land, unused:	5	1	0	1	1	8

Table 4.5: Future Land Demand in Serviceable Areas, under the Business as Usual Scenario

¹⁹ Does not include any areas in Chatham County.

²⁰ Rights of Way assumed to be 10% of total land area.

Future Land Demand and Population in Unserved Areas, Business as Usual Scenario		
	Chatham Co., unserved	Middle Creek, unserved or cluster
Gross Land Supply:	5,667	1,151
Deduction for ROW:	567	115
Net Land Supply:	5,100	1,036
Acres per Dwelling:	7.5	1.0
Total Dwellings:	680	1,036
Persons per Dwelling:	2.65	2.65
Total population:	1,802	2,744

Table 4.6: Future Land Demand in Unserviceable Areas, under the Business as Usual Scenario

Buildout Population Summary, Business as Usual Scenario	
June 1996 municipal pop. estimate:	76,000
Municipal pop. increase, 1996 to “buildout”	124,600
Buildout Cary pop. estimate:	200,600
Buildout pop., unserved Chatham area	1,802
Buildout pop., unserved Middle Creek area	2,744
Tot. buildout pop., served+unserved:	205,146

Table 4.7: Buildout Population Summary, under the Business as Usual Scenario

Future Land Demand in Serviceable Areas (by land use category, in acres) <i>Compact Development Scenario</i>						
	Town Limits + ETJ	PPA west of Davis Drive	PPA south of US1	Middle Creek, served	Chatham Co., served	Total
Developable Land Supply (acres):	16,891	2,342	1,039	2,841	5,369	28,482
Supportable pop. increase:	82,373	11,422	5,068	13,856	26,181	138,900
Future Land Demand:						
Commercial	690	96	42	116	219	1,163
Industrial	725	100	45	122	230	1,222
Institutional	946	131	58	159	301	1,596
Lakes, Water Bodies	663	92	41	111	211	1,118
Office	936	130	58	157	297	1,578
Parks, Open Space, Golf	2,599	360	160	437	826	4,382
Residential, High Density	827	115	51	139	263	1,394
Residential, Medium Density	2,205	306	136	371	701	3,718
Residential, Low Density	5,471	759	337	920	1,739	9,226
Residential, Very Low Density	136	19	8	23	43	230
Public Rights of Way	1,689	234	104	284	537	2,848
Remaining Land, unused:	4	1	0	1	1	7

Table 4.8: Future Land Demand in Serviceable Areas, under the Compact Development Scenario

Future Land Demand and Population in Unserved Areas, <i>Compact Development Scenario</i>		
	Chatham Co., unserved	Middle Creek, unserved or cluster
Gross Land Supply:	5,667	1,151
Deduction for ROW:	567	115
Net Land Supply:	5,100	1,036
Acres per Dwelling:	7.5	1.0
Total Dwellings:	680	1,036
Persons per Dwelling:	2.65	2.65
Total population:	1,802	2,744

Table 4.9: Future Land Demand in Unserviceable Areas, under the Compact Development Scenario

Buildout Population Summary, Compact Development Scenario	
June 1996 municipal pop. estimate:	76,000
Municipal pop. increase, 1996 to buildout	138,900
Buildout Cary pop. estimate:	214,900
Buildout pop., unserved Chatham area	1,802
Buildout pop., unserved Middle Creek area	2,744
Tot. buildout pop., served+unserved:	219,446

Table 4.10: Buildout Population Summary, under the Compact Development Scenario

It can be seen in Table 4.7 that Cary would achieve buildout with a final population of approximately 200,600 if the future pattern of development mirrors the past. Table 4.10 shows that with the more compact future development pattern, an ultimate population of about 214,900 could be accommodated in the same land area.

It is interesting to observe the magnitude of the effect that average residential densities have on both land use demand estimates and the estimated buildout population. For example, suppose the residential density assumptions of the Compact Development Scenario were modified as follows:

1. Assume that average densities for the *low density residential* category increases from its historical average of 2.4 units/acre, to 2.8 units/acre for future development.
2. Assume that average densities for the *medium density residential* category increases from its historical average of 4 units/acre, to 6 units/acre for future development.
3. Assume that average densities for the *high density residential* category increases from its historical average of 9.6 units/acre, to 16 units/acre for future development.

With no other changes in the assumptions of the Compact Development Scenario, the future land use demands and population predicted for the scenario would now be those given in Tables 4.11, 4.12, and 4.13, below. As indicated in Table 4.13, an ultimate Town population of about 230,200 could now be accommodated at buildout. While there is a substantial range between the buildout population of 200,600 given at the low end by the Business as Usual Scenario, and the figure of 230,200 given by the modified Compact Development Scenario, the three estimates taken together provide a useful indication of the ultimate limits of Cary’s population growth. The scenarios also offer valuable insight as to how Cary’s overall future demand for land for various uses might vary in response to changing development patterns.

Future Land Demand in Serviceable Areas (by land use category, in acres) <i>Modified Compact Development Scenario</i>						
	Town Limits + ETJ	PPA west of Davis Drive	PPA south of US1	Middle Creek, served	Chatham Co., served	Total
Developable Land Supply (acres):	16,891	2,342	1,039	2,841	5,369	28,482
Supportable pop. increase:	91,446	12,681	5,626	15,382	29,065	154,200
Future Land Demand:						
Commercial	766	106	47	129	243	1,291
Industrial	805	112	49	135	256	1,357
Institutional	1,051	146	65	177	334	1,772
Lakes, Water Bodies	736	102	45	124	234	1,241
Office	1,039	144	64	175	330	1,752
Parks, Open Space, Golf	2,885	400	177	485	917	4,865
Residential, High Density	688	95	42	116	219	1,161
Residential, Medium Density	1,836	255	113	309	583	3,096
Residential, Low Density	5,245	727	323	882	1,667	8,844
Residential, Very Low Density	151	21	9	25	48	255
Public Rights of Way	1,689	234	104	284	537	2,848
Remaining Land, unused:	0	0	0	0	0	0

Table 4.11: Future Land Demand in Serviceable Areas, under the modified Compact Development Scenario

Future Land Demand and Population in Unserved Areas, <i>Modified Compact Development Scenario</i>		
	Chatham Co., unserved	Middle Creek, unserved or cluster
Gross Land Supply:	5,667	1,151
Deduction for ROW:	567	115
Net Land Supply:	5,100	1,036
Acres per Dwelling:	7.5	1.0
Total Dwellings:	680	1,036
Persons per Dwelling:	2.65	2.65
Total population:	1,802	2,744

Table 4.12: Future Land Demand in Unserviceable Areas, under the modified Compact Development Scenario

Buildout Population Summary, <i>Modified Compact Development Scenario</i>	
June 1996 municipal pop. estimate	76,000
Municipal pop. increase, 1996 to “buildout”	154,200
Buildout Cary pop. estimate	230,200
Buildout pop., unserved Chatham area	1,802
Buildout pop., unserved Middle Creek area	2,744
Tot. buildout pop., served+unserved	234,746

Table 4.13: Buildout Population Summary, under the modified Compact Development Scenario

4.4 Analysis and Implications

Analysis of the land supply and demand figures both on their own and in conjunction with the Land Use Plan Map yields the following findings:

1. Middle Creek and the southern PPA are rapidly urbanizing. Out of a total area of 2,230 acres in the PPA south of US1, only 1,039 acres remain for future development -- over 50% of the area has already been developed. And, out of a total area of 5,664 acres in the Upper Middle Creek Study Area, 1,672 acres have already been developed, leaving 3,992 acres for future development. However, of those 3,992 remaining acres, 1,151 acres lie south of Optimist Farm Road in an area designated in this Plan for either *Very Low Density Residential* or *Low Density Cluster Residential* uses (these uses are defined in Chapter 6). It is perhaps indicative of the strong growth pressures in this region that this rapid urbanization has occurred even though the area is under County jurisdiction, beyond the current Cary town limits and municipal services.
2. The Plan’s land use designations supply adequate amounts of land in all land use categories. However, over twice as much Office and Office/Industrial land is designated on the Map as projected to be demanded. This is not, however, either an unexpected or undesirable result. The finding is not unexpected because the ratios used to project future office and industrial demand are largely based on existing patterns, which are unusually low for a town of Cary’s size, and reflect Cary’s very large existing residential base. As Cary matures and continues to attract an increasingly larger share of regional employment, it is likely that the ratio of office and industrial land per capita will rise significantly, yielding larger demand forecasts for office and industrial acreage.