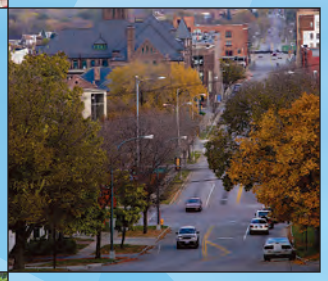
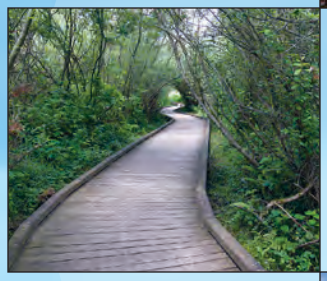
GUIDEBOOK ON Local Planning FOR Healthy Communities





North Carolina
Department of
Commerce
DIVISION OF
COMMUNITY
ASSISTANCE

GUIDEBOOK ON Local Planning FOR Healthy Communities

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Preface

The North Carolina Department of Commerce is charged with providing technical assistance to municipalities and counties in solving local planning problems (NC Gen. Stat. § 143B-431). State law (NC Gen. Stat. § 113A-151) specifically notes that "governmental agencies for controlling land use and private and public users of the land resource are often unable to independently develop guidelines for land-use practices which would provide adequate and meaningful provision for future demands on the land use, while allowing current needs to be met." Further, state law (NC Gen. Stat. §113A-151) provides that "the state should take whatever steps necessary to encourage and assist local governments in meeting their obligations to control current uses and plan for future uses of the land resource."

Statewide land use planning guidelines were issued by the North Carolina Department of Commerce in 1999, when it sponsored the publication of *Land Development Plan Guidelines for North Carolina Local Governments: Incorporating Water Quality Objectives in a Comprehensive Land Planning Framework*, prepared by the Center for Urban and Regional Studies, University of North Carolina at Chapel Hill. Publication of that document was funded by the North Carolina Clean Water Management Trust Fund and as such it emphasized water quality objectives. Its explicit purpose was to "describe the components that should comprise a local government land development plan, the characteristics and features it should have, and how such plans can help protect water quality and provide a base for infrastructure planning" (p. 2).

Another land use planning guidance document was prepared in 2002 specifically for cities and counties within the 20-county coastal region established by the Coastal Area Management Act of 1974 (NC Gen. Stat. § 113A-100): The *Technical Manual for Coastal Land Use Planning: A "How To" Manual for Addressing the Coastal Resources Commission's 2002 Land Use Planning Guidelines*, prepared by William B. Farris and published by the North Carolina Department of Environment and Natural Resources in July 2002. Although written for Coastal Area Management Act (CAMA) counties, the 2002 guidebook is appropriate for local governments outside CAMA jurisdiction. This guidebook borrows heavily from that prior guidebook in later chapters about the basic techniques of and approaches to comprehensive planning.

The 1999 statewide and 2002 coastal planning guidance documents described above have substantial information that is still relevant today. However, more than a decade has passed, and they are in need of updating. The Community Assistance Division of the NC Department of Commerce began discussions in 2010 and searched for funding to complete a new set of land use planning guidelines. In 2013, the division secured a Community Transformation Grant (CTG) from Albermarle Regional Health Services (which had received a CTG subgrant from the Division of Public Health, North Carolina Department of Health and Human Services) to complete a guidebook on local planning for healthy communities. The CTG funding enabled the Community Assistance Division to provide the detailed guidelines for planning healthy communities in this document, but it also enabled the updating and incorporation of still-relevant materials from the earlier planning guidance documents, as they relate to statewide land use planning needs.

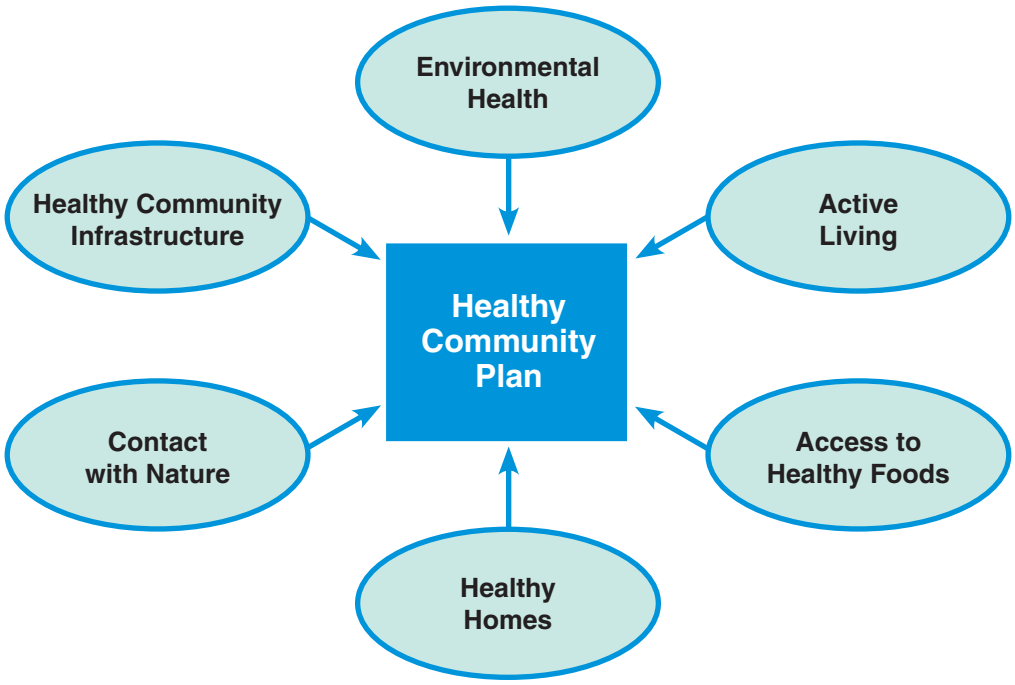
The recommended practices in this guidebook are not mandatory in any way, but they should be used by towns, cities, and counties to improve long-range planning.

Executive Summary

This guidebook on local planning for healthy communities is intended to assist cities, towns, and counties in preparing new comprehensive plans or amending portions of existing plans that accommodate healthy community objectives. Among other objectives, this guidebook will help planners to assess built environment conditions that impact public health, update plans and policies to include public health considerations, and put programs and actions in place that support implementation of healthy planning goals.

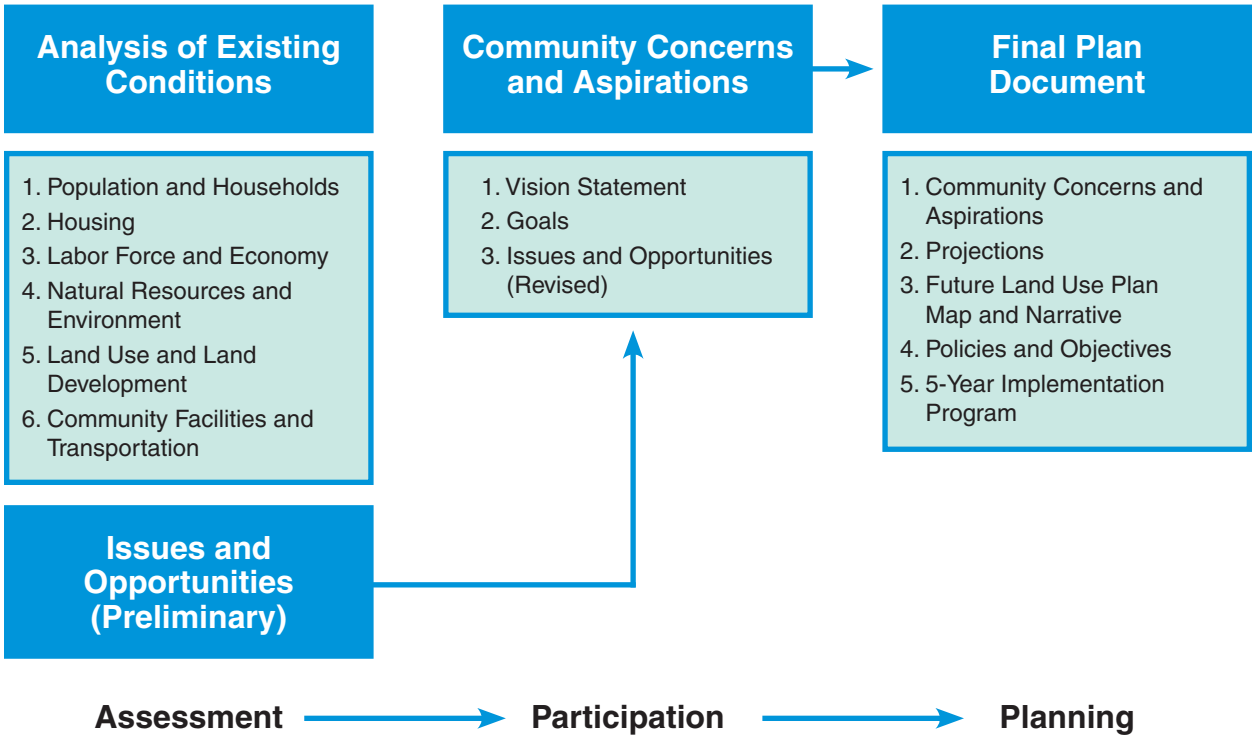
Chapter 1 provides an overview of planning which recognizes there are different types of plans. Chapter 2 is a guide to data sources. Chapters 3 through 8 of this guidebook are organized according to six major themes which collectively constitute the contents of a healthy community plan, as shown in the figure below:

Components of a Healthy Community Plan



This guidebook also provides technical suggestions with regard to the planning process and contents of planning documents. Chapter 9 provides an overview of planning documents (see figure below). Chapter 10 provides guidance on preparing the land use plan, and Chapter 11 provides guidance on preparing community facilities and transportation plans. This guidebook concludes with a description of various public participation techniques (Chapter 12) that can used in the planning process. Appendix B provides a template for planners to use in preparing the analysis of existing population, housing, and economic conditions.

Suggested Planning Process and Documents



CHAPTER 1

Introduction

More than a century ago, prior to the start of planning as a profession, public health officials were leading the way in terms of addressing municipal problems and devising solutions for urban ills. American cities were not sanitary places in the early 19th century. The sanitary reform and public health movements brought more scientific understanding of infectious diseases in the middle decades of the 19th century (Peterson 1979). Many of the leading causes of death and disability at that time were related to communicable or infectious diseases. The planning profession was born in the early 20th century and focused its efforts on improving cities with strong support of the public health movement and building on the previous successes of sanitary engineers.

Communicable and infectious diseases are no longer the leading causes of death and disability; the medical profession has found effective treatments over recent decades. Now, lifestyles (what we eat or don't eat, our physical activity levels, our smoking behaviors, etc.) are a leading cause of death and disability. There is not a "pill for every ill" when it comes to lifestyle choices. Over the past several decades we have come to realize that communities must be designed in a way that supports healthy behaviors. The public health and planning professions have reconnected in the pursuit of promoting healthy behaviors and designing healthier cities.

The health of a community—its people and places—is among the most important factors to address when planning for the future. States give local governments the "police power" to regulate in the interest of the promoting the health, safety, general welfare, and comfort of the community. Localities exercise their police powers in a variety of contexts and for a variety of purposes. For instance, environmental health is regulated (typically at the county level) to ensure potable water and adequate sanitary conditions. As another example, the health and safety of buildings and their occupancy are regulated by state and local building codes. And land uses are often regulated by counties, cities, and towns via zoning ordinances, land subdivision controls, and other land use and development regulations.

Prior to regulating in the interest of the public health, safety, general welfare and comfort of a given community, it is highly desirable (if not required) to engage in

community planning. Planning for the future is especially important when it comes to the exercise of zoning and local land use regulatory powers. This guidebook addresses the subject of planning by local governments to promote healthier communities and places. Before discussing the planning actions and programs a town, city, or county can undertake to become healthier, one needs to understand more about the types of plans localities can undertake.

Types of Local Plans

Local governments in some states are mandated to engage in planning. In other states, cities and counties are encouraged but not required to prepare and adopt community or land use plans. In still other states, there are no requirements or expectations for localities to engage in planning at all. Furthermore, the subject matter of planning and the standards by which localities engage in planning differ rather remarkably from state to state. All of this means that one must understand the types of plans that localities can prepare, before describing how localities can plan healthier communities. The focus of attention is on localities in the State of North Carolina, but much of the discussion has broader applicability outside the state. The discussion of plans begins with the most all-encompassing (the comprehensive plan) and then follows with planning efforts that are narrower in scope. No matter what type of plan is being prepared in your locality, this guidebook can assist you in planning for a healthier community.

Comprehensive Plans

The most all-encompassing type of community plan is often referred to as a "comprehensive plan." A comprehensive plan is a long-range (usually 20 years) guide to future community building and improvement, adopted by the local governing body of a county, town, or city. In many states (exceptions include Oregon and Florida), a comprehensive plan does not have the force of law but is used by communities as a guide to the programs, regulations, capital improvements and other actions that are needed to improve the community and address issues it is likely to confront. In North Carolina, state statutes require that city and county zoning regulations shall be made in accordance with a comprehensive plan; and when considering zoning amendments, a statement describing whether the action is consistent with an adopted comprehensive plan and other officially adopted plan must be approved (NC Gen. Stat. § 160A-383 and § 153A-341, respectively). A comprehensive plan therefore must be consulted under North Carolina's planning and zoning enabling statutes when local governments evaluate rezoning decisions. A comprehensive plan considers several different facets

of community planning in a single, unified document, crafted so that each element or component of the comprehensive plan is consistent with one another.

There is no universally accepted standard for the elements that go into a comprehensive plan, and states and localities vary considerably but they will usually address the following: population; housing; economic development; natural and historic resources; land use; community facilities and services (including especially transportation); and intergovernmental coordination. Comprehensive plans also have a detailed implementation program specifying actions that will be undertaken during the five or six years following adoption of the comprehensive plan (for a sample work program, see Appendix C). There is no requirement in North Carolina for all localities across the state to prepare and adopt comprehensive plans, although many communities (particularly the more populated urban local governments) elect to do so. This guidebook is written predominantly for localities preparing comprehensive plans, as opposed to the other types of plans described in this chapter. However, as this guidebook indicates, healthy community provisions can be incorporated into many different types of local plans.

Land Use Plans

A land use plan differs from a comprehensive plan in that its central purpose is to establish an optimum pattern of future land use. The land use plan is then used to guide the drafting of zoning ordinances and maps, as well as other land use regulations. Although the name implies that the focus is on physical land use planning, land use plans will typically go well beyond an exclusive focus on land use to include population projections, policies for housing and industry, some attention to transportation, and certain non-physical aspects of community planning. Local governments in North Carolina outside the coastal North Carolina region are not required to adopt land use plans, although many elect to do so.

Healthy community planning can be incorporated into land use plans, just like it can with comprehensive plans. However, the scope and breadth of land use plans is narrower than that of comprehensive plans, so planners may not utilize all of the ideas in this guidebook if the land use plan does not address those particular plan elements. For instance, a land use plan may not cover in detail all provisions of community facilities, which include health services; yet, the comprehensive plan will frequently address those subject matters.

CAMA Land Use Plans

In 1974, North Carolina passed the Coastal Area Management Act (CAMA). That act requires counties (and their cities and towns to some extent) in the 20-county coastal

region to prepare land-use plans which must be approved by the Coastal Resources Commission (NC Gen. Stat. § 113A-110). Permits issued by local government for development must be in compliance with the adopted and approved land use plan (NC Gen. Stat. § 113A-111). Over the almost forty years in which CAMA has been law, these plans have come to be known as "CAMA land use" plans. There are also state administrative rules which specify the contents of CAMA land use plans (15A NCAC Subchapter 7B—CAMA Land Use Planning).

Transportation and Other Functional Plans

Sometimes, local governments prepare and adopt separate plans for functional facilities like transportation and, if they provide those services, water and sewer plans. Furthermore, there may be a separate parks and recreation master plan in a given community. When a locality has adopted a comprehensive plan, these functional plans are at least referenced in the comprehensive plan, if not fully incorporated therein. If the locality has adopted a land use plan, these functional plans are often not fully incorporated into the land use plan and may not be referenced.

In North Carolina, Metropolitan Planning Organizations (MPOs) (where they exist) are required to develop a comprehensive, multimodal transportation plan; municipalities not located in an MPO shall develop a comprehensive transportation plan; counties may but are not required to adopt a comprehensive transportation plan (NC Gen. Stat. § 136-66.2).

Even if your locality is preparing only a transportation plan, or a parks and recreation master plan, the provisions of this guidebook are likely to be applicable. For instance, many "active living" involve multi-modal transportation systems, or in other words, encouraging walking, biking, and public transportation use (where available). Similarly, much of the concern about active living hinges on providing park and recreation facilities that will promote human health. Therefore, planners with these more limited planning scopes should still consult this guidebook.

Corridor, Neighborhood, and Small Area Plans

Sometimes, localities decide there is a need to prepare a plan for a specific gateway corridor entering the urban area, or a particular neighborhood in a city needs special planning attention, or some other part of the community (e.g., special district) needs to be singled out for more detailed planning. We refer to those types of plans collectively as "small area" plans because they cover a geography that is something less than the entire locality. This guidebook can be useful and therefore should be consulted when planning for areas smaller than the county, city or town as a whole.

Dimensions of Planning

Planning as a Process

Comprehensive plans, land use plans, CAMA land use plans, functional plans, and small area plans all have at least one thing in common—they follow a planning process. It is helpful to understand what is meant by the planning process. Any planning process followed is usually viewed as linear in nature. First, communities that are planning (regardless of the type of plan being prepared) start with intelligence—data gathering/collection and analysis. This might be considered the "study" stage of planning. That is, before one can present plans, planners have to know lots of things about the community—the composition of the population, how fast the locality will grow or decline in the future, the conditions of the built environment (roads, parks, housing, etc.), the existing pattern of land uses, and many other existing conditions. All of these are important for and addressed within comprehensive plans, and they are usually at least alluded to in other types of plans. A comprehensive plan or other type of plan will include data collection and studies, although plan writers may or may not elect to include all the data they compile and studies they conduct in the plan document itself.

This guidebook pays considerable attention to conducting planning studies that relate to healthy communities. For instance, in studying characteristics of the population, there are certain variables that are important with respect to public health. As another example, if the locality is concerned about providing better parks and recreation facilities, it may conduct a study of how accessible its existing parks and recreation facilities are to the homes of the community's existing population.

Planning as a Participatory Process

No matter what type of planning is undertaken, it will involve the citizenry. Planners interview "stakeholders" (or anyone who has a stake in the outcome of the planning process), discuss planning issues with interest groups, seek structured input from citizen advisory or "steering" committees, consult with the local planning commission, engage the public health community, conduct charrettes and public hearings, and execute various other community participation strategies (see Chapter 13 of this guidebook). Every locality will address the need for participation differently, but every plan will have some sort of participation component to the work scope.

Planning as Strategy

Planning sometimes utilizes the SWOT approach—an analysis of strengths, weaknesses, opportunities, and threats—as a way of determining what the issues are that need to be

addressed in a plan. A SWOT analysis is a tool of strategic planning, and strategic plans are different from those plans discussed here primarily because one engages in strategic planning for organizations and community planning for localities. However, it is useful to think of planning as strategic thinking about the future of the community. A list of issues to be addressed (whether community or strategic) is typically a part of any plan.

Planning as Policy

Whether comprehensive or not, every plan will have statements of vision, goals, policies, and/or objectives to be accomplished. A vision statement is a succinct set of thoughts about the future of the community—what it desires to become during the planning horizon (i.e., the future time frame addressed by the plan, usually 20 years in the case of a comprehensive plan) (Ames 1993). The plan will articulate a number of "goals" or generalized statements such as "promote affordable housing." Such goals generally state the intended outcome, but they do not describe the means by which the goal will be attained. Plans should also include a number of specific objectives—such as reduce the number of substandard housing units in the city from 250 to 100 in 10 years. A key characteristic of an objective is that it is measurable—it usually answers the questions "how much?" and "by when?"

Then, there are variations—instead of calling these statements (about what ought to be done) goals, or objectives, they might be referred to as "guiding principles" or, simply, "policies." While this guidebook sometimes distinguishes among goals, objectives, strategies, vision statements, and guiding principles, in general terms we can refer to all of them collectively as "policies." As inferred earlier in defining a comprehensive plan, policy statements are not regulatory or binding—they are a statement of what "should" be done, but there is no enforcement mechanism or penalty for failing to attain or execute the given policy statement. This could mean that a given community does not ever attain the policy outcome desired, but it is nonetheless a statement that the local governing body adopting the plan has accepted as desirable. A comprehensive plan includes an implementation framework or short-term work program to implement the policies (for an example, see Appendix C of this guidebook).

The Plan as an Implementation Blueprint

No matter what type is being prepared, the plan will articulate some specific suggestions on how to implement the plan once it is adopted by the local governing body. Implementation means the process of carrying out the recommendations and policies of the plan. The plan, of whatever type, should be specific on what is needed to implement the plan during the short term (i.e., five or six years). It will clearly suggest the actions

that need to be taken, who is responsible for undertaking them, the time frame involved, and who (what agency or department) is responsible for carrying out the implementation measure (see Appendix C for a sample). Implementation can consist of regulations, programs, budgets, and other activities. Regulations include amendments to a locality's zoning ordinance and maps (or other ordinances). Programs can be wide ranging, from adopting a community development program which addresses substandard housing, to a program that provides incentives for homeownership. Budgets include both "capital" items (i.e., costly items with a useful life usually of ten years or more) and "operating" and are usually separated into those two types. A functional plan for parks may call for $1 million in improvements to an existing park. A transportation plan may call for multiple projects on existing streets to retrofit them for sidewalks for better "walkability." The locality's operating budget may provide for additional staffing or purchase of special equipment identified as necessary in the plan. Other activities might include conducting a study, modifying a town's development review process, or most anything else not encompassed as a regulation, program, or budget item.

Healthy Community Plan Defined

What is a healthy community plan? There are numerous definitions that have been provided by various sources to define healthy communities. Some definitions of a healthy community encompass goals that are somewhat coincidental to, or broader than, the central issue of public health considerations at the local level. For instance, some definitions of healthy communities include references to affordable housing, an accessible transportation system, a safe environment, and sustainability (U.S. Department of Health and Human Services 1998). These goals are very important, but they are indirectly rather than directly associated with community health at the local level.

For purposes of this guidebook, a healthy community plan is defined as follows: A healthy community plan calls for positive steps to proactively plan and design the built environment to facilitate healthy lifestyles for all residents. A healthy community plan (see Figure 1) is a guide to the future of the locality (local unit of government) that takes positive steps to:

1. Reduce exposure to environmental health hazards;
2. Increase physical activity;
3. Improve access to healthy foods;
4. Ensure healthy homes for all households;
5. Increase access to greenery and contact with nature; and
6. Ensure the quality and accessibility of health services and supporting infrastructure.

A healthy community plan also acknowledges that certain segments of the population are affected disproportionately by the health consequences of physical inactivity and poor nutrition, and embraces perspectives of social equity (International City/County Management Association. 2005).

Components of a Healthy Community Plan

Figure 1

There are many other factors that influence the public health of a community. Those factors that are discussed in this guidebook are the ones which are most heavily emphasized in the literature. Many others can and should be considered, however. Poverty, for instance, is an important factor leading to premature death in some instances. A good education reduces the likelihood of poverty. Housing, land use, and transportation can have substantial effects on social and mental health and spiritual well-being.

A Note about Health Impact Assessment

Interest in health impact assessment is growing exponentially and is bringing planners and public health professionals ever closer together in collaborative efforts. A health impact assessment employs methods, procedures and tools to evaluate certain policies, programs and projects in terms of their potential health effects. Health impact assessment is conceptually the same as other tools with which planners are familiar, such

as environmental impact analysis, traffic impact analysis, and fiscal impact analysis. The subject matters, the focus of attention, and the methods used are different, however.

The exponentially increasing interest in health impact analysis has led to a number of publications, and the subject matter is now substantial enough that separate guidebooks on how to conduct health impact assessments have been written (Bhatia 2010, 2011). Health impact assessment is not addressed in this guidebook primarily because the implementation of that tool falls mostly outside the comprehensive planning process rather than being an integral part of it. However, planners can and should consider using health impact assessment as a tool to evaluate various proposals in the comprehensive plan itself. Planners will sometimes (and in some states they may be required to) analyze the environmental and transportation consequences of various land use scenarios or alternatives considered in the draft comprehensive plan before adoption. The same principle can and should apply to health impacts, and health impact assessment should be integrated into approaches to evaluating the outcomes and consequences of comprehensive plans. Conducting a health impact analysis in conjunction with a planning effort can bring great value to the experience.

A Note about "Stand-Alone" Healthy Plans

This guidebook shows how planners can include healthy planning principles in various components of a comprehensive plan (and other planning efforts). Some communities will elect to prepare a separate health element of their comprehensive plan, as opposed to integrating health considerations into conventional plan elements such as housing, land use, and transportation. Stand-alone health elements are an equally valid approach to the organizational approach used in this guidebook.

CHAPTER 2

Data and Analyses for Healthy Community Planning

Sound planning relies on substantial data and analysis of those numbers to identify trends, issues, and concerns. This chapter reviews data sources with particular attention to public health issues. In subsequent chapters, illustrative applications of data collection and analysis for healthy communities planning are provided. Before we examine data sources, we need to address the issue of whether to report data and data analyses in the comprehensive plan itself.

Recall in Chapter 1 of this guidebook that a comprehensive plan should serve as a policy tool and guide for local officials. As this chapter indicates, a large proportion of the planning function involves the collection and analysis of data. This would suggest that a large portion of the comprehensive plan's contents will also consist of data and analysis. However, one should be cognizant that a comprehensive plan filled up with mostly tables of data and paragraph after paragraph of analysis is likely to detract from its use by decision makers as a policy tool. That is to say, if the plan is long and boring, it may get ignored or "shelved" without being consulted very often. In light of the need to avoid lengthy recitations of data and analysis in the plan document itself, and to keep the plan document as approachable as possible by community leaders, it is recommended that the detailed data and analysis be placed in a technical document ("analysis of existing conditions") separate from the plan (see Figure 1); then, the plan document can be kept more brief and focused on policy and implementation.

Next, we describe some of the more important data sources, with attention to planning for public health.

Decennial Census Data

One of the most reliable sources of data for planning is the U.S. Census Bureau's decennial census (www.census.gov). Detailed population and housing data are available for 2010, 2000, 1990, etc. for all units of geography. These data are the

"gold standard" for accuracy, since the statistics are based on 100% counts. The most popular or useful data table from the 2010 Census, which can be accessed in American Factfinder (factfinder2.census.gov), is DP-1, "Profile of General Population and Housing Characteristics." DP-1 (demographic profile) provides data on sex, age, race, ethnic origin, households, housing occupancy, and housing tenure. For more detailed data from the decennial census, consult SF-1 (Summary File), which provides multiple tables on population and housing characteristics (100% data). Generally, the decennial census provides many important data variables for comprehensive planning, but fewer that relate directly to public health issues.

Population Estimates

Planning requires knowledge of the current population in the community served. The U.S. Census Bureau provides estimates of population as of July 1 annually, for counties, cities and towns. The estimates can be obtained from American Fact Finder by selecting the local government geography of interest, then selecting the data set, "Annual Estimates of the Resident Population," for the most recent year or years of interest. Planners should report the population count (100 percent data) from the most recent decennial census, then utilize official estimates from the U.S. Census Bureau or another reputable source to get current or recent year estimates of the population in the community served.

American Community Survey

These data sets are established by the U.S. Census Bureau to provide essentially the same types of statistics as the decennial census, but with greater frequency. Unlike most of the decennial census, the American Community Survey provides sample statistics, not 100% counts. American Community Survey data generally consist of one-year, three-year, and five-year estimates. Cities and towns are considered "places" in the data sets. Not all places are covered by each of the estimate intervals. The most all-encompassing with regard to geography are the five-year estimates—these include counties, cities, and small towns. A drawback to these data is that they are estimates for a five-year period. For instance, in a more recent five-year reporting period (2007-2011), one does not know if the estimates are valid for 2007, 2011, or the years in between. The estimates also have relatively high margins of error.

The three-year estimates cover counties as well as cities and towns with populations of 20,000 or more (i.e., 42 "places" in North Carolina). The three-year data are preferable to the five-year estimates if available for your place. Similarly, the American Community

Survey's one-year estimates are preferable to the three-year estimates, because they provide estimates for the year specified, not a range of years as with the three-year and five-year estimates. However, in terms of data for cities, the one-year estimates of the American Community Survey have data only for cities of 65,000 or more (i.e., 14 cities in North Carolina as of 2013).

From a healthy communities planning perspective, a number of individual data items from the American Community Survey could be of significant interest. The appendix of this guidebook provides a list of data items that are particularly relevant to healthy communities planning. For instance, the 2007-2011 five-year estimates of the American Community Survey, under "Selected Economic Characteristics," provide work commuting data which provide estimates of the number of people who walk to work, use public transit, get to work by other means, etc. An illustrative example of collection and analysis of these data is provided in Chapter 4 of this guidebook.

North Carolina State Data

Log Into North Carolina (LINC) Website

Accessible via the World Wide Web on the Log Into North Carolina (LINC) website (www.linc.com), the State of North Carolina has compiled a large number of variables with data for several years from various state agencies, for counties. These data have an almost endless number of planning applications. However, in this guidebook, we have reviewed those data for their relationship to public health issues and identified those data variables that pertain to healthy communities planning. In Appendix A of this guidebook, those variables that relate to healthy community planning are shown.
Chapter 4 shows how vehicle, pedestrian, and bicycle data can be compiled and analyzed for a given county. Planners in small towns or cities may want to report county-level data even though city or town-level data are generally not available in LINC.

It is also important to note some of these data variables in their most basic form may not be very meaningful—unless there is some comparative context. One useful way to give context to the numbers is to report multiple years—in that way, communities can see a trend of whether the variable is increasing or decreasing over time. But even a time-series comparison may not yield much insight. Therefore, another useful mechanism is to relate the variable to the population served (or per 1,000 residents) and then compare the local county data with data for the state as a whole. Comparing the county's rates with those of the state will then provide some additional context and insight.

County Community Health Assessments

The NC Department of Health and Human Services, Division of Public Health, maintains detailed county community health assessments. These reports are available for any county in North Carolina and can be downloaded from http://publichealth.nc.gov/lhd/cha/reports.asp. As one example, the Community Health Assessment of Bertie County (2010) by Albemarle Regional Health Services spans 142 pages and includes a community profile, a chapter on health care access, very detailed health statistics (in comparison with states and county averages), survey results, action strategies, and an appendix containing inventories of health services. Planners should start with the report for their county of interest, then decide what additional data may need to be collected, since these county reports tend to be detailed. Some of the county reports are not as comprehensive, or as up-to-date, as the one for Bertie County as well as others in the Albemarle Regional Health District. It is recommended that census data for 2010 be collected unless the health report has already incorporated 2010 (or later) data.

North Carolina Health Statistics Pocket Guide

In addition to health statistics and other health-related data from LINC, and information that can be derived from the county community health assessments, the North Carolina Department of Health and Human Services also publishes the *North Carolina Health Statistics Pocket Guide* (http://www.schs.state.nc.us/schs/data/pocketguide/2011/PocketGuide.pdf). The Pocket Guide includes some data that may be available in LINC or referenced in county community health assessments. The first six tables of the Pocket Guide provide statewide statistics which can be useful as benchmarks or comparisons for county data. Tables 7 and 8 provide county level data for: current or recent population by generalized age cohort; poverty and incomes, health personnel, Medicaid recipients, pregnancies; and rates for births, deaths, cancer, and communicable diseases.

Detailed health statistics such as rates for communicable diseases and cancer are usually not fully reported in reports of existing conditions supporting local comprehensive plans. During the data collection process, planners should consult with public health professionals about the data available and how such data should be incorporated so as to influence preparation of the land use plan or comprehensive plan.

AccessNC

AccessNC is a website that provides economic data and specific site information that are useful for general planning purposes. Planners can collect data from AccessNC at the following website: http://accessnc.commerce.state.nc.us/EDIS/page1.html. By accessing the “community demographics” tab, planners can select and run a profile for any one

of North Carolina's 100 counties. The reports are updated annually and contain five-year projections of population by age group and housing units. With regard to health data, in the "quality of life" section of the report, information is provided on health care providers. By accessing the "business data" tab, planners can run a report of the 25 largest employers by county, generate industry wage and employment data, view data on occupations, and search industries by North American Industry Classification System (NAICS) codes or company name. Planners can also generate a basic map of a given county using this website.

NC OneMap

NC OneMap (http://www.nconemap.com/) is the state's clearinghouse for geospatial information. This site will be most useful for Geographic Information Systems (GIS) professionals to download geospatial data for use in GIS. However, planners without experience in GIS can still benefit from NC OneMap; by using the OneMap Data Explorer, planners can choose a topographic map, road base map, or aerial image of a given area. Sample output from NC OneMap is shown in Figures 2 and 3 below for the Plymouth, NC, area.

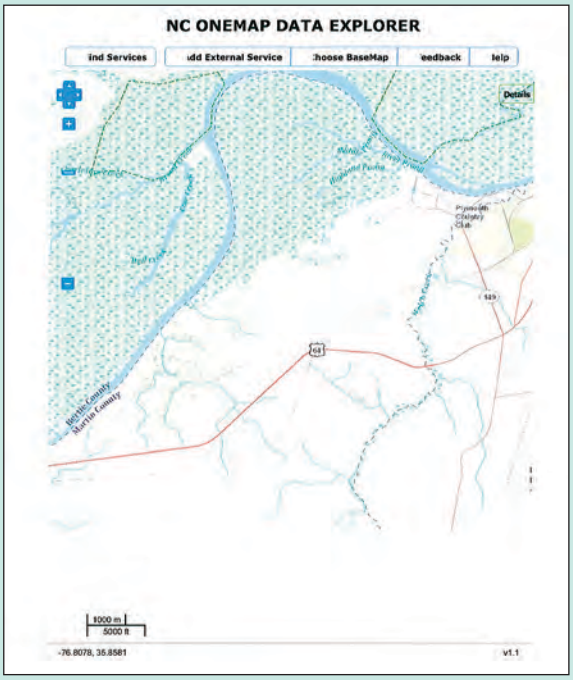


Figure 2. Sample Output from NC OneMap Base Map of Plymouth, NC Area

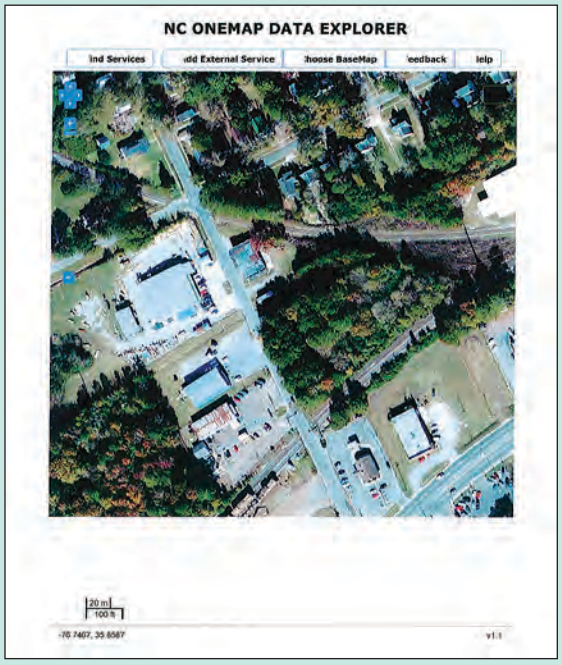


Figure 3. Sample Output from NC OneMap Aerial Photograph of Plymouth, NC Area

Water Resources of North Carolina

The United States Geological Survey (USGS) North Carolina Water Science Center is a source for water-resource information (http://nc.water.usgs.gov/). Planners can select a major river basin and generate a map showing surface and groundwater withdrawal sites in the river basin. For illustrative output, see Figure 4, which is a map showing the Chowan-Pasquotank watershed. Figure 4 shows the "base map" option, but users can also select an aerial image or terrain image. The site also has other query tools and publications that are useful in water quality studies.

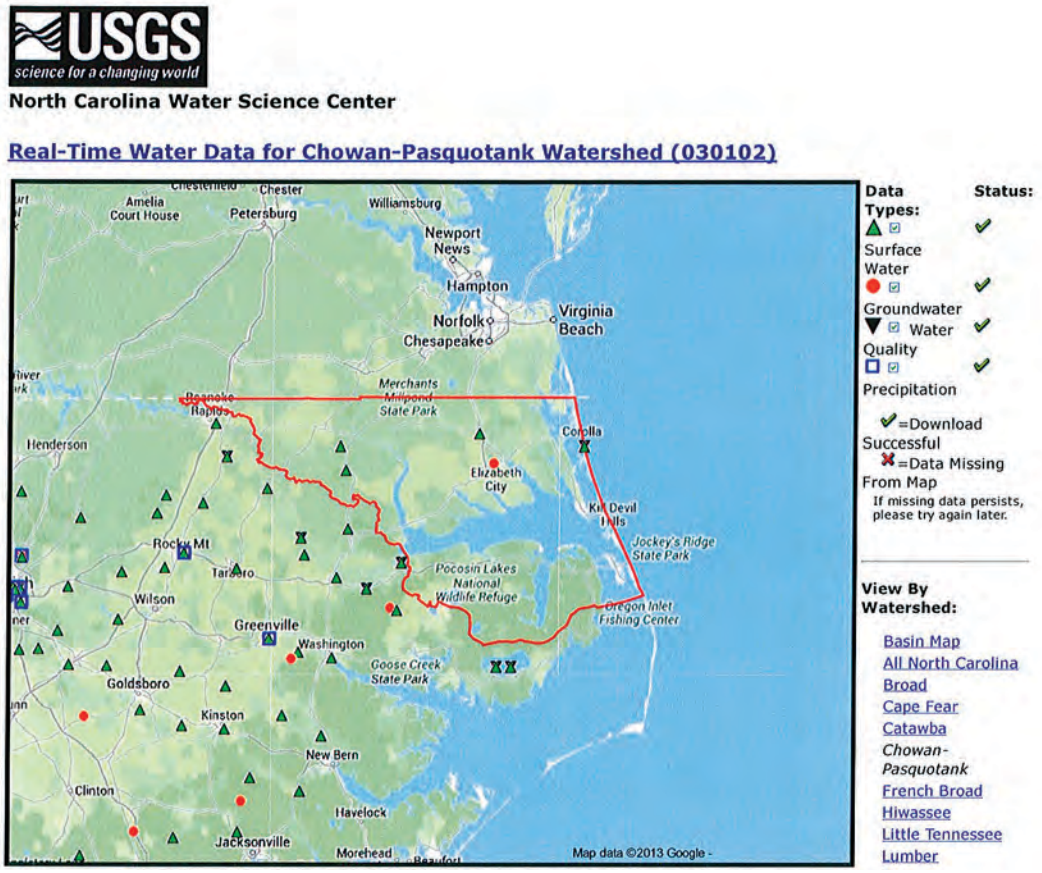


Figure 4. Chowan-Pasquotank Watershed Map Showing Surface and Groundwater Supply Locations

U.S. EPA's Toxic Release Inventory

The U.S. Environmental Protection Agency's Toxic Release Inventory (TRI) covers a subset of (but not all) toxic chemicals managed at U.S. facilities. Information is available through a variety of reports, query tools, and data files. For instance, through the TRI explorer query tool, a list of TRI sites by name can be generated for any county in the U.S.; further queries can identify a "facility profile report" which identifies the address of the facility. Then, planners can map these facilities and consider the relative threats

of such facilities to surrounding land uses. To gather data from the TRI data base and generate reports, go to the following web address: http://iaspub.epa.gov/triexplorer/tri_release.chemical. One can also search for sites by individual zip code, which is preferable for small town planning, at the following website: http://www.epa.gov/enviro/facts/tri/search.html

Data Analysis for Special Populations and Smaller Geographies

Vulnerable Populations

Certain segments of the population in a given community may be disproportionately affected by the health consequences of physical inactivity, poor nutrition and other negative health factors. These negative health factors can be generated by physical design, not necessarily individual behaviors. Planners therefore should take steps to investigate whether the planning jurisdiction has vulnerable populations—then ensure that such populations have access to the same choices and opportunities for healthy lifestyles as the population at large (ICMA 2005).

Segments of the community can be "vulnerable" based on several variables: age, race, ethnicity, income, proximity to hazards, and many others. Literature cited in this guidebook reports results from studies that have emphasized income and race as important variables. For instance, research indicates that households earning less than $15,000 are more likely to be obese, be diagnosed with diabetes or asthma, live a sedentary lifestyle, and be at risk for health problems related to lack of exercise than people from households with incomes above $50,000. Similarly, research shows that African-Americans are less likely to get recommended levels of physical activity and are more likely to suffer from more chronic diseases associated with physical inactivity than the population at large (ICMA 2005). There is also evidence that a disproportionate number of Hispanics reside within air quality non-attainment areas (Morris 2006a). As another example, Native Americans may have higher rates of disease and death due to alcoholism, nutrition deficits, and physical inactivity.

Planners should therefore investigate the income, racial, and ethnic characteristics of the population in the planning area being studied. You can do this by collecting statistics on income, race, and ethnicity for the community as a whole, and such data could be informative especially when presented in comparative context. For instance, if one is planning for a small town, it is useful to determine how the town's population compares with the county, or state as a whole, with regard to low-income households or in terms of racial or ethnic composition. Comparison with national statistics can also be useful.

Analyzing Smaller Geographies: Census Tracts

All prior discussions of data sources have focused on the local unit of analysis—usually a county, but also including cities and towns. While it is important to get the overall picture for the community, of equal if not greater importance is the need to analyze subareas of the planning jurisdiction. Low-income households and minority households may be concentrated in a given part of the community. Planners can analyze those smaller areas of a given community by reporting statistics by census "tract." Census tracts are defined as small, relatively permanent geographic entities within counties, generally between 2,500 and 8,000 residents and with boundaries that follow visible features (U.S. Census Bureau). Planners can go to the U.S. Census Bureau's web page, then select census reference maps under the geography tab (go to: http://www.census.gov/geo/maps-data/maps/reference.html).

An example illustrates. Elizabeth City, NC, is divided by the U.S. Census Bureau into various census tracts, as shown in Figure 5. Planners may be interested in learning whether parts of the city contain higher concentrations of vulnerable populations.

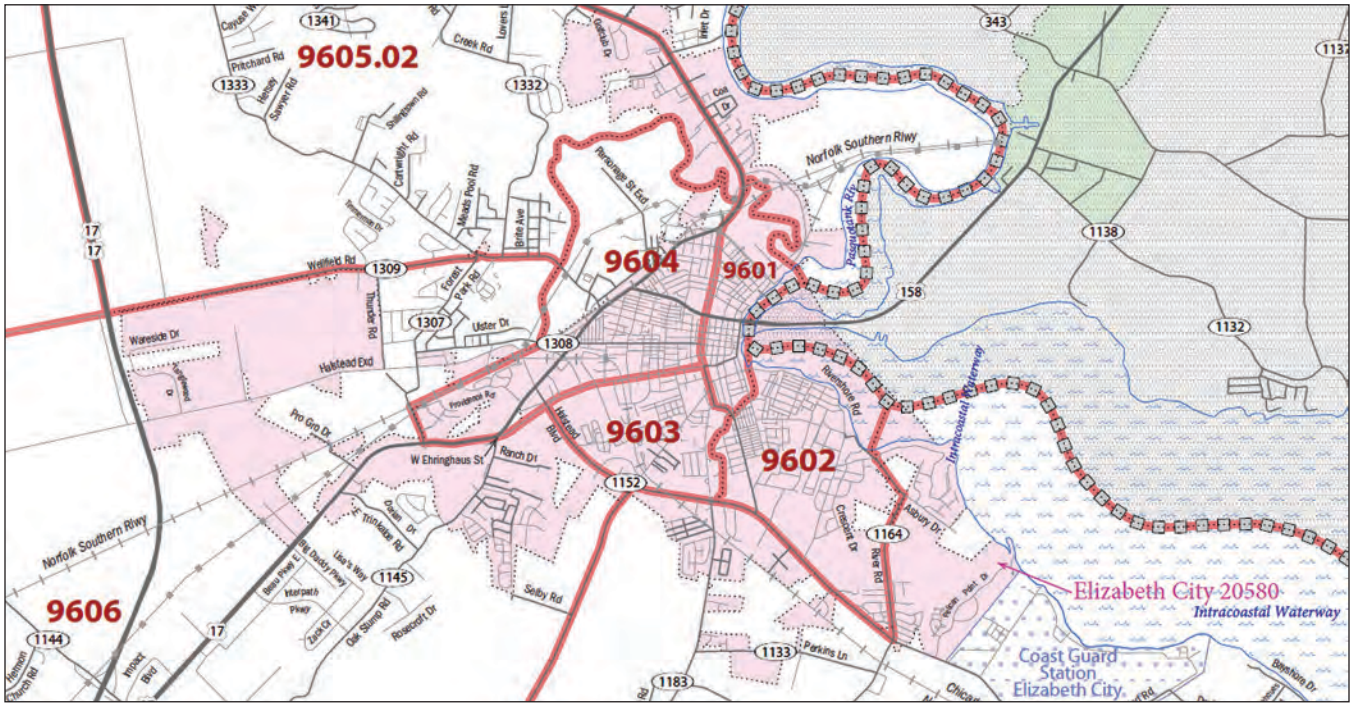


Figure 5. 2010 Census Tracts in Elizabeth City, North Carolina

Source: U.S. Census Bureau, Geographic Reference Map. http://www.census.gov/geo/maps-data/maps/reference.html

As indicated in Table 2.1, Elizabeth City is an urban area that has a higher percentage of African-Americans and more households with annual incomes of less than $15,000 than Pasquotank County as a whole. Further, one can investigate data for the census

tract level of geography to see if there are concentrations of vulnerable populations. As Table 2.1 indicates, Census Tract 9603 in central Elizabeth City is 81% Black or African American as of 2010, and more than 40 percent of the households in that census trace have incomes of less than $15,000. Hence, Census Tract 9603 (of the four shown in the table) would probably contain the most vulnerable population in the city, at least with regard to two variables (race and income). The analysis of vulnerable populations can and should be extended to other races (e.g. whites), ethnicity, age, and others, since those variables can also be associated with vulnerable populations.

Table 2.1. Analysis of Vulnerable Populations, 2010-2011
Elizabeth City, North Carolina

Geography	Black or African American, 2010	% of Total Population Black or African American, 2010	% of Total Households with Annual Income Less than $15,000 (2011)
Pasquotank County	15,355	37.8%	16.1%
City of Elizabeth City	10,090	54.0%	23.4%
Census Tract 9601	843	48.7%	32.4%
Census Tract 9602	3,103	60.0%	14.8%
Census Tract 9603	2,397	80.9%	42.0%
Census Tract 9604	1,730	41.1%	25.7%

Source: U.S. Census Bureau, 2010 Census, Summary File 1, Table QT-P3, "Race and Hispanic or Latino Population." U.S. Census Bureau, 2007-2011 American Community Survey 5-Year Estimates, Table S1901, "Income in the Past 12 Months (In 2011 Inflation-Adjusted Dollars).

CHAPTER 3

Environmental Health

Poor air quality is linked to premature death, cancer, and long-term damage to respiratory and cardiovascular systems. Contamination of surface and ground waters by infectious agents or chemicals can cause mild to severe illness. Protecting water sources and minimizing exposure to contaminated water sources are important parts of environmental health. The health effects of toxic substances and hazardous wastes are not yet fully understood, but efforts to reduce exposures continue. Reducing exposure to toxic substances and hazardous wastes is fundamental to environmental health.

Various statutes in North Carolina are adopted to promote the public health, safety and welfare of citizens. These include authority to adopt floodplain zoning (NC Gen. Stat. § 143-215.51), to abate public health nuisances (NC Gen. Stat. § 160A-193 for cities and § 153A-140 for counties), and several for purposes of protecting water quality (discussed below).

Water Quality

Pollution of Water

Pollution of water can originate from "point" sources (stationery locations) and "non-point" sources (Jeer et al. 1997). Non-point pollution sources include urban stormwater runoff as well as agricultural runoff (Morris 2006a). Water quality can be significantly degraded by non-point sources. There are five groups of waterborne contaminants; these occur due to nature but also because of land-use activities:

- **Microbial contaminants** such as viruses and bacteria may come from sewage treatment plants, septic systems, and agricultural livestock operations.
- **Inorganic contaminants**, such as salts and metals, from urban stormwater runoff, industrial or wastewater discharges, oil and gas production, mining, and farming.
- **Pesticides and herbicides** from residential uses, agriculture, and surface runoff generally.

- **Organic chemical contaminants** such as synthetics and volatile organic chemicals, as by-products of industrial processes and petroleum production, as well as from gas stations and septic systems.
- **Radioactive contaminants** as a result of oil and gas production and mining activities (Morris 2006a).

State Law and Policy

In the state of North Carolina, the General Assembly has recognized that a critical need exists to clean up pollution in the state's surface waters and to protect and conserve those waters that are not yet polluted (NC Gen. Stat. § 113A-251). A number of state laws exist with the purpose of protecting water quality. In 1973, the state adopted the Sedimentation Pollution Control Act (NC Gen. Stat. § 113A-50) which recognizes that sedimentation of streams, lakes and other waters of the state constitute a major pollution problem and that control of erosion and sedimentation is deemed vital to the public interest and necessary to the public health and welfare (NC Gen. Stat. § 113A-51). That law authorizes the environmental management commission to adopt and enforce rules and regulations for the control of erosion and sedimentation resulting from land-disturbing activities, develop a model ordinance and review and approve local government soil erosion regulatory programs (NC Gen. Stat. § 113A-S4). Local governments are authorized to adopt ordinances and regulations to establish and enforce erosion and sedimentation control programs (NC Gen. Stat. § 113A-60).

State law requires the development and implementation of basinwide water quality management plans for 17 major river basins in the state (NC Gen. Stat. § 143-215.8B). The General Assembly has also established a Clean Water Management Trust Fund to finance projects to clean up or prevent surface water pollution (NC Gen. Stat. § 113A-253), as well as a Community Conservation Assistance Program to reduce the input of nonpoint pollution into the waters of the state (NC Gen. Stat. § 143-215.74M). There is also a water supply watershed protection program in the state (NC Gen. Stat. § 143-214.5). Local governments subject to the water supply watershed protection requirements established in state law which fail to adopt a protection program (including ordinances as appropriate) shall result in the state's environmental management commission enforcing minimum statewide requirements (NC Gen. Stat. § 143-214.5). Rules and regulations for stormwater runoff for point and nonpoint sources also exist at the state level via the environmental commission (NC Gen. Stat. § 143-214.7). Cities are authorized to adopt and enforce stormwater control ordinances to protect water quality and control water quantity (NC Gen. Stat. § 160A-459). Also, the state has adopted a cooperative state-local program for coastal management, known as the Coastal Area Management Act of 1974 (NC Gen. Stat. § 113A-100).

Surface Water Protection and Impervious Surface Limitations

Roofs, roads, parking lots, and other paved or non-porous surfaces are called impervious surfaces. They are, of course, a necessary part of urban and suburban development. But they prevent stormwater from infiltrating into the ground. Instead, the water runs off of these impervious surfaces and is referred to as runoff. Stormwater runoff from impervious surfaces carries various pollutants and pathogens, as summarized above, into the area's "receiving waters." Pollutants and pathogens in stormwater runoff have been linked to chronic and acute illnesses when people are exposed to them (Morris 2006a).

Planners and engineers have learned over time that there are consequences to building impervious surfaces when it comes to water quality and public health. We have also learned that we should reduce unnecessary impervious surfaces because of the threat to water quality but also because impervious surfaces prevent or reduce the amount of stormwater that infiltrates into the ground and thus replenishes groundwater. For these reasons, local governments across the nation are instituting certain regulations to reduce the amount of impervious surfaces in their communities.

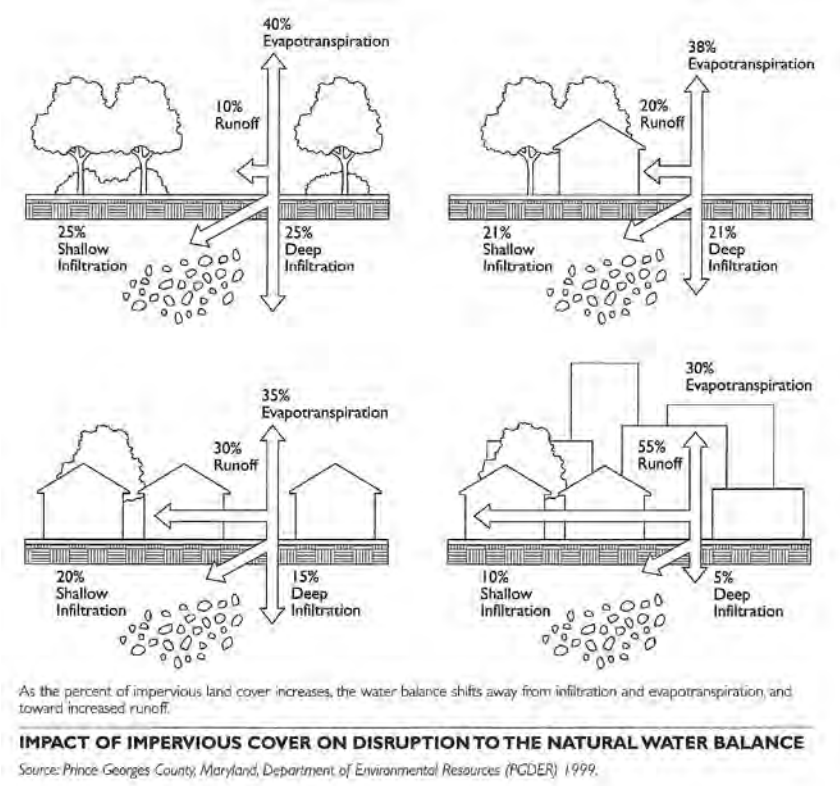


Figure 6

Source: Richard Clayton. 2006. "Stormwater Overview, Runoff and Recharge." P. 336 In *Planning and Urban Design Standards*. Hoboken, NJ: John Wiley and Sons, 2006.

Impervious surface limitations are especially important within what is known as water supply watersheds (note the state law referenced above). A water supply watershed is an area upstream of a water supply intake on a surface water, and it includes all that land that drains into the tributaries and streams providing the water supply. As the amounts of impervious surface within a water supply watershed increase, the costs of treating the water for public consumption tend to increase. Of equal if not greater importance is the

effect of impervious surfaces on watershed health. There have been studies that show fish populations are adversely affected by increasing amounts of impervious surface. In the Pacific Northwest U.S., for instance, fish counts in urban streams decline when only 10 percent of the urban watershed is covered in pavement and rooftops. If the urban watershed is 25 or 30 percent impervious, there is a good chance that fish populations will collapse (Condon 2010). This means that, for a healthy watershed, regardless of whether it is used for water supply or not, communities should consider limiting the amount of impervious surface constructed as a part of development.

Low Impact Development

One way to accomplish limitations on impervious surfaces is to practice what is referred to as "low impact development." The low impact development, or LID, approach to stormwater management is relatively simple to understand. Basically, LID uses and relies on the natural hydrology of an area as much as possible to deal with stormwater runoff, as opposed to piping stormwater to flow directly into creeks and streams. A key to LID is that it promotes the infiltration of water, thus reducing the volume of surface water that must flow to retention or detention basins and then ultimately into the receiving waters. Specific methods of LID include bio-retention, rain gardens, rooftop gardens, vegetative swales, permeable paving surfaces, impervious surface reductions, and pollution prevention (Morris 2006a). Across the nation, communities are reworking their drainage and stormwater ordinances in order to promote LID. A healthy community will also promote natural infiltration and reduce its reliance on engineered stormwater solutions like pipes, curbs, gutters, and the like, in favor of more naturalized drainage systems for new land developments.

Reduction of Standing Water

The pooling, ponding, or collection of stormwater in places where it wasn't intended to collect (i.e., standing water) can increase potential breeding areas for mosquitoes, which can carry infectious diseases such as dengue fever and the West Nile Virus (Morris 2006a). This is an important enough issue that communities should consider studying their built environment after heavy rains to see where standing water occurs. Once areas of standing water are identified, measures can be designed to drain them or at least mitigate the potentially adverse health effects of standing water.

Agricultural Runoff Control

Activities from farms can reduce water quality. Sediment from runoff of farm fields can cloud water, thus reducing the amount of sunlight that reaches aquatic plants. Sediment

can also clog the gills of fish or smother fish larvae. Chemicals and manure, often used as fertilizers, contain nutrients such as phosphorus, nitrogen, and potassium which can cause algae blooms, ruin swimming opportunities, create foul taste and odor in drinking water, and kill fish by removing oxygen from the water. Confined animal feeding operations result in the concentration of animal wastes which can seriously impair water quality (US EPA 2005).

While farms are certainly necessary and should be encouraged, agricultural nonpoint pollution is a leading cause of water quality impacts. Furthermore, wetlands can be impaired significantly by agricultural runoff (Burke et al. 1988), as can groundwater (U.S. EPA 2005). One solution is to have farmers follow "best management practices" as may be prescribed by federal and state agencies in order to prevent water pollution.

Groundwater Protection

Underground sources of water are also subject to contamination and need to be protected. Various federal laws are already in place to protect groundwater supplies. All states have wellhead protection programs approved by the U.S. Environmental Protection Agency. Nonetheless, federal and state regulations and plans do not guarantee the protection of groundwater quality, and thus local governments can and should play important roles in protecting groundwater supplies.

Ground-water contamination can originate on the surface of the ground, in the ground above the water table, or in the ground below the water table. From the surface of the ground, polluted surface water can infiltrate, and fertilizers can also enter groundwaters. A major cause of ground-water contamination in many areas of the United States is effluent, or outflow, from septic tanks. As noted by the U.S. EPA, "if these [septic] systems are improperly sited, designed, constructed, or maintained, they can allow contamination of the ground water by bacteria, nitrates, viruses, synthetic detergents, household chemicals, and chlorides." Leaky underground storage tanks are another hazard that threaten groundwater quality (U.S. EPA 1990).

Local governments, in order to protect groundwater quality, can take a number of actions. The local role is primarily through land use management. County health departments are responsible for permitting of wells for water supplies. Localities can inventory threats to groundwater in the community. Best management practices can be adopted to reduce threats. Management plans and regulations can be instituted to protect the head of wells (at the surface level) from various land uses and/or activities that could threaten groundwater quality (for details see Witten et al. (1995). Local health departments or governing bodies of towns, cities, and counties can pass regulations

requiring the ongoing maintenance of septic tanks, because if septic systems are not pumped out frequently enough, solid materials can leave the tank and enter the drainage field (U.S. EPA 1990).

Air Pollution

Air pollution can occur naturally from airborne dust generated by winds or other natural events. Air can also become polluted due to the built environment. There are two types of air pollution sources: stationary (e.g., factories, power plants, dry cleaners, etc.) and mobile (e.g., cars and trucks). The federal Clean Air Act provides a federal-state-local regulatory framework to protect air quality.

There are a wide variety of air pollutants, but six are commonly cited which can harm health and cause property damage: particle pollution (i.e., particulate matter), ground-level ozone, carbon monoxide, nitrogen oxides, sulfur oxides, and lead. From U.S. EPA, these pollutants and their health effects (based on numerous scientific studies) if exposed to them are summarized below:

- **Particulate matter:** can cause premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.
- **Ozone:** Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground level ozone also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue.
- **Carbon Monoxide:** According to EPA, carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. People with heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia (reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress. At extremely high levels, carbon monoxide can cause death.
- **Nitrogen Oxides:** Nitrogen oxides are reactive gases which form from emissions from cars, trucks, and buses, power plants, and off-road equipment. They contribute to the formation of ground-level ozone, and fine particle pollution, and they are also linked directly with a number of adverse effects on human respiratory systems. Health effects of short-term exposure include airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

- **Sulfur Oxides:** This group of pollutants is generated mostly from power plants and certain industrial facilities. Sulfur dioxide is linked with a number of adverse effects on human respiratory systems, including bronchoconstriction and increased asthma symptoms. These particles also cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease. Populations especially vulnerable to sulfur oxides include children, the elderly, and asthmatics.
- **Lead:** Lead can show up in drinking water and foods. Metals processing is the major source of lead emission. Lead-based paint may exist in older homes (see Chapter 7). According to the US. EPA, depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The lead effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits and lowered intelligence quotients (US EPA).

Land Use Planning for Healthier Air Quality

Protecting Sensitive Land Uses

Children and other vulnerable populations should be kept out of harm's way with respect to nearby sources of air pollution. Studies in California have shown that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for much of the overall cancer risk from airborne toxics. There is also substantial evidence that children are more sensitive to cancer-causing chemicals. Sensitive land uses (i.e., residences, schools, day care centers, playgrounds, and medical facilities) deserve special attention because children, pregnant women, the elderly, and those with existing health problems are especially vulnerable to the non-cancer effects of air pollution (California EPA 2005; Arnold 2007).

Land Use Separation Requirements

California's EPA (2005) has published recommendations regarding the siting of new sensitive land uses near the following air pollution sources (especially those with diesel fuel emissions): high traffic freeways and roads, distribution centers, rail yards, ports, refineries, chrome plating facilities, dry cleaners, and large gasoline dispensing facilities. Table 3.1 identifies air pollution sources that were evaluated by California EPA from the standpoint of the proximity issue.

Table 3.1. Recommended Separation Requirements Between Air Pollutant Sources and Sensitive Land, Based on Range of Relative Cancer Risk

Air Pollutant Source (land use)	Recommended Distance Separation Standard (Feet) from Sensitive Land Uses (residences, schools, day care centers, playgrounds, and medical facilities)
Urban roads with 100,000 vehicles per day	500 feet
Rural roads with 50,000 vehicles per day	500 feet
Distribution centers accommodating more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week)	1,000 feet (especially from entry and exit points)
Rail yards (service and maintenance)	1,000 feet
Ports and refineries	Avoid siting immediately downwind
Chrome platers	1,000 feet
Dry Cleaners using perchloro-ethylene	300 feet; 500 feet for two or more machines
Large gasoline dispensing facilities (with a throughput of 3.6 million gallons per year or greater)	300 feet
Other gas dispensing facilities	50 feet

Source: California Environmental Protection Agency (2005).

Keeping new homes and other sensitive land uses from being sited too close to such facilities will provide additional health protection.

Additional Uses Which Pose Significant Health Risks

The four top environmental toxins related to the use of land are hydrochloric acid, zinc compounds, arsenic, and lead (Morris 2006a). The land uses involving those toxins and the public health risks of the toxins are summarized below.

- **Hydrochloric acid:** common sources include production of chlorides, fertilizers and dyes, as well as photographic, textile, and rubber industries. Hydrochloric acid can cause irritation to the eyes, skin, and mucous membranes.
- **Zinc compounds:** Zinc is used in the production of coolants, fuels, hydraulic fluids, boiler water, and many other industrial fluids. Exposure to zinc compounds can cause irritation, bronchitis, pulmonary edema, emphysema, and cancer.

- **Arsenic:** Production was banned by the U.S. in 1985 except for use in industry, and use of arsenic as a wood preservative accounts for the vast majority of use nationally. Arsenic is a human carcinogen of high hazard. Arsenic is associated with lung cancer, and its ingestion is associated with skin, bladder, liver, and lung cancer. Arsenic is also a cardiovascular toxicant that can cause hypertension, hardening of the arteries, and cardiac arrhythmia, and it can cause birth defects, low birth weight, and other deficits.
- **Lead:** Lead-based paint was banned by the U.S. in 1978, but industrial processes such as the manufacture of circuit boards, paints, lubricants, and additives involve lead. High levels of lead in children can cause brain and nerve damage, behavior and learning problems, slowed growth and hearing problems. In adults, lead can cause reproductive and digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain (Morris 2006a).

California EPA has also prepared a list (see Table 3.2) of other industrial sources that could pose a significant health risk to nearby sensitive individuals, depending on a number of factors. These factors include the amount of pollutant emitted and its toxicity, the distance to nearby individuals, and the type of emission controls in place.

Recommendations for Land Use Planners

Land use policies and practices can worsen air pollution exposure and adversely affect public health by mixing incompatible land uses (California EPA 2005). The previous section provides a basis for land use planning and regulation that is more strongly grounded in scientific evidence than the simple principle of separating industries from residences which has remained pervasive since conventional zoning began to be practiced in the early 20th century. It may be appropriate for a locality to separate industrial areas from residential areas on the simple basis of mitigating noise, odor, truck traffic, objectionable aesthetics, and other nuisance effects. It may also be appropriate to establish and enforce natural vegetative buffer requirements between certain industrial uses and residences, and between commercial and residential uses. However, land use planners should be careful not to assume that all industry and all commercial uses are the same. In other words, some industry may be appropriate near residences, and the same is true of commercial uses. Indeed, mixing of land uses can be a major goal of healthy community practices (see Chapter 6 of this guidebook).

It is recommended that land use planners first study existing land use patterns to assess the relative risks now associated with the existing land use pattern, using the separation recommendations in Table 3.1 as well as specific information about land uses in Table 3.2. Furthermore, land use planners can consult the query tools available

Table 3.2. Other Facility Types That Emit Air Pollutants of Concern

Categories	Facility Type	Air Pollutants of Concern
Commercial	Auto body Shops	Metals, Solvents
	Furniture Repair	Solvents, Methylene Chloride
	Film Processing Services	Solvents, Perchloroethylene
	Distribution Centers	Diesel Particulate Matter
	Printing Shops	Solvents
	Diesel Engines	Diesel Particulate Matter
Industrial	Construction	Particulate Matter, Asbestos
	Manufacturers	Solvents, Metals
	Metal Platers, Welders, Metal Spray (flame spray) Operations	Hexavalent Chromium, Nickel, Metals
	Chemical Producers	Solvents, Metals
	Furniture Manufacturers	Solvents
	Shipbuilding and Repair	Hexavalent chromium and other metals, Solvents
	Rock Quarries and Cement Manufacturers	Particulate Matter, Asbestos
	Hazardous Waste Incinerators	Dioxin, Solvents, Metals
	Power Plants	Benzene, Formaldehyde, Particulate Matter
	Research and Development Facilities	Solvents, Metals, etc.
Public	Landfills	Benzene, Vinyl Chloride, Diesel Particulate Matter
	Waste Water Treatment Plants	Hydrogen Sulfide
	Medical Waste Incinerators	Dioxin, Benzene, PAH, PCBs, 1,3-Butadiene
	Recycling, Garbage Transfer Stations	Diesel Particulate Matter
	Municipal Incinerators	Dioxin, Benzene, PAH, PCBs, 1,3-Butadiene
Transportation	Truck Stops	Diesel Particulate Matter
Agricultural Operations	Farming Operations	Diesel Particulate Matter, VOCs, NOx, PM10, CO, SOx, Pesticides
	Livestock and Dairy Operations	Ammonia, VOCs, PM10

Source: California Environmental Protection Agency 2005.

via the Toxic Release Inventory (introduced in Chapter 2) to further analyze potential conflicts among pollution sources and sensitive land uses. Policies can be explicitly stated in the land use element of the comprehensive plan (or land use plan) citing these separation recommendations. When zoning regulations are rewritten, the separation recommendations can and should be integrated as standards for specific land uses (both the air pollutant sources and the sensitive land uses). Finally, when specific land use projects are proposed which require hearing and approval (such as conditional use permits), planners should evaluate the potential public health effects of air pollution sources on sensitive land uses and consider health impacts as one of several factors in deciding on whether to recommend approval.

The Contribution of Trees to Healthy Communities

Trees provide numerous benefits to communities. Trees add natural character to our communities, providing colors, flowers, and beautiful shapes, forms, and textures. Trees are used to screen out objectionable views and soften the appearance of buildings (South Carolina Forestry Commission). They absorb and block noise from the urban environment and thus provide good buffers between incompatible land uses. Trees help reduce heating and cooling costs.

The community health benefits of trees are less frequently emphasized. Trees directly provide cleaner air by releasing oxygen through photosynthesis, by absorbing gaseous pollutants through the pores in their leaf surfaces, and by trapping and filtering particulates such as dust and ash until they are washed to the ground by rainfall (Martineau 2011). Trees act as a carbon sink by removing the carbon from carbon dioxide and storing it as cellulose in the trunk while releasing the oxygen back into the air. A healthy tree stores about 13 pounds of carbon annually—or 2.6 tons per acre each year (South Carolina Forestry Commission). Trees play an essential role by cooling the atmosphere through shade and evapotranspiration. Trees help reduce the "urban heat island" effect because they absorb rather than reflect heat energy. Trees use sun energy for the production of sugars and leave the air that surrounds them five to eight degrees Fahrenheit cooler than ambient air (Condon 2010).

Trees protect people from harmful ultraviolet radiation. Over-exposure to ultraviolet radiation, especially in children, is associated with increases in cancer (Martineau 2011). Trees also promote positive psychological effects by providing connections with nature (see Chapter 6 of this guidebook). Indirectly, trees provide a more enjoyable environment which can increase outdoor activity and promote a more active lifestyle (see Chapter 4 of this guidebook).

With all of these public benefits, it is easy to conclude that trees should be considered part of the community's green infrastructure, and that comprehensive plans should capitalize on these important community benefits by including tree protection strategies, policies, and programs. We turn now to some specific programs, strategies and policies that should be adopted by communities in order to protect and enhance its tree resources.

Protecting Trees and Enhancing Tree Coverage and Canopy

Tree Protection During Land Development

Communities should have regulations that prohibit the indiscriminate and wasteful and purposeless cutting of trees during the land development process. It is customary for local governments to: require tree surveys for large development sites, review land development plans so that they minimize tree disturbance; require the retention of some of the existing on-site trees during the land development process; protect trees designated for retention on site with the installation of tree protection fencing; require the replanting of trees when trees are disturbed; and specify disincentives for cutting larger trees (sometimes referred to as "heritage" trees). Often, these requirements are specified in a detailed tree ordinance.

Tree Canopy Analyses and Policies

Local governments are paying increasing attention not only to protecting individual trees and tree stands, but also to the percentage of total area that is covered by tree canopy. As the percentage of total area covered by tree canopy increases, the relative health of the community is also likely to increase given the important role that trees play in improving community air quality. Communities can also establish targets, expectations, or policies for tree canopy which should vary by type of land use. For instance, commercial areas may have a lower tree canopy ratio (i.e. percent of the lot shaded by a tree canopy) than single-family residential neighborhoods because of the need for larger buildings, parking lots, loading/unloading areas, and pedestrian access ways in commercial developments.

A brief description follows of how a tree canopy analysis might be conducted. Planners can acquire a high-resolution aerial photograph of the community or given area of study. Tree canopy can be generalized from the aerial photograph and polygons digitized of tree canopy area. Then, by importing the polygon shape files into a Geographic Information System (GIS), total tree canopy coverage can be estimated. Further analyses can be conducted in GIS to estimate the amount of tree coverage (% of total area) for each major type of land use (residential, institutional, commercial,

industrial, etc.) after subdividing the data analysis by land parcels coded in the existing land use analysis. Based on these analyses, planners can establish an overall target policy for tree canopy coverage and policies for major land use types. After conducting such an analysis, planners may find that tree canopy is deficient as a whole, or for certain land uses. Or, the community planners might find that it has adequate tree canopy overall and for all land uses but needs to establish policies to maintain the existing tree canopy.

Street Tree Planting Programs

Communities should go beyond the basic concern about trees on private lands to also consider how they can add tree canopy and additional trees in public places, especially along streets and roads. Many communities have adopted programs designed to incrementally plant trees within or adjacent to the right of way of roads and streets. Adding trees to provide canopy and shade will have numerous benefits, including the cooling of the local microclimate, better air quality, and enhancement of the walkability of the community. Planners are cautioned, however, to involve landscape architects and/or foresters in devising street tree programs, since a multitude of concerns can arise. Significant attention should be given to selection of the types of street trees, for example. To promote healthy foods, it is suggested that some street trees might be fruit or nut-bearing trees, but the product falling from such trees must be managed (see Chapter 5 of this guidebook). Street tree planting programs must also ensure there will be adequate area for the street trees to grow. Street trees must not be planted in places where they will interrupt sight visibility of motorists at intersections and driveways, and street trees must also be planted after considering the location of utilities.

Urban Forestry Programs

Some communities may elect to go beyond tree protection regulations, tree canopy analyses, and street tree planting programs to embrace more comprehensive approaches to trees in the community. Urban forestry programs aim to maintain and enhance the tree coverage in the community. They are more formalized efforts which may meet professional standards, such as the Tree USA designation. There may be public or private grant money available to communities in their pursuit and maintenance of tree canopy and establishment of urban forestry programs.

Overhead Power Lines and Public Health

Overhead high voltage power lines radiate electromagnetic fields and expose people to electromagnetic radiation. Such power lines have raised some public health concerns. There are conflicting opinions about the relative health risks; studies seem to produce

widely divergent and contradictory results. There is research which suggests that electromagnetic fields from power transmission lines may pose a public health hazard (Slesin, Connelly and Bergman 1991). Leukemia and cancer are the most widely cited potential health risks of living near power lines. Some scholarly research indicates an increased risk of both, especially for children. There are also studies that show connections with breast cancer, decreased libido, fatigue, depression, birth defects, reproductive problems, heart disease, stress headaches, trouble sleeping, and many other symptoms (Earthcalm 2010). Yet other researchers have concluded that power lines do not represent any significant health issue. The US EPA sums it up this way:

> **"Much of the research about power lines and potential health effects is inconclusive. Despite more than two decades of research to determine whether elevated EMF exposure, principally to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. The general scientific consensus is that, thus far, the evidence available is weak and is not sufficient to establish a *definitive* cause-effect relationship" (U.S. EPA).**

Overhead power lines have caused some concerns about public health but evidence of public health effects are mostly considered inconclusive.

Although one cannot definitively conclude that power lines are dangerous to public health, the US EPA suggests that people concerned about possible health risks from power lines can reduce their exposure by increasing the distance between themselves and the source. This suggests that in planning land uses, communities should map major overhead transmission lines and consider separation (e.g., 500 feet) standards for residences from them.

Abatement of Public Health Nuisances

A public nuisance is a condition or activity involving real property that amounts to an unreasonable interference with the health, safety, morals, or comfort of the community. Cities and counties are given nuisance abatement authority under NC Gen. Stat. § 160A-193 (cities) and § 153A-40 (counties). There are minor differences between the authority of cities and counties to abate nuisances (Ducker 2011).

In North Carolina, the county board of health is the policy-making, rule-making and adjudicatory body for a county health department (NC Gen. Stat. § 130A-35 and

§ 130A-37). A local board of health has the responsibility to protect and promote the public health and to adopt rules necessary for that purpose (NC Gen. Stat. § 130A-39). A local board of health, after consulting with the appropriate county board or board of commissioners, appoints a local health director (NC Gen. Stat. § 130A-40).

A local health director has numerous powers but is generally charged with advising local officials with regard to local health matters (NC Gen. Stat. § 130A-41). The local health director may determine that a public health nuisance exists and may issue an order of abatement directing the owner or person in control of a given property to abate the public health nuisance (NC Gen. Stat. § 130A-19). If an imminent hazard exists, after notice to the property owner or person in control of the subject property, a local health director can take action as necessary to abate an immediate public health hazard (NC Gen. Stat. § 130A-20).

Recommended Policies

Environmental Health Goals

- Promote health for all people through a healthy environment.
- Improve air and water quality and reduce air and water pollution.
- Minimize the risks to human health and the environment posed by hazardous sites.

Environmental Health Policies and Objectives

- Reduce the amount of toxic pollutants released into the environment.
- Reduce waterborne disease outbreaks arising from water intended for drinking among persons served by community water systems.
- Consider the installation and maintenance of buffer zones to mitigate the adverse health effects and risks of environmental exposure to air pollution, noise pollution, and the heat island effect.
- Establish and maintain a clear procedure and responsibility for the abatement of public health nuisances.

Protection of Air Quality

- Attain national ambient air quality standards, as may be applicable to the region and locality. Take necessary actions to achieve and maintain compliance with state and federal air quality standards for criteria pollutants.

Tree Protection

- Provide and protect trees through sound, responsible land development practices.

- Encourage the retention of some existing trees and the delineation of "tree save areas" on all plans for land disturbance or land development.
- Require a tree replacement plan be submitted when trees will be removed as a result of land development.
- Compensate for the net loss of tree-density units (those proposed to be removed) on the site by requiring the installation of replacement trees to be planted in such quantity and size (i.e., tree density units) as to equal the number of total tree density units to be removed.
- Require that street trees be planted along all new public streets and private streets within commercial, industrial, and residential subdivisions; consider the appropriateness of fruit-bearing trees.
- Require new development and significant additions to existing development to provide adequate tree canopy to counteract heat island effects and improve environmental health.

CHAPTER 4

Physical Activity and Active Living

"Active living" can be defined as a way of life that integrates physical activity into daily routines" (ICMA 2005). Yet, in the last 50 years, we have unintentionally but effectively engineered physical activity out of our daily lives. As a result people are becoming less physically active. To decrease heart disease, cancer, osteoporosis, depression, and other diseases, we need convenient opportunities for regular physical activity. The building of communities in a suburban, low density, automobile-dependent form is one explanation for why people are less active. Many suburban and rural communities currently lack the design and land use features that enable active living, thus making active and healthy lifestyles much more difficult for residents. The obesity epidemic our nation faces today could be due not only to bad nutrition but also to severe car dependency brought about by sprawl (Dannenberg et al. 2011).

A study done in Atlanta found that every hour spent in the car raises the probability of being obese by 6%, but every half-mile walked per day reduces the probability of being obese by 4.8% (Fallon and Neistadt 2006). In another study, individuals residing in a neighborhood that was considered highly "walkable" had lower body mass indexes (BMIs) than individuals who resided in a neighborhood with low walkability levels (Casagrande et al. 2011).

Since the mid-1990s, public health professionals have recognized that the design of the built environment has a direct bearing on people's ability to incorporate physical activity into their daily routines (Morris 2006a). We now understand that we cannot fully address the increasing rates of illness within the medical sector alone. We need to pay greater attention to the public health implications of how we lay out our cities and how we design homes and buildings. Community design changes that promote physical activity, such as sidewalks and trails, may reduce obesity, injuries, and air pollution. The built environment can positively influence (rather than discourage) physical activity, especially among children and adolescents, if: there is a presence of sidewalks, bike

lanes, trails, and parks; if there is access to neighborhood or school play areas and/or recreational equipment; if there are other destinations to walk to, and if traffic density is low. Adults in particular are persuaded to increase outdoor physical activity if the built environment provides adequate access to satisfactory facilities, enjoyable scenery, and safe neighborhoods.

The health rationale for improving the built environment so that it encourages greater physical activity is well established. Among children and adolescents, physical activity can: improve bone health, improve cardiorespiratory and muscular fitness, decrease levels of body fat, and reduce symptoms of depression. Among adults and older adults, physical activity can lower the risk of early death, coronary heart disease, stroke, high blood pressure, type 2 diabetes, breast and colon cancer, falls, and depression. Many cancers are preventable by reducing risk factors such as physical inactivity and obesity. Continued focus on preventing weight gain will lead to lower rates of cancer and many chronic diseases (Healthypeople.gov).

As a further indication of how the built environment can positively benefit individual physical health, there is evidence that: mixed land use environments are associated with higher levels of total physical activity; and that living close to parks, trials and recreation is associated with greater use of facilities and more recreational physical activity. There is also evidence that access to recreation is not as good in areas with mostly low-income and racial or ethnic minority populations (Samit 2011).

Data Analysis

People travel to destinations for a variety of purposes. Getting to work is one important purpose of travel. Data are available on the modes of travel that workers use to get to their jobs. Other trips, such as those made for shopping, services, school, visiting family, and leisure, can depend on whether vehicles are available and whether destinations are close enough to reach by walking or biking. Data are available on the number of vehicles available to households. The safety of a walking or biking route can be critically important in one's decision regarding whether to use active transportation options. Data are available on pedestrian and bicycle accidents. Active transportation may be encouraged if there are attractive destinations to which one can walk or bike. Data are available on outdoor recreation facilities. A healthy community plan will include an analysis of these types of data in an effort to improve active transportation. The following subsections illustrate how these data can be collected and analyzed.

Illustrative Analysis of Data: Means of Transportation to Work

It is desirable from a community health perspective to have significant numbers of workers who commute to work via walking and biking, because these modes of transportation are "active" (i.e., involving human activity). Table 4.1 shows estimates of the number of workers 16 years and over in the Town of Ahoskie and their means of transportation to work, for the 2007 to 2011 time period. Percentages are also shown and compared with the State of North Carolina as a whole. Workers in Ahoskie are relatively similar to workers in the state as a whole when it comes to means of transportation to work. In Ahoskie and the state of North Carolina, more than four of every five workers 16 years and over drive a vehicle alone to work. Carpooling is the second most popular choice of commute to work for workers in both Ahoskie (14.8%) and the state (11.0%). Only 36 workers in Ahoskie (2% of the total) walked to work, but that percentage is slightly higher than for the state as a whole. Although not specifically shown in Table 4.1, an estimated 0.6% of all workers in Ahoskie and 0.2% of all workers in North Carolina used a bicycle as a means of transportation to work (American Community Survey, Table B0801, "Commuting Characteristics by Sex").

Walking or biking to work is an opportunity for a more active and healthy population. The numbers in Table 4.1 suggest that Ahoskie's working residents are similar to those of the state as a whole. Active and healthy populations also have the opportunity to walk and bike to other destinations and purposes besides work, so these data provide a relatively limited picture of potential for walking and biking in the Town of Ahoskie.

Table 4.1. Means of Transportation to Work, 2007-2011 5-Year Estimates Town of Ahoskie, North Carolina and Comparison with State

Means of Transportation to Work	Town of Ahoskie, NC		State of North Carolina
	Number of Workers 16 Years and Over	Percent of Total Workers 16 Years and Over	Percent of Total Workers 16 Years and Over
Car, truck or van—drove alone	1,429	80.1%	80.7%
Car, truck or van—carpooled	263	14.8%	11.0%
Public transportation (excluding taxicab)	8	0.4%	1.1%
Walked	36	2.0%	1.8%
Other means	23	1.3%	1.3%
Worked at home	24	1.3%	4.2%
Total Workers 16 Years and Over	1,783	—	—

Source: American Community Survey, 2007-2011 Five-Year Estimates, Table DP03, Selected Economic Characteristics.

Illustrative Analysis of Data: Vehicles Available

Vehicle availability can be an important variable in assessing the potential for active transportation. High percentages of households with two or more vehicles available would suggest that there is a tendency to travel by vehicle (given the investment, all other things being equal) rather than use active transportation modes. To the contrary, people without a vehicle available must rely on transit (if available) or active transportation means (i.e., walking or biking), unless they can borrow someone else's vehicle or ride with another person. Statistically, individuals with lower incomes are less likely to have cars and are twice as likely to walk compared with people with higher incomes (ICMA 2005).

Table 4.2 provides estimates of the percentage of workers ages 16 years and over by number of vehicles available for the Town of Windsor as of 2007-2011 (five-year estimates). It also provides percentage comparisons for the town and the State of North Carolina as a whole.

Table 4.2. Percentage of Workers 16 Years and Over in Households by Vehicle Availability Town of Windsor, NC and State of North Carolina, 2007-2011 5-Year Estimates

Vehicles Available	Town of Windsor, NC	State of North Carolina
	Percent of Total Workers 16 Years and Over in Households	Percent of Total Workers 16 Years and Over in Households
No vehicle available	3.7%	2.5%
1 vehicle available	15.4%	20.3%
2 vehicles available	45.5%	43.0%
3 or more vehicles available	35.4%	34.2%

Source: American Community Survey, 2007-2011 5-Year Estimates, Table S0801, "Commuting Characteristics by Sex."

As these data indicate, more than 9 of every 10 workers 16 years and over residing in households, in both Windsor and the State as a whole, have at least one vehicle available. A large percentage of workers with vehicles available may serve as an impediment to the promotion of active transportation. In 2007-2011, there was a slightly higher percentage of workers in the Town of Windsor who did not have a vehicle available than compared with the state as a whole for the same time period. That slightly higher percentage in Windsor would suggest a slightly greater need for active transportation and transit in the town than for the state as a whole.

Illustrative Analysis of Data: Accidents

A healthy environment presupposes that pedestrians and bicyclists will have a safe environment in which to walk or bike. As pedestrians, children and the elderly are especially vulnerable to death or injury (Morris 2006a). A large number of accidents to pedestrians and bicyclists may be evidence that the pedestrian and bicycle environments are unsafe and therefore will not promote active living. Roadway design features may be responsible for safety concerns.

Data are available from the North Carolina Department of Transportation for counties on the number of vehicle, pedestrian, and bicyclist accidents, injuries, and fatalities. Table 4.3 shows such data for three years—2000, 2005, and 2010—for Washington County.

Table 4.3. Accident Data, 2000, 2005 and 2010, Washington County, North Carolina

	2000	2005	2010
Traffic Accidents	300	270	306
Traffic Accident Fatalities	3	5	7
Pedestrian Accidents	1	2	2
Pedestrians Injured	2	5	2
Pedestrian Fatalities	0	0	0
Bicyclists Injured	2	4	0
Bicyclist Fatalities	0	0	1

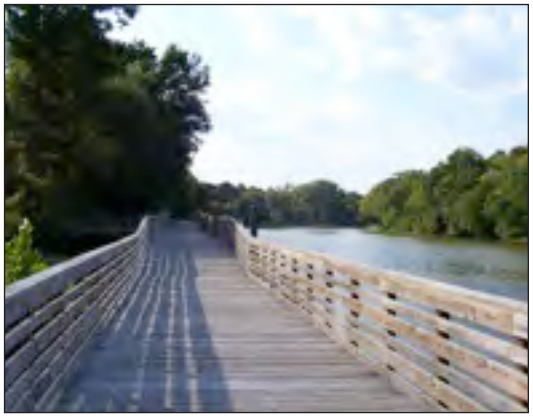
Source: State Agency Data: Department of Transportation, via LINC, accessed June 4, 2013.

Over the years, Washington County has had very few accidents and injuries to pedestrians and bicyclists and only one fatality to a bicyclist (in 2010). These low numbers are not surprising, given Washington County's rural location. While these low numbers are promising, they do not necessarily present evidence that Washington County has safe pedestrian and bicycling routes throughout the county.

Dismal Swamp multi-use trail in Camden County, NC

Illustrative Analysis of Data: Outdoor Recreation Acreage

The amount of outdoor recreation acreage is a good indicator of active living opportunities, since outdoor recreation opportunities tend to promote an increase in leisurely human activity. Table 4.4 shows total outdoor recreation acreage in Washington County and North Carolina as a whole by type (local, state, and federal). Table 4.4 also provides a "level of service" for outdoor recreation acreage per 1,000 residents in 2008. From the data, it can be surmised that Washington County residents have an extremely high level of service with regard to acres of outdoor recreation land per 1,000 residents: almost 3,000. This is a positive finding in terms of providing active living opportunities for the county's residents. Note however, that not all of this outdoor recreation land may be considered accessible to population centers in Washington County. The State of North Carolina's level of service with regard to outdoor recreation acreage in 2008 is also considered very high—it is a function of huge areas of National Forest lands as well as vast amounts of lands in public ownership along the coastlines of the state.



Roanoke River boardwalk in Williamston, NC

Table 4.4. Outdoor Recreation Acreage and Acres per 1,000 Population, 2008 Washington County and State of North Carolina

	Acres in Washington County, NC	Acres in State of North Carolina
Local outdoor recreation acreage	12	104,883
State outdoor recreation acreage	21,140	691,275
Federal outdoor recreation acreage	17,940	2,154,647
Total acreage all ownerships	39,092	2,950,805
2008 Population Estimate	13,326	9,269,633
Total outdoor recreation acres per 1,000 population (2008)	2,933.51	318.33

Source: State Agency Data: Department of Transportation, via LINC, accessed June 4, 2013. Acres per population calculated by author.

Analyzing "Walkability"

As alluded to already, the extent to which people will use active transportation modes (i.e., walking, biking, and riding transit which also involves some human activity) depends on many factors including whether an automobile is available. The term "walkability" is now accepted among planners and active living enthusiasts. Walkability refers to the extent to which a person feels comfortable and safe in walking to and from destinations. It also means that the built environment is planned in a way that facilities for walking are provided and that origins and destinations are close enough that walking is possible. Substantial research has taken place on people's travel "behavior." In this section, we summarize the elements of the built environment that influence people's decisions to use active transportation.

Facility Availability and Adequacy

People will walk or bike to destinations if the facilities needed to do so are available. If sidewalks and/or bike trails are not available, people may not feel comfortable walking or biking in the street or alongside it. This makes pedestrian and bicycle infrastructure (sidewalks, multi-use trails, and various forms of bicycle travel) critically important to active transportation. The same can be said for public transportation; bus stops and transit stations must be available for people to use public transit. Not only must active transportation infrastructure be available, facilities must meet certain standards of acceptability and be maintained in good order.

Safety and Comfort

Pedestrian and bicycle infrastructure must not only be available and adequate; it must also provide assurances to users that the facilities are safe and comfortable. If people feel unsafe, they will not walk or bike. People may not want to walk along a sidewalk that is perilously close to speeding traffic. Too many driveway intersections can make a pedestrian route more dangerous. And if the travel experience is uncomfortable, that too will dissuade active transportation. For instance, exposure to weather is important; people may not want to walk in the heat of summer along a sidewalk that exposed to the blazing sun or during times when they will soaked by rain. The comfort of pedestrians can be enhanced with shade trees, and "streetscape" improvements such as benches. Awnings along storefronts overhanging the public sidewalk can also contribute to the comfort of pedestrians.

Proximity of Origins and Destinations

There are practical limits to how far people will walk or ride a bike. Active transportation presupposes that the origins (residence, workplace, etc.) are within a reasonable walking

or biking distance to destinations (schools, workplaces, shopping facilities, leisure places). Transportation planners typically use ¼ or ½ mile as a standard for distance that people will travel by foot. Bicyclists will likely travel farther than ½ mile if other conditions are favorable.

This means that the built environment must be one that brings the origins (usually, residential neighborhoods) and destinations (multiple purposes described above) closer together. This is contrary to how many suburban communities have been built in the past—prior planning has mostly ignored the needs of pedestrians and has ensured that people can only travel by automobile. Clearly, for active transportation to be promoted, the locality's land use pattern must be more concentrated and carefully thought out so that people can go from house to work, home to school, home to shop, and home to leisure (among other travel purposes). When homes and shops are brought closer together in terms of distance, or better yet combined in the same development (i.e., mixed land uses, as described in Chapter 6 of this guidebook), active transportation can be encouraged. Similarly, when important destinations like schools and parks are located within or close to residential neighborhoods, active living is promoted.

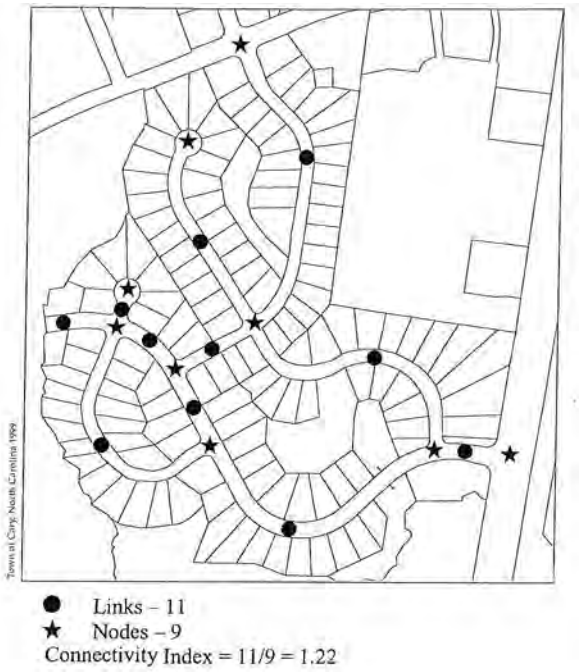
Connectivity and Accessibility

Not only have many communities failed to provide homes close to destinations, they have also failed to ensure that the transportation system provides direct connections to origins and destinations. For instance, suburban development designs have resulted in a preponderance of dead-end streets with cul-de-sacs. Little attention has been given in suburban and rural areas to connecting streets which will reduce distances between origins and destinations and thus encourage walking and biking. That lack of attention to street patterns is beginning to change with much greater attention to the "connectivity" of the street network so that travel distances can be minimized and active transportation fostered.

Many communities are looking now at how they can improve the connectivity of their street networks (Handy, Paterson and Butler 2003). In addition to better connectivity, "accessibility" must exist for active transportation to be feasible. By accessible, we mean the pedestrians or bicyclists must be able to gain access to the destination once they arrive. Gates and other obstacles can prevent access. Individuals with mobility impairments may not be able to gain access unless proper ramps and other improvements are available. Bicyclists may not go to a destination if there is no place to securely park the bicycle. Shopping centers that don't provide direct connections to the public sidewalk system, bus stop, or bike path are hindering accessibility.

Walkability Audits

The factors above, and others, have been incorporated into specific ways of studying whether a given community promotes walkability. There are growing numbers of methods and techniques that have been offered to help planners conduct audits and assessments of just how walkable their community is. Such details are generally beyond the scope of this guidebook, but a growing body of guidance sources is available to instruct planners on how to assess the walkability of their community.



Measuring Street Connectivity with a Connectivity Index in Cary, NC

Source: Handy, Paterson and Butler, 2003, p. 36.

Such audits will typically provide the following in an effort to determine how walkable the community is:

- An inventory and assessment of the conditions of the sidewalk, bicycle facility, and trail network;
- An assessment of safety and comfort of existing facilities;
- Measurements of the relative connectivity of the street network;
- Analysis of how many residences are within walking distance of a public park or open space;
- A critical review of the land use mix in the community with an eye toward whether origins and destinations are close enough together to promote walking and biking.
- Analysis of local subdivision and land development regulations to see if they promote accessibility by foot and bicycle, and if not, what is needed to improve such accessibility. As one example, the City of Greenville, NC, received a grant from Pitt County and used the funds for a consultant to review the city's development regulations and recommend changes (Clark Nexson 2012).

Site and Building Design Standards

Many urban designers now suggest that buildings should be placed close to the street in order to provide a better, more interesting walking environment. For instance, various sources have noted how buildings with appropriate heights, located close to the street right of way, help "frame" the street which makes it desirable for pedestrians. In North Carolina, there is a statute (NC Gen. Stat. § 160A-306(b)(2)) which (in addition to

Auto-orientated highway with building setbacks (Jacksonville, NC)

"Build-to" lines bring buildings closer to the "Main Street", enhancing the pedestrian experience. (Ayden, NC)

zoning enabling authority via other statutes) authorizes cities to establish minimum building setback lines from streets "to protect the public health by keeping dwellings and other structures an adequate distance from the dust, noise, and fumes created by traffic on the street and by insuring an adequate supply of light and air." Of course, the extent of a building setback from a given street depends on its function—large setbacks are desirable for highways carrying large amounts of truck and auto traffic (see Chapter 3 of this guidebook), while setbacks along a "main street" or downtown area may be minimal for purposes of enhancing the pedestrian environment.

As alluded to above, local governments should review their zoning, subdivision, and land development regulations to ensure that they promote the public health; this may mean greater setbacks for buildings in certain parts of the city (i.e., adjacent to busy thoroughfares) and minimal or no building setbacks in so-called "Main Street" areas. Standards should also be developed for future road connections and pedestrian and bicycle infrastructure that will promote active transportation. The United States Access Board has developed guidelines for public rights of way in an effort to address challenges to accessibility. These standards may be viewed at: www.access-board.gov/guidelines-and-standards/streets-sidewalks/public-rights-of-way.

Recommended Policies

Physical Activity

- Improve the built environment to enhance access to and availability of physical activity opportunities.
- Promote walking and biking (i.e., "active transportation").
- Ensure equitable access to transportation networks.

Transportation Policies for Healthy Communities

- Incorporate active transportation design features into new development projects.
- In areas served by light rail transit or bus rapid transit, encourage or require transit-oriented development projects. (see Chapter 6 of this guidebook for more information)
- In areas served by light rail transit or bus rapid transit, promote walking and bicycling to public transportation stations by encouraging, requiring, and/or providing sidewalks, bicycle lanes, and bicycle storage.
- Improve street connectivity with grid-like street patterns, more intersections, and limits to block size.

CHAPTER 5

Access to Healthy Foods

The food system we have today has contributed to the increased incidence of obesity and diet-related disease (American Planning Association 2007). Nutrition behaviors play a significant role in many diseases, including diabetes, obesity, cardiovascular diseases and many cancers. As of 2010, North Carolina ranked 17th nationally in adult obesity rates and fifth in childhood obesity. Also, more than one in three children in North Carolina is considered overweight or obese as of 2010. And in North Carolina, people with lower income levels have a higher risk for diet-related chronic diseases (Curtis et al. 2010).

With the exception of providing a healthier built environment, which can promote active living, there seems on the surface to be little that land use planners and policy makers can do to influence lifestyle choices and eating habits. That is, it seems that if people want to eat foods that are unhealthy, or don't want to be active physically, that is their choice and there is little that can be accomplished in a comprehensive plan to persuade people to behave in healthier ways, short of public education programs. This chapter challenges the prevailing way of thinking, that comprehensive plans cannot influence people's eating habits.

There is evidence that if people would eat healthier foods, obesity and other human health problems would be reduced. There is also evidence that local food systems can improve the health of community members. For instance, epidemiological studies have found correlations between higher levels of direct-to-consumer farm sales and lower levels of mortality, obesity, and diabetes (Mettam, King, and Dunning 2013).

Planners can engage in certain studies that will determine the relative access people have to healthy food, plus they can propose policies that if followed will increase access to healthy foods. There are, in fact, several ways localities can provide a built environment that provides better access to healthy foods. Localities can increase access to healthy foods by preserving agriculture at the fringe of the community, allowing certain compatible agricultural practices within the community's developed area, conducting food "desert" analyses, and promoting community gardening practices. This chapter

provides an overview of these planning efforts. For more detailed information, planners should consult *A Community and Local Government Guide to Developing Local Food Systems in North Carolina* (Mettam, King, and Dunning. 2013) at: http://www.cefs.ncsu.edu/publications/guide-to-developing-local-food-systems-in-nc.pdf.

Data on Healthy Food Providers

North Carolina is a major producer of fresh fruits and vegetables and has approximately 3,745 vegetable farmers (Curtis et al. 2010). According to the 2007 Census of Agriculture, there were 3,712 farmers in North Carolina selling products directly to consumers at farmers markets, roadside stands, and community-supported agriculture programs (Mettam, King, and Dunning 2013). Communities should learn the degree to which healthy food is produced in an around the locality. The AccessNC data base of the NC Department of Commerce, introduced in Chapter 2 of this guidebook, can be used to find information about specific agricultural businesses in a given county. Food industries particularly relevant to healthy foods include but are not limited to the following North American Industrial Classification System (NAICS) codes: 1112, Vegetable and Melon Farming; 1113, Fruit and Tree Nut Farming; and 1123, Poultry and Egg Production. A list of individual businesses in these and other NAICS categories can be generated in AccessNC. The data show the city and county in which each business is located. Planners can also click on individual businesses to find their address and a map showing the location of the business. Other local and regional sources may exist.

Table 5.1 provides a list of businesses that might be contacted for possible participation in healthy food programs in northeastern North Carolina counties. Planners should use the AccessNC data base and contact the local Farm Bureau and/or other associations to provide an inventory of healthy food producers in the locality and region.

Table 5.1. Farm Businesses in Selected Locations

NAICS	Business Name	County	Address	Product
1112	Comstock's Potato Shed	Tyrrell	578 Levels Rd, Columbia	Vegetables
1123	Briggs & Briggs Poultry Farm	Gates	431 Acorn Hill Rd, Sunbury	Poultry hatchery
1123	Cannon Poultry	Martin	3982 Edmondson Rd., Oak City	Poultry hatchery

Source: AccessNC Business Search by NAICS. http://accessnc.commerce.state.nc.us/EDIS/business.html

Another way to find local farmers and foods in a given area of North Carolina is to search online at the Carolina Farm Stewardship Association website (www.carolinafarmstewards.org) (Curtis et al. 2010).

Agricultural Preservation

Food must be grown and produced somewhere. When food is grown in places different from where the food is consumed, it must be transported to consumers, thus increasing the cost. Of course, no locality is likely to be entirely self-sufficient in terms of supplying all of the food types consumed by the local population. In America, we have taken for granted that we can purchase most any type of food we want, and that it can and will be made available to us if we will pay for it. This situation has led many communities to overlook the importance of having opportunities to grow food locally, and in turn to underemphasize the importance of protecting agricultural lands for food and fiber production.

Nationally, agricultural land is steadily being lost, primarily through non-farm development. Some observers do not believe that the loss of agricultural land is a problem, because the U.S. has an abundance of agricultural land. However, it is important to note that more than half of U.S. farm production occurs within "urban influenced" counties which have annual population growth rates more than twice the national average (American Planning Association 2007). This means that the most productive agricultural lands are among the most threatened by suburban and urban development. This also means that local governments have a critical role to play in protecting agricultural lands through land use regulations.

North Carolina Policy and Law

Like most of the rest of America, North Carolina is rapidly losing its agricultural base (Mettam, King, and Dunning 2013). Prime farmland is being replaced by land development, threatening the disappearance of high-quality soils needed for food production (Curtis et al. 2010). In North Carolina, the declared policy of the state is to conserve and protect agricultural land for the production of food, fiber, and other products (NC Gen. Stat. § 106-700). The state's statutes protect agriculture from being declared a nuisance (NC Gen. Stat. § 106-701) and allow for "use value taxation," or for agricultural land to be valued at its current agricultural use rather than its highest and best use or market value (NC Gen. Stat. § 105-277.2).

The North Carolina General Assembly also passed the Agricultural Development and Farmland Preservation Enabling Act in 1986, which authorizes counties and cities to undertake programs to encourage the preservation of qualifying farmland.

Such programs include establishment by ordinance of voluntary agricultural districts (NC Gen. Stat. § 106-738) and "enhanced" voluntary agricultural districts (NC Gen. Stat. § 106-743.1).

Farmland in Edgecombe County, North Carolina

Local Techniques to Protect Farmland

Local comprehensive plans should pay considerable attention to protecting farmlands close to urban areas for future food production. Scattered residences in agricultural areas threaten agricultural productivity directly by removing agricultural land from production. In a more indirect manner, development of prime agricultural areas may force farmers out of production for various reasons, including nuisance complaints and raising agricultural land values for non-farm uses, thus increasing property taxes for farms (American Planning Association 1999, 2007). Localities will likely need to develop, implement and enforce several techniques to effectively preserve agricultural land. Currituck County, North Carolina, has expanded use allowances in its rural zoning districts to include agribusiness and agricultural support services such as refrigerated storage, thus reinforcing land values for farmland (King 2013).

Although some counties in North Carolina have elected not to adopt zoning regulations, one of the more effective farmland preservation techniques is exclusive agricultural zoning, i.e., an agricultural zoning district that establishes agriculture and farming as the principal use and which does not include residential uses except for farm-related dwellings. To effectively prevent rural residential sprawl, the minimum lot size should be at least ten acres; five-acre minimums are generally too small to farm and do not prevent rural sprawl (Daniels and Bowers 1997). Localities can also pass general obligation bond referenda and use bonds to finance farmland and open-space preservation efforts (Curtis et al. 2010).

There are many other farmland protection techniques that should be considered and implemented, as determined appropriate locally. For additional information on farmland protection techniques in North Carolina, especially voluntary and enhanced voluntary agricultural district programs, see Mettam, King, and Dunning 2013. Localities are encouraged to discuss possible techniquest with their Cooperative Extension Service Representative and agricultural organizations to build consensus. As already noted, a combination of techniques is likely to be most effective.

Local Food

Food is essential for life, yet food has not been considered a priority for planning by local officials. Food has been perceived as largely the purview of the private sector (Curtis et al. 2010). That needs to change.

More than a century ago, those thinking about how cities and settlements should be planned and laid out suggested that communities should be surrounded by an agricultural greenbelt. Indeed, the idea of surrounding settlements with agricultural greenbelts is quite old. Yet, over time, due mostly to advances in transportation (i.e., automobiles and trucks) we have forgotten the initial logic of what prompted that idea in the first place—it is desirable to have food products grown near urban areas and other settlements because that provides the benefits of healthy, locally grown food delivered at low transport costs.

Local plans and policies need to encourage strategies that will result in more locally grown produce. Weather anomalies (droughts and flooding, among others) and global climate change affect food production cycles and at their worst can wipe out products altogether. Agriculture depends on petroleum and, with prices of petroleum generally on the increase, growing locally can hedge against rising costs.

With more reports of bacterial contamination of food and food-borne illnesses from pathogen-contaminated food (e.g., Salmonella in peanuts), there is also increasing concern about the "security" of food. Furthermore, the growing obesity epidemic suggests the need for healthy food has never been greater. These concerns about the quality, nutritional value, availability, security, and price of food all suggest that policy changes are needed in favor of locally grown food products (Nordahl 2009). Interest in food system issues is clearly increasing in the planning community (American Planning Association 2007).

Urban Agriculture

Generally speaking, planners have tended to assume that farming is not an appropriate land use within developed areas. We have relegated most agricultural practices to the fringe of the urban area or in rural/agricultural areas. That sentiment also needs to change. Farming does not have to be relegated to the periphery of a given town or settlement; it can be interwoven into the fabric of urban and suburban areas (Nordahal 2009).

Urban agriculture is much more than a community garden in a distressed neighborhood. Generally, planners need to change the emphasis in the way we look at plants and public spaces in the urban environment from aesthetics and recreational values to sustenance and nutrition (i.e., emphasize the provision of food for human consumption) (Nordahl 2009).

Produce on Public Lands

Local planners should conduct an inventory of public spaces and their potential for urban agriculture. This includes not only the prospect of planting fruit- and nut-bearing trees in street medians and along public street rights-of-ways, but also specifically setting aside land for crop cultivation in parks, at schools, in town squares, and on any other publicly owned properties that may be appropriate. School grounds, if planted with edible gardens, offer an exceptional opportunity for education. For other innovations, consider that Drake Park in Des Moines, Iowa, has an orchard that provides a food supply for nearby residents, and Berkeley, California, has food-producing shrubs and trees lining neighborhood streets (Nordahl 2009). The City of Seattle allows the growing of food in planting strips but prohibits certain trees, including fruiting cherry, apple, and pear species that can pose a safety risk to pedestrians when fruit falls on the walkway (Puget Sound Regional Council 2012).

Urban Agriculture

Urban agriculture generally means activities beyond simply growing fruits and vegetables. Allowing farming, including livestock (i.e., backyard farm animals) and even beekeeping, in urban areas can provide fresh food to areas that are short on grocery stores (see the discussion of "food deserts" below). Agriculture in urban areas is now being promoted in part due to the recognition that it can improve public health, and some urban areas are establishing food policy councils to help set policy and regulation for urban agriculture (Mukherji and Morales 2010). Small livestock operations in urban areas have been labeled "micro-livestock" (Bouvier 2013). Chicago has a colony of 200,000 honey bees on the roof of City Hall that help to pollinate vegetable, fruit, and nut crops (Nordahl 2009). The major fear with honey bees is being stung, but they are defensive in nature and will not usually bother others unless threatened (Bouvier 2013).

Urban Poultry Farming

North Carolina has a number of cities that allow for backyard chickens, including: Asheville, Carrboro, Chapel Hill, Charlotte, Durham, Fayetteville, Graham, Greensboro, Pittsboro, Raleigh, Sanford, Siler City, Southern Pines, Wake Forest, Wilmington, and Winston-Salem (Curtis et al. 2010; see also King 2013). Yet, chicken farming is often viewed as a potential threat to the health and safety of the city population. For that reason, farming in many other cities is outlawed. The historic reluctance to allow farming practices in urban areas is giving way in some places to a "new agrarianism." Yet there continue to be concerns regarding the health and safety of keeping livestock in urban areas. For instance, there is the threat of contraction or transmittal of diseases between

the avian species (avian influenza) and fowls to humans. There are also concerns of attracting rodents from uneaten food sources (Meakins 2010).

Local governments that want to permit urban chicken farming, particularly for fresh egg production, should begin with establishing some revised policies in their comprehensive plan. Such policies can set the regulatory framework for changes to zoning regulations, which might include the following to avoid threats to public health:

- The number of chickens can be limited outright, or one can limit the number of chickens based on lot size (e.g., one bird per 1,000 square feet of lot area).
- Roosters might be banned, since they are prone to crowing (not just in the morning but all day) and thus can create nuisances (Meakins 2010). Also, roosters are not necessary for the production of eggs (only to fertilize them) (Bouvier 2013).
- Localities can require that chickens be enclosed to alleviate unwanted wandering and to protect them from predators. Enclosures should be required to be predator-proof, and feed containers should be required to be rodent-proof.
- Minimum setbacks for enclosures can be established from property lines or abutting residential dwellings (research shows setbacks range from 10 to 90 feet in larger cities that permit urban chicken farming) (Meakins 2010).

Food "Deserts"

Studies show that in many urban areas there is an unequal distribution of food resources, such that supermarkets and fresh food are limited in rural and African American urban neighborhoods. Low-income urban neighborhoods in particular tend to house individuals who do not have access to cars and may lack access to healthy and affordable foods within walking distance or within an easy ride by public transportation (if available). Such residents often must rely on smaller, convenience-oriented markets that tend to offer fewer healthy foods (such as fruits and vegetables), fewer options in general, and higher prices than larger supermarkets (ICMA 2005). There is also evidence that rates of obesity, overweight, hypertension, and diabetes are higher among residents living near smaller grocery or convenience stores which have a limited range of goods (Cannuscio and Glanz 2011). Planners can address the issue of food deserts by conducting a study which identifies areas underserved by retail, then specifically looking at food stores. Policies can be included to encourage (and perhaps provide appropriate incentives for) fresh food sales in such underserved areas.

Community Gardens

Community gardens are frequently mentioned as a means of increasing healthy food access, and they are often cited as a means towards building community and increasing neighborhood vitality (Puget Sound Regional Council 2012). Community gardens can enable residents to produce healthy foods at low cost, encourage physical activity among residents served by the garden, and increase social ties among neighborhood residents (ICMA 2005).

In North Carolina, as of November 2009 there are at least 94 community gardens operating. The growth in community gardens has been aided by the North Carolina Community Garden Partners, established in 2008 as a network of more than 25 public and private organizations, including most notably the North Carolina Department of Public Health and the Cooperative Extension Service. The Partners organization has developed fact sheets and has written a primer on how to set up a community garden (Curtis et al. 2010).

Cities can donate or lease vacant land to land trusts that can then organize community gardens (Mukherji and Morales 2010). Maintaining community gardens can be challenging, because it takes sustained organizational resources that may be lacking in some communities (Curtis et al. 2010). Nonetheless, community gardens should be promoted in local comprehensive plans.

Farmers Markets and Farm Stands

Farmers Market, Onslow County, NC

Farmers markets involve the direct sales of farm products to consumers. The number of farmers' markets in the U.S. has increased by 70 percent in the last decade to approximately 5,000; North Carolina has approximately 200 farmers markets. For a listing of farmers' markets by county, visit the N.C. Department of Agriculture and Consumer Services' NC Farm Fresh Web site (www.ncfarmfresh.com/farmmarkets.asp) (Curtis et al. 2010). Local comprehensive plans should include policy statements and programs that support the establishment of farmers markets.

Another way for farmers to directly sell farm products to consumers is the so-called "farm stand." In North Carolina, county authority to regulate agriculture and bona

fide farm purposes by zoning is limited by statute (NC Gen. Stat. § 153A-340), including the marketing and selling of agricultural products. This means that farmers in unincorporated areas cannot be restricted in establishing farm stands on their properties. However, cities in North Carolina are not limited by that same statute. Municipalities have broad authority to regulate a wide range of agricultural activities within their city limits but not their extraterritorial jurisdictions (Owens 2011). Cities may therefore seek to regulate farm stands within city limits. Cities are likely to do so for a variety of reasons, including the size and aesthetics of farms stands and operational issues such as parking. Comprehensive plans for cities should establish a policy framework for allowing farm stands. The goal should be to allow farm stands to operate, subject (inside city limits) to reasonable standards to lessen any negative impacts they might have on the neighborhood and community (Gibbons 2003).

Produce Stand, U.S. Highway 258, NC

Recommended Policies

Healthy Foods Goal

Increase access to healthy foods.

Policies for Agricultural Preservation

- Develop and implement mechanisms to preserve large, contiguous blocks of productive agricultural land.
- Work jointly with other jurisdictions to preserve agriculture land.
- Maintain, and if possible, expand the viability of agricultural production as an economic activity.
- Encourage farm owners to practice good environmental stewardship (e.g., soil erosion best management practices, groundwater protection measures, etc.).
- Encourage owners of productive agricultural land to enroll in the county tax assessor's present use assessment program.
- Purchase, or encourage land trusts to acquire, conservation easements to protect farmland.

Healthy Foods Objectives

- As a land use planning benchmark, consider whether or not at least 50% of town residents reside within a ½ mile walk of healthy food sold at retail (i.e., a full-service grocery store, fresh produce market, or a convenience store that stocks fresh produce).
- Analyze the food-producing potential of city street (or county road) rights of ways.
- Identify and remove zoning and other policy barriers to urban food production.
- Encourage neighborhood markets and convenience stores to carry healthy food such as fresh fruit and vegetables.
- Determine and apply incentives for grocery store development in underserved areas, where possible.
- Allow cultivation and sale of herbs, vegetables, or similar crops in residential areas, as an accessory use.
- Encourage new residential subdivisions and multi-family residential developments to designate common areas for residents to garden.
- Allow community gardens as a permitted use in all zoning districts.
- Establish one community garden for each 500 households.
- Encourage the provision of resources to help get community gardens started in low-income areas.
- Establish policies that allow healthy food vending in public areas.
- Encourage roof gardens and edible landscaping.
- Change municipal zoning rules to authorize farms, and farm produce stands in appropriate zoning districts.
- Support local marketing campaigns to promote local food production.
- Establish and implement preferences and targets for local food at local government sponsored events.

CHAPTER 6

Contact with Nature

More than a century ago, Frederick Law Olmsted, the famed designer of Central Park in New York City and widely considered the father of landscape architecture, advocated parks designed to "feed the spirit" of the users and create environments that provided spiritual uplift of the soul of the user (Olmstead 1870). Without the benefit of much scientific evidence at the time, Olmsted accurately portrayed the values of parks and open spaces to public health, and the value of providing parks in urban areas. Among other things, Olmsted (1870) observed:

> **In the internal parts of large and closely built towns…the air carries into the lungs highly corrupt and irritating matters… air is disinfected by sunlight and foliage… no part of the town should finally be many minutes' walk from some one of them [parks and/or parkways]... Reserves of ground should be fixed upon as soon as possible, before the difficulty of arranging them, which arises from private building; later it shall be a greatly more formidable challenge than now… We want a ground to which people may easily go after their day's work is done, and where they may stroll for an hour, seeing, hearing, and feeling nothing of the bustle and jar of the streets, where they shall, in effect, find the city put far away from them. (Olmsted 1870)**

Without the benefit of empirical studies, Olmsted was aware of the healing powers of parks for urban dwellers. Today, there is a growing body of literature which confirms what Olmsted knew more than a century ago. People have deep-seated connections with the natural environment. People develop "attentional fatigue from excessive concentration, resulting in memory loss, diminished ability to focus, and impatience and frustration in interpersonal interations," and contact with nature at least theoretically helps restore their attention; Humans have an ability to find "tranquility, comfort, restoration, and even healing" when in contact with nature (Frumkin and Fox 2011a). Human health benefits from contact with nature, by reducing stress; people exposed to nature scenes (even if just on a video) are better able to cope with stressors and recover more quickly than people who don't have that contact with nature (Frumkin and Fox 2011a). Direct

exposure to nature is essential for healthy childhood development and for the physical and emotional health of children and adults (Louv 2005). Other research suggests that a lack of near proximity to nature may be associated with numerous deleterious conditions such as asthma, childhood obesity, and childhood diabetes (Martineau 2011).

This chapter identifies major land use practices that can increase contact with nature. These land use practices complement the basic strategy of providing parks and preserving natural features when planning cities. Each of the land use practices described in this chapter will increase the amount of park land and open space in close proximity to people in settlements. The benefits of doing so have already been highlighted—active living (see Chapter 4 of this guidebook) is promoted if people have enjoyable scenery and a place to recreate. These major land use practices do much more than just increase contact with nature, but the open space and park characteristics of these land use practices are emphasized in this chapter.

Subdivision Regulations

In the interest of public health, safety, and general welfare, cities in North Carolina are authorized to adopt ordinances regulating the subdivision of land (NC Gen. Stat. § 160A-371). Such ordinances can provide for the dedication or reservation of recreation areas serving residents of the immediate neighborhood or, alternatively, for provision of funds to be used to acquire recreation areas serving such residents (NC Gen. Stat. § 160A-372). Counties in North Carolina are afforded basically the same authority (NC Gen. Stat. § 153A-330 and § 153A-331).

Subdivision proposals can be reviewed for the extent to which they provide contact with nature. It is useful to distinguish between "active" and "passive" recreation. Active recreation emphasizes leisure activities that are facility oriented, such as swimming pools, tennis courts, and ball fields, while passive recreation emphasizes leisure activities that are natural resource oriented, such as hiking trails, conservation areas, and nature preserves. Greenways are typically considered passive recreation; a greenway is a linear park or open space conservation area that provides recreational opportunities, pedestrian and/or bicycle paths, and/or conservation of open spaces or natural areas. Both active and passive recreation facilities are important in a public health context, but contact with nature is more prevalent with passive recreation.

Conservation Subdivisions

A conservation subdivision is a division of land into lots, where open space is the central organizing element of the subdivision design and that identifies and permanently

protects all primary and all or some of the secondary conservation areas within the boundaries of the subdivision (Arendt 1996).

Before the term "conservation" subdivision became acceptable in the planning profession, the term "cluster" subdivision was used (Pivo, Small and Wolfe 1990). Basically, a conservation subdivision is a different design technique from a conventional subdivision layout. A conservation subdivision will generally have the same number of lots (residential density of homes) as a conventional subdivision, but less space is developed for lots and roads in exchange for open space preservation. Designers will first identify land resources (e.g., scenic views, steep slopes, riparian areas, etc.) worthy of conservation, then design the development in a way that respects and preserves the resources identified. A conservation subdivision results in each lot (or at least most lots within the subdivision) fronting on public or common open space. Lot owners within conservation subdivisions therefore are able to enjoy views and immediate access to natural areas, farmlands, or other preserved areas.

Illustrative Conservation Subdivision

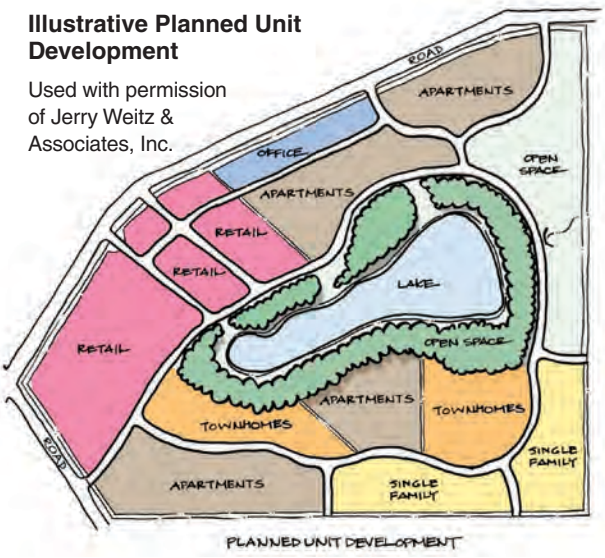
Used with permission from The Jaeger Company, Gainesville, GA

Local governments should promote conservation subdivisions in their comprehensive plans and allow and encourage them in land use regulations, for a variety of reasons in addition to public health benefits. They can help communities to: maintain rural character, protect environmentally sensitive areas, preserve historic resources, establish local and regional networks of open space, and accommodate homes more efficiently on less developed land. Developers should embrace the practice of designing and developing conservation subdivisions because they have been shown to reduce development costs and also result in a "premium" in lot sales because of the proximity of lots to open space (Mohamed 2006).

Planned Unit Development

Planned unit development is a form of development usually characterized by a unified site design for a number of housing units, clustered buildings, common open space, and a mix of building types and land uses in a slightly more dense setting than allowable on separate lots. Planned Unit Developments (PUDs) arose out of criticisms of conventional zoning in the 1950s and 1960s, when conventional zoning was considered by some to be

much too rigid and unable to accommodate different land uses in a single development. PUDs are viewed as a way to permit a mixture of land uses (usually residential, with a mix of housing types and sometimes with some accompanying neighborhood commercial uses) that is otherwise not allowed by conventional zoning districts. PUDs have thus been considered an alternative to the monotonous, lot-by-lot design of residential subdivisions; they have also been promoted to encourage creative design so that developers will use land more efficiently (Burchell and Hughes 1972; Kelly 1998; Juergensmeyer and Roberts 1998; Mandelker 2007).



Illustrative Planned Unit Development

Used with permission of Jerry Weitz & Associates, Inc.

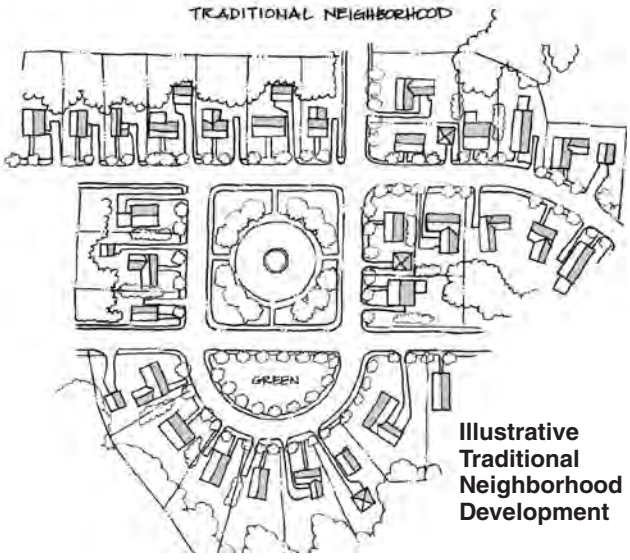
Like conservation subdivisions, PUDs tend to involve the clustering of land development in an effort to protect and save open space. PUDs provide for public and/or community open space that is typically not achievable under conventional zoning and standard subdivision platting practices.

There are several other beneficial outcomes of developing PUDs, but only those pertaining to healthy communities have been emphasized here.

Traditional Neighborhood Development

Traditional neighborhood development, sometimes called neotraditional development and more frequently referred to as new urbanism, involves designing residential neighborhoods much differently from conventional, suburban subdivisions.

Generally, the notion is to build neighborhoods the way they were designed before the automobile. Densities are generally higher (smaller lot sizes) than conventional subdivisions, so they have a more compact appearance and feel. The street pattern is usually a grid or modified grid pattern and well connected. There is typically a mix of housing units in a traditional neighborhood, whereas conventional subdivisions are usually dominated by detached, single-family



Illustrative Traditional Neighborhood Development

Used with permission of Jerry Weitz & Associates, Inc.

residences. Traditional neighborhoods mix not only housing types but also civic uses (churches, schools, etc.) and neighborhood commercial uses. Thus, they provide origins and destinations in close proximity to one another and a street network that promotes walkability as discussed in Chapter 4 of this guidebook. Houses typically have shallower front yards/ building setbacks from the street, which tends to promote more social cohesion and neighbor activity. Parking of vehicles is usually allowed on public streets, and carports and garages are frequently designed to access off of rear alleys where they are relatively hidden from the street scene when compared with conventional subdivisions. The traditional neighborhood is also planned with parks and open spaces. Traditional neighborhood developments go beyond the simple provision of open space by actually using greens, squares, and pocket parks as organizing features. Greens and squares should be spatially defined and distributed throughout the developed area so that no lot is more than a walking distance of 1,350 feet from a green, square, or park (Arendt 1999). By placing these open spaces within walking distance to residents, active living is encouraged.

Transit-Oriented Development

Transit-oriented developments (TODs) involve concentrating land development, usually residential but including an appropriate mixtures of uses, around public transportation hubs and focal points such as light rail stations. The principles of transit-oriented development can also be applied to bus stops along public transportation corridors served only by buses. By concentrating residences very close to public transportation, people may decide they can get to their destinations without even owning a vehicle. The design of TODs relies heavily on providing development oriented toward pedestrians.

Since transit-oriented development applies only in urban or suburban areas (i.e., where transit exists), one would not expect such developments to provide much contact with nature. Transit-oriented development is celebrated more for its successful connection of land use and transportation. However, transit-oriented developments provide plazas and pocket parks that can help compensate for the lack of natural conditions.

Mixed-Use Development

The mixing of land uses is implied if not explicit for traditional neighborhood developments and transit-oriented developments; given its importance to healthy living, however, it is useful to single out mixed-use development as a critical strategy for healthy living. Mixed-use development will typically provide some type of open space, but the

technique is often promoted for other reasons such as bringing origins and destinations closer together in a more compact form.

Mixed-use development can consist of a single building containing more than one type of land use; or a single development of more than one building and use where the different types of land uses are in close proximity, planned as a unified, complementary, cohesive whole. When establishing mixed-use districts, it is desirable to specify a minimum land area (20 percent minimum recommended) that is set aside for passive or active recreation or open space. Like with traditional neighborhood development and transit-oriented development, open spaces and recreation areas are typically provided in the form of "greens" and "squares."

Other Ways Of Increasing Contact With Nature

Wetlands Protection

Local government comprehensive plans should acknowledge the importance of wetlands. In addition to providing opportunities for human contact with nature, wetlands provide very valuable and frequently overlooked functions in the ecosystem, including the storage of flood waters, improving water quality by filtering out pollutants, and providing habitat to thousands of wildlife species. The protection of wetlands is critical if we are to avoid flood damages, enjoy a good quality water supply, and ensure a healthy environment. National Wetlands Inventory (NWI) maps are available in both digital (computer) and paper format to help local planners identify wetlands and establish protection programs.

Tree Protection Strategies

Trees provide natural amenities and many advantages with regard to public health (see Chapter 3 of this guidebook). By planting and maintaining trees in developments and along roadways (see Chapter 5 of this guidebook), contact with nature in urban and suburban areas can be at least incrementally improved.

Playground at Richlands Primary School

Institutional Master Plans

Health care facilities, especially hospitals, are increasingly becoming "green" places. Based on increasing scientific evidence of their benefits, hospital campus planners are adding "healing gardens" to increase patient contact with nature (Zimring and DuBose 2011).

Similarly, schools, community colleges, and universities should be designed in ways that increase contact with nature, including the provision of windows, plants in classrooms, and access to natural playgrounds and nearby greenspaces (Frumkin and Fox 2011b).

Other large institutional campuses such as churches can and should incorporate healing gardens and other strategies for increasing contact with nature into their designs and improvements.

Recommended Policies

- Use local subdivision controls to provide active and passive park space in subdivisions with an emphasis on increasing human contact with nature.
- Authorize and encourage (through incentives such as density bonuses) conservation subdivisions as an alternative to conventional suburban subdivision designs.
- Authorize and encourage traditional neighborhood developments as an alternative to conventional suburban neighborhoods.
- In areas served by public transit, authorize and encourage transit-oriented development.
- In all land developments, encourage or require designs that accommodate pedestrians.
- Authorize and encourage mixed-use development.
- Protect and maintain wetlands.
- Encourage institutions to incorporate contact with nature into their campus master plans.

Note: For policies related to tree protection, see Chapter 3. For additional recommended land use policies, see Chapter 10 of this guidebook.

CHAPTER 7

Healthy Homes

Housing is special in terms of the comprehensive plan for a variety of reasons. Housing provides the shelter for households in the community, protecting its occupants from weather and hostile environments (Krieger and Jacobs 2011). Because homes are where people spend most of their time, they have a greater potential to impact human health if unhealthy conditions exist. Collections of homes make up neighborhoods, and residential land use almost always comprises the largest land area of a given community. The quality of homes is a major indicator of neighborhood quality. For these reasons, it is prudent to single-out homes from other structures for attention in this guidebook. A healthy home is free of moisture and leaks, adequately ventilated, free of exposure to contaminants (lead, radon, formaldehyde, etc.), free of pests, clean, well maintained, and safe and free of injury hazards (National Center for Healthy Housing 2010, as cited in Krieger and Jacobs 2011).

Home Health Risks

Homes with moderate or severe physical problems place residents at increased risk for fire, electrical injuries, falls, rodent bites, and other illnesses or injuries. Over 6 million U.S. homes are severely deficient, according to the American Housing Survey, and such housing conditions can cause significant illness, injury and deaths (US HUD).

Boarded Up Housing Units in Rocky Mount, NC

Some 38 million U.S, homes have lead-based paint hazards that can lead to childhood lead poisoning (CDC 2010). Persons living in poverty lack the resources needed to maintain or make improvements to their homes. This means that lower income households are more vulnerable to the health risks in their homes. There are many specific health risks about which homeowners and occupants must be concerned.

Pests and Mold

Rats and mice, if they exist in homes, can aggravate allergies, bite, transport fleas, lice, mites and ticks (which pose health threats), and contaminate food with urine, feces, and hair. They also can carry a variety of parasites that cause disease in humans. House mice can also transmit lymphocytic choriomeningitis, which causes severe illness in people with compromised immune systems and can cause severe birth defects when contracted during pregnancy. Other pests, such as cockroaches, dust mites, and flies, also pose a health threat in homes. Cockroaches can pick up disease-causing bacteria like Salmonella on their legs and deposit them on previously uncontaminated food products, possibly causing foodborne illnesses. Cockroach allergens can cause allergic reactions or trigger asthma symptoms in some people. Dust mites are a risk factor for asthma development (Ryan and Bowles 2011).

Mold, if present in homes or other buildings, can threaten a person's health in several ways. Some molds produce volatile organic compounds, such as alcohols, ketones, and esters, which cause the musty odor often associated with mold growth. The growth of mold in buildings is a direct result of moisture problems. Water damage, other moisture problems, and excessive humidity also can cause wood rot and deterioration of building materials, dust mites and other pests, and bacteria, such as Legionella. Mold can also adversely affect health by triggering immune responses; symptoms include sneezing, cough, runny nose, red eyes, and skin rashes. Molds can cause infections and may also produce mycotoxins, a metabolic byproduct of mold that is toxic to humans and animals (Ryan and Bowles 2011).

Radon

Radon is a colorless, odorless, radioactive gas that occurs naturally in soil and rock in some parts of the country. It can migrate through fractures and porous substrates in building foundations and enter living areas in homes (Krieger and Jacobs 2011). It is the second leading cause of lung cancer in America and claims about 20,000 lives annually (Ryan and Bowles 2011).

Asbestos

Asbestos is a mineral fiber that was widely used in building construction materials until the 1970s as an insulator and fire retardant. When damaged or disturbed by remodeling, microscopic fibers become airborne. If inhaled, asbestos fibers can cause lung cancer and asbestosis (Krieger and Jacobs 2011).

Lead

Lead from paint, including lead-contaminated dust, is one of the most common causes of lead poisoning (U.S. Environmental Protection Agency). Homes built before 1978 have a greater likelihood of having lead-based paint. In 1978, the federal government banned consumer uses of lead-containing paint, but some states banned it even earlier. Like radon, lead cannot be detected by sight or smell.

Extreme Temperatures

Hot weather or excessive indoor temperature can make cardiovascular and lung disease worse and can cause death, especially among the elderly. Cold temperatures have been associated with lower general health status and more health service visits, especially among the elderly (Krieger and Jacobs 2011).

Excessive Noise

Homes sited near airports, railroad yards, and busy highways may experience excessive noise, which may result in sleep disturbances, hypertension, performance reduction, increased annoyance responses, and adverse social behavior (Krieger and Jacobs 2011)

Interventions

In North Carolina, a state building code is in effect (NC Gen. Stat. § 143-138), which establishes minimum standards necessary to preserve and protect public health and safety of buildings. Cities are authorized to create an inspections department (NC Gen. Stat. § 160A-411) to enforce state and local laws relative to buildings, structures, systems, and building maintenance to ensure safe and healthful conditions (NC Gen. Stat. § 160A-412). Counties are authorized with the same basic powers (NC Gen. Stat. § 153A-352). An inspector may declare a building unsafe for various reasons, including dilapidated conditions which may cause disease, hazards, or dangers to children (NC Gen. Stat. § 160A-425.1, § 153A-364, and § 153A-366).

Housing codes include minimum standards that must be met to occupy a building for residential purposes (Owens 2011). Cities may adopt ordinances that provide standards for determining the fitness of dwellings for human habitation (NC Gen. Stat. § 160A-444). Cities in North Carolina are authorized to exercise (by ordinance) police powers to repair, close or demolish dwellings (or require such repair, closure or demolition) that are dangerous to health and safety, including a lack of ventilation, light, or sanitary conditions (NC Gen. Stat. § 160A-441). In cases where urban blight exists (whether residential or nonresidential), cities in North Carolina are authorized under the state's urban redevelopment law to establish redevelopment commissions (NC Gen. Stat. §

160A-500 et seq.), which can prepare redevelopment plans for approval by the governing body after review by the planning commission in conformance with the locality's comprehensive general plan (NC Gen. Stat. § 160A-513).

A rental housing inspection program can be implemented to detect and mitigate home health hazards. Weatherization programs, which focus on repairing the building envelope, can be adopted and targeted at low-income homeowners.

Data and Analysis

Age of Housing Units

Communities can gain some idea of the number of homes that may have lead-based paint in them by examining data on the year homes were built. The age of housing may also be a potential indicator of the existence of asbestos, which was used in homes until about the 1970s. Furthermore, older homes generally are associated with higher maintenance.

Data on the year the structure was built may be available from the county tax assessor's data base, which is preferred because then individual locations can be mapped using GIS. However, for a broader picture, sample statistics from the American Community Survey can yield some insight.

To illustrate, Table 7.1 provides estimates of the year housing structures were built in the Town of Edenton, North Carolina. Percentages of structures within the range of years built are also shown, along with percentages for the State of North Carolina's housing stock as a whole, to enable a comparative perspective.

Edenton is an historic town and so, not surprisingly, its housing stock is considerably older than the housing stock of the state as a whole. From Table 7.1, we can surmise that approximately three out of four (76.5%) homes in the Town of Edenton were built before 1980. For comparative purposes, for the state's housing stock, an estimated 42.8% were built before 1980 according to estimates of the American Community Survey.

While not every home built before 1978 will have lead-based paint, the data in Table 7.1 clearly reveal that Edenton may have a much higher percentage of homes with lead-based paint given its comparatively old housing stock. This may be significant enough of a public health issue that more study of homes in Edenton is needed (such as a review of tax assessor's records to determine age and thus potential risk of lead exposure). Town officials may determine that a special program of lead paint mitigation, or homeowner education, is needed.

Table 7.1. Housing Units by Range of Year the Structure Was Built Town of Edenton, NC, and State of North Carolina, 2007-2011 5-Year Estimates

Year Housing Unit (Structure) Built	Town of Edenton, NC, Number of Units	Town of Edenton, NC, Percent of Total Units	North Carolina Percent of Total Units
Built 2005 or later	25	1.0%	7.3%
Built 2000 to 2004	119	4.9%	12.1%
Built 1990 to 1999	259	10.6%	20.9%
Built 1980 to 1989	169	6.9%	16.8%
Built 1970 to 1979	376	15.4%	15.0%
Built 1960 to 1969	267	10.9%	10.0%
Built 1950 to 1959	267	10.9%	7.8%
Built 1940 to 1949	265	10.8%	4.1%
Built 1939 or Earlier	698	28.5%	5.9%
Total Housing Units	2,445	99.9%	4,286,863

Source: American Community Survey, 2007-2011 Five-Year Estimates, Table DP 04, "Selected Housing Characteristics."

Overcrowding

There is evidence that severe overcrowding (i.e., more than 1.5 people per room), is linked to adverse mental health conditions; children are at increased risk of stress, aggression, and lower levels of interaction (Morris 2006). Planners can use sample data from the American Community Survey to analyze whether a problem of overcrowded housing units exists. An example follows.

Table 7.2 provides sample counts of both owner-occupied and renter-occupied housing units in Elizabeth City. A housing unit is considered to be overcrowded if it is occupied by more than one person per room. Severe overcrowding is considered to be 1.51 or more persons per room, which as noted above has been linked to mental health problems in individuals. Data in Table 7.2 show that almost 5 percent of the housing stock in the City of Elizabeth City was occupied with households or families that had 1.01 to 1.5 person per room.

Table 7.2. Overcrowded Housing Units by Tenure, 2007-2011 5-Year Estimates Elizabeth City, North Carolina

Occupancy	Owner Occupied Units	%	Renter Occupied Units	%
0.50 or less occupants per room	3,303	46.6	2,395	63.3
0.51 to 1.00 occupants per room	2,610	36.8	1,075	28.4
1.01 to 1.50 occupants per room	80	1.1	133	3.5
1.51 to 2.00 occupants per room	10	0.1	114	3.0
201 or more occupants per room	0	—	71	1.9
Total occupied housing units	7,091	—	3,788	—

Source: U.S. Census Bureau, American Community Survey 2007-2011 5-Year Estimates, Table B25014, "Tenure by Occupants Per Room."

Severe overcrowding (1.51 or more persons per room) is not much of an issue for owner-occupied homes in Elizabeth City. However, for renter-occupied homes, severe overcrowding is a much more significant issue—almost 5 percent of the renter-occupied housing units in Elizabeth City is severely overcrowded. Note that from a public health perspective, again, severe overcrowding can have detrimental impacts on the occupants' mental health. Hence, severe overcrowding of renter-occupied housing units is enough of an issue in Elizabeth City that the city might consider housing programs that alleviate severe overcrowding. Note that this information on occupancy of housing units is available for the census tract level of geography, and planners for Elizabeth City could collect more data to see if overcrowded renter-occupied housing conditions are disproportionately concentrated in one specific area (census tract) of the city, thus illuminating further the geographic extent of the problem (see Chapter 2 of this guidebook for use of census tract geographical analysis).

Recommended Policies

- Use available data to identify health and housing hazards within the community.
- Identify geographic subareas and vulnerable populations within the community to target for intervention to correct housing problems.
- Reduce the number of homes that have lead-based paint or related hazards.
- Increase the proportion of persons living in pre-1978 housing that has been tested for the presence of lead-based paint or related hazards.
- Reduce the proportion of occupied housing units that have moderate or severe physical problems.
- Reduce the number and proportion of occupied housing units that are severely overcrowded.
- Use applicable authority to adopt housing and building codes to effectively to address health hazards in homes.
- Identify gaps in regulations, ordinances, and program enforcement policies, and address gaps/inconsistencies identified in such codes and laws.
- Increase the proportion of persons living in homes at risk that have an operating radon mitigation system.
- Encourage "integrated pest management" to eliminate pests and reduce allergens.
- Ensure the integrity of housing structures to avoid cracks and crevices that can give pests access or lead to water damage and moisture problems.
- Adopt and enforce county health standards for locating septic systems. At a minimum, septic systems should be 10 feet from the house and other structures, 5 feet from property lines, 50 feet from water wells, and 25 feet from streams. Larger separation and distance requirements should be considered.
- Encourage designers, architects, and contractors to seek to understand building science and construction methods involving healthy homes.

CHAPTER 8

Healthy Community Infrastructure

Public health infrastructure can be broadly described to include all major facilities and services that pertain to community health, including public water, sewage management, hazardous and solid waste management, parks and recreation facilities, transportation, and public health facilities, among others. Public health infrastructure therefore goes well beyond the actual health care delivery system, though we emphasize that in this chapter. Access to health care positively impacts overall physical, social, and mental health status, prevents disease and disability, and results in the detection and treatment of health conditions.

Health Care Delivery System

The health care delivery system includes hospitals, public health facilities, and private health care practitioners. Comprehensive plans should include an inventory and assessment of the adequacy of the local and regional health care delivery system, as well as policies for maintaining and improving the system. Mental health facilities should not be excluded, since there is ample evidence now that the built environment affects mental health both directly and indirectly (Morris 2006a).

The number of medical personnel and facilities can have an impact on the quality of life of a given community. Without easily accessible physicians and medical facilities, residents in need of medical care may have more difficulty getting the proper care, and longer distances to go for such care may make it more difficult to seek professional care when needed. Finding care in adjacent counties is also more costly and time consuming than in-county care.

Table 8.1 shows medical personnel and medical facilities in Gates County in 2000 and 2010.

As the data in Table 8.1 indicate, Gates County has only one active primary care physician as of 2010, down from two in 2000. For comparative purposes, the state as a whole has closer to 1 active physician per 1,000 population. Gates County also has low ratios of midlevel practitioners and registered nurses per 1,000 population when compared to the state as a whole.

Table 8.1. Gates County Medical Personnel and Facilities in Comparison with State, 2000 and 2010

	Gates County, North Carolina				State of North Carolina			
	2000	Per 1,000 population	2010	Per 1,000 Population	2000	Per 1,000 population	2010	Per 1,000 Population
Population	10,516	—	12,197	—	8,046,813	—	9,535,483	—
Active primary care physicians	2	0.19	1	0.08	6,696	0.83	9,017	0.95
Midlevel practitioners	1	0.10	1	0.08	3,536	0.44	7,331	0.77
Registered nurses	23	2.18	22	1.80	72,421	9.00	93,133	9.77
Active dentists	1	0.10	0	0	3,225	0.40	4,178	0.44
Beds in general hospitals	0	0	0	0	21,001	2.61	20,699	2.17
Nursing facility beds	70	6.66	70	5.74	42,458	5.28	45,143	4.73
Blind and visually impaired persons	31	2.95	37	3.03	23,309	2.90	20,971	2.20

Source: State Data: University of North Carolina, via LINC, accessed June 4, 2013. Ratios calculated by author.

Gates County has seen some significant population growth in the last decade—an addition of 1,681 residents from 2000 to 2010. This growth in population would suggest that medical personnel and facilities should be increasing proportionally, more or less, to serve the higher population at the same levels as in the earlier year (2000). Indeed, with the state as a whole, the ratios have generally increased from 2000 to 2010, but in Gates County a larger population base than in 2000 is being served by fewer medical personnel. The implication of these data is that the county may want to actively recruit more medical personnel and/or offer incentives for them to practice in Gates County.

Based on the level of service of hospital beds available in the state as a whole, 2+ hospital beds should be available per 1,000 population. Gates County does not have any hospital beds. This means that its residents must travel to another county for hospital care, and this will increase the time it takes to arrive at a hospital (and thus increase the risk) to most residents of the county. In terms of beds in nursing facilities, Gates County's ratio or level of service per 1,000 residents was higher than that for the state as a whole in 2000 and 2010. However, given the lower ratio of registered nurses in Gates County, the level of care provided may not be as comparable as in other parts of the state. Data in Table 8.1 also show that Gates County had about the same ratio of blind and visually impaired persons per 1,000 residents as the state as a whole. In conclusion, these data raise some concern about the comparative extent of health care infrastructure and personnel in Gates County. Elected officials may need to discuss with county health officials if there are any prospects for increasing the medical personnel and health care infrastructure in the county.

Public Water

Public water supplies are regulated by federal and state sources and also at the local level in North Carolina by county boards of health. States pass and implement laws that meet federal requirements when it comes to public water supplies. North Carolina passed a Drinking Water Act in 1979 for the purpose of regulating water systems within the state which supply drinking water that may affect the public health (NC Gen. Stat. § 130A-311 and § 130A-312). There are also drinking water rules to regulate public water systems (NC Gen. Stat. § 130A-315). Furthermore, local governments that provide public water service must prepare a local water supply plan and submit it to the NC Department of Environment and Natural Resources for approval (NC Gen. Stat. § 143-355). Plans must be revised every five years. Many of the legal considerations associated with the regulation of water supplies for public health are beyond the scope of this guidebook. Plans should describe the important role that federal, state, and local board of health requirements play in ensuring healthy and safe drinking water supplies. Local comprehensive plans do not usually address public health issues associated with public and community drinking water supplies. Input from public health officials in any given planning process can help identify additional concerns or information to include in the local comprehensive plan.

Wastewater Systems

Sanitary sewer systems, private community systems, and individual on-site septic tanks are a part of the healthy community infrastructure. Federal and state laws and administrative rules apply to establishing sewer systems. In addition, on-site sewage management systems for individual homes and developments are also regulated. A "septic tank system," the

threats of which are discussed in Chapter 3 of this guidebook, is a subsurface wastewater system consisting of a settling tank and a subsurface disposal field.

The NC General Assembly has found and declared that "continued installation, at a rapidly and constantly accelerating rate, of septic tank systems and other types of wastewater systems in a faulty or improper manner and in areas where unsuitable soil and population density adversely affect the efficiency and functioning of these systems, has a detrimental effect on the public health and environment through contamination of land, groundwater and surface waters" (NC Gen. Stat. § 130A-333). Any proposed site for a residence, place of business, or place of public assembly in an area not served by an approved wastewater system must be evaluated by the local health department in accordance with adopted rules (NC Gen. Stat. § 130A-336). The local health department is charged with determining whether such systems have been installed or repaired in accordance with any conditions of the improvement permit, the state rules, and state law (NC Gen. Stat. § 130A-337).

Hazardous Waste Management

"Hazardous waste" is defined by North Carolina law as solid waste, or combination of solid wastes, which because of its quantity, concentration or physical, chemical or infectious characteristics may: (a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed (NC Gen. Stat. § 130A-290). Hazardous waste is regulated at the state level, and local governments are not authorized to adopted ordinances prohibiting hazardous waste facilities (NC Gen. Stat. § 130A-293).

Solid Waste Management

North Carolina passed a Solid Waste Management Act in 1989 (NC Gen. Stat. § 130A-309.01). That law finds that: "inefficient and improper methods of managing solid waste create hazards to public health, cause pollution of air and water resources, constitute a waste of natural resources, have an adverse effect on land values, and create public nuisances" (NC Gen. Stat. § 130A-309.03). Under this act, the North Carolina Department of Health and Human Services has the responsibility of developing a comprehensive solid waste management plan, and to provide planning, technical, and financial assistance to units of local government with regard to solid waste management and disposal (NC Gen. Stat. § 130A-309.06).

Local governments are required to assess local solid waste collection services and disposal capacity and determine the adequacy of collection services and disposal capacity to meet local needs and to protect human health and the environment. Until passage of House Bill 321 by the North Carolina General Assembly in 2013, signed by the Governor August 23, 2013, local governments were required to develop a 10-year comprehensive solid waste management plan. Local governments must still make a good-faith effort to achieve the state's forty percent (40%) municipal solid waste reduction goal, and to comply with the state's comprehensive solid waste management plan (NC Gen. Stat. § 130A-309.09A). Each unit of local government must establish and maintain a solid waste reduction program (NC Gen. Stat. § 130A-309.09B).

Transportation Systems

All of the facilities that allow for mobility should be considered part of the public health infrastructure. As is evident from Chapter 4 of this guidebook, active and healthy living depends on being able to exercise and get around to places. The public street and sidewalk system is therefore an important component of the public health infrastructure system. One can add trails and public transit facilities to the overall healthy community's transportation system.

Many pages of this guidebook could be devoted to specific techniques and standards for establishing and maintain an active transportation system to promote healthy communities. For our purposes here, it should be sufficient to note that comprehensive plans should explicitly state a number of active transportation policies, such as the provision of sidewalks and bike trails. In addition to Chapter 4, see Chapter 11 of this guidebook for more information about transportation planning.

Schools

School planning should be integrated with comprehensive planning as much as possible. The local comprehensive plan should identify ways in which schools and school facility planning can contribute to healthier communities. Schools have a profound impact on community design. School siting decisions, for example, influence the extent to which youth both near and far are able to walk and bicycle as part of their daily routines. Locating schools at the fringes of a community can perpetuate "school sprawl" and necessitate trips to school by bus or private automobile. On the other hand, siting schools as part of the neighborhood fabric and near residential areas can create opportunities for active living and can reduce the costs of school transportation (ICMA 2005).

Intergovernmental Coordination

Comprehensive plans recognize that it takes more than the local government itself to implement plans. Local governments enter into a variety of agreements with other governments and service providers. Of particular significance are shared use agreements between local governments and schools for use of park and recreation facilities (for guidance, see North Carolina Department of Public Instruction and Division of Public Health 2012).

Recommended Policies

Health Care Delivery System

- Ensure that the locality has local health agencies and infrastructure necessary that effectively provide essential public health services.
- Eliminate disparities in terms of access to health facilities by different segments of the population.
- Improve access to comprehensive, quality health care services.
- Ensure that all persons have access to rapidly responding emergency medical services.

Transportation System

- Improve street connectivity.
- Plan for and encourage "complete streets."
- Monitor and improve the safety of pedestrians and bicyclists.
- Expand bicycle and pedestrian facilities where funding exists.
- Expand local and regional trail networks.
- Give priority to nonmotorized travel.
- Increase transit access (where transit is provided).
- Design streets to serve the needs of all transportation modes.
- Construct and maintain a connected network of multi-use trails.
- Provide and expand public transportation in areas where feasible.
- Provide safe and convenient bicycle and pedestrian connections to schools, public parks, and other destinations as appropriate.
- Improve the perceived safety of parks, trails, and green spaces, including the installation of adequate lighting and emergency call boxes or cameras in parks.

- Promote safe roadway crossing by pedestrians through use of pedestrian refuge islands and cross-walks.
- Adopt land use regulations that give priority to pedestrians, bicyclists, and transit users over vehicle users.
- Reduce traffic speeds in neighborhoods and implement traffic-calming measures where necessary to further slow vehicle traffic.
- Provide streetscape amenities such as benches, landscaping, lighting, and public art.
- Install way-finding signs, maps, and landscape cues to direct pedestrians and bicyclists to the most direct route.
- Remove and correct the physical barriers that inhibit mobility for persons with disabilities, especially for those who rely on wheelchairs and walkers.
- Meet Americans with Disabilities Act (ADA) accessibility requirements in the design and maintenance of all facilities, including pedestrian networks.

Note: See also Chapter 4 for additional policies and Chapter 11 of this guidebook for discussion related to transportation.

CHAPTER 9

Preparing Planning Documents

The comprehensive plan may not necessarily consist of a single document. The guidebook prepared for Coastal Area Management Act (CAMA) land use plans (Farris 2002), recommends that the first step in the planning process be the preparation of an "analysis of existing and emerging conditions." We follow that logic here, with one exception: we suggest the analysis should be focused on "existing" conditions and that "emerging" conditions (which are more difficult to predict) be included in the form of projections and produced during the final stage of the planning process.

After analyzing existing conditions, or as a part of it, the planning team will provide a listing and descriptive summary of "issues and opportunities." The existing conditions and issues and opportunities components together will provide the planning team sufficient background information to begin engaging the community in participation exercises. Community participation will lead to the preparation of a "Community Concerns and Aspirations" component with input from the community. Once that component is written and consensus is reached, the comprehensive plan document can be completed (see Figure 7). The remainder of this chapter describes the recommended contents of these documents in greater detail. Appendix B of this guidebook provides a template for use in collecting data for the "analysis of existing conditions."

Analysis of Existing Conditions

It is recommended that a draft description of existing conditions be written, then presented along with a preliminary list of issues and opportunities (discussed in the next section) to stakeholders at the outset of the citizen participation process. Citizens may have comments on the accuracy and validity of some of the information. These comments need to be considered before the draft of is finalized. Existing and emerging conditions should at a minimum address population, housing, and economy for the locality and, as appropriate, the region (Farris 2002).

Suggested Planning Process and Documents

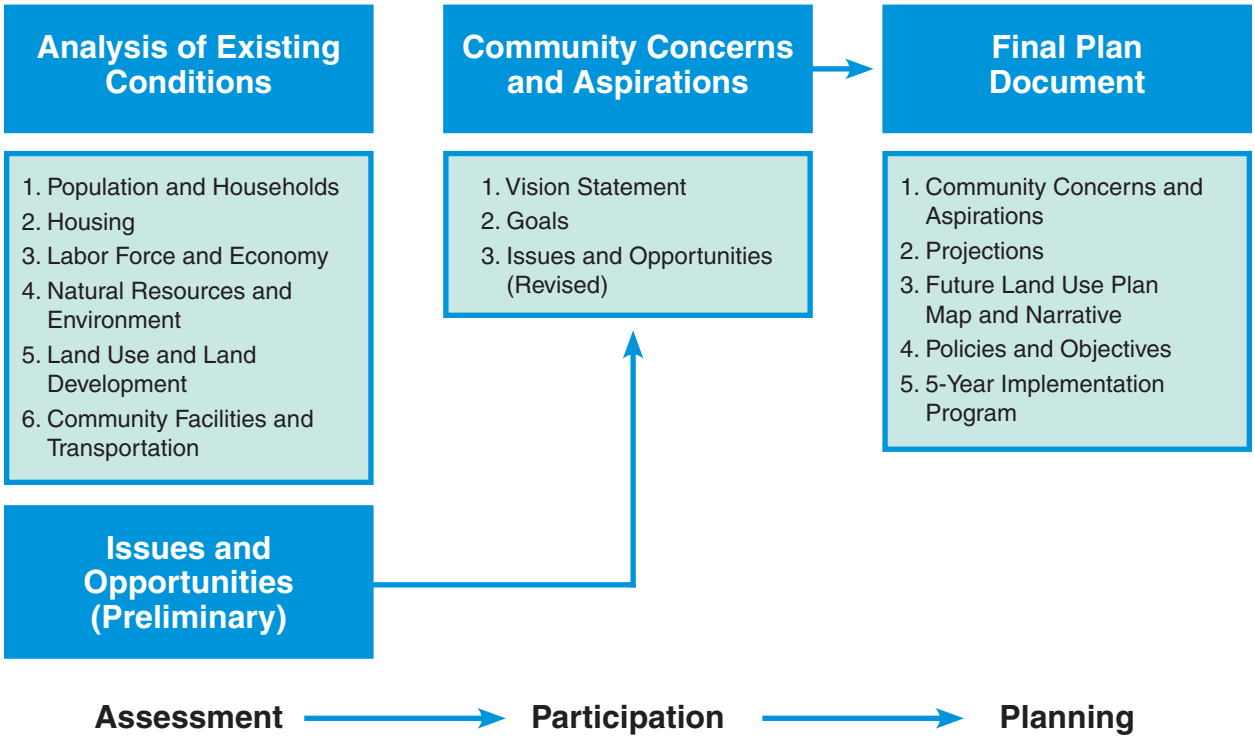


Figure 7

1.0 Population and Households

Knowledge of population characteristics such as age and income help planners estimate the needs for different types of housing and related land uses and special needs of the community. Population changes (age, race, ethnicity, income, educational attainment) during at least the past decade should be analyzed. CAMA rules specifically require analysis of population data reported in the last two decennial censuses. Population change can signal related pressures that may be expected on natural resources and the built environment. The current population needs to be estimated, and the degree to which population will change during the planning period (i.e., population projections, usually for twenty years into the future) is needed so that the proper amounts of land and facilities can be allocated.

The "seasonal population" consists of persons who are temporarily residing in the planning area, such as tourists and vacationers, but who normally reside in another location. Some communities experience seasonal population increases or decreases, and if so those trends should be apparent in the analysis. Analysis of population trends by subareas (smaller than the jurisdictional whole) should also be considered, as they can help identify growth areas and other conditions, such as concentrations of poverty.

Another issue may need to be addressed—the population within the extraterritorial jurisdiction (ETJ). Estimating and projecting population and land use needs for an ETJ is more challenging because sources like the U.S. Census Bureau do not collect data specific for such geographies. Despite that challenge, planners in cities and towns with ETJs may prepare estimates and projections for the ETJ in addition to the city limits, since municipal planning and zoning jurisdictions extend to unincorporated areas included in the ETJ.

2.0 Housing

Data on the planning area's housing stock and information related to households and their composition are needed, because they provide the foundation for determining future housing needs. This information should include a current estimate of housing units and data on the types, location, age, condition, and value of housing units. Planners should also study household characteristics (e.g., the number of owners and renters), look at data concerning whether the units are permanently or seasonally occupied, and use all of these data to project the number and type of housing units that will be needed during the 20-year planning horizon. CAMA rules require CAMA jurisdictions to supply data on the number of residential building permits, by type of unit, issued (Farris 2002). Such data reveal market trends in housing construction and are therefore recommended for all comprehensive plans.

3.0 Labor Force and Economy

The analysis of existing and emerging conditions should address economic considerations, especially labor force by industry and occupation, and employment by industry. It is critically important to understand how different data sources may report economic information. For instance, labor force data are reported on the basis of "place of residence." So, if you come across labor force data (showing unemployment and employment, for instance), be aware that those data are for the residents of the jurisdiction reported and do not reflect jobs in the jurisdiction. Employment figures are typically reported by "place of work," meaning they reflect the number of employees working in the subject city or county, regardless of where they may reside. For the purposes of planning land use and community facilities, "place of work" employment statistics are much more important than "place of residence" statistics for the resident labor force. Again, planners must be careful to acknowledge this difference when presenting statistics.

It should also be acknowledged by local planners that employment (by place of work) data are often reported only for the county and state level of geography. This makes the

job of estimating and projecting employment for cities much more difficult, as reliable published data are not available. Some data are available from Zip Code Business Patterns, but those data will not perfectly match the city's geography or the ETJ, plus that data source does not report employment by industry categories. Cities may need to rely on business license data; even if business license data report the number of employees for a given business, planners should keep in mind the data are "self reported" and therefore not independently verifiable. Planners can also consult with local chambers of commerce, councils of government, and the state economic development regions in an effort to find information on employment and local business activity.

4.0 Natural Resources and the Environment

For Coastal Area Management Act (CAMA) land use plans, there is a requirement to "describe and analyze the natural features and environmental conditions of the planning jurisdiction and to assess their capabilities and limitations for development" (Farris 2002). The emphasis is placed on three components of analysis: conditions, capabilities, and limitations. Planning outputs include land suitability analysis (Figure 8) and a composite map of environmental conditions. The CAMA requirement to specifically address the capabilities and limitations of natural features should be an objective for comprehensive plans, but it may be overly detailed or too time-consuming for smaller non-coastal planning areas.

This section of the analysis will include maps of (at least) the following: natural hazard areas (e.g., flood plains, steep slopes, etc.), wetlands, water supply watersheds, key soil characteristics, and any other features of the natural environment that are appropriate to the planning effort. Note that CAMA plans must by rule address a specific list of several additional considerations, including "areas of environmental concern."

Soil surveys can be a land use planner's best friend. Soil surveys are available from the U.S. Department of Agriculture, Natural Resources Conservation Service for each county in North Carolina. The soil survey manuscripts are available on line but the web versions do not include the soil maps (go to: http://soils.usda.gov/survey/online_surveys/north_carolina). The soil survey manuscript will identify important characteristics of each soil type. Ideally, planners will locate the source of the soil maps (such as NC One Map) and download the shape files for soil types in the county they are working, which can then be imported into a Geographic Information System (GIS). For an illustrative example of a soil map, see Figure 9.

Two of the more important soil characteristics that should be mapped for the planning area are prime farmland soils and soils with severe limitations on septic tank absorption fields. A significant share of areas containing prime farmland soils (which are also often the most suitable areas for residential development) should then be considered for preservation, and

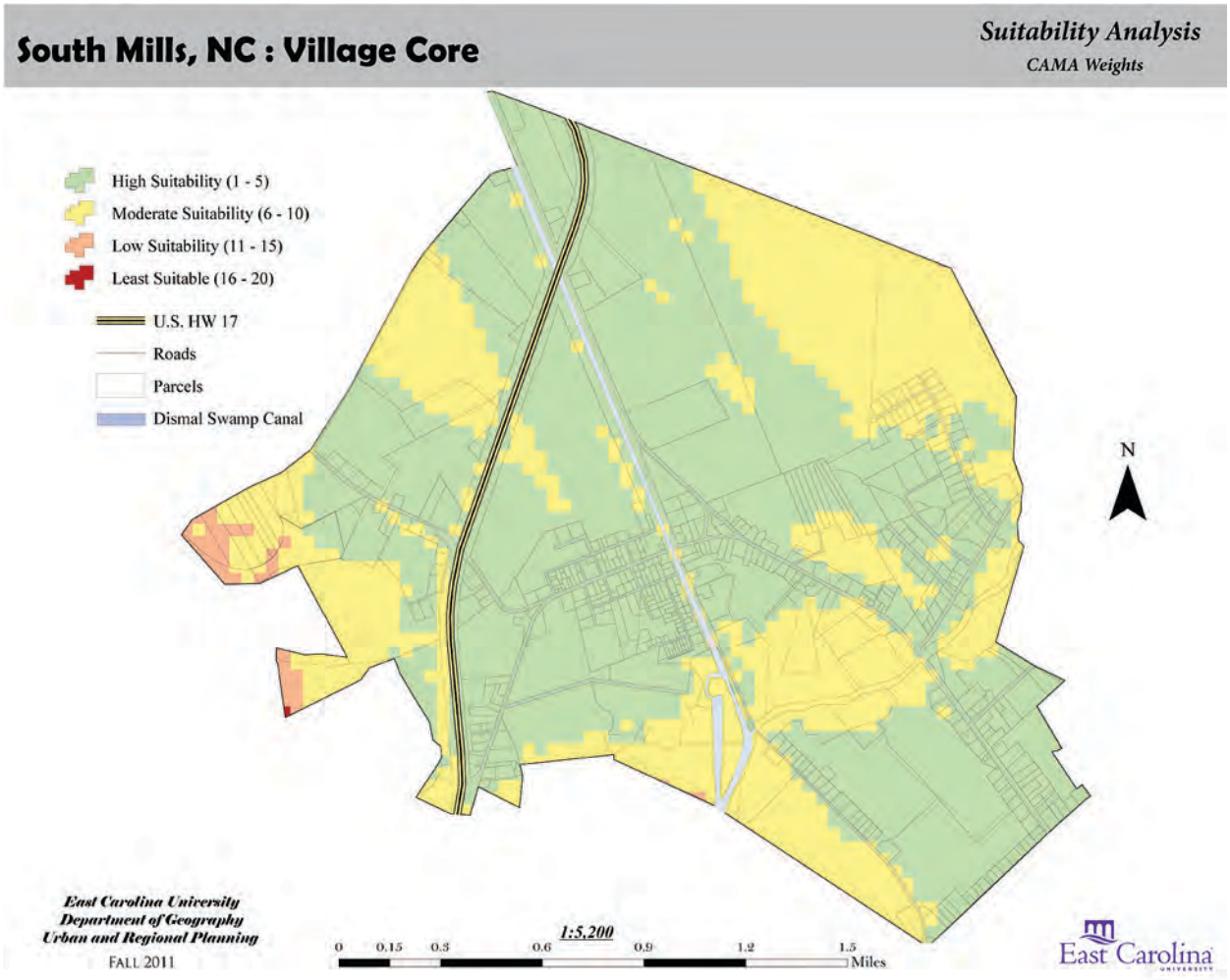


Figure 8. Example Land Suitability Analysis Map

Source: East Carolina University, Urban and Regional Planning Program. January 2012. Small Area Plan for South Mills Village Core, Camden County, North Carolina.

future residential development should be steered away from areas with severe unsuitability for septic tanks absorption fields unless sanitary sewer is available. The soil survey and associated maps of soil units have many additional, important applications, including suitability for building foundations, recreation potential, and suitability for wildlife.

5.0 Land Use and Land Development

The most significant component of this analysis is an existing land use map (see Figure 10 for an illustrative example). Existing land use maps can be detailed or generalized. Detailed existing land use maps will be completed on a parcel base map. Parcel-specific existing land use maps are preferred, because they will yield accurate spatial and acreage data, and parcel specific data should be completed for small towns and cities. In the case of countywide analyses, parcel data are still preferred, but it may be too time consuming to prepare a parcel-based existing land use map for the entire county.

Figure 9. Detailed Soil Map Units, Manteo Area, North Carolina

Source: U.S. Department of Agriculture, Soil Conservation Service. March 1992. *Soil Survey of Dare County, North Carolina.*

Planners prepare existing land use maps from three principal sources: aerial photographs, tax assessor data bases, and field surveys. Usually, none of these three sources is sufficient in isolation. Buildings and certain land uses (e.g., agriculture) will be discernible from aerial photographs, but one cannot determine from an aerial photograph what the land use is inside a given building. Tax assessor data bases are very helpful because they usually provide a land classification (not the same thing as zoning assigned by the locality if applicable), and the land use can sometimes be determined based on the ownership or other data in the data base. Still, information in tax assessors' data bases is not always accurate or up-to-date. Field surveys are a good source for verifying existing land uses, though even that method is subject to error. For instance, a building may be coded commercial because of signs on the property, but a new industrial use may have moved into the building. Accurate existing land use inventories will be based on all three sources and any other information readily available. For instance, if land cover data are available, in some cases this can help planners produce an existing land use map.

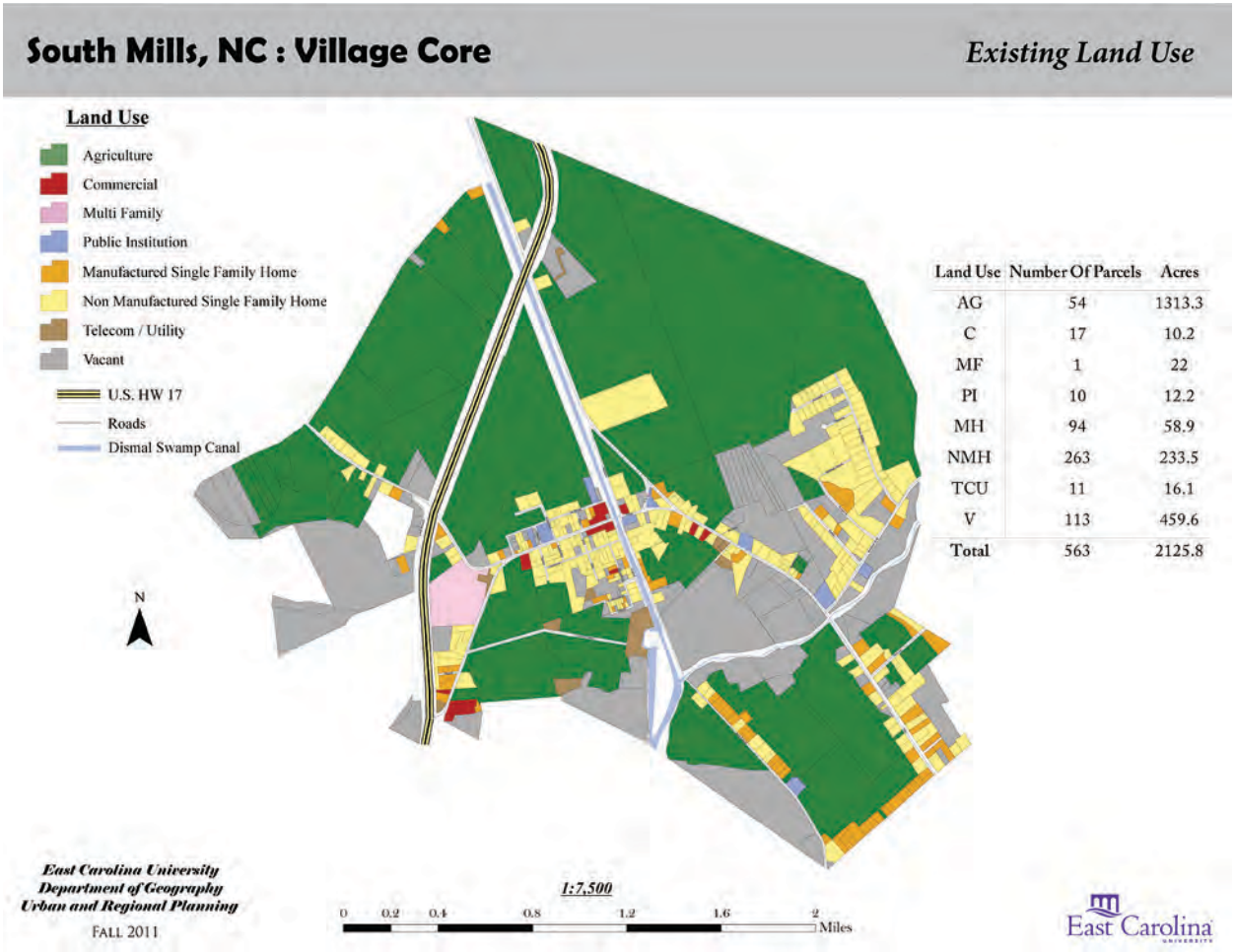


Figure 10. Illustrative Parcel-Specific Existing Land Use Map

A classification scheme for land uses is a prerequisite to completing an existing land use map (for details, see Chapter 10 of this guidebook). The categorization scheme used may depend on local objectives, but usually an existing land use map will at minimum include the following categories and the final map will adhere to accepted practices for colors: parks, recreation, and conservation (dark green); agriculture and forestry (light green); residential, which may be further subdivided into densities or housing unit types (yellow for single-family or low density and moving to darker shades of orange or brown for higher density or multi-family residential); institutional (blue); commercial (red); utilities (gray); industrial (purple); and vacant (uncolored) (American Planning Association 2009). Detailed descriptions of each category are essential and therefore must be provided (see also Table 10.2 of this guidebook).

Increasingly, planners are recognizing that mapping existing land uses by individual land use category may lead to policies and zoning regulations that segregate the land uses by type. An alternative approach has been developed and is gaining acceptance—character area planning (Kendig and Keast 2010). A character area map does not

necessarily plan different areas of the locality according to individual land use types, and it is more focused on what the look and "feel" of an area is (e.g., rural, urban, institutional campus, main street commercial, etc.). While character is important, and planners should prepare a map showing existing community character if they want to guide aesthetics and the design of the community, a character area map should not substitute for an existing land use map. Our reasoning is that the existing land use map is needed for a variety of analyses related to population, housing, economic development, community facilities, and transportation, and the existing land use map yields more appropriate information for such analyses when compared with character area map approaches.

The planner's job does not stop with the completion of the existing land use map. A table is also constructed that shows the amount of land in acres for each land use category. Area calculations are simple, when GIS is used. As noted in requirements for CAMA land use plans, other information on development trends, such as building permits by type, subdivision plat approvals, and major industry location decisions should also be included in this section.

6.0 Community Facilities and Transportation

Facilities include water and sewer services (expansions, capacity issues, operational problems, etc.), public safety facilities (sheriff, police, fire, emergency medical services), general government facilities (city halls, county courthouses, etc.), parks and recreational facilities, health facilities (hospitals and county health facilities), educational and cultural facilities (schools, universities, libraries, etc.) and transportation (new facilities, upgrades, multiple modes), among others. Demands placed on community infrastructure are directly related to changes in population, households, and employment. The existing conditions analysis should identify any community facilities and services that are considered to be deficient now and how they have been impacted by recent population and employment changes. "Deficiencies" can be defined by empirical analyses using professional standards of evaluation (e.g., a level of service standard), or they may be based on community consensus during the public participation process. For more guidance, see Chapter 11 of this guidebook.

Issues and Opportunities

The issues and opportunities component should describe the issues of local (and if applicable, regional) concern. Issues may include problems and assets. Problems are stated as undesirable situations or obstacles that need to be addressed by the comprehensive plan. Problem statements do not include solutions; the development of

policy solutions comes later in the planning process. Assets are opportunities or resources that can be deployed by the community to achieve the desired future. Some examples of possible assets are community groups and volunteers, community facilities and services, unique natural areas or resources, strategically located vacant or underutilized land, protected open space, and educational programs and partnerships.

In the context of land use, which is often emphasized, planners need to examine the existing land use pattern and determine what the various issues are that might need to be addressed. Farris (2002) has developed a useful list which might be consulted, but the list should not substitute for original analysis and community judgment:

- Location of intensive livestock and poultry operations in close proximity to existing residential areas;
- Encroachment of residential and other urban-level land uses into traditional agricultural and forestry areas;
- Extractive industrial operations encroaching on developed areas;
- Location of hazardous operations in close proximity to developed areas;
- Inappropriate land uses adjacent to airports;
- Manufacturing uses encroaching on residential uses;
- Residential development in flood hazard areas;
- Small lot development on soils with septic tank limitations;
- Residential development in and adjacent to land traditionally used for public access;
- Auto salvage operations located in flood hazard areas; and
- Blighted areas (Source: Farris 2002)

Community Concerns and Aspirations

A "Community Concerns and Aspirations" component is required for CAMA plans and is recommended for all comprehensive plans. It is in some ways an extension of the issues and opportunities component; planners will list and describe issues and opportunities, but then those issues and opportunities will be discussed with stakeholders during the public participation process (see Chapter 12 of this guidebook). The public may decide that some of the issues or opportunities identified by the planners are not all that important to address, while others may be suggested. In other words, the list of issues and opportunities gets translated into "concerns" of the public during the participation part of the planning process. The community concerns and aspirations component of the plan articulates the concerns, opinions, and values identified by the stakeholders and citizens through the citizen participation process. The community concerns and

aspirations element guides the development of goals, policies, the future land use plan map, and the plan's implementation strategies.

CAMA land use planning rules delineate required elements of community concerns and aspirations components.

- A description of dominant growth-related conditions that influence land use, development, water quality, and other environmental concerns in the planning area.
- A description of the land use and development topics important to the future of the planning area, including public access, land use compatibility, infrastructure carrying capacity, natural hazard areas, water quality, and local areas of concern. This description should also cover trends in the surrounding region as well as the planning area, or at least the extraterritorial jurisdiction (ETJ) if planning for a city that is exercising ETJ powers.
- A community vision statement should be prepared, consisting of a description of the general physical appearance and form that represents the citizens' collective consensus about the future. The overall objective is to develop a vision that describes what the community wants to be and how it wants to look in the future. The vision statement must reflect a high level of community consensus.

These elements are not required for plans in non-CAMA jurisdictions. We suggest it is useful to follow the requirements for community concerns and aspirations, except perhaps for one deviation. We suggest here that describing "emerging" conditions can be done in the comprehensive plan document itself rather than in the community concerns and aspirations component. Despite our viewpoint, planners may allude to emerging or future conditions, where warranted, in the community concerns and aspirations component.

The Comprehensive Plan Document

As indicated in Chapter 2 of this guidebook, the final comprehensive plan document may not be the appropriate place to include all data and analyses completed in support of the plan. The reasoning is that inclusion of all data analyses may make the document too lengthy and somewhat cumbersome for elected officials to read. It is up to the community to determine the proper combination of data and analyses to include in the final plan document. In the interest of brevity and readability, however, we suggest that the analysis of existing conditions remain a separate document and that the final comprehensive plan document be limited to the following:

1. Community Concerns and Aspirations. As noted above, this section of the comprehensive plan will include a vision statement, along with other major goals of the plan. It is based on the "issues and opportunities" component prepared earlier (and described above), but it represents a final list of those issues and opportunities that have gained acceptance and consensus in the public participation process. This component of the comprehensive plan should also summarize the public participation process followed in preparing the comprehensive plan.
2. Projections of population, households, housing, and, if possible, employment, and how those projections translate into long-term (20-year) needs for housing and other land uses, community facilities, and transportation.
3. A future land use plan map, designed to meet the various needs of the community, along with an accompanying narrative text description of the future land use plan. Note that many planners will suggest that more than one (i.e., alternative) future land use plan map needs to be provided. Indeed, many planning processes result in the development of different land use plan maps based on different scenarios, such as "existing trends continued," "maximum environmental protection," "compact city," etc.). Scenario-driven future land use plan maps are useful in helping the citizenry to better understand the implications of choosing certain policies; therefore, if conducted, scenarios need to be prepared and presented while the public participation process is ongoing.
4. Policies and objectives to implement the comprehensive plan, consistent with but in more detail than the goals provided in the community concerns and aspirations component.
5. A five-year implementation program, showing specific actions needed to implement the comprehensive plan in the short term. The implementation program needs to show the year it is anticipated to be implemented, an estimated cost (if any), and the agency or department responsible for implementation. The implementation component should also be specific on expectations for amending and updating the comprehensive plan. See Appendix C of this guidebook for a sample implementation work program.

Although we have specified the recommended contents of the final comprehensive plan document, there is great flexibility for planners to organize the planning document in any way they believe will be most suitable for the planning area. Planners should therefore take these specifications as non-binding suggestions for organizing the planning document.

CHAPTER 10

Preparing the Future Land Use Plan

This chapter provides detailed discussion and guidance about preparing the most important component of the final planning document—the future land use plan and narrative text for the planning area. Recall from Chapter 9 of this guidebook that before getting to this stage of preparing the future land use plan map, planners have already prepared an existing land use map, collected and analyzed information about land development trends, and identified certain land use and land development issues and opportunities in the planning area. Furthermore, the working assumption here is that through the community participation process, a vision statement and goals have been drafted and have received some consensus in the planning area, and that the vision statement and goals provide significant guidance on what the community wants in terms of future development.

Simultaneously with preparing the land use plan, or preceding it, planners prepare projections of population for the planning horizon. Ideally, employment projections are also available for the planning area. This chapter provides guidance on how to translate population projections into projections of households and housing units and ultimately into residential land needs. It also briefly suggests a method for translating employment projections into space needs for non-residential development. The chapter concludes with recommended policies.

Land Use Planning Approaches

Edward Kaiser and David Godschalk (1995) have introduced the "family tree of land use planning" which describes four approaches to land use planning. The four principal approaches are land classification plan, land use design plan, verbal policy plan, and a development management plan. The land classification (map) approach typically divides the planning area into urban, transition, or suburban development areas, as well as rural and conservation (critical) areas. The land use design plan (map) approach

portrays the future urban form as a pattern of residential, institutional, office, retail/service commercial, industrial, and open spaces. The verbal policy plan specifically rejects the task of mapping future land use; it is based on the argument that planners rely too heavily on maps, which are difficult to keep updated with changes in policy (Kaiser and Godschalk 1995). The verbal policy plan is not considered sufficient to satisfy a healthy communities plan. A development management plan is a coordinated program of actions supported by analysis and goals and covers a 3 to 10 year time frame. It is regulation and planning fused together, including an outline of a proposed development code and a capital improvement program (Kaiser and Godschalk 1995). While very useful, the development management plan approach is not recommended for healthy communities comprehensive plans because it is has a short-term rather than long-range planning horizon.

In the *Technical Manual for Coastal Land Use Planning*, Farris (2002) indicates that a land classification approach is acceptable. Indeed, many CAMA land use plans provide only a land classification and not a land use design plan. We do agree with the observation that generally, counties or more rural planning areas may opt for a land classification or growth-management approach, and that more highly developed areas and municipalities may choose the land use design approach. However, we argue here that the land classification approach is usually not detailed enough to support community facilities and transportation planning (e.g., especially with regard to densities or intensities of development), is usually not sufficient to support a zoning regulation scheme, and therefore should not be utilized. We urge use of the land use design plan, even if a land classification approach is deemed acceptable under CAMA rules.

The Existing Land Use Map

This map shows how land is used currently (or for the year shown). It has no regulatory significance. It divides the planning area into land use classifications simply to describe how each property is being used presently. It does not reflect future land use, or zoning. In communities that are not growing (or that are declining), the existing land use map remains a reasonably accurate depiction of future land use. The existing land use map is therefore a critically important starting point, because existing land use patterns in an already developed area are not likely to change demonstrably during a twenty-year time period. Even if the planning area is growing rapidly, there will be areas where the existing land use will remain the same for decades. There is yet another practical reason for starting the future land use plan design process with the existing land use map—when inputting into a Geographic Information System, starting with the existing land use

coverage is very likely to save considerable time, especially for those parts of the planning area that are not expected to experience land use changes from existing to future.

In virtually all planning cases, planners will want to report the existing land use data in the final plan document, even though it has been reported earlier in the planning process (as a part of the existing conditions analysis). Table 10.1 provides an illustrative example (modified from Farris 2002) showing the desirable reporting of existing acreage data by land use category. Note that localities with mixed land uses may want to add a mixed use category or otherwise code mixed land uses according to the predominant land use.

Table 10.1. Illustrative Example of an Existing Land Use Table

Category	Acres	% of Total
Agriculture and forestry	161,484	81.2
Residential (all types)	12,822	6.4
Public and Institutional	845	0.5
Commercial	658	0.3
Industrial	1,175	0.6
Utilities	n/c	n/c
Parks, recreation, conservation	2,038	1.0
Vacant/Undeveloped	20,000	10.0
Total planning area acres	199,022	100

Source: Adapted from Farris (2002)

Land Use Categories

Planners must provide definitions or descriptions of the categories used in the future land use plan and shown on the future land use plan map. Note that a land use categorization scheme has already been prepared and used for the existing land use map. Planners may decide to use the exact same categories for the future land use plan map as the existing land use map; however, the land use categories used to prepare the existing land use plan map are intended to be *descriptive* in nature, and the future land use plan is *aspirational* in nature, or in other words, it is expected to reflect the community vision, goals, and policies for future land use. Therefore, the land use classification schemes for existing and future land use maps need not be identical. On the other

hand, using identical classifications helps facilitate a better picture of how land use will change in the planning area. Another reason why classifications of land use in the future land use plan map may differ some from those used in the existing land use analysis relates to the matter of detail. For example, all commercial uses may be grouped into a single commercial category on the existing land use map, but planners elect to divide commercial into central business, neighborhood commercial, and highway commercial categories for the future land use plan map.

Another important consideration in defining future land use categories is that they should be "quantifiable" for purposes of transportation and community facilities planning. That is, the land use categories must be specific enough so that transportation and community facility planners can take the future land use plan and project the number of trips generated and future facility needs. The work of transportation and community facilities planners is facilitated if the land use plan narrative text describes how land use acreages will change during the planning horizon (i.e., generally, future land use minus existing land use; see later section in this chapter).

In CAMA jurisdictions, there is flexibility to design a land use classification scheme that best addresses the needs of the planning area and the local government (Farris 2002). Table 10.2 provides descriptions of different land use classifications which may be used in mapping existing and future land use. Decisions on appropriateness must be made locally.

Table 10.2. Land Use Category Colors and Descriptions

Category Name	Color	Description
Vacant or undeveloped	uncolored	Open field or wooded, no building or other development improvement exists. **Note:** *For future land use plan maps, this designation will be used sparingly if at all since it doesn't imply any property rights.*
Parks, recreation and conservation		Lands dedicated to both active and passive recreational uses. These lands may be either publicly or privately owned, and they may include playgrounds, public parks, nature preserves, wildlife management areas, forest preserves, golf courses, recreation centers, or similar uses.
Intensive agriculture		Concentrated animal feeding operations, poultry farms, and similar uses with potential nuisance impacts on abutting or nearby residences. This category includes farm-related dwellings but intensive agricultural uses are intended to be protected from major subdivision tract development.
Agriculture/forestry		Farmland and forests, including the raising of livestock and cultivation of crops. This category includes residential uses that primarily relate to the larger agricultural or forestry tract, but agricultural and forestry uses are intended to be protected from major subdivision tract development.
Residential		This overarching, general residential category includes dwellings of all types and densities. Most commonly, they consist of single-family, detached dwelling units on individual lots, but the type of housing unit (e.g., stick-built versus manufactured) is not differentiated. **Note:** *Localities may further divide this residential category into more than one classification, according to either type of unit (detached, single-family, manufactured home, apartment, etc.) or by range of density.*
Public/Institutional		Federal, state, or local government uses, and a wide variety of institutional land uses. Government uses include county-and city and town-owned facilities, fire stations, post offices, and schools. Private institutional uses include schools, colleges, churches, cemeteries, and private non-profit meeting halls, among others.
Commercial		Non-industrial business uses, including retail sales, offices, services, and entertainment facilities. **Note:** *Localities may further divide this category into more than one category, for instance, central business, neighborhood commercial, and highway business. Some localities separate out office given its appropriateness as a transition land use between residential and more intensive commercial activities.*
Industrial		Warehouses, wholesale trade facilities, research and development facilities, manufacturing operations, processing plants, factories, and mining or mineral extraction activities.
Utilities		Water and sewer treatment plants, electric power substations, and major overhead and underground utility transmission lines, and cell towers. Note: some planners may elect to title this "transportation, communications, and utilities" to include airports, and other uses.

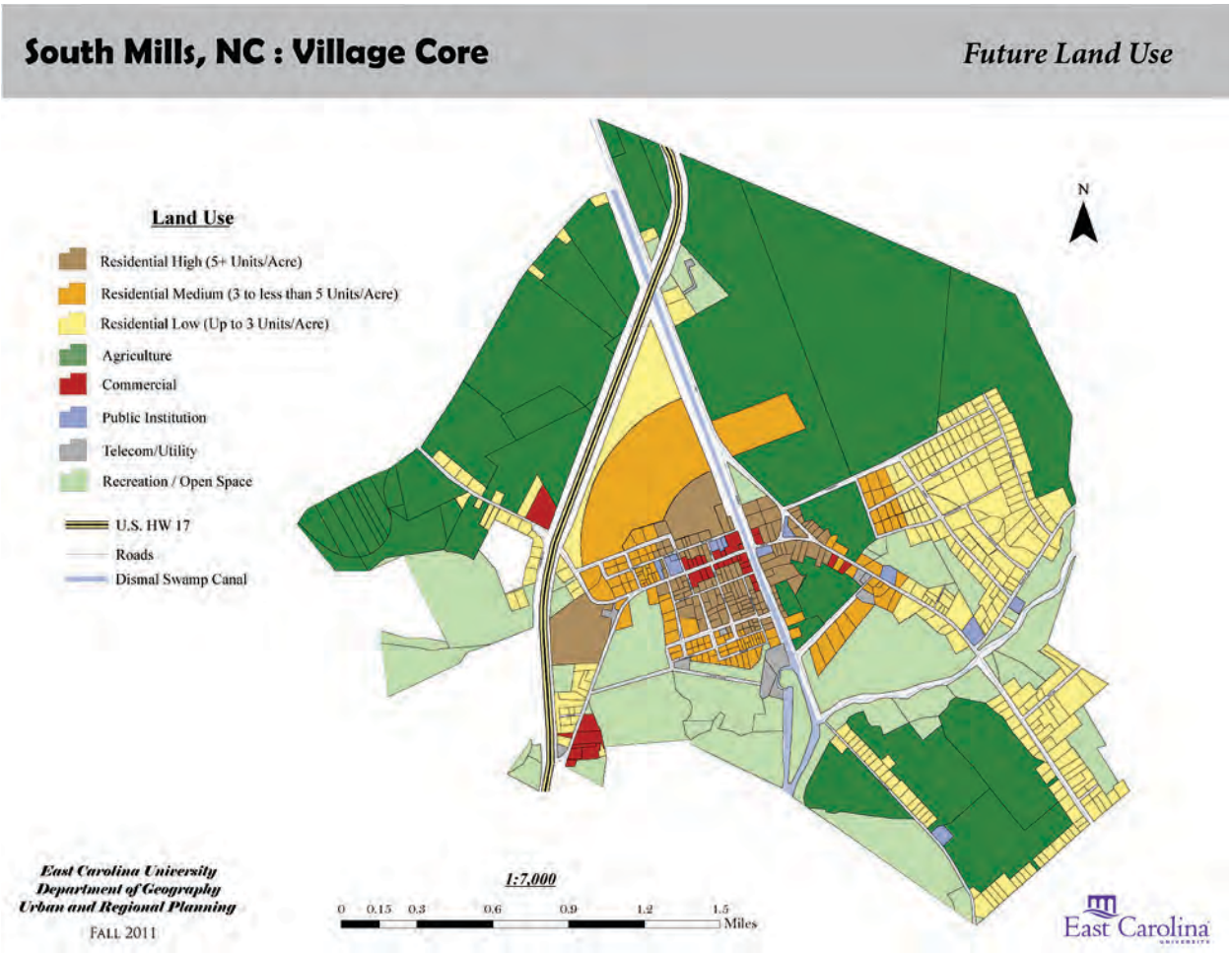


Figure 11. Illustrative Future Land Use Plan Map

A Conceptual "Starting Block"

At the risk of vastly oversimplifying the professional role and expertise of the land use planner, planning for future land uses can be guided conceptually by five general principles:

1. **Existing land use.** For mostly developed planning areas, the existing land use map should be used as a starting point, since developed land uses do not usually change much even over a 20-year time frame. The existing land use pattern will, however, require adjustment for evolving or anticipated transitions from one land use to another, intentions for redevelopment of already developed lands, and to otherwise reflect the community's vision, goals, and land use policies. See more discussion of existing land use in a later section of this chapter.
2. **Zoning.** For localities that have adopted a zoning ordinance, the official zoning map (i.e., land uses permitted by the various zoning districts) should be considered the "default" future land use, unless or except modified by the community's vision, goals, and land use policies. This is prudent from a property rights standpoint—

land can be "downzoned" (i.e., changed from a permissive zoning district like commercial to a more restrictive zone such as office), but downzoning should be undertaken only with serious caution and great care. Using zoning as the default future land use is not always as simple as it sounds. A review of existing uses allowed by the zoning ordinance may reveal choices that must be made (i.e., more than one type of land use permitted) which may not easily reconciled. One also has to decide whether "nonconforming uses" (e.g., an industry in a single-family neighborhood zoned for low-density single-family residential) will be recognized or assumed to eventually go out of existence.

3. **Where not to grow.** Dedicated parks, conservation areas, open spaces, and environmentally sensitive areas (e.g., flood plains and wetlands) will almost always be considered off-limits to future development, unless policies and community aspirations indicate otherwise (and even in such instances, designating development in these areas should be resisted or debated by the land use planner). Such areas will have been previously identified on a separate (or composite) map of environmental conditions and will typically be shown on the future land use plan map as parks, recreation and conservation, or perhaps vacant/undeveloped. Agricultural preservation areas may be included in those "off-limits" areas, if the locality's vision and policies support such agricultural preservation as recommended in this guidebook.
4. **Where to grow.** Land use planners will assign development (land uses) to those areas where the vision, goals, and land use policies suggest that future land uses should go (i.e., where the community wants to grow). Frequently, this means: designating vacant "infill" tracts for development with an appropriate type of land use; focusing additional development in areas served with public water, sanitary sewer, and adequate road capacity; and promoting development in economic opportunity zones (such as a planned industrial park, downtown, or a redevelopment corridor).
5. **Address the "remainder."** After designating areas where the community does not want to grow or should not grow, and after designating lands where the community wants development to occur, the land use planner is left with a number of "remainder" tracts of land that don't fit neatly into the "where to grow" or "where not to grow" dichotomy. Determining the appropriate future land use for these lands will take more concerted study and may be influenced by numerous factors, including: land use needs; suitability of the land for one or more land uses; market trends; guidance from the community vision and land use policies; efforts to ensure "compatibility" or transitions among land uses; efforts to reconcile land use problems; and the influence of every day politics (i.e., property owner advocacy, recommendations of the planning commission, and decisions of the locality's governing body).

Population Projections

Population projections should be provided for five-year increments throughout the long-term (20-year) time frame. The North Carolina State Data Center (SDC) provides population projections using a cohort-component approach for the state and its 100 counties. Official projections are not available for municipalities or other sub-county geographic areas, thus increasing the challenge of preparing population projections for municipalities and their extraterritorial jurisdictions.

Local planners might use county-level projections from the State Data Center but adjust them proportionally (using the so-called ratio method) to fit the planning area based on prior trends (Farris 2002). A simple ratio approach estimates a planning area's share of the population of a larger area—the state or county—and uses that share to develop a population projection. That approach may be satisfactory for developing projections for "sub-county" planning areas, cities and extraterritorial jurisdictions (ETJs). However, note that ratio methods assume population change will be evenly distributed across the county, which is rarely the case since urban areas normally constitute a higher percentage of county population than rural areas.

Annexation is yet another uncertain variable to be considered in projecting population, since a large annexation could significantly increase a city's or town's population. Therefore, municipal planners are advised in most cases to develop their own projections based on residential building permit and approved subdivision plats, analyses of vacant, developable residential land at densities prescribed in their land use plan or as allowed by the governing residential zoning districts, and some forecast of future market trends.

Population increases, whether short-term or long-term, can depend on numerous factors: (1) natural increase (births minus deaths); (2) net in-migration as a result of increases in the number of housing units; (3) expansion of the city limits (annexation); (4) increases, if any, in household sizes; (5) additions to the group quarters population (including major additions to institutional or group quarters populations); and (6) residential land availability and capacity, as well as zoning for residential development.

Projecting Residential Land Use Needs

Localities in the Coastal Area Management Act (CAMA) jurisdiction are required to project the amount of residential land that is needed to accommodate the anticipated population growth of the planning area (Farris 2002). According to CAMA rules, the amount of land allocated to residential uses on the future land use map may not exceed the projected residential land need (Farris 2002). While such a standard is certainly

justifiable as a rule so as to prevent the wasteful and unnecessary designation of land for residential use, planners might legitimately include marginally higher amounts of residential land on the future land use plan map than is projected to be needed, under the assumption that not all land designated for future residential development will be available for development during the planning horizon.

Once land use planners have estimates of future population growth, the objective is to determine acreage needs for residential development so we can design the land use plan (i.e., convert the future household population to housing units). An example illustrates. Let's say we are working for a county and the county needs to accommodate 20,000 people in the next 20 years (population increase, or the total population projected minus the existing population).

1. Divide the population increase into household and group quarters populations. In almost all localities except those with a university, large prison, or military base, 90 percent or more of the population increase will be accommodated in houses (households). One might assume the percent of total population that lives in households (calculated as a percentage from the most recent decennial census data) will hold true in the future.
2. Determine what the average household size was for the locality from the most recent decennial census. One might reasonably assume the average household size will be stable in the future, even though historically average household size has consistently declined.
3. Divide the household population increase (20,000) by the average household size (we will use 2.5 persons per unit). This yields 8,000 housing units as a rough indicator of future need. Note that some of the demand may be met with vacant units in the existing housing stock, so the estimate might be adjusted to account for the potential occupancy of existing vacant units. However, also note that some vacancy rate is desirable so that people can move in and out of the community. Hence unless the existing vacancy rate is very high, one might just elect not to address the issue of existing housing vacancies.
4. Our next question is how to determine the land needs for these 8,000 housing units. The key factor is lot size or density. For instance, a plan promoting transit-oriented development might call for 40 dwelling units per acre around transit stations. Or in a rural county the plan might call for 1-acre lots. In a small town with sewer, the density might be 3 or 4 units per acre for single-family neighborhoods. More than one residential housing product will exist in the planning area, and it is likely more than one residential product will be accommodated in the land use plan. Land use planners will use either the existing zoning requirements for lot size and density (if the locality has adopted zoning) or it may use the density parameters given for the residential land use category (e.g., residential, 3 to 4.5

units per acre). When a range of density is given, thought must be given to whether the minimum, maximum, or mid-point of the range of densities should be used. In most cases, a mid-point will be the safest choice, unless market trends show otherwise in which case the market may be the best predictor of density. Planners should look at the vision statement and land use policies that are available for the community to help determine how the total future households should be accommodated in the locality, given the various residential categories and/or differences in densities. Chances are pretty good that the land use planner will not have community consensus on a preferred "allocation" of total new households into different residential categories (although this is in itself an argument to seek such a consensus). Otherwise, the planner will have to make a policy choice or assumption. Table 10.3 provides an example of these calculations.

Table 10.3. Illustrative Example of Calculating Residential Acreage Needs to Accommodate Future Household Population

Residential Land Use (or Zoning) Category	Units Per Acre	Acres Per Unit	% Distribution of New Units (policy based)	Units in Category	Acreage Needed (acres per unit x units in category)
Low density rural	1 unit per 1 acre	1.0	10%	800	800
Suburban	2 units per acre	0.5	30%	2,400	1,200
Urban	5 units per acre	0.2	50%	4,000	800
Denser Urban	15 units per acre	0.067	10%	800	53.6
Total			100%	8,000	2,853.6

If the percentage distribution is acceptable locally, then the land use planner now has a good idea or at least a target for designing the residential land use portion of the future land use plan map. He or she can then proceed to spatially allocate residential densities on the future land use plan map that generally match these residential acreage needs. Outside CAMA jurisdictions, land use planners might elect to provide more than the total acreage of land estimated to be needed for future residential development, to provide some flexibility in the residential land market. However, any significant provision of residential land beyond the residential acreage needs will result in excessive residential land which could then promote lower densities than planned and a "sprawl" pattern.

A Note on Calculating Residential "Buildout" Capacity

Communities are frequently interested in the "capacity" of land in the planning area to accommodate residential development. The mayor or manager of a city or town may ask the planner, what will our future population be (or how many new housing units could we have) if developers build houses on all of the remaining residential, suitable and vacant lands and no policies are changed? Indeed, such an estimate of population and/or housing units at buildout (i.e., if all land for that purpose is consumed) is quite revealing and might even be one of the first technical tasks a land use planner undertakes before designing the land use plan. After all, if there is enough residential land in the planning area to accommodate the projected household population, then adding additional residential development capacity on the future land use plan map is not warranted (and would not be permitted under CAMA rules).

The method of determining residential buildout basically follows the same steps for determining future residential acreage needs, but the steps are performed in reverse. Planners can prepare a residential buildout analysis by first collecting acreage data on vacant, developable land zoned or planned for residential use. This may be best accomplished with a spreadsheet listing each vacant, residentially developable parcel as a row in the spreadsheet, then inputting acreage of each parcel in one column and allowable density (in dwelling units per acre) in another column. The planner can then enter a formula that automatically will multiply the acreage by the housing unit density allowed by zoning (or planned by residential future land use category), and show the total number of housing units potentially developed for each parcel. Note that some adjustments may be needed for the actual "yield" of the land, which might be 70 or 75% of the total acreage, after subtracting some portion for undevelopable parcels and the installation of roads. Then, sum the residential housing units for each vacant, residentially developable parcel for a total, planning area-wide estimate of housing units that could be constructed in the planning area. Note also that this approach only addresses "Greenfield" vacant sites. Redevelopment may be contemplated in a given planning area, in which case planners must add redevelopable tracts to the vacant lands inventory. Planners can accomplish that by identifying the tracts that are likely or desired to be redeveloped, then calculating the net new housing units based on zoned or planned densities.

Once the housing unit buildout estimate is determined, the planner can multiply the total housing units by the average household size for the planning area to determine the likely buildout population. The planner might add some sophistication to the buildout population method by incorporating different average household sizes for renter and

owner-occupied units, or for different types of housing units (census data can reveal such differences), or by factoring in a prevailing housing unit vacancy rate (which would result in a decrease in the total buildout population estimate).

Projecting Non-Residential Land Use Needs

Let's now consider an example of how to calculate non-residential acreage needs. To do that, one has to have a projection of employment in the planning area which may be difficult or challenging to acquire. The lack of small area employment projections is in itself enough of an obstacle that projecting non-residential acreage needs is not frequently done to support land use planning for small cities and towns. Even if a total employment estimate is available or calculated, planners need the total employment to be divided into categories that can reasonably be assigned to non-residential land use categories. The vast majority (but not all) of the future employment will locate in office, commercial, and industrial zones and mixed use districts. The employment projection should be divided by industry (manufacturing, retail trade, services, etc.) which can then be assigned to land use categories (e.g., manufacturing in the industrial land use category, retail in the commercial, service as some mix between commercial and office, etc.).

Returning to our example, in our county, we have an employment projection showing that 10,000 new jobs will be added during the 20-year planning horizon. Planners can make estimates, assumptions, and calculations as reflected in Table 10.4.

Table 10.4. Illustrative Example of Calculating Non-Residential Acreage Needs to Accommodate Future Employment Projection

Nonresidential Land Use Category	Jobs Per Acre	% Distribution of New Units (policy based)	Jobs in Category	Acreage Needed (Jobs/ jobs per acre)
Offices	15	10%	1,000	66.7
Retail and Service	15	25%	2,500	166.7
Institutional	12	10%	1,000	66.7
Industrial	10	25%	2,500	250
Mixed Use	10	30%	3,000	300
Total	—	100%	10,000	850.1

Like with the residential acreage needs estimate (Table 10.3), the vision and policies of the county are unlikely to give us a "policy" recommendation on how the employment is best allocated among the various non-residential land use categories. This means that land use planners will most likely have to use their best informed judgment on how to allocate the employment to the various non-residential land use categories. Further complicating matters is the fact that there is not that much published literature on how many jobs there are per acre for various land use types (commercial, industrial, etc.); Nelson (2004) is the closest, most reputable source in that regard, and even Nelson's work is almost a decade old and may not reflect rapid changes in employment densities. The jobs per acre cited in Table 10.2 should be used with relative caution for that reason.

Another way of determine prevailing jobs per acre by industry or land use type is to collect data for square footage of building space per worker (e.g., 1 employee per 1,000 square feet of industrial building, on average), then calculate likely building per acre densities (e.g., 20,000 square feet per acre for an industrial building), then calculate likely total building area for each parcel and divide that by the average square foot of building space per worker. Such a technique may also be subject to significant error, since there is little literature on this topic other than Nelson (2004). Another obstacle to this approach is that it is too time-consuming for local planners to collect local data. Yet another concern is that assumptions regarding the average square feet per worker are changing rapidly.

Finally, let us note that, just the same as with the residential acreage needs method, the steps involved in this non-residential acreage needs method can generally be applied in reverse order to derive a "buildout" estimate of the capacity for jobs in the community.

Land Use Change

The final planning document needs to contain calculations of acreage for each future land use category. It is also strongly recommended that the existing land use acreages be shown in the same table, along with another column showing change in acres during the planning horizon (see Table 10.5). If the existing land use map and future land use plan map utilize identical categories, this table is easily facilitated. If the categories are different, showing the land use change for every land use category may not be possible.

Note that the existing land use map should also be included in the final planning document, so that there is a graphic representation of both existing and future land use in the planning area. The acreage data on land use change during the planning horizon enables planners to then quantify net new development that will occur and forecast the transportation and community facility impacts of future development (see Chapter 11 for more guidance in that regard).

Table 10.5. Illustrative Existing Land Use, Future Land Use, and Land Use Change

Category	Existing Acres (Year)	% of Total	Future Acres (Year)	% of Total	Net Change in Acres
Agriculture and forestry	161,484	81.2			
Residential (all types)	12,822	6.4			
Public and Institutional	845	0.5			
Commercial	658	0.3			
Industrial	1,175	0.6			
Utilities	n/c	n/c			
Parks, recreation, conservation	2,038	1.0			
Vacant/Undeveloped	20,000	10.0			
Total planning area acres	199,022	100			

Source: Existing acreage adapted from Farris (2002)

Implementation Considerations

It should go without saying that the future land use plan map is not just a desirable future, it is something that realistically can be attained, and should be attained. But to implement the future land use plan, the locality will need to adopt and enforce land use regulations (in particular, zoning and subdivision and land development regulations). It is possible, but unlikely, that a locality will adopt a land use plan and then elect not to implement it with some combination of regulations. Without land use controls, a land use plan is merely a depiction of a desirable future state that is unlikely to be attained. The narrative text accompanying the future land use plan map should include a description of the local government's existing policies, ordinances, codes, and regulations and how they will be coordinated and employed to implement the community vision, goals, future land use plan map, and land use and development policies and objectives. The narrative text should also describe any additional tools, such as new or amended ordinances, capital improvements, purchase of property, or other specific projects, needed and accepted by the locality to implement the plan (Farris 2002).

Recommended Policies

Future Land Use Plan Generally

- Use the future land use map, narrative text and policies as a guide to decision-making.

Natural Resources, Environment, and Open Space

- **Environmentally sensitive areas.** Limit development in environmentally sensitive areas such as water supply watersheds, severe topography, and areas with drainage problems.
- **Environmental and landscape heritage character.** Protect scenic or natural features that contribute to the community's character.
- **Flood-prone areas.** Prohibit development within floodways and restrict or prohibit development within floodplains, while protecting the private property rights of landowners.
- **National Flood Insurance Program.** Continue to participate in the National Flood Insurance Program. Periodically amend the flood damage prevention/floodplain management ordinance to comply with changes to ordinances specified by the Federal Emergency Management Agency.
- **Wetlands.** Preserve wetlands where they exist, or as a last resort if they cannot be preserved on-site, mitigate wetland loss by increasing ecologically equivalent wetlands on other appropriate sites (i.e., wetland mitigation through wetland banking).
- **Efficient and low impact land utilization.** New development should be designed to minimize the amount of land consumed, and whenever possible, the natural terrain, drainage, and vegetation of an area should be preserved.
- **Best management practices.** Implement best practices for water pollution control and stormwater management, including but not limited to biofiltration (vegetated swales/strips), wet ponds, and constructed wetlands.
- **Innovative land development practices.** Encourage innovative land development practices that preserve environmentally sensitive land areas and open space.
- **Open space preservation.** New development should set aside open space for use as public parks or as greenbelts/wildlife corridors and to increase human contact with nature. Open spaces need to connect to existing or planned open spaces and green corridors.
- **Environmental restoration and mitigation.** Restore and enhance environmental functions damaged by prior site development activities.

- **Prime farmland soils.** Prime farmland soils are hereby declared to be important natural resources worthy of protection for future crop cultivation in support of future food security. Prevent the inclusion of prime farmland soils within residential subdivision lots, where permitted, if alternative designs are feasible.

Heritage Preservation

- **Heritage preservation.** The traditional character of the community should be maintained through preserving and revitalizing historic areas of the community, and encouraging new development that is compatible with the traditional features of the community.
- **Preservation programs.** Maintain and expand programs and activities that will instill an appreciation of and pride in the community's historic resources.

Settlement Form and Land Use Patterns

- **Infill development.** Minimize the conversion of undeveloped land at the community's periphery by encouraging development or redevelopment of vacant and redevelopable sites closer to the traditional core of the community. Encourage homebuilding on existing, vacant, residential subdivision lots prior to approving requests to plat new residential lots.
- **Land use compatibility.** Encourage a land use pattern that emphasizes land use compatibility and preserves the integrity of existing land uses. Ensure appropriate transitions and/or buffers between incompatible land uses. The public-institutional future land use category is considered a transitional designation to buffer residential uses from commercial and/or industrial uses.
- **Neighborhoods.** Maintain and preserve quiet, stable neighborhoods, and protect established residential areas from encroachment by incompatible land uses, while remaining flexible with regard to changing lifestyle opportunities. The preservation of the integrity of residential neighborhoods shall be considered to carry great weight in all land use plan map amendment, rezoning, and conditional use permit decisions.

Agriculture Preservation Areas (See also Chapter 5 of this guidebook)

- **Land subdivision and development.** Major subdivisions (6 or more lots) for non-agricultural purposes are inconsistent with this future land use area and should not be allowed. Land developments of 2 acres or more, when unrelated to agriculture, forestry, resource land use or public or semi-public use, are inconsistent and should not be allowed.

- **Small subdivisions.** Small land subdivisions (i.e., creation of no more than three lots in any given three-year period) for purposes of intra-family land transfer or public sale are consistent with this future land use area, if consistent with other stated policies. Successive practices over time of such subdivisions to the point that 6 or more lots are created on the same original lot of record are inconsistent with this future land use area and should be precluded via regulation.

Housing

- **Housing opportunities.** A range of housing size, cost, and density should be provided in the planning area, to increase the chances that people working in the community can also live in the community.
- **Housing mix.** A desirable mix of housing types for the community is as follows: Detached, single-family—__%; Manufactured homes—__%; Townhouses—__%; and Apartments and Condominiums—__%. This policy may be used as a criterion in reviewing and approving planned unit developments and zoning map amendments.
- **Housing occupancy mix.** A desirable mix of tenure in the community is __% owner-occupied housing units and __% renter-occupied housing units. This policy may be used as a criterion in reviewing discretionary development applications.
- **Accessory housing.** Allow householders to add an accessory apartment (attached to or detached from) a detached, single-family dwelling as a means for seniors to "age in place," give the householder a source of income, and to provide affordable housing.
- **Mixed-income housing.** Encourage the development of mixed-income housing communities within mixed-use developments and within the designated redevelopment corridors. Use design controls or guidelines as a method of making mixed-income housing more compatible with surrounding residences.
- **Life-cycle and multi-generation housing.** Encourage "life cycle" and multi-generational housing and communities that provide for persons of different age groups (including seniors) to live in the same community as they age.
- **Housing for persons with disabilities.** Avoid regulations and practices that would discourage the provision of housing for persons with disabilities.
- **Housing for all.** Encourage mainstream housing that accommodates all ages and abilities (i.e., universal or better living homes).
- **Housing code enforcement.** Adopt and enforce a housing code and property maintenance standards to prevent and mitigate substandard housing conditions.
- **Nonprofit housing organizations.** Encourage the creation of, and cooperate with, community-based housing organizations in the pursuit of more affordable workforce housing.

- **Housing grants and programs.** Identify and pursue various private, state, and federal housing programs designed to improve the housing stock.
- **Avoid unnecessary regulatory barriers**. In amending the locality's zoning and development regulations, consider the potential impact of such amendments on housing affordability, in order to avoid creating or sustaining unnecessary regulatory barriers.

Central Business

- **Development characteristics.** Development in the central business district may consist of greater lot coverage, building heights, and building intensities, as well as shallower or no front and side building setbacks.
- **Parking.** Development that is adequately served by public parking or on-street parking should be exempted from (or have reduced) minimum off-street parking requirements.
- **Auto-related uses.** Automobile-related commercial facilities and services are considered inappropriate in the central business district because such uses serve primarily auto-oriented traffic and do not facilitate pedestrian friendly design.

Neighborhood Commercial

- **Neighborhood market area.** Neighborhood commercial areas are intended to provide areas for limited, small-scale commercial uses of a convenience nature (including fresh produce) serving nearby residential neighborhoods as opposed to a regional market.
- **Use limitations.** Except for convenience stores with gasoline pumps, neighborhood commercial areas are not intended to permit or accommodate automotive uses or other types of more intensive highway business activities, or those uses that generate excessive traffic, noise, odors, pollution, safety hazards, or other adverse impacts which would detract from the desirability of adjacent properties for residential use.
- **Storage and display of goods.** Uses within neighborhood commercial areas generally occur within enclosed buildings with no outside storage and limited outdoor display of goods and merchandise.

Highway Commercial

- **Patterns.** Discourage patterns of "strip" commercial development. The fact that an existing lot has frontage on a state or federal highway is not in itself prima facie evidence that such property should be or will be allowed to develop commercially.
- **Efficient use.** Encourage the re-occupancy of existing retail space prior to the construction of new retail spaces.

- **Design.** Encourage highway commercial building designs which do not locate all of the off-street parking provided on the commercial lot between the road and the building. When commercial development occurs in phases, and for commercial development with outparcels reserved for future commercial development, ensure that the designs of building forms are interrelated and architecturally harmonious.

Industry

- **Location**. Industrial land uses should be limited to areas outside of flood plains, with relatively level topography, adequate water and sewerage facilities, and access to arterial streets.
- **Objectionable uses.** Unless located in a heavy industrial district, new industrial operations should be limited to those that are not objectionable by reason of the emission of noise, vibration, smoke, dust, gas, fumes, odors or radiation and that do not create fire or explosion hazards or other objectionable, dangerous, or unhealthful conditions.
- **Design.** Future industrial developments serving more than one industry are strongly encouraged to be developed within planned industrial parks which are designed with campus-style layouts including generous building setbacks from exterior roads and landscaping.

CHAPTER 11

Preparing Facilities and Transportation Plans

Recall that Chapter 4 of this guidebook gives considerable attention to the transportation system and its potential to promote physical activity and active living. Also note that Chapter 8, on healthy community infrastructure, provides an overview of various community facilities and services that are addressed in local comprehensive plans. Chapters 4 and 8 both provide recommended policies. This chapter supplements those prior chapters with additional guidance on preparing community facilities and transportation plans.

The quality of life in a given community depends on maintaining existing community facilities and transportation systems and adding facility and service capacity in order to continue growing and developing. The overall goal of such plans is to ensure the provision of the best possible public facilities and services for the citizens and businesses within the jurisdiction, within the locality's financial means.

Preparing community facilities plans is complex and may take expertise beyond that available from local planning staffs. Furthermore, each community facility has its own unique requirements for analysis, evaluation, and planning that cannot be fully explained in any generic process of planning community facilities (Anderson 2000). This chapter provides some limited guidance, but detailed facility planning should usually be done by planning and engineering consultants if local planning staff members do not have the requisite expertise. Local government elected officials should recognize this when putting together budgets for comprehensive planning, or they should provide for additional training of their existing planning staff members to engage in community facilities planning.

Facility Master Plans

Frequently, local governments will prepare and separately adopt a master plan or facility plan for thoroughfares, parks and recreation, and water and sewer systems. When facility plans are prepared, they should be adopted by reference as a part of the comprehensive plan. Care must also be taken to ensure the facility plans are consistent with all other elements and components of the comprehensive plan. This means facility plans use the same assumptions, data, and projections as the land use and other plan components.

Planning for major facilities involves: assessing existing facilities for adequacy and deficiencies; determining existing and desired level-of-service standards; forecasting future needs based on population, employment growth, and other demands; soliciting input from stakeholders and (if applicable) steering committee members on facility improvements and programs that are needed or desired; prioritizing all recommended projects; estimating the costs for such improvements; reviewing the locality's existing revenue sources and identifying other potential new sources; and assigning responsibilities for program implementation. Anderson (2000) provides another viewpoint for steps involved in generic community facilities planning.

Water

As noted in Chapter 8, localities in North Carolina are required to prepare local water supply plans and update them at five-year intervals (NC Gen. Stat. § 143-355). Water service is best thought of as an integrated system of production, treatment, storage, and distribution. Adequate water supplies are needed for all settlements from a public health and also a fire fighting capability standpoint. However, as water lines are extended into rural areas, such projects may not be very efficient (i.e., the marginal costs exceed marginal revenues in terms of connecting additional water customers in low-density rural areas). Extending water lines into areas previously not served can stimulate residential development, sometimes in a manner inconsistent with countywide land use plans.

To meet future needs for water, estimates of future consumption are needed. Many factors influence the amount of water used, including the price, leaks in the system, wasteful practices versus conservation measures, the sizes and types of commercial and industrial establishments, and the amount of municipal annexation (or changes to water service area boundaries) and rezoning. If the estimates of future water consumption are too low, the community risks not having enough water to meet its needs. If the estimates are too high, it risks spending substantial sums of money for capacity it will not use. Table 11.1 provides a compilation of water consumption averages by land use (these should be used with some caution). The broadest concern of the facility planner in relation to land use planning is to

ensure development contemplated in the future land use plan does not exceed the planned capacity or capability of the water treatment plant or other water production sources.

Table 11.1. Average Water Use by Selected Land Use

Use	Average Use (Day)
Detached, Single-Family (site built)	100 gallons per capita*
Manufactured home	75 gallons per capita
Multi-family dwelling unit	75 gallons per capita
Office	93 gallons per 1,000 gross square feet
Retail Space	106 gallons per 1,000 gross square feet
Hotel or motel	168 gallons per room
Restaurant	50 gallons per seat
Day care center or school	16 per student
Industry	150 gallons per employee
Assembly hall	2 gallons per seat in largest assembly room
Self-service laundry	250 gallons per washing machine

*Anderson (2000) indicates per-capita water consumption for private homes ranges from 20 to 80 gallons per capita per day, with an average of only about 40 gallons per capita per day.

Source: Compiled from various sources including: Colley (1986); Burchell (1994); Listoken and Walker (1989); and Matusik and Nickerson (2002).

Sewer

Facility planners need estimates of sewage effluent from future development so that the sewage treatment system can be appropriately sized. Sewer systems are usually accomplished by installing gravity-flow sewer mains. When topography does not permit the design of a gravity-flow system, a pumped system with forced mains (pressure systems) is used (Colley 1986). Where sewer is not available, on-site sewage management systems (usually septic tanks with absorption fields) are utilized.

For sewer, as a general rule of thumb, approximately 70 to 80 percent of the potable water supplied by any given community's water system is returned to the sanitary sewer collection system. Another source notes that in general "about 60 to 80 percent of the per capita consumption of water will become sewage" (Colley 1986). Anderson (2000) indicates

that the general rule is that 60 to 75 percent of the water introduced to an area will find its way out of the area in the form of wastewater, but that this is an unreliable rule of thumb. Sanitary sewer systems are usually sized to accommodate average wastewater flows of approximately one hundred gallons per capita per day (Somers et al 1986).

The comprehensive plan should include a map of designated water and sewer service areas for each service provider. Service area boundaries should be revised periodically to account for municipal annexations. When the city or town does not control water service, or water service is provided by a special district, efforts must be made to ensure spatial alignment between water purveyor extension policies and the land use plan. An intergovernmental agreement should be sought that water and sewer line extensions will not be granted unless consistent with the spatial future land use plan and applicable policies. Master plans for sewer and comprehensive plans should also address issues and contain policies regarding use of decentralized wastewater treatment systems (Feiden and Winkler 2006).

Parks and Recreation

In the past the National Recreation and Park Association (NRPA) recommended that jurisdictions provide 6.5 acres of park and recreation land per 1,000 population. Those guidelines have not been updated since 1995 (NRPA 2013). PRORAGIS, an acronym for Park and Recreation Operating Ratio and Geographic Information System, has replaced the NRPA standards that have guided land acquisition and development for the past 45 years (NRPA 2012).

In a survey of counties, the NRPA found that the median amount of park acreage per 1,000 population provided by counties was 13.1 acres (NRPA 2013). Another NRPA source shows that in 2012 for all jurisdictions surveyed (383, of which half were municipalities), the median amount of park acreage per 1,000 population provided was 11.1 acres, down from 14.1 in 2010 (NRPA 2013).

Jurisdictions may use these benchmarks for planning purposes, or establish their own standards. However, a number of factors might be evaluated in the determination of need for park land, including: additional recreational facilities available to the residents of the jurisdiction, such as parks and recreation facilities in adjacent jurisdictions and the county, use of school facilities, private recreation centers such as YMCAs, pools, playgrounds and tennis courts in residential subdivisions, proximity to State, National or other public parks and lakes, and the usage of existing facilities provided by the jurisdiction, which includes the potential use of facilities by non-residents. As noted in Chapter 4 of this guidebook, the location of park facilities and their proximity to neighborhoods (i.e., within walking distance for active living) may be considered a higher priority than achieving an overall

total acreage of parks and recreation lands provided in the planning area. For additional information on planning for parks and open spaces, see Lewis (2008).

Planners may also be engaged in designing plans for specific recreational facilities. For facility specifications, a useful but dated source is DeChiara and Koppelman (1978). Another useful source for recreation facility standards and planning principles is DeChiara, Panero and Zelnick (1995). For a discussion of park planning principles, another useful but dated source is Christiansen (1977).

Fire Protection

Planning for fire protection involves several steps, including the identification of the nature and extent of fire risks, establishment of level of service standards, identification of the most efficient and effective use of public resources to obtain the level of service standards, and implementation of a management and evaluation system (Burns 1988). The water system, discussed in another section, is an integral part of fire protection capabilities. Fire houses must be adequate in terms of size (e.g., equipment storage, number of bays for rolling stock, volunteer or full-time firefighters' quarters, etc.). Indeed, there are numerous metrics on which to base a determination of adequacy for fire departments. These include the overall Insurance Services Office, Inc. (ISO) rating, the amount and type of development served within a certain radius of stations, the number of fire stations, the number of bays and square footage of individual fire stations, the staffing levels per station and piece of equipment, the rolling stock (heavy vehicles such as engines and ladder trucks assigned), the number of pieces of reserve equipment, response times, and various other metrics related to water supply including fire hydrant spacing and flow (water pressure).

Level of Service Standards

Local plans should articulate level-of-service and/or performance standards for the major community facilities and services provided by the locality. Unless specified by facility-specific master plans and adopted as superseding policy, the locality may consider maintaining the following minimum level of service standards (use with some caution).

Water: 300 gallons per day per equivalent residential unit or 100 gallons per day per functional population (residents plus employees) within the given service area, whichever is less.

Sewer: 225 gallons per day per functional population (residents plus employees) within the given service area.

Roads: No worse than a Level of service "D" (a condition with heavy traffic operating at tolerable speeds, although temporary slowdowns in flow may occur) for arterials.

Law Enforcement: 2 sworn officers for each 1,000 population within the given service area.

Emergency Medical Services: One EMS station and vehicle for every 10,000 residents.

Fire Stations and Rolling Stock: 1.0 square feet of fire department building space per functional population and 1 fire engine per 4,000 functional population.

Parks and Recreation: 4.0 acres of developed park and recreation facilities per 1,000 residents, and 2.5 acres of passive recreation and/or open space land per 1,000 residents (excluding state owned facilities), for a total of 6.5 acres per 1,000 residents in the service area. (Also note the proximity standard recommended in Chapter 4 of this guidebook).

Libraries: 0.5 square feet of library space for each resident.

Administrative Space: 0.5 square feet of administrative space per functional population (residents plus employees in the planning area).

Capital Improvement Programs

Localities should maintain a five-year capital facilities plan and capital improvement program, updated annually. Facility plans should anticipate maintenance and repair needs for all existing community facilities, and include maintenance and repair projects in the capital improvement program as necessary. A detailed discussion of capital improvement programs is beyond the scope of this guidebook, but for additional guidance see Bowyer (1993) and Marlowe, Rivenbark, and Vogt (2009).

Transportation Improvement Programs

In North Carolina, plans for improvements to the highway and arterial road system will generally be completed at the multi-county, regional level by the Metropolitan Planning Organization (MPO) or Rural Planning Organization (whichever has jurisdiction), in conjunction with state and federal transportation officials. Transportation improvements to the arterial street and highway system, as called for in transportation improvement programs of the MPO or RPO, should be researched and the details of the project improvements should be cross-listed in the locality's capital improvement program.

Road widening projects and additions to the arterial road system (such as construction of a bypass) can have significant implications for land use which need to be recognized and addressed in the future land use plan. Localities should be active and vocal in ensuring that the federal, state, and regional projects programmed by the federal and state government will meet their needs, such as sidewalks, bike paths, and pedestrian street lighting in activity center areas.

MPOs and RPOs are generally better equipped than local planning agencies to prepare transportation plans, and they employ transportation models that: estimate vehicle trips (traffic) that will be generated by land uses (i.e., trip generation), distribute and assign the vehicle trips to the surrounding (or planned) road network, and estimate mode choice (e.g., car, truck, transit). While land use planners do not necessarily have to be skilled in transportation modeling, they should have a basic understanding of the data needs for transportation models.

Transportation Models and Traffic Analysis Zones

Transportation models use data produced for a small area of geography, called the traffic analysis zone (TAZ). A transportation modeler will input data for population by housing unit type and employment by industry type within each TAZ in the planning area. The first place the transportation modeler will look for such data is the locality's future land use plan. The modeler will hope that the local future land use plan is specific enough so that it will answer the needs for modeling. Ideally, this would mean the local planners: are aware of the TAZ geography used in regional transportation models and are able to estimate population, housing units, and employment by industry for each TAZ. Most of the time (except perhaps in the more sophisticated metropolitan regions of the state), the transportation modeler will not find the data he or she needs to accurately "load" the traffic on the future transportation network of roads and "run" the model to determine where deficiencies (congestion or failure to meet the level of service standard) will exist.

Land use planners and growth managers can assist the transportation modeling team by preparing land use design plans that provide detailed descriptions of the land uses for lands in the planning area. That is to say, planners can take a block of land (the area within a TAZ boundary) and help quantify the probable population and employment (and ultimately, trip generation for modeling purposes) resulting from development according to the future land use plan. If the local land use plan does give enough information to help the transportation modeler input model data that reasonably reflect future land use conditions, the modeler may have to make too many unwarranted assumptions. It is therefore prudent for local land use planners to provide transportation planners assistance that will lead to transportation model data that more accurately reflects the future development conditions contemplated in the locality's future land use plan.

Local Transportation Network Connectivity

The MPO or RPO transportation modeling efforts alluded to in the prior section will usually only address the major arterial transportation network, though some include major and minor collector streets. This means that, by and large, the regional transportation modelers are not that concerned with evaluating the performance of local roads and streets. Therefore, there is still plenty that local planners need to think about when it comes to the local roads and streets in the planning area. Recall the discussion about street connectivity in Chapter 4 of this guidebook. Planners should promote active living, and a grid network of connected streets is much more likely to serve that purpose than a curvilinear, disconnected pattern usually found in low-density, suburban, residential subdivisions. A true grid might not exist but might be established in part as lands are platted in the future.

Planners should sketch out an ideal local street and pedestrian network for the entire planning area that is shaped and sized to match the land uses the roads and sidewalks will serve. It is unlikely that all such network connections will ultimately be recommended to be constructed, but a comprehensive look at the planning area is likely to reveal a smaller number of important street and sidewalk network extensions needed for adequate connectivity.

It is also the responsibility of local planners to evaluate the safety and function of intersections within the local road and street network. The locality may have road intersections where one of the roads does not align with the other at an optimum (i.e., 90 degree) angle. If site visibility is impaired, improvements to the misaligned intersection need to be proposed. Evaluating sidewalk and trail networks is also generally the responsibility of local planners, but hopefully there will also be plans for regional bicycle routes, multi-use trails, and greenways to which local plans can connect.

Local Transportation Standards

Local government planners are responsible for ensuring that new streets get built as new development occurs. More importantly, the planner should ensure that the "right kind" of transportation improvements get constructed when subdivision or land development occurs. This means that the locality must have fairly detailed standards and construction specifications for the installation of local streets and bicycle and pedestrian infrastructure. Ideally, the transportation element of the comprehensive plan will provide policies on "complete" streets and "context sensitive" designs of roads and pedestrian infrastructure that meet the needs of occupants and also contribute to a "sense of place" for the neighborhood, activity center, or locality. It is not uncommon

for complete streets planning and detailed, urban design plans to be done only for one significant road segment at a time, rather than several road segments at once. Planning that simultaneously considers the land uses and the desired active transportation network usually occurs within a redevelopment corridor planning context. The locality's comprehensive plan should include cross-section drawings of context-sensitive road designs, and local government engineers should be given wide latitude in regulations to approve innovative designs for the transportation system. Such cross-sections should specifically include greenway trails, sidewalks and bike paths alongside roads, bike lanes within certain road pavements where appropriate, and transit-supportive infrastructure in places that are or can be served by bus, bus rapid transit, or rail transit in the most urban areas. Ideally, the plan and supporting regulations will require traffic impact analysis for larger projects and ensure the timely installation of necessary infrastructure.

CHAPTER 12

Citizen Participation: Engaging the Public

Planning is all about balance among competing interests and almost always involves difficult trade-offs. An effective plan reflects those trade-off decisions. The challenge for the local government is to capture, in words, maps, and illustrations, the future envisioned by the community's citizens, making those difficult trade-off decisions along the way. This often overwhelming challenge is made simpler when the local government systematically organizes the process (Easley and Coyne 2005).

Including a broad spectrum of the community in the planning process will ensure a stronger basis for broad support of the plan and commitment to its implementation (Center for Urban and Regional Studies 1999). *The Technical Manual on Coastal Land Use Planning* (Farris 2002) is especially strong in its guidance regarding citizen participation in comprehensive planning. This chapter provides planners with a summary description and evaluation of techniques to provide information and engage the public in comprehensive planning processes. It should also be noted that complete guidebooks (e.g., Easley and Coyne 2005) can and have been written about citizen participation methods in the comprehensive planning process, so the content here is intentionally brief, providing just a summary of some significant methods. Before describing participation techniques, let us not forget who will automatically be involved in the planning process in addition to the planning staff: The local elected officials and the appointed planning commissioners (in cities that have such commissions).

The Local Governing Body

It should first be acknowledged that the local governing body is the policy making arm of local government. Comprehensive plans include policies and hence they must be adopted by the local governing body (county commission, city council, etc.). Adoption of the comprehensive plan cannot be assumed by local planners, and they should

give elected officials all of the time they are willing to devote to the comprehensive planning process. Some comprehensive planning efforts assume that the local elected officials will not participate and, thus they are left out of the process until a "bottom up" plan is developed with the larger citizenry in a broad public participation process. While that may be appropriately decided by local elected officials if that is their desire, the comprehensive plan may run into debate, delay, and possibly revision or rejection altogether if the elected officials are not afforded adequate opportunities to "weigh in" on key policy debates, especially those with major budget implications.

The Planning Commission or Steering Committee

Since localities will almost always have an appointed planning commission (at least those jurisdictions that administer zoning regulations), the local planning commission may be the best choice in terms of a steering committee. However, planning commission members may have crowded agendas and therefore insufficient time to devote to overseeing the planning process (Farris 2002). For this and other reasons, many communities will establish broader steering committees comprised not only of one or more elected officials and one or more planning and zoning commissioners, but also many other stakeholders and representatives of numerous groups. If localities decide to appoint a steering committee on an ad hoc basis for the comprehensive planning process, the composition of steering committee is left to the locality to decide. Stakeholders can be interviewed if a committee is not established.

Citizen Participation Plan

To adequately engage the public, planners should carefully anticipate and decide how various stakeholders, citizens, business owners, and local officials will be involved in the comprehensive planning process. It is best that planners prepare a written community participation program and gain the approval of the governing body and planning commission prior to its execution. For local governments planning under the Coastal Area Management Act (CAMA), if CAMA funds are used, a citizen participation plan is required (Farris 2002). In preparing the citizen participation plan, considerable thought should be given to what results are expected from the methods and techniques that are used. The citizen participation plan or program should be prepared as early as possible in the planning process and should consist of three components: the identification of stakeholders; the identification and selection of appropriate participation techniques; and a schedule for completion of the comprehensive plan. These three components are summarized in the following sections.

Identifying Stakeholders

Because the comprehensive plan will establish policies and outline programs and regulations that will touch the lives of many people and groups in important ways, one could easily identify an almost endless list of stakeholders (i.e., anyone who may have a stake in the outcomes of the planning process). Table 12.1 provides a list of groups that should be invited to participate through stakeholder interviews, in hearings and workshops, or as members of a comprehensive plan steering committee.

Participation Techniques

Participation usually involves a combination of citizen participation techniques and approaches (Center for Urban and Regional Studies 1999). Farris (2002) identifies and summarizes the advantages and disadvantages of various participation techniques. Those techniques identified by Farris, and others, are summarized in Table 12.2.

Table 12.1. Potential Stakeholders to Consult in the Planning Process

Private Business and Related Interests	
Agricultural and forestry interests	Homebuilders association
Banks	Media—local and regional
Business owners, managers	Real estate professionals
Chamber of commerce	Schools and universities—private
Developers, for-profit	Utilities—private
Non-Profits and Community Organizations	
Bicycle, hiking clubs	Environmental organizations
Churches and places of worship	Ethnic and minority groups
Community development corporations	High school / college students
Community service organizations	Historic or preservation society
Developers, non-profit	Neighborhood organizations
Public Agencies and Organizations	
Cooperative Extension Service	Military base planners
County; other cities and towns in planning area	Public utilities
Federal agencies with jurisdiction	Regional planning agencies
Health-public	State agencies with jurisdiction

Source: Derived from Georgia Department of Community Affairs. April 2005. State Planning Recommendations: Suggested Stakeholders.

Table 12.2. Citizen Participation Techniques

Citizen Participation Technique	Description/Comment
Organized Input from Selected People/ Representatives	
Technical advisory committee	Provides technical expertise about facts and programs, but generally is not a mechanism for evaluating policy
Steering committee	Effective and recommended in many cases because it brings together a cross-section of community interests that can debate policy and direct the process toward a consensus on controversial issues
Stakeholder interviews	One-on-one discussions (interviewer and stakeholder) can yield in-depth qualitative information on particular issues; greater exchange of information than would occur at another assembly
Focus group(s)	Discussion involving a small group of people and facilitated by an interviewer on a specific topic (more than one focus group may be convened)
Speakers bureau	Consists of staff members or invited experts providing a series of introductory presentation on a particular topic or issue; can be used to discover opinions and preferences
Briefing	Information meetings with a community group or leader (elected officials, business leaders, the media, regional groups, or special interest groups
Site visit(s)	Trips taken by community residents, officials, agencies, and consultants to project areas, such as corridors, impacted areas, or affected properties. Also known as field visits or site tours.
Retreat	With elected officials and/or planning commissioners; usually includes a thorough briefing and sufficient time to debate key policy issues
Community-wide Meetings	
Kick off—public information meeting	Introduce and explain the planning process, including a presentation covering project purpose and approaches. May include initial opinion surveys and request for volunteers
Community forum	Mostly informal but structured for issue interaction; more effective if properly advertised and conducted near the beginning of the planning process
Roundtable discussions	Consensus building in small groups with report from each group; summary by staff at end
Open house	Informal; no set, formal agenda; typically scheduled near the end of the planning process or after planning materials, such as maps and policies, are available for review. People receive information from exhibits and staff. Attendees are encouraged to give opinions, comments, and preferences to staff either orally or in writing.
Facilitated town meeting	Useful in identifying a broad range of the community's issues and in generating a single list of priority issues; background information is typically presented first

Speaker's bureau	Briefings and presentations to civic clubs; or invitations of speakers to appear at steering committee meetings can add depth and expertise to discussion of community issues
Charrette	Intensive involvement of a relatively small number of participants; may result in a sketch plan that serves as a foundation for the future land use plan; requires trained facilitator(s) and possibly significant expenditure of funds; focused mostly on physical design to the possible exclusion of other issues and concerns
Community preference survey	Participants choose one image (as preferred) from a series of pairs of images, usually a mix from the subject community and from other communities; participants mark their preferences on a score sheet
Public hearing	Allows for opportunity to make official comments for the public record; recommended and advisable if not required; not usually considered an effective forum for participation and debate
Communication Media for Educating and Engaging the Public	
Media release(s) and/or newsletter	Mostly one-sided communication; serves an educational role but not very effective at soliciting input; more effective if given on a regular basis throughout the planning process
Video	Recorded visual and oral messages with project information; underutilized approach with good potential
Television and radio	Government access TV channel; local radio stations
E-mail blasts	Collect e-mail addresses from sign-in sheets at other meetings or acquire from locality; provides notices and other information
Website	Provides education but unless made interactive (i.e., with a feedback procedure provided), it allows only one-sided communication
Facebook and Twitter	Can be effective at generating detailed discussion and debate; persons who participate may be limited
Information centers	Established at locations including libraries, schools and other facilities to distribute project- or program-related information; may not be widely used by the public
Kiosk/lobby display(s)	Information available at selected, limited location; enables citizens to view assessments and plan drafts at their own leisure; participation is limited to those who will visit the kiosk/lobby location
Formal Data Collection	
Survey	Can be disseminated by phone, mail, internet, or in person; may be expensive and may not provide a representative and statistically significant sample
Photographic journals	Citizens are asked to take and share photographs depicting places in their own community that they cherish, places in other communities that they want to be like, and places in their own community that they want to change; journals are assembled, sorted and arranged into groups and tallies presented to arrive at community preferences

Involving Public Health Officials in Planning

Historically, public health professionals have been vastly underemphasized as a resource in the comprehensive planning process. This section provides some suggestions on how planners and public officials can collaborate more effectively toward mutual aims.

Planning begins with intelligence gathering, and as this guidebook indicates, there is a wealth of data about public health available. Planners need the assistance of public health professionals in determining how public health data can yield insights that can then be translated into programs and other actions to improve the health of the built environment. Planners need to specifically identify local public health officials and professionals as stakeholders and invite them to participate in the planning process. Public health professionals need to take initiative and invest time in the planning process. In addition to the goal of generally participating, it would be productive at the outset of the planning process to convene a roundtable meeting of local planning and public health professionals to discuss their respective missions and how they intersect around shared responsibilities. The outcomes of such a roundtable meeting should include action planning worksheets describing missions of both the planning agency and public health agency, areas of concurrence, areas of conflict, and priorities for action (Morris 2006a). Planners should also identify groups that have in interest in public health and neighborhood quality of life and forge partnerships with them. From these efforts, one will expect that consensus can be reached on goals, policies, strategies, objectives, and work program actions to be included in the plan. And finally, public health officials should be vocal advocates at the time the plan comes up for adoption by the local governing body; brief testimony before the decision makers on the beneficial impacts the plan will have on community health can go a long way toward helping win approval and neutralizing any opposition to plan adoption that might surface.

Preparation for Public Meetings

Key Questions to Answer for the Public

- Who will prepare the plan?
- How long will the planning process last?
- What subject matters will be included in the plan?
- What are the costs, and how much money is budgeted or earmarked for the planning process?
- How will the community's citizens be involved and engaged? (based on Easley and Coyne 2005)

Key Questions to Ask the Public (General)

- What do you have as a community?
- What existing elements of the community do you like and dislike?
- What do you want in the community?
- How can we get to what you want in the community? (based on Easley and Coyne 2005)

Key Questions to Ask in Stakeholder Interviews and Surveys

- List three specific characteristics of the community you like.
- List three specific characteristics of the community you do not like (or community problems) that you would like to changed or addressed.
- What is missing from the community that is needed to achieve the kind of development you want? In other words, what would you add as land uses in the community?

Items to Bring to Meetings

- Directory signs to meeting room, etc.
- Sign-in sheets
- Name tags
- Agenda or fact sheets
- Comment forms (or surveys)
- Meeting supplies (computer, pencils, markers, flip-chart, tape, poster panels, etc.)

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Appendix A

County Level LINC Data for Comprehensive Planning with Particular Attention to Health Considerations

Variable Name (Range of Years Available)	Source in LINC	Definition Provided in LINC	Notes on Appropriate Application(s)
Population projection by age group (to 2030)	NC Office of the Governor	A projection differs from an estimate in that it relies on certain assumptions about long-term trends in data which are not yet available, while an estimate is based on data from predictor variables that are available for the estimate year.	Determine future population for multiple planning purposes
Blind and visually impaired persons (1980-2011)	NC Department of Health and Human Services (see Disability)	A count of the number of North Carolinians on the Register of Blind and Visually Impaired Persons as of December of the reference year by county of residence.	Population analysis or population element
Manufacturing employment by place of work (1970-2010)	NC Department of Commerce (see Labor Force and Employment—Annual)	Estimate of the average annual number of nonagricultural wage and salary jobs held by place of work (i.e., the county or region in which the job is held) for all manufacturing as defined by the standard industrial classification system. Nonagricultural wage and salary employment figures exclude agriculture employment, non-farm self-employed, domestic workers in private households, and unpaid family workers.	Economic base analysis; also can be used to calculate level-of-service for facilities considering employment in addition to population
Nonmanufacturing employment by place of work (1970-2010)	NC Department of Commerce (see Labor Force and Employment—Annual)	Estimate of the average annual number of nonagricultural wage and salary jobs held by place of work (i.e., the county or region in which the job is held) for all nonmanufacturing industries as defined by the standard industrial classification system. Nonagricultural wage and salary employment figures exclude agriculture employment, nonfarm self-employed, domestic workers in private households, and unpaid family workers.	Economic base analysis; also can be used to calculate level-of-service for facilities considering employment in addition to population
Farm cash receipts (1000s) from all crops (1980-2011)	NC Department of Agriculture and Consumer Services	Farm income amounts for the calendar year are estimated income from tobacco, cotton, peanuts, corn, grain, potatoes, fruits and vegetables, greenhouse and nursery items, hay and other field crops, livestock products, farm forest products, and government payments.	Agricultural economic analysis; note these data may help analyses of potential for localized healthy food programs

Variable Name (Range of Years Available)	Source in LINC	Definition Provided in LINC	Notes on Appropriate Application(s)
Farm cash receipts from livestock/dairy/poultry (1000s) (1980-2011)	NC Department of Agriculture and Consumer Services	Farm income amounts for the calendar year are estimated income from actual sales of livestock, dairy, and poultry products. Income is credited to the county of production, even if marketed, stored, or processed in another county.	Agricultural economic analysis; note these data may help analyses of potential for localized healthy food programs
Acres of harvested cropland (2002-Present at five-year intervals)	NC Department of Agriculture and Consumer Services	Cropland for calendar year consists of all land from which crops were harvested including field crops, hay, fruits and vegetables. Acres that have more than one crop (i.e. wheat, soybeans and hay) harvested are counted only once.	Land use studies; potential for localized healthy food programs.
State outdoor recreation acreage (2008)	NC Department of Environment and Natural Resources (see Recreation Land)	Total acreage of sites operated by state agencies for outdoor recreation use by the general public. Included are the state parks system, historic sites, and wildlife game lands.	Park and open space analyses and community facility plans
Federal outdoor recreation acreage (2008)	NC Department of Environment and Natural Resources (see Recreation Land)	Total acreage of sites operated by federal agencies for outdoor recreation use by the general public. Includes the national parks, forests, and wildlife refuges.	Park and open space analyses and plans and community facility plans
Local outdoor recreation acreage (2008)	NC Department of Environment and Natural Resources (see Recreation Land)	Total acreage of sites operated by local park and recreation agencies for outdoor recreation use by the general public.	Park and open space analyses and plans and community facility plans
Active primary care physicians (1972-2011)	The University of North Carolina (see health manpower)	Active physicians in the specialties of general practice, family practice, internal medicine, internal medicine, pediatrics, and obstetrics/gynecology. The data are assigned to counties by the physician's business address.	Community facilities and services element (health services component)
Midlevel practitioners (1980-2011)	The University of North Carolina (see health manpower)	Active nurse practitioners plus active physician's assistants. The data are provided by county of the extender's business address and by home address if the business address is not known.	Community facilities and services element (health services component)

Variable Name (Range of Years Available)	Source in LINC	Definition Provided in LINC	Notes on Appropriate Application(s)
Registered nurses (1980-2011)	The University of North Carolina (see health manpower)	Active registered nurses who are licensed by the N.C. Board of Nursing effective October of the listed year and includes those whose activity status is unknown. Nurse practitioners registered with the N.C. Board of Medical Examiners are also included, as are certified nurse midwives. The data are provided by the county of the nurse's business address and by home county if the business address is not known.	Community facilities and services element (health services component)
Total Active Physicians, Nonfederal, Non-resident-in-training (1979-2011)	The University of North Carolina (see health manpower)	Active, nonfederal, non-resident-in-training physicians (doctors of medicine and doctors of osteopathy) licensed by the N.C. Board of Medical Examiners effective October of the listed calendar year. The data are assigned to counties by the physician's business address, if known, and to the home county if the business address is not known.	Community facilities and services element (health services component)
Active dentists (1980-2011)	The University of North Carolina (see health manpower)	active dentists who are licensed N.C. Board of Dental Examiners effective October of the listed year and includes those whose activity status is unknown. The data are provided by the county of the dentist's business address and by home address if the business address is not known.	Community facilities and services element (health services component)
Beds in general hospitals (1980 to 2010)	NC Department of Health and Human Services (see Health Facilities)	General acute care beds in hospitals, that is, beds which are designated for short-stay use, as licensed at the end of the third calendar quarter of the year.	Community facilities and services element (health services component)
Nursing facility beds (1980 to 2011)	NC Department of Health and Human Services (see Health Facilities)	Beds licensed as nursing facility beds, meaning those offering a level of care less than that offered in an acute care hospital, but providing licensed nursing coverage 24 hours a day, seven days a week. In addition to these beds, licensed long-term nursing care (extended nursing care) beds in nonfederal, non-state general hospitals are included.	Community facilities and services element (health services component)
Human services expenditures (1980-2011)	NC Department of State Treasurer	Expenditures by the county or municipal government for health, mental health, legal aid, subsidies paid to hospitals, and other human services. For counties, also includes social service administration and assistance programs (not including county payments to the state for Medicaid, AFDC, etc.) and veterans service officer. For municipalities, also includes social services.	Community facilities and services element (health services component)

Variable Name (Range of Years Available)	Source in LINC	Definition Provided in LINC	Notes on Appropriate Application(s)
Persons served in area mental health programs (1980-2010)	NC Department of Health and Human Services (see Mental Health)	All clients of a community-based Area Program for mental health, developmental disabilities, and drug and alcohol abuse active at the beginning of the state fiscal year plus all admissions during the year. Also included are persons served in three regional mental health facilities. Multiple admissions of the same client are counted multiple times. County of residence is reported at the time of admission	Community facilities and services element
Licensed child day care facilities (1985-2010)	NC Department of Health and Human Services (see Children)	The number of licensed child day care facilities as of December. Included are licensed day care centers and licensed large day care homes serving 6 to 15 children.	Community facilities and services element
Capacity of licensed child day care facilities (1985-2010)	NC Department of Health and Human Services (see Children)	The number of slots in child day care facilities as of December. Included are the capacities of licensed day care centers and licensed large day care homes serving 6 to 15 children.	Community facilities and services element
Public school final enrollment (1971-2011)	NC Department of Public Instruction	The number of pupils registered in the state's public schools. Once a pupil is initially counted in the enrollment figure, he/she remains in that count throughout the school year. Students transferring to the North Carolina public school system from another state or from nonpublic schools are added to enrollment.	Community facilities and services element—also, use to gauge potential impact of improving facilities for walking and biking to school
Public high school final enrollment (1980-2011)	NC Department of Public Instruction	Pupils registered in grades 9-12 in the state's public schools at the end of the school year. Once a pupil is initially counted in the enrollment figure, he/she remains in that count throughout the school year.	Community facilities and services element—also, use to gauge potential impact of improving facilities for walking and biking to school
Traffic accidents (1970-2010)	NC Department of Transportation (see Traffic Accidents)	the number of reportable traffic accidents in the calendar year. A reportable accident is one which involves a motor vehicle resulting in injury, death, or total property damage of $1,000 or more.	Walkability audits; transportation element

Variable Name (Range of Years Available)	Source in LINC	Definition Provided in LINC	Notes on Appropriate Application(s)
Nonpublic school enrollment (1961-2009)	NC Department of Administration	Nonpublic school enrollment data are as of the first school day of October of the school year and include students in grades K-12.	Community facilities and services element—add to any total school enrollment data analyzed
Enrollment in home schools (1988-2009)	NC Department of Administration	Enrollment data for students attending home schools, which under North Carolina law are nonpublic schools in which one or more children of not more than two families or households receive academic instruction from parents, or legal guardians, or a member of either household.	Community facilities and services element—add to any total school enrollment data analyzed
Pedestrian accidents (1990-2010)	NC Department of Transportation (see Traffic Accidents)	Number of reportable accidents during a calendar year involving a pedestrian as determined by the investigating officer's report, which is filed within 24 hours of the accident. Reported by county of occurrence.	Walkability audits; transportation element
Pedestrians injured (1990-2010)	NC Department of Transportation (see Traffic Accidents)	The number of individuals injured in reportable collisions between a pedestrian and a motor vehicle as determined by the investigating officer's report, which is filed within 24 hours of the accident.	Walkability audits; transportation element
Pedestrian fatalities (1990-2010)	NC Department of Transportation (see Traffic Accidents)	Death due to injuries of an individual within 30 days from the date of a reportable traffic accident in which he/she was involved as a pedestrian, as determined by the investigating officer's report, which is filed within 24 hours of the accident.	Walkability audits; transportation element
Bicyclists injured (1980-2010)	NC Department of Transportation (see Traffic Accidents)	The number of individuals injured in reportable collisions between a bicycle and a motor vehicle as determined by the investigating officer's report, which is filed within 24 hours of the accident.	Walkability audits; transportation element
Bicyclist fatalities (1980-2010)	NC Department of Transportation (see Traffic Accidents)	Death due to injuries of an individual within 30 days from the date of a reportable traffic accident in which he/she was involved as a bicyclist, as determined by the investigating officer's report, which is filed within 24 hours of the accident.	Walkability audits; transportation element

Source: Log Into North Carolina (LINC) website: http://linc.state.nc.us/

Appendix B

Template for Analysis of Existing Conditions

(Population, Housing, and Economy)

This appendix provides blank tables that are designed to help planners organize and present data on population, housing, and economy. It is available as a Word document from the community planning offices of the Division of Community Assistance (NC Department of Commerce) upon request. To find a contact, go to www.nccommerce.com/cd/community-planning/regional-office-services.

1.0 Population and Households

This section provides an inventory and analysis of past and present population and household characteristics. An understanding of population growth and general population characteristics is an important first step in completing a comprehensive plan. Analyzing where the people are, in what amounts and composition, and at what rates they are expected to increase in number helps to determine the location and need for public facilities, capital improvements, housing, and employment opportunities.

Population Trends

Table 1.1 shows past and current populations of the city, the city's extraterritorial jurisdiction (ETJ), and the county as a whole.

Table 1.1. Historic Population Trends, 2000, 2010 and Current City, City Plus ETJ, and County

Jurisdiction	2000	%	2010	%	Current	%
City of _____						
City Plus Extraterritorial Jurisdiction (ETJ)						
Total County						

Source: U.S. Department of Commerce, Bureau of the Census. 2000 and 2010 Decennial Census. Current estimate from _____.

Comparison of Growth Rates

Table 1.2 shows the percentage change in population between decennial censuses for the city, county, and state. The U.S. (national data) could be added to all tables if desired.

Table 1.2. Percent Change of Population, 1990-2000 and 2000-2010
City, County, and State

Jurisdiction	Percent Change, 1990-2000	Percent Change, 2000-2010
City of _____		
County		
State		

Source: U.S. Department of Commerce, Bureau of the Census. 1990, 2000, and 2010 Decennial Census.

Household and Group Quarters Populations

The total population is divided into "household" and "group quarters" (e.g., college dormitories, nursing homes, and correctional facilities) populations. The number of households is important in part because it reflects the needs for housing units. Group quarters population is generally not considered in estimating needs for future housing units.

Table 1.3. Historic Household and Group Quarters Populations, 2000, 2010 and Current
City of _____

Type of Population	2000 Census	%	2010 Census	%	Current (Est.)	%
Household Population						
Group Quarters Population						
Total Population						

Source: U.S. Department of Commerce, Bureau of the Census, Decennial Census, 2000 and 2010. Current estimate from _____.

Family and Non-Family Households

Table 1.4. Households by Type of Household, 2000, 2010 and Current
City of _____

Households By Type	2000 Census	%	2010 Census	%	Current Est.	&
Family Households						
Nonfamily Households						
Total Households						

Source: U.S. Department of Commerce, Bureau of the Census. 2000 and 2010 Decennial Census. Current estimate from _____.

Age of the Population

Age is the single most important dimension of the population. There can be vast differences in the needs of children versus the elderly. Household income varies with age of householders. Age has a relationship to the labor force—workers include the population ages 16 years and over through retirement age and sometimes beyond. Age has important relationships to housing and can help predict likely first-time homebuyers, renters, owners of second homes, etc. The relationship of the age of population to the needs for community facilities and services is also very important. For instance, a high elderly population often translates into a need for health care and personal care homes. On the other hand, a town with many children signals a need for schools, day care centers, and playgrounds.

Table 1.5. Population by Age, 2000-2010
City of _____

Age Group	2000	City %	State %	2010	%	State %
0-4						
5-9						
10-14						
15-19						
20-24						
25-29						
30-34						
35-39						
40-44						
45-49						
50-54						
55-59						
60-64						
65-69						
70-74						
75-79						
80-84						
85+						
TOTAL						

Sources: U.S. Census Bureau, 2000 and 2010 Decennial Census.

Population by Race

The racial composition of the city's population is shown in Table 1.6.

Table 1.6. Racial Composition of the Population, 2000, 2010, and Current City of _____

Race	2000	%	2010	%	Current	%
White						
Black or African American						
American Indian & Alaska Native						
Asian						
Other race						
Two or more races						
Total		100%		100%		100%

Source: U.S. Census Bureau. 2000 and 2010 Decennial Census. Current data from _____.

Hispanic Origin

Hispanic origin is not a race, and thus it is noted separately in Census statistics.

Table 1.7. Hispanic or Latino Population, 2000, 2010, and Current City of _____

Origin	2000	%	2010	%	Current	%
Not Hispanic						
Hispanic or Latino (of any race)						
Total Population		100%		100%		100%

Source: U.S. Census Bureau. 2000 and 2010 Decennial Census. Current data from _____.

Education of the Population

Table 1.8. Educational Attainment, 2000 and Current
Persons 25 Years and Over
City of _____

Educational Attainment	2000 Census	%	____ - ____	%
Less than 9th grade				
9th to 12th grade (No Diploma)				
High School Graduate (Includes Equivalency)				
Some College (No Degree)				
Associate Degree				
Bachelor's Degree				
Graduate or Professional Degree				
Total Adult Population 25 Years and Over		100%		100%

Source: U.S. Bureau of the Census. 2000 Decennial Census. American Community Survey, _-Year Estimates, ____ - ____, Table ____

Income of the Population

Table 1.9. Comparison of Median Family and Median Household Income, ____ - ____
City, County, and State

Income	_____ - _____ (Estimates)		
	City of _____	County	State
Median Family Income ($)			
Median Household Income ($)			

Source: American Community Survey, _-Year Estimates, ____ - _____, Table _____.

Table 1.10. Number of Households by Income Grouping, ____ - ____
City of _____ and County

Income Grouping	____ - ____			
	County		City of _____	
	Households	% Total Households	Households	% Total Households
Less than $10,000				
$10,000 to $14,999				
$15,000 to $19,999				
$20,000 to $24,999				
$25,000 to $29,999				
$30,000 to $34,999				
$35,000 to $39,999				
$40,000 to $44,999				
$45,000 to $49,999				
$50,000 to $59,999				
$60,000 to $74,999				
$75,000 to $99,999				
$100,000 to $124,999				
$125,000 to $149,999				
$150,000 to $199,999				
$200,000 or more				
Total Households				

Source: American Community Survey, _-Year Estimates, ____ - ____, Table _____.

2.0 Housing

The housing analysis (this section) provides an inventory of the existing housing stock in the planning area and helps to establish existing and emerging trends. These data are used by planners, stakeholders, and public officials to assess the adequacy and suitability of the existing housing stock for serving the current population, determine future housing needs, establish goals to guide long- range needs, and prepare strategies for the adequate provision of housing for all sectors of the population.

Types of Housing Units

The share of single-family dwellings as percentage of total housing stock is usually examined.

Table 2.1. Types of Housing Units, 2000 and Current
City of _____

Type of Unit	Units 2000 (Census)	%	____ - ____ Units	%
One family, detached				
One family, attached				
Multiple family				
Mobile Home				
Total Housing Units		100%		100%

Sources: U.S. Department of Commerce, 2000 Census, Summary File 3 sample data, Table H30, "Units in Structure." Current estimates from _____.

Occupancy and Vacancy

It is important to examine the proportion of housing units that are owner occupied and renter occupied, as well as vacancy rates for owner occupied and rental units.

Table 2.2. Occupancy and Vacancy of Housing Units, 2000 and Current
City of _____

Status	2000 Units	%	____ - _____	%
Occupied				
Vacant				
Total Units		100%		100%

Source: U.S. Department of Commerce, Bureau of the Census. 2000 Census. Current estimates from _____.

Tenure of Housing Units

Table 2.3. Owner and Renter Occupied Housing Units, 2000 and 2010
City of _____

Occupancy of Units	2000 Units (Census)	%	2010 Units (Census)	%
Owner				
Renter				
Total Occupied		100%		100%

Source: U.S. Department of Commerce, Census 2000, SF 3 (sample data), Table H7. Census 2010.

Average Household Size

Table 2.4 shows housing unit occupancies (persons per unit or average household size) by tenure.

Table 2.4. Average Household Size by Tenure, 2000 and 2010
City of _____

Occupancy	2000 Census Avg. Household Size	2010 Census Avg. Household Size
Persons Per Unit, Owner-Occupied Housing Units		
Persons Per Unit, Renter-Occupied Housing Units		
All Occupied Housing Units		

Source: U.S. Department of Commerce, Bureau of the Census. Census 2000, SF 1, Table H12. Census 2010.

Age of Housing Units

Table 2.5 provides age ranges for housing units constructed as of 2000 and Table 2.6 provides estimates for the current year. These tables compare the relative age of the city's housing stock with that of the county and state as a whole.

Table 2.6. Age of Housing Units, 2000
City, County, and State (Housing Units by Range of Years Structure Was Built)

Year Structure Built	City of _____	%	County	%	State %
Built 1999 to March 2000					
Built 1995 to 1998					
Built 1990 to 1994					
Built 1980 to 1989					
Built 1970 to 1979					
Built 1960 to 1969					
Built 1950 to 1959					
Built 1940 to 1949					
Built 1939 or earlier					
Total		100%		100%	
Median Year					
Structure Built					

Source: U.S. Census Bureau. Census 2000. SF 3 (sample data). Table H34 and H35.

Table 2.7. Age of Housing Units, ____ - ____ Estimates
City, County, and State (Housing Units by Range of Years Structure Was Built)

Year Structure Built	City of _____	%	County	%	State %
March 2000 to Present					
Built 1999 to March 2000					
Built 1995 to 1998					
Built 1990 to 1994					
Built 1980 to 1989					
Built 1970 to 1979					
Built 1960 to 1969					
Built 1950 to 1959					
Built 1940 to 1949					
Built 1939 or earlier					
Total		100%		100%	
Median Year					
Structure Built					

Source: U.S. Census Bureau. American Community Survey. _____.

Overcrowded Housing Units

Overcrowding is another important measure of inadequate housing conditions. An overcrowded housing unit is one that has 1.01 or more persons per room. Severe overcrowding is considered to occur when units reach 1.51 or more occupants per room. Table 2.8 shows data on overcrowding in 2000 for the housing stock. Table 2.9 shows current estimates.

Table 2.8. Overcrowded Housing Units by Tenure, 2000
City of _____

Occupants Per Room	Owner Occupied		Renter Occupied	
	Units	%	Units	%
1.01 to 1.50 occupants per room (overcrowded)				
1.51 or more occupants per room (severely overcrowded)				
Total overcrowded or severely overcrowded		100		100

Source: U.S. Census Bureau, Census 2000, SF 3, Table H21.

Table 2.9. Overcrowded Housing Units by Tenure, ____ - ____ Estimates
City of _____

Occupants Per Room	Owner Occupied		Renter Occupied	
	Units	%	Units	%
1.02 to 1.50 occupants per room (overcrowded)				
1.51 or more occupants per room (severely overcrowded)				
Total overcrowded or severely overcrowded		100		100

Source: American Community Survey, _____.

Value and Cost of Housing

Planners should determine the cost of housing in the community, both for owners and renters, in terms of affordability for residents and workers in the community. This is accomplished with a review and analysis of data showing the values of owner-occupied housing units (Table 2.10) and median monthly rents for renter occupied units (Table 2.11).

Table 2.10. Value of Specified Owner-Occupied Housing Units in 2000 and Current City of _____

Range of Value ($)	2000		____ - ____		State %
	Units	%	Units	%	
Less than $50,000					
$50,000 to $99,999					
$100,000 to $149,999					
$150,000 to $199,999					
$200,000 to $299,999					
$300,000 or more					
Total		100%		100%	100%
Median (all owner occupied units) ($)	$		$		$

Source: U.S. Census Bureau, 2000 Census, SF 3, Table H74 and Table H85. American Community Survey, _____.

Table 2.11. Gross Rent, Specified Renter-Occupied Housing Units, 2000 and Current City, County, and State

Gross Rent ($)	2000 (Census)		____ - ____		State %
	Units	%	Units	%	
Less than $250					
$250 to $499					
$500 to $749					
$750 to $999					
$1000 or more					
Total Units With Cash Rent		100%		100%	100%
Median Gross Rent ($)		—		—	

Source: U.S. Census Bureau, 2000 Census, SF 3, Table H62 and Table H63. American Community Survey, _____.

Housing Cost Burden

Local planners should the number of households that are cost-burdened (i.e., paying 30% or more of net income on total housing costs) and severely cost-burdened (i.e., paying 50% or more of net income on total housing costs). Data enable an analysis of housing cost burden for both households of owner-occupied housing units (Table 2.12) and renter-occupied housing units (Table 2.13).

Table 2.12. Monthly Owner Costs as a Percentage of Household Income, Current Estimate City of _____ (Specified Owner-Occupied Housing Units)

Monthly Owner Costs as a Percentage of Household Income	____ - ____ Specified Owner-Occupied Housing Units	% of Units
Less than 30 percent (not cost burdened)		
30 to 49 percent (cost burdened)		
50 percent or more (severely cost burdened)		
Total Specified Owner-Occupied Housing Units		100%

Source: U.S. Census Bureau, American Community Survey, _____.

Table 2.13. Gross Rent as a Percentage of Household Income, Current Estimate City of _____ (Specified Renter-Occupied Housing Units)

Gross Rent as a Percentage of Household Income	Specified Renter-Occupied Housing Units	% of Units Computed
Less than 30 percent (not cost burdened)		
30 to 49 percent (cost burdened)		
50 percent or more (severely cost burdened)		
Units not computed		
Total Specified Renter-Occupied Housing Units		

Source: U.S. Census Bureau, American Community Survey, _____.

3.0 Labor Force and Economy

This section provides an investigation of the city's labor force, economic base, and general economic trends. The intent of this section is to provide the background data to determine needs and establish economic development strategies in the city's comprehensive planning process.

Labor Force Participation

Table 3.1. Labor Force Participation, 2000, and ____ - ____ Estimates
Persons 16 Years and Over
City of _____

Labor Force Status	2000		_____ - _____ Estimates	
	Persons 16 Years and Over	% Total 16 Years and Over	Persons 16 Years and Over	% Total 16 Years and Over
In Labor Force				
Not in Labor Force				
Total 16+ Years				

Source: U.S. Census Bureau. Census 2000, Summary File 3, Table P43. American Community Survey, ____ - ____ _-Year Estimates, Table B23001.

Employment Status

Table 3.2. Employment Status of the Labor Force, 2000 and ____ - ____ Estimates
Persons 16 Years and Over
City of _____

Labor Force Status	2000	%	____ - ____ Estimate	%
Employed				
Unemployed				
Total 16+ Years		100%		100%

Source: U.S. Census Bureau. Census 2000. Summary File 3, Table P43. American Community Survey, ____ - ____ _-Year Estimates, Table B23001.

Place of Work of City Residents

Table 3.3. Place of Work of City Residents
Persons 16 Years and Over
2000 and ____ -____ Estimates

Place of Work	2000		____ -____ Est.	
	Number of Residents Working	% of Total	Number of Residents Working	% of Total
Worked in place of residence				
Worked in County, not in City				
Worked Outside County of Residence				
Worked Outside State				
Total		100%		100%

Source: U.S. Census Bureau, 2000 Census. Summary File 3. Tables P26, P27, and P28. American Community Survey, ____ - ____-Year Estimates, Tables B08007 and B08008.

Employment of City Residents by Occupation

Table 3.4. Comparison of Employment by Occupation, ____ - ____
Employed Civilian Population 16 Years and Over
City, County, State, and Nation

Occupation	City of _____	City %	County %	State%	U.S.%
Managerial professional, and related					
Service					
Sales and office					
Farming, fishing, and forestry					
Construction, extraction, and maintenance					
Production, transportation, and material moving					
Total		100%	100%	100%	100%

Source: U.S. Census Bureau, American Community Survey, _____.

Table 3.5. Comparison of Employment by Industry, ____ - ____
Employed Civilian Population 16 Years and Over
City, County, State, and Nation

Industry	City	City %	County %	State %	U.S. %
Agriculture, forestry, fishing and hunting, and mining					
Construction					
Manufacturing					
Wholesale trade					
Retail trade					
Transportation and warehousing and utilities					
Information					
Finance, insurance, real estate and rental and leasing					
Professional, scientific, management, administrative, and waste management services					
Educational, health and social services					
Arts, entertainment, recreation, accommodation and food services					
Other services (except public administration)					
Public administration					
Total		100%	100%	100%	100%

Source: U.S. Census Bureau, American Community Survey, _____.

Table 3.6. Employment by Industry, 2002 and 2012
By Place of Work in _____County

Industry	2002	%	2012	%
Manufacturing (31-33)				
Wholesale trade (42)				
Retail trade (44-45)				
Real estate & rental & leasing (53)				
Professional, scientific, & technical (54)				
Admin. & support & waste mgmt & remediation services (56)				
Educational services (61)				
Health care & social assistance (62)				
Arts, entertainment, & recreation (71)				
Accommodations & foodservices (72)				
Other services (except public admin.) (81)				

Source: U.S. Bureau of Census, County Business Patterns, 2002 and 2012.

Employment by Zip Code

The U.S. Census Bureau provides total employment data by zip code. Viewing how employment has increased or decreased over time by subarea (zip code) helps economic developers understand where employment is concentrating and areas that have lost employment over time. Reviewing employment by zip code is useful because one can begin to identify patterns and trends in employment at a smaller unit of geography than the individual county. The zip code data are especially important since employment estimates for individual cities are not provided by the U.S. Census Bureau and are generally not available from other sources.

Table 3.7. Employment by Selected Zip Code, 2002 and 2012
(By Place of Work)

Name of Zip Code	Zip Code Number	2002 Total Employment	2012 Total Employment

Source: Zip Code Business Patterns, 2002 and 2012.

Appendix C

Sample Implementation Work Program for a Comprehensive Plan

Note: This appendix is intended to give planners an example of an implementation program for a comprehensive plan. The format may be copied, but localities should prepare their own work programs based on the contents of their own plans. Planners should not assume that all of the actions listed in this work program are valid and should be recommended in their own localities.

Plan Element	Description	Target Year to be Completed	Responsible Party (Assigned to)	Estimated Cost ($), If Any	Possible Funding Source(s)
Natural Resources	Revise stormwater management regulations to facilitate and encourage "low impact development"	2014	Public Works	Staff function	
Natural Resources	Street tree planting program	2014-2019 (annually)	Public Works	$5,000 annually	General fund or grant
Historic Preservation	Nominate all worthy historic buildings, structures, and districts to be listed on the National Register of Historic Places	2015	City Planner (consultant)	$2,500 per nomination	General fund
Land Use	Prepare small area plan for Area "A"	2015	City Planner	$20,000	General fund
Land Use	Amend zoning ordinance to allow farm stands in appropriate zoning districts and to provide for conservation subdivisions	2014	City Planner	Staff function	
Land Use	Review tree protection regulations and amend zoning ordinance to include tree canopy requirements	2015	City Planner	Staff function	

Plan Element	Description	Target Year to be Completed	Responsible Party (Assigned to)	Estimated Cost ($), If Any	Possible Funding Source(s)
Housing	Require the repair of housing units that do not meet standards of the housing code	2014-2019 (annually)	Community Development	Staff function	
Housing	Apply for Community Development Block Grant (CDBG) funds to upgrade conditions in Neighborhood “A”	2017	Community Development	Staff function	
Economic Development	Aggressively market opportunities for redevelopment in the city	2014-2019 (annually)	City Manager; Chamber of Commerce	Staff function	
Community Facilities	Develop community garden in Neighborhood “A”	2014	City Planner	TBD	General fund; volunteers
Community Facilities	Design and install new playground in Neighborhood “B”	2015	Public Works	TBD	Capital fund
Community Facilities	Acquire 10-acre parcel for City Park expansion	2016	City Manager	$200,000	Capital fund
Community facilities	Update local water supply plan	2017	Public Works	TBD	Water proprietary fund or general fund
Community facilities	Update ten-year comprehensive solid waste management plan	2018	Public Works	Staff function	
Community facilities	Complete building addition to downtown library	2015	City Manager	TBD	Capital fund
Community facilities	Adopt or update as necessary shared-use agreement with local school system for use of park and recreation facilities	2015	City Manager	Staff function	

Plan Element	Description	Target Year to be Completed	Responsible Party (Assigned to)	Estimated Cost ($), If Any	Possible Funding Source(s)
Transportation	Prepare, or participate in preparation of, a comprehensive, multimodal transportation plan for the region	Per schedule of MPO or RPO	MPO or RPO	As budgeted by MPO or RPO	MPO or RPO
Transportation	Complete sidewalk improvements for improved walkability	2014-2019 (annually)	Public Works	$100,000	Capital fund
Transportation	Prepare and adopt specifications for “complete streets” in subdivision ordinance and standard specifications	2016	Public Works	Staff function	
Transportation	Construct phase 2 improvements to greenways plan	2014	Public Works	$350,000	Capital fund
Transportation	Restripe Maple St. and Acorn Ave. for bike lanes	2014	Public Works	TBD	Capital fund
Transportation	Extend Mason Street to Elks Club Road for improved neighborhood connectivity	2015	Public Works	$200,000	Capital fund
Transportation/ Beautification	Complete and implement a citywide wayfinding/ signage program	2015	Public Works	$12,500	General fund
Intergovern-mental Coordination	Reconsider, and revise as appropriate, existing intergovernmental agreements	2016	City Manager	Staff function	
General	Update the comprehensive plan and capital improvement program at no less than five-year intervals	2019	City Planner	Staff function	

Abbreviations—MPO: Metropolitan Planning Organization; RPO: Rural Planning Organization; TBD: To be determined