

Land Capability Analysis

Knoxville-Knox County-Farragut, Tennessee

**Base Studies for Preparing a Growth Plan
as Required by Tennessee Public Chapter 1101**



April, 1999

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note: maps, tables and figures appear at the end of the appropriate section.

Introduction

Public Chapter 1101, the new Tennessee growth management law, requires city and county governments to prepare a 20 year Growth Plan for each county. At a minimum, a growth plan must identify three classifications of land:

- **Rural areas.** Rural areas are to include land to be preserved for farming, recreation, and other non-urban uses.
- **Urban growth boundaries (UGB's).** UGB's must be drawn around all cities and towns. The land within the UGB must be reasonably compact but adequate to accommodate all of the city's expected growth for the next 20 years.
- **Planned growth areas (PGA's).** PGA's must be reasonably compact but large enough to accommodate medium and high intensity growth expected to occur in unincorporated areas over the next 20 years.

A Growth Policy Coordinating Committee has been formed pursuant to the new law. The Committee is responsible for putting together a plan for adoption by the governing bodies of Knoxville, Knox County and Farragut. Several public hearings will be required to obtain the views of citizens. The law encourages cities and counties to cooperate in preparation of the plan, and directs the Coordinating Committee to give due consideration to any proposals submitted in a timely manner by the county and cities.

This report has been prepared by MPC staff to assist the Growth Policy Coordinating Committee, Knox County, the City of Knoxville and the Town of Farragut in complying with the requirements of Public Chapter 1101. It addresses the land use, population, and environmental factors that the new law requires localities to consider in designating rural areas, urban growth boundaries and planned growth areas.

The remainder of this report is consists of four parts. Section 1 is a *Summary of Findings*. Section 2, *Land Capability Analysis*, contains maps and tables that show the remaining supply of developable land and provides background information regarding land use and environmental constraints. Section 3, *Development Trends and Projections*, summarizes recent development and population trends, and also describes a computer spreadsheet model developed by MPC to make projections of future land requirements. Section 4 summarizes relevant plans adopted by local governments.

Section 1,
Summary of Findings

Section 1

Summary of Findings

Land Capability Map

MPC staff has prepared an analysis of Knox County's land resources. Map 1, Land Capability, shows 3 categories of land:

- 1. Least Constrained Land/Sewered.** Land that is vacant, free of significant environmental constraints, and has ready access to existing sanitary sewer lines. This category of land is generally the most logical for future development. It is also generally contiguous to the existing urbanized area. This is important because of Public Chapter 1101's emphasis on compact development patterns and containment of urban sprawl.
- 2. Least Constrained/ Not Sewered.** Land that is vacant, free of significant environmental constraints, but does not have ready access to existing sanitary sewer lines. Even if all of the Category 2 land is allocated to Urban Growth boundaries and Planned Growth Areas, some of the Category 3 lands will have to be included in the UGB's and PGA's to provide adequate land development alternatives.
- 3. Other Land.** Land that is not considered available for future development because it is already developed or because it is subject to significant environmental constraints.

Table 1 shows the acreages of each of the three categories of land in Knox County and the two municipalities as of January, 1998.

Projected Needs for Urban/Suburban Land

Table 2 shows projected, county-wide needs for developable land between the years 1998 and 2020. Land needs have been projected using two sets of population forecasts:

- Projections by the University of Tennessee's Center for business and Economic Research (UTCBER). These projections were prepared by UT specifically for the Growth Plan process.
- The Knoxville-Knox County Metropolitan Planning Commission's "moderate growth" projections, which are higher than the UTCBER projections.

"Unadjusted" and "adjusted" forecasts are shown in the table. The unadjusted numbers are a projection of actual land needs for the period

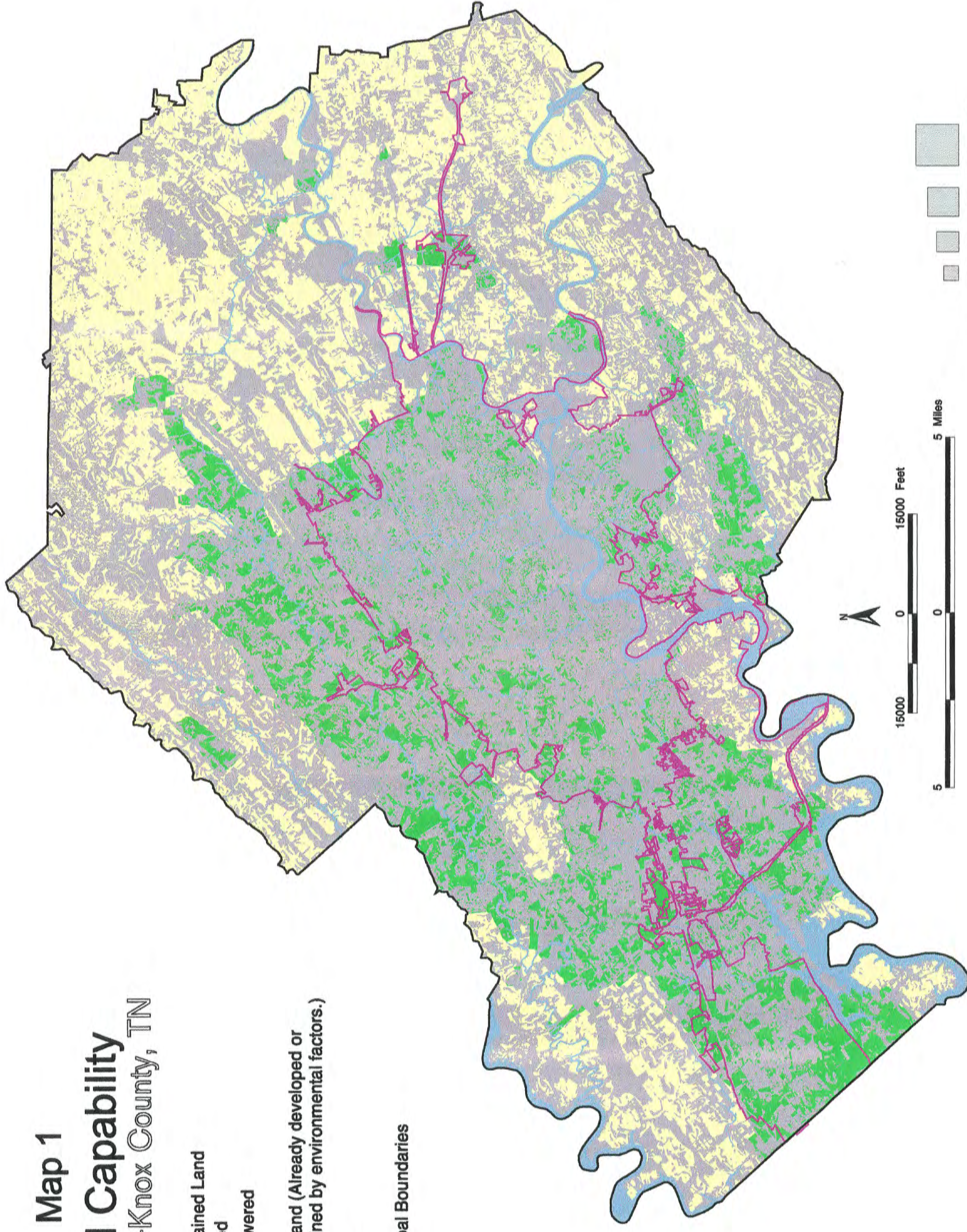
of 1998 to 2020, based on the two sets of population projections, historical ratios of population to land use, park and open space service standards, and the Knox County Development Corporation's industrial land needs forecast. The adjusted projections have been inflated by a market factor adjustment (100% for residential development and 50% for most non-residential land uses) intended to avoid creating an artificial shortage of developable land.

The computer spreadsheet model used to make these projections is described in Section 4. Variables such as housing density and the market factor adjustment can be manipulated to achieve a more compact development pattern. The model can be used to forecast land needs for Farragut, Knoxville and the unincorporated Knox County. The land demand projections are provided for illustrative purposes only. The City, County and Farragut are required to prepare their own forecasts, and they may wish to use different population and land variables than those reflected in Table 2.

Map 1

Land Capability Knoxville-Knox County, TN

- Least Constrained Land
 - Sewered
 - Not Sewered
- Other Land (Already developed or constrained by environmental factors.)
- Water
- Municipal Boundaries



15000 0 15000 Feet

5 0 5 Miles



80 160 320 640 (1 sq. mile)
acres

Table 1
Land Capability Summary

	Acreage	Square Miles	Percent of Land Area
a. Knox County (Total)			
Vacant Land	172,476.241	269.494	51.235
Vacant With No Constraints	108,186.883	169.042	32.137
Sewered	31,143.358	48.661	9.251
Not Sewered	77,043.525	120.381	22.886
Vacant With Constraints	64,289.358	100.452	19.097
All Knox County Land	336,640.000	526.000	
b. City of Knoxville			
Vacant Land	10,896.083	17.025	17.128
Vacant With No Constraints	6,786.054	10.603	10.667
Sewered	6,014.513	9.398	9.454
Not Sewered	771.541	1.206	1.213
Vacant With Constraints	4,110.029	6.422	6.461
All Knoxville Land	63,616.000	99.400	
c. Town of Farragut			
Vacant Land	4,395.703	6.868	42.360
Vacant With No Constraints	3,887.936	6.075	37.467
Sewered	3,885.596	6.071	37.444
Not Sewered	2.340	0.004	0.023
Vacant With Constraints	507.767	0.793	4.893
All Farragut Land	10,377.046	16.214	

Table 2
County-wide Land Requirements Summary
(in Square Miles)

Without Market Factor Adjustment

	Using MPC Moderate Growth Population Projection			Using UT-CBER Population Projection	
	<u>1998</u>	<u>2010</u>	<u>2020</u>	<u>2010</u>	<u>2020</u>
Non-urban	316.53	276.44	250.93	280.26	258.56
Parks & Open Space	6.434	10.63	11.61	10.28	10.99
Urban/suburban	209.47	249.56	275.07	245.74	267.44
Increase from 1998 (sq. mi.)		46.52	72.04	42.70	64.41
Increase from 1998 (%)		22.9%	35.5%	21.0%	31.7%

With Market Factor Adjustment

	Using MPC Moderate Growth Population Projection			Using UT-CBER Population Projection	
	<u>1998</u>	<u>2010</u>	<u>2020</u>	<u>2010</u>	<u>2020</u>
Non-urban	316.53	244.23	205.05	250.89	218.61
Parks & Open Space	6.434	10.63	11.61	10.28	10.99
Urban/suburban	209.47	281.77	320.95	275.11	307.39
Increase from 1998 (sq. mi.)		78.73	117.91	72.08	104.36
Increase from 1998 (%)		38.8%	58.1%	35.5%	51.4%

Section 2, Land
Capability Analysis

Section 2

Land Capability Analysis

This section consists of an inventory of land resources. Land use, environmental constraints, and sanitary sewer availability have been mapped. The purpose of this inventory is to identify the location and extent of vacant land available for development over the next twenty years.

The Land Capability Map in Section 1 was compiled by overlaying various land characteristics shown on the maps in this section.

Existing Land Use

Knox County is approximately 526 square miles in area. One half of this land is in vacant or agricultural use. Another 10 percent consists of rural residential development on parcels of two to ten acres in size. About 3 percent of the county is used for business purposes (office, commercial, wholesale and industrial land uses). Ten percent of the county consists of public rights of way, primarily for streets, highways, and railroads.

Knoxville's land use profile is much different than the county as a whole. Knoxville's total land area is approximately 100 square miles. Only 16 percent of the city is classified vacant or agricultural, and only 4 percent is in rural residential use. Seventeen percent of Knox County is in single family residential use. About 12.5 percent of the city consists of public (government buildings, park land, schools, etc.) and quasi public (churches, hospitals, cemeteries, private recreation) uses. Twenty-five percent of the city is devoted to single family residential development. Almost 10 percent of Knoxville's land is used for business purposes. Most of Knoxville's vacant land consists of individual vacant lots and parcels that have not been developed due to environmental limitations, with the exception of the Northwest City planning sector, most development opportunities are limited to "infill" on small sites or redevelopment of previously urbanized properties. In the Northwest Sector, there are still a few "green field" development opportunities. In recent years, this sector has had more new development than other parts of the city due to its larger supply of vacant sites. Separate existing land use statistics are currently unavailable for the town of Farragut.

Map 2, Existing Land Use, shows the general distribution of land uses. Table 3 summarizes the land use statistics. Table 4 is of particular

interest because it shows developed land only. When vacant and agricultural land are excluded, we can get an idea of the development pattern that will extend out into the unincorporated county over the next twenty years. For example, while 16 percent of Knox County's *total* land area is developed as single family residential, almost 36 percent of the county's *developed* land is single family residential. The table also shows that, in the unincorporated part of Knox County, rural residential and single-family residential land accounts for two-thirds of the developed area.

Urbanized Land Analysis

Map 3, Pattern of Urbanization, presents a simplified picture of the land use pattern as a first step in identifying future urban growth boundaries, planned growth areas, and rural areas.

Environmental Constraints

As noted earlier, half the county is still vacant or in agricultural use. Not all of this land is available for future urban development. Lands with extreme topography (greater than 15 percent slope) generally do not lend themselves to urbanization due to the high cost of engineering and development on steep slopes. Development on steep slopes also creates problems with drainage, erosion, water pollution, stream sedimentation, and aesthetics.

Other severe environmental constraints include sinkhole systems, hydric soils associated with wetlands, and regulatory floodways which cannot be developed under local and federal regulations. These features are shown on Map 4, Environmental Constraints, and are summarized in Table 5.

Karst terrain is a widespread environmental condition in East Tennessee. Karst terrain is underlain with limestone formations which are subject to formation of sinkholes, underground caverns, and unpredictable subsurface geology. These areas are also shown on Map 4 as "areas underlain by dolomite and limestone". With the exception of areas with pronounced sinkhole problems, these lands should not be automatically removed from the pool of developable land. Site-specific analysis may allow engineers to successfully deal with Karst characteristics in the development process.

Least Constrained Land

Map 5, Least Constrained Land, was created by overlaying land use and environmental data. The areas shown in dark green are undeveloped and

are apparently free of serious environmental constraints. The "least constrained" areas do include some areas of karst terrain, and these areas must be carefully evaluated during the development process.

Sanitary Sewers

Map 6, Sanitary Sewer Service, shows the extent of sanitary sewer service. When sanitary sewer service is extended into rural areas, the possibility and urban or suburban development is introduced. In their reports to the Growth Coordinating Committee, the several utility providers serving the county explained that they propose to extend sanitary sewer and other utilities into rural areas on the basis of environmental and economic feasibility.

The map of sanitary sewer availability was combined with the Least Constrained Land Map to create Map 1, Land Capability, introduced earlier in this report.

Lands Worthy of Special Consideration

The growth management law requires cities and counties to evaluate the impact of their proposed growth strategies on :

- agricultural lands
- forests
- recreational areas
- wildlife management areas

Recreational and Wildlife Management Areas

Map 7A, Recreational and Wildlife Management Areas, includes parks and land which is currently set aside for wildlife management purposes. In some cases, such as the 498 acre House Mountain State Natural Area, the land serves both recreational and wildlife management purposes.

The City of Knoxville owns or works with others to manage 87 park, recreational and natural areas, amounting to approximately 1,250 acres. Forty-nine parks have been established for neighborhood and community recreation and typically are 1 to 20 acres in size. The City also has 11 greenway trails, extending over 18 miles; the most prominent are the Third Creek and Neyland Drive Greenways. Some of the parks such as the new Lakeshore Park have been set aside through a long-term lease. A few of the City's parks, including Fort Dickerson Park (97 acres), Sharp's Ridge Park (111 acres), and the Smith Property (22 acres) are considered natural areas and contain significant wildlife habitat.

Knox County has 61 parks, recreational or natural areas in its system, amounting to approximately 1,628 acres. Seventeen of the parks in the County system are leased or managed by the County, but are owned by community groups. The County has a handful of greenway trails. The Pellissippi Greenway Trail is the only one that lies outside of an existing park. Eleven parks have been set aside as natural areas. These areas lie along Fort Loudoun Lake and Melton Hill Lake and provide noteworthy habitat.

The Town of Farragut owns and manages four parks, amounting to 101 acres. Additionally, the town has set aside 51 acres of open space which will be tied into its greenway system.

Other park and wildlife management lands have been set aside by state or federal agencies as natural areas and wildlife management areas. The largest area (331 acres) expressly set aside for wildlife management is the State Wildlife Management Area at the Forks of the River. Another significant state resource is the previously mentioned House Mountain Natural Area. The Tennessee Valley Authority manages seven tracts of land, containing over 250 acres as natural areas along Melton Hill Lake.

Portions of two farms have been set aside as wildlife management areas through the US Natural Resource and Conservation Service's Wildlife Habitat Incentive Program. Seventy-one acres are included in this program, conserving the habitat at least until the year 2009.

Agricultural Land

Map 7B, Agricultural Land, depicts the parcels in Knox County which are classified by the Tax Assessor as an "Agricultural Act" or agricultural land use. The Agricultural Act was passed in 1976 and revised in 1992 to offer land owners a property tax incentive to maintain land for agricultural or forestry purposes. Through this Greenbelt law, as the program is often called, property taxes are based upon the use of land, rather than the market value. As of January 1998, approximately 78,500 acres of Knox County land, composed of 1,689 parcels, were included in the Agricultural Act category. The vast majority of the parcels include land which is used for agricultural production. As of April 1999, only 106 parcels, comprising 5,418 acres, were part of the Agricultural Act forestry program. The Agricultural Act program contributes to agricultural land conservation but offers no guarantee that permanent agricultural uses will continue. Additionally, there are 1,469 parcels, representing 44,207 acres of other agricultural land; owners of those parcels have not elected to take part in the Agricultural Act tax

incentive program. All the parcels depicted on Map 7B are over 15 acres, the threshold used by the Assessor for eligibility for the Agricultural Act.

According to the US Census of Agriculture, the number of farms and agricultural acreage has steadily decreased (See Table 6). In 1954, almost 57 percent of the county's land was in agricultural. By 1997, slightly more than 25 percent was in agricultural uses. Between 1992 and 1997, the land devoted to farming decreased 7 percent. Surprisingly, the number of farms slightly increased; however, the average size of farms decreased from 81 acres to 74 acres.

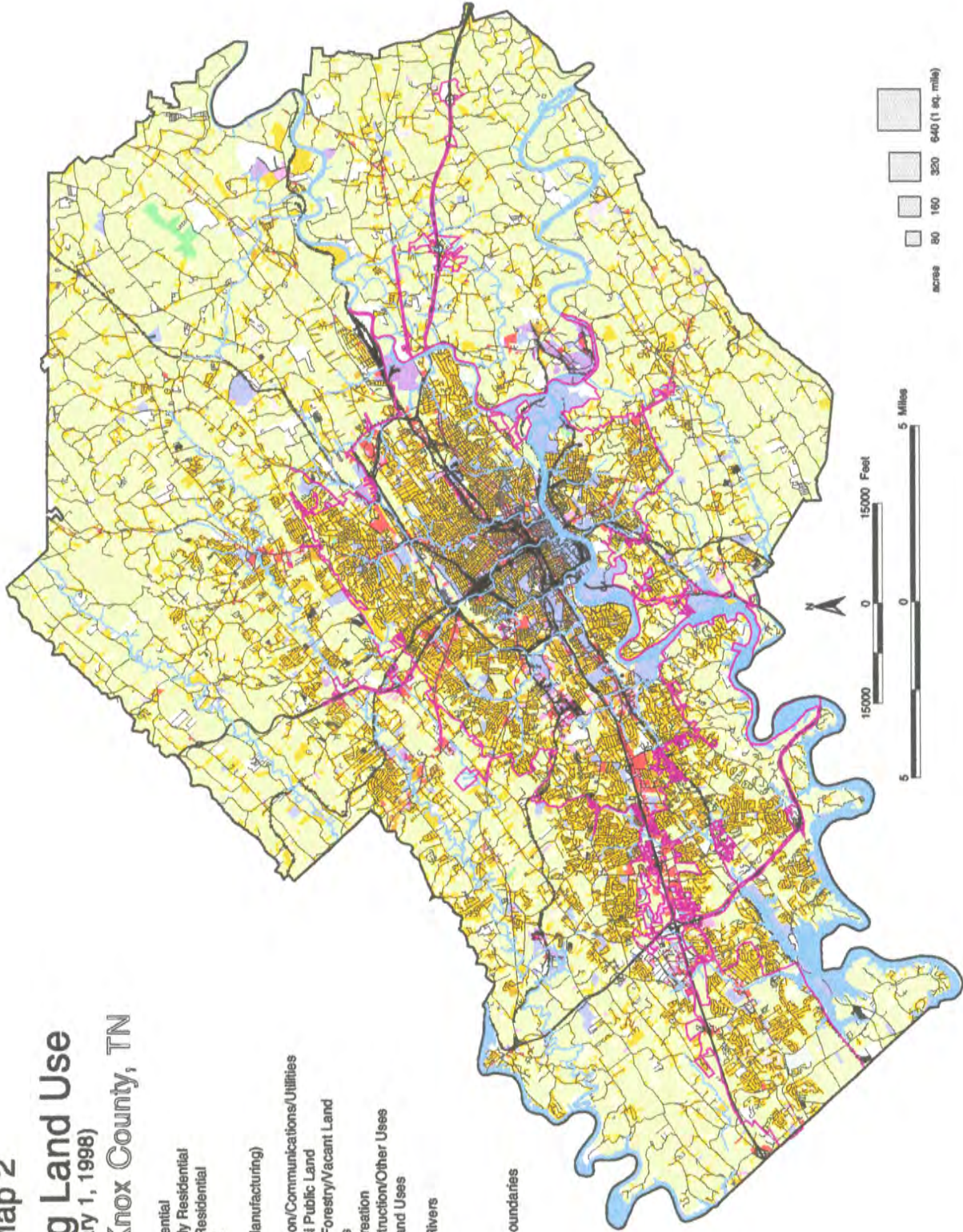
Table 7 summarizes land with agricultural zoning. Land zoned agricultural (A in the county and A-1 in the city) is largely used in farming but also includes residential uses on lots as small as 1 acre. Currently, there is approximately 195,000 acres zoned agricultural in Knoxville/Knox County.

Map 2

Existing Land Use (January 1, 1998)

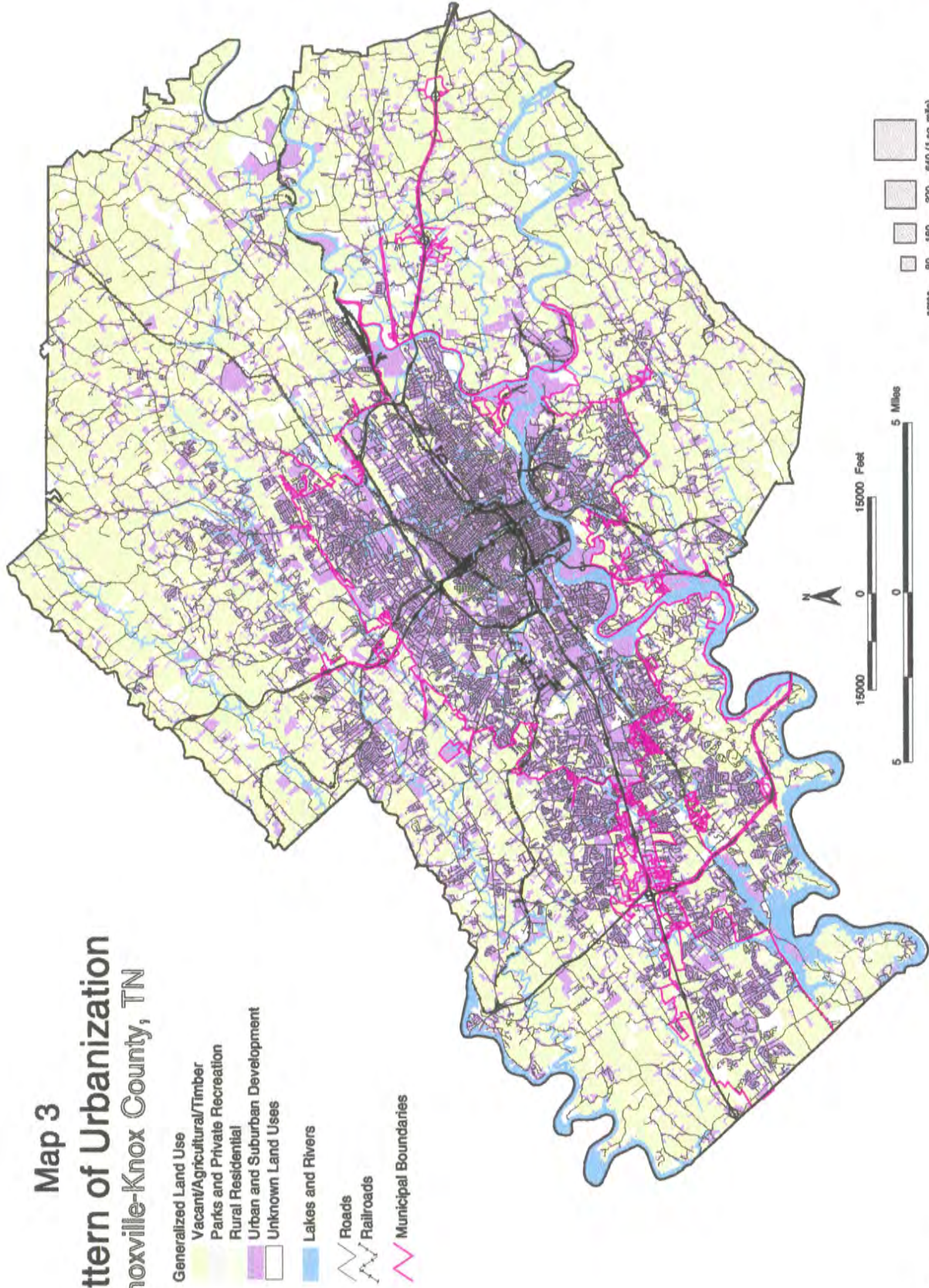
Knoxville-Knox County, TN

- Rural Residential
- Single Family Residential
- Multifamily Residential
- Commercial
- Office
- Industrial (Manufacturing)
- Wholesale
- Transportation/Communications/Utilities
- Public/Quasi Public Land
- Agriculture/Forestry/Vacant Land
- Public Parks
- Private Recreation
- Under Construction/Other Uses
- Unknown Land Uses
- Lakes and Rivers
- Roads
- Railroads
- Municipal Boundaries

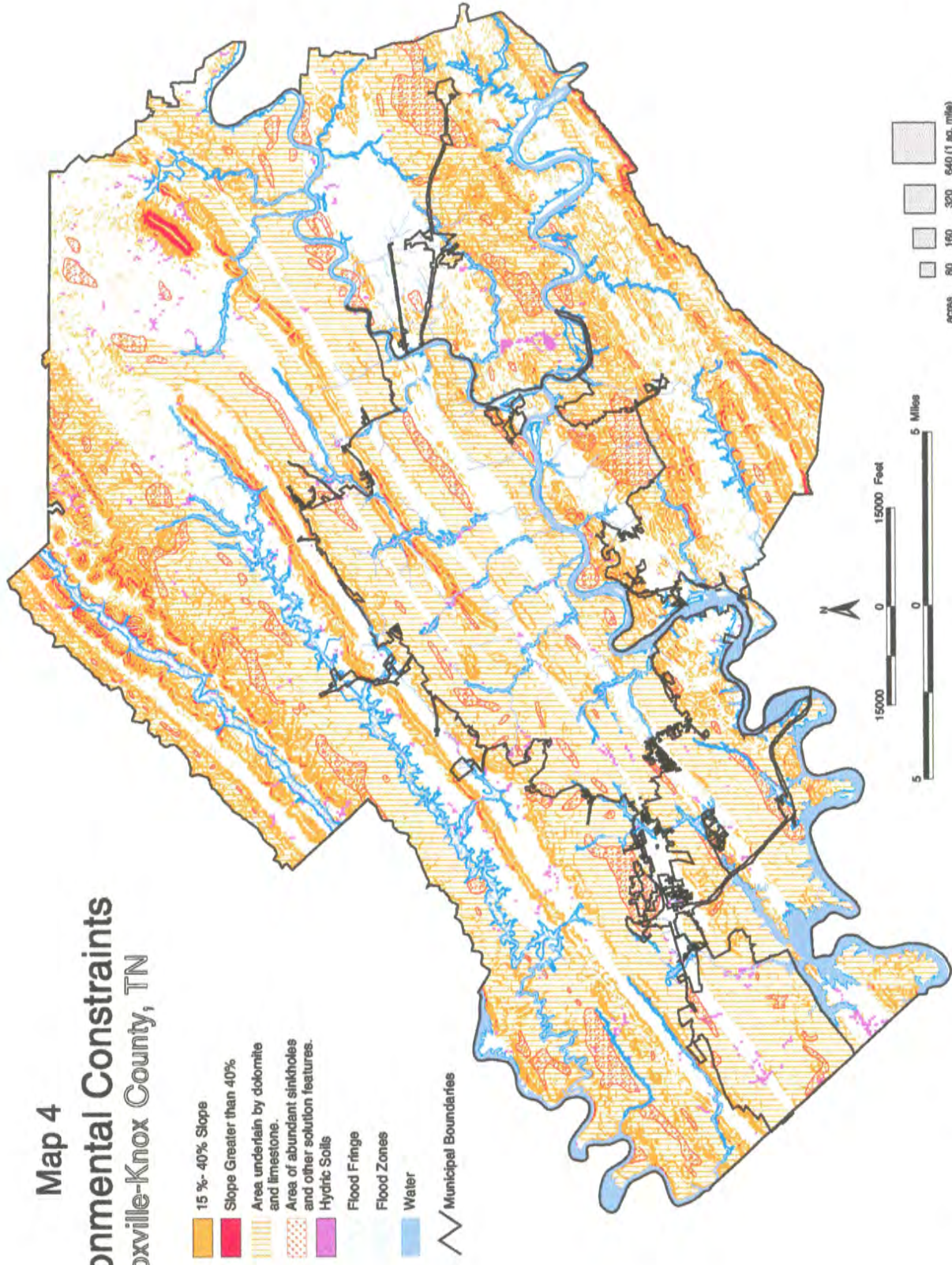


Print date: April 1, 1999.

Map 3 Pattern of Urbanization Knoxville-Knox County, TN

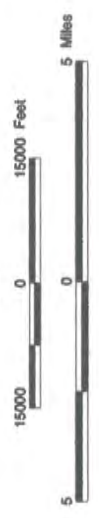
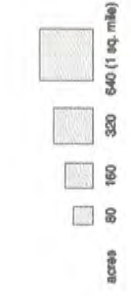
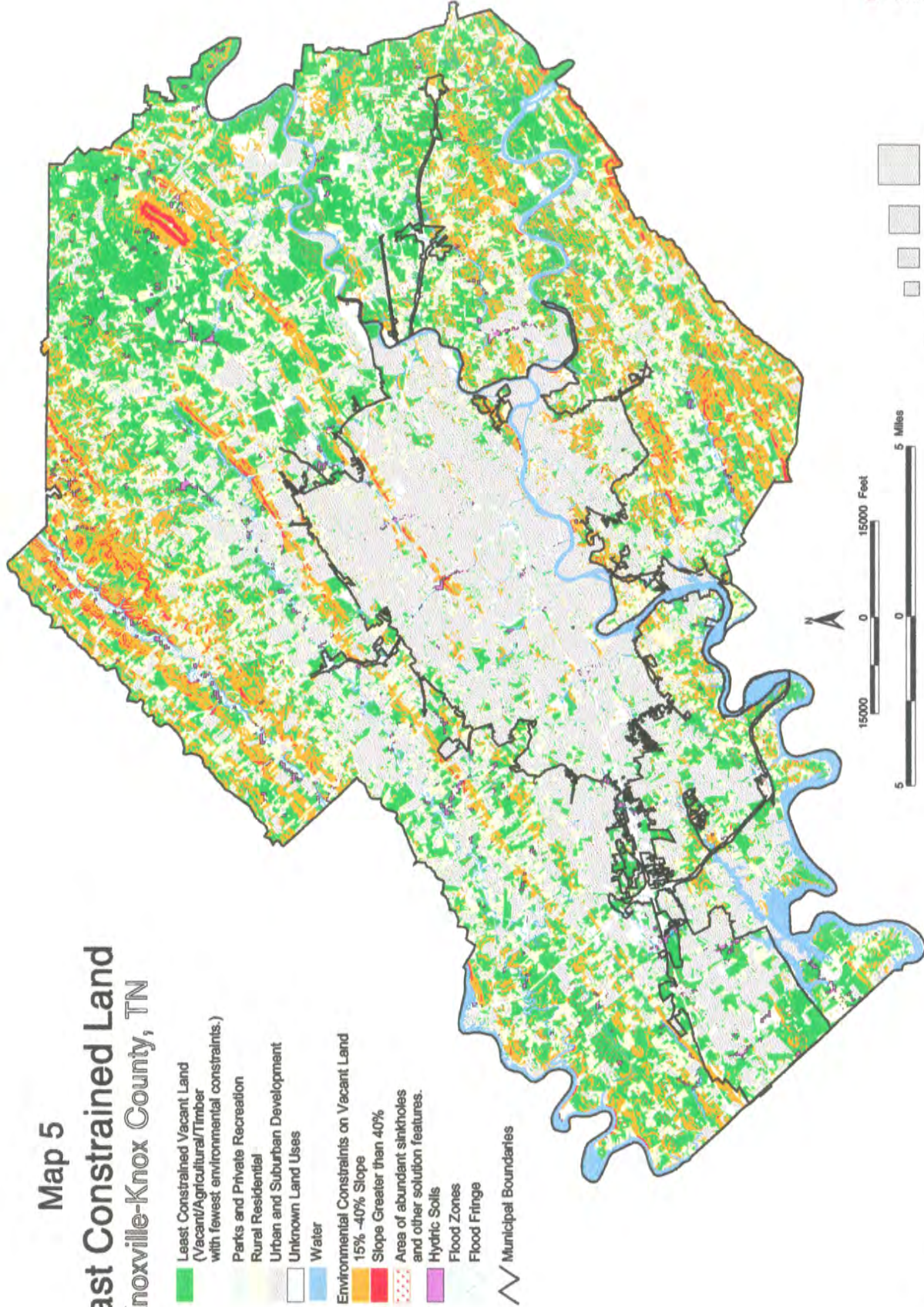


Map 4 Environmental Constraints Knoxville-Knox County, TN



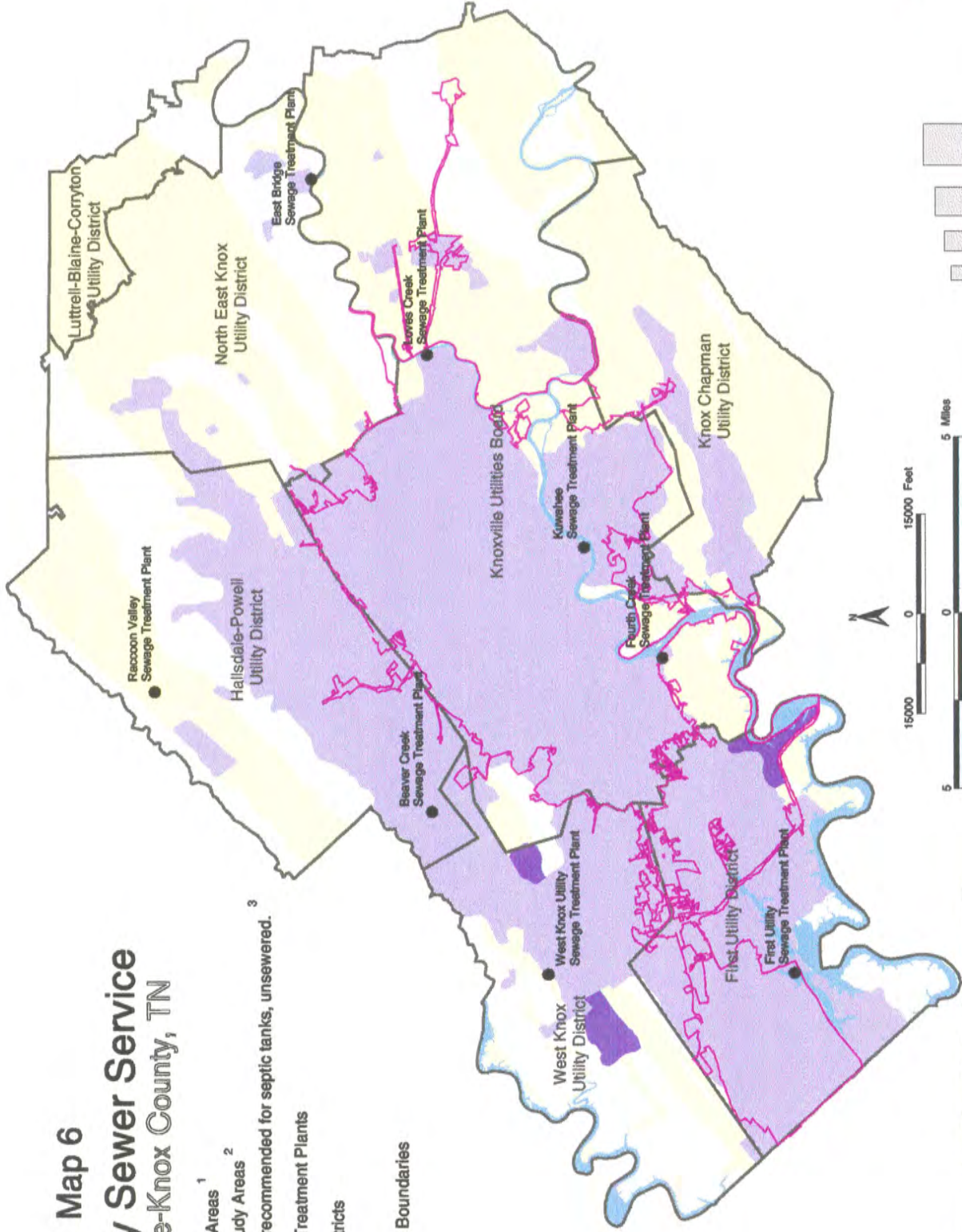
Print date: April 5, 1999.
Data sources include the U.S. Geological Survey and the Tennessee Valley Authority.

Map 5 Least Constrained Land Knoxville-Knox County, TN



Map 6 Sanitary Sewer Service Knoxville-Knox County, TN

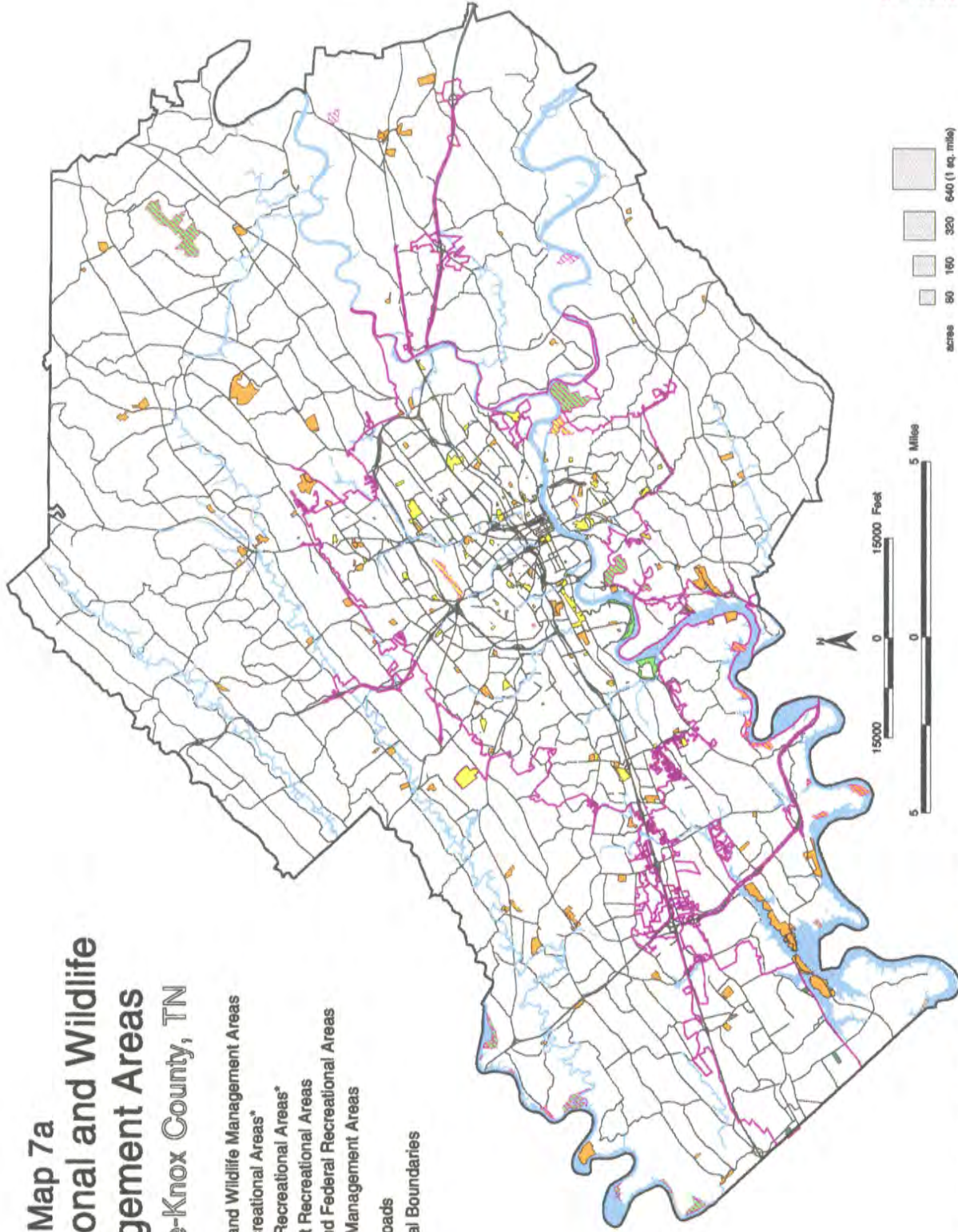
- Sewered Areas ¹
- Sewer Study Areas ²
- Soils not recommended for septic tanks, unsewered. ³
- Sewage Treatment Plants
- Utility Districts
- Water
- Municipal Boundaries



Print date: April 5, 1999
 1) Trunk lines or low pressure systems are available in these areas. (Source: MPC consultation with the utility districts, November 1998.)
 2) Feasibility and cost studies are underway to extend service to these areas.
 3) These soils generally have a percolation rate in excess of 75 minutes, are flood-prone, are less than 6 feet in depth, or are on steep slopes.
 (Source: Leonard D. Harris, Categories of Relative Feasibility for Septic Tank Filter Fields in Knox County, U.S. Geological Survey, 1972, and MPC consultation with U.S. Natural Resource Conservation Service/Knox County Engineering Department, November 1998.)

Map 7a Recreational and Wildlife Management Areas Knoxville-Knox County, TN

- Recreational and Wildlife Management Areas
- City Recreational Areas*
- County Recreational Areas*
- Farragut Recreational Areas
- State and Federal Recreational Areas
- Wildlife Management Areas
- Major Roads
- Municipal Boundaries

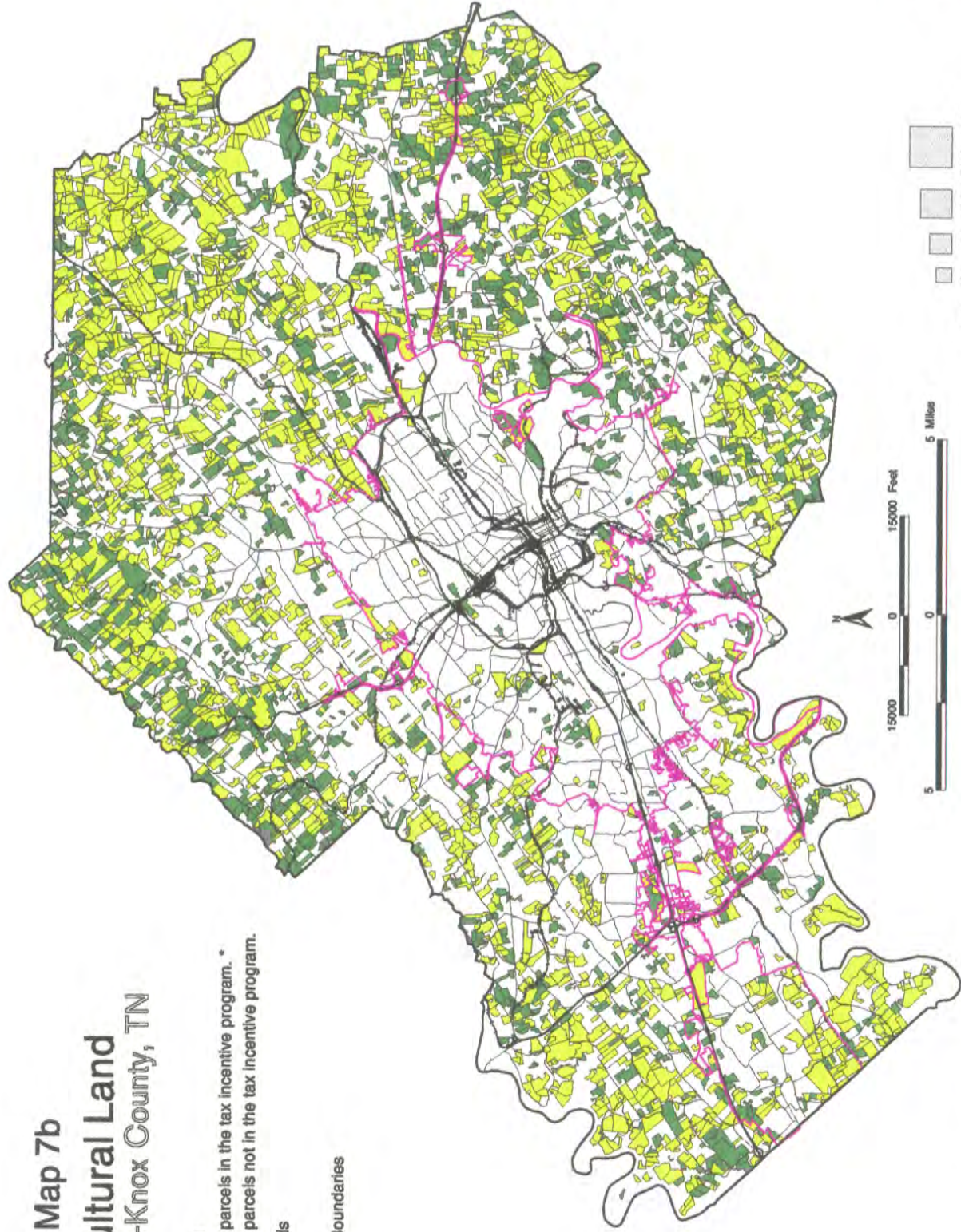


acres 80 160 320 640 (1 sq. mile)

Print date: April 9, 1999.
(Note * : Includes land which is leased through or managed in conjunction with civic groups, private owners, or other institutions.)

Map 7b Agricultural Land Knoxville-Knox County, TN

- Agricultural Land**
- Agricultural parcels in the tax incentive program. *
 - Agricultural parcels not in the tax incentive program.
 - Major Roads
 - Railroads
 - Municipal Boundaries



acres 80 160 320 640 (1 sq. mile)

Print date: April 8, 1999.
(Note * : Owners of these parcels are using the State Tax Act Incentive which was created to conserve agricultural land.)

Table 3
Existing Land Use

	Acreage	Square Miles	Percent of Total	Square Miles per 1000 Population
a. Knox County (Total)				
Agriculture/Forestry/Vacant Land	171,220.942	267.533	50.862	0.732
Parks, Recreation	1,629.458	2.546	0.484	0.007
Public/Quasi-Public Land	14,134.549	22.085	4.199	0.060
Rural Residential	33,847.087	52.886	10.054	0.145
Single Family Residential	56,210.788	87.829	16.698	0.240
Multifamily Residential	3,990.356	6.235	1.185	0.017
Office	2,341.053	3.658	0.695	0.010
Commercial	5,094.467	7.960	1.513	0.022
Industrial	2,676.351	4.182	0.795	0.011
Mining	223.195	0.349	0.066	0.001
Transportation/Communications/Utilities	1,284.873	2.008	0.382	0.005
Wholesale	475.328	0.743	0.141	0.002
Under Construction/Other Uses	1,931.859	3.019	0.574	0.008
Unknown Land Uses	7,460.170	11.657	2.216	0.032
Water	0.083	0.000	0.000	0.000
Rights-Of-Way	34,119.440	53.312	10.135	0.146
Total	336,640.000	526.000	100.000	1.439
b. Knox County (Excluding City of Knoxville)				
Agriculture/Forestry/Vacant Land	160,589.969	250.922	58.819	1.269
Parks, Recreation	878.246	1.372	0.322	0.007
Public/Quasi-Public Land	6,892.674	10.770	2.525	0.054
Rural Residential	31,299.598	48.906	11.464	0.247
Single Family Residential	39,378.377	61.529	14.423	0.311
Multifamily Residential	1,912.250	2.988	0.700	0.015
Office	1,080.585	1.688	0.396	0.009
Commercial	2,018.000	3.153	0.739	0.016
Industrial	1,272.294	1.988	0.466	0.010
Mining	223.195	0.349	0.082	0.002
Transportation/Communications/Utilities	552.393	0.863	0.202	0.004
Wholesale	92.854	0.145	0.034	0.001
Under Construction/Other Uses	1,429.986	2.234	0.524	0.011
Unknown Land Uses	6,756.630	10.557	2.475	0.053
Water	0.083	0.000	0.000	0.000
Rights-Of-Way	18,646.866	29.136	6.830	0.147
Total	273,024.000	426.600	100.000	2.157
c. City of Knoxville				
Agriculture/Forestry/Vacant Land	10,630.973	16.611	16.711	0.099
Parks, Recreation	751.212	1.174	1.181	0.007
Public/Quasi-Public Land	7,241.876	11.315	11.384	0.067
Rural Residential	2,547.489	3.980	4.004	0.024
Single Family Residential	16,832.411	26.301	26.459	0.157
Multifamily Residential	2,078.106	3.247	3.267	0.019
Office	1,260.468	1.969	1.981	0.012
Commercial	3,076.468	4.807	4.836	0.029
Industrial	1,404.057	2.194	2.207	0.013
Mining	0.000	0.000	0.000	0.000
Transportation/Communications/Utilities	732.480	1.145	1.151	0.007
Wholesale	382.474	0.598	0.601	0.004
Under Construction/Other Uses	501.873	0.784	0.789	0.005
Unknown Land Uses	703.540	1.099	1.106	0.007
Water	0.000	0.000	0.000	0.000
Rights-Of-Way	15,472.574	24.176	24.322	0.144
Total	63,616.000	99.400	100.000	0.592

Table 4

Existing Land Use, Developed Land Only

	Acreage	Square Miles	Percent of Total	Square Miles per 1000 Population
a. Knox County (Total)				
Parks, Recreation	1,629.458	2.546	1.032	0.007
Public/Quasi-Public Land	14,134.549	22.085	8.948	0.060
Rural Residential	33,847.087	52.886	21.428	0.145
Single Family Residential	56,210.788	87.829	35.586	0.240
Multifamily Residential	3,990.356	6.235	2.526	0.017
Office	2,341.053	3.658	1.482	0.010
Commercial	5,094.467	7.960	3.225	0.022
Industrial	2,676.351	4.182	1.694	0.011
Mining	223.195	0.349	0.141	0.001
Transportation/Communications/Utilities	1,284.873	2.008	0.813	0.005
Wholesale	475.328	0.743	0.301	0.002
Under Construction/Other Uses	1,931.859	3.019	1.223	0.008
Rights-Of-Way	34,119.440	53.312	21.600	0.146
Total	157,958.805	246.811	100.000	0.675
b. Knox County (Excluding City of Knoxville)				
Parks, Recreation	878.246	1.372	0.831	0.007
Public/Quasi-Public Land	6,892.674	10.770	6.522	0.054
Rural Residential	31,299.598	48.906	29.618	0.247
Single Family Residential	39,378.377	61.529	37.263	0.311
Multifamily Residential	1,912.250	2.988	1.810	0.015
Office	1,080.585	1.688	1.023	0.009
Commercial	2,018.000	3.153	1.910	0.016
Industrial	1,272.294	1.988	1.204	0.010
Mining	223.195	0.349	0.211	0.002
Transportation/Communications/Utilities	552.393	0.863	0.523	0.004
Wholesale	92.854	0.145	0.088	0.001
Under Construction/Other Uses	1,429.986	2.234	1.353	0.011
Rights-Of-Way	18,646.866	29.136	17.645	0.147
Total	105,677.318	165.121	100.000	0.835
c. City of Knoxville				
Parks, Recreation	751.212	1.174	1.437	0.007
Public/Quasi-Public Land	7,241.876	11.315	13.852	0.067
Rural Residential	2,547.489	3.980	4.873	0.024
Single Family Residential	16,832.411	26.301	32.196	0.157
Multifamily Residential	2,078.106	3.247	3.975	0.019
Office	1,260.468	1.969	2.411	0.012
Commercial	3,076.468	4.807	5.884	0.029
Industrial	1,404.057	2.194	2.686	0.013
Mining	0.000	0.000	0.000	0.000
Transportation/Communications/Utilities	732.480	1.145	1.401	0.007
Wholesale	382.474	0.598	0.732	0.004
Under Construction/Other Uses	501.873	0.784	0.960	0.005
Rights-Of-Way	15,472.574	24.176	29.595	0.144
Total	52,281.487	81.690	100.000	0.487

**Table 5
Environmental Constraints**

Knox County			
Constraint	Acreage	Square Miles	Percent of County Land Area
15% to 40% Slope	76,308.529	119.232	22.668
>40% Slope	7,417.223	11.589	2.203
Hydric Soils	4,604.983	7.195	1.368
Sinks	12,202.644	19.067	3.625
Floodway	13,137.898	20.528	3.903
All Land	336,640.000	526.000	

City of Knoxville			
Constraint	Acreage	Square Miles	Percent of City Land Area
15% to 40% Slope	9,002.855	14.067	14.152
>40% Slope	678.820	1.061	1.067
Hydric Soils	951.387	1.487	1.496
Sinks	3,153.645	4.928	4.957
Floodway	4,150.919	6.486	6.525
All Land	63,616.000	99.400	

Town of Farragut			
Constraint	Acreage	Square Miles	Percent of Farragut Land Area
15% to 40% Slope	613.381	0.958	5.911
>40% Slope	13.636	0.021	0.131
Hydric Soils	273.153	0.427	2.632
Sinks	171.678	0.268	1.654
Floodway	0.185	0.000	0.002
All Land	10,377.046	16.214	

Note:

Do not sum the 5 categories of constrained land or shares of county land. They are not mutually exclusive geographic features. Example: land with hydric soil can also be found in floodways. Summing the categories will result in multiply-counting some land.

Table 6
Farms and Farm Land in Knox County
1954-1997

	<u>1954</u>	<u>1959</u>	<u>1974</u>	<u>1978</u>	<u>1982</u>	<u>1987</u>	<u>1992</u>
Total Number of Farms	3,599	2,377	1,278	1,251	1,414	1,253	1,157
Total Farm Acreage	192,471	166,724	104,259	105,186	108,490	94,701	94,254
Average Farm Size (acres)	54	70	82	85	77	76	81

Source: U.S. Census of Agriculture. The difference in the Tax Assessor's records (the Agricultural Act and agriculture acreage) and the figure in this table is substantially due to an undercount in the US Census of Agriculture, according to local U.S.D.A. officials.

Table 7
Agricultural Zoned Land
(In Acres)

	County		
	<u>Knoxville</u>	<u>Balance</u>	<u>Farragut</u>
All Land Zoned Agricultural	4,146	189,436	1,440
Tracts Over 15 Acres	3,750	188,642	1,423
Zoned Agricultural			

Section 3, Development
Trends & Projections

Section 3

Development Trends and Projections

Growth of Knoxville

Map 8, Growth of the City, shows the gradual expansion of Knoxville since 1792. The city started with 55.9 acres (.087 square mile) over 200 years ago. Today Knoxville has a land area of just under 100 square miles. The map shows that a relatively small area has been annexed during the 1980's and 1990's, compared to very large annexations during the World War I era and the 1960's.

Subdivisions and Building Permits

Maps 9 and 10 show five year's worth of residential subdivisions and building permits, respectively. The maps show that the majority of residential development has been in North, Northwest and Southwest Knox County. Farragut and Northwest Knoxville have also been growth centers. More detailed information about residential and non residential development trends is available in MPC's 1998 Development Activity Report. Between 1990 and 1998, building permits for 29,510 dwelling units were issued.

Historical Population Trends

The U.S. Census Bureau estimates that Knox County's population grew from 335, 749 to 366,846 between April 1990 and July 1998, an increase of 9.3 percent. The Knox County-Knoxville Metropolitan Statistical Area (MSA) grew 12.4 percent during the same period. Knox County accounts for about 55 percent of the MSA's population of 659,074. Census figures for Knoxville showed a slow decline during the 1980's. After the 1990 census, population began to increase. The last available Census estimate for 1997 placed Knoxville's population at 167,854 a 1.7 percent increase over 1990.

Farragut's population has grown at a steady rate since it was founded. In 1997, the Census Bureau estimated Farragut had grown to 16,654, up 27% since 1990.

Population Projections

Population projections proposed by the University of Tennessee Center for Business and Economic Research (UTCBER) have been released for use in the growth planning process. Knox County, Knoxville, and Farragut have all written letters to UT expressing concern that the projections are too low. For comparison, Knox County population projections based on high, moderate, and low employment growth

scenarios have been prepared by MPC. Figures 1 , 2 and 3 summarize the population projections.

MPC Population Projections

MPC projected Knox County's population through 2020, using a cohort survival model, regression analysis, and a shift-share employment projection technique. Our model uses employment forecasts to project the number of people migrating in and out of the county. The high and moderate growth scenarios are based in part on the U.S. Department of Commerce's projections of employment growth for the MSA. High, moderate, and low growth scenarios are shown on the attached chart.

High Growth Scenario. Employment in the six-county Knoxville Metropolitan Statistical Area (MSA) grows 36 % between 1995 and 2020, as predicted by the U.S. Department of Commerce. During this time, Knox County's job growth equals or slightly exceeds the MSA rate. (In the 1990's, Knox County employment has grown slower than the MSA average). Approximately 100,000 people and 66,000 net new jobs would be added between 2000 and 2020.

Moderate Growth Scenario. Employment in the six-county Knoxville MSA grows 36 % between 1995 and 2020 , as predicted by the U.S. Department of Commerce. During this time, Knox County's job growth is a little slower than the MSA average. Approximately 76,000 people and 48,000 net new jobs would be added between 2000 and 2020. This scenario represents a continuation of the 1990 to 1997 Knox County growth trend.

Low Growth Scenario. Employment growth slows down and does not fully recover during the planning period. Approximately 53,000 people and 33,000 net new jobs would be added between 2000 and 2020. This scenario represents what would happen if the low growth period of 1995 to 1997 returned and conditions did not improve. The rate of population growth is similar to the preliminary projections released by the University of Tennessee Center for Business and Economic Research.

Farragut and Knoxville Projections. MPC used two ratio techniques to forecast year 2020 populations of Knoxville and Farragut. Both techniques were applied to the Moderate Growth forecast described above.

A. Growth Shares

The first technique assumes that the two cities' share of Knox County's growth will be the same as it has been reported by the Census Bureau during the 1990's. We have applied 1990-1997 "growth shares" to the 2000 through 2020 Knox County moderate growth projection.

B. Population Ratio

For the second technique, MPC developed a population ratio based on the percentage share of total county population assigned to Farragut and Knoxville in the UTCBER . This results in higher projections for the two cities

Projecting Future Land Needs

The growth management law requires cities and counties to draw urban growth boundaries and planned growth areas based, in part, on anticipated population growth and the land supply needed to accommodate two decades of growth. MPC staff has developed a computer spreadsheet model to forecast land needs based on current land use patterns, projected population growth, housing demand forecasts, anticipated residential development density (dwelling units per acre) and a market factor adjustment to avoid creating an artificial shortage of land for development. An example of the results generated by the model, is shown in Tables 8 and 9. The land projection model was prepared as follows:

1. An existing land use study was prepared using tax assessor's data from the Knoxville Knox County Geographic Information System (GIS).
2. Ratios of existing population to exiting land use were calculated.
3. Population projections were prepared. (The example in Table 8 shows land needs under the UTCBER projections and MPC's moderate growth scenario.)
4. A housing demand projection was prepared.

5. Future residential land needs were projected based on the housing demand forecast. (For the example in Table 8, densities of 2.5 dwelling units per acre for single family housing and 8 units per acre for attached housing were used.)
6. Park and public open space needs were derived from service standards in adopted park and open space plans. The existing inventory of park land from the tax assessor's records was adjusted to include all lands shown on MPC's open space inventory, including TVA lands, wildlife management areas, and private land leased for public recreation.
7. Future industrial land requirements were calculated based on information obtained from the Knox County Development Corporation.
8. Land requirements for other categories were projected by applying the population/acreage ratios developed in step 2 to the population projections.
9. These were totaled to provide the "Unadjusted land needs" for the years 2010 and 2020, as shown in Table 9
10. Table 9 shows projected land needs adjusted with a "market factor." A market factor adjustment of 100% was applied to unadjusted residential land needs for new development between 1998 and 2020. A market factor adjustment of 50 % was applied to the commercial, office, "other business", public-quasi public and right of way categories for new development between 1998 and 2020. This resulted in adjusted projected land needs for the years 2010 and 2020.

Variables Affecting Land Demand Forecast

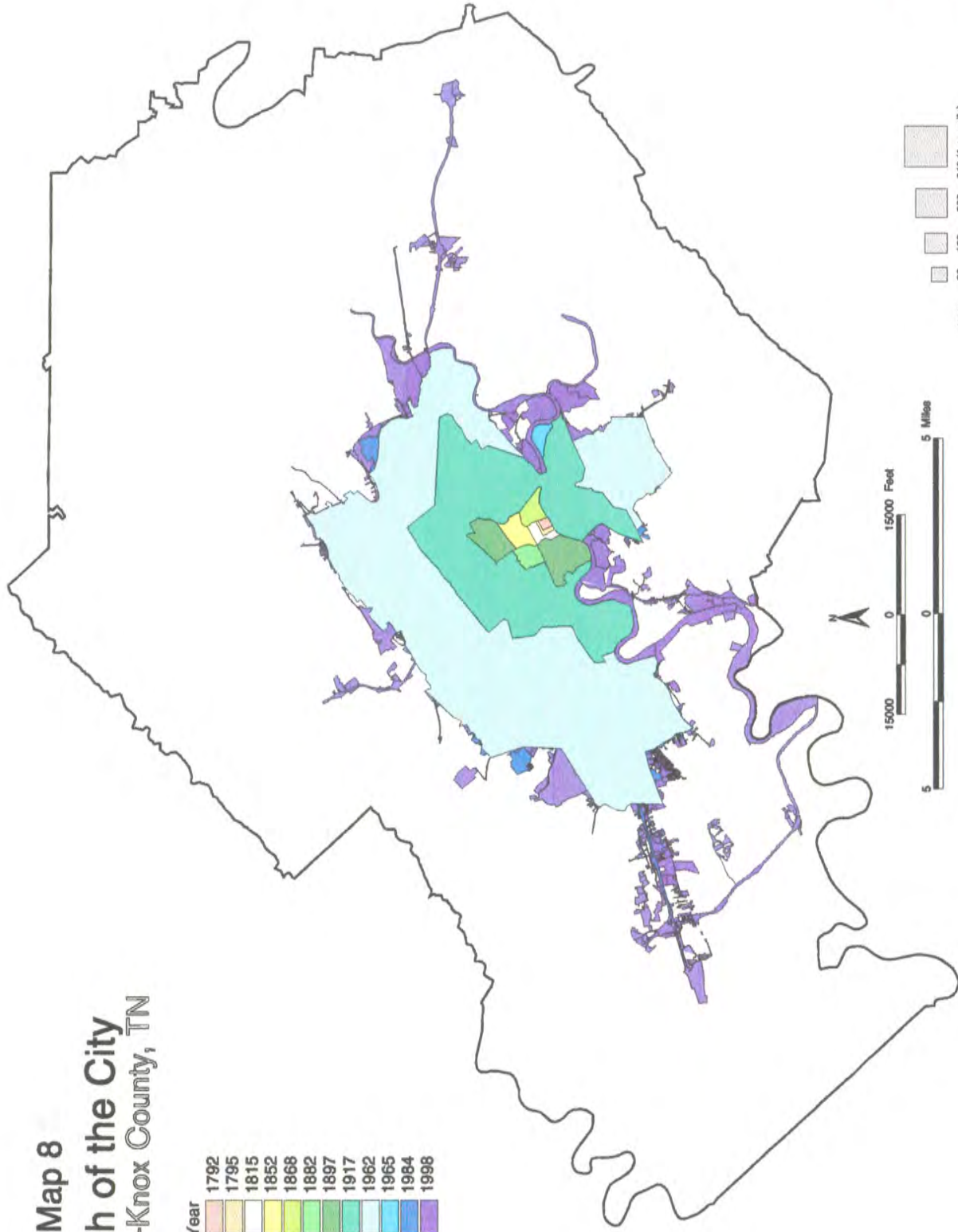
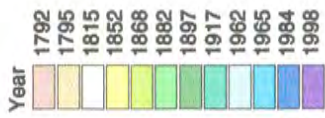
The results produced by the land projection model will vary depending on three variables:

1. **Population Projections.** Because future need for most land uses are calculated based on population ratios or service standards, the higher the population figures used, the higher the projected land needs will be.
2. **Housing Demand and Density Forecast.** Housing demand grows faster than population because the average number of

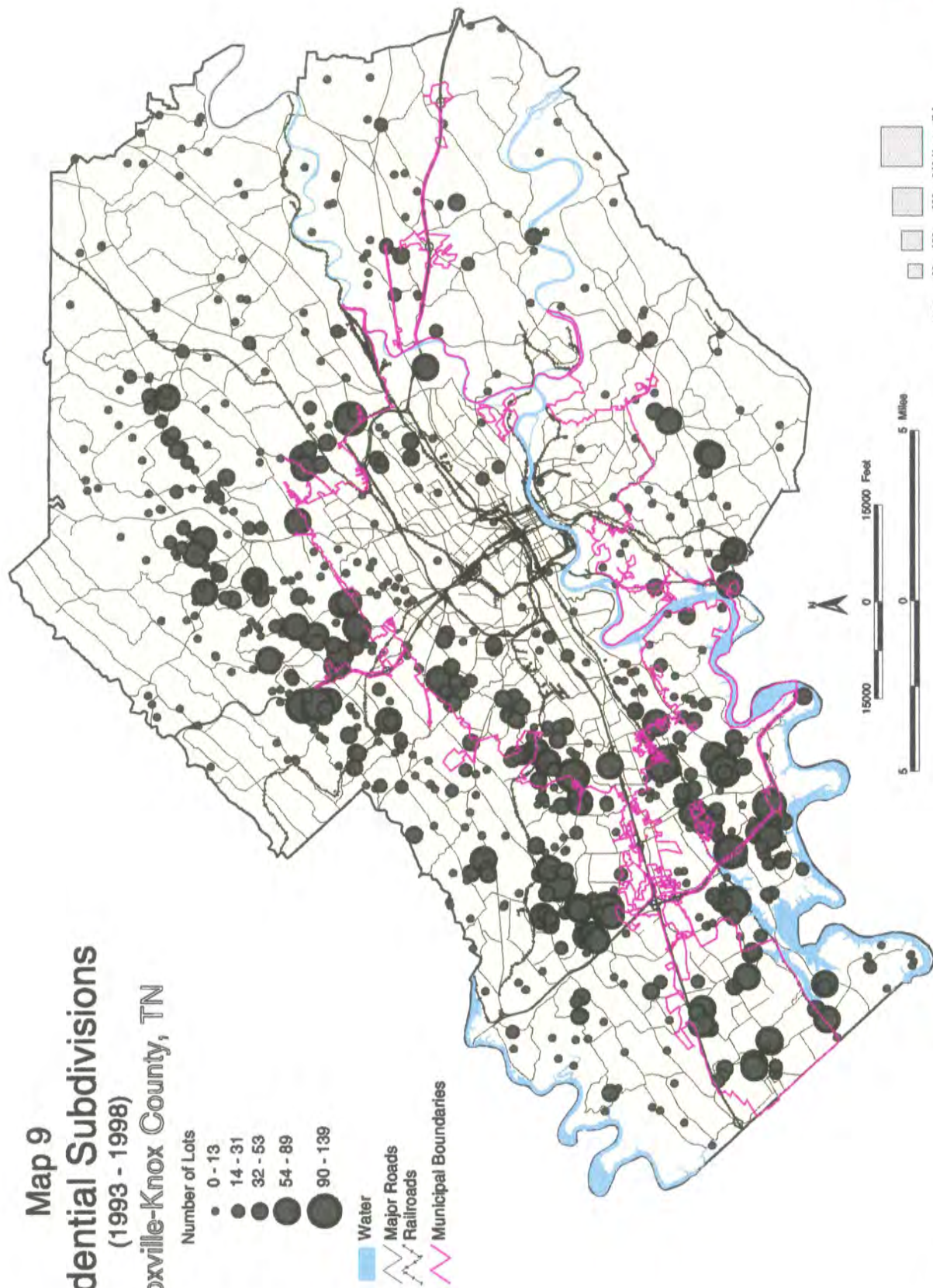
persons per household continues to decline over time. Single family residential development is the largest category of developed land and the largest consumer of raw land in the development process. Encouraging higher residential development densities will have the most dramatic impact in reducing the long range demand for land.

- 3. Market Factor Adjustment.** The purpose of the market factor adjustment is to avoid creating an artificial shortage of developable land later in the planning period. The market factor adjustment is need because not all property owners will be interested in selling their land for development; not all developers will build at the predicted intensity, and some land identified in this report as developable may prove to have problems relating to environmental characteristics, configuration or ownership. The example shown in Table 9 is based on a 100% percent market factor for residential land and a 50% market factor for most non-residential uses. A more conservative market factor adjustment would result in more compact growth boundaries.

Map 8 Growth of the City Knoxville-Knox County, TN



Map 9 Residential Subdivisions (1993 - 1998) Knoxville-Knox County, TN



Print date: April 5, 1999.
Data represents residential subdivisions approved in Knox County from 1993 through October 1998.

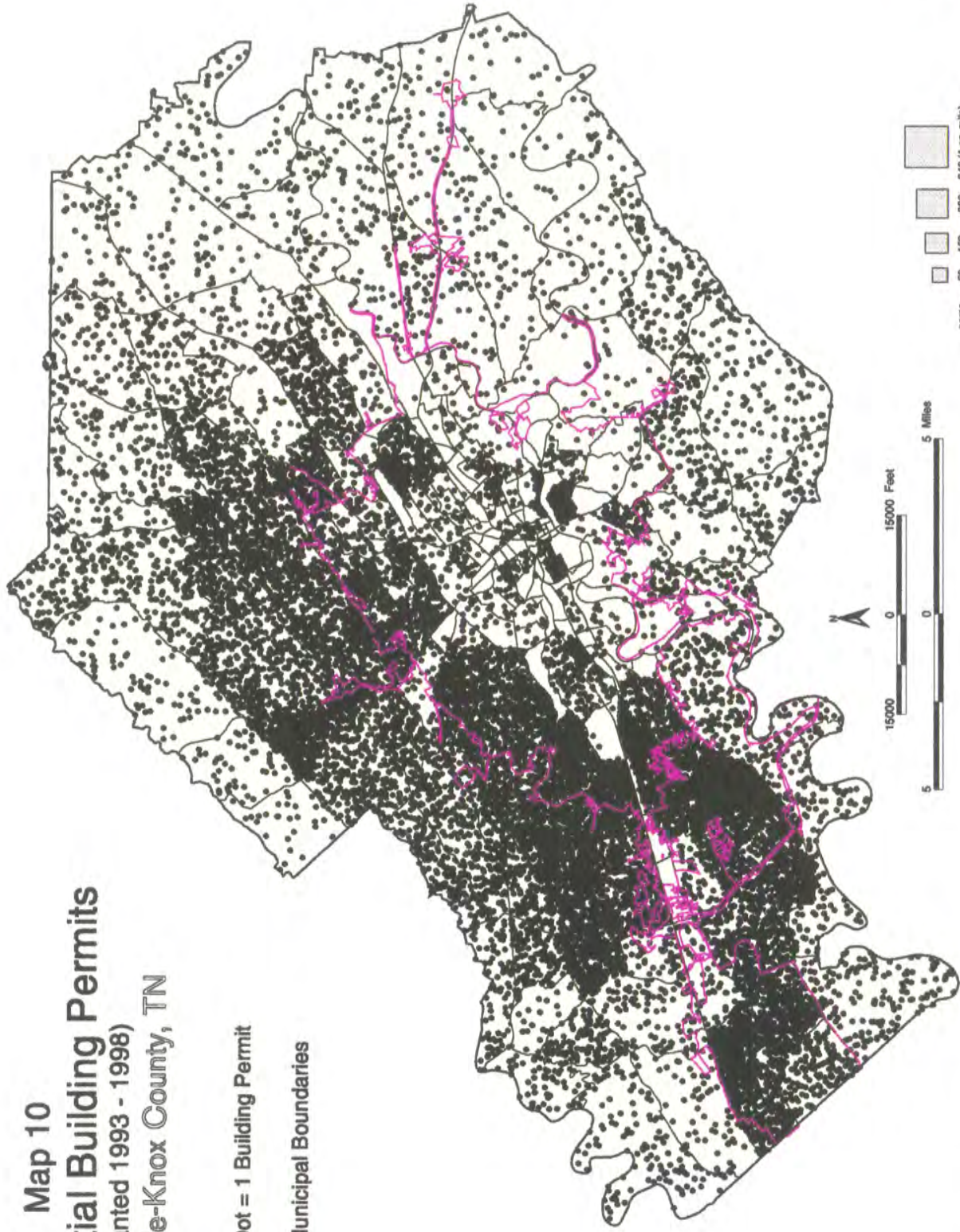
Map 10

Residential Building Permits (Granted 1993 - 1998)

Knoxville-Knox County, TN

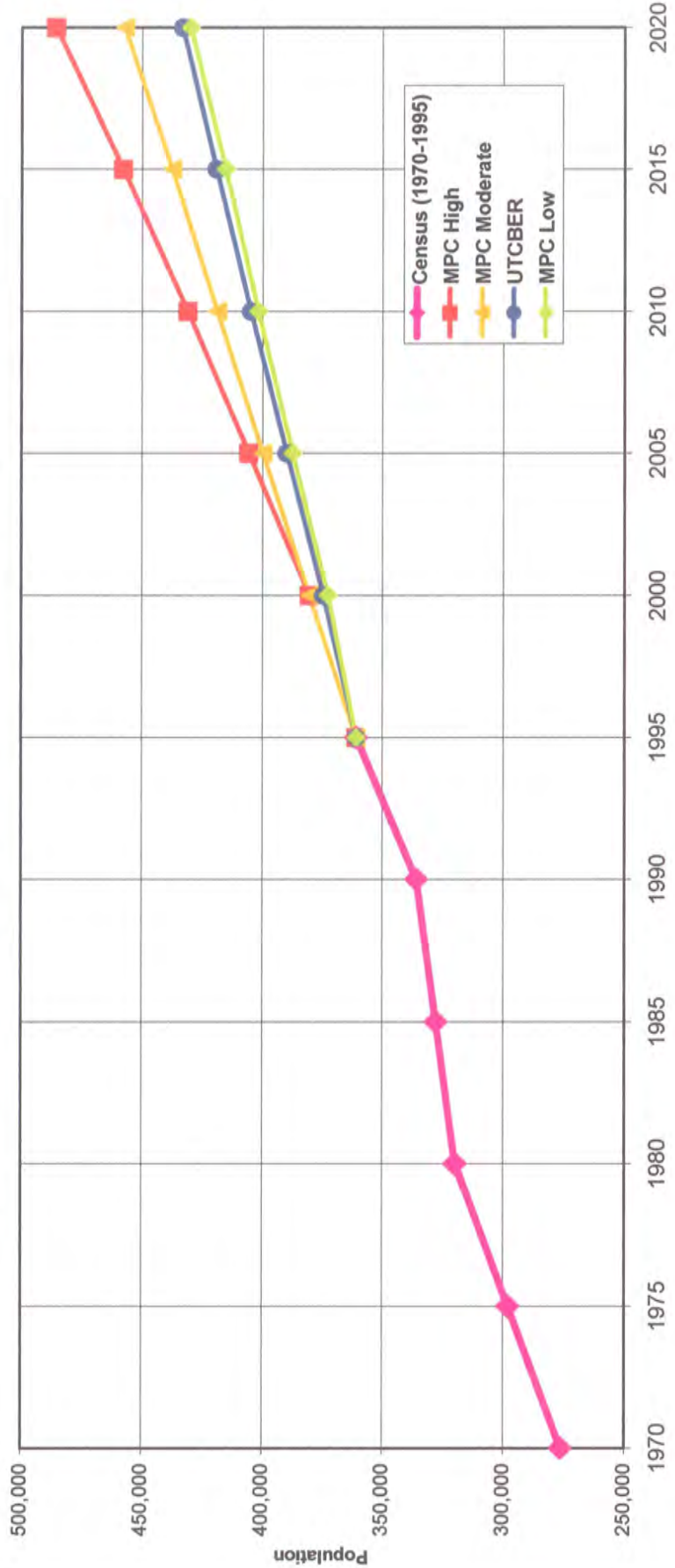
• 1 Dot = 1 Building Permit

~ Municipal Boundaries



Print date: April 5, 1999.
Data represent the number of housing units associated with building permits granted in Knox County from 1993 through October 1998. These data are mapped by Traffic Analysis Zone (TAZ).

Figure 1: Knox County Population Trends and Projections, 1970-2020

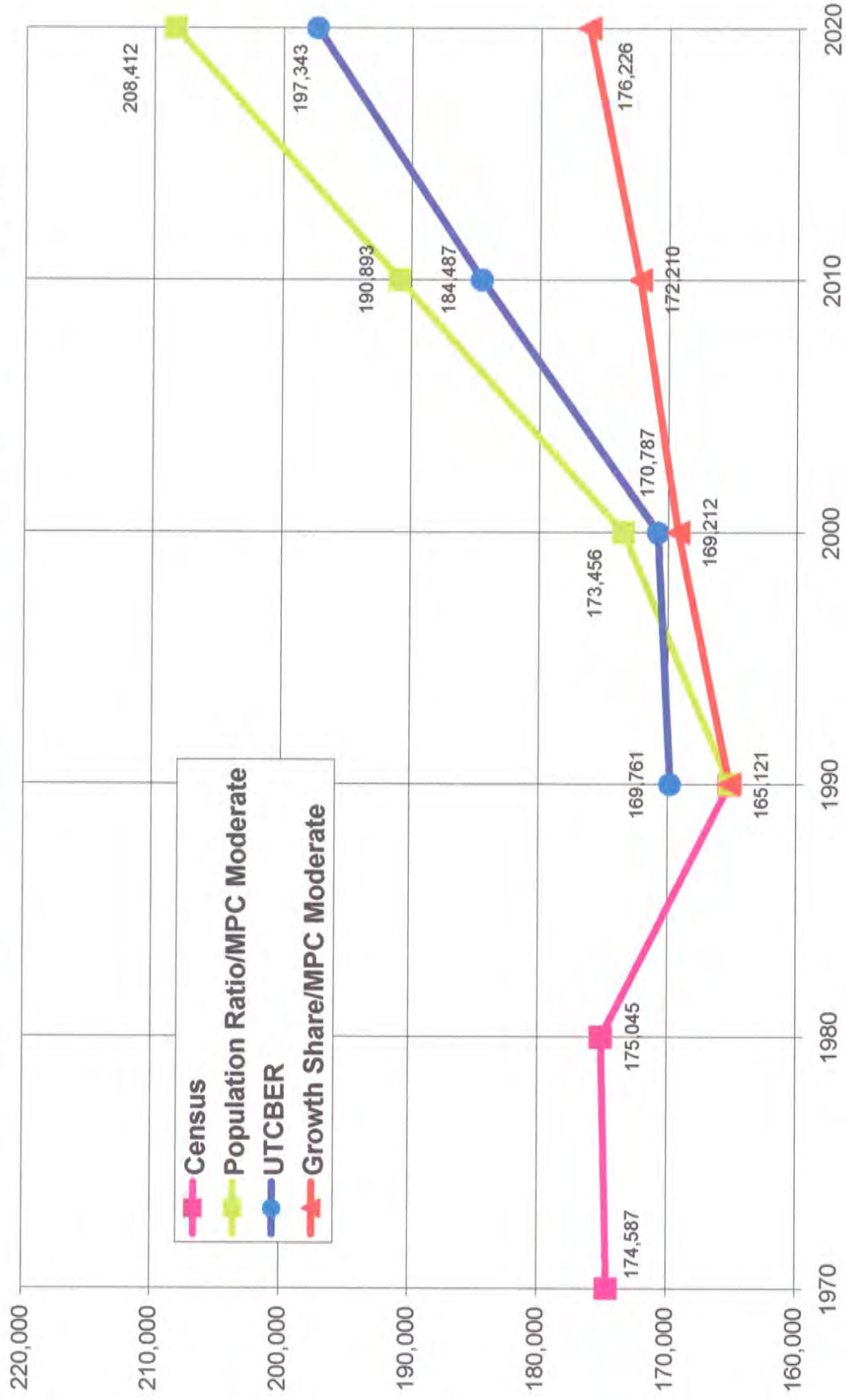


Knox County Population Projections, 1970-2020

Year	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020
Census (1970-1995)	276,293	297,994	319,694	327,722	335,749	360,860	--	--	--	--	--
MPC High	--	--	--	--	--	--	380,469	405,553	430,785	457,641	485,742
MPC Moderate	--	--	--	--	--	--	380,469	399,638	418,716	437,471	457,145
UTCBER	--	--	--	--	--	--	374,616	389,865	404,666	418,992	432,866
MPC Low	--	--	--	--	--	--	372,594	387,318	401,567	415,141	429,711

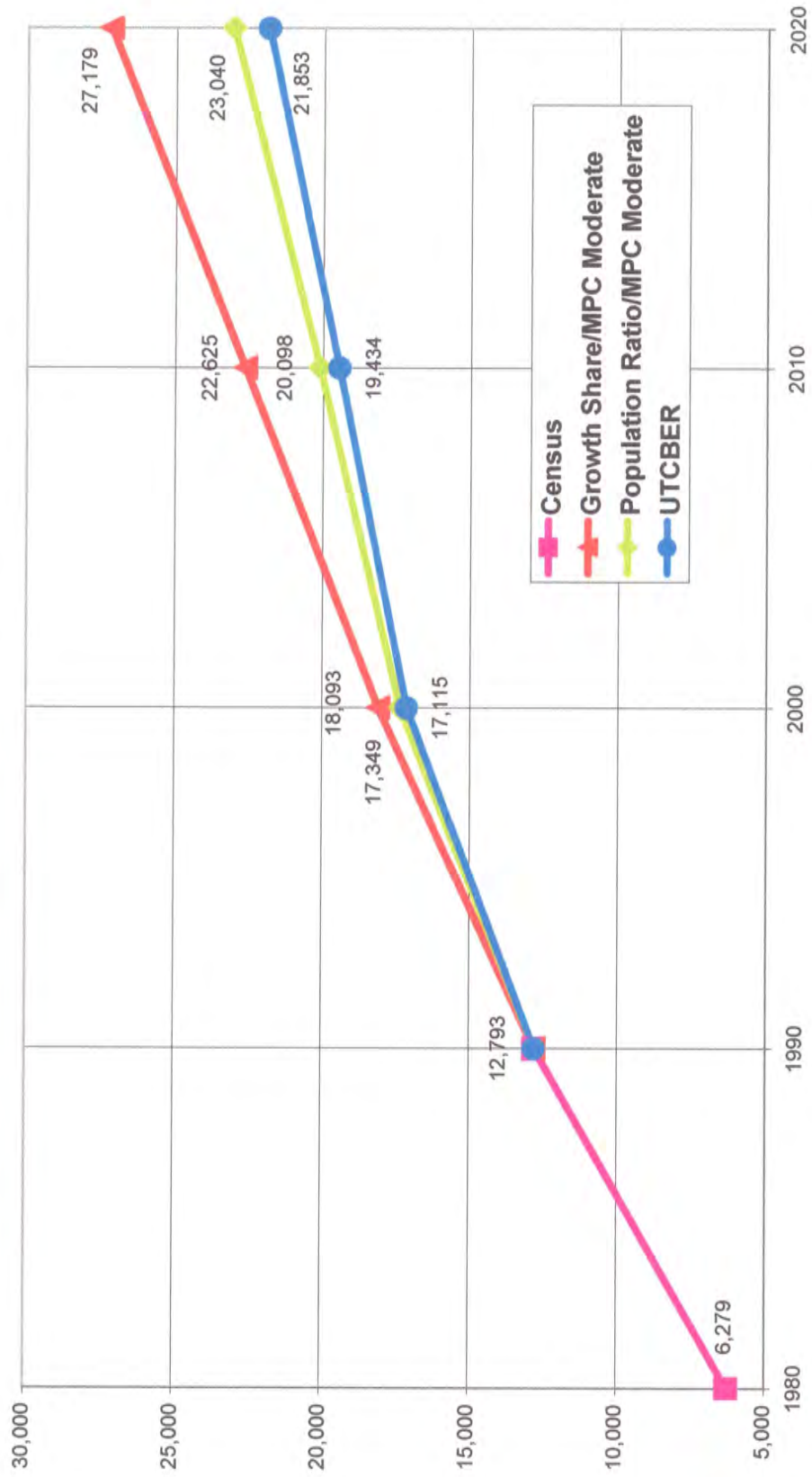
Source: MPC, 1999

Figure 2: Knoxville Population Trends and Projections, 1970-2020



Source: UTCBER, March 1999
MPC, January 1999

Figure 3: Farragut Population Trends and Projections, 1980-2020



Source: UTCBER, March 1999
MPC, January 1999

Table 8

Example of Land Projection Model Output - Without Market Factor Adjustment

Land Use	Existing Inventory		Moderate Growth Scenario		CBER Growth Scenario	
	Land Area (sq. mi.)	Area per 1000 Population	Land Area (sq. mi.)	Land Area (sq. mi.)	Land Area (sq. mi.)	Land Area (sq. mi.)
		1998				
Rural	316.531	0.863	273.745	241.682	279.348	252.742
Parks, Recreation	6.434	0.018	10.631	11.607	10.275	10.991
Public/Quasi-Public Land	22.085	0.060	25.208	27.522	24.362	26.060
Single Family Residential	87.829	0.239	99.717	109.132	98.131	105.509
Multifamily Residential	6.235	0.017	8.202	9.760	7.940	9.160
Office	3.658	0.010	4.175	4.558	4.035	4.316
Commercial	7.960	0.022	9.086	9.919	8.781	9.393
Industrial	4.182	0.011	10.745	17.307	10.745	17.307
Other Private/Business Uses	17.774	0.048	20.287	22.149	19.607	20.973
Rights-Of-Way	53.312	0.145	64.203	72.364	62.777	69.549
Total	526.000	1.434	526.000	526.000	526.000	526.000

Calculations							
Population	1998	2010	2020	Net Additions 1998-2010	Net Additions 2010-2020		
	Knox County (moderate)	366,846	418,716	457,145	51,870	38,429	
Knox County (high)	366,846	430,785	485,742	63,939	54,957		
Knox County (CBER)	366,846	404,666	432,866	37,820	28,200		
Residential Units	1999	2010	2020	Net Additions 1999-2010	Net Additions 2010-2020	Needed New Land 1999-2010	Needed New Land 2010-2020
	Knox County (moderate)	172,095	201,187	224,227	29,092	23,040	
Single Family (65.38% share)	112,516	131,536	146,600	19,020	15,064	11.888	9.415
Multi-Family (34.62% share)	59,579	69,651	77,627	10,072	7,976	1.967	1.558
Knox County (high)	172,095	206,731	237,700	34,636	30,969		
Single Family (65.38% share)	112,516	135,161	155,408	22,645	20,248	14.153	12.655
Multi-Family (34.62% share)	59,579	71,570	82,292	11,991	10,721	2.342	2.094
Knox County (CBER)	172,095	197,306	215,361	25,211	18,055		
Single Family (65.38% share)	112,516	128,999	140,803	16,483	11,804	10.302	7.378
Multi-Family (34.62% share)	59,579	68,307	74,558	8,728	6,251	1.705	1.221

Notes:

Rural = Vacant, agriculture, forestry, water, and rural residential.
 Other Private/Business Uses=Mining, transportation/communications/utilities, wholesale, under construction, and unknown uses.
 Single family residential density=2.5 dwelling units per acre.
 Multi-family residential density=8.0 dwelling units per acre.
 Parks, recreation=Calculation of projected needs based on design standard of 16.25 acres per 1000 population.
 Industrial=Current inventory (4.182 sq. mi. in 1998) plus 13.125 sq. mi. over planning period (6.563 sq. mi. per 10-yr. period).
 ROW=Ratio of developed land to ROW area is 2.929:1 for existing land inventory. Ratio was applied across all scenarios to calculate ROW area.

Table 9

Example of Land Projection Model Output - With Market Factor Adjustment

Land Use	Existing Inventory		Moderate Growth Scenario (Adjusted)		CBER Growth Scenario (Adjusted)	
	Land Area (sq. mi.)	Area per 1000 Population	Land Area (sq. mi.)	Land Area (sq. mi.)	Land Area (sq. mi.)	Land Area (sq. mi.)
		(sq. mi.)				
	1998	1998	2010	2020	2010	2020
Rural	316.531	0.863	250.278	199.879	259.682	218.889
Parks, Recreation	6.434	0.018	10.631	11.607	10.275	10.991
Public/Quasi-Public Land	22.085	0.060	26.769	30.240	25.501	28.047
Single Family Residential	87.829	0.239	111.605	130.434	108.433	123.188
Multifamily Residential	6.235	0.017	10.169	13.285	9.644	12.086
Office	3.658	0.010	4.434	5.008	4.224	4.645
Commercial	7.960	0.022	9.648	10.899	9.191	10.109
Industrial	4.182	0.011	10.745	17.307	10.745	17.307
Other Private/Business Uses	17.774	0.048	21.544	24.337	20.523	22.572
Rights-Of-Way	53.312	0.145	70.176	83.004	67.783	78.165
Total	526.000	1.434	526.000	526.000	526.000	526.000

Calculations

Population	1998	2010	2020	Net Additions	Net Additions	Unadj. New Land	Unadj. New Land	Adj. (100%) New Land	Adj. (100%) New Land
				1998-2010	2010-2020				
Knox County (moderate)	366,846	418,716	457,145	51,870	38,429				
Knox County (high)	366,846	430,785	485,742	63,939	54,957				
Knox County (CBER)	366,846	404,666	432,866	37,820	28,200				
Residential Units	1999	2010	2020	Net Additions	Net Additions	1999-2010	2010-2020	1999-2010	2010-2020
Knox County (moderate)	172,095	201,187	224,227	29,092	23,040				
Single Family (65.38% share)	112,516	131,536	146,600	19,020	15,064	11,888	9,415	23,775	18,829
Multi-Family (34.62% share)	59,579	69,651	77,627	10,072	7,976	1,967	1,558	3,934	3,116
Knox County (high)	172,095	206,731	237,700	34,636	30,969				
Single Family (65.38% share)	112,516	135,161	155,408	22,645	20,248	14,153	12,655	28,306	25,309
Multi-Family (34.62% share)	59,579	71,570	82,292	11,991	10,721	2,342	2,094	4,684	4,188
Knox County (CBER)	172,095	197,306	215,361	25,211	18,055				
Single Family (65.38% share)	112,516	128,999	140,803	16,483	11,804	10,302	7,378	20,604	14,755
Multi-Family (34.62% share)	59,579	68,307	74,558	8,728	6,251	1,705	1,221	3,409	2,442

Notes:

Rural = Vacant, agriculture, forestry, water, and rural residential.
 Other Private/Business Uses=Mining, transportation/communications/utilities, wholesale, under construction, and unknown uses.
 Single family residential density=2.5 dwelling units per acre.
 Multi-family residential density=8.0 dwelling units per acre.
 Parks, recreation=Calculation of projected needs based on design standard of 16.25 acres per 1000 population.
 Industrial=Current inventory (4.182 sq. mi. in 1998) plus 13.125 sq. mi. over planning period (6.563 sq. mi. per 10-yr. period).
 ROW=Ratio of developed land to ROW area is 2.929:1 for existing land inventory. Ratio was applied across all scenarios to calculate ROW area.

Section 4, Adopted
Plans

Section 4

Adopted Plans

There are two active planning commissions in Knox County. The Knoxville-Knox County Metropolitan Planning Commission (MPC) is a joint venture of Knoxville and Knox County. MPC provides planning, zoning and subdivision review services to both governments. The Farragut Municipal Planning Commission serves the Town of Farragut and makes recommendations to the Board of Aldermen. Plans adopted by these planning commissions, coupled with zoning, subdivision review, and capital improvements programming, give the three local governments in Knox County, the authority to determine the timing, nature, location and extend of development.

Knoxville-Knox County General Plan

The General Plan for Knoxville/Knox County, prepared in 1994, includes long range policies for land use, utilities, recreation, transportation, public facilities and other concerns. It is the Planning Commission's official policy statement on the long-term development within Knoxville and Knox County. The plan has also been adopted by Knoxville's City Council. Policies and proposals are expressed in written and graphic forms. The plan identifies the neighborhood as the basic building block of the community; proposes compact, intensely developed "activity centers" at major thoroughfare intersections as a better alternative to commercial strip development; identifies areas for new development, revitalization, and conservation; and advocates economic development and affordable housing.

Knoxville-Knox County Sector Plans and Knoxville One Year Plan

Knoxville/Knox County is divided into twelve geographic sectors for the purpose of preparing City and County sector plans. These plans provide projections for land use, transportation, and community facilities for a five-year and fifteen-year period. The sector plans are more specific than the General plan and are used in making zoning decisions. Map 11 shows the land use plans for all sectors joined into one county-wide map. All of the Sector plans have been adopted by MPC and the Knoxville City Council. Knoxville's City Charter includes a requirement that rezoning decisions must be consistent with the City's comprehensive development plan. To maintain that consistency, MPC maintains the *Knoxville One Year Plan*, which is reviewed annually.

Farragut 2004 Plan

In April, 1995, the Town of Farragut issued a plan which captured the vision of their community in the year 2004. Their plan included "consideration of the aspects of Town life most important to the residents of Farragut: arts, culture, environmental quality, growth and economic development, public service, recreation, information technologies and transportation systems." Included in the "Farragut 2004 Plan" is a description of the Town as it exists and operates currently, along with a planning and citizen participation process which will guide the implementation of the Plan. The plan concludes with a set of overarching strategic recommendations intended to guide the evolution of the Town through the year 2004.





Currently, the Town of Farragut is assembling their Land Use Plan, which is scheduled to be completed in January, 2000.

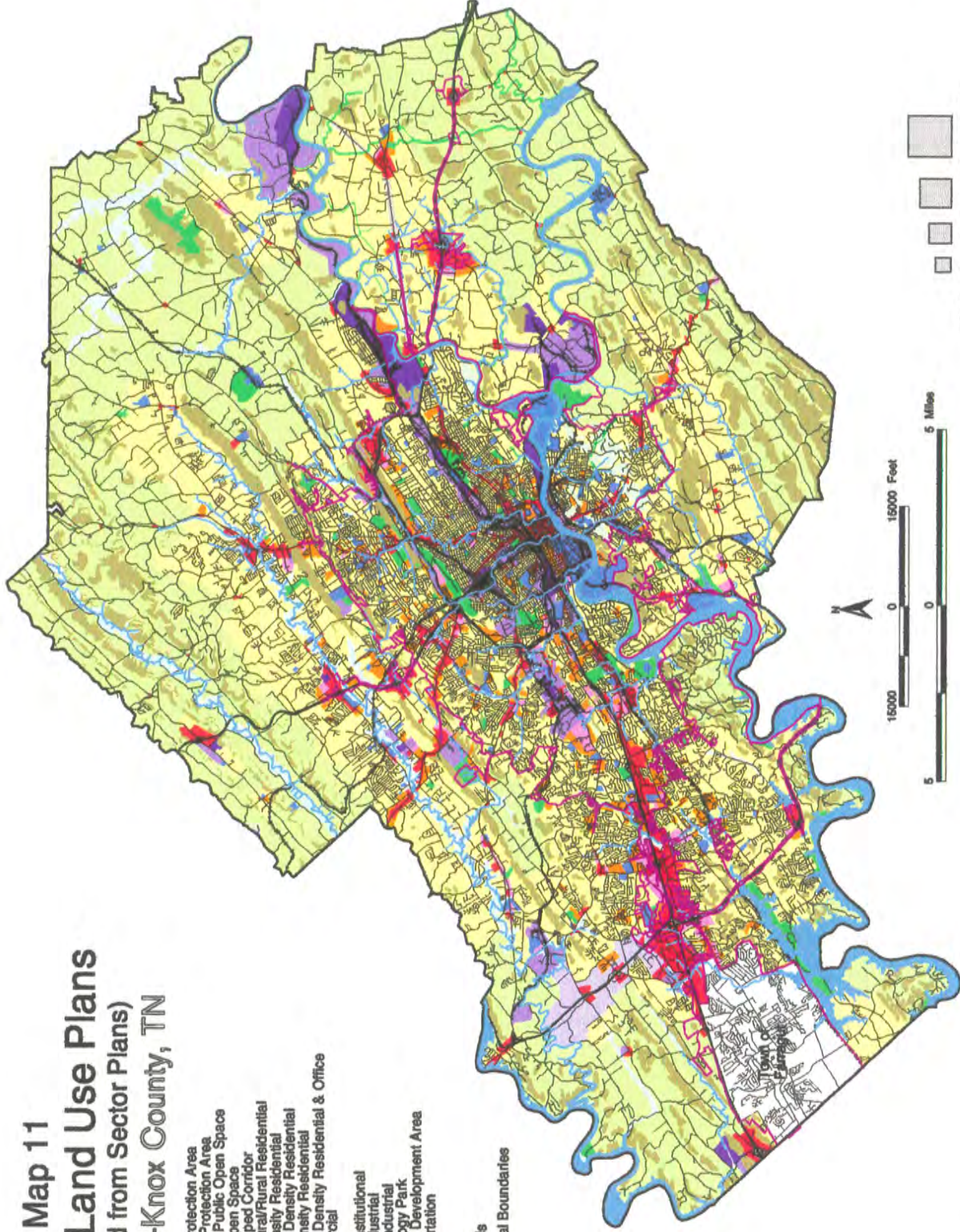
Map 11

Adopted Land Use Plans

(Compiled from Sector Plans)

Knoxville-Knox County, TN

-  Slope Protection Area
-  Stream Protection Area
-  Parks & Public Open Space
-  Other Open Space
-  Landscaped Corridor
-  Agricultural/Rural Residential
-  Low Density Residential
-  Medium Density Residential
-  High Density Residential
-  Medium Density Residential & Office
-  Commercial
-  Offices
-  Public Institutional
-  Light Industrial
-  Heavy Industrial
-  Technology Park
-  Planned Development Area
-  Transportation
-  Water
-  Roads
-  Railroads
-  Municipal Boundaries



15000 0 15000 Feet

5 0 5 Miles

