

MURFREESBORO 2035

Our Future Begins Now

Introduction

Murfreesboro is projected to grow by approximately 100,000 residents in the next 20 years. This number will fluctuate, depending on the community's ability to retain and grow existing and new employers, attract high school and college graduates back to the City, and meet housing needs for a broad spectrum of life stages; all while enhancing the quality of life and economic wellbeing of its citizens. The purpose of this chapter is to establish the necessary policy guidance and associated strategies and actions to enable the City of Murfreesboro to manage its ongoing physical growth and development in a sensible, predictable, and fiscally responsible manner. It highlights the need to encourage additional infill development - absorb more population in appropriate areas within the current City limits - and manage growth in the City's Urban Growth Boundary.

Orderly growth of the City, within the current corporate limits and ultimately into suitable portions of its Urban Growth Boundary, is critical to its long-term viability. The community has a responsibility to its residents and taxpayers to ensure an equitable and fiscally responsible growth pattern that balances maintenance, and replacement needs of existing development with future growth. The integrity of public safety services must also be supported and maintained as the service areas for utilities infrastructure, police, fire, and emergency medical response are expanded as a result of Murfreesboro's geographic growth.



MURFREESBORO: MEET ME IN THE MIDDLE

As the geographic center of Tennessee, Murfreesboro is a natural hub within the state. That's why we host events like TSSAA tournaments. And with the expansion of the Gateway District and the addition of more conference capacity, we are poised to expand our role as a meeting place for statewide events.

The following goals will be applied to each service provision:

- ▶ **Goal 1:** Ensure fiscally responsible and carefully managed development aligned with growth expectations and in concert with the ability to deliver infrastructure and services in a safe, timely, and effective manner.
- ▶ **Goal 2:** Encourage infill development and redevelopment, which maximizes existing infrastructure, maintains the existing character of neighborhoods, and preserves a compact community form.
- ▶ **Goal 3:** Provide for the orderly and efficient delivery and location of public facilities, utilities and services to the residents and businesses within the community.
- ▶ **Goal 4:** Direct growth to areas that can be most efficiently and economically served with public services and utilities, while securing the best economic development interests of the community.
- ▶ **Goal 5:** Provide for responsible growth that conserves natural resources and enhances the freestanding character of the community.

Guiding Principles

The following principles will inform the development of recommended strategies, initiatives and actions for accomplishing the above-mentioned goals.

- ▶ **Growth Principle 1:** Incentivize Performance. Maximize the use of planning and financial tools to mitigate the cost of development to the community while providing incentives for well-planned development that achieves stated City principles and goals.
- ▶ **Growth Principle 2:** Direct Growth. Establish a balance between contiguous outward growth and inward directed infill development, redevelopment, rehabilitation, and reuse projects. Direct growth into areas where basic services such as sanitary sewer, water supply facilities, police and fire protection can be efficiently and economically provided; in order to promote the responsible use of land, infrastructure, energy and other resources.
- ▶ **Growth Principle 3:** Manage Growth. Improve and expand the City's capacity to enact effective growth management policies while encouraging compatible economic development.

- ▶ **Growth Principle 4:** Leverage Growth. Encourage shops and services to locate where existing or planned residential and employment densities are sufficient to make delivery of services efficient; and where the City and the private sector can collaborate on further enhancements to the urban environment.
- ▶ **Growth Principle 5:** Preserve Community Character. As Murfreesboro continues to grow, strive to preserve the attributes of the community's unique, hometown character and identity, the beauty of its natural environment, and the strengths of its neighborhoods, while minimizing the adverse effects of growth.

Growth Trends

This comprehensive plan makes assumptions anticipating the pattern of future growth and offers the necessary policy guidance to effectively manage it. Through advance planning, an opportunity exists to ensure that new development occurs in a contiguous, orderly and fiscally responsible manner through subdivision and zoning regulations, annexation, and other regulatory policies and incentives; and at the appropriate time.

As discussed in Chapter 1, *Planning Context*, the community anticipates a robust and sustained growth trajectory that reflects regional trends. A question confronting this community, however, is not only how to attract and sustain economic development but how to maximize its net fiscal benefits. In the context of this chapter, the pattern of growth and efficiency of service provision are contributing factors, among many others.

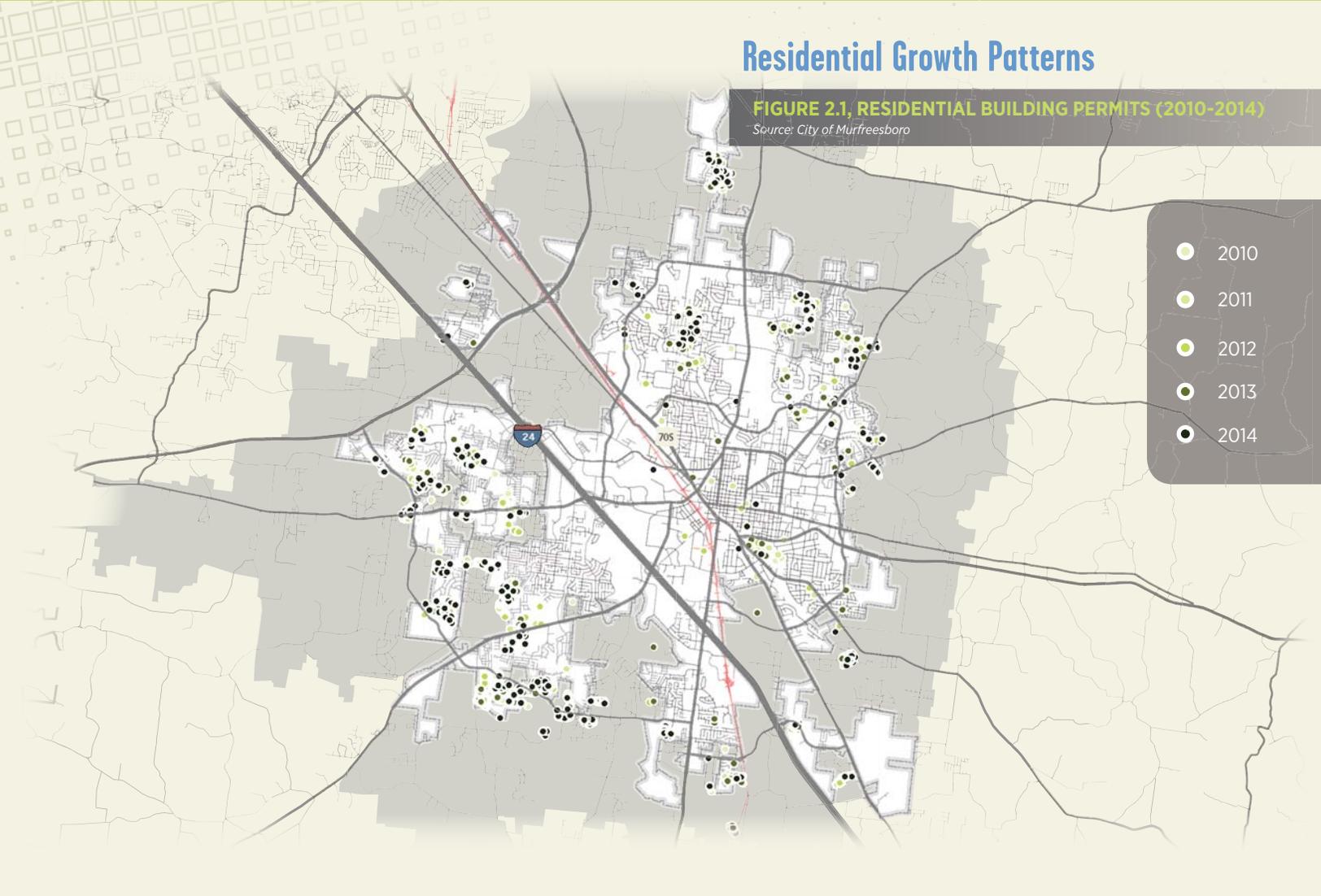
Based on a review of building permit applications, over the last 25 years the predominant pattern of development reflects growth at the fringes of the city, as illustrated in part, in Figure 2.1, *Residential Building Permits, 2010-2014*, and Map 2.1, *Annexation History*. This pattern reflects gradual changes in commercial, residential, and institutional growth; as well as which residents have chosen to live within the City compared to living in Rutherford County. If this trend continues, the growth pattern may become increasingly haphazard and will result in inefficiencies in infrastructure and service provision, which may strain the fiscal resources of the City.

Chapter 2, *Growth Capacity and Infrastructure*, examines the City of Murfreesboro's prospective growth patterns, and identifies tools and policies through which the city can pro-actively guide that growth in a fiscally

Residential Growth Patterns

FIGURE 2.1, RESIDENTIAL BUILDING PERMITS (2010-2014)

Source: City of Murfreesboro



responsible manner. The benefits and consequences of differing growth patterns are presented, and the community's capacity to absorb new population and public service demands are evaluated. Growth policies and recommendations have been developed for 11 interdependent focus areas, or measures of community capacity. The community capacity evaluations begin on page 2.15, and include strategies and actions the City can utilize to prepare itself for future growth.

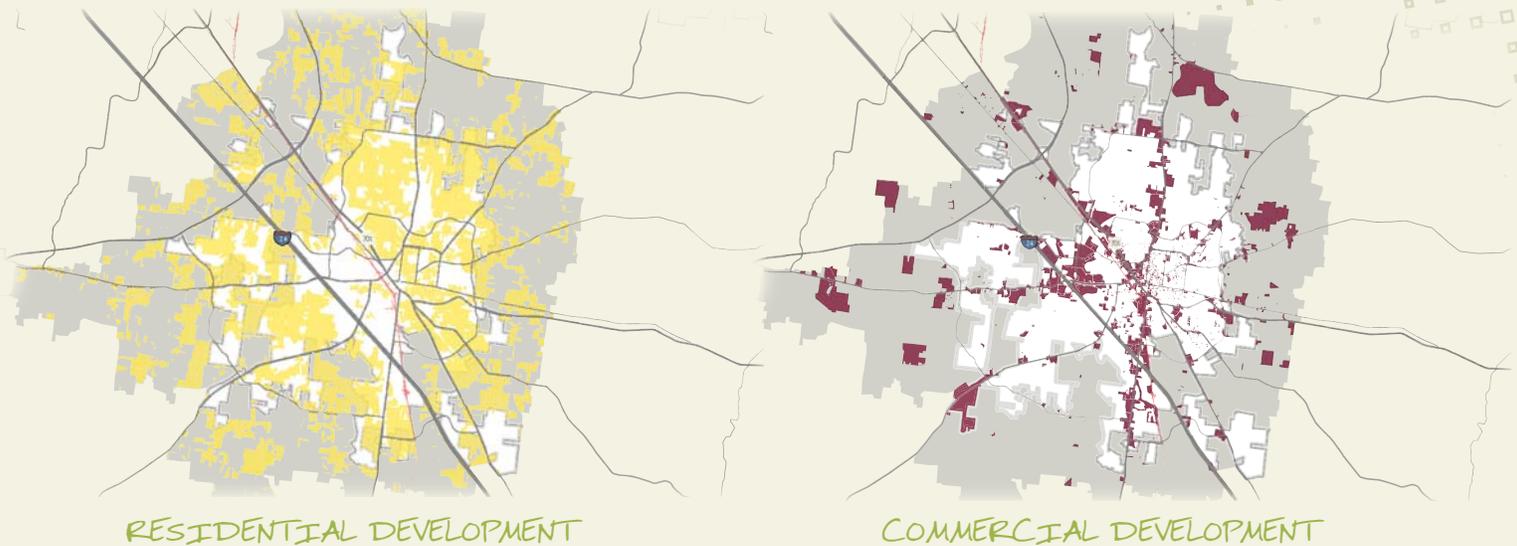
There are approximately 37,337 acres within the City limits and 77,708 acres within the City's Urban Growth Boundary, with a total of approximately 115,045 acres within the City's planning area. Of the land area within the City limits, the community is composed of approximately 12,525 acres of residential lands; 4,855 acres of commercial lands and 937 acres of industrial lands; and 1,100 acres of parkland (the patterns of

existing development are depicted in Figures 2.2, *Existing Residential and Commercial Development within the Planning Area*).

As depicted in Map 2.2, *Utilized Lands within Planning Area*, 46,680 acres within the planning area are already developed. As depicted within Figure 2.4, *Land Utilization and Demand*, over the next 20 years, the community will need to increase developed land by approximately 21,204 acres. This figure is based on needed acreage based on the 20-year population projections for the City and planning area, as outlined in Chapter 1. It is recognized that this projected acreage is based on multiple assumptions regarding current development trends and existing population densities. The required acreage to accommodate the projected population growth may be more or less than what is identified in Figure 2.4, and underscores the need for effective planning growth policies.

FIGURE 2.2, EXISTING RESIDENTIAL AND COMMERCIAL DEVELOPMENT WITHIN THE PLANNING AREA

Source: Rutherford County Tax Assessors Office



67% of existing development within the city and UGB is residential.

In order to promote a flexible market that is independent of specific land ownership, the Future Land Use Map in Chapter 4, *Land Use and Character*, identifies land utilization beyond the 2035 demand to include unincorporated enclaves in the system; adjacent property near annexed right-of-way (e.g. immediately northeast of the U.S. Highway 70 and State Route 840); and greenfield development contiguous to recently developed land. While these areas include more land than necessary for the 2035 population, they provide a planning framework for the short- and long-term community vision.

One of the challenges in addressing these projected commercial, residential, and industrial demands is to supplement natural growth with the economic development function of the City, which supports and promotes a real estate market that will attract high-quality retailers, restaurants, and professional-level employment. As summarized in part in Chapter 1, *Planning Context*, the City has several future development opportunities that are currently under consideration, including additional industrial development associated

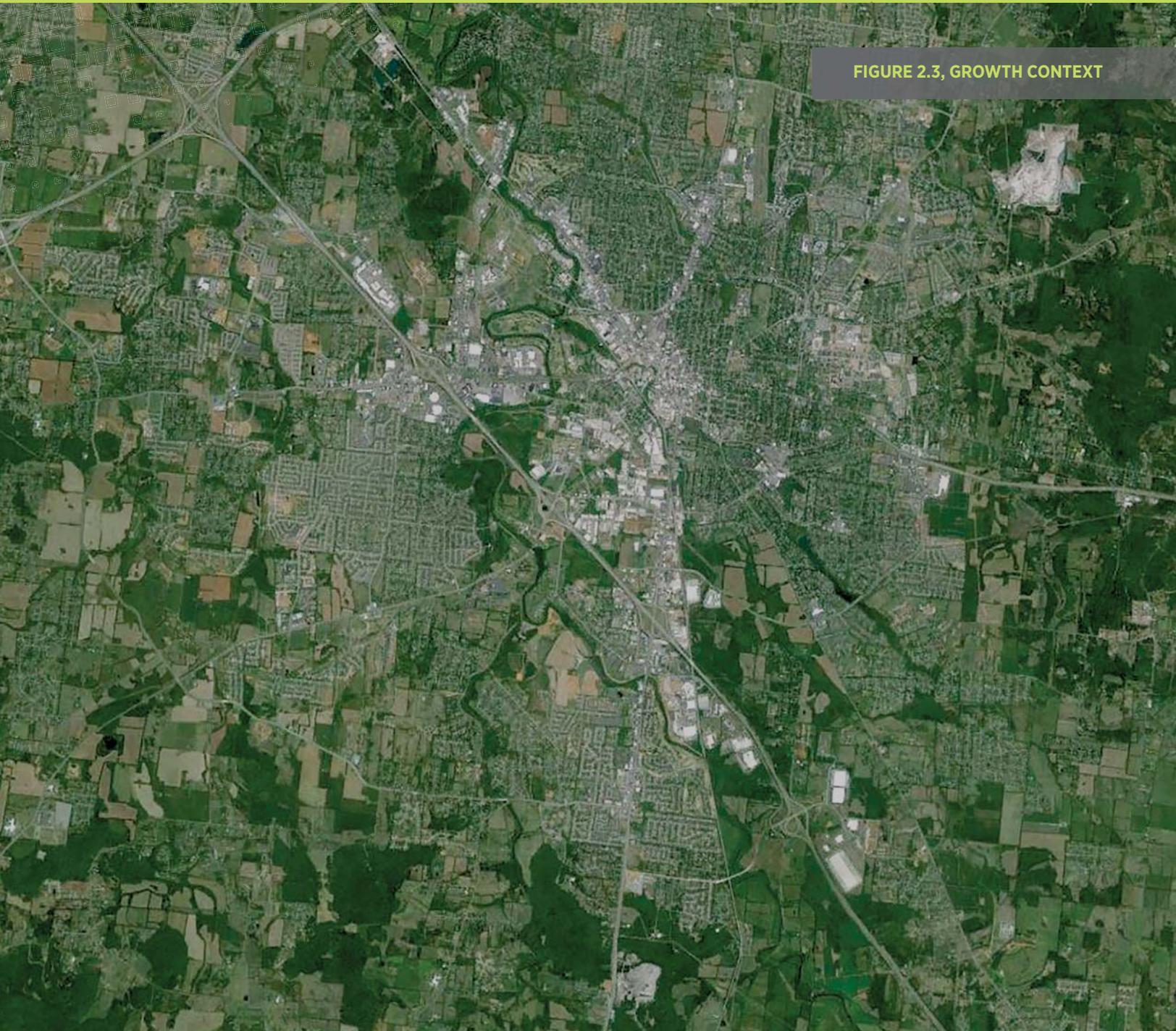
the extension of Joe B. Jackson and Veterans Parkways; the Gateway District and Middle Tennessee Medical Center; continued revitalization and expansion of Murfreesboro's Downtown area; as well as development to accommodate the educational and residential needs of Middle Tennessee State University (MTSU). As will be discussed, there are also several areas within the City limits that are currently underutilized, based on market demands, and subject to redevelopment. Redevelopment within these zones of the City may be stimulated through the use of special financing districts and other incentives.

On Growth Management

The concept of "growth management" is multi-faceted and involves the City's ability to provide adequate public infrastructure and municipal services to support existing development while programming the capital needs for continuing growth. More specifically, it also involves the formulation of policy regarding the direction and amount of future development to support the projected growth during the horizon of this Comprehensive Plan.

[Continued on page 2.8]

FIGURE 2.3, GROWTH CONTEXT



Growth Context

Murfreesboro is a community that is generally surrounded by agricultural and forested land, as depicted in Figure 2.3, *Growth Context*. There are relatively few natural boundaries that restrict where Murfreesboro can grow. The most significant natural boundaries include the Stones River floodplain and areas where the region's karst geology and the abundance of sinkholes, and soils types, exacerbate drainage and the use of conventional utilities infrastructure. Interstate 24 historically served as the City's development edge to the west. However, the annexation of land and development of West Murfreesboro reflects a step beyond the City's historical boundaries.

FIGURE 2.4 LAND UTILIZATION AND DEMAND

Murfreesboro City Limits

TOTAL LAND =
37,337 acres

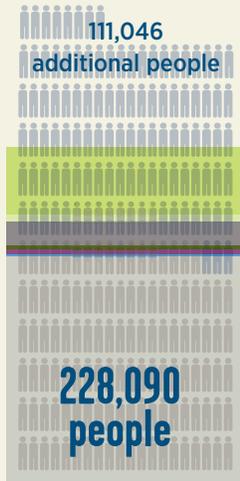
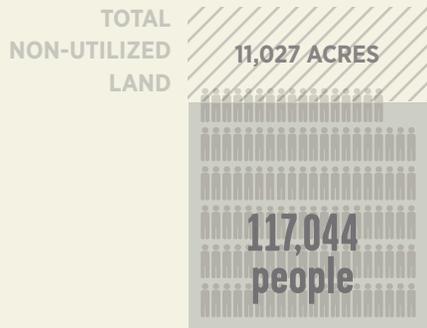
WHAT DO THE POPULATION INCREASES FOR THE CITY LOOK LIKE IN TERMS OF LAND AREA NEEDS?



TOTAL UTILIZED LAND =
26,310 acres

NEW TOTAL UTILIZED LAND =
38,842 acres

11,046 additional people



LAND NEEDED TO ACCOMMODATE ADDITIONAL POPULATION =

- 7,861 ACRES NEEDED SF RESIDENTIAL ACREAGE
 - 720 ACRES NEEDED MF RESIDENTIAL ACREAGE
 - 2,749 ACRES NEEDED NONRESIDENTIAL ACREAGE INCLUDING UTILITIES AND TRANSPORTATION INFRASTRUCTURE
 - 500 ACRES NEEDED PARKLAND
 - 477 ACRES NEEDED RECREATIONAL FACILITIES
 - 225 ACRES NEEDED FOR 9 NEW SCHOOLS
-

12,532 ACRES TOTAL LAND NEEDED *

There is a deficit of **1,505 ACRES** to accommodate the residential, park, schools, fire and police additional acreage needs based on the projected 2035 population for the City.

10,000 people

2013 BASE POPULATION

PROJECTED 2035 POPULATION*

** Using 2013 population as base comparison population

WHAT DOES A POPULATION INCREASE OF 111,046 LOOK LIKE IN TERMS OF SERVICE NEEDS?



- 4 ADDITIONAL FIRE STATIONS
- ? ADDITIONAL FIRE PERSONNEL TO BE DETERMINED

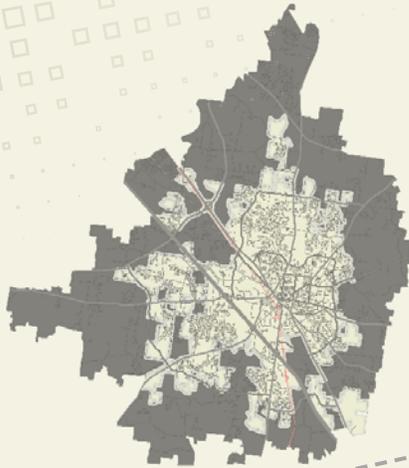


- ? ADDITIONAL POLICE STATIONS TO BE DETERMINED
- 178 MORE POLICE OFFICERS NEEDED

Lands within the UGB

(EXCLUDING MURFREESBORO CITY LIMITS)
 TOTAL LAND =
77,708 acres

WHAT DO THE POPULATION INCREASES FOR THE THE PLANNING AREA LOOK LIKE IN TERMS OF LAND AREA NEEDS?



* SOME OF THE LAND NEEDED FOR GROWTH WITHIN THE UGB MAY OCCUR IN THE CITY LIMITS

LAND NEEDED TO ACCOMMODATE ADDITIONAL POPULATION =

TOTAL UTILIZED LAND =
20,070 acres

NEW TOTAL UTILIZED LAND =
28,742 acres

4,696 ACRES NEEDED RESIDENTIAL ACREAGE

1,408 ACRES NEEDED NONRESIDENTIAL ACREAGE INCLUDING UTILITIES AND TRANSPORTATION INFRASTRUCTURE

873 ACRES NEEDED PARKLAND, RESPONSIBILITY?

815 ACRES NEEDED RECREATIONAL FACILITIES****

880 ACRES NEEDED FOR 19 NEW SCHOOLS:

4 ELEMENTARY (100 AC)



9 MIDDLE SCHOOLS (360 AC)



6 HIGH SCHOOLS (420 AC)



TOTAL NON-UTILIZED LAND

57,638 ACRES

49,781 ACRES

56,903 additional people

77,395 people

134,298 people

8,672 ACRES TOTAL LAND NEEDED *

There is **48,966 ACRES** remaining to accommodate the residential, park, schools, and any fire and police additional acreage needs based on the projected 2035 population for the Planning Area.

**** Total acreage needs for recreational facilities is based on an assumption that there are zero facilities existing in the Planning Area

10 icons = 10,000 people

2015 BASE POPULATION

PROJECTED 2035 POPULATION***

*** Using 2015 population as base comparison population

WHAT DOES A POPULATION INCREASE OF 56,903 LOOK LIKE IN TERMS OF SERVICE NEEDS?



?

WILL ONE COUNTY WIDE VOLUNTEER FIRE STATE PROVIDE ADEQUATE SERVICE FOR THE UGB AREA



?

IS THE COUNTY SHERIFF'S OFFICE ADEQUATELY STAFFED TO SUPPORT THE UGB POPULATION GROWTH

Also of importance is the City's capacity to provide public services such as police and fire protection and collection / disposal of municipal solid waste in a fiscally responsible manner. Lastly, of significant consideration for this community is the best long-term interests and capacity of the area within the defined Urban Growth Boundary to accommodate the type, pattern, and extent of ongoing future development. Through this Plan the City must position itself to *proactively* respond to impending development to ensure growth occurs in a logical and responsible manner.

Over the course of the last three decades or so (1980 – 2014), the City has experienced an accelerated rate of growth, averaging between 2.2 and 4.7 compound annual growth rate (CAGR). The analysis reflected in the demographic profile of Chapter 1, *Planning Context*, supports the premise that this rate of growth will continue and likely increase during the next two decades. The City must be in a position to respond to its increasing service demands and delineate the areas it is prepared to serve to avoid a sprawling, irresponsible pattern of development beyond the City limits and throughout its Urban Growth Boundary.

There are several reasons why the recent pattern of growth has occurred in and around Murfreesboro, including, but not limited to, the following:

- ▶ There is a lure to greenfield development due to the ease of development approval, particularly since the City currently has no authority within its Urban Growth Boundary to regulate:
 - The use of any building or property for business, industrial, residential, or other purposes;
 - The bulk, height, or number of buildings constructed on a particular tract;
 - The size of a building that can be constructed on a particular tract of land, including, without limitation, any restriction on the ratio of building floor space to the land square footage (floor area ratio);
 - The number of residential units that can be built per acre of land (density);
 - The size, type, or method of construction of potable water or wastewater facilities that can be constructed to serve a developed tract of land, subject to specified criteria;
- Building standards by requiring building permits and inspections; or
- Street and right-of-way design and construction standards
- ▶ Property in the Urban Growth Boundary is not subject to City ad valorem taxes. Therefore, residents and businesses outside the City limits benefit from access to municipal facilities and services, such as streets, parks, trails, libraries, and other community facilities, but do not share equitably in the tax burden associated with constructing and maintaining those facilities and services.
- ▶ Land is generally less expensive outside the City limits due primarily to the absence of public infrastructure and improvements, which equates to cheaper development and, hence, lowers development costs.
- ▶ There is an attraction to the open, rural landscape often found at the City's fringe.

Several conditions and factors can influence how and where physical growth and development occurs in a municipal planning area. Over time, patterns of development emerge, along transportation corridors,

[Continued on page 2.10]



MURFREESBORO: MEET ME IN THE MIDDLE (CONTINUED)

We are also “in the middle” in terms of our size and character, a small city straddling the cultural divide between Tennessee’s rural communities and its handful of large metropolitan areas. We offer a balance of work-life opportunities that is the best of both worlds.

Leveling the Playing Field

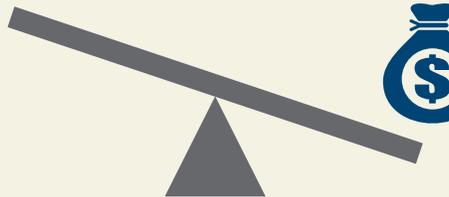
Making the Case for Infill Development

The State of Tennessee has no local or state income tax. This leaves property tax, sales tax, and business licenses as the main forms of taxation available to municipal governments within the State. Property taxes are the number one source of funding for municipal governments and sales taxes are the second highest source of funding. All property owners in Tennessee, outside of limited exceptions, must pay property taxes in whatever county the land and associated improvements are located in. If a property is within the municipal city limits, it will then be subject to an additional municipal property tax that is assessed separately and independently by a municipal government. There is no reduction in county taxes because a property is within a municipal city limit; therefore, residents living within city limits pay more in taxes.

On the flip side, the residents that live within city limits benefit from a much wider range of services that the city provides due to the additional taxes that are collected. In order to make the case for infill development, the City can coordinate among City Departments to better promote and educate the public on the services offered and their benefits. In short, residents who live within city limits “pay it forward” with respect to city services and the quality of life that they provide.

Conversely, Rutherford County residents who live immediately outside of the City limits, within the Urban Growth Boundary, pay less in taxes but enjoy many of the benefits the City provides, including parks and recreational facilities, libraries, and a well-maintained network of roads. How can the playing field be leveled to incentivize living within the City, thereby increasing infill development?

VARIETY OF SERVICES



COUNTY + MUNICIPAL TAXES

RESIDENTS OF CITY OF MURFREESBORO

TABLE 2.1, DIRECT SERVICES TO CITY RESIDENTS

	City of Murfreesboro	Rutherford County
Building Codes	■	■
Property Maintenance	■	■
Housing Programs*	■	
Zoning Enforcement	■	■
Construction / Stormwater	■	■
Planning	■	■
Fire Administration / Education	■	■
Fire Suppression / Fire Emergency Response / Rescue	■	
Ambulance		■
Schools: Kindergarten - 6th Grade	■	■
Schools: 7th - 12th Grade		■
Parks & Recreation Organization	■	■
Parks & Recreation Facilities	■	
Law Enforcement	■	■
Public Transportation	■	
Senior Center	■	
Garbage Household Pickup	■	
Garbage Drop Off Centers		■
Recycling Convenience Centers / Education	■	■
Street Maintenance	■	■
Landscaping / Tree Services	■	
Water	■	
Yard Waste	■	
Sewer	■	
Health Department		■
Animal Services		■
Landfill		■

* Housing Programs include: Affordable Housing Program, Housing Rehabilitation Program, and Community Development Block Grants (CDBG)

at crossroads, adjacent to water bodies, etc. Sometimes growth is logical and contiguous following an already established development pattern. Other times, growth is haphazard and scattered, the result of economic influences, such as the availability of inexpensive land, or access to a utility trunk line.

Consequences of Ineffective Growth Management

There are several reasons why the City of Murfreesboro should try to encourage a balance of development within and contiguous to its municipal boundaries. The term “sprawl” refers to the reduction of rural land due to the inefficient increase of the total size of the land area of a city and its suburbs over a particular period of time. Sprawl is a spatial development pattern or condition that occurs when large tracts of land are devoted to a single use (single-use zoning); where individual buildings take-up increasingly large portions of land (low-density zoning); and the only way to navigate from one area to another is by automobile (auto-dependency). Urban sprawl and car-dependent communities results in another land use symptom related to employment: “job sprawl.” Job sprawl is defined as low-density, geographically spread-out patterns of employment, where the majority of jobs in a given metropolitan area are located outside of the main city’s central business district (CBD), and increasingly in the suburban periphery. As a pattern of land development, sprawl consumes precious landscape resources, requires substantial amounts of utilities and transportation infrastructure and, as a consequence, is very costly to both construct and maintain. Without adequate foresight and preparedness, unmanaged physical growth can have several negative consequences, including:

- ▶ Erosion of a defined community edge, thereby blurring its boundaries and contributing to a general loss of community character, identity and sense of place;
- ▶ Degradation of environmental resources, such as floodplains, wetlands, and mature tree canopy;
- ▶ Increased demands on public infrastructure (e.g., roads, water, and wastewater systems) and services (e.g., police and fire protection, parks, libraries, and schools), in some cases, creating unsafe conditions.
- ▶ A lack of coordinated planning between individual developments, which can lead to unexpected shifts in traffic patterns, which causes congestion and

environmental impacts as development occurs in an uncoordinated fashion before adequate road infrastructure is in place; and

- ▶ Cumulative impacts on the natural environment due to urban stormwater runoff (increased drainage volumes and velocities) and non-point source pollution of sinkholes and subsurface water conveyance, area streams and watercourses from contaminants and sediments carried by overland drainage.
- ▶ Increased commuting times as residents have to travel relatively longer distances to reach work, places of worship, shopping, services, schools, recreation, and entertainment destinations.
- ▶ The potential for disinvestment in older areas of the community as new development continues to occur on the periphery.

These consequences, if left unchecked, can significantly erode the quality of life and economic well-being within a community. While many of these development issues are largely driven by market forces, the City has the ability to guide and direct the trajectory of development by implementing sound growth management policies.

New development is best accommodated and most economically served where transportation, utility, and other public services are already existing or readily available. Given their cost efficiency, development of areas already within or contiguous to the City limits and closer to existing infrastructure and services is more suitable than development which occurs in outlying areas. Costs associated with the provision of both capital and social infrastructure are much higher than they are for a compact pattern of development. Research has shown that compact (versus sporadic) developments result in:

- ▶ **25** percent lower road costs;
- ▶ **50 to 75** percent reduction in road length; and
- ▶ **20 to 40** percent lower costs of sewer and water hookups (3).

The cost of public service provision is also reduced by a compact development pattern. For fire and police services, outward development requires greater travel distance from police and fire stations to emergency sites. This increased distance results in greater response times, which, in turn, may compromise life and structure. Additionally, it influences the City’s ISO rating, which in turn can affect local insurance rates. Clearly, the pattern and timing of development is important on many fronts.

Source: Ken Robinson



REVITALIZING DOWNTOWN

The City's downtown area is certainly a more small-town feel than the rest of the city. We can still maintain a small-town feel while at the same time encourage economic development in the downtown region. Somehow, the City needs to be able to attract major corporations that will invest heavily and create large bases of operation. Bringing the City's downtown into the future can help with that.

Similar to the provision of public safety services, Murfreesboro City Schools benefits from well-managed growth due to their building and transportation costs. Given the location of school campuses, it is prudent to consider the directions of future growth to align with other major community and infrastructure investments.

Preserving Choices: Principles of Smart Growth

Smart Growth describes an approach to urban planning that concentrates growth in compact, walkable, urban centers to avoid sprawl. Smart growth planning advocates land use that is compact, transit-oriented, walkable, and bicycle-friendly. Neighborhood schools, complete streets, and mixed-use development with a range of housing choices are examples of smart growth.

The principles of Smart Growth advocate a more compact pattern of development. This is based on the objective of maximizing the efficiencies of the infrastructure systems (e.g., water, wastewater, storm sewers, and transportation) and the provision of services (notably police and fire protection). Other principles of Smart Growth include: retaining and growing employment within the City to produce tax revenue; shortening commuting distances and promoting alternative modes of transportation; protecting natural resources and preserving rural agricultural land; reinforcing the value and integrity, while promoting reinvestment in well-established neighborhoods; and generally, forging a more fiscally responsible growth pattern.

When communities choose smart growth strategies, they can create new neighborhoods and maintain existing ones that are attractive, convenient and safe. They can protect the environment while stimulating economic growth. Most of all, they can create more choices for residents, workers, visitors, children, families, single people, and older adults—choices regarding where to live, how to get around, and how to interact with the people around them. When communities do this kind of planning, they preserve the best of their past while creating a bright future for generations to come.

Patterns of Growth

The following represent different types of growth scenarios that could occur in Murfreesboro:

SCATTERED DEVELOPMENT

Often referred to as “leapfrog” development, scattered development represents a pattern of random development that skips over empty land to build in a remote locations. It is a major cause of urban sprawl. Leapfrogging often occurs in areas where there are few land use regulations or development standards that properly assign infrastructure costs to the developer. In other cases, developers attempt to move beyond city boundaries to either avoid municipal land use and development regulations; or to ensure some degree of predictability regarding adjacent future development.

INFILL AND REVITALIZATION / REDEVELOPMENT

Infill development is a form of development which occurs when leftover land gets developed - often years after development has passed by. It can take the form of infilling individual vacant lots in existing subdivisions or through the development of larger, undeveloped tracts located within existing development. The advantages of infill development are that significant investments in additional infrastructure are rarely needed to support it. Also, public services such as parks and neighborhood schools are already in place and immediately available. There are several potential locations for infill / redevelopment in Murfreesboro. Redevelopment opportunities may include such areas where there is a predominant presence of deteriorating or obsolete homes, older strip centers, and large stand-alone commercial buildings. These areas are typically located in the older parts of the City and can be combined with vacant land to create a larger revitalization/redevelopment project. Additionally, as the City's Downtown continues to revitalize more businesses will want to move into the immediate area, which will in turn

growth is smart when it gives us great communities, with more choices and personal freedom, good return on public investment, greater opportunity across the community, a thriving natural environment, and a legacy we can be proud to leave our children and grandchildren.

increase property values and subsequently, a different mix of land uses. As will be discussed later in this chapter, there may be opportunities to foster public-private partnerships whereby the City of Murfreesboro can donate City-owned land as a means of incentivizing new, mixed-use development opportunities in and around Downtown.

CORRIDOR DEVELOPMENT

This common form of development occurs along major highways, and takes advantage of the access afforded by an existing highway and its accompanying utility services. Corridor development, if developed to a standard that is compatible with the community's vision for the future, provides infrastructure cost savings and contiguous growth patterns. Care must be taken, however, to manage the intensity and quality of development to avoid overbuilding, which can place undue stress on roadways and infrastructure and result in clutter and a perceived lowering of quality of life.

CLUSTER DEVELOPMENT

Clustering is a form of contiguous development that results in better land utilization by preserving natural assets while still allowing some degree of development on smaller, constrained building sites. In the best

examples, natural features, ponds and open spaces are preserved and become development focal points and amenities, thereby adding value for both the developer and homeowners over time, especially when homes and/or other uses are arranged and oriented to take advantage of open space views. By setting aside natural areas, ponds, and open space, cluster designs are also effective at reducing storm water runoff and improving water quality. Better drainage practices can reduce site infrastructure costs, and more compact development generally requires less linear feet of streets, sidewalks, and utilities infrastructure components.

CONTIGUOUS DEVELOPMENT

This form of new development provides for gradual outward growth adjacent or in very close proximity to existing development. When carefully planned, this development form is highly efficient and the least obtrusive to existing neighborhoods or businesses. Under real-world circumstances, perfectly staged contiguous development rarely occurs. Land ownership patterns or natural features usually result in small amounts of short-distance skipping, occasional leapfrogging, or checkerboard patterns of development.

[Continued on page 2.15]

Smart Growth Network



The Smart Growth Network (SGN) is a network of private, public, and non-governmental partner organizations seeking to improve development practices in neighborhoods, communities, and regions across the United States. SGN has developed 10 smart growth principles, which, when applied, can help to create compact and livable communities. The principles include:

- ▶ encouraging community and stakeholder collaboration in development decisions;
- ▶ preserving open space, farmland, natural beauty, and critical environmental areas;
- ▶ mixing land uses;
- ▶ taking advantage of compact building design;
- ▶ creating a range of housing opportunities and choices;
- ▶ creating walkable neighborhoods;
- ▶ fostering distinctive, attractive communities with a strong sense of place;
- ▶ strengthening and directing development towards existing communities;
- ▶ providing a variety of transportation choices; and
- ▶ making development decisions predictable, fair, and cost effective.

Communities that are successful in translating these principles into planning policies are well on their way to achieving socially, environmentally and economically sustainable places for their citizens to live work, and play.

Iconography



MINDMIXER QUOTE



CODE AMENDMENTS



TENNESSEE LAW



WATER PARADIGM SHIFT

2.1 Growth Policies

If growth is not carefully planned, the elements that first attracted new residents to the community (e.g., community livability, quality schools, economic diversity, etc.) will be slowly eroded by poor quality development. The integrity of public fiscal resources may also be compromised because quality and subsequent cost of new development may not contribute sufficient revenues to cover the costs of the services it demands. Growth management usually involves a combination of techniques to proactively direct the pattern of growth and the timing of infrastructure provision, leading to better long-term economic sustainability. It is a combination of regulatory, capital investment, and financing methods that influence growth and development patterns and protect the community's long-term interests. The overall goal for Murfreesboro's growth in the years ahead is to ensure fiscally responsible and carefully managed development aligned with growth expectations and in concert with the ability to deliver infrastructure and services in a safe, timely, and effective manner.

Coordinated Growth

A new future land use plan for growth within the planning area (City limits and Urban Growth Boundary) will provide a basis for coordinating a range of other community-building investments by the City (and others), particularly through the City's multi-year capital improvements planning and programming. This will help to ensure that the thoroughfare network and other infrastructure and public facilities are extended and located consistent with anticipated directions, types, and intensities of new development. Additionally, coordination with Murfreesboro City Schools, the Rutherford County School District, and Middle Tennessee State University on future facility siting is essential. This can provide opportunities for joint City parkland acquisition and development in conjunction with new public facilities, as well as advance planning for area trail linkages as residential and nonresidential development plans take shape.

It is ironic, and ultimately unfortunate, that people who move to more remote locations just outside cities, intending to get away from denser, in-city living, can end up as being part of a trend that gradually erodes rural character through piecemeal, less regulated development. This dispersed development activity can begin to impact daily quality of life as traffic increases

and raises safety issues on minimally improved county roads and at intersections. Eventually, the City—and its existing taxpayers—may have to bear the burden of bringing substandard infrastructure and public facilities up to municipal standards if and when previously developed land is annexed and such standards were not met originally. The five strategies in this section elaborate on these themes and community priorities.

STRATEGY 2.1.1: *Develop the tools to identify and monitor land use demands based on projected population growth.*

ACTIONS AND INITIATIVES

1. Revise / Amend the Murfreesboro Zoning Ordinance (Appendix A) as follows:
 - **Section 1, Title, Purpose and Applicability:** Revise the General Purpose and Intent to articulate the purpose and intent relative to the pattern and management of future growth.
 - **Section 4, Comprehensive Plan and Procedure (Subsection B: Purpose and Definition):** Revise to include growth management among the elements that are included within the plan.
 - **Section 4, Comprehensive Plan and Procedure (Subsection C: Effect):** Consider strengthening from an advisory document to require consistency. This would mean that proposed development that is inconsistent with the growth management or land use plans would require a plan amendment before rezoning or development is considered. Such amendment would go before the Planning Commission and City Council with review and decision criteria as to why the change is warranted.
2. Coordinated Planning. Ensure that the strategies and actions of this Comprehensive Plan carry through to the City's development and redevelopment plans. The City's Comprehensive Plan updates should include provisions that relate directly to the City's *Future Land Use Plan*, the Murfreesboro Water and Sewer Department's (MWSD) and Consolidated Utility District's (CUD) future utility master plans and Capital Improvements Plan; parks, recreation, and open space plans and programs; *Greenways, Blueways, and Bikeways Master Plan*; and *2040 Major Transportation Plan*.
3. Maintain a Growth Planning Map. Beyond the City's core development area, and largely contiguous developed area (where infill opportunities are available, along with existing infrastructure and public

services), the growth planning map should build-off of analytical maps generated for this chapter and generally delineate, with increasing specificity:

- Protection Areas / Environmental Constraints (e.g., airport runway protection zones, sinkholes and surface waters [streams and drainage ways and their associated 100- and 500-year floodplains, wetland areas, designated surface/ground water protection areas], steep slope and ridgeline areas, and other natural features and areas that warrant permanent protection); and
- Growth Areas that delineate where projected population growth and associated land development activity, beyond the 2035 projected population and spatial area demands can best be accommodated and served.

The Growth Planning Map should be developed in conjunction with the Nashville Area Metropolitan Planning Organization (NAMPO) and Rutherford County Planning and Engineering Department, and maintained by the City's Planning Department. The map is not intended to be a rigid regulatory mechanism but rather function as a tool for general long-range planning purposes. It is very likely that some development outside identified Growth Areas may make sense and cause no difficulties from a public service or fiscal impact standpoint within the 20-year timeframe. Likewise, some locations included within the Growth Areas may turn out not to be conducive for near-term development, at least with the support of City utilities and services. However, the Growth Planning Map should directly influence periodic updates to the *Future Land Use Map* in this Comprehensive Plan. Additionally, to ensure that the growth timing aspect of municipal zoning is employed effectively, a direct link should be established between character areas indicated on the *Future Land Use Map* and the development intensities permitted in these areas through the City's Zoning Ordinance (Appendix A) and Zoning Map.

For this mapping tool to be effective as part of the City's ongoing growth management efforts, the various designated areas must be reviewed at least quarterly and updated, as appropriate, based on changed market (or other) conditions, economic development opportunities, ongoing capital improvements and their timing/location/capacity, annexation activity by the City, etc.

4. Promote Zoning Integrity. Guard against Zoning Map amendments that, cumulatively, can lead to extensive residential development in growth areas without adequate land reserves for a balance of commercial, public, educational and recreational uses.

5. Monitor Trends. In conjunction with periodic reviews of the Comprehensive Plan, identify market shifts that could have implications for desired housing types, retail or other commercial offerings, and particular public service and recreational needs. Also monitor actual population and development trends and various community indicators (e.g., traffic counts and collision frequency, roadway and intersection capacities, police and fire call volumes and response times, storm drainage volumes and rates in key locations, floodplain changes, water quality parameters, etc.) to detect any growth-related impacts of concern.
6. Evaluate likely population-dependent thresholds for public facilities and services. At some point in the future, population demands may approach the desired capacity of important public facilities and services, whether it is water and wastewater systems, roadways, parks, or schools; to accommodate growth and development. Generally, the difference between the established threshold and the existing level of service is the amount available for development. These thresholds will need to be determined as part of feasibility analyses when considering annexation.
7. Traffic Impact Analyses. Protect road capacity and safety by strengthening requirements for traffic impact analyses when proposed developments exceed a designated size or projected trip generation. Provisions for analysis and potential mitigation should be extended to significant single-family residential developments.
8. Density/Intensity Bonuses. Use the prospect of increased development yield (retail/office square footage and/or additional residential units in mixed-use developments) to entice redevelopment projects aiming for increased development intensity.
9. Provide for Cluster and Conservation Development Approaches. Clustering results in better land utilization by preserving natural assets while still allowing some degree of development on constrained sites, which provides return on investment to property owners and addresses area housing needs (including incorporation of townhomes, patio homes, and other housing options in a well-planned setting). In the best designs, natural features are preserved and incorporated as development focal points and amenities, thereby adding value for both the developer and home owners over time, especially when homes and/or other uses are arranged and oriented to take advantage of open space views. By setting aside natural areas and open space, cluster

designs are also effective at reducing both storm water runoff and water quality impairment. Better drainage practices can reduce site infrastructure costs, and more compact development generally requires less linear feet of street, water and sewer lines, sidewalks, other utilities, etc.

Given the diversity of terrain in Murfreesboro's planning area, which includes the lands within the City limits and Urban Growth Boundary, several levels of alternative subdivision design should be identified, including: "cluster," "conservation," and "preservation" options. The operating principle is to trade density for open space—with "open space" meaning all the non-built, non-paved/pervious portions of a site.

The increased concentration of units/buildings allowed through each successive category would be offset by a higher open space requirement for the overall site. Particularly for suburban and rural character areas, this is meant to ensure compatibility of the development with area character, with more space on the site automatically set aside for buffering purposes. As with lot size averaging, discussed below, various incentive provisions can be incorporated directly into the standards to promote use of clustering on sites where a conventional layout would work against community character and resource preservation objectives. Incentive possibilities include density bonuses, reduced building setbacks, narrower streets, and greater reliance on natural infiltration and drainage versus "hard" infrastructure to handle storm drainage. Cluster development methods should be promoted with applicants at the concept plan stage and through educational seminars for area land planners and developers.

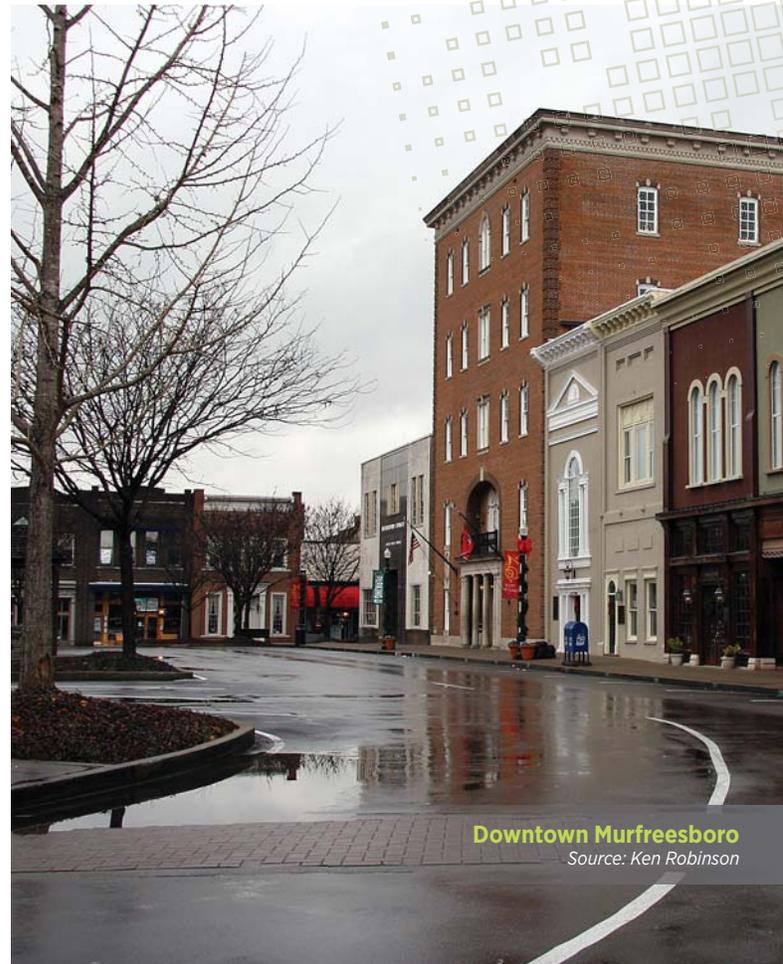
10. Provide for Lot Size Averaging. With the ability to reduce lot sizes on some areas of a particular site, land planners can lay out larger lots in more sensitive or scenic areas, such as along a water feature or wetland fringe, steep-slope or sinkhole location, or where a floodplain covers a portion of the property (and also to buffer homes from a highway or railroad corridor, pipeline easement, abutting incompatible land use, etc.). The average-lot design would have the same total number of lots as a conventional layout to ensure no density increase and, therefore, no increased traffic generation or utility demands. However, density bonuses (with offsetting open space requirements) could also be offered as an incentive since lot size averaging, like clustering, can help to achieve expressed community objectives.

11. Specific Approval for Development. Approve only those development proposals that are consistent with the growth management principles brought forward in this plan.
12. County Coordination. Coordinate with Rutherford County to achieve uniform development standards for future growth in the Urban Growth Boundary.
13. Coordination with School Districts. Establish an educational initiative with the Planning Commission, Board of Zoning Appeals, and other public bodies stressing the importance of the Comprehensive Plan's role in guiding decisions on development approvals, zoning map amendments, use variances, capital budgeting, and similar planning decisions related to the location of schools relative to new development.

STRATEGY 2.1.3: *Adopt policies to promote the construction of high-performance, green buildings within the planning area.*

ACTIONS AND INITIATIVES

1. Continue to monitor evolving trends and practices in building codes, land development, and public facilities arenas related to high-performance, "green" building and operational standards (including for



Downtown Murfreesboro

Source: Ken Robinson

energy efficiency; water conservation, capture, and re-use; waste reduction and recycling, renewable energy generation, etc.) to ensure that the City's codes and policies promote and do not discourage such activity in Murfreesboro. The US Green Building Council (USGBC) is an important resource, along with other governmental and non-profit resources.

2. Adopt a City-wide policy to review and evaluate the construction or remodelling of new and existing public buildings in responding to the minimum requirements to achieve the EPA's *Energy Star* rating.
3. Incentivize green building in the City's 2014 Zoning Ordinance (Appendix A). Most incentives are based on a "bonus" system where there are relaxed standards or expedited administrative procedures as a reward for providing a public amenity. In such a project, the green design features would be considered a public amenity even though they are not public in the same sense as a plaza, fountain, or pedestrian walkway. The "bonus" can focus on the height of buildings, floor area ratio (FAR) requirements, parking ratios, or setbacks. Develop and adopt a long-term municipal energy strategy to include an energy plan that enumerates reduction goals based on current energy usage.
4. For the programming and design of public buildings, consider:
 - Encouraging solar-oriented (passive and active) design in development.
 - Evaluate the potential for geothermal technologies application.

- Utilize chemical-free and toxic-free building materials as readily available.
- Remove regulatory obstacles to using recycled materials for building.

STRATEGY 2.1.4: *Build community consensus around a preferred character for future growth and development by establishing a series of growth covenants that will promote a responsible urban form of varying densities, including, but not limited to the following provisions:*

1. Encourage compact development that maximizes investment in infrastructure and minimizes the need to drive.
2. Integrate local neighborhood uses — housing, shops, workplaces, schools, parks, civic facilities — within walking or bicycling distance.
3. Create human-scaled development that is pedestrian-friendly.
4. Encourage more intense development oriented around public transit.
5. Promote regional and local designs that respect the regional ecosystems and natural functions which support human communities.
6. Encourage development patterns that respect natural systems, such as watersheds and wildlife corridors.
7. Encourage landscaping that utilizes plant types that are native, require less water, and are less prone to insect damage.
8. Use local materials and native plants in facility design to reduce transport distances and maintenance.
9. Guide development to areas with existing or readily available infrastructure and minimize development in outlying, undeveloped areas.
10. Remediate and redevelop brownfield sites and other developed lands that suffer from environmental or other constraints.

STRATEGY 2.1.5: *Identify and implement growth management techniques for areas within the Urban Growth Boundary.*

This would involve such strategies as protecting natural drainage ways and their associated riparian areas, and identifying unique natural landmarks and asset areas that are worthy of early public acquisition (and/or private conservation methods). Such steps would reap both environmental and very practical benefits over the long term. This includes preservation of ecological services that reduce the need for costly "hard" infrastructure while protecting public water supplies



and other health and safety factors (e.g., storm water absorption and flooding attenuation, aquifer recharge, water quality protection, erosion control, reduced “heat island” effect of urbanization, etc.). These areas can also provide strategic park sites and valuable open space for passive recreation, ensuring that natural relief will be available amid the more intensive urban environment likely to emerge over time. Additionally, preserved open space is a prime amenity for nearby residential and non-residential development, reinforcing suburban or rural character and boosting community aesthetics and image.

ACTIONS AND INITIATIVES

1. Interlocal Cooperation. In anticipation of future municipal annexations within the Urban Growth Boundary, pursue interlocal cooperation agreements with Rutherford County in order to address coordination of subdivision review, thoroughfare planning and construction, floodplain management, signage, utilities infrastructure and other service provision, among other matters of mutual interest.
2. Promote Conservation through Public (or Non-Profit) Acquisition within the Urban Growth Boundary. Establish a cooperative interlocal agreement with Rutherford County to promote the use of conservation easements to protect sensitive lands and open space areas. A conservation easement is a legal means through which landowners can voluntarily restrict the use of a designated piece of land. Because conservation easements are freely negotiated between the landowner and the receiving agency or organization, they are a flexible tool to preserve scenic land, historic sites, cultural resources or other types of property. The parties may choose to restrict uses of the land permanently or for a specific period of time. (1)



3. Evaluate the establishment of a Countywide Land Trust. In accordance with Rutherford County's *Vision for the Future* plan, partner with Rutherford County and the Chamber of Commerce to investigate the programmatic, financial and organizational feasibility of establishing a County-wide, quasi-governmental land trust; the responsibilities of which would include administering:
 - land conservation and management programs, including a conservation easement program and transfer of development rights program;
 - working with County and City Planning Departments to incentivize and promote cluster and conservation development practices;



Municipal Green Building (LEED) Policy

Many companies and municipalities are committing to building green facilities as a matter of policy. Although the definition of a high-performance, green building can vary, the most widely accepted benchmarks are established by the EPA Energy Star and U.S. Green Building Council (www.usgbc.org). These green design standards are collectively known as the Leadership in Energy and Environmental Design (LEED) system, which evaluates green buildings according to specific performance criteria. There are five general areas:

- ▶ Sustainable site planning
- ▶ Safeguarding water and water efficiency
- ▶ Energy efficiency and renewable energy
- ▶ Conservation of materials and resources
- ▶ Indoor environmental quality

- maintaining a County-wide database of sensitive lands within the Planning Area that are unsuitable for development and worthy of conservation.
4. As stated within the Rutherford County *Vision for the Future* plan, work with the County to develop a pilot scenic corridor management plan on one or more high quality corridors that extends into the City of Murfreesboro; the objectives of which would be to balance conservation and management of sensitive lands with development objectives, and ensure exceptional, high-quality development through the implementation of community character-based covenants and design guidelines.
 5. Amend the City's Zoning Ordinance (Appendix A), to include compatibility provisions for the purpose of protecting existing operations and agricultural uses from encroaching development and, in turn, protecting development from common nuisance associated with agriculture, e.g. dust, odor, heavy equipment operation, etc.

Growth Management Methods in Tennessee

Within the current context of anticipated economic and population growth, it is wise for the City of Murfreesboro to consider ways in which it can exert maximum influence over the direction, timing, pattern, mix and quality of new development within the planning area (City limits and its Urban Growth Boundary) - growth that will require the provision of public utilities and services in a cost-efficient manner; that in turn, may be catalytic in attracting businesses and people to the area. It is currently within the City's capacity to exercise the following tools to manage growth:



▶ **Comprehensive Planning** is an attempt to establish guidelines for the future growth of a community. As the term "comprehensive" suggests, this is an all-inclusive approach to addressing the issue of a community's future growth. A comprehensive plan is the formal document produced through this process. The document is

official in nature, meaning that it is designed to be adopted into law by some form of local government. The document should then serve as a policy guide to decisions about community development. A key principle in the concept of the comprehensive plan is that it is an instrument to be used by community leaders who establish the policies and make the decisions regarding physical development. The plan document should fulfill five basic requirements:



- It should be comprehensive;
- It should be long-range;
- It should be general;
- It should focus on physical development; and
- It should relate physical design proposals to community goals and social and economic policies.

It should be a policy instrument first, and a technical instrument only second. Absent a comprehensive plan being adopted by the governing body (City Council), Tennessee state law does not require land use decisions to be made that conform to a comprehensive plan. This is significant because in Tennessee a comprehensive plan will frequently be adopted by a planning commission and not a city council. When this situation occurs, the comprehensive plan is not legally binding and serves only as an advisory document. However when a comprehensive plan is adopted by a planning commission and is subsequently adopted by the governing body (City Council), the comprehensive plan is given legal significance and land use decisions made by the City Council must be consistent with the comprehensive plan. (See T.C.A. 13-4-202).

▶ **Countywide Comprehensive Planning** (Public Chapter 1101). In 1998, the State of Tennessee passed a growth management law aimed at creating countywide comprehensive planning that is commonly referred to as Public Chapter 1101. The law called for a comprehensive growth policy plan (referred to as a growth plan) in each county that outlined anticipated development over the next 20 years. The initial draft of the growth plan was to



Ecological Services

Ecological services are provided to society by natural systems, such as storing and cycling essential nutrients, absorbing and detoxifying pollutants, maintaining the hydrologic cycle, moderating the local climate, and providing areas for recreation and tourism.

be formulated by a coordinating committee whose membership was composed of representatives of the county, cities, utilities, schools, chambers of commerce, soil conservation districts, and others. After the growth plan was developed, the coordinating committee was mandated to conduct public hearings and submit the plan to each city and county for ratification. After ratification it was the committee's responsibility to submit the final growth plan to the State of Tennessee. The amendment process for any county growth plan pursuant to Public Chapter 1101 is the same as that for initial adoption; and requires the original coordinating committee to again meet, agree on a new plan, submit the plan for ratification to local governments, and send a final version to the Tennessee state government.

The only required element within a growth plan, as defined by Public Chapter 1101, was to create boundaries where each municipal government in a county would be able to annex new properties over the next 20 years. Public Chapter 1101 provided the necessary legislation through which counties and their municipalities can create more restrictive requirements in their plans by addressing specific land-use, transportation, public infrastructure, housing, and economic development issues.

Significantly, as originally drafted, Public Chapter 1101 is designed to expire in 2019 unless it is renewed. Public Chapter 1101 identified three distinct types of areas within counties:

- "urban growth boundaries," which are those regions which contain the corporate limits of a municipality and the adjoining territory where a city may annex.
- "planned growth areas," compact sectors outside of any urban growth boundary where new incorporations may occur; and
- "rural areas," territory not within one of the other two categories where new incorporation or municipal incorporation is not possible. Subdivision and Development Regulations can be used to carry out growth strategies, particularly in terms of the quality of new development or redevelopment. Clear infrastructure standards in the regulations, and associated City specifications and criteria, shall establish minimum improvements required of private development.

- ▶ **Development Agreements** can be negotiated with private interests that request extension of the City's utility infrastructure to fringe locations

around the municipal limits. These agreements can be used to clarify the timing of future planned improvements and any conditions in exchange for the City's infrastructure and service commitments. It is advised when the city grants infrastructure and service commitments that they also obtain the developers agreement to annex the property into the municipal limits. Development agreements can also be used to establish levels of participation in public-private cost-sharing arrangements for infrastructure improvements, as well as reimbursement provisions for infrastructure oversizing or other special circumstances.

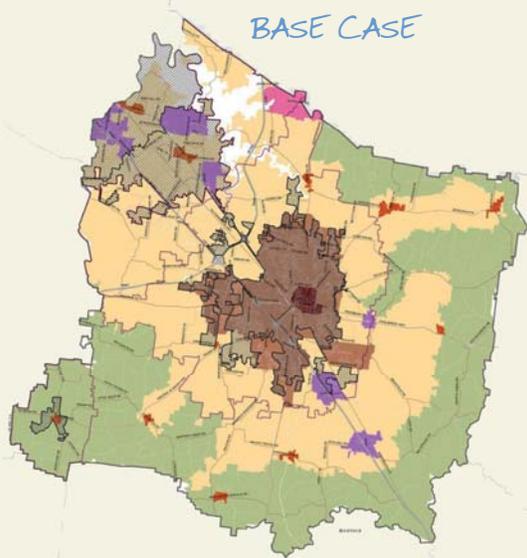
- ▶ **Impact Fees** assessed on new residential and nonresidential development provide dedicated funding for particular capital improvements that are specifically needed to serve the new development. The ability to assess impact fees to properties currently within the current Murfreesboro municipal limits is allowed. [See Murfreesboro City Charter Article III, Section 4A(7)]. This section of the current Murfreesboro City Charter could also be used to create and assess an adequate facilities ordinance, if so adopted.
- ▶ **Multi-year Capital Improvements Programming** clearly establishes the City's intentions for extending its primary arterial streets, trunk water mains, and wastewater collection lines to targeted growth areas.
- ▶ **Interlocal Agreements** can be entered into between two or more local governments within the State of Tennessee. These agreements are usually in the form of one local government paying another local government for that government's ability to provide a service. Interlocal agreements are frequently seen in Tennessee for issues such as water use. These agreements can be between two or more municipal governments, a municipal and county government, or can be used to create a joint agency.
- ▶ **Zoning** is the land use regulatory concept under which a municipality establishes rules for the use and development of land. A zoning structure consists of two separate components. The first is the text of the ordinance, which establishes specific development regulations that will be applicable to structures and property within the community. The second component is the zoning map, which allocates the various zoning districts geographically within the community. In adopting zoning the City establishes a series of districts, and within each district, sets forth the uses to which structures or land may be placed.

[Continued on page 2.24]

Planning in Rutherford County

On April 25, 2011 the Rutherford County Planning Commission adopted a new Comprehensive Plan for the County. As part of the Plan, three scenarios showing future growth in Rutherford County were developed for evaluation, and included Base Case, Suburban Belt and Urban Infill scenarios. Each future scenario was based on a 2035 total County population of 409,986. Each future scenario recognized constraints on the location of development based on land suitability (e.g., the presence of floodplains; steep slopes, etc.). Each development scenario was evaluated based on predetermined, quantifiable indicators, termed Measures of Effectiveness. New growth was also assigned to varying Character Areas, which included Urban, Urban Fringe, Suburban, Rural, and Conservation; and Center Types, which included Employment Centers, Activity Centers, Village Centers, and Rural Centers. Each Center Type has a specific purpose, mix of uses at different densities, and represents the idea that future growth that is organized and compact will have fewer detrimental effects on the environment, transportation, and county services.

- TTC - Traditional Town Center
- V - Village Center
- RC - Rural Center
- AC - Activity Center
- EC - Employment Center
- GUF - General Urban Fringe Area
- SU - Suburban Character Area
- R - Rural Area
- CA - Conservation Area
- Centers - 1/4 Mile Buffer
- Centers - 1/2 Mile Buffer
- Centers - 1 Mile Buffer
- UGB
- City Boundary

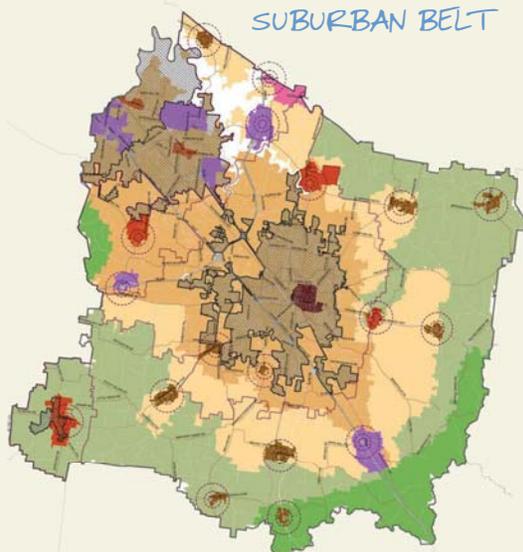
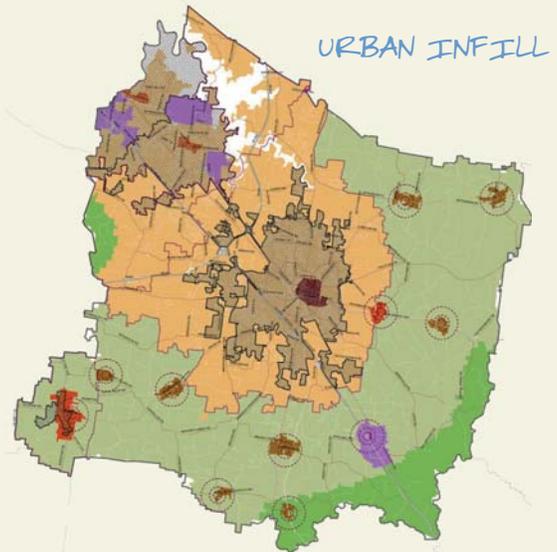


BASE CASE SCENARIO

Under this scenario, new growth will follow the same pattern as past growth, which is largely low-density, scattered development in all areas of the County. Residential and nonresidential uses will occur at random locations, adding to the loss of agricultural land, endangering historic and cultural resources. New areas of development will compete with existing rural communities and require further expansion of water and sewer systems. The result is a map that shows 2035-levels of development based on current trends and suitability factors.

URBAN INFILL SCENARIO

The Urban Infill Scenario evaluated a development pattern that encourages higher densities inside the Urban Growth Boundaries of Murfreesboro and Smyrna; encourages the creation of rural “nodes” or “centers” outside of the UGBs to concentrate non-urban growth; encourages low development densities outside UGBs and centers; and creates conservation areas to discourage growth where the land is steep and floodplains are present.



SUBURBAN BELT SCENARIO

The Suburban Belt Scenario was created to evaluate a development pattern that encourages high density growth within one mile of Murfreesboro, and within Smyrna’s Urban Growth Boundary. This scenario also designates a potential Employment Center south of Murfreesboro on I-24 as part of an Urban Fringe Character Area. The next “belt” of growth that extends outward from the Urban Fringe character area typifies development densities currently allowed today county-wide and exemplify the Suburban character area. The outer Rural “belt” of development would have much lower densities, with two areas on the county edges labeled for “conservation” due to slope and soil issues.



The Comprehensive Plan steering Committee voted to recommend the suburban Belt scenario be selected as the preferred plan.

As outlined within the Comprehensive Plan, the rationale behind this decision included the following comments:

1. The scenario represented an incremental change and not a radical departure from current development practices;
2. The scenario best matches with existing development policies and previous development decisions in areas outside of Urban Growth Boundaries (UGB);
3. Infrastructure may be already available or planned in areas designated for suburban type development;
4. The scenario provides an ability to protect sensitive natural areas and cultural and historic resources from undesirable impacts;
5. The scenario should reduce development pressures in designated rural areas; and
6. The scenario is fairly consistent with existing and planned development within the Urban Growth Boundaries (UGB).

RUTHERFORD COUNTY ZONING MAP

Informed by the 2011 Comprehensive Plan, the Rutherford County Zoning map was adopted in 2013 and consists of five residential zoning districts of varying densities, three commercial districts, two office and institutional districts, two industrial districts, and three special districts.

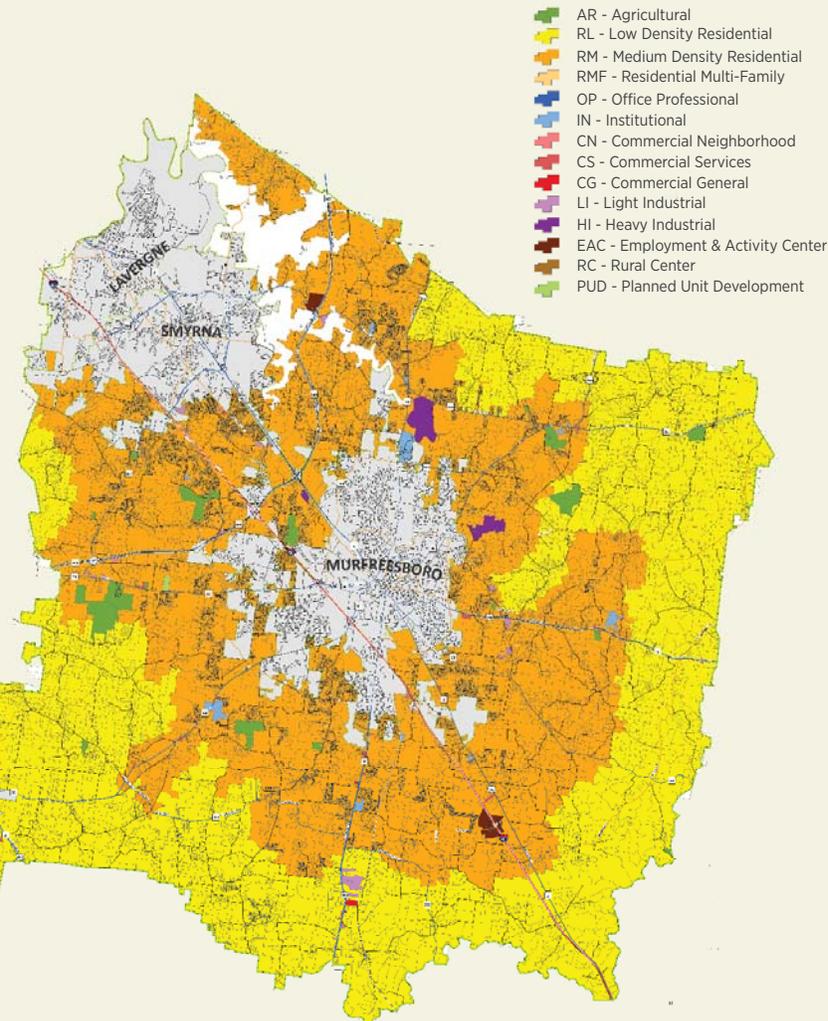


TABLE 2.2, RUTHERFORD COUNTY ZONING TOTALS

Zoning District	Acres	Percentage
AR - Agricultural Residential	3,505.97	1.15%
RL - Low Density Residential	145,313.94	47.65%
RM - Medium Density Residential	151,919.45	49.81%
RMF - Residential Multi-Family	34.45	0.01%
PUD - Planned Unit Development	238.33	0.08%
CN - Commercial Neighborhood	130.30	0.04%
CS - Commercial Services	357.24	0.12%
CG - Commercial General	70.72	0.02%
OP - Office Professional	27.10	0.01%
IN - Institutional	1,028.72	0.34%
LI - Light Industrial	610.10	0.20%
HI - Heavy Industrial	1,176.64	0.39%
EAC - Employment & Activity Center	554.27	0.18%
RC - Rural Center	23.81	0.01%
TOTAL	304,991.04	100.0%

97% of Rutherford county is zoned residential

► **Annexation** brings key growth areas and areas intended for limited development into the City limits well before any significant development activity begins, and so appropriate land use and development standards may be established early on. Annexation is a mechanism to expand the City's tax base, especially to incorporate the pool of tax and fee payers who benefit from municipal infrastructure and services.

2.2: Annexation

PAST GROWTH PATTERN

As discussed, over the last several decades, Murfreesboro has experienced rapid population growth, averaging five percent per decade. As illustrated in Chapter 1, *Planning Context*, Figure 1.14, *Annexation History*, it was during the 10 year period between 2000 and 2010, just prior to the national economic downturn, that the number of annexations and the corresponding area increased in orders of magnitude not previously experienced in the City's history. Although annexation has slowed since that period the population has not, resulting in much growth within Murfreesboro's Urban Growth Boundary, outside of the City limits.

Murfreesboro's increase in population and corresponding employment growth is a positive indicator of the City's economic competitiveness and stability. While attracting and sustaining economic development is a primary goal, the community must also consider ways to maximize the fiscal benefits associated with additional development. The physical growth pattern of the City and the efficient provision of City services are key factors in this consideration. As displayed in Map 2.1, *Annexation History*, since the 1980s the development began to scatter and has increasingly moved outward since. Continuation of this growth pattern will become increasingly more expensive due to the challenges associated with providing cost-efficient City services and infrastructure to expanding areas.

MAP 2.1, ANNEXATION HISTORY

Based on a review of Murfreesboro's annexation history, and as depicted in Table 2.3, *Annexation History Summary*, there have been a total of 363 annexation ordinances in Murfreesboro's history, involving 37,204 acres, adopted over the last 197 years (since 1817). Like many cities in Tennessee and across the country, growth has extended predominantly westward from Murfreesboro's original city limits. In the process of developing a future annexation strategy, which is

necessary to make prudent and fiscally responsible decisions, the City must evaluate the value of an increased tax base with the cost of providing long-term infrastructure maintenance and other associated services.

Orderly growth of the City, within the current City limits and ultimately into remaining portions of the Urban Growth Boundary, is critical to its long-term viability. A municipality has a responsibility to its residents and taxpayers to ensure a growth pattern that makes good fiscal sense, particularly in terms of the infrastructure investments needed to keep pace with growth. Effective growth management can prevent roads, utility infrastructure, and public facilities from becoming overloaded by a scale and intensity of development that cannot yet be served safely and effectively. It can also serve to guide growth and development to targeted infill areas, thereby maximizing the efficiency and effectiveness of the City's existing infrastructure network.

STRATEGY 2.2.1: *When considering annexation, utilize the growth management policies of their Comprehensive Plan to develop strategies through which to accommodate future growth and development and protect surrounding areas.*

It is recommended that the City of Murfreesboro actively consider the benefits of future annexation strategies within the pre-existing framework of a plan for the provision of facilities and services.

1. Continually analyze and monitor the City's utilities infrastructure capacity to determine the areas that are feasible to readily and efficiently extend

Theory of Annexation



The whole theory of annexation is that it is a device by which a municipal corporation may plan for its orderly growth and development. The failure of a city to extend its corporate boundaries to embrace contiguous areas of growth and development is an abdication of responsibility. The time to annex is in the incipient stage of growth, lest the basic purpose of annexation be frustrated and the public interest suffer by the annexation of substandard areas. *State ex rel. Collier v. Pigeon Forge*, 599 S.W.2d 545, 1980 Tenn. LEXIS 458 (Tenn. 1980)

TABLE 2.3, ANNEXATION HISTORY SUMMARY

Timeframe	Total Annexations	Incremental Annexations	Total Acreage	Incremental Acreage	Population	Density (person/acre)
1817-1850	5	-	325.5	-	1,917	5.89
1850-1950	12	7	2,441.5	2,116	13,052	5.35
1950-1960	25	13	4,572.2	2,130.7	18,991	4.51
1960-1970	39	14	7,444.5	2,872.3	26,368	3.54
1970-1980	61	22	12,769.7	5,325.2	32,845	2.57
1980-1990	126	65	19,545.4	6,775.7	44,922	2.30
1990-2000	226	100	26,540.7	6,905.3	60,816	2.60
2000-2010	346	120	35,504.3	9,053.6	108,155	2.92
2010-2014	363	17	37,204.1	1,699.8	117,044	3.00

infrastructure, which may serve as a basis for an annexation plan and capital improvement program.

2. Financial and Strategic Considerations for Annexation. Utilize the Public Chapter 1101 required feasibility study to evaluate the costs and benefits to both the City and landowners for annexing developed and developing areas outside the City limits within the Urban Growth Boundary. Use reliable, sophisticated cost/benefit analysis methods to evaluate the anticipated revenues and up-front and ongoing costs to the City of all proposed annexations. The study should evaluate the options through which to ensure equity and fairness with considerations as to the appropriateness and feasibility of annexation, possible alternatives to annexation (e.g. delayed or non-annexation development agreements, varied rate structures, etc.), and a planned course of action (or no action). However, it should be recognized that, in some cases, other strategic, non-financial considerations must guide annexation decisions, such as the need to exert early control over future critical growth areas or corridors, protect water supply resources, sensitive lands such as sinkholes and wetlands, or other public assets, etc.
3. Revise / Amend the Murfreesboro *Zoning Ordinance* (Appendix A) as follows:
 - Section 17, Annexed Land: Revise the code so that newly annexed land will be zoned in accordance with the city's Future Land Use Map. In order to accommodate more people the city should not allow new property to be annexed as RS-15 which is one of the least dense districts (15,000 square foot lots) within the city's zoning scheme.

The initial zoning district for newly annexed land should be dependent upon the city's land use and growth plans, availability of utilities, presence of environmental features, and an area's future development character and density.

2.3: Infill Development and Redevelopment

OVERVIEW

As discussed, the City of Murfreesboro can utilize a number of strategies, tools and techniques for influencing and managing the pattern and timing of development and redevelopment within the planning area, which includes lands within the City limits and Urban Growth Boundary (UGB). While there is no single approach that meets all needs, a combination of planning, regulatory, and financing mechanisms can be used to influence what is constructed. However, given the provisions that Tennessee state law places on cities and especially counties, there are few, if any, mechanisms currently available to entirely prevent haphazard growth patterns, particularly within the City's UGB.

Ultimately, growth management and utility extension policies should be based on the community's stated goals and objectives pertaining to the kind of community within which residents want to live. The long-term pattern of growth should be managed to balance market demands with economic development objectives. Indeed, future growth should be coordinated with infrastructure and public service investments such that the pattern and timing of development occurs in a





Tennessee Planning Framework

Tennessee state planning statutes are set up to provide a framework through which local governments can plan their communities. As an overarching theme Tennessee state law grants local governments specific authority to plan for urban growth; although comprehensive planning is not required. This means that local governments can enact a zoning ordinance and subdivision regulations without first creating a comprehensive plan.

There are two types of planning commissions created by Tennessee state statute that exist in Rutherford County:

- ▶ **Municipal Planning Commissions** [See Tennessee Code Annotated (T.C.A.) 13-4-310]; and
- ▶ **Regional Planning Commissions** (See T.C.A. 13-3-101). Municipal Planning Commissions are typically administered through municipal governments and Regional Planning Commissions are administered through county governments; although this is not always the case. A Regional Planning Commission can be administered through a municipal government (See T.C.A. 13-3-102).

The City of Murfreesboro operates a Municipal Planning Commission which is given specific authority granted to it by the City of Murfreesboro's City Charter and the Murfreesboro City Council. (See *Murfreesboro, TN Charter*, Section 5). This authority gives Murfreesboro's Planning Commission the ability to provide recommendations to the City Council as it pertains to the zoning ordinance and subdivision regulations.

Rutherford County operates a Regional Planning Commission. Similar to Municipal Planning Commissions, Regional Planning Commissions can provide recommendations to their governing bodies as to the county government's zoning ordinance and subdivision regulations. The existence of which is not required. Additionally, county governments are not required to provide any type of infrastructure to its citizens. However should a county government decide to grant infrastructure service (water, sewer, etc.), the county must create a Plan of Services. This plan must set forth the location of the services to be installed, the proposed timing of the services, and the necessary engineering and financing plans. (See T.C.A. 5-16-112).



REGIONAL PLANNING COMMISSION



MUNICIPAL PLANNING COMMISSION

fiscally responsible manner.

INFILL DEVELOPMENT OPPORTUNITIES

While new development has typically occurred at the City's outskirts on larger swaths of undeveloped land (e.g. south of State Highway 99), infill development will occur closer to the city center. These areas are less costly to serve and hence, more efficient as they are already serviced by roads, water and sewer lines, public safety, solid waste collection, and existing parks and schools. The City currently has several vacant or underutilized lots that could be subject for infill development, as illustrated in Map 2.1, *Underutilized Lands within Planning Area*.

REDEVELOPMENT OPPORTUNITIES

One of the ways to address growth is to focus on redeveloping underutilized properties or obsolete building sites. This may involve construction on individual lots or small undeveloped parcels in established neighborhoods and commercial districts. There are several sizeable undeveloped and underdeveloped parcels that provide the opportunity for infill development where streets and utilities may be readily extended. In addition, there are several areas that warrant consideration of redevelopment during the horizon of this plan.

There are several reasons for resulting undeveloped or under-utilized lands within an existing urban or suburban fabric, and Murfreesboro is no exception. Common constraints that result in so much left-over land may include the following:

- ▶ there may be environmental / brownfield constraints;
- ▶ over time land development patterns result in zoning that is inappropriate to the existing context;
- ▶ there may be administrative hurdles, e.g., parcels may require time to replat / rezone before they can be developed; the ability to rezone is problematic; and/or zoning regulations may be cumbersome, time-consuming and costly;
- ▶ because zoning ordinances are typically written for development of "green grass" parcels, infill development / redevelopment may be subject to increased procedural and other costs;
- ▶ the likelihood of an increase in intensity is unrealistic compared to adjacent parcels;
- ▶ existing streets / utilities infrastructure does not have the capacity to support infill development;

- ▶ the property may be encumbered by easements that may need to be relocated; and
- ▶ individual parcels may be too small in area to accommodate the prescribed building intensity, and must be assembled with adjacent parcels in order to make development financially feasible.

SPECIAL FINANCING (TIF) DISTRICTS

As discussed, there are several tools cities use to influence where growth occurs within their jurisdictional authority. By way of example, delineating special financing districts within which to promote and incentivize new development and redevelopment can be an effective tool within the City's urban core; as long as it can be demonstrated that an increase in tax base can reasonably be expected and the overall quality of life for people who live and work in the City can be improved.

While special districts can be very diverse in their application, they share the same general objectives, including:

1. Improving the overall quality and performance of the City's infrastructure and facilities, where new development should make significant positive economic contributions that will have broad reaching benefits for older and blighted areas of the City.
2. Promoting diversification and balance in the local economy, to encourage environmentally friendly, clean industry; and attract high-paying jobs.
3. Ensuring high quality, well-planned developments:
 - to promote only the highest and best use of land in order to foster a sustainable tax base;
 - that are comprehensive in scope, taking into consideration the impact of the proposed development on potential future development opportunities on adjacent lands;
 - that are mixed-use, including a strong environmentally-friendly commercial / industrial component, where appropriate, that will include high-paying jobs; and
 - that provide a broad range of housing options, including a variety of high-end and affordable housing.
4. Protecting the City's tax-base, where development should generate the highest possible ad valorem value and sales tax revenue; and development should not create a burden on existing taxpayers.



Public Chapter 707

Public Chapter 707 of 2014 created substantial changes to annexation law in the State of Tennessee. Previous to 2014 the most frequently used legal means to annex property by a municipal government was found in T.C.A. 6-51-122: *Annexation by Ordinance*. The Annexation by Ordinance process allowed a municipal government to, on their own initiative, place onto the agenda a proposal to annex property near its current municipal boundaries. Public Chapter 707 stripped Tennessee local governments of their power to annex by ordinance. Now, in order to complete the process of annexation the municipal government must create a Plan of Services and have the annexation adopted by its Planning Commission and the City Council. Additionally, Public Chapter 707 requires a municipal government to annex a parcel of property only under the following conditions:

- ▶ the tract is contiguous to a tract of land that has the same owner and has already been annexed by the municipality;
- ▶ the tract is being provided water and sewer services; and
- ▶ the owner of the tract, by notarized petition, consents to being included within the urban growth boundaries of the municipality; [See T.C.A. 6-58-118].

Public Chapter 707 is very restrictive, particularly with the elimination of Annexation by Ordinance.

This puts cities such as Murfreesboro at an extreme disadvantage if and when they try to annex property that is already receiving some municipal services.

There are few incentives for residents to be annexed if they are already receiving municipal services and the city cannot do so on its own initiative because the ability to annex by ordinance has been stripped as a municipal government power.

Another legal means of annexation that does still exist in Tennessee is Annexation by Referendum; however, this too will change on May 16, 2015 as a result of Public Chapter 707. (See T.C.A. 6-51-104, T.C.A. 6-51-102 and T.C.A. 6-51-102).

TAX INCREMENT FINANCING

Tax Increment Financing (TIF) is a way to encourage reinvestment in blighted or under-utilized areas that probably will not redevelop on their own. In 2012, the Tennessee General Assembly enacted Public Chapter 605, Uniformity in Tax Increment Financing Act, which strengthened a powerful tool for redevelopment projects, economic development and job creation. Historically, TIF in Tennessee has typically been used for housing and redevelopment, although TIF use for economic development is growing. According to Public Chapter 605, TIF increments, or expenditures, can be used for a variety of improvements. These include: acquiring, clearing, and preparing land; the cost of constructing public infrastructure (broadly defined), professional design costs, and financing costs. Put simply, it is a way to self-finance new development projects by capturing their back-end tax proceeds to amortize front-end project costs. This happens by withholding new tax revenues generated within the district from a city's general fund for a specified period of time, usually greater than 15 years. The withheld amount (the "increment") is used to pay off the district's debts, which are typically funded by public bonds.

TIF does not mean an increase in property tax rates within the district. Instead, TIF helps expand the district's overall tax base by stimulating private development with new TIF-financed infrastructure or developer incentives. Most private development would not otherwise happen in TIF-designated areas because of blight or other impeding conditions. Since TIF-funded projects create their own debt-payment streams (from the additional tax revenue that they themselves generate), they are a type of self-financing mechanism. Also, because the increment is unlikely to accrue at the same level without the TIF (again, TIF-funded investments are needed to induce the revenue-generating investment) it does not equate to a dollar-for-dollar reduction to the general fund absent the TIF (refer to Figure 2.5, *Tax Increment Financing Model*). In other words, most of the increment would not otherwise exist were it not for the public debt needed to create it.

Generally, TIF works through the following steps:

- ▶ a geographic area is designated (the TIF district);
- ▶ a plan for specific improvements in the TIF district is developed;
- ▶ bonds are issued and the proceeds are used to pay for the planned improvements; the improvements encourage private development and thus raise property values above where they would have been without the improvements;
- ▶ with higher values, property tax revenues rise; and
- ▶ property tax revenue from increased assessments over and above the level before the TIF project began (the tax increment) is used to finance the debt. (1)

TIFs, however, can cause harmful fiscal impacts if used to finance development projects with high public service burdens, such as single-family housing. This is because district tax revenues flowing into the general fund are frozen at their current levels, resulting in the need to spread new service costs system-wide with no commensurate increase in general revenues emanating from the district. Therefore, TIFs are typically used to help finance mostly commercial and industrial development. Many cities establish eligibility criteria for the use of TIF. Common requirements usually include many of the following:

- ▶ job creation;
- ▶ blight elimination;
- ▶ project scale (usually defined by minimum capital investment);
- ▶ public benefits and amenities;
- ▶ catalytic effects (i.e., ability to spawn follow-on/spillover investment);
- ▶ proposed amount and timing of public return on investment (i.e., how soon will the project pay for itself and what is the long-term contribution to the public purse);
- ▶ amount of private investment leveraged; and
- ▶ clear community need.

PAYMENT-IN-LIEU-OF-TAXES (PILOT) PROGRAMS

The Payment in Lieu of Taxes (PILOT) Program is a financial incentive available to property owners within a Central Business Improvement District who wish to improve or stabilize their property through building renovations or new construction. The objective of PILOT programs is to prompt major property redevelopments where the developments would not be financially feasible otherwise because of the prospect of higher taxes usually associated with improving a parcel of underutilized property. Typically, projects that consist of 60 percent in capital improvements to the property are eligible for this program. This incentive effectively freezes ad valorem (real estate) taxes at the current, pre-development rate for a determined period of time, as determined by specific PILOT tax freeze evaluation criteria.

Utilization of a PILOT Program is based on need. To receive a PILOT, a property owner must prove that, without the incentive, financing the property improvements would be impossible and the property would remain degraded. If a development doesn't need an incentive to attract financing, it doesn't get one. To qualify for a PILOT, the value of the proposed improvements must greatly exceed the total predevelopment value of the property.

STRATEGY 2.3.1: Utilize administrative, regulatory and financial mechanisms to stimulate public and private investment into redevelopment-related activities within the City limits.

ACTIONS AND INITIATIVES

1. Evaluate the City's land development regulations to determine potential regulatory barriers to mixed-use development and redevelopment. Revise / Amend the Murfreesboro Zoning Ordinance (Appendix A), as follows:
 - Section 24, *Overlay District Regulations: Article III, Gateway Design Overlay District: (Subsection C: Use, Setback, and Height Regulations):* The existing 75 ft. height of multi-family residential could be increased from to something approaching the allowed 150' height for commercial uses, hotels, and hospitals. Additionally, these height

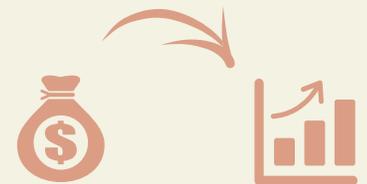
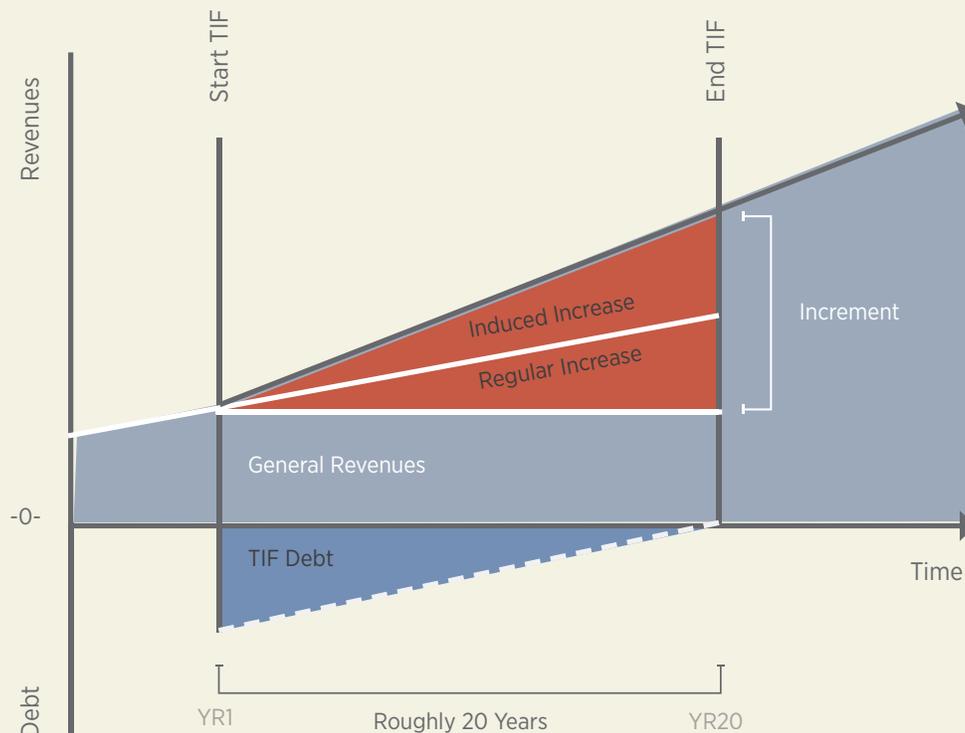
regulations do not address mixed use projects. The same applies to the GDO-2 and GDO-3 districts.

- Revise the City's Central Business District (CBD) regulations to enable building heights greater than 75 feet.
- Section 24, *Overlay District Regulations: Article III, GDO, Gateway Design Overlay District:* The Gateway Design Overlay District provides for high quality development standards. Much of these standards could be applied as building and site design standards for multiple family, public/institutional, and nonresidential developments across the city and not just within the boundaries of the GDO districts.
 - Section 24, *Overlay District Regulations: Article III, GDO, Gateway Design Overlay District: (Subsection C: Use, Setback, and Height Regulations; 8 Floor Area Ratio Requirements):* The Floor Area Requirements could be increased with structured parking, which would accommodate more floor area, more employees, and make more efficient utilization of the land. This recommendation is only for larger scale projects where structured parking is feasible.



What is Tax Increment Financing?

FIGURE 2.5, TAX INCREMENT FINANCING MODEL



Tax increment financing is one of the most powerful redevelopment tools available to municipalities throughout the U.S. When used responsibly, it is a highly effective way to partially fund infrastructure and lessen taxpayer burdens. TIF can fund hard and soft costs associated with redevelopment, including land purchase, relocation costs, public infrastructure, streetscape amenities, recreational facilities, developer cash incentives, developer financing, marketing and brokerage fees, consultant fees, and staff salaries (or portions thereof).

2. Density/Intensity Bonuses. Evaluate the prospect of increased development yield (retail/office square footage and/or additional residential units in mixed-use developments) to entice redevelopment projects aiming for increased development intensity (e.g., assembly of four adjacent parcels and re-platting to reduce parcel size to create five parcels). This approach is particularly useful when land assembly is critical to making redevelopment financially feasible. Establish minimum requirements, such as assembling parcels that compose one side of a city block, to encourage townhouse development
3. Evaluate the utility of a Redevelopment Commission, or City-specific, Industrial Development Board, to administer TIF and PILOT programs, sponsor and fund redevelopment studies and municipal grant programs that may reduce the financial impact of front-end redevelopment costs.
4. Consider a Land Bank Program. In 2012, the General Assembly created the Tennessee Local Land Bank Pilot Program (Tennessee Code Annotated Title 13, Chapter 30), authorizing the creation of land bank corporations with broad powers to acquire, hold, improve, and convey any interest in real property. Land bank corporations can be used as a legal and financial mechanism to return vacant, abandoned, and tax-foreclosed properties to productive use through rehabilitation, demolition, or redevelopment and then sell them. According to a study by the University of Michigan, “successful land bank programs revitalize blighted neighborhoods and direct reinvestment back into these neighborhoods to support their long-term community vision.”(2)
5. Evaluate the utility of a Community Redevelopment Officer City staff position within the City of Murfreesboro Planning Department. The Officer would work with the Rutherford County Chamber of Commerce’ Industrial Development Board, the City’s Redevelopment Commission, and the development community to identify infill development and redevelopment opportunities, administer incentive programs, and manage consultant studies.
6. Consider the development of a dedicated source of funding to pay for special market and other studies to prove redevelopment feasibility and subsequent financing.

STRATEGY 2.3.2: *Develop policies and incentives that encourage and promote infill development and redevelopment.*

Actions and Initiatives

1. Revise / Amend the Murfreesboro *Zoning Ordinance* (Appendix A), as follows:
 - Section 7, *Site Plan Review*: Consider applying administrative site plan review and approval for projects that meet stated objectives such as infill development, redevelopment, and increased density in certain defined districts/areas/zones. Projects that are eligible for administrative review will need to have well-articulated design and development standards clearly spelled out in the code.
 - Section 8, *Procedure for Uses Requiring Special Permits*: Consider applying expedited review and approval (e.g. shortening the current required timeframe for a public hearing from 45 days to 20 or 30 days) for projects that meet stated objectives relative to infill development, redevelopment, and increased density in certain defined districts, areas, or zones.
 - Section 8, *Procedure for Uses Requiring Special Permits* (authorized special uses and additional standards): Many of the uses currently listed in this section could be converted from special uses requiring a public hearing and Board of Zoning Adjustment (BZA) approval to administratively approved, limited uses. This could be particularly applicable to ease the timing and complexity of uses and development projects in areas that the City wants to advocate for development such as redevelopment opportunity areas, infill sites, and areas already served by utilities.
 - Section 8, *Procedure for Uses Requiring Special Permits*: (Accessory Apartments): In certain districts, areas, and zones where increased density and urbanization is warranted (e.g., around the University, downtown, etc.), accessory apartments could be permitted for non-family members when there are strict parking standards. Three options for accessory apartments include in-the-home, above garage, and detached units only when appropriate regulations related to lot size and floor area requirements are met.
 - Section 13, *Planned Development Regulations*: Consider providing attractive density bonuses and other incentives for mixed use projects and mixed



- housing types, such as attached housing, in order to attempt to develop the currently approved Planned Unit Developments.
- Section 13, *Planned Development Regulations*: (Subsection 8: *Relationship to the Subdivision Regulations and other Zoning Regulations*): Revise the code to specify by-right development options pertaining to density and open space requirements, with bonuses for more compact developments.
2. Meet with property owners within the potential infill areas, as well as with developers, to identify the constraints to infill development. Consequently, amend the zoning and subdivision regulations and other standards and requirements so as to mitigate the obstacles to infill development.
 3. Consider appropriate incentives to overcome infrastructure-related constraints to infill development, or redevelopment, of areas within the City limits by providing adequate street and utility infrastructure, and other measures to accommodate new development requirements. Requirements pertaining to setbacks, lot coverage, and building height may need to be modified to allow feasible development of constrained infill sites.
 4. Study the infrastructure needs of the infill opportunity sites and prepare a schedule of capital improvements, including the timing and methods of funding the improvements. Prioritize capital projects that will benefit undeveloped sites, potentially increase density and the efficiency of the infrastructure system.
 5. Create and adopt infill development standards concerning density, intensity, and other dimensional requirements to maintain a consistent character with existing adjacent development. Of particular importance within many of the older, historic areas is to ensure that the architecture, including façade treatments, massing and materials, density and intensity, etc., are consistent with those in the immediate neighborhood. For instance, a brick building may not be appropriate or desirable in an area where existing housing primarily has clapboard siding.



6. To enable infill development and/or redevelopment, maintain an annual rehabilitation and replacement program for potable water and reclaimed water distribution and wastewater collection systems within well-established areas.
7. Identify the areas that are most conducive for infill development and either pre-zone them or develop interim zoning regulations to ensure that development conforms to the future intent of the area and is compatible with the scale and character of adjacent development.
8. Establish “green-light” procedures to streamline approval of applications that comply with the City’s established infill development standards, including expedited review and permitting, waiving permit fees, etc.

STRATEGY 2.3.3: *Analyze areas within the City of Murfreesboro that may be worthy of redevelopment.*

ACTIONS AND INITIATIVES

1. Work with the Rutherford County Tax Assessor’s Office and Chamber of Commerce to identify and evaluate parcels where the assessed value of the land is higher than the appraised value of improvements to the parcel.
2. In accordance with Chapter 5, *Housing and Neighborhoods*, define areas that warrant redevelopment and designate them as a redevelopment district. Subsequently, prepare a redevelopment plan to determine the type and general form of development, which may serve as a basis for design and implementation.
3. Identify on the *Future Land Use Plan* the future character of the redevelopment areas. Establish the zoning provisions necessary to achieve the intended development outcomes.

STRATEGY 2.3.4: *Encourage and promote the redevelopment of land that is currently occupied by obsolete or non-functioning structures.*

1. Zoning in Support of Redevelopment. Together with other incentive measures, apply targeted zoning strategies and performance standards to designated redevelopment zones. Options may include items such as reduced setbacks, waiver to height limitations, increased density, reduced parking standards, and reduced impact fees. For example, the Light (L-1) and Heavy (H-1) Industrial Districts need to be re-evaluated as to their future feasibility of being developed for an industrial use. Many of these industrial zones are centrally located parcels of land that may be more suitable for residential

or mixed use development. Redevelopment of commercial / retail areas. Continue to emphasize redevelopment and revitalization opportunities for large, underutilized retail sites.

2. Parking Management. Encourage residential, commercial and mixed development models in the City’s targeted redevelopment areas, that focus on integration of structured parking to enable more productive use of the overall site in place of extensive surface parking.

STRATEGY 2.3.5: *Position Downtown as a unique local and regional destination and viable place to conduct business.*

Downtown Murfreesboro was once the center of commerce and community activity. As in city centers across the county, the focus of Downtown has shifted away from its central retail activity to more offices, services, and government. The transition of Downtown has occurred over many years and is the result of an increased reliance on the automobile, establishing a market for auto-oriented strip shopping centers and malls. This draws retail out of the core of the city and to the fringe of the community. The emergence of big box stores located within the fringe areas of the community attracts fast food and small retailers to nearby sites away from Downtown.

Since the retail focus has moved to the primary corridors as well as the Gateway district, Downtown must create a new identity that is solely unique to the community and region. There are great opportunities to build-off of the momentum generated by Main Street Murfreesboro/ Rutherford County Inc. and position Downtown so as not to compete for the typical retail outlets and franchise restaurants; but more as a destination and niche market with an orientation toward culture, entertainment, and



DOWNTOWN

“Downtown needs to be developed with more of an urban mindset. Dense development needs to be encouraged and zoning rules need to be changed to encourage more mixed use development.”



Aerial of City Hall
Source: Ken Robinson

community gathering, with a healthy compliment of local shops and eateries. Doing so will require a commitment to restore the market attraction and expand the existing urban fabric; which will require a combination of economic incentives and physical improvements to create a business-friendly environment that is both accessible and walkable. An appropriate mix of uses is also essential to re-invigorating Downtown, including vertically-integrated residential over retail uses, as well as higher-intensity attached-living integrated within or on the immediate fringes of Downtown. Moreover, the perceived boundaries of the Downtown may warrant realignment and expansion.

Given its central location among the City's well-established neighborhoods and its proximity to MTSU, Murfreesboro's Downtown is well-suited to cater both to residents and students, as well as regional visitors and tourists.

ACTIONS AND INITIATIVES

1. Evaluate the current boundaries of the Central Business District (CBD) and the Main Street Downtown District to determine whether or not the district should be enlarged to include areas now on the periphery that could be developed into an urban character (refer to Figure 2.6, *Proposed CBD Expansion*).
2. Establish a Business Improvement District in the Downtown area. A central business improvement district (CBID) is an area of significant commercial activity designated to receive special improvements, projects, and management services funded through a special assessment of commercial property owners. There are a variety of benefits to being located within the CBID:
 - Development projects in the CBID could be eligible for reduced interest rate loans, grants and technical assistance that are available only through programs within the proposed Murfreesboro Redevelopment Commission.
 - The proposed Murfreesboro Redevelopment Commission would work in partnership with businesses and organizations in the CBID to develop and attract new businesses.
 - Federal office facilities give preference to the CBID for new locations.
 - New development, such as hotels and multi-family housing, are encouraged because of tax benefits available only in the CBID.
3. Perform a study to define the market potential of Downtown regarding its regional economic capture, saleable/leaseable square footage, and likely rate of absorption. Identify the range and preferred mixture of use types, along with a retention and attraction strategy and target marketing approach.
4. Solicit professional assistance in developing a brand identity for Downtown. This could be an expansion of the "Downtown Deals Murfreesboro" and include an advertising campaign and production of related media materials.
5. Identify a design theme for the Downtown district. This may include parameters related to architecture, signage (including street signage specific to the Downtown district), streetscape and public art amenities. The theme should allow for individual expression while ensuring a semblance of design cohesion.
6. Prepare a multi-year implementation program to initiate the recommended strategies and improvements stemming from market research, branding and design studies. The program should outline implementation authorities and responsibilities, specific timelines, and the methods and means of funding for individual projects.
7. In keeping with the design theme, character and streetscape elements included within the proposed "Bridge over Broad Street" transportation enhancements, design and install distinct monuments and gateway treatments at the primary entries to the Downtown district, along with unifying design elements like vegetated walls, decorative lighting, street and sidewalk paving materials and patterns, and other unique design treatments.

STRATEGY 2.3.6: *Re-establish the traditional urban character of Downtown.*

Over time, the pattern of buildings and parking has dramatically shifted the character of the peripheral areas of Downtown from an urban to an auto-urban character. This is caused by the placement of newer buildings set back relative to the street and the percent of highly valued Downtown property that is devoted to surface parking and accessways. As a result, the pedestrian orientation of these areas of Downtown has declined in favor of the automobile. If the City is to re-establish Downtown as a destination and size its economic opportunities, it should reconsider the form and design of development, including how parking is handled and treated.

ACTIONS AND INITIATIVES

1. Prepare a Downtown master plan that is of sufficient detail to result in a regulating plan that illustrates the intended arrangement and form of development. This would include general lot and block arrangements, typical building footprints to reflect general character and scale, public spaces, the location of parking areas, and contextual relationship with existing uses and adjacent properties.
2. Utilize the Downtown plan to amend the Central Business District (CBD) to specify allowable parking configurations, such as mid-block only lots, as well as building form standards including building massing, height, placement, allowable frontage types and conditions, and allowable encroachments. The use of standards may allow more general use types with a greater emphasis placed on design.
3. Integrate into the CBD floor area ratio (FAR) bonuses for vertical mixed use buildings, shared and/or structured parking, and USGBC LEED™ certified buildings (refer to Strategy 2.1.3). Also consider allowances and incentives for first floor retail and entertainment uses with upper floor office, institutional and residential uses.
4. Include attached residential dwellings as a special use within the CBD. Additionally, consider rezoning the fringes of Downtown for more intensive urban residential uses. This may include housing for mature residents as a means for increasing the Downtown population while offering convenient access to community services.
5. In the interim, before the Downtown master plan and regulating plan are prepared, amend the CBD to require a site design study to evaluate alternative siting and configurations of parking, subject to the review and recommendation of the City's Historic Zoning Commission.
6. Revise existing design standards to guide the construction of new and improvement of existing buildings to ensure compatibility of the architecture and cohesion with the historic integrity of Downtown.
7. Conduct a Downtown parking study to evaluate the existing and planned use types (based on recommendations from the market study) and their respective space requirements. Utilize the findings to determine the options to provide adequate parking. Study the alternatives and feasibility of public versus private and surface versus structured parking schemes.



Main Street

Source: Ken Robinson

STRATEGY 2.3.7: *Improve connections to, through and within Downtown and its surrounding neighborhoods.*

To aid in the success of a Downtown revitalization and expansion program, there must be improved linkages that are both direct and safe. Additionally, the existing rights-of-way need to become complete streets, meaning they are redesigned to better serve pedestrians, cyclists and public transit vehicles. These improvements are particularly warranted in Downtown as its function and character are intended to be pedestrian-oriented.

ACTIONS AND INITIATIVES

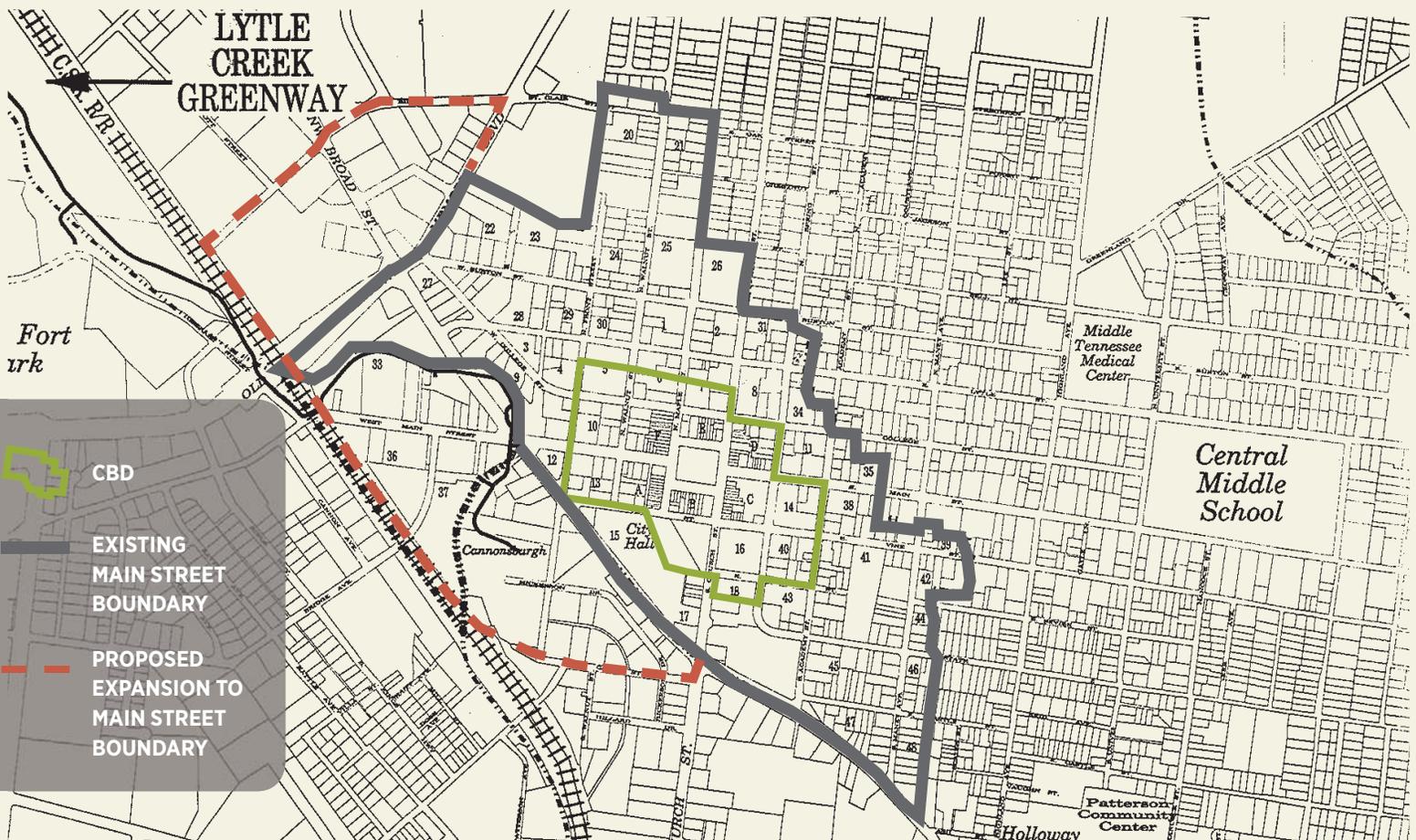
1. Use street trees, building canopies and awnings, covered walkways, and other design treatments as not only pedestrian shelter from inclement weather but to announce entrance into the Downtown Central Business District (CBD).
2. Identify commercial and residential properties that are experiencing, or at risk of experiencing, disinvestment and decline, and evaluate the potential for redevelopment. Special emphasis should be placed on corridors and entrances to Downtown.
3. Improve the pedestrian experience Downtown with active storefront displays; informational and

interactive kiosks; public seating, including the use of parklets (refer to Figure 2.7, *Parklets*); pedestrian-scaled ornamental street lighting; landscaped planters; public art displays; sidewalk displays; and interpretive signage focused on Murfreesboro's collective heritage.

4. In accordance with the City's *Greenways, Blueways, and Bikeways Master Plan*, create a plan for pedestrian precincts and civic spaces within the Downtown CBD with connections to City-wide active transportation network of recreational trails and on-street bike lanes. Establish a significant pedestrian linkage from Downtown to Historic Cannonsburgh Village and the Cannonsburgh Trailhead of the City's Greenway system.
5. Reconnect adjacent neighborhoods to Downtown by way of sidewalk maintenance improvements, and/or construction; handicapped accessibility improvements at intersections, including curb cuts and ramps; pedestrian and bicycle actuated signal detectors; increased signal timing for pedestrian crossings; possible alleyway pathways; and on-street bike lanes.

[Continued on page 2.40]

FIGURE 2.6, PROPOSED CBD BOUNDARY EXPANSION



**DOWNTOWN REVITALIZATION EFFORTS**

“Make Downtown area more accessible and safe by creating a pedestrian bridge to Cannonsburgh Village and Greenway System. Perhaps from W. Vine Street to Cannonsburgh. My wife and I just moved to Murfreesboro and had no idea the Village and Greenway are so close to the square. A pedestrian bridge would also look beautiful.”

Source: Ken Robinson



Parklet

FIGURE 2.7, PARKLET SIDEBAR

The term “parklet” was first used in to represent the conversion of an automobile parking space into a mini-park for passive recreation. Parklets emerge from the low-cost conversion of small and under-utilized residual spaces originally devoted to cars into spaces for the passive or active recreation of people. Parklets vary based on the following characteristics:

- ▶ **Location:** Parklets can occupy former parking spaces, street medians, traffic triangles, repurposed travel lanes and parking lots or excess asphalt space at angled or irregular intersections;
- ▶ **Surrounding land uses:** Commercial or residential;
- ▶ **Size:** From a couple of parking of spaces to spaces extending along the length a block, to larger spaces occupying entire parts of a block;
- ▶ **Shape:** Linear, square, rectangular, triangular, or irregular;
- ▶ **Duration:** From a few hours (e.g. Ciclovias and Sunday Streets), to one day (Park(ing) Day), to part of the year (during spring and summer), to year-around installations;
- ▶ **Type of activity:** Passive or active recreation.

The following general design guidelines are recommended:

- ▶ Parklet should be easily accessible from the sidewalk;
- ▶ Some landscaping is expected;
- ▶ Parklet should be visually permeable to enable people to rest and experience the street off the sidewalk;
- ▶ Parklet should conform to ADA access guidelines. Parklet must be open to the public and display two standard signs (per city template) stating “public parklet;”
- ▶ Should feel public and be devoid of cues (e.g. umbrellas and condiment bottles on tables) that signify that the space’s primary function is for commercial activity;
- ▶ Seating should be included and any removable furniture must be distinct from those of restaurants.

Source: *Reclaiming the Right of Way: A Toolkit for Creating and Implementing Parklets*. UCLA Luskin School of Public Affairs. UCLA Complete Streets Initiative. September 2012.



Parklets emerge from the low-cost conversion of small and under-utilized residual spaces originally devoted to cars into spaces for the passive or active recreation of people.

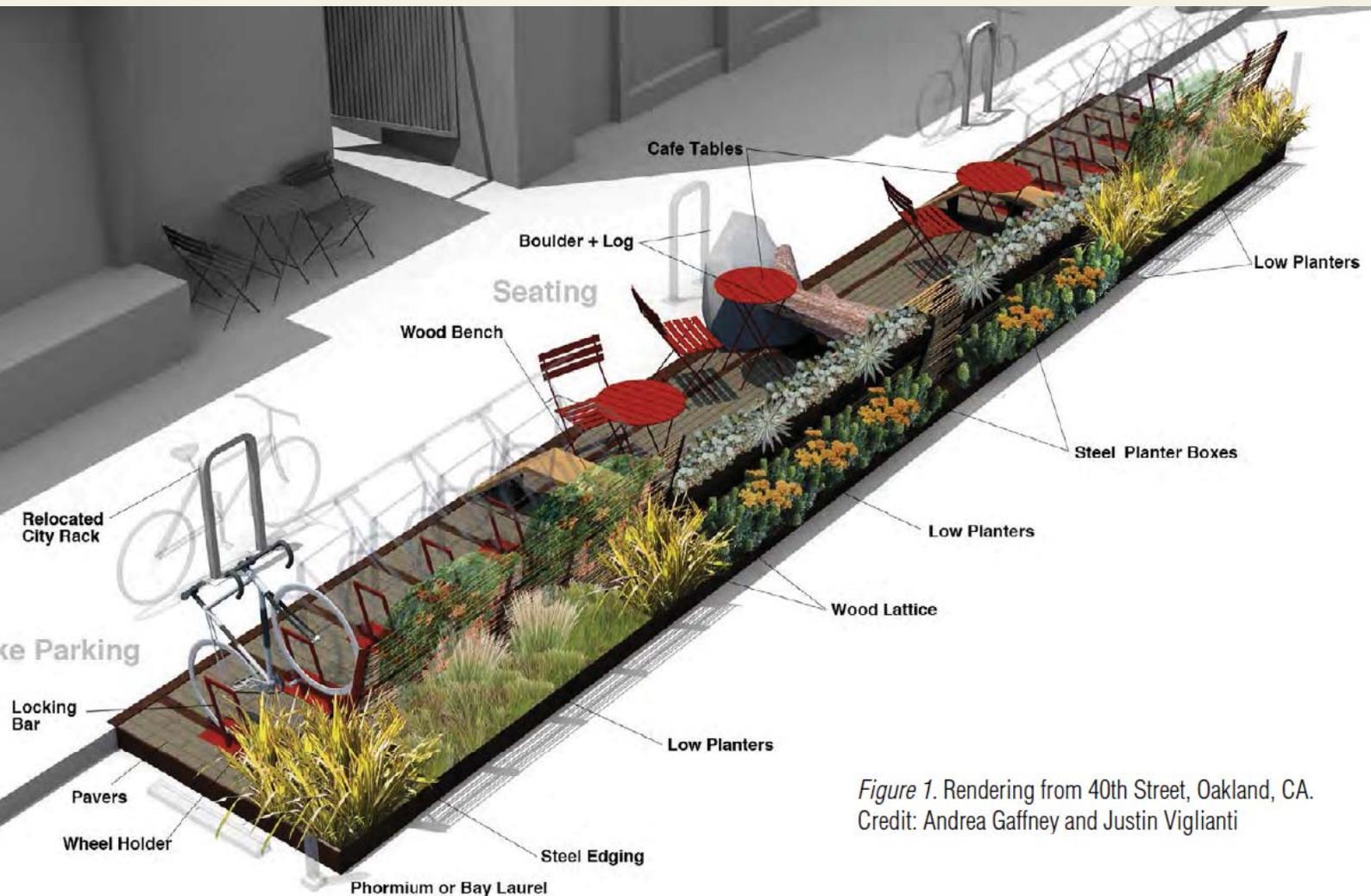


Figure 1. Rendering from 40th Street, Oakland, CA. Credit: Andrea Gaffney and Justin Viglianti

2.4 Managing Utilities Infrastructure : Drainage

Introduction

This section addresses existing flooding, drainage, and water quality related issues within the planning area. Strategies and specific action items will be presented that the City can implement to address existing and future flooding, drainage, and water quality issues related to development.

FLOODING AND DRAINAGE

As stated in Volume 1 of the October 16, 2008 *Flood Insurance Study* (FIS) for Rutherford County, Tennessee, the principal flood season for major streams within the planning area is winter and early spring, from December through April. However, flooding on small streams and from sinkholes are most likely to occur from intense bursts of rainfall produced by thunderstorms that can occur at any time of the year. Essentially, all streams in the planning area are relatively small and subject to very rapid flood rises, from streambed to peak flood elevations in less than 12 hours. These rapid flood stages have a significant impact on structure and road flooding and are a potential threat to the health, safety, and welfare of the public.

Floods of large magnitude have occurred within the planning area causing damage to bridges, roads, residences, and public facilities. These floods occurred in 1902, 1944, 1945, 1948, 1955, 1963, and 1975, May 2010, and April 2011.

WATER QUALITY

The City has a Phase II Municipal Separate Storm Sewer System permit (MS4 permit) for coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) program. The Tennessee Department of Environment and Conservation (TDEC) is responsible for ensuring the City implements and stays in compliance with their MS4 permit requirements. The MS4 permit is part of EPA's effort to preserve, protect, and improve the Nation's water resources from pollutants conveyed from stormwater runoff into streams, lakes, wetlands, and other water bodies. Non-compliance with the MS4 permit could result in financial penalties or a moratorium

on development until the City comes into compliance with their MS4 permit.

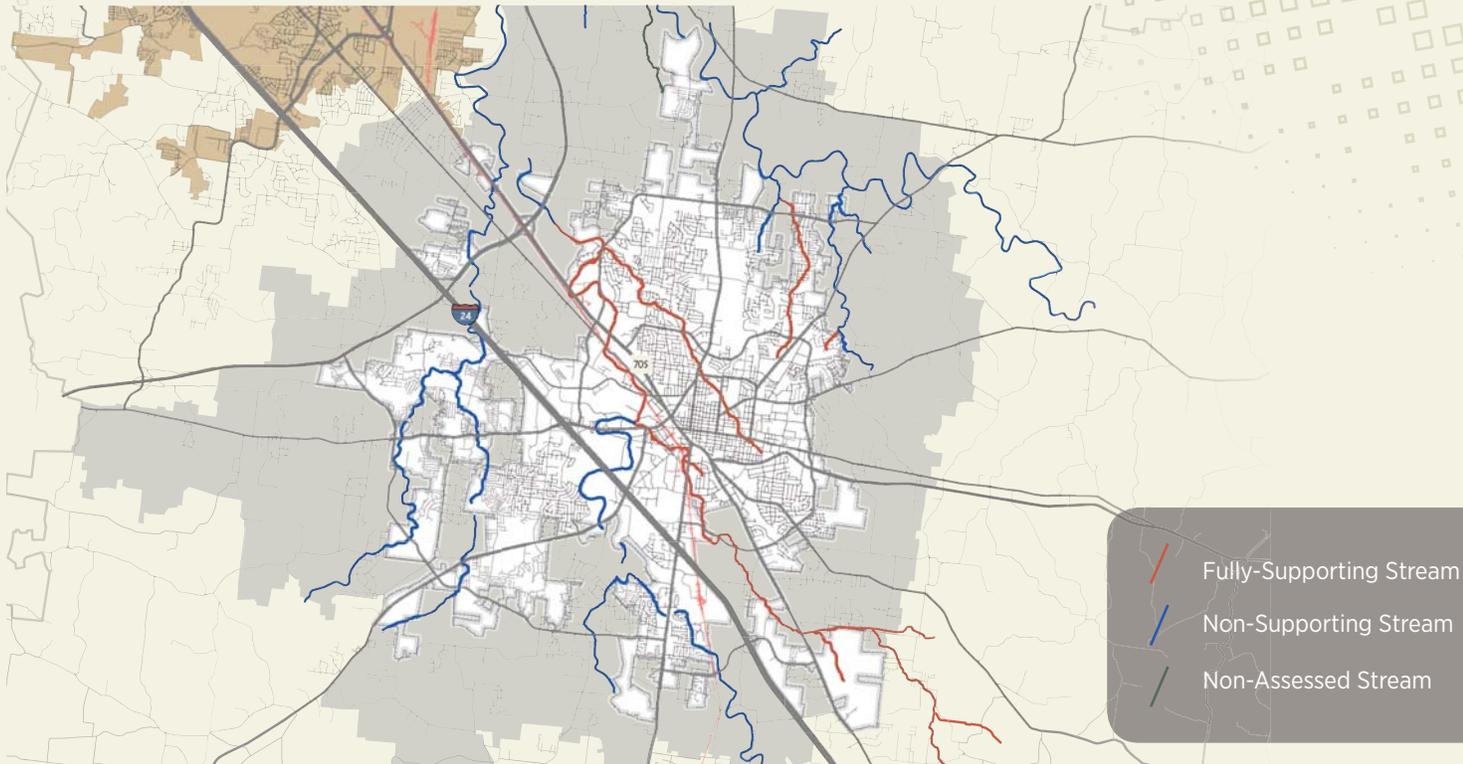
Section 303(d) of the federal Clean Water Act requires that TDEC develop a compilation of streams and lakes that are "water quality limited" or are expected to exceed water quality standards over a two year period. Water quality limited (303(d) listed) streams are streams that violate water quality standards, are considered impaired by pollution, and do not meet water quality standards for their designated uses, such as fishing, swimming, and as a source of drinking water. Once a stream has been placed on the 303(d) list, it is considered a priority for water quality improvement efforts. If a stream is on the 303(d) list, TDEC cannot authorize or allow additional loadings of the same pollutant that caused the stream to be on the 303(d) list. This could mean that the City may not allow additional development along these streams until the source of the pollutants have been controlled through use of the appropriate best management practices (BMPs) to reduce pollutant loadings to the 303(d) stream (refer to Figure 2.8, *Non-Supporting Streams in the Planning Area*). The draft 2014 303(d) report is the current source for 303(d) streams within the planning area.

Each 303(d) stream segment may also have Total Maximum Daily Loads (TMDLs) assigned to a particular pollutant that causes the stream to be 303(d) listed. TMDLs are identified in a study that quantifies the amount of pollutant in the stream; identifies the source of that pollutant; and recommends regulatory or other actions that may need to be taken in order for the stream to be no longer polluted. Tools that can be used to meet TMDL requirements for a stream include additional and more stringent BMPs to address a particular pollutant. An increase in stream buffer widths to allow more filtering of stormwater runoff may be appropriate for specific pollutants. Tools and goals for specific TMDLs may require new developments and redevelopment to have more stringent BMPs in place than the current regulations require. New growth and development can contribute stormwater pollutants to streams if the MS4 permit requirements are not met and enforced. Streams on the 303(d) list are classified by TDEC as non-supporting of their designated uses.

Flooding and Drainage Issues

The areas subject to flooding and drainage issues within the planning area are, for the most part, older residential neighborhoods, commercial, and industrial areas. These areas were typically developed prior to implementation of the Federal Emergency Management Agency (FEMA)

FIGURE 2.8, EXISTING NON-SUPPORTING STREAMS IN THE PLANNING AREA



Flood Insurance Program (FIS). Development occurred within the floodplain and floodway without knowledge of the potential for flooding. FEMA now publishes maps showing the 100-year floodplain and floodway for rivers and streams which were not available prior to the 1970s. The City uses FEMA maps to guide development of floodplain areas. The current effective FIS and Flood Insurance Rate Maps (FIRM) are dated October 16, 2008 and used by the City in the administration of the National Flood Insurance Act of 1968 and Flood Protection Act of 1973. Figure 2.13, *Floodplains*, shows the location and extent of the 2008 effective FEMA floodplains and floodways within the planning area. In addition to the lack of FEMA maps, adequate stormwater regulations and design criteria were not available at the time these older areas were developed.

The City prioritizes existing drainage issues based on the following parameters with 1 having the highest priority.

- ▶ Public health, safety, and welfare
- ▶ Structural flooding (first floor/living spaces, etc.)
- ▶ Flooding of support facilities (HVAC, crawl spaces, etc.)
- ▶ Loss of use and level of service (driveways inundated, road flooding, etc.)
- ▶ Nuisance flooding (yard won't drain, etc.)

Figure 2.19, *Areas with Existing Drainage Issues*, shows areas that have priority 1 and 2 drainage issues. As shown on the map the areas are mostly located on the western portion of the planning area. As shown on Figure 2.19, most of the flooding and drainage related issues are the result of multiple complex karst drainage basins in combination with a poorly defined or inadequate natural drainage system.

AECOM, in association with Michael Baker Jr., Inc. and Deloitte Consulting LLP, published a study for FEMA and the Federal Accounting Office dated June 2013 that evaluated the impact of climate change and population growth on the National Flood Insurance Program. Entitled: "*The Impact of Climate Change and Population Growth on the National Flood Insurance Program through 2100*," the study looked at both riverine and coastal flooding throughout the U.S. with estimates at 20-year intervals through the year 2100. The AECOM study found that over the next 90 years there will likely be a 50 percent chance of a significant increase in coastal and riverine flooding which will have a severe impact on the National Flood Insurance Program.

The AECOM study approach was based on well-established methods of riverine hydrology utilizing regression analyses to relate peak flood discharges to watershed or basin characteristics. In order to incorporate climate change into the approach, the

Examples of Flooding within the City



April 2011 Flooding of Spence Creek at Intersection of Genoa Drive and St. Andrews Drive



April 2011 Flooding on West Fork Stones River at SR 99



May 2010 Flooding on Shores Road West of Veterans Parkway

study expanded the list of regression factors to include a set of extreme climate indices reported in climate model projections. In addition to changes in climate, there will be changes in population. Projected changes in population were used to estimate changes in basin impervious cover, one of the non-climate regression factors. The relationship of impervious cover in percent versus population density in people per square mile is depicted in Figure 2.9, *Impervious Cover Model*. An increase in impervious cover will result in increased stormwater peak flows and volumes unless mitigated by detention. The regression equations were used to provide estimates of stream flow and associated changes in 100-year flood depths and floodplain areas. The general findings of the study for riverine environments predicts the typical 100-year floodplain area nationally is projected to grow by approximately 45 percent with very large regional variations. The 45 percent growth rate is a median estimate. Within typical developed areas, approximately 30 percent of the increase in floodplain impacts may be attributed to normal population growth, while approximately 70 percent of the change may be attributed to the influence of climate change. It is important to note that the projected future discharges do not include the effects of detention structures to mitigate the future impacts of climate change.

Sinkhole Flooding

As described in the United States Geological Survey (USGS) report (USGS report), "*Sinkhole Flooding in Murfreesboro, Rutherford County, Tennessee, 2001-02*", the planning area is typical of thinly mantled limestone areas where much of the rainfall and stormwater runoff flows to low areas with sinkholes. The Murfreesboro area is underlain by limestone and shaley limestone of Ordovician age. The formations are relatively flat-lying with some local, low-angle folds. All of the limestone

[Continued on page 2.45]

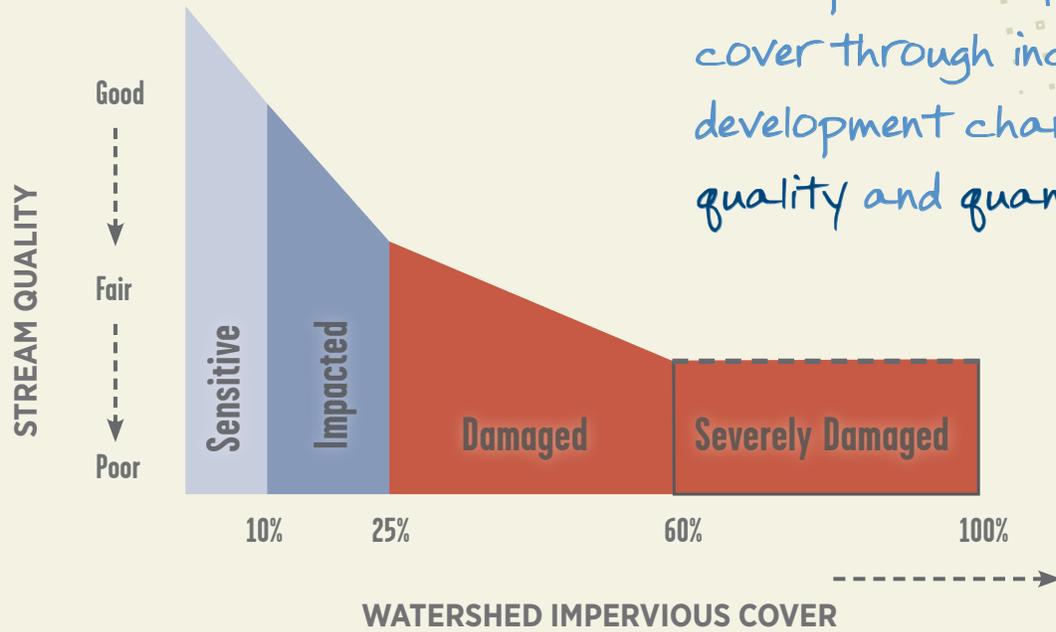
It is important to note that the projected future discharges do not include the effects of detention structures to mitigate the future impacts of climate change.



Area With Frequent Flooding of Road

Source: Mississippi River Ecohydrology Past, Present, and Future PDF, United States Army Corps of Engineers Conservation Partnership Conference 2011

FIGURE 2.9, IMPERVIOUS COVER MODEL



Impervious cover which increases with density will result in increased stormwater runoff; however, stormwater detention and low impact development exist as mitigation options.

FIGURE 2.10, IMPERVIOUS COVER VERSUS POPULATION DENSITY

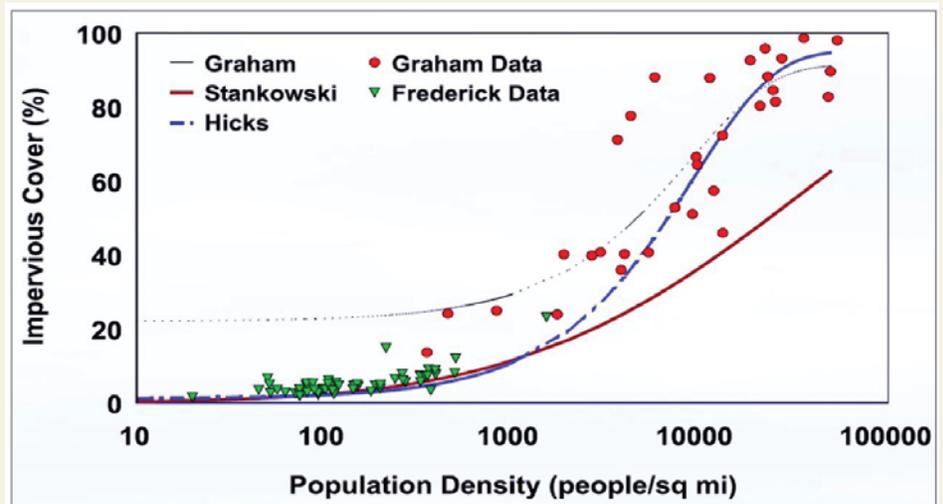
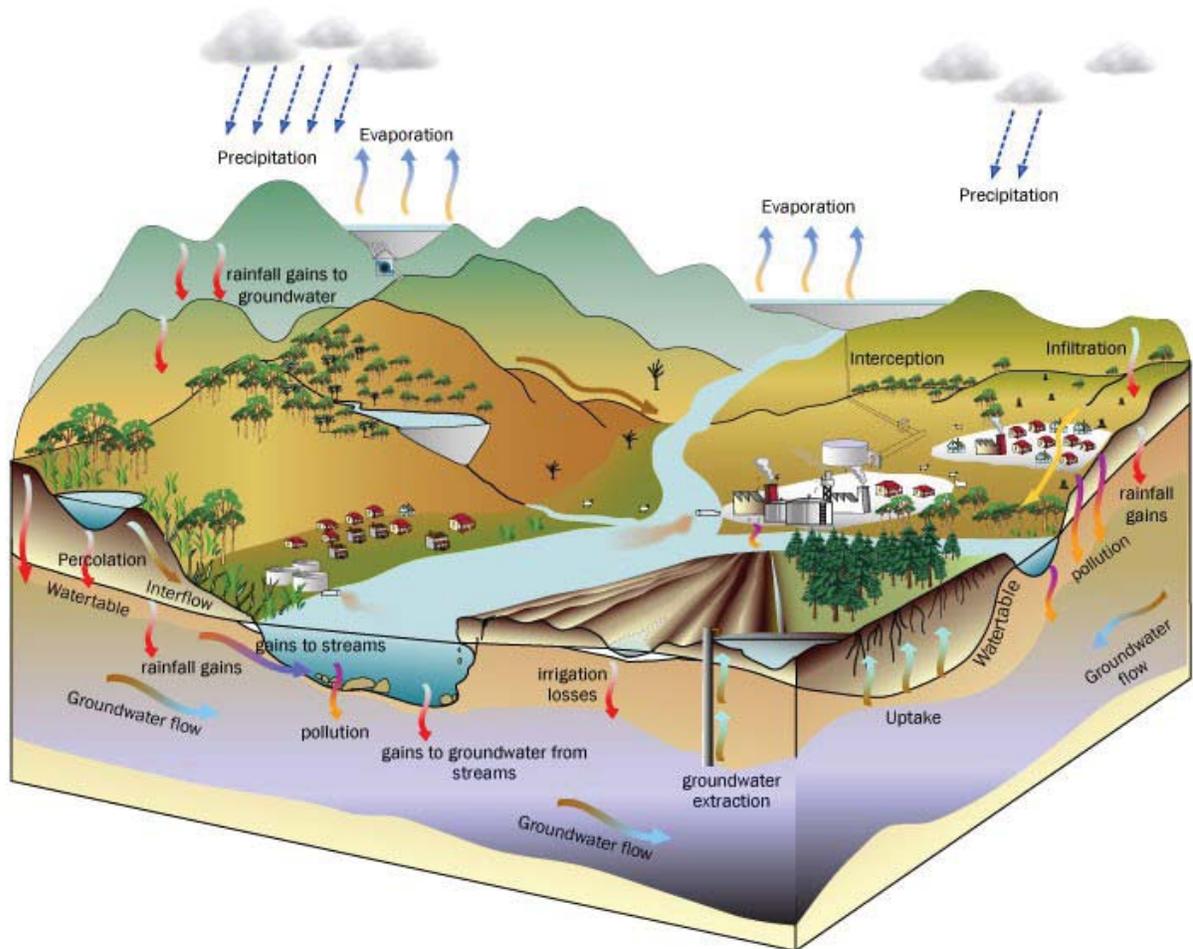


Figure 2.10 shows the relationship of impervious cover in percent versus population density in people per square mile. An increase in impervious cover will result in increased stormwater peak flows and volumes unless mitigated by detention.

Typical sinkhole and Karst geology



units within the planning area have some level of karst development. Groundwater moving through the joints, bedding planes, and fractures dissolve and enlarge openings in the rock. Sinkholes are present throughout the area and the watershed that drains to the sinkholes range in size from a fraction of an acre to several square miles. Figure 2.14, *Sinkholes*, depicts the general location of sinkholes within the planning area. Figure 2.11, *Overall Creek Sinkhole System*, shows the known sinkhole system within the Overall Creek Watershed.

The USGS report evaluated flooding in 78 sinkholes in three focus areas. The three focus areas were Hooper Bottom (northern portion of planning area), Manson Pike (western portion of planning area), and Shiloh (eastern portion of planning area). Each focus area is underlain primarily by Ridley limestone with some outcrops of the underlying Pierce limestone. Terrain analysis was used to define the sinkholes and delineate watersheds contributing stormwater runoff to the sinkhole. Flooding to each sinkhole was tracked using

aerial photography following major rainfall events in February 2001, January 2002, and March 2002 to characterize the sinkhole hydrologic response to major rainfall events.

Sinkhole flooding is controlled by stormwater inflow, water outflow, and degree of connectivity to a groundwater conduit system. Flood levels and duration of flooding in the deeper sinkholes are primarily affected by connectivity with the groundwater conduit system. Land surface alterations that increase the stormwater runoff to sinkholes can result in higher flood levels or increased duration of flooding. Karst areas with bedrock close to the surface, steep slopes, and seasonal high groundwater close to the surface are more prone to flooding. Map 2.15, *Areas with Less Than 3 Feet to Bedrock*, shows areas where bedrock is less than three feet below the existing ground and Map 2.18, *Areas with Less than 2 Feet to the Seasonal High Groundwater Table*, shows areas where the seasonal high groundwater is less than two feet below the existing ground.

Sinkholes are a major source of flooding and drainage issues within the planning area. Approximately 50 percent of stormwater runoff within the UGB drains to sinkholes. Developers and the City need to know where sinkholes are located, which sinkholes might present flood and groundwater contamination hazards, and which sinkholes are well connected to the ground and surface water systems. The karst topography and geology, combined with the presence of rivers, streams, and creeks, make areas within the City and UGB vulnerable to severe flooding and groundwater contamination. A coordinated effort between the federal government, Rutherford County and the City of Murfreesboro to manage stormwater runoff to sinkholes is critical.

Water Quality

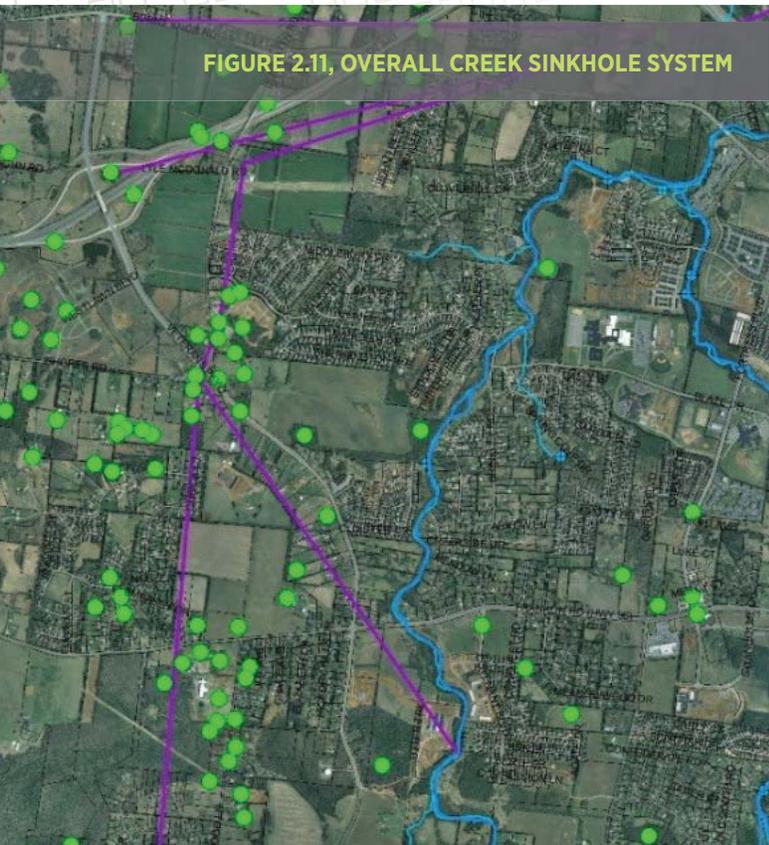
The MS4 permit, issued and administered by TDEC, requires the City to determine whether stormwater runoff from any part of the City contributes pollutants of concern to streams with an emphasis on 303(d) stream segments listed in TDEC's draft 2014 303(d) List and streams that are non-supporting of their designated uses. TDEC does not currently publish maps showing the 303(d) stream segments but does publish maps showing streams that are supporting or non-supporting of their intended uses such as recreation, water supply, fishing, etc.

The 303(d) stream segments that are listed in the TDEC 2014 draft 303(d) list which lie within the City's MS4 jurisdictional limits and where the City is considered a source of the pollutant include the following; Sinking Creek, West Fork Stones River, Town Creek, Lytle Creek, and Garrison Branch. Pollutants TDEC has identified the City as being a source of impairment include stream side vegetative cover alteration, loss of biological integrity due to siltation, E-coli, and physical substrate habitat alteration.

The MS4 permit requires the City to document which best management practices (BMPs) it will use to control the discharge of pollutants of concern to 303(d) stream segments and demonstrate that stormwater runoff will not cause or contribute to a stream impairment. The City must develop a stream monitoring program to assess the effectiveness of the BMPs to control the pollutants of concern to 303(d) stream segments. The goal of the City is to remove all stream segments from the 303(d) list and prevent new stream segments from becoming 303(d) listed and restore streams that are non-supporting of their designated uses to supporting of designated uses.

Karst topography prevalent in the planning area means that groundwater contamination is an ever present concern. The Environmental Protection Agency (EPA) and TDEC Underground Injection Control (UIC) program regulates the discharge of pollutants into the groundwater. "Improved sinkholes" that receive stormwater runoff are considered Class V Injection wells by EPA. EPA's definition states that any sinkhole, open fracture, or other karst feature conveying surface water to groundwater is considered an "improved sinkhole", though interpretations vary by EPA region. Stormwater pollutants that cannot be conveyed to sinkholes include hydrocarbons, antifreeze, nitrate, road salts, fecal bacteria, floatables, and potentially any pollutant in the watershed that stormwater comes in contact with. Discharge of stormwater runoff into the karst habitat may adversely impact species present in the karst aquifer which could include rare, threatened, or endangered species.

FIGURE 2.11, OVERALL CREEK SINKHOLE SYSTEM



Water Resources Goals, Guiding Regulations and Documents

Stormwater management is critical within the planning area since many areas are vulnerable to flooding, water quality, and drainage related issues. The City's goal is to protect, enhance, and restore natural and scenic



May 2010 Flooding at Sulphur Springs Near River Road

Source: City of Murfreesboro

resources, striving for a balance between development and natural resources conservation to maximize benefits for the City by its natural setting.

FLOODING AND DRAINAGE

The FIS is used by City and County planners to promote sound land use and floodplain development. There is a significant FIS update planned for 2015 for several streams within the planning area. The 2015 FIS will provide updated floodplains and floodways to further assist the City in promoting sound land use and floodplain development.

Requirements for Floodplain Zoning are included in Section 34 of the City's *Zoning Ordinance* (Appendix A). Section 34 contains regulations required for the City to maintain eligibility in the National Flood Insurance Program. The purpose for Floodplain Zoning is to restrict or prohibit uses within the regulatory floodplain and floodway which result in erosion, increased flood heights, high velocities, and to minimize expenditure of public funds.

Development is permitted within the floodplain provided requirements of Section 34 are met. Development within the regulatory floodway is not allowed unless it can be demonstrated through hydrologic and hydraulic analyses that the development does not result in a net increase in the 100-year water surface elevation and 100-year velocity and the width of floodway is not affected. Section 34 also contains requirements for locations without established floodplains and floodways.

The City of Murfreesboro's Board of Zoning Appeals hears and decides requests for variances from requirements within Section 34 if the requirements cannot be met due to site conditions.

WATER QUALITY

Section 27-1/2 of the City Code contains regulations required to meet the MS4 permit requirements, and for development within the floodplain, floodway, and alterations of land within the floodplain and drainage channels. As stated in Chapter 27-1/2, Purpose: "This chapter is intended to manage the manner in which stormwater is addressed in areas of new development and significant redevelopment through the course of construction, post-construction stabilization and maintenance to benefit water quality, to provide measures against stream bank erosion and flooding, and thereby benefit the quality of life and character of the City".

The MS4 permit requires that a water quality protection area (stream buffer) be established for areas of new development and redevelopment. The stream buffer is a strip of undisturbed vegetation bordering streams, ponds, wetlands, reservoirs, and lakes. The required stream buffer width is 50 feet from each top of bank for streams and 35 feet for ponds and wetlands. Article II of Chapter 27-1/2 contains requirements and allowable uses within the stream buffer. Stream buffers are not shown on Figure 2.13, *Floodplains*, since approximately 90 percent of the stream buffers are located within the 100-year floodplain.

The City's *Stormwater Planning & Low Impact Design Guide* (design guide) provides guidance on development of stormwater management site plans that are applicable to development activities which disturb an area of one acre or more, and/or where the total impervious area is increased by more than five percent above current land development (existing) conditions. New development or significant redevelopment in critical or sensitive areas identified through a watershed study or plan, may be subject to additional performance and/or regulatory criteria. The design guide also includes recommended BMPs to meet MS4 permit requirements and reduce the impacts of new and significant redevelopment impacts on stormwater runoff from the site.

The design guide presents an integrated approach for meeting stormwater runoff quantity and quality management goals by addressing key adverse impacts of development on stormwater runoff such as an increase in impervious area. Through the use of prudent site design practices, natural drainage and treatment systems can be preserved. With conservation of natural features, reduced imperviousness, and use of the natural drainage system, stormwater runoff and discharge of pollutants from the site is reduced.

Water Resources Strategies

It is well documented that an increase in imperviousness related to development results in increased stormwater runoff volume and peak flow, a decrease in base flow, increased pollution, and increased channel erosion. Figure 2.9, *Impervious Cover Model*, shows the average impact of watershed imperviousness on stream water quality within a watershed. As shown by Figure 2.10, the stream quality of a watershed that has approximately 25 percent of its total area covered by impervious surfaces is already impacted and stream quality is on the verge of being damaged.

STRATEGY 2.4.1: *Reduce the point and non-point sources for pollutants of concern into 303(d) listed streams within the planning area.*

ACTIONS AND INITIATIVES

1. The City should document which best management practices (BMPs) are the most effective to reduce the discharge of pollutants of concern to 303(d) stream segments and demonstrate that stormwater runoff from these areas will not cause or contribute to a stream impairment. The mandatory implementation of these BMPs during all new construction should then be regulated.

2. The City should continue developing a stream monitoring program to assess the effectiveness of BMPs currently being used to control and reduce the pollutants of concern to 303(d) stream segments.

STRATEGY 2.4.2: *Reduce the effects of imperviousness resulting from development.*

ACTIONS AND INITIATIVES

1. Reduce the amount of imperviousness using LID and green infrastructure principles, disconnect impervious areas when possible, infiltrate stormwater runoff and encourage stormwater reuse from new development and significant redevelopment.
2. Continue to require implementation of five principles of stormwater management site planning as described in the design guide.

Flooding and Drainage Strategies

STRATEGY 2.4.3: *Manage stormwater in areas of the City that are vulnerable to flooding, water quality, and drainage related issues.*

ACTIONS AND INITIATIVES

1. The City should continue to emphasize site design guidance contained in the City design guide to control stormwater peak flows, volumes, and pollutants.
2. The City should consider performing detailed hydrologic and hydraulic modeling in areas with complex karst drainage basins in combination with poorly defined or inadequate natural drainage systems. The goal of detailed modeling is to accurately define the 100-year floodplain and floodway and evaluate alternatives to improve flooding and drainage within these areas.
3. The City should consider adopting FEMA guidance for flood proofing of existing flood prone structures



and regulating its implementation for all new construction.

4. The City should consider developing a methodology to determine the 100-year floodplain for sinkholes and incorporate the requirement that the 100-year floodplain must be determined for sinkholes into Chapter 27-1/2 of the City Code.
5. Continue to update the current area of 100-year floodplains and floodways.
6. Develop 100-year floodplain and floodway for streams that have not been studied with emphasis on streams in areas within the planning area that are currently being developed or expected to undergo development in the future.
7. Identify specific policy to guide development within watersheds that currently have imperviousness greater than 10 percent.
8. Require more stringent detention and LID micro-detention requirements for developments where stormwater runoff flows to streams or sinkholes with existing flooding issues.
9. Continue to implement best management practices (BMPs) with emphasis on LID and green infrastructure techniques and water reuse to reduce the quantity of storm runoff from new and existing development.
10. Continue to prohibit construction of structures or on-site disposal systems within the 100-year floodplain.
11. Modify, as necessary, land development regulations to ensure that land use and development decisions consider the physical suitability and natural resources of individual sites or areas of anticipated development within watersheds.
12. The City should consider requiring that finish floor elevations for residential structures be two feet and commercial and industrial finish floor elevations one foot above the 100-year water surface elevation to account for the uncertainty of climate change and population growth.

Karst and Sinkhole Strategies

Stormwater management is critical within the planning area since many areas are vulnerable to flooding and contamination of groundwater because of geology and karst landscape. Sinkholes and karst hydrology with an underground stream network introduce a set of variables that are not ideal for development such as flooding, groundwater contamination, and increased susceptibility to soil erosion.



The only City Code that has requirements addressing sinkholes is Chapter 27-1/2 *Stormwater Management*. Section 27-1/2-5 (D) (g) requires that the applicant obtain appropriate permits from TDEC if a sinkhole is located on the property. The only permit required for sinkholes is a Class V Injection Well permit. Chapter 27-1/2 currently does not require a waterway natural area (water quality buffer) be provided around sinkholes. The county does require a 25 foot buffer around sinkholes. The City's MS4 stormwater permit does not directly address stormwater runoff to sinkholes. However, Section 4.2.5.2.1 lists the presence of sinkholes where application of runoff reduction (green infrastructure) requirements may be limited. Runoff reduction requirements may also have limitations where a potential for introducing pollutants into the groundwater exists, unless pretreatment is provided.

The City treats sinkholes as outfalls for proposed developments. Therefore, the water quantity and quality requirements in Chapter 27-1/2 and design guide are applicable for stormwater runoff to sinkholes located on the site of the proposed development.

The following strategies are recommended to address sinkhole flooding and contamination of groundwater.

STRATEGY 2.4.4: *Reduce the limits of sinkhole flooding and consequent contamination of groundwater.*

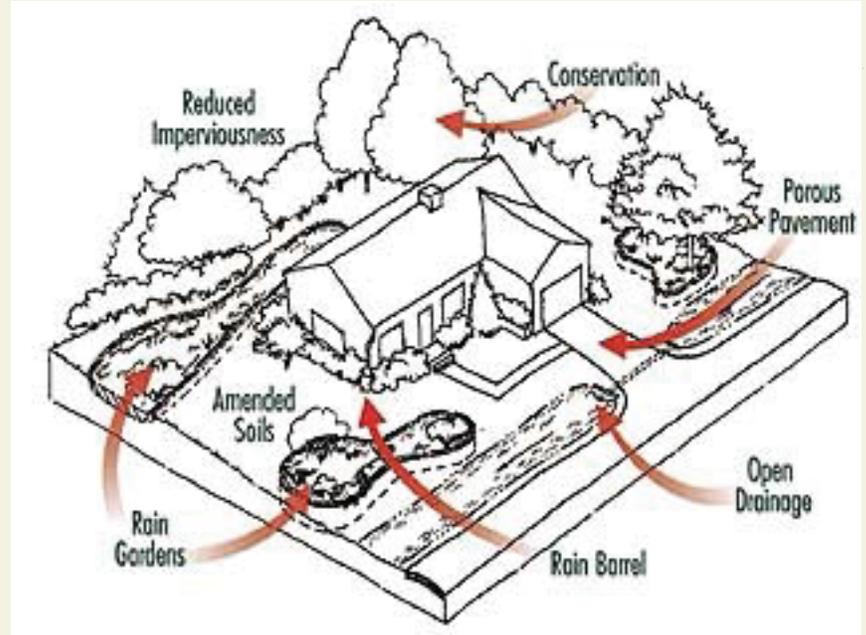
ACTIONS AND INITIATIVES

1. Establish a procedure for continually tracking scientific research and findings regarding the karst landscape and adjust sinkhole regulations based on those findings.
2. Develop updated geologic maps to further characterize the karst topography, sinkholes, and geologic features within the planning area.
3. Continue to emphasize site design guidance contained in the City design guide.
4. Identify policy to guide development within areas that drain to sinkholes that currently have imperviousness greater than 10 percent.
5. Prepare, implement, and periodically update a plan to identify, preserve, and track environmentally sensitive lands, including, but not limited to: wildlife habitats, wetlands, marsh lands, and floodplains associated with streams and sinkholes.
6. Revise Chapter 27-1/2 of the City code to require a 25 foot concentric waterway natural area buffer around sinkhole throats.

Low Impact Development

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed, decentralized, micro-scale controls. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Landscape features, known as Integrated Management Practices (IMPs) are the building blocks of LID. Almost all components of the urban environment have the potential to serve as an IMP; this includes not only open space, but also roof tops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects.

FIGURE 2.12, SITE DESIGN INCORPORATING LID PRINCIPLES



Source: Prince George's County Department of Environmental Resources



LID addresses stormwater through small, cost-effective landscape features located at the site level.

Example of Water Reuse on an Urban Lot





7. Revise Chapter 27-1/2 of the City code to allow the ability to require more stringent detention requirements for developments where stormwater runoff flows to a sinkhole with existing surface flooding issues or areas downstream at the outlet of the sinkhole with existing flooding issues.
8. Require berms around sinkholes to protect sinkhole throats from being clogged with sediment and floatables (trash, etc.).
9. Require more specific detention requirements for developments where stormwater runoff flows to a sinkhole or karst system with flooding issues.
10. Require more specific water quality best management practices for developments where stormwater runoff flows to a sinkhole that discharges into a non-supporting stream.
11. Develop a policy to guide development and the incorporation of LID IMPs within areas that discharge to a sinkhole.
12. Continue to implement best management practices (BMPs) with emphasis on low impact and green infrastructure techniques and stormwater reuse to reduce the quantity and improve the quality of storm runoff to sinkholes from new and existing development.
13. Continue to prohibit construction of structures or on-site disposal systems within the sinkhole 100-year floodplain.
14. Modify, as necessary, land development regulations to ensure that land use and development decisions consider the physical suitability and natural resources of individual sites or areas of anticipated development within watersheds that discharge to sinkholes.
15. The City should consider appointing a task force to develop a karst/sinkhole policy that addresses development within watersheds that discharge to sinkholes. The task force should develop policy and specific guidance to address development related issues for karst watersheds with existing imperviousness greater than 10 percent; watersheds with existing flooding and water quality issues; sinkholes that discharge into streams with existing flooding and water quality issues; sinkholes within or discharge to areas that are sensitive and critical; and sinkholes that discharge to non-supporting streams.

Stormwater Planning and Low Impact Design Guide

The City's Stormwater Planning & Low Impact Design Guide (design guide) provides guidance on development of stormwater management site plans that are applicable to development activities which disturb an area of one acre or more, and/or where the total impervious area is increased by more than five percent above current land development (existing) conditions. New development or significant redevelopment in critical or sensitive areas identified through a watershed study or plan, may be subject to additional performance and/or regulatory criteria. The design guide also includes recommended BMPs to meet MS4 permit requirements and reduce the impacts of new and significant redevelopment impacts on stormwater runoff from the site.

The design guide contains the following five principles of stormwater management that should be kept in mind while preparing a Stormwater Management Site Plan for developing or redeveloping a site.

PRINCIPLES OF STORMWATER MANAGEMENT SITE PLANNING

Basic principles for sustainable water infrastructure management:

1. The site design should utilize an integrated approach to deal with stormwater quality protection, streambank protection, and flood control requirements.
2. Stormwater management practices should strive to utilize the natural drainage system and require as little maintenance as possible.
3. Structural stormwater controls should be implemented only after all site design and nonstructural options have been exhausted.
4. Structural stormwater solutions should attempt to be multi-purpose and aesthetically integrated into the site design.
5. "One size does not fit all" in terms of stormwater management solutions.

Through the use of prudent site design practices, natural drainage and treatment systems can be preserved.

Water Quality Strategies

The MS4 permit will soon require that the first 1.2 inches of a rainfall event be managed on site by infiltration, reuse, or low impact development practices. Figure 2.16, *Soil Suitability for Infiltration*, shows areas with soils that may be appropriate to meet the stormwater infiltration requirements. It was assumed if the soils could meet Natural Resource Conservation Service requirements for onsite septic systems then stormwater permit infiltration requirements could be met. If the infiltration requirements cannot be met for a proposed development, the MS4 permit allows other alternatives to meet the 80% TSS requirement. Figure 2.16, *Soil Suitability for Infiltration* shows areas with soils that are labeled as fair. Areas with fair soils reflect limitations that affect on-site septic systems based on criteria provided by TDEC. This means areas with these soils and land characteristics may not be approved for conventional septic systems such as the Septic Tank Effluent Pumping (STEP) system. Permeability of the fair soils are 0.6 to 2 inches per hour. The soils are typically silty, loamy, and mixture of silt-loam particles. Flooding of areas with fair soils is rare. The depth to bedrock is approximately 40 to 72 inches and depth to the high groundwater table is approximately four to six feet. Therefore, areas with fair soils shown on Figure 2.16, *Soil Suitability for Infiltration* can be assumed to have soils suitable to meet the MS4 permit requirement for stormwater infiltration.

Areas classified as not limited have soils and land characteristics that are generally favorable for use of a conventional septic system or stormwater infiltration. Soils within these areas are typically well drained with a permeability of two to six inches per hour. The areas never flood and depth to the high groundwater table is greater than six feet.

Figure 2.17, *Steep Slopes*, shows slopes which are greater than 10 percent. As shown on the map, steep slopes are generally found within the Urban Growth Boundary. The City street design criteria does not allow slopes steeper than 10 percent for roads. Figure 2.18, *Steep Slopes*, was compiled from a digital elevation model provided by the United States Geological Survey (USGS). Parcels for proposed development located on these slopes are referred to as critical lots and must meet a set of requirements such as a geotechnical investigation and detailed grading and drainage plan before these lots can be developed. It is difficult to utilize LID and GIP practices within areas with steep slopes. Water quality benefits are more effective for LID and GIP practices on slopes that are very flat.

TDEC has rules and regulations that govern on site suitability for domestic sewage disposal systems. These regulations are contained in Chapter 0400-48-01. Rule 0400-48-01-22(7) contains site restrictions for use of onsite domestic subsurface sewage disposal systems. Rule 0400-48-01-22(7)(a)2. states: "The soil material in the domestic septage disposal site shall be at least twenty-four (24) inches deep before subsurface rock formations or seasonal ground water is encountered". Rule 0400-48-01-22(7)(a)1. states: "Domestic septage disposal sites shall have a slope of twelve (12) percent or less". Figure 2.18, *Areas With Less Than Two Feet to the Seasonal High Groundwater Table*, shows areas within the planning area where the depth to the seasonal high groundwater table is less than two feet.

The following strategies are recommended to address water quality issues.

STRATEGY 2.4.5: *Reduce pollution associated with stormwater runoff and maintain compliance with MS4 permit requirements.*

ACTIONS AND INITIATIVES

1. Continue to emphasize site design guidance contained in the City design guide particularly for areas where infiltration is not practicable.
2. Modify, as necessary, land develop regulations to ensure that land use and development decisions consider the physical suitability and natural resources of individual sites or areas of anticipated development within watersheds.
3. Revise applicable ordinances and regulations to add specific guidance and requirements according to MS4 permit requirements for proposed developments within environmentally sensitive watersheds and watersheds where stormwater runoff flows into non-supporting streams.
4. Develop policy and specific guidance to meet MS4 permit requirements within watersheds that are not suitable for infiltration, green infrastructure, or low impact development practices.
5. Develop specific policy and guidance for developing retrofit plans for areas with existing development that discharge to a stream with EPA-approved or established TMDLs with emphasis on infiltration, evapotranspiration, and stormwater reuse.

Section 3.1.2 of the City's MS4 permit requires development of a retrofit plan for existing developed sites that discharge to streams with EPA-approved or established TMDLs. Town Creek is located in a highly developed area in the vicinity of Church and Broad Street. Approximately 700 feet of Town Creek is currently listed on the 2014 draft 303(d) list with EPA approved TMDLs and waste load allocations assigned to the City.

Town Creek is encapsulated from approximately the southeast corner of the intersection of Church Street and Broad Street to Front Street at the entrance to Cannonsburgh Pioneer Village. The length of encapsulation is approximately 1,850 feet. ICA Engineering prepared a report entitled, *Inspection of Town Creek Conveyance*, dated November 14, 2004 (ICA report). The report summarized the structural integrity of the encapsulation.

The City envisions that the stream can be daylighted and complement redevelopment of this area. Anticipated redevelopment includes a new transit center on West Main Street. Because of the existing greenway and

sidewalk network, the redevelopment would need to include pedestrian facilities likely at road grade since space may not exist to connect the system directly to the stream. The City envisions a low flow channel with vegetative treatment along with high flow capability since this is a FEMA-studied stream. This project would offer a retrofit opportunity for this area with low impact development principals and other water quality treatment of stormwater runoff prior to entering Town Creek.

Development Suitability

Map 2.3 *Environmental Constraints*, depicts environmental constraints that could severely limit the location and intensity of development within the planning area. Parameters shown on the figure include surface water, including 100-year floodplain and floodway, and wetlands; depth to bedrock and water table; sinkholes; steep slopes; and soils suitability for septic systems and infiltration for water quality (culmination of Figures 2.13 through 2.18). On the opposing page, Map 2.4, *Development Suitability*, depicts areas that are suitable for development.

[Continued on page 2.60]

The City has highlighted Town Creek for a potential retrofit plan as it is located in a highly developed area that has connections to existing greenway and sidewalk infrastructure.



Upstream Entrance to Encapsulated Town Creek

Source: ICA Report

Land Suitability Components

Floodplains

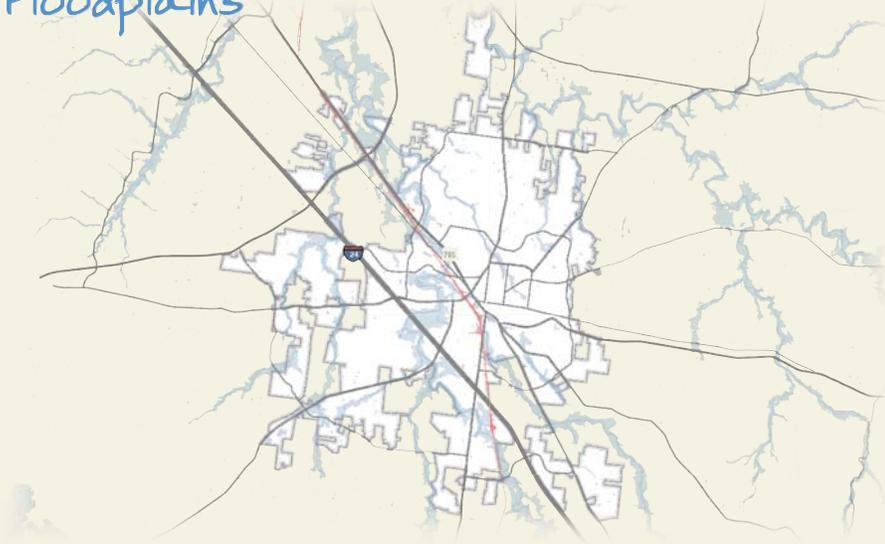
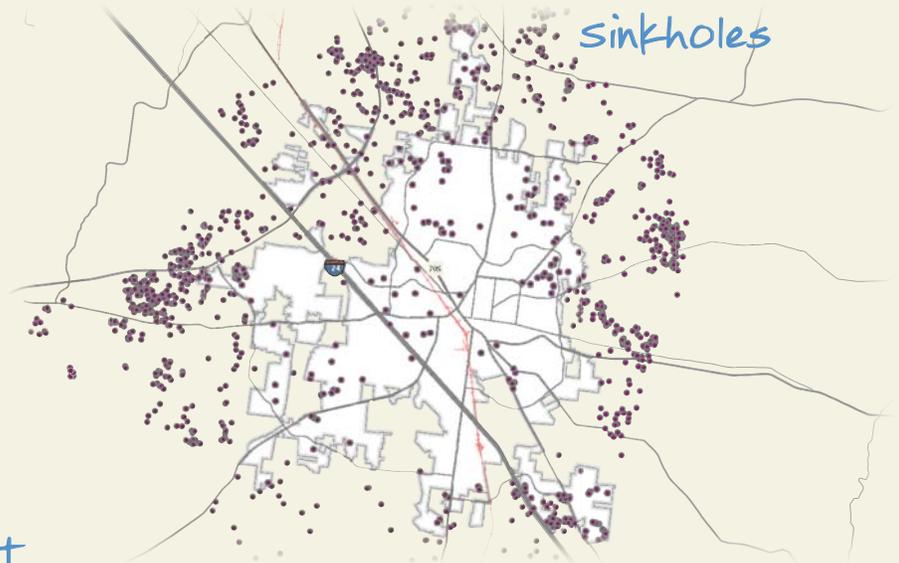


FIGURE 2.14, SINKHOLES

Sinkhole locations are essentially points on the map, which make delineation somewhat problematic to discern how developable these areas may be. Areas where sinkholes are clustered would indicate that development within these areas may be difficult. Sinkholes are a major source of flooding and drainage issues within the City and UGB. Sinkholes present a potential for flooding and pollution of the groundwater. Flooding and drainage issues within areas with sinkholes is complex often consisting of poorly defined natural drainage systems, multiple complex karst drainage basins, and closed depressions.

FIGURE 2.13, FLOODPLAINS

Development within the 100-year floodplain and floodway may result in erosion of the channel banks, increased flood heights, and high velocities which could threaten the health, safety, and welfare of the public. Development within the floodplain and floodway also reduces the floodplain's ability to store excess water, sending more water downstream causing floods to rise to higher levels. Development is not allowed within wetland areas without considerable expensive mitigation.



Areas with Less Than 3 Feet to bedrock

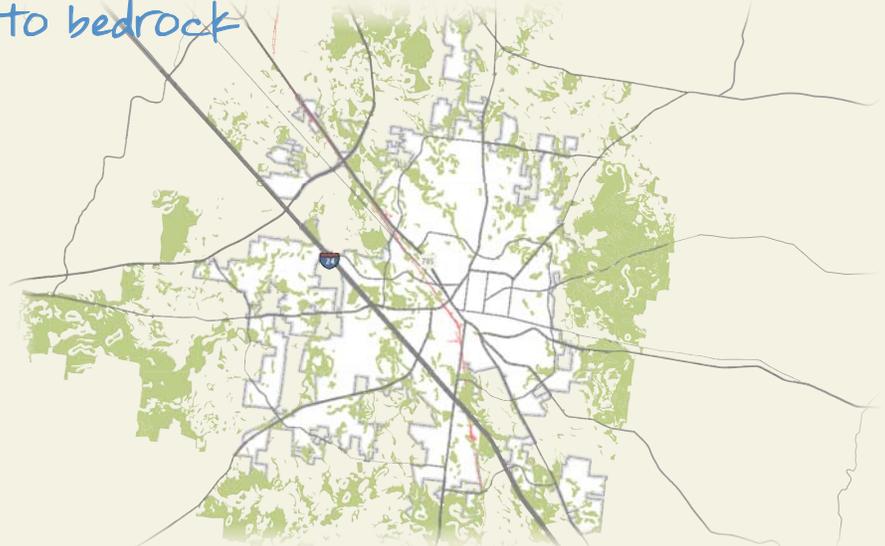


FIGURE 2.15, AREAS WITH LESS THAN 3 FEET TO BEDROCK

The Tennessee Department of Environment and Conservation will not allow onsite septic systems on lots where the depth to bedrock is three feet below the existing ground and seasonal high groundwater table is less than two feet below existing ground. These areas can only be developed if sanitary sewer service is available. Development within these areas are not suitable for green infrastructure practices that encourage infiltration to meet water quality requirements. These areas may flood since the ground quickly becomes saturated due the lack of water storage between the existing ground and top of rock or seasonal high groundwater.

soil suitability for Infiltration

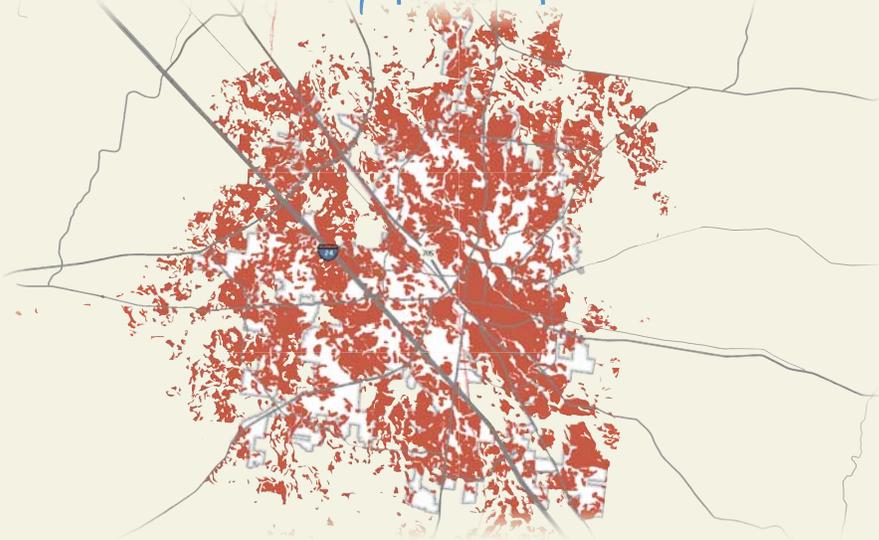


FIGURE 2.16, SOIL SUITABILITY FOR INFILTRATION

Soil suitability parameters include soils classified as very limited by the Natural Resources Conservation Service (NRCS) for conventional septic systems such as the STEP system and use as infiltration for water quality. These areas are where soil and land characteristics have one or more features unfavorable for storm water infiltration or a conventional septic system. Limitations for areas with very limited soils are generally difficult to overcome without major soil reclamation.

FIGURE 2.17, STEEP SLOPES

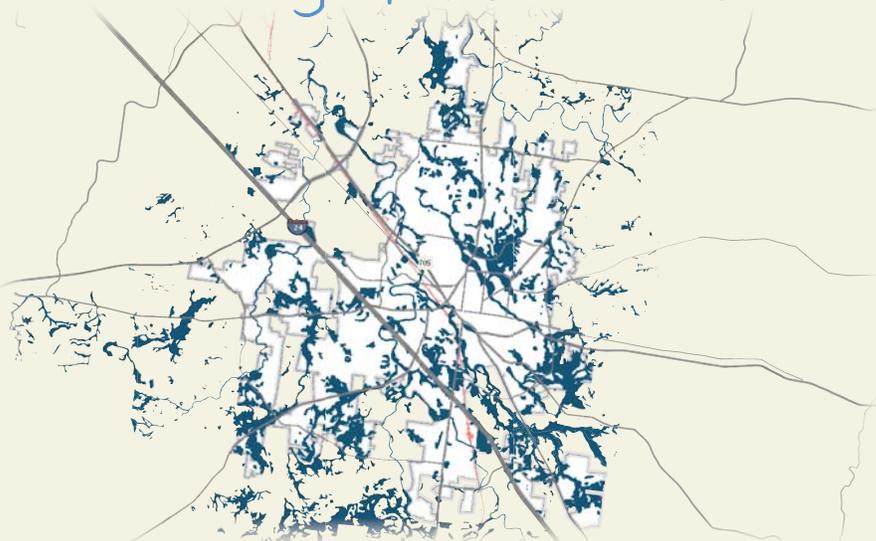
Steep slopes are defined as slopes greater than ten percent. City design standards do not allow road grades greater than ten percent. Green infrastructure practices and best management practices for water quality that rely on infiltration are not effective on steep slopes. Precipitation that falls on steep slopes cannot be efficiently absorbed which results in increased stormwater runoff.

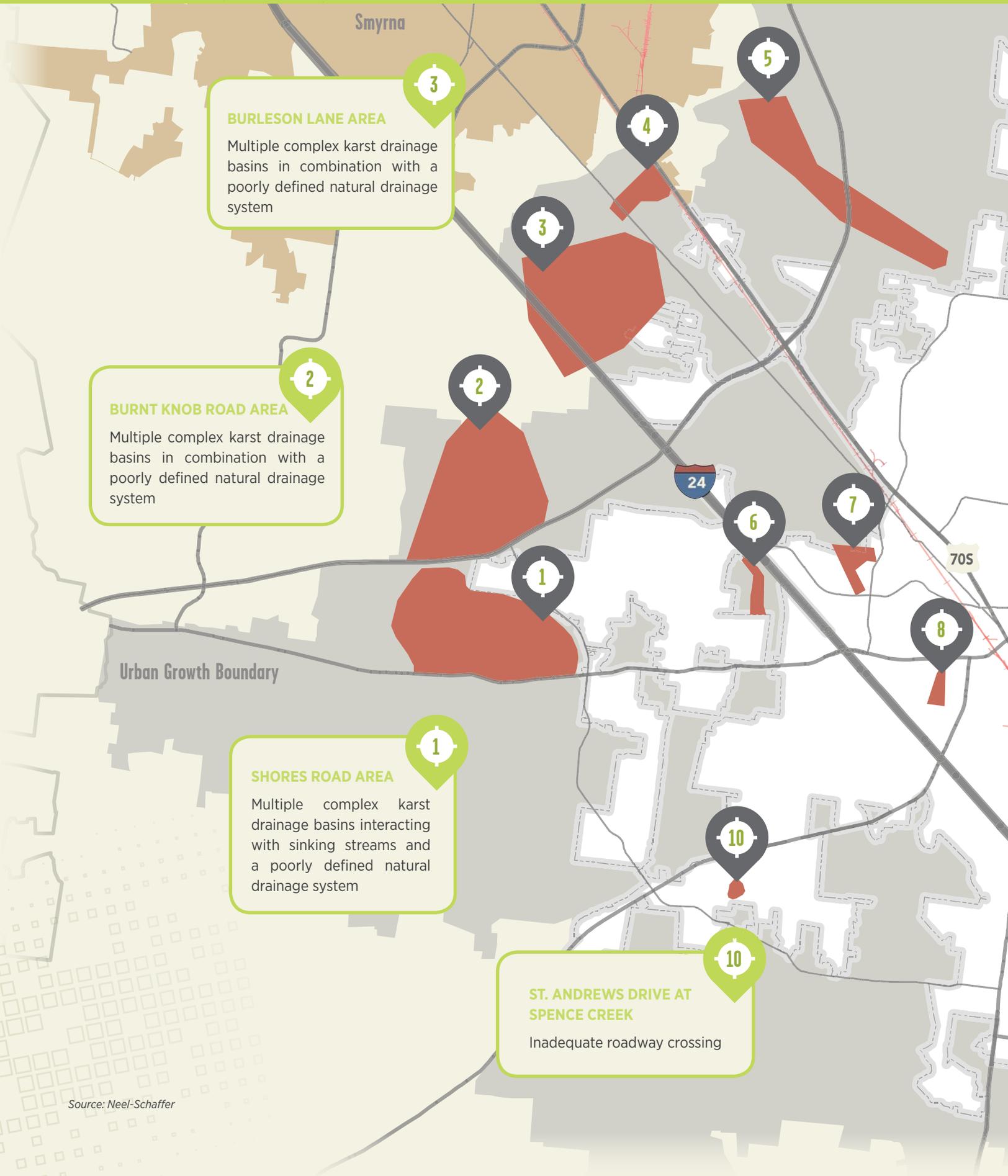


FIGURE 2.18, AREAS WITH LESS THAN 2 FEET TO SEASONAL HIGH GROUNDWATER TABLE

There are areas within the planning area where the seasonal high groundwater table is less than two feet below the existing ground and development is not practical. The Tennessee Department of Environment and Conservation (TDEC) will not allow on site domestic septic systems where the seasonal high groundwater table is less than two feet below the existing ground.

Areas with Less Than 2 Feet to Seasonal High Groundwater Table





BURLESON LANE AREA
Multiple complex karst drainage basins in combination with a poorly defined natural drainage system

BURNT KNOB ROAD AREA
Multiple complex karst drainage basins in combination with a poorly defined natural drainage system

SHORES ROAD AREA
Multiple complex karst drainage basins interacting with sinking streams and a poorly defined natural drainage system

ST. ANDREWS DRIVE AT SPENCE CREEK
Inadequate roadway crossing

Source: Neel-Schaffer

Areas with Existing Drainage Issues

FIGURE 2.19, AREAS WITH EXISTING DRAINAGE ISSUES





Chapter 2

COMP PLAN TASK FORCE DRAFT 1.26.2015

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2.5 Managing Utilities Infrastructure: Water

Potable water service is provided to the City of Murfreesboro by two primary entities – The Murfreesboro Water and Sewer Department (MWSD) and the Consolidated Utility District of Rutherford County (CUD). MWSD provides drinking water supply for the majority of the customers within the city limits of Murfreesboro as well as wastewater collection, treatment and disposal services for the current city limits and portions of the area within the Urban Growth Boundary (UGB).

Four separate utility districts were formed in the 1960s to provide water service to customers in unincorporated

areas of Rutherford County. The CUD was originally formed by the consolidation of the Double Springs and Stones River districts in 1968. Soon afterwards the Florence and Rockvale districts merged with CUD as well. The district serving Eagleville was merged with CUD in the 1990s. Today CUD’s service area covers all of the unincorporated areas of Rutherford County as well as Eagleville. As the City of Murfreesboro expands into Rutherford County, it is anticipated that most new city residents will be water customers of CUD.

Effective Utility Management

MWSD has embraced the tenets of effective utility management (EUM) for the management of daily activities at their respective utilities. CUD has established certain processes and systems that address EUM goals. Details of their respective programs are reviewed in the sections that follow.

[Continued on page 2.63]



Membranes at Stones River Water Treatment Plant
Source: Smith Seckman Reid, Inc.



HOW CAN WE BETTER MANAGE THE RESOURCES ENTRUSTED TO US?

“The common thread in EUM is efficiency improvement. Managing a water/wastewater system asset is not like owning car. We can’t just trade it in for a new model when it gets outdated or unreliable. Instead we must intentionally focus on making what we have work like new...making every dollar, every manhour, and every decision count. We must produce reliably 24/7.”

Stones River Water Treatment Plant

Source: Smith Seckman Reid, Inc.

BENCHMARKING

MWSD has fully embraced the attributes of EUM and intends to use all of the program's data to benchmark themselves against similar systems within the state of Tennessee and across the U.S. The EUM commitment has involved the entire MWSD senior leadership and the Murfreesboro Water and Sewer Board. These individuals have attended training seminars and conferences related to EMU. At a planning retreat in 2013, the Board and senior staff were asked to prioritize the ten attributes of effective utility management in order to set the priorities for the Department moving forward. The ranking of those attributes indicated that financial viability, customer service and product quality were the three top ranked attributes for MWSD.

MWSD hired a full time EUM coordinator in 2013 to facilitate movement towards implementation of the EUM protocols. Based upon the ranking of the attributes and a self-assessment performed by MWSD, a number of system changes have been implemented or are planned.

The CUD has invested heavily into EUM component processes as well including an improved customer information system (CIS), as well as automatic meter reading (AMR) equipment for improved accuracy and monitoring of water distribution system meters.

CIS

The CUD has invested heavily into systems including an improved customer information system (CIS). CUD's system allows payment in person, by phone, by automated bank draft, or online. A CIS has been deployed by MWSD in order to improve customer satisfaction and the experience of their customers with respect to on-line billing, credit card payments, and resolution of any customer service issues.

AMI

CUD has had automatic meter reading (AMR) for all water meters within its distribution system in place for several years. MWSD is reviewing advanced metering infrastructure (AMI) proposals for replacement of water meters within its distribution system, as well as, the deployment of on-line leak detection technology that uses sonic devices. MWSD intends to implement the AMI system in FY 2015.



IN DECEMBER 2010, THE WATER ENVIRONMENT RESEARCH FOUNDATION (WERF) RELEASED "SUSTAINABLE INTEGRATED WATER MANAGEMENT STATE OF THE KNOWLEDGE." INSIDE THIS DOCUMENT WAS INCLUDED A CHALLENGE STATEMENT FOR WATER UTILITIES ACROSS THE US. THIS CHALLENGE WAS:

"To advance a paradigm shift in water management for cities and towns toward next generation, integrated, sustainable systems. These systems would:

- Integrate wastewater, stormwater, drinking water, and other water resources;**
- Maximize energy, materials and water recovery;**
- Be safe and resilient to external impacts;**
- Protect water quality for designated uses;**
- Maximize triple-bottom line benefits;**
- Leverage existing and emerging models for service delivery; and**
- Incorporate integrated and comprehensive water planning and smart growth planning at the national, regional and watershed/local level."**

These paradigm shifts are highlighted throughout Chapter 2 in the appropriate sections and annotated with the water drop symbols.



The deployment of these systems also allows CUD and MWSD to improve operational efficiencies, reduce operational expenses and, in general, improve their level of service to the customers in the City of Murfreesboro. This technology allows CUD and MWSD to proactively operate and maintain their water systems to reduce real and apparent losses from the water distribution system and to optimize the operation of both systems.

SCADA

Supervisory control and data acquisition systems (SCADA) have become the industry standard for water systems. SCADA systems enable utilities to constantly monitor operational parameters for existing treatment processes and distribution infrastructure. MWSD and CUD have implemented SCADA technology for their water treatment plants and their respective distribution systems.

GIS

The CIS, AMI, and SCADA systems for both CUD and MWSD are fully integrated with previous investments in geospatial information systems (GIS). The GIS system covers the entire county. Both CUD and MWSD have a team of GIS professionals responsible for routinely updating and maintaining this information for accuracy.

HYDRAULIC MODELING

CUD utilizes calibrated hydraulic modeling extensively within their systems in order to optimize their operation and maintenance of the water distribution system. The model also provides CUD with a tool to determine optimal pipe sizing for new or improved service and aids in control of water quality.

MWSD also utilizes a calibrated hydraulic modeling to optimize their operation and maintenance of the water distribution systems. The model provides MWSD with a tool to determine optimal pipe sizing for new or improved service and assists in control of water quality.

FINANCIAL PERFORMANCE

Both MWSD and CUD are operated in a financially sound manner. Each entity maintains a positive annual bottom line as well as an adequate debt service coverage ratio.

Extension Policy

Both MWSD and CUD encourage extension of water service within their respective service areas. Details of such extensions vary based on the location of the proposed customer and availability of existing facilities. All extensions must be made in accordance with the

Principles of Sustainable Water Infrastructure

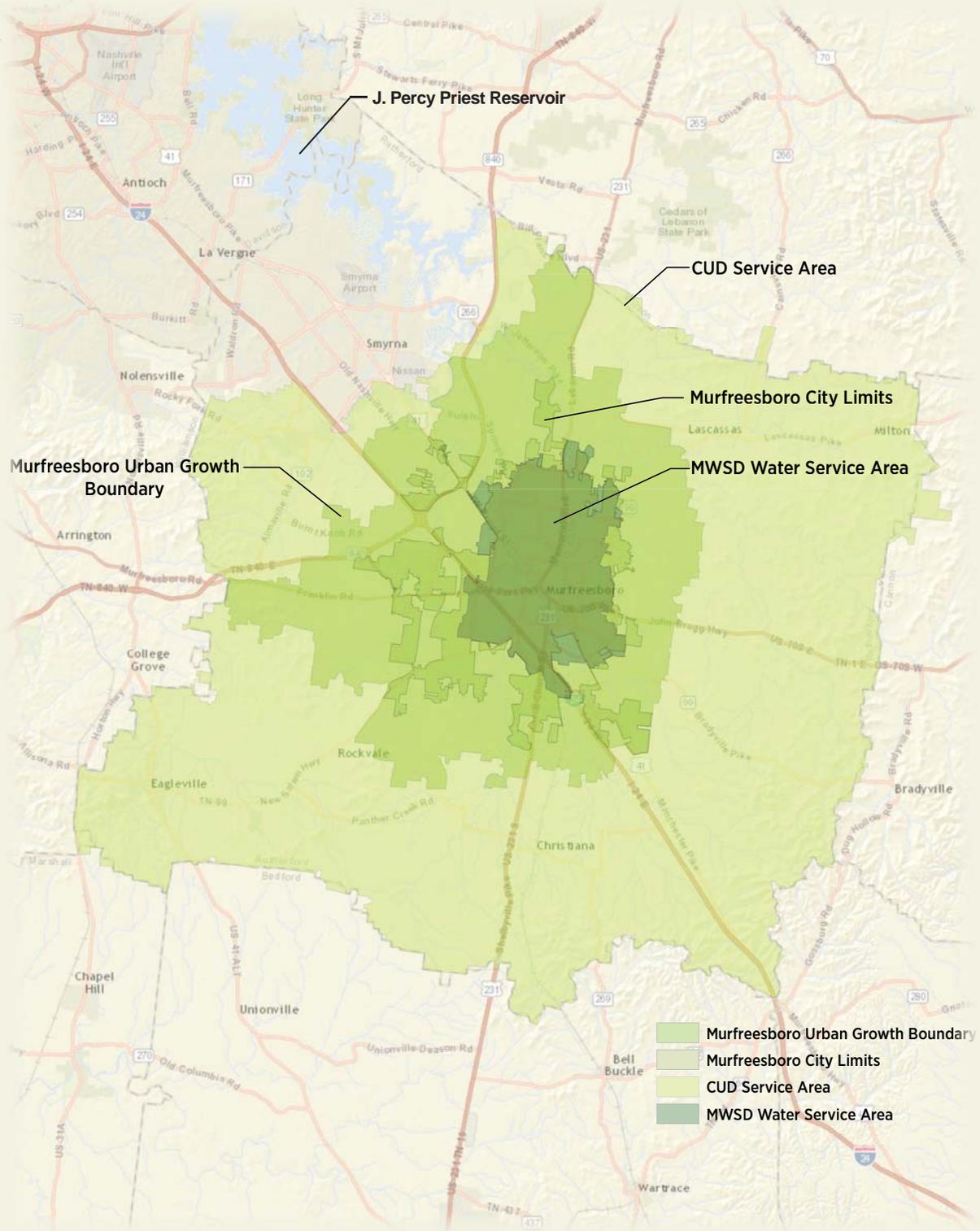
Basic principles for sustainable water infrastructure management:

- ▶ **Adaptable:** Maximize flexibility and future adaptability to climate change and other conditions;
- ▶ **Watershed scale:** Plan and Implement water infrastructure at a watershed scale;
- ▶ **Natural infrastructure:** Protect and restore natural system functions;
- ▶ **Decentralize:** Integrate decentralized, distributed green infrastructure that replicates natural hydrology with built infrastructure;
- ▶ **One water:** Integrate drinking water, wastewater, and stormwater and fit the best water to its use;
- ▶ **Resource efficiency:** Optimize conservation and efficiency investments before developing new supply or expanding treatment;
- ▶ **Multiple benefits:** Maximize the environmental, social, and economic benefit of every infrastructure dollar; Pricing: Price water, wastewater, and stormwater for ratepayers/customers to meet the total cost of sustainability requirements;
- ▶ **Full life cycle:** Plan, manage, and account for full life cycle infrastructure expenditures;
- ▶ **Asset management:** Apply best industry practices for repair/rehabilitation and replacement and innovative management;
- ▶ **Good governance:** Governing boards, city councils, and special utility boards should be designed to ensure sustainability and transparency.

Source: Waterless World, July 2014. "Creating a New Sustainable Water Infrastructure"

Potable Water Supply

FIGURE 2.20, SERVICE AREAS OF CUD AND MWSD



plan of service (or utility master plan) for the area and current customer policies. In most cases the applicant or developer will have responsibility for extending water lines to serve the proposed customer(s).

Current Plants Capacity and Flow

Drinking water for the City of Murfreesboro is provided both by MWSD and CUD. Each system has a surface water treatment plant that draws raw water from the East Fork Stones River and/or J. Percy Priest Reservoir.

The MWSD operates the Stones River Water Treatment Plant which is one of the largest membrane filtration facilities and the first lime softening facility in the State of Tennessee. The Stones River Water Treatment Plant is a 20.0 MGD nominally rated facility with adequate space remaining for an expansion up to approximately 24.0 MGD. The facility is one of the most technologically advanced water treatment plants in the State of Tennessee, utilizing membrane filtration, granular activated carbon (GAC) contactors, on-site sodium hypochlorite generation and a robust SCADA system for monitoring raw water quality and treatment process variables.

CUD operates a 16.0 MGD treatment plant located in the backwaters of the J. Percy Priest Reservoir. This facility utilizes conventional flocculation, sedimentation, and granular media filtration, as well as, an advanced oxidation chlorine dioxide for iron, manganese and total organic carbon reduction. The plant is equipped with a membrane backwash recovery system to minimize water waste.

MOR SUMMARY

MWSD and CUD compile monthly operation reports (MOR) that provide details of daily water treatment plant operations. Parameters that are traced by the report include raw water quantity, raw water quality, finished water quantity, and finished water quality.

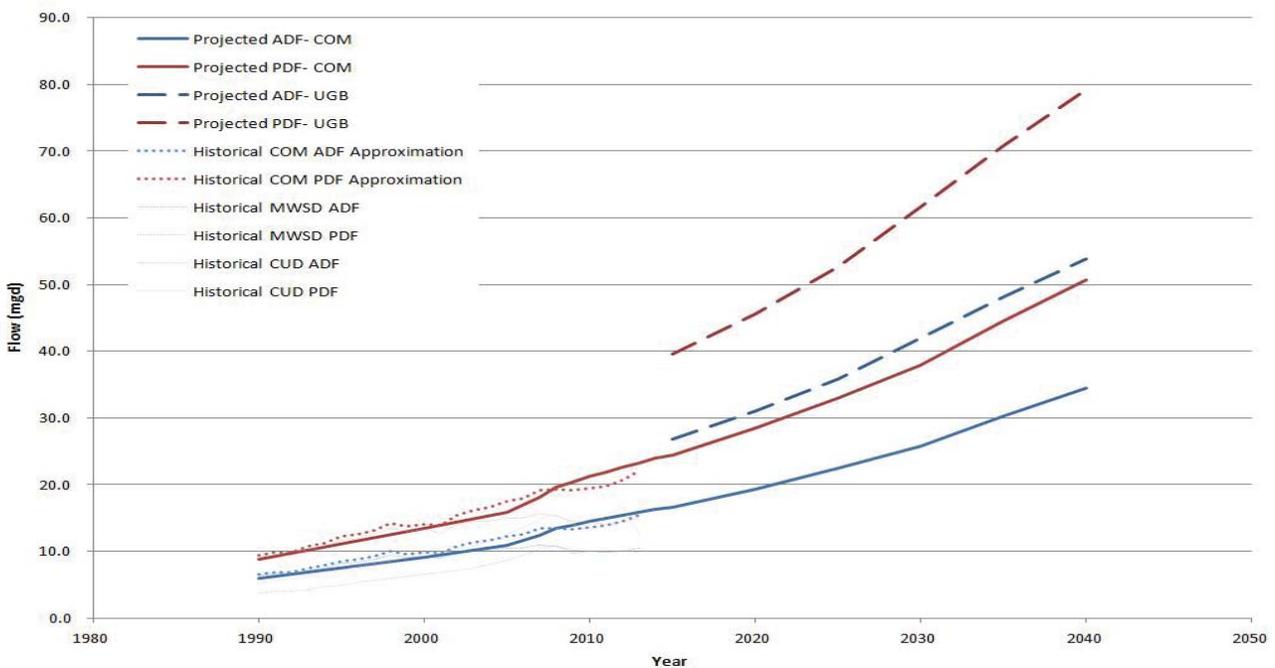
The average water demand for CUD is about 11 MGD and the average demand for MWSD is about 10 MGD. Water demands for each system over the last two decades are shown in Figure 2.21, *City of Murfreesboro Potable Water Demands*.

PRESSURE ZONES

MWSD has one pressure zone that serves the entire water distribution system. CUD has fourteen (14) different pressure zones within its system.

[Continued on page 2.68]

FIGURE 2.21, CITY OF MURFREESBORO POTABLE WATER DEMANDS



Distribution System

TABLE 2.4, DISTRIBUTION SYSTEM

Table 2.4, *Distribution System*, summarizes the inventory of existing distribution lines for CUD and MWSD systems.

Water Line Size and Length Summary			
CUD		MWSD	
Size (in.)	Length (ft.)	Size (in.)	Length (ft.)
3/4	382	1	7,081
1	433	2	87,654
2	113,192	3	22,397
2	48,305	4	52,888
3	556	6	415,072
3	6,041	8	1,031,591
4	341,776	10	246,565
6	3,167,523	12	174,734
8	1,877,278	16	213,099
10	206,952	20	23,645
12	496,628	24	29,687
16	177,345	36	4,359
18	174	MWSD Total	2,308,771
20	250,607		
24	43,997		
30	85,282		
36	10,554		
42	358		
48	46,797		
CUD Total	6,874,181		

COE Withdrawal Allocation

The original congressional authorization for J. Percy Priest Dam and Reservoir did not include a provision for water supply. In 2000 MWSD and CUD asked the Corps to study the possibility of obtaining water supply from J. Percy Priest Reservoir. The US Army Corps of Engineers performed a study of the reservoir to determine if some of the existing storage volume could be allocated to water supply. The results of the study indicated that allocation for water supply was indeed available and set a price for the cost of the storage required to meet the water supply demands.

CUD contracted with the Federal Government that allows the District to withdraw up to 16.0 MGD of raw water from the J. Percy Priest Reservoir. MWSD has a contract with the Federal Government that allows the City to withdraw up to 18.6 MGD. Both service providers have asked for additional allocations of water from the reservoir to meet future growth.

Volume of J. Percy Priest Reservoir for intended uses.

Storage Capacities, acre-feet	
Flood control (Elev. 504.5-490.0)	260,000
Power drawdown (Elev. 490.0-480.0)	124,000
Permanent pool (below Elev. 480.0)	268,000
Total (below Elev. 504.5)	652,000



Lime Softening

Source: Smith Seckman Reid, Inc.

Interconnections between MWSD, CUD, Smyrna

There is a definite sense of partnering between CUD and MWSD in an effort to ensure consistent levels of service for customers, especially within the city limits of the City of Murfreesboro. Interconnections between CUD, MWSD, and the Town of Smyrna’s water distribution systems improve service and efficiency within their respective distribution systems and provide for redundancy in the event of system emergencies.

CUD has an agreement with Smyrna that allows CUD to purchase 1 MGD of water on a daily basis and up to 2.0 MGD on an as-needed basis. This agreement gives CUD a source for some of its anticipated future water supply growth.

CUD and MWSD have two proposed interconnections. One is near the MWSD water plant on Compton Road. The other is on County Farm Road.

SYSTEM HYDRAULICS

Due to differences in operating hydraulic grade lines, CUD has to boost the system pressure at its connection with Smyrna to move water into its distribution network. The connections between CUD and MWSD operate at roughly the same hydraulic grade line allowing water to move between providers without adjusting system pressure.

The similarity in system pressures may allow for increased interconnections between the two entities to improve water quality and availability in certain areas of the respective service areas. It has been proposed to combine the individual hydraulic models for MWSD, CUD and the Town of Smyrna into an “Integrated” model that would allow for the evaluation of potential interconnections. This combined model could be incorporated into the proposed Water Resource Integration Plan described in Section 2.8, *Managing Utilities Infrastructure: System Challenges*.

POTENTIAL EXPANSIONS OR ADDITIONS

These partnering efforts are expected to continue to expand and improve in the future. Expansion could include additional points of connection, joint operations of services areas and shared treatment capacities.

Storage

CUD AND MWSD CAPACITIES

MWSD and CUD maintain a series of water storage reservoirs that provide emergency supply and hydraulic equalization for their systems. The storage tanks and sizes and total storage capacity for each system are shown in Table 2.5, *MWSD Capacity* and Table 2.6, *CUD Capacity*.

TABLE 2.5, MWSD CAPACITY

MWSD Tanks	Capacity (MG)
Mill Street	2
Jones Boulevard	2
Halls Hill	3
Stoney Meadows	2
WTP Clearwell	2
Tiger Hill	3
MWSD Total Storage	14

TABLE 2.6, CUD CAPACITY

CUD Tanks	Capacity (MG)
Baker Road	2
Big Springs	1
Eagleville	0.25
Fosterville	0.4
Halls Hill II	3
Milton	0.5
Mooreland Lane	3
Rice Ranch	1
Rocky Fork	0.5
Tiger Hill I	1
Tiger Hill II	4
Two Hills I	1
Two Hills II	5
Whitus Road	0.1
CUD Total Storage	22.75



Jones Boulevard Tank
Source: Smith Seckman Reid, Inc.

Fire Protection

Both MWSD and CUD face a challenge from the competing interests of providing fire protection while at the same time controlling disinfection byproducts (DBP) formulation. Significant levels of fire protection have been requested by commercial and industrial customers along the I-24 corridor on the south side of the city of Murfreesboro. Unfortunately, both CUD and MWSD's water treatment facilities are located in the northwest corridor of the City of Murfreesboro, nearest to the J. Percy Priest Reservoir. In order to provide high levels of fire protection to these entities, both MWSD and CUD have to install large diameter potable water distribution mains to the farthest reaches of their service areas. The resulting approximate fire flow capacities throughout the respective service areas are illustrated in Figure 2.22, *Fire Flow Capacities*.

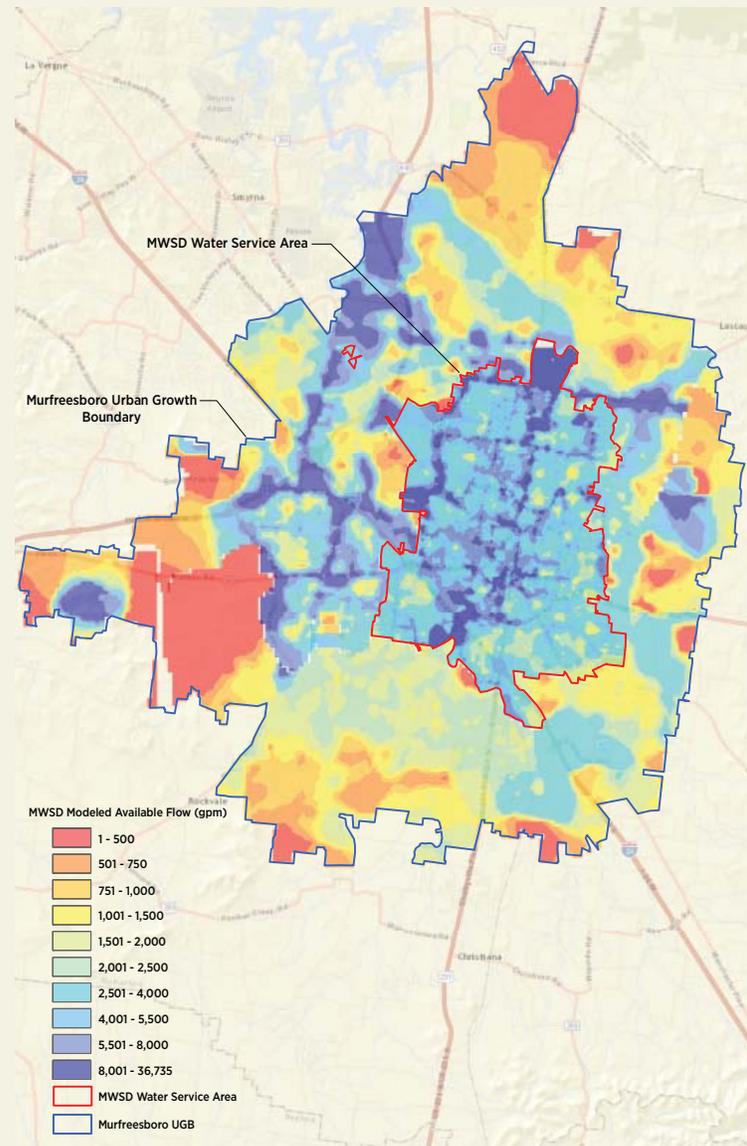
In general, potable water needs for residential and commercial customers are far less than fire protection needs, allowing for comparatively smaller line sizes. Because fire protection needs dictate sizing of transmission mains, during periods when only residential and commercial needs are present (which is most of the time), water moves very slowly through these larger distribution mains. This translates into longer residence times and a greater potential of developing DBPs. In order to balance these competing needs and provide for the fire protection requirements of potential commercial and industrial customers, decentralized fire protection systems may be required. These systems involve onsite storage and pumping of the water required to meet the individual needs of the customers.

Water Loss and Leak Detection

CUD and MWSD average water loss is 19 percent and 25 percent respectively. These values fall within the guidelines established by the American Water Works Association and State of Tennessee. In order to better utilize the water that has been treated and pumped from their respective water treatment plants, both CUD and MWSD have implemented aggressive water loss reduction programs within their distribution systems.

CUD regularly dispatches water loss crews within their distribution system using sonic technologies to identify leaks within the distribution system. CUD has also contracted for a pilot program for a service that will utilize thermal imaging to locate potential water leaks within their distribution system. CUD has replaced all of

FIGURE 2.22, FIRE FLOW CAPACITIES



their meters with automatic meter reading equipment to capture more revenue from water sales as well as identify and reduce water loss within the distribution system. CUD recently implemented a program for pipe materials that is intended to reduce water line leaks.

MWSD is currently in the early stages of implementing an advanced metering infrastructure system (AMI) that includes replacing all water meters within its distribution system with newer technology. The AMI technology will allow real time monitoring of all meters, to improve both

the level of service for the customers and identification of potential leaks in both residential and commercial properties. Murfreesboro will also deploy permanently installed sonic listening devices in the distribution system to improve their ability to identify and isolate leaks within the distribution system.

MWSD recently signed an agreement for a pilot program for a drive-by thermal imaging system that purports the ability to identify water leaks below ground surface utilizing a technology similar to the Google Earth drive-by cameras.

Compliance

Both CUD and MWSD maintain their water systems in compliance with all applicable laws and regulations as required by the Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC).

TDEC conducts annual Sanitary Surveys that review operational performance and record keeping requirements related to water distribution and treatment systems. The results of the surveys are shown in a numerical score. Any issues identified by the survey are corrected. Both MWSD and CUD have annual scores that are in the approved range.

The 1998 amendment to the EPA's 1996 Safe Drinking Water Act requires water providers to publish a Consumer Confidence Report every 12 months. The goal of the EPA is to inform all customers about water quality issues in their area and to give customers any information needed to become involved in local water issues, if so desired. Both systems have been testing their water for years and their water passes the required testing annually. Each system produces an annual water quality report as required by EPA.

In July 2014, MWSD received the Award of Excellence from the Kentucky Tennessee Section of the American Water Works Association for Distribution System Operations. This award requires operation of the water treatment and distribution system without a single violation of any state or federal drinking water regulations. This award is a testament to dedication of the MWSD to providing safe and economical drinking water to its residents and customers.

STRATEGY 2.5.1: Cooperation with Local Water providers.

Since much of the growth for the City of Murfreesboro will occur within the service area of the Consolidated Utility District (CUD), continued cooperation with CUD will be essential to foster this growth.

ACTIONS AND INITIATIVES:

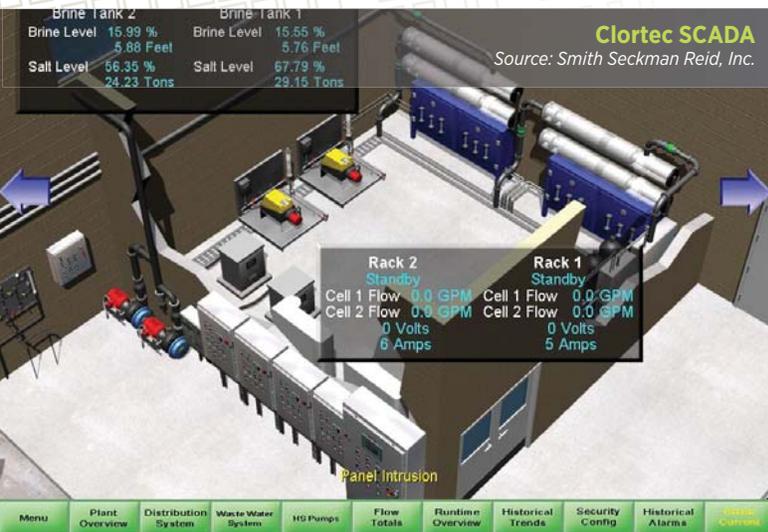
- ▶ Combine Compile the hydraulic water models for MWSD, CUD and the Town of Smyrna into a single unified water model. Utilize this model to determine supply limitations and simulate interconnections between the utilities to determine if the required demands could be satisfied through a cooperative effort.
- ▶ Monitor plant production levels, and evaluate if surplus capacity exists at any one of the three plants, or if expansion of one plant could benefit another utilities and provide economies of scale.
- ▶ Seek to equalize treatment levels to provide similar quality of water to customers.

STRATEGY 2.5.2: Reduce Non-Revenue Water.

Both CUD and MWSD have determined that a significant portion of the water produced at their water treatment facilities is not adequately being accounted for. A portion of this water is lost due to leaks in the distribution systems and a portion of the water is unaccounted for due to aged metering issues.

ACTIONS AND INITIATIVES:

- ▶ Implement automatic meter reading (AMR), automated metering infrastructure (AMI) and leak detection technologies to improve accounting of delivered water and identify significant leaks within the distribution system.
- ▶ Utilize geospatial information systems (GIS), asset management and computerized maintenance management systems to track and monitor aged infrastructure for increases in the likelihood of leaks and system integrity issues.
- ▶ Implement water main rehabilitation or replacement programs for infrastructure nearing its useful life or which indicates excessive rates of leakage or failure.



Strategy 2.5.3: Evaluate alternative sources of water.

The reallocation study currently underway by the Corps of Engineers represents a significant concern for continued growth of the City of Murfreesboro and Rutherford County. Alternative sources of water should be identified and evaluated to determine adequacy and cost of treatment.

ACTIONS AND INITIATIVES:

- ▶ Initiate a Water Resource Integration Plan (WRIP) study to evaluate potential water sources including the Cumberland River, indirect potable reuse (IPR), direct potable reuse (DPR), interconnections, and other feasible alternatives.
- ▶ Evaluate conservation activities as a means of reducing the necessity for expanded water source availability. Develop a campaign to educate citizens and community groups on the ways to reduce water consumption and waste, including do-it-yourself, low-cost measures such as residential water catchment and water-efficient fixtures.



PARADIGMS

CURRENT PRACTICE

Treat all supply-side water to potable standards

NEW PARADIGM

Apply “right water for right use” – level of water quality supplied is based on the intended use.

Source: WERF Sustainable Integrated Water Management

2.6 Managing Utilities Infrastructure: Wastewater

Effective Utility Management

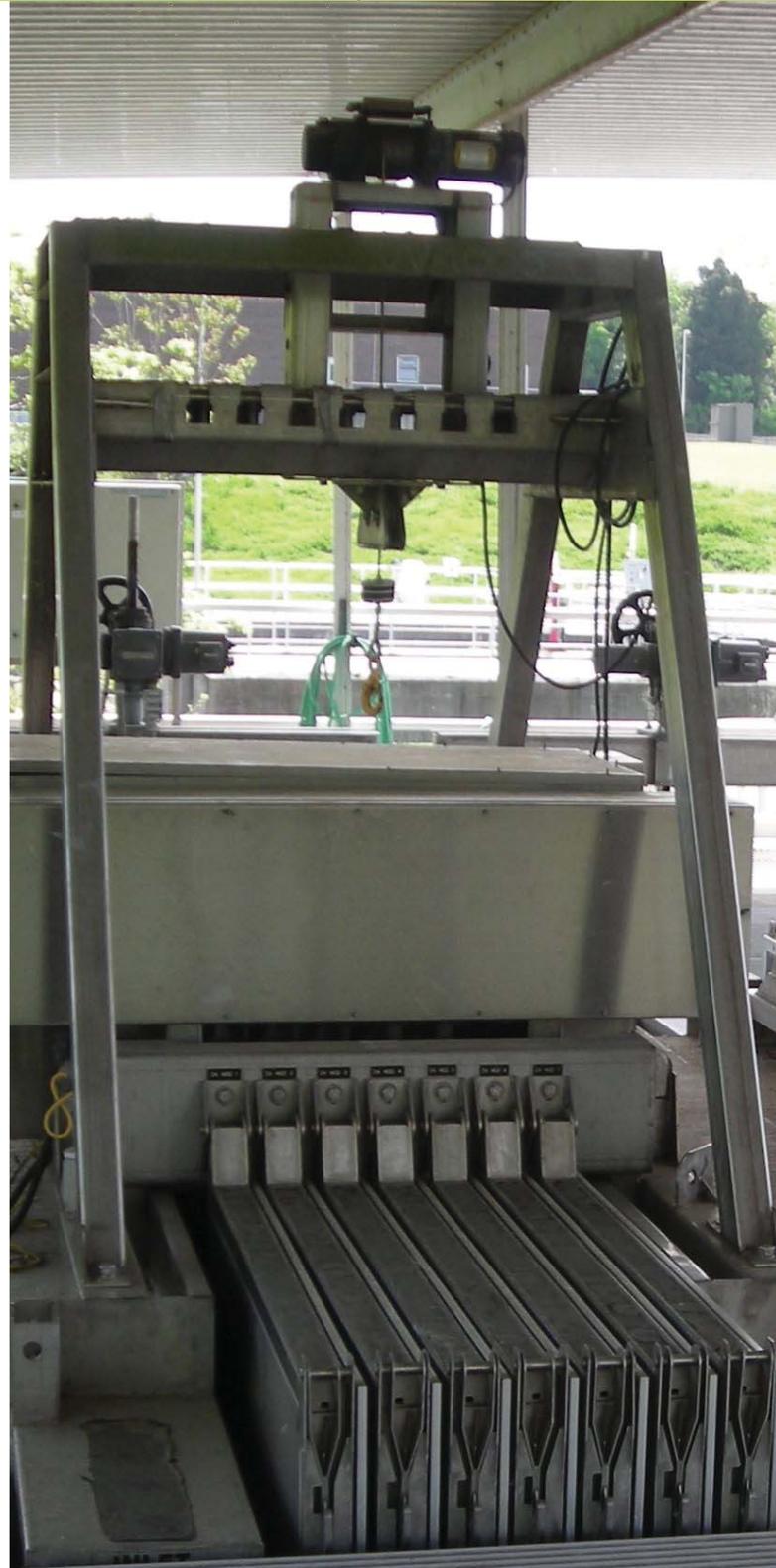
MWSD provides wastewater service to about 40,000 customers within the City of Murfreesboro. Approximately 40 percent of MWSD's sewer customers are within CUD's water service area. The service area for MWSD wastewater system is shown in Figure 2.23, *MWSD Wastewater System Service Area*.

CUD does not have a centralized wastewater system. CUD endorses the use of decentralized septic tank effluent pumping (STEP) systems when connection to the MWSD collection system is not feasible. STEP systems are generally built to serve localized connections, though some systems may serve more than one development. The systems are composed of collection lines with recirculating sand filters for treatment. Effluent disposal is accomplished via sub-surface drip lines. CUD operates approximately 50 decentralized systems

Extension Policy

Both MWSD and CUD encourage extension of wastewater service within their respective service areas. Details of such extensions vary based on the location of the proposed customer and the availability of existing facilities. As a general rule, extension of both water and wastewater service are required for sizable residential, commercial, or industrial developments. The areas of the Planning Area that are most conducive to such extensions are generally those that are within close proximity to significant water transmission and wastewater collection system lines. Figure 2.24, *Growth Capacity* illustrates those properties which are within 1/2 mile of either a 12-inch waterline or sewerline, or both within both MWSD's and CUD's service areas. While a detailed assessment of available capacity in these lines must be compared to projected water and wastewater flows from the development, this illustration roughly delineates those areas that have sufficient infrastructure for possible developments.

[Continued on page 2.76]



Sinking Creek Wastewater Treatment Plant UV

Source: Smith Seckman Reid, Inc.

FIGURE 2.23, MWSD WASTEWATER SYSTEM SERVICE AREA

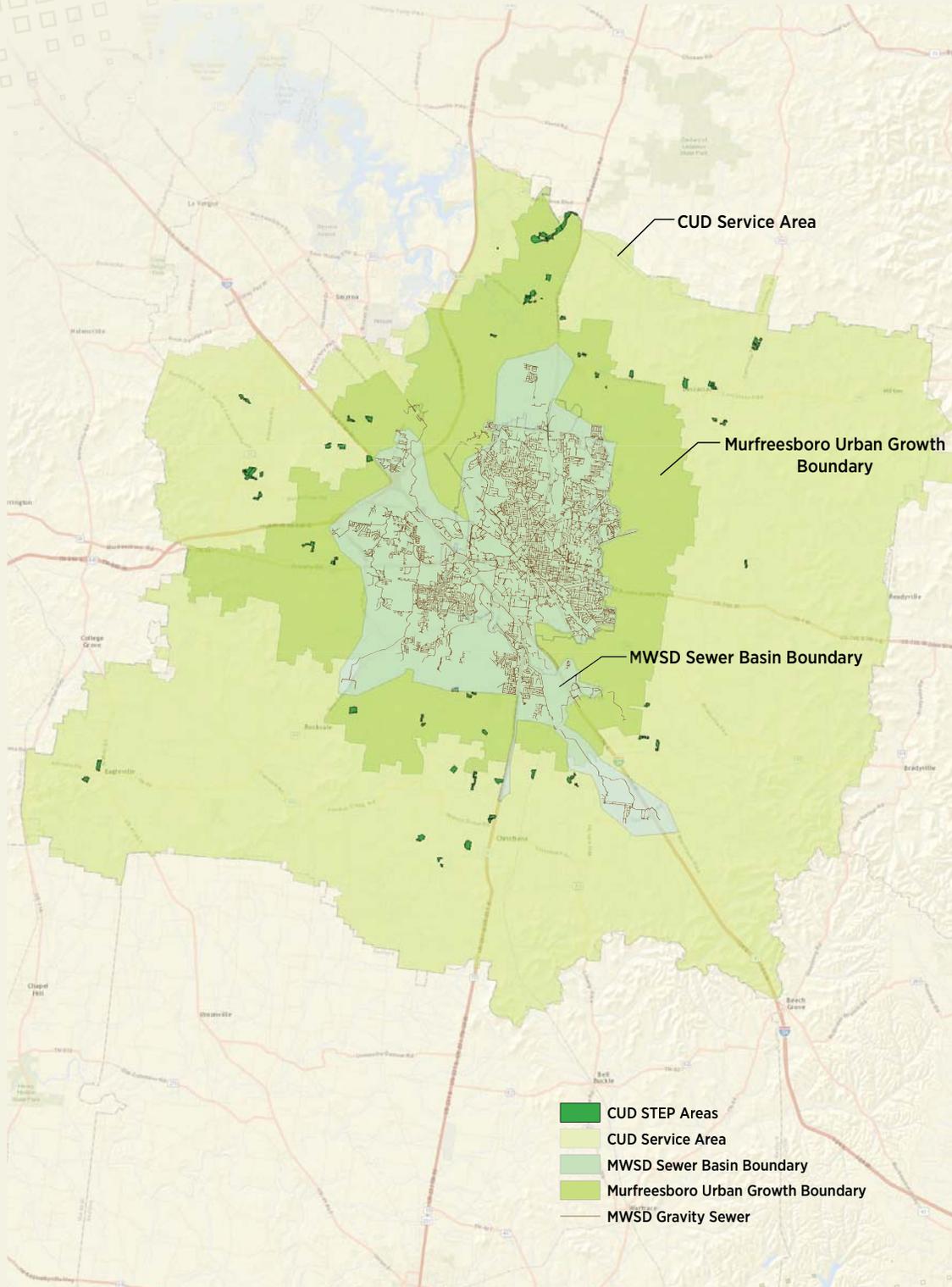
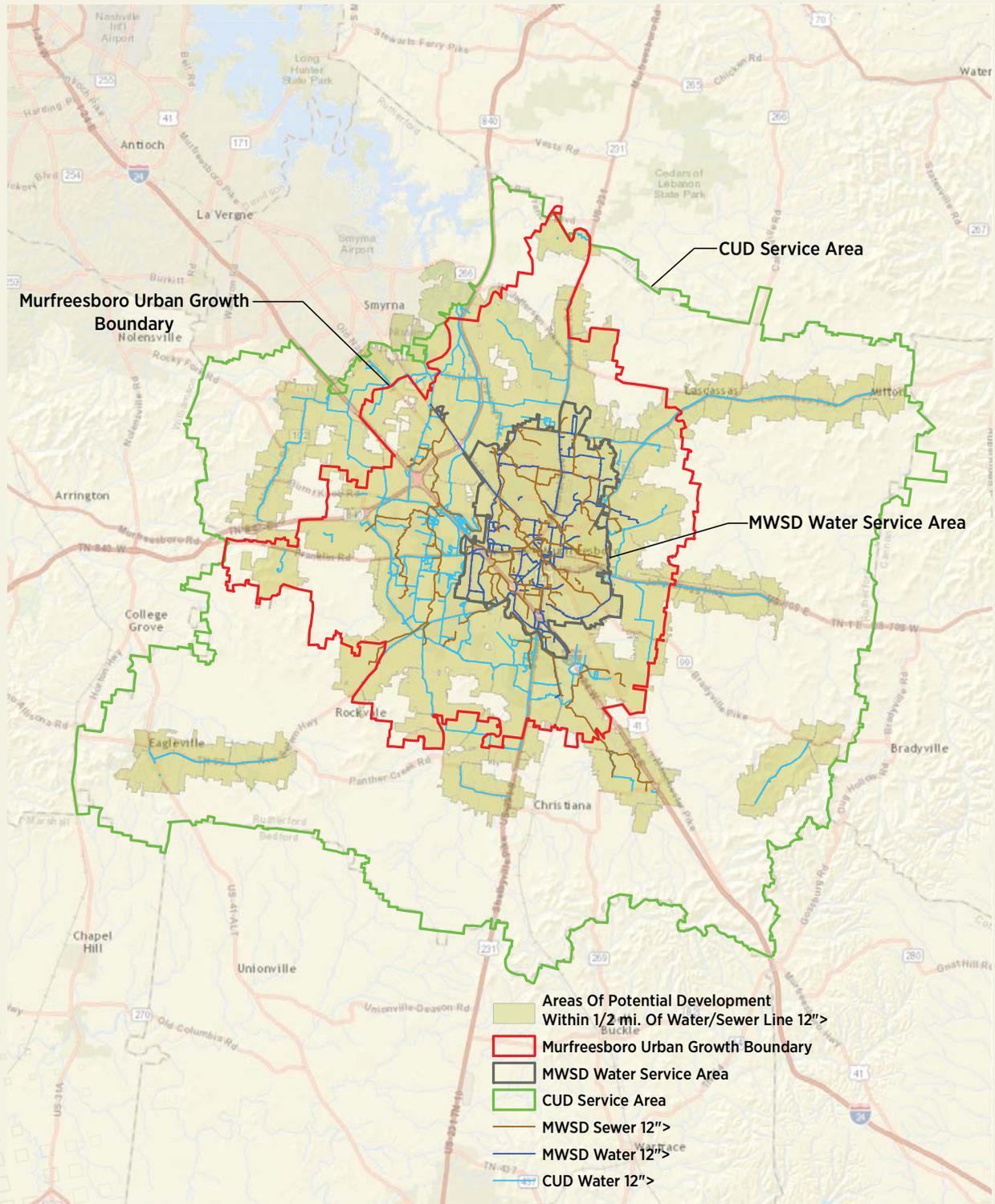


FIGURE 2.24, GROWTH CAPACITY

Figure 2.24 illustrates those properties which are within 1/2 mile of either a 12-inch waterline or sewerline, or both within both MWSD's and CUD's service areas.



MWSD endorses the use of its centralized wastewater collection, when appropriate, within the newly developed areas that are within reach of existing or proposed sewer interceptors. When this approach is not feasible, decentralized systems may be considered.

All extensions must be made in accordance with the Capacity Assurance Plan and the plan of service (or utility master plan) for the area and current customer policies. In most cases the applicant or developer will have responsibility for extending sewer lines to serve the proposed customer(s).

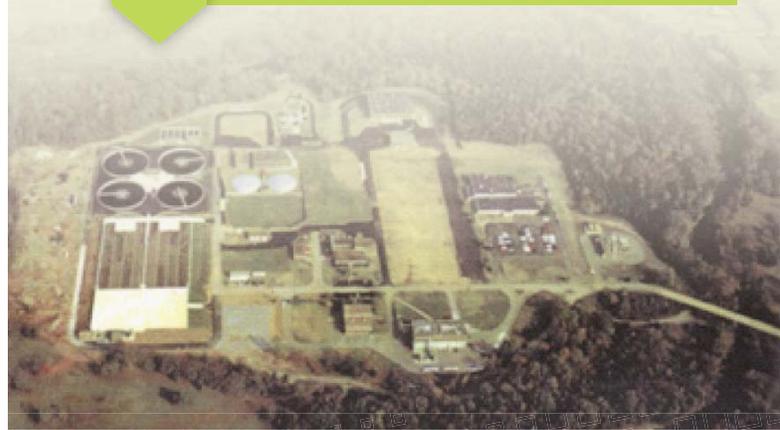
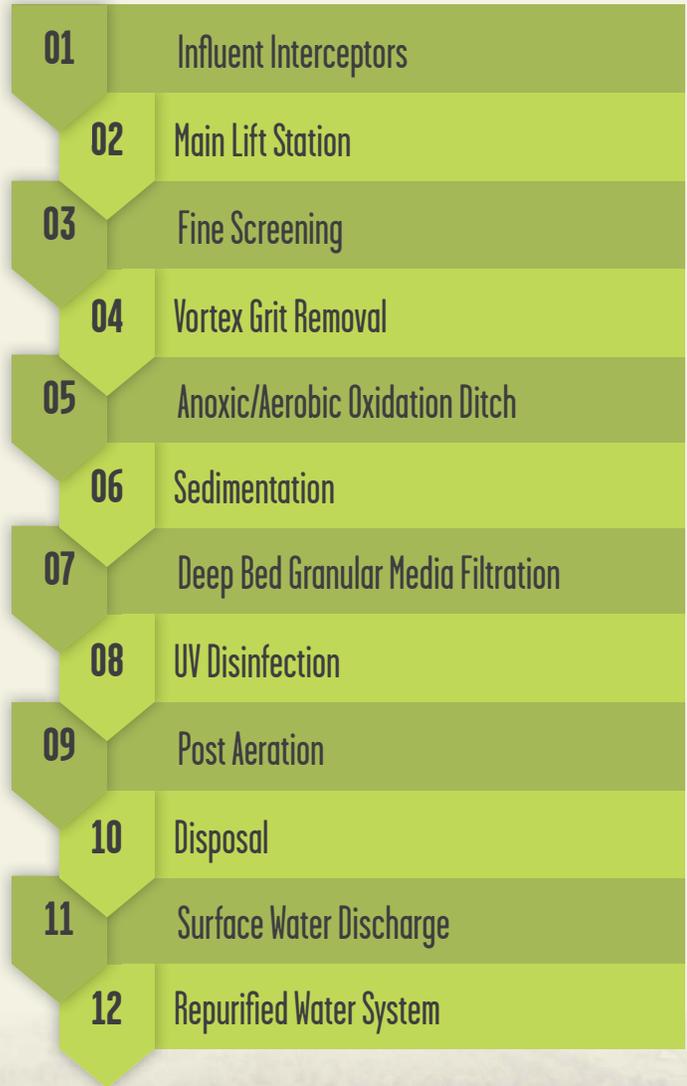
In the CUD service area the applicant or developer will also be responsible for providing an on-site treatment system if one is not already available. Service areas for on-site systems in CUD service area vary, generally due to the availability of suitable soils for drip irrigation.

Treatment Plant Capacity and Flow Diagram

All sewage collected within the wastewater collection system is conveyed to the Sinking Creek Wastewater Treatment Plant located on Blanton Drive. This facility was originally constructed in 1964, and has been expanded numerous times since. The facility will be expanded in the next several months as State Revolving Fund (SRF) monies have been obtained for that construction. The existing wastewater treatment plant capacity is 16 MGD and will be expanded to 24 MGD over the next two years.

As illustrated in Figure 2.25, *Sinking Creek WWTP Process Flow Diagram*, the treatment plant is a tertiary level treatment facility that currently utilizes rotary drum fine screens, followed by vortex grit removal, anoxic and aerobic treatment for biochemical oxygen (BOD), ammonia and total nitrogen reduction, followed by clarification and filtration for suspended solids removal, ultraviolet (UV) light disinfection, and post-treatment aeration. Plant effluent is either discharged into the West Fork Stones River or subsequently chlorinated and pumped into the city's repurified water system for non-potable reuse. These efforts dramatically decreased levels of both constituents from the system's wastewater and demonstrated to Tennessee Department of Environment and Conservation that these levels could be maintained. This optimization played a critical role in allowing MWSD to obtain an expanded NPDES discharge into West Fork Stones River and SRF funds for the planned expansion of the facility. Additionally,

FIGURE 2.25, SINKING CREEK WWTP PROCESS FLOW DIAGRAM



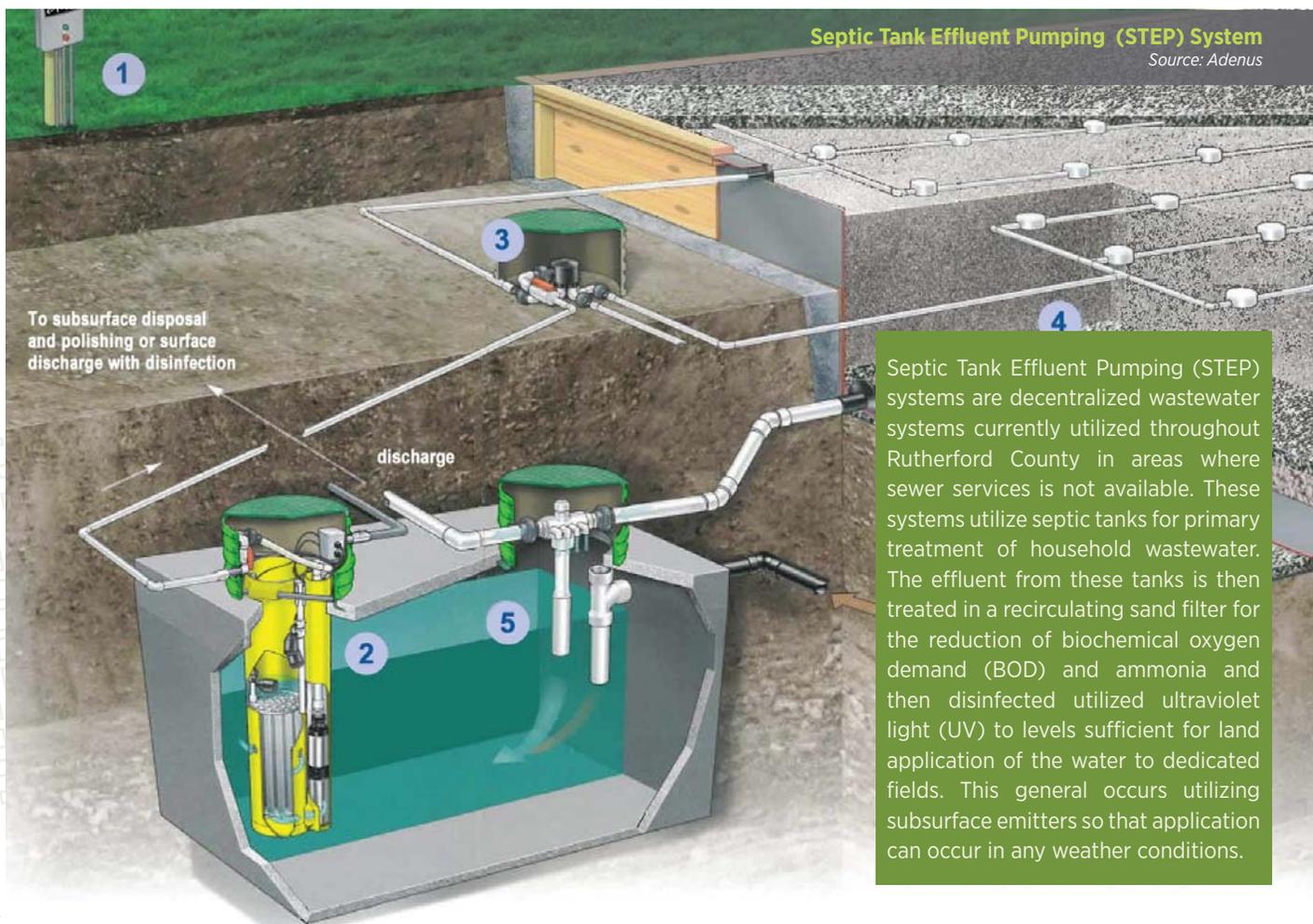
this optimization has proven effective at reducing energy costs at the facility by \$10,600 per year over that time period. These efforts demonstrate the wastewater treatment plant personnel's commitment to the concept of effective utility management.

The design of the wastewater treatment plant also included precepts of value engineering that reduced the construction cost by approximately \$3.5 million by delaying several capital improvements, including sludge holding basins that may be deferred indefinitely.

Based upon current projections of population and resulting wastewater flows generated, the proposed expanded capacity of the SCWWTP will allow the facility to adequately serve the City's growth until sometime after year 2026. Continued planning activities will be required to determine whether a centralized wastewater treatment plant expansion or investment in a similar decentralized wastewater treatment protocol to CUD would be most advantageous for continued growth of the City.

This planning is complicated by increasingly stringent discharge requirements for discharge into either the

West Fork Stones River or the East Fork Stones River. Studies are currently underway to determine whether additional assimilative capacity is available, either farther downstream along the West Fork Stones River, or, potentially, into the East Fork Stones River near the MWSD-owned Coleman Farm. The West Fork Stones River downstream of the SCWWTP is currently included on TDEC's list of impaired waterbodies for impairment from Nitrate + Nitrite, Total Phosphorus and loss of biological integrity due to siltation. The East Fork Stones River is not currently listed for impairment, and may have some capacity for additional discharge of treated effluent. Continued planning level investigations should continue to determine the most cost effective and advantageous means for disposal of wastewater effluent. Continued expansion of the repurified water system and identification of land application sites and other non-potable water uses will likely be required for this growth. Additional alternatives include investment in either indirect potable or direct potable reuse, advanced treatment and continued discharge into the West Fork and/or East Fork Stones River, or potential discharge into the Cumberland River.



Septic Tank Effluent Pumping (STEP) System

Source: Adenus

Septic Tank Effluent Pumping (STEP) systems are decentralized wastewater systems currently utilized throughout Rutherford County in areas where sewer services is not available. These systems utilize septic tanks for primary treatment of household wastewater. The effluent from these tanks is then treated in a recirculating sand filter for the reduction of biochemical oxygen demand (BOD) and ammonia and then disinfected utilizing ultraviolet light (UV) to levels sufficient for land application of the water to dedicated fields. This general occurs utilizing subsurface emitters so that application can occur in any weather conditions.

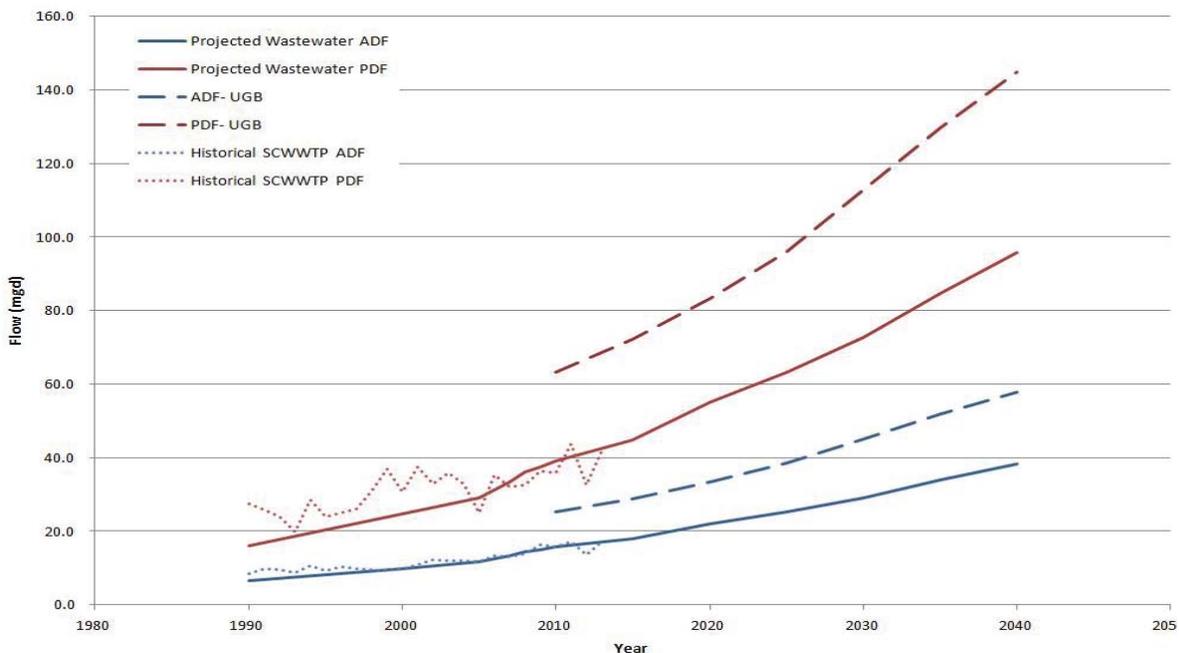
CUD also provides wastewater collection and treatment systems through nearly 50 decentralized septic tank effluent pumping (STEP) systems at numerous locations within their service area. These STEP systems generally utilize recirculating sand filters for the reduction of BOD, TSS, and ammonia to sufficient levels for permitted subsurface discharge through drip emitters on dedicated disposal fields. Capacities of the STEP systems vary based on the number of service connections.

The analysis of centralized versus decentralized treatment is a complicated endeavor. Numerous factors including the current availability and capacity of collection and treatment system infrastructure, the desired development density for the area, and the availability of suitable soils all factor into the overall cost of service associated with each treatment alternative. MWSD and CUD have agreed to evaluate both treatment alternatives as part of a comprehensive analysis of providing wastewater service for the continued growth of the City of Murfreesboro as part of the Water Resource Integration Plan discussed in Section 2.8, *Managing Utilities Infrastructure: System Challenges*.

Infiltration and Inflow (I/I)

One of the greatest challenges facing water utilities across the world is infiltration and inflow of rain water, ground water, and surface water into sewage collection systems. I/I occurs as the various forms of extraneous water find their way into the collection system through either defects in the system caused by improper installation or deterioration of the infrastructure, or through illicit connections like roof drains and sump pumps. If in addition to the domestic wastewater, the amount of I/I that enters the collection system exceeds the capacity of the collection system, either a surcharge or a Sanitary Sewer Overflow (SSO) will occur. The Murfreesboro Water & Sewer Department proactively monitors the collection system both during dry and wet conditions to assess those areas in need of rehabilitation to prevent these SSOs. As a large portion of the I/I has been proven to come from either damaged or faulty service laterals, the City of Murfreesboro has recently implemented a lateral replacement policy. This policy allows the Murfreesboro Water & Sewer Department to repair or replace any lateral shown to contribute I/I to the collection system at no cost to the property owner. The property owner can alternatively repair or replace the lateral themselves, provided that it occurs in a timely manner.

FIGURE 2.26, CITY OF MURFREESBORO WASTEWATER PROJECTIONS



Current Wet and Dry Weather Flows

Average daily flows at the SCWWTP have been near the rated capacity (i.e. 16.0 MGD) of the SCWWTP since 2009. This is reflective of continued growth in sewer service and rainfall related infiltration/ inflow into the system. Peak flows at the plant are rainfall dependent as well. Flows have been recorded as high as 43.6 MGD. This figure is slightly in excess of the plant's design hydraulic capacity of 40.0 MGD. However, over the

last decade, MWSD's rehabilitation efforts have been successful in systematically reducing peaking factors from approximately 4.0 in 1999 to approximately 2.5 in 2013.

MWSD has a plan underway to expand the SCWWTP to a rated capacity of 24.0 MGD with a peak hydraulic capacity of 60.0 MGD. That project is slated to be completed by 2017.

A compilation of annual average and peak flows at the SCWWTP since 1988 are shown in Figure 2.27, *Annual and Average Peak Flows*. [Continued on page 2.80]

FIGURE 2.27, ANNUAL AND AVERAGE PEAK FLOWS



Fournier Biosolids Press

Source: Smith Seckman Reid, Inc.



Collection System

The MWSD wastewater collection system entails a total of 588 miles of gravity sewer pipeline, 29 miles of force main, and 46 sewage pump stations that all convey wastewater to the Sinking Creek facility. These facilities are further detailed in Table 2.7, *MWSD Collection System*, Table 2.8, *MWSD Repurified System* and Table 2.9, *MWSD Lift Stations*.

[Continued on page 2.82]

TABLE 2.7, MWSD COLLECTION SYSTEM

MWSD Collection System	
Size (in.)	Length (ft.)
4	380
6	14,810
8	2,314,220
10	177,169
12	142,019
15	102,062
16	14,071
18	156,170
20	2,380
21	59,176
24	27,629
27	11,613
30	11,082
36	36,547
42	18,276
48	12,285
54	2,310
Total	3,102,200

TABLE 2.8, MWSD REPURIFIED SYSTEM

MWSD Repurified System	
Size (in.)	Length (ft.)
1	1,071
2	1,008
3	280
4	2,621
6	1,526
8	20,370
10	5,397
12	30,729
20	2,185
24	63,071
Total	128,258

TABLE 2.9, MWSD LIFT STATIONS

MWSD Lift Stations		
No.	Address	Capacity (gpm)
2	2220 NW Broad International Paper	180
3	1030 Golf Lane Agriculture Center	5800
6A	1214 Raleigh Ct. Scotland Acres	100
6B	1214 Raleigh Ct. Scotland Acres	350

TABLE 2.9, MWSD LIFT STATIONS (CONTINUED)

MWSD Lift Stations		
No.	Address	Capacity (gpm)
9	1959 Ransom Dr. Lakeview	120
10	3173 N. Thompson Lane	1800
13	931 DeJarnette Lane Oakland	1225
14	589 DeJarnette Lane Jennings	4000
17	3501 Old Nashville Highway Stones River Battlefield	50
18	2426 E. Main St. Holly Park	100
19	2277 NW Broad	75
20	2240 NW Broad Neil Sandler	80
21	507C River Rock Blvd River Chase	300
23	155 Kensington Dr.	380
25	1084 Compton Rd "A"	800
26	820 Compton Rd. "B"	1000
27	542 Compton Rd. "C"	1400
28	3427 Memorial Blvd VA Hospital	975
29	1921 Pacific Place Olympic Springs	135
30	2831 Meadowhill Dr. Huntington Place	180
31	1736 Mercury Blvd.	400
32	2633 English Hill Dr.	150

MWSD Lift Stations		
No.	Address	Capacity (gpm)
35	759 N. Thompson Lane	300
36	3402 Belle Chase Dr. Meaderlay Way Hawksridge	180
37	3507 Oakleigh Cove	110
38	4656 NW Broad Overall Creek	3500
39	3196 Holsted Dr.	215
40	5528 Sam Jared Rd.	180
41	1000 County Farm Rd.	690
43	816 Ronald Dr.	280
44	5730 MacArthur Ave.	425
45	3030 Waywood Dr.	230
46	808 Indian Park Dr.	185
47	531 Cherry Lane	90
48	2228 Tortuga Ct.	145
49	5232 NW Broad	280
50	2495 Wilkinson Pike The Avenues	690
51	2609 Candlewick Ct.	200
53	2998 Siegel Rd.	80
54	1753 John Lee Ln.	115
	VA Comminutor	NA
55	2360 Barfield Rd.	332
	Johnson St Flood Control	NA

FLOW MONITORING BASINS

MWSD has invested heavily in capacity management operations and maintenance activities (CMOM) for the proactive remediation of the wastewater collection system. These activities include the deployment of 17 permanent flow monitors within the system as well as periodic flow monitoring in targeted drainage basins.

Figure 2.28, *MWSD Flow Monitoring Basins*, illustrates the location and shape of the tributary sewer basins that feed into each of the permanent flow monitors. Figure 2.29, *MWSD Flow Monitoring Basins Percentages*, indicates the relative percentage of gravity sewer lines within each of these basins

The information gathered from these flow meters is utilized to assess and prioritize areas within the collection system in need of either system renewal or rehabilitation.

In order to renew the wastewater collection system assets on an approximate 50-year interval, MWSD has implemented a policy of renewing approximately two percent per year of the sewage collection system. Continued monitoring within the sewage collection sub-basins indicates that these efforts have gradually reduced the amount of extraneous infiltration and inflow (I&I) within the wastewater collection system.

SYSTEM CAPACITY

The last comprehensive analysis of the MWSD wastewater collection system was in conjunction with the 2001 revision to the 201 Facilities Plan. This plan is required as a pre-requisite for State Revolving Fund (SRF) loans for capital improvements. MWSD intends to update this Facilities Plan in the near future, and to incorporate computerized hydraulic modeling into the effort to more closely model existing system capacity and to assist

FIGURE 2.28, MWSD FLOW MONITORING BASINS

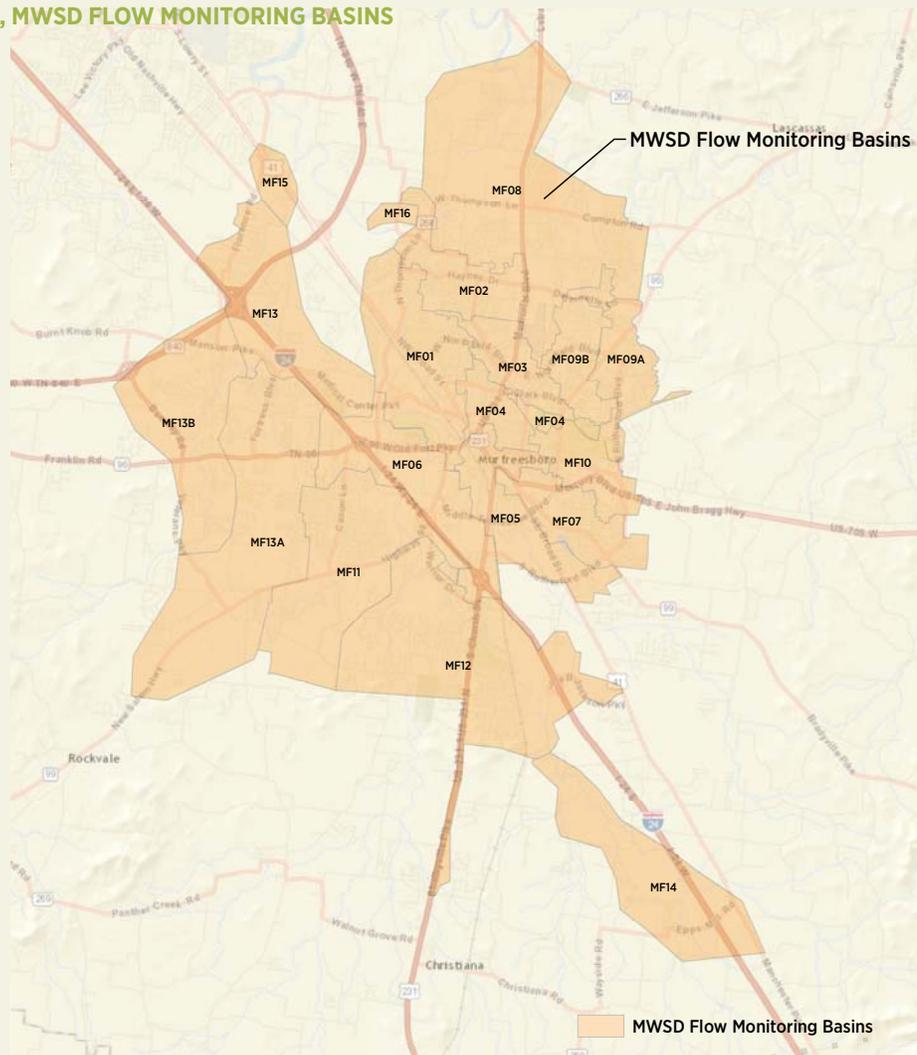
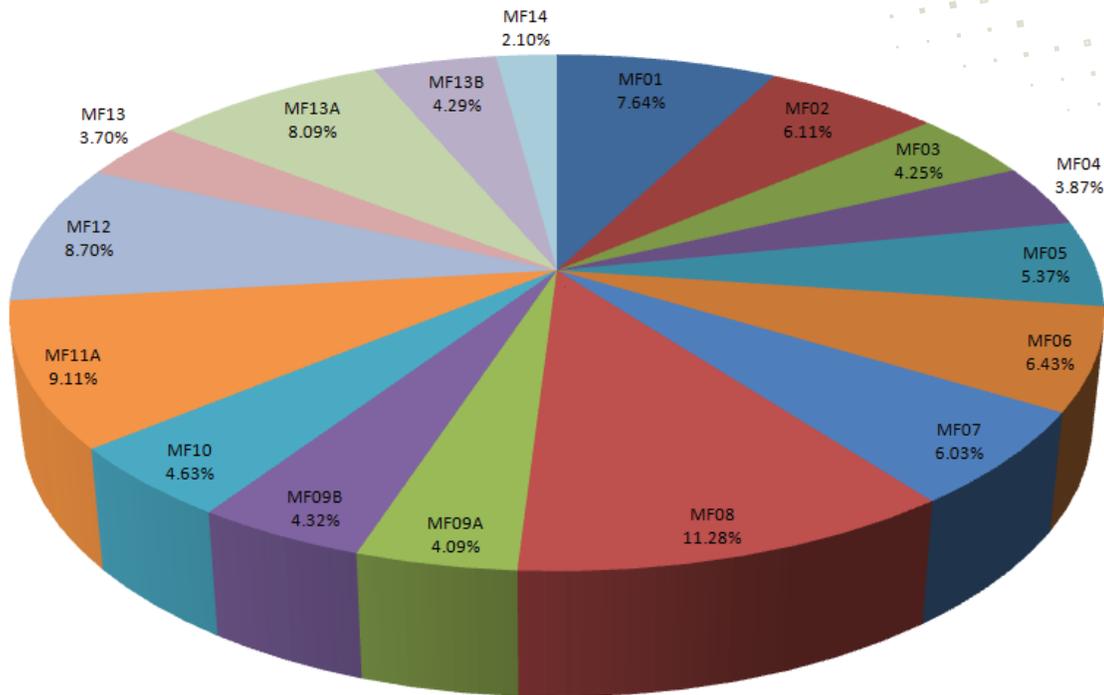


FIGURE 2.29, MWSD FLOW MONITORING BASINS PERCENTAGES



with capital improvement planning. In the meantime, the Department utilizes several tools to assist with its capacity assurance and planning. MWSD contracts with ADS Environmental not only for maintenance of the permanent and temporary flow monitors, but also for semi-annual reports detailing performance of the collection system. One of the analyses required within this report is an assessment of system performance both during typical dry weather periods and also during monitored wet weather periods. While the goal of every municipal wastewater collection system is to operate under all conditions without incident, the reality is that system deficiencies exist that allow extraneous water to enter the collection system, typically referred to as infiltration and inflow (I/I). Unfortunately, if excessive I/I enters the system, it could overwhelm the carrying capacity of the infrastructure, at which time a sanitary system overflow (SSO) occurs. MWSD closely monitors for SSO's and reports them under the provisions of their National Pollutant Discharge Elimination System (NPDES) permit through the Tennessee Department of Environment and Conservation (TDEC).

The most recent ADS semi-annual report (2013-2014 Winter Period) indicated that, during dry weather conditions, all of the monitored flow basins, except one, operated within appropriate levels as determined within guidance from the American Society of Civil Engineers (ASCE) and the Water Environment Federation

(WEF). This data is illustrated in Figure 2.30, *ADS Flow Monitoring Dry Weather*.

The same report indicated that during the monitored wet weather event, surcharge conditions in excess of the ASCE/WEF guidance was observed at 11 of the flow monitoring locations. This information is illustrated in Figure 2.31, *ADS Flow Monitoring Wet Weather*. A surcharge condition indicates capacity limitations within a gravity collection system, but does not necessarily indicate that the infrastructure is without available capacity. The MWSD Capacity Assurance Program (CAP) indicates that available capacity remains in a gravity sewer until such time as the surcharged hydraulic level reaches within one foot of the manhole casting in most areas within the collection system, or within two feet of the casting elevation in areas that have indicated significant backup complaints during the reference storm. MWSD elected to use the 2-year, 3-hour cloudburst event for that design storm, which corresponds to 2.08 inches of rainfall. The event monitored by ADS during the winter 2013-2014 period was 2.51" of rainfall, or roughly the 2-year, 6-hour event. Figure 2.32, *ADS Flow Monitoring Surcharge Depth from Capacity*, illustrates the distances from the reference manhole castings to the surcharge water levels during this event.

While this figure indicates potential capacity limitations, several capital improvement projects that are either currently being constructed, or will soon

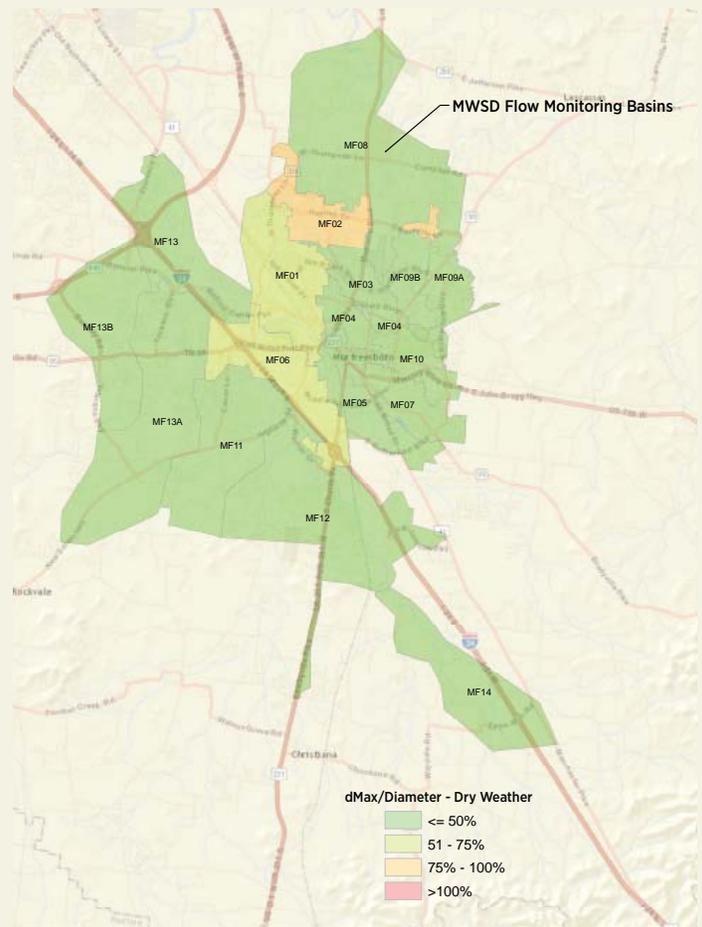
be constructed, should significantly improve these capacity limitations. Construction of the Southwest Regional Pump Station and Force Main and the new SCWWTP Headworks Facility should be completed near the middle of 2015. These improvements will reroute a large portion of the sewage flow from the southern corridor Murfreesboro directly to the SCWWTP, which should allow the system to regain capacity in several large interceptors. The aforementioned expansion of the SCWWTP should be completed in 2017, which will increase the City's ability to treat peak flows and significantly reduce surcharging along the Sinking Creek and Stones River Interceptors. Finally, the surcharging indicated in MF14 was the result of a single point failure in the collection system. This deficiency was identified and corrected by MWSD personnel, and this surcharge condition should be eliminated in the next ADS report.

I/I REDUCTION EFFORTS

MWSD began a concerted effort to reduce Infiltration/Inflow (I/I) within its collection system in 2002. Since that time the system's peaking factor has been reduced from approximately 3.8 to 2.5. By proactively implementing their CMOM program and adhering to these policies, MWSD has also been able to avoid scrutiny from regulatory authorities, unlike many of their counterparts across Tennessee and the U.S. Their approach to system renewal and rehabilitation utilizes a dual approach to these activities. First, MWSD maintains their own construction crews who, when available, will clean and televise gravity sewer lines within the system. Where appropriate, MWSD crews will dig and replace old or structurally compromised sewer lines with newer material pipelines. Second, when areas of the collection system that are not appropriate for dig and replace activities are identified, MWSD will contract with local contractors for cured-in-place (CIP) lining and service renewal of those gravity sewer lines.

MWSD also recently enacted changes to the City charter that allow them to enter private property and replace the individual sewer lateral to the foundation of the residence. This service is provided at no cost to the home owner, if the home owner grants right-of-entry to the property. If a home owner does not grant right-of-entry for the service renewal, they have X months to rehabilitate their sewer service on their own or face cut-off of water service to their property. MWSD recognizes that the most effective means of reducing extraneous I&I within the collection system involves renewal of compromised individual service laterals as well.

FIGURE 2.30, ADS FLOW MONITORING DRY WEATHER



Much work remains to be done. As evidenced by the ADS flow monitoring data presented in Figures 2.30, 2.31, and 2.32, much of the MWSD collection system becomes surcharged during rainfall events. In order to preserve existing system capacities and create additional capacity to serve growth in the system, MWSD will need to remain vigilant on the I/I reduction program.

FIGURE 2.31, ADS FLOW MONITORING WET WEATHER

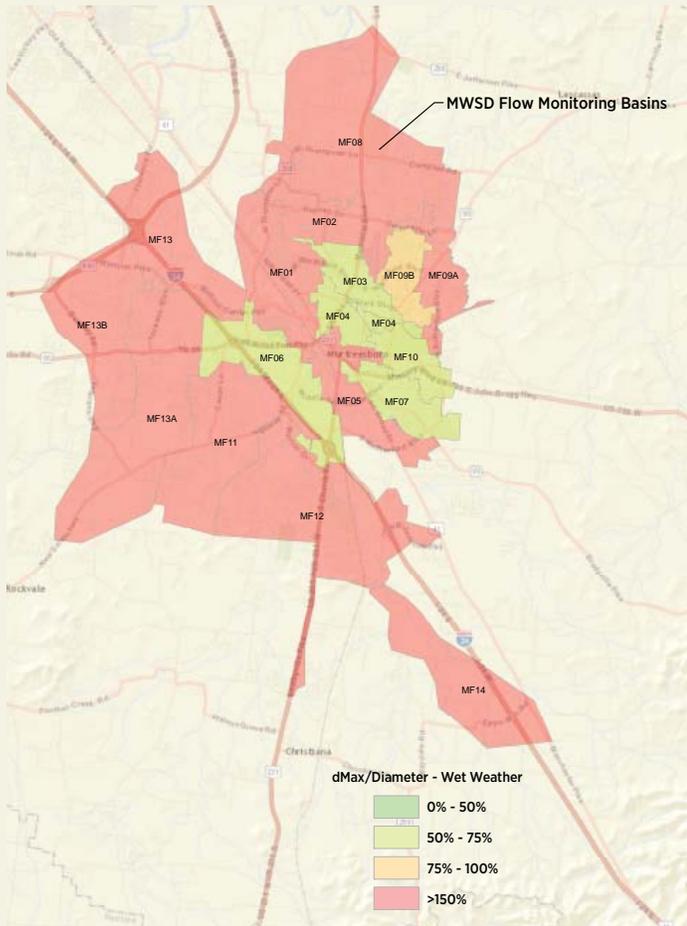
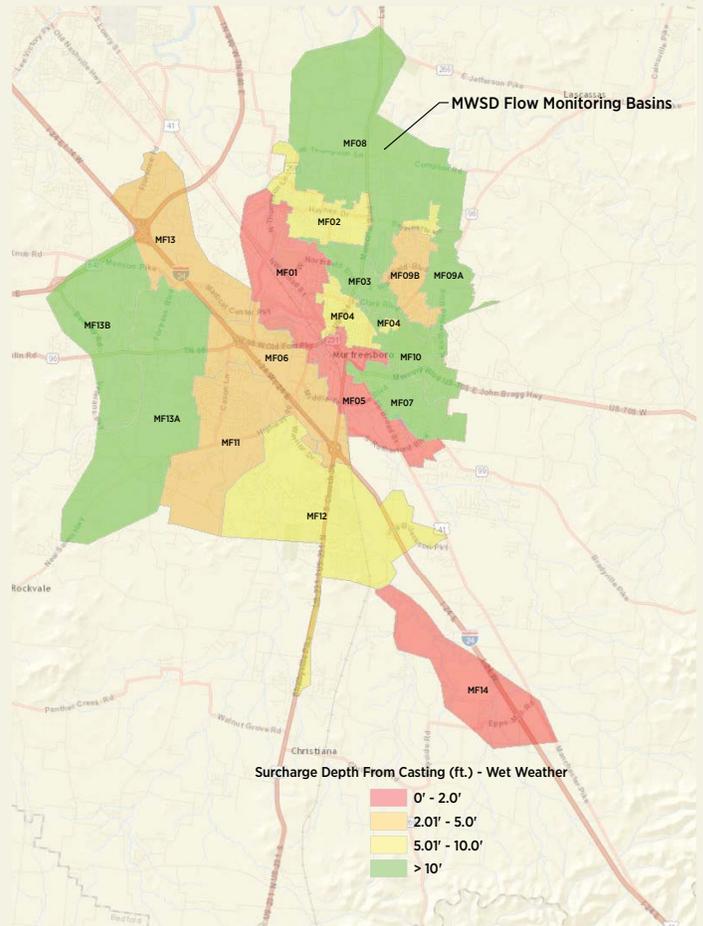


FIGURE 2.32, ADS FLOW MONITORING SURCHARGE DEPTH FROM CAPACITY



Compliance

The Murfreesboro wastewater collection and treatment systems operate under a National Pollutant Discharge Elimination System (NPDES) Permit issued and enforced by the Tennessee Department of Environment and Conservation. This permit requires monitoring of over one hundred individual constituents at varying intervals. Department personnel collect and analyze

approximately 10,000 individual samples per year to verify compliance with this permit. In July 2014, MWSD was awarded the Operational Excellence Award by the Kentucky Tennessee Water Environment Association for operating without a single violation of the NPDES permit for the calendar year 2013. MWSD takes its stewardship of the environment seriously, and this award demonstrates the fruit of their dedication.

STRATEGY 2.6.1: Evaluate alternative effluent discharge strategies.

The proposed expansion of the Sinking Creek Wastewater Treatment Plant (SCWWTP) will likely utilize the remaining assimilative capacity of the West Fork Stones River at the current outfall location. Further expansion of this facility will require alternative options for effluent disposal.

ACTIONS AND INITIATIVES:

1. Finalize investigations of alternative outfall locations on the East Fork Stones River and further downstream West Fork Stones River to determine potential assimilative capacities and begin permitting activities through TDEC.
2. Evaluate technologies, including super-oxygenation of either effluent or surface water, for adequacy in alleviating regulator concerns with dissolved oxygen deficiencies in local water bodies.
3. Investigate potential for utilization of effluent as a source water for treatment through either indirect potable reuse (IPR) or direct potable reuse (DPR).

STRATEGY 2.6.2: Reduce extraneous infiltration and inflow (I/I) from wastewater collection system.

Approximately 40 percent of the wastewater treated at the SCWWTP is extraneous water that has found its way into the collection system. This extraneous water consumes available capacity for growth and significantly increases operational and maintenance expenses associated with conveyance and treatment.

ACTIONS AND INITIATIVES:

1. Develop standard specifications and details in conjunction with current industry best practices for the rehabilitation of wastewater collection systems.
2. Maintain annual budget associated with both in-house and contracted rehabilitation efforts that allows MWSD to replace/ repair approximately two percent of the collection system annually.



PARADIGMS

CURRENT PRACTICE

Preference for large, centralized treatment and distribution systems that focus on economies of scale at the treatment facility without considering the whole system, which includes collections and distribution systems as well.

NEW PARADIGM

Favor distributed approach evaluating the spectrum from small decentralized systems to larger centralized systems, including combinations, based on local needs and the triple bottom line.

Source: WERF Sustainable Integrated Water Management

2.7 Managing Utilities Infrastructure: Repurified Water

The 2001 Revision of the Murfreesboro Water and Sewer Department 201 Facilities Plan determined that non-potable reuse of repurified effluent from the Sinking Creek Wastewater Treatment Plant was a viable means to decrease discharges into the impaired West Fork Stones River and to allow continued growth of the wastewater collection system. Additionally, the repurified water system was intended to reduce the overall peak loading requirements on the water treatment plant as more customers elect to utilize repurified water for irrigation due to its lower cost. The initial repurified water system construction began in 2004 with pumping and storage facilities at the SCWWTP and 24-inch distribution mains running north from the plant to the newly acquired Jordan Farm and Siegel Soccer Complex and south from the plant to the Old Fort Golf Course.

The popularity of the repurified water system has exceeded MWSD's expectations, and the demand upon the system has at some times exceeded the ability of the SCWWTP to supply this resource. As a result, expansion of storage capacity was recently constructed, and the extension of repurified water lines continues throughout the system. Figure 2.34, *MWSD Repurified Service Areas*, illustrates the growth of the average and peak demands upon the repurified water system over the last decade. Projections for the continued growth of the system prove challenging, however the MWSD anticipates that average daily flow levels could reach 8.0 mgd within the next decade.

Current Inventory of Pipe and Storage Tanks

MWSD has two elevated repurified water tanks that provide storage necessary to meet system demands during low-flow cycles at the Sinking Creek WWTP and help maintain system pressure. A one million gallon tank is located on the treatment plant site. A second 1.5 million gallon tank is located in the vicinity of Medical Center Parkway.

[Continued on page 2.90]



Repurified Hydrant

Source: Smith Seckman Reid, Inc.



NEW WATER POLICY: RIGHT WATER FOR RIGHT USE

“The worldwide focus on Sustainability and minimizing our impact on the environment has greatly increased the visibility and popularity of water reclamation. Murfreesboro has been a leader in this area for the last decade, and currently operates the largest repurified water system in the State of Tennessee. The Murfreesboro Water and Sewer Department closely monitors developments in the use of technology to improve levels of treatment of this precious resource. In September 2014, Department personnel visited one of the first Direct Potable Reuse (DPR) facilities in the United States in Wichita Falls, TX. Similar facilities are being planned, designed and constructed across the United States in locations where adequate water supplies are scarce. While DPR has not yet been used in Tennessee, several utilities have investigated it as another means to balance potable water needs with good stewardship of the environment. Murfreesboro should periodically investigate whether its repurified water system should eventually evolve into a DPR source.”

FIGURE 2.33, REPURIFIED WATER FLOW

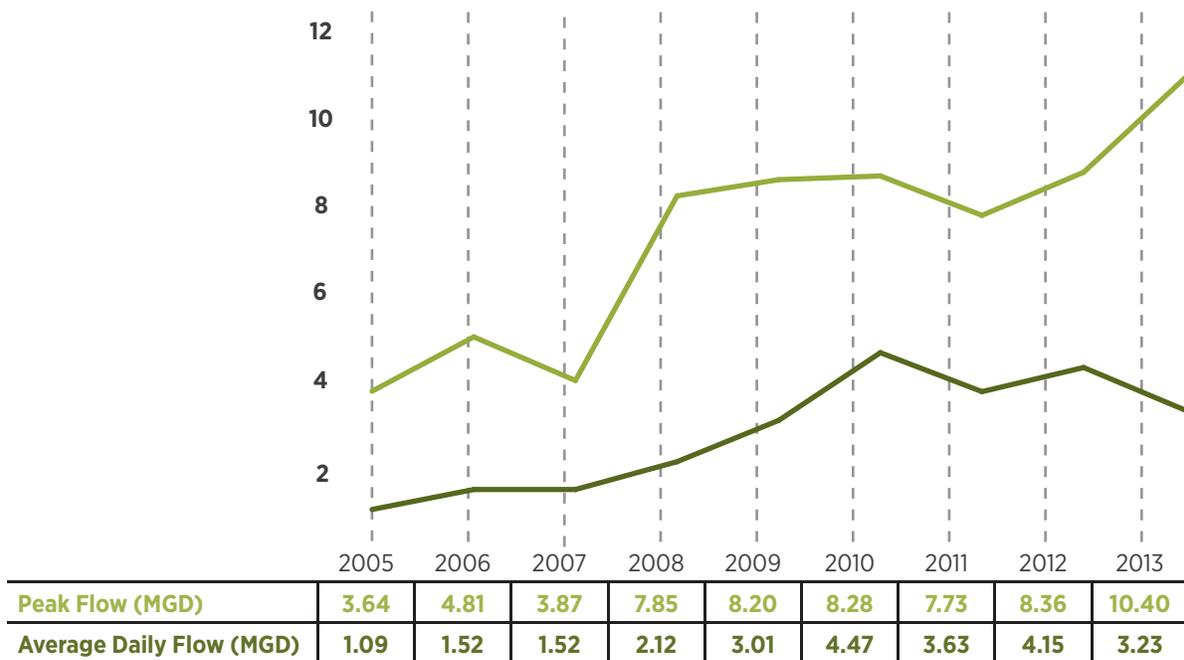
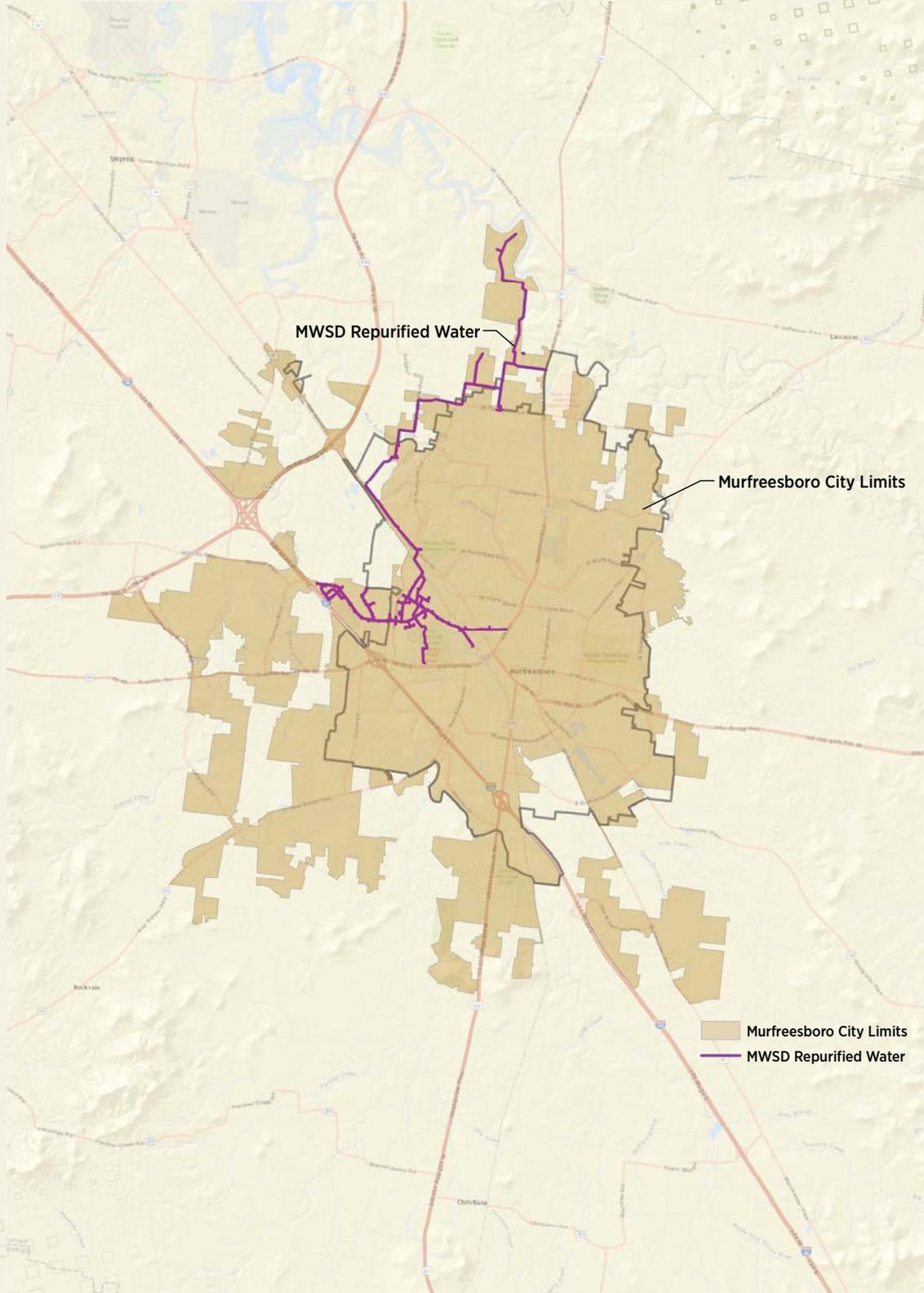


FIGURE 2.34, MWSD REPURIFIED SERVICE AREAS



Land Application Sites

MWSD currently owns two dedicated repurified water land disposal sites. The 200-acre Jordan farm and the 400-acre Coleman farm are equipped with spray irrigation equipment that is utilized year-round (weather permitting). The farms can accommodate from one to four million gallons per day (MGD) depending on weather conditions.

In addition, repurified water is used to irrigate the City-owned 36-hole Old Fort Golf Course and the 130-acre Siegel Soccer Complex. The course uses from 0.5 MGD to 2.0 MGD of repurified water, depending on weather conditions. The soccer fields use 0.5 MGD to 1.0 MGD, depending on weather conditions.

Future Expansion of the System

Expansion of the repurified system has been contemplated since its inception. Development that occurs adjacent to existing repurified lines is encouraged to connect to the system. Recently, as depicted in Figure 2.34, *MWSD Repurified Service Areas*, the system has been expanded through the installation of grey water systems in certain commercial developments within the existing service area.

Two factors restrict expansion at this point. First, the demand for repurified water is greatest when the effluent flow at the wastewater plant is the least. This is because most irrigation users set their automatic systems to operate in the early morning hours when few people are awake or contributing flow to the wastewater collection system. Therefore there may be times when low flow impacts customers. This factor will be mitigated as wastewater flow to the MWSD treatment plan continues to increase and as additional storage capacity is constructed in the distribution system.

The second factor is identification of additional customers. New customers would need to have an irrigation load that would be best served by the repurified system. As new repurified customers are justified, additional expansion will follow.

The continued appropriate growth of the repurified system is a key component to providing for the continued growth of the City of Murfreesboro. The use of repurified water alleviates demands upon the potable water systems, but it also reduces the discharge



Southwest Repurified Tank
Source: Smith Seckman Reid, Inc.

of water back into the Stones River and the J. Percy Priest Reservoir. This decrease in discharge is favorable from the standpoint that less discharge equates to lower levels of nutrients and other constituents in the water bodies. It is however unfavorable from the standpoint that it also reduces the availability of water for withdrawal from those same water bodies. This complex interaction should be analyzed further in the Water Resource Integration Plan discussed in Section 2.8.

STRATEGY 2.7.1: *Increase distribution of repurified water.*

Murfreesboro's repurified water system has been wildly successful and is now the largest of its kind in Tennessee. Continued growth for the City will require expansion of the distribution of this resource.

ACTIONS AND INITIATIVES:

- ▶ Consider "rebranding" repurified water to increase its appeal to potential customers and highlight its benefit as a cost effective source of water for multiple uses including irrigation, fire protection, etc.
- ▶ Embark on a campaign to educate the public to the extensive levels of treatment and monitoring utilized to ensure the quality of the repurified water.
- ▶ Promote repurified water to industrial, institutional, and commercial customers as an alternative to potable water for cooling towers and other non-potable uses.
- ▶ Work cooperatively with CUD to encourage repurified water use for irrigation of new subdivisions within a reasonable distance from repurified lines.
- ▶ Consider working with City Council to enact codes requiring repurified water system installations in commercial buildings and multi-family housing for non-potable applications such as toilet flushing.



2.8 Managing Utilities Infrastructure: System Challenges

Regulatory Issues

Both the drinking water and wastewater systems face numerous regulatory constraints with respect to their daily functions. Both MWSD systems have also recently won awards from trade associations that were predicated upon compliance with all applicable federal and state regulations.

The primary regulatory drivers currently facing potable water systems are related to maintaining adequate protection for the public from pathogenic organisms while limiting the exposure of the public to potentially harmful disinfection byproducts. Concerns over emerging contaminants, pharmaceuticals, and personal care products are also receiving national media exposure and may soon result in new regulations. Both MWSD and CUD maintain compliance with these regulations through advanced processes including membrane filtration, activated carbon, and alternative oxidant usage.

There are a number of regulatory issues related to the wastewater system that MWSD is managing. Continued rehabilitation and renewal of the collection system will be necessary to minimize Sanitary Sewer Overflows (SSOs) to prevent regulatory action. Current Anti-Degradation policies prevent the addition of any additional constituents from the SCWWTP into an impaired waterbody. Several studies are currently underway to determine if there are unimpaired water bodies with sufficient assimilative capacity for future expansion of the plant, or if alternatives must be developed for the plant effluent. Federal emphasis on nutrient reduction will also likely result in more and more stringent discharge limitations.

Issues with COE Allocation

Raw water supply is a critical issue for the potential future growth of the City. Therefore MWSD and CUD have been pursuing options for additional water supplies as part of their respective system planning.

In 2009 utility systems in Rutherford County asked the US Army Corps of Engineers for access to additional water supplies from J. Percy Priest Reservoir. Once the Corps began to study the situation, they initially determined that the yields of the existing contracts may not be fully met by the reservoir based on the conditions in the reservoir during recent historic drought conditions. The outcomes of the allocation study are pending, but may lead both MWSD and CUD to evaluate other sources of raw water if the outcome is unfavorable.

Walter Hill Dam

The Walter Hill Dam built in 1918 is on the East Fork of the Stones River immediately upstream of J. Percy Priest Reservoir. The dam was purchased by the City of Murfreesboro in the 1980s in order to insure consistent raw water supply for the Stones River Water Plant.

The dam should continue to be maintained by the City to provide an alternative for the City's intake at J. Percy Priest Reservoir and serve as a back-up in case of emergencies. Additional study will be required to ascertain the best approach for maintaining and possibly expanding Walter Hill Dam.

Water Resource Integration Plan

Beginning in 2011, the USEPA began endorsing "Integrated Municipal Stormwater and Wastewater Planning" to better achieve the water quality objectives of the Clean Water Act. In 2014, the USEPA solicited technical assistance from consultants to help determine how this integrated planning could be implemented to improve communities. The complex matrix of challenges facing the City of Murfreesboro warrants this type holistic approach to the management of water within the city's watersheds. However, it should also include potable water and repurified water considerations to incorporate every facet of water management to provide for the City's continued growth. A Water Resource Integration Plan (WRIP) would serve as a strategic roadmap to assist the City of Murfreesboro in planning the most effective and most affordable capital improvements necessary to provide for the continued growth of the City.

The goal of this plan is to ensure that the "Right Water is provided for the Right Use", and that the needs of the citizens of the City of Murfreesboro are provided for without compromising our responsibility to be stewards of our environment.



HOW DO WE MEET THE WATER RESOURCE CHALLENGES FACING OUR CONTINUED GROWTH?

"As water resources are becoming more and more recognized, both nationally and at the state level, as necessary in maintaining local community's socioeconomic viability, Murfreesboro wants to be recognized as a progressive and innovative leader in the integrated 'One Water' concept. MWSD embraces the 'Utility of the Future' paradigms developed by WERF, WEF and NACWA that espouse becoming managers of sustainable resources, watershed-scale environmental leaders seeking least-cost, highest return solutions, regional planners of weather-resilient, green communities, and becoming integrated members of economically thriving local communities."

STRATEGY 2.8.1: *Vision for the Future Plan.*

In conjunction with the Rutherford County Consolidated Utility District, and to advance the provisions of the Rutherford County *Vision for the Future* plan, provide infrastructure that efficiently delivers necessary service in designated growth areas.

ACTIONS AND INITIATIVES:

1. Review and update facility capital requirements to apportion the cost of growth appropriately through system development charges (a.k.a. connection fees) and special assessment districts in designated area;



PARADIGMS

CURRENT PRACTICE

Single use – water is used only once before treatment and disposal.

NEW PARADIGM

Greater emphasis is placed on water reuse and reclamation, use water multiple times (e.g., household graywater for irrigation), and reclaim treated water for the supply side of the infrastructure.”

Source: WERF Sustainable Integrated Water Management

Stones River Water Treatment Plant

Source: Smith Seckman Reid, Inc.

2. Update 201 Facilities Plan for establishing sanitary sewer system to serve the City's entire Urban Growth Boundary area;
3. Implement water conservation requirements in zoning and building codes; and
4. Review the use of on-site sanitary systems such as STEP systems to ensure their use in appropriate locations for the type and density of development supported.

Strengthen the Water/Sanitary Sewer Extension Policies. Amend the water/sewer extension policies to require extensions to be consistent with the Future Land Use and Character Plan; the City's ongoing growth area planning; and utility master plans and multi-year Capital Improvement Plans.

STRATEGY 2.8.2: *Develop the tools to identify and monitor land use demands based on projected population growth.*

ACTIONS AND INITIATIVES

1. Certain City policies over the past 30 years may have contributed to areas of non-linear development within the City. In the future, it is recommended that the City should concentrate on in-filling areas that have been passed over/ left-out of previous annexations and increase access to City services thereby.

2.9 Managing Municipal Solid Waste (MSW) - Closing the Loop

It was not until 1965 that the federal government finally put the solid waste problem on par with protection of water resources. In that year, Congress passed the Solid Waste Disposal Act (SWDA), which was the federal government's first effort to implement a comprehensive management framework for the nation's solid waste. SWDA was designed to assist state and local governments with the technical and financial aspects of developing and managing waste disposal programs and to promote the development of guidelines for waste collection, transportation, recovery, and disposal. Further, no state, including N.H., had yet established any real solid waste legislation. Instead, solid waste was indirectly regulated under health and nuisance statutes. Then, in 1976, Congress passed the Resource Conservation and Recovery Act (RCRA), shifting the emphasis of federal involvement from disposal to recycling, resource recovery and waste-to-energy technologies. The term "municipal solid waste" or "MSW" is used broadly to mean non-hazardous garbage, trash and other such waste generated by residences, commercial or industrial establishments and institutions. The term is not typically used to mean construction and demolition debris ("C&D waste"), motor vehicle scrap and waste, or wastes requiring special handling such as infectious waste, asbestos waste, soils contaminated by petroleum or other regulated substances, or ash.

Recycling in Tennessee

There are currently 33 active landfills within Tennessee. It is estimated that all will be full within 25 years. To prolong the inevitable closure of multiple landfills the State of Tennessee has established an incremental waste stream diversion goal which is currently 25 percent diversion statewide. This quantity will be increased to 35 percent in 2015, and then to 50 percent diversion by 2018.

ZAPATA CAMPOS AND HALL (2013):

"Resilient and sustainable cities need to develop more sustainable modes of organizing urban waste. This challenge requires the embedding of new and robust linkages between the design, production, and consumption and consumption of goods and services, and the management of the resultant waste, closing the manufacturing and consumption loop ."

Murfreesboro Solid Waste Department

The Murfreesboro Solid Waste Department oversees five specific areas: Sanitation Education, Convenience Centers, Recycling, Landfill, and Post-closure Care. The Department's operating budget of \$4.5 million is



According to the Murfreesboro Solid Waste Department 48% of all household waste is food waste.

funded by sales tax (60 percent of which is collected in the County's unincorporated area), grants, a host fee from Middle Point Landfill, gate rate at the Rutherford County Landfill, the sale of recycled materials, and any available fund balance from the department. The Solid Waste Department is responsible for curbside collection and disposal of solid waste in 93 locations throughout Rutherford County.

MIDDLE POINT LANDFILL

Middle Point Landfill is located adjacent to the Rutherford County Landfill and began municipal solid waste collection operations in 1988 under the operations of BFI. In 1995, Rutherford County and BFI entered into an agreement for Middle Point that allowed the county to send its household waste to the landfill free. Later that year, the City of Murfreesboro entered into an agreement with BFI for its residents to benefit from no-cost trash removal. In late 2004, Middle Point Landfill proposed an expansion of 70 additional acres, which would add up to 15 years to its lifespan. The proposal was approved in early 2006, expanding the landfill from 139 to 209 acres. In 2006, Middle Point Landfill was expanded by 70 acres, adding up to 15 years to its lifespan.

RUTHERFORD COUNTY LANDFILL

The Rutherford County Landfill is the County-operated Class III/IV (construction/demolition wastes and yard debris) landfill. It is expected to reach capacity within three to five years.

The following techniques and opportunities, in order of priority, should guide the design and operation of an integrated solid waste management system:

On average, the landfill collects approximately 4,000 to 5,000 tons of solid waste per day, accumulating to just over one million tons per year.

REDUCING MATERIAL CONSUMPTION

REUSING AND RECYCLING MATERIALS

COMPOSTING BIODEGRADABLE MATERIALS

TRANSPORTING EXCESS SOLID WASTE TO ONE OF THREE TYPES OF PROCESSING FACILITIES (IN ORDER OF PREFERENCE:

SANITARY LANDFILLS

INCINERATION WITH ENERGY RECOVERY

INCINERATION WITHOUT ENERGY RECOVERY



CAN'T BEAT "ALL IN ONE" RECYCLING

"We subscribe to curb side service, comes twice a month and can mix everything into one large recycle can, no sorting, no issues. what about looking into a city wide incinerator for all non recyclable materials? would help reduce landfill waste and create a net zero green energy."

Case Study:

Comprehensive Recycling, Compost, and Yard Waste System

**TORONTO, ON CANADA
(2,800,000 PEOPLE)**

Toronto is trying to solve their landfill problem. Currently there are 160 closed landfills and one active landfill, which at the current rate capacity will be reached in 2029. To keep costs down from shipping trash to outside landfills Toronto passed the Waste Diversion Act 2002 in order to extend the life of their landfill.

PROGRAMS

- ▶ Reduce > Reuse > Recycle > Recover > Residual Disposal
- ▶ Blue bin: Beverage and food containers, home and personal product containers, foam polystyrene and plastic retail shopping bags, and paper

- ▶ Green bin: food waste, diapers, sanitary products, animal waste, house plants and soil, and soiled paper and food packaging
- ▶ Leaf and Yard waste

STATS

- ▶ 955,000 tons of waste annually
- ▶ 53 percent of waste is diverted

BUDGET

- ▶ Waste Management budget is \$355 million (2014) funded largely through fee revenues
- ▶ \$19,600 revenue from sales of recyclables (2013)

CHALLENGES

- ▶ Implementing recycling and composting and increasing the diversion rate in multifamily homes

GOALS

- ▶ Increase diversion rate to 70% to extend operation life of local landfill and reduce residual waste related costs.

FIGURE 2.37, CITY OF TORONTO LONG-TERM WASTE STRATEGY

Waste Flow Cart. Source: City of Toronto



Case Study: Waste-to-Energy

METRO VANCOUVER, BC CANADA (2,500,000 PEOPLE)

Metro Vancouver has an impressive recycling timeline with a strong zero waste initiative. Recycling began in 1983 and they have been working on increasing the diversion rate ever since. They started a Waste-to-Energy program started in 1988 to handle the residual waste that can't be recycled with the goal to produce energy and collect recycled metal.

PROGRAMS

- ▶ Comprehensive Recycling program.
- ▶ Disposal bans on recycling materials and organics.
- ▶ Waste-to-Energy (WTE) to recover energy (electricity, hot water, steam and fuel) and metals from garbage that cannot be recycled.

STATS

- ▶ 1 million tons of waste annually.
- ▶ 58 percent of waste is diverted.

BUDGET

- ▶ \$102 million budget covered by landfill tipping fees, energy sales and other funds/reserves and external revenues
- ▶ \$6 million per year revenue from power generated
- ▶ \$1.4 million from sale of 8,000 tons of recycled metal

CHALLENGES

- ▶ Even with recycling and a high diversion rate there is still be thousands of tons of waste

GOALS

- ▶ 10 percent reduction, per person, in the amount of waste generated by 2020.
- ▶ Increase diversion rate to 80 percent.
- ▶ Build new WTE facility to reduce amount of waste going to landfill.
- ▶ Pursue options for improving/maintaining local market for key recyclable materials.

FIGURE 2.38, METRO VANCOUVER WASTE-TO-ENERGY DIAGRAM

Source: Metro Vancouver



Case Study: Materials Recovery Facility (MRF)

LAFAYETTE, LOUISIANA (230,000 PEOPLE)

A small, local landfill operated in Lafayette in 1980 and closed eight years later. Prior to the closing the city needed to make a fast decision on how to handle waste. The city hired an engineering firm to help them find solutions. Because city already has a utility company, Lafayette Utilities System, they didn't need an energy solution and therefore didn't invest in waste-to-energy, the city chose recycling and hired the Recycling Foundation (RF) to help divert waste.

PROGRAMS

- ▶ Allied Waste picks up waste weekly and goes to regional landfill in southwest Louisiana.
- ▶ Weekly single-stream recycling through RF, recycling goes to a materials recovery facility.
- ▶ Weekly yard waste collected and taken to compost facility, compost offered to residents free of charge
- ▶ Public education: Restoring the closed landfill into a natural Cajun prairie using native grasses, plants and trees. And a rain garden to demonstrate how native plants can filter pollutants from stormwater runoff along impervious areas before the water enters the watershed

STATS

- ▶ 8,000 tons of recycling.
- ▶ 17,000 tons of compost.
- ▶ Total (including recycling, hazardous waste, etc.) 43 percent diverted from landfill.

BUDGET

Monthly payment for trash pickup, recycling services and to fund the City of Lafayette Environmental Quality Division

- ▶ RF provides \$25,000 a year for public education.

CHALLENGES

- ▶ Initially the RF charged nothing for services and quickly turned to charging a monthly fee. Currently, the sale of commodities is low and the RF is losing money.
- ▶ For a short term of the contract a floor to ceiling agreement was established with RF to share profits with the city.
- ▶ Monthly recycling rates are inadequate to keep up with the costs of collecting and processing, and low profit from selling recyclables.

GOALS

- ▶ Send less waste going into landfills keeping garbage rates stable
- ▶ Save energy and natural resources by recycling
- ▶ Create jobs in Lafayette and in other cities that are in the "recycling loop" of making new items from recyclables.

Lafayette Consolidate Government Recycling Campaign

"Pride Guide" Parish Residents Interested in the Direct Environment



Case Study:

Materials Recovery Facility (MRF)

MONTGOMERY, ALABAMA (205,000 PEOPLE)

The City of Montgomery struggled with their curbside recycling program because of cost, participation, and capacity issues the program shut down in 2009. Recycle depot locations were used in the meantime but were inadequate. The City need a fresh start and put out requests for proposals (RFPs) to come up with a better solution.

PROGRAMS

- ▶ City has a 25 year contract with the Advanced Mixed Materials Recovery Facility (AMMRF), IREP Montgomery, to receive and process all of the municipal solid waste (MSW) collected by the City
- ▶ Single bin collection format with twice a week pick up. Items accepted include: organic waste, food waste, all paper, cardboard, all plastic, aluminum cans, tin cans, plastic bags, and glass.

STATS

- ▶ City is committed to provide 100,000 tons of waste per year; the facility has a capacity of 225,000 tons per year
- ▶ 100 percent of waste goes to facility and a 60 percent of recyclables are recovered out of the waste stream.

Future phases of the facility will increase that to 85-95 percent recovery rate

BUDGET

- ▶ City of Montgomery sanitation budget is \$14 million
- ▶ Residents pay monthly for curbside pickup
- ▶ City pays tipping fee of \$50 for every ton of trash delivered to the AMMRF. More communities join sending waste here the less burden on the City of Montgomery
- ▶ AMMRF pays tipping fee to the City for the trash that goes back to the landfill
- ▶ After the City meets its 100,000 tons, it will begin to share in the recycling center's profits

CHALLENGES

- ▶ A modern facility that can have a high recovery rate of materials and ensure low contamination.

GOALS

- ▶ To be environmentally responsible.
- ▶ Send less material to the landfill and reduce equipment and personnel costs, and extend the life of the landfill.
- ▶ Future phases of the facility include installation of a SMARTFERM dry anaerobic digestion (AD) system to process the organic materials that are sorted out to create a compressed natural gas (CNG) and compost, as well as Waste to Energy.

Montgomery Advanced Mixed Material Recover Facility

Source: Recycling Today online magazine



STRATEGY 2.9.1: To further divert waste from the landfills, develop a program whereby viable construction material waste and office furnishings can be put aside and donated to Habitat for Humanity programs and other nonprofit affordable housing programs.

ACTIONS AND INITIATIVES

1. Consider providing specialty item pickup (i.e. bulky items, ewaste)

STRATEGY 2.9.2: *Develop an Integrated Solid Waste Recycling Program, based on the existing Rutherford Recycles program.*

According to the City of Houston’s Solid Waste Department, every 10,000 tons of municipal solid waste (MSW) that goes to the landfill creates one job, while recycling the same amount of waste creates 20-100 jobs. Reuse or remanufacture from 10,000 tons of waste creates on average over 180 jobs. According to the US EPA Office of Solid Waste, a well-run curbside recycling program can cost anywhere from \$50 to more than \$150 per ton...trash collection and disposal programs, on the other hand, cost anywhere from \$70 to more than \$200 per ton.

ACTIONS AND INITIATIVES

1. Establish incremental waste stream diversion (recycling and composting) goals for the residents of Rutherford County to meet over time. Establish a method of enforcing these goals.
2. Develop a Recycling Coordinator position within the City’s Solid Waste Department. Responsibilities would include:
 - engaging citizens in design of a public education and outreach program to help gain support and ensure participation (refer to Action No. 5);
 - Establish a Municipal Recycling Team;
 - Assess and Identify Program Supporters;
 - Determine Scope and Assess Your Waste;
 - Evaluate Options and Set Reduction Goals;
 - Find and develop markets for recyclables;
 - identify and secure sufficient grant funding and other financial assistance;
 - secure adequate local government financial support.
3. Develop and implement immediately a comprehensive recycling plan for City and County governments. The amount of solid waste material

should be collected and quantified; the results of which should be summarized within the City’s Capital Improvements Program budget.

4. Review the City Code to consider amendments which would ban specific materials from disposal and require mandatory recycling of specific materials; e.g., organics, paper products.
5. Develop a multi-media public education program outlining best management practices for disposing of and recycling specific elements in the municipal solid waste stream, including:

- | | |
|------------------------------------|--------------------------------------|
| - Antifreeze | - Leaf & Yard Waste Composting |
| - Asbestos | - Mercury Containing Devices & Lamps |
| - Batteries | - Paint and aerosol canisters |
| - Construction & Demolition Debris | - Refrigerants |
| - Electronic Waste | - Scrap Metal |
| - Food Waste Composting | - Scrap Tires |
| - Glass | - Universal Wastes |
| - Household Hazardous Waste | - Used Oil & Filters |
| - Household Sharps | |

Include multiple media sources, including:

- ▶ pamphlets/brochures/bumper stickers,
- ▶ speeches by officials to schools or local groups,
- ▶ special programs in schools,
- ▶ neighborhood/community meetings,
- ▶ peer pressure by neighbors;
- ▶ contests and public recognition.

STRATEGY 2.9.3: Establish a price for residential and nonresidential solid waste collection, based on volume; and implement.

STRATEGY 2.9.4: *Explore the technological feasibility and benefit to cost of implementing a waste to power incineration program for Rutherford County.*

Thermal treatment involves recovering energy and recyclables from the waste stream and reducing the volume of waste sent to landfill. It can be referred to as Energy-from-Waste and Waste-to-Energy. The most common technology for thermal treatment of waste is combustion, and this figure illustrates how the process works. Other new and emerging technologies include gasification, pyrolysis and waste pelletization.

STRATEGY 2.9.5: *Work with Wilson County and the Nashville Area Metropolitan Planning Organization (MPO) to develop a comprehensive solid waste transfer program, whereby Wilson County would be the recipient of Rutherford County's solid waste.*

STRATEGY 2.9.6: *Consider a range of public, private and quasi-public partnerships through which to develop a comprehensive waste management program.*

ACTIONS AND INITIATIVES

1. Municipal partnerships may reduce administration and operating costs, draw on collective resources and assets, and allow for strategic planning across a broader geographic region.
2. Consider a range of spin-off programs, including:
 - One Bin For All - MRF Facility
 - Single Stream and Dual Stream recycling
 - Curbside Pickup - Provide bins and containers
 - Pay as you Throw - hybrid
 - ReUse Warehouses for construction and building materials
 - Food Waste processing



IMPROVED RECYCLING OPTIONS

With the forecasted life of our landfill in mind, we need to become more progressive about recycling - both at the household level and in our institutions, businesses and public places. It is eye-opening to visit other cities and see how far behind we collectively are in terms of recycling mentality and options.



2.10 Managing Public Safety Services: Police, Fire, EMS

Murfreesboro's Police and Fire Departments, along with the Rutherford County Emergency Medical Services (EMS) exist to protect the health, safety, and public welfare of the community. The effectiveness of each department is dependent on the staffing of well-trained police officers, firefighters, and emergency medical personnel; equipment such as vehicles, apparatus, and firearms; training and continuing education; and adequate building facilities. The locations of the fire stations is a critical factor regarding response time for emergency calls, which correlates to life safety and also impacts the City's insurance rating. The capacity of these essential functions is necessary to evaluate the impacts and needs warranted by community growth.

Police Protection

The Murfreesboro Police Department (MPD) is committed to the protection of life and the prevention of crime and disorder. With an emphasis on community policing, MPD builds partnerships and seeks proactive approaches and innovative solutions to address crime and other safety issues in Murfreesboro that adversely affects the daily lives of its citizens. Through prompt, efficient, and courteous service, MPD strives towards

its ultimate goal of creating a better quality of life for Murfreesboro's citizens and visitors.

The Murfreesboro Police Department (MPD) has an interlocal agreement with Rutherford County Emergency Communications District (RCECD) to provide 911 service support. RCECD also coordinates 911 services for other agencies in Rutherford County such as the Sheriff's Department and Middle Tennessee State University (MTSU).

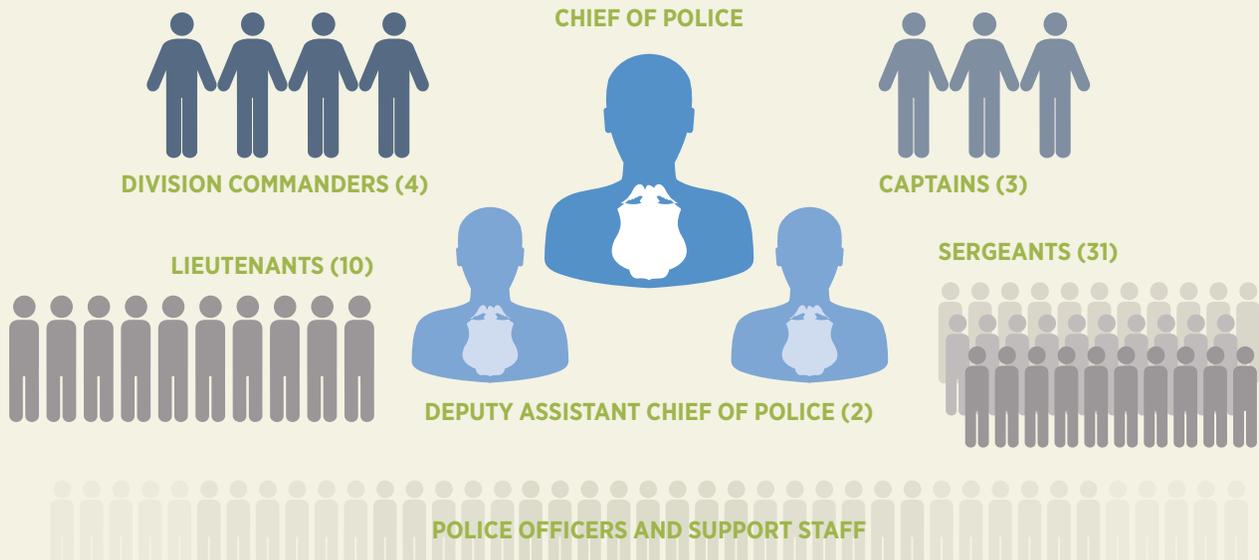
The Department has 232 sworn officers including one Chief of Police, two Deputy/Assistant Chiefs of Police, four Division Commanders, three Captains, 10 Lieutenants, and 31 Sergeants.

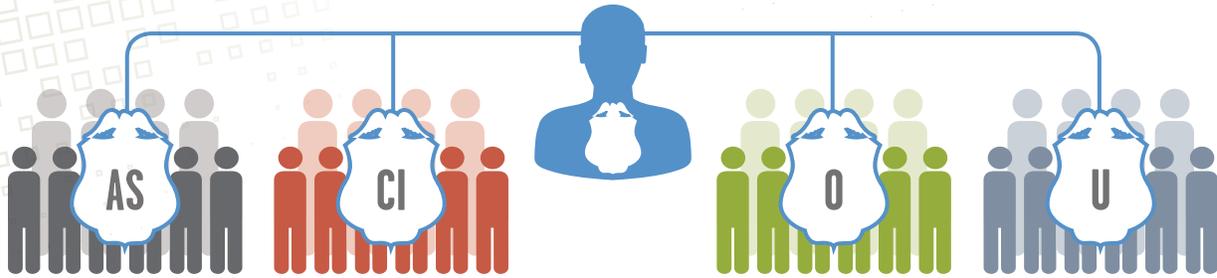
FOUR PRIMARY DIVISIONS

MPD is composed of four primary divisions which include the Administrative Services Division (AS), the Criminal Investigations Division (CI), the Operations Division (O), and the Uniform Division (U).

Administrative Services Division

Administrative Services includes sections for personnel, training, community relations, school programs and uniform and equipment supply. The Personnel Section is responsible for weekly time accountability and overtime payments for approximately 317 employees of the MPD. In addition, this section is also responsible for maintaining personnel files including sick, vacation, and compensatory time balances. It assists employees with medical issues, administers the sick abuse report, files supervisor event reports and employee evaluations. The Training Section is responsible for providing, scheduling, and reporting annual and specialized training for all certified police officers and civilian employees to comply





with the Tennessee Peace Officers Standards and Training Commission (POST) certification requirements and/or city mandated training requirements. All Murfreesboro Police Officers are certified by POST. The Training Section also hosts numerous training classes on-site as well as facilitating travel, tuition and accommodations for off-site training. Community relations provides crime prevention and other educational programs for community groups. Drug Abuse Resistance Education (DARE) and Gang Resistance Education and Training (GREAT) are presented at Murfreesboro City Schools by officers assigned to school programs section. Uniform and equipment supply is responsible for providing issued items to officers and other employees as required.

Criminal Investigations Division

The Criminal Investigations Division is responsible for the investigation of crimes reported to MPD. This division is divided into eight different groups, including Property Crimes, Personal Crimes, Special Victim's Unit, Forensics/Sex Offender Unit, General Investigations Section, Vice Unit, Gang Unit, and the Crime Scene Investigation Unit. Cases are referred to different sections and units depending upon the exact nature of the issue.

Operations Division

The Operations Division is divided into three different sections which include the Police/Fire Communications Center, the Records Section, the Office of Professional Responsibility and the Information Desk. The Police/Fire Communications Center serves the community by:

- ▶ answering emergency and non-emergency requests for police and fire;
- ▶ coordinating response for those citizen requests; and
- ▶ assisting our local emergency service providers in protecting life and property 365 days per year.

The Records Section is commanded by a lieutenant and employs six employees, one of which is a supervisor. The Records Section is responsible for the storage and maintenance of all records, property and evidence submitted by police officers.

The Office of Professional Responsibility is commanded by a lieutenant and includes a sergeant and a police officer. The Office of Professional Responsibility is responsible for the investigation of complaints against police officers and other department employees, the management and approval of secondary employment and the retrieval of requested information from mobile video archives.

The Information Desk clerk on duty greets visitors as they enter the lobby of Police Headquarters.

Uniformed Division

The Uniformed Division, consisting of approximately 163 sworn officers, is the largest single division of the department and provides all uniformed police services for the citizens of Murfreesboro. The division is commanded by a major with two captains sharing responsibility for the management of the Patrol Services and Traffic / Special Services sections within the division. Patrol Services is divided into three patrol shifts. Included in patrol operations are various community policing initiatives, bicycle patrol, park patrol, greenway patrol, Special Operations Unit (SOU) tactical team, and Directed Patrol Service. Traffic / Special Services includes three shifts of traffic enforcement officers, as well as parking enforcement personnel assigned to the downtown central business district. Traffic/Special Services is also responsible for wrecker schedules and inspections, as well as many of the specialized units within the department such as the Fatal Accident Crash Team (FACT), the Murfreesboro Alcohol Counter-Measures Team (MPACT), Motorcycle Unit, Canine Unit, and Photo Red Light Enforcement.

SERVICE AREA

The MPD's primary service area includes the City's municipal boundaries, which is approximately 57.8 square miles. When there is a question as to whether or not an incident is within the municipal limits the MPD will provide service. The MPD does not provide any coverage for the areas outside of the municipal city limits. The department coordinates with other police and public safety agencies when necessary including the Rutherford County Sheriff's Department and the MTSU Police Department.

Renovation Plans

Plans are currently being developed for the renovation of a 125,000 square foot building at 1004 North Highland Avenue to become the future MPD Headquarters building. The design of the building is currently under way with a tentative time frame to bid the project in 2015.

This building will house all of the MPD operations with the exception of the Community Policing Precincts, VICE Section, and the Special Operation Unit. Funding for the purchase of the property, interior demolition and the architectural and design work has been secured. The larger amount for the renovation of the building will be included in the 2015 capital improvement budget.

Future MPD Headquarters

1004 NORTH HIGHLAND AVENUE

SOUTH CHURCH STREET
MPD HEADQUARTERS

1734 SOUTH RUTHERFORD BLVD
CRIMINAL INVESTIGATIONS DIVISION

FACILITIES

The Main Police Department building is located at 302 South Church Street. This building contains general office space for administration and assigned staff, including two interview rooms, Communications Center, Computer Server Room, Janitorial Supply Storage, Office Supply Storage, Teleserve Room, Workout Room, and the City Emergency Operations Center (EOC).

The Police Annex Building is located at 324 South Church Street. This building contains general office space for assigned staff, including Personnel Records Storage, Training Rooms, Garage (Storage Area), and the Records Section Evidence Storage Room.

The Uniformed Building is located at 308 South Church Street. This building contains the Roll Call Room, Uniformed Division Sergeant's Offices, Men's and Women's Locker Rooms, and the Report Forms Storage Room.

The Records Building is located at 314 South Church Street. This building is used for general office space for assigned staff, including Filed Reports Storage, Evidence and Personal Property Storage Room, and the Overnight Property Room.

The Criminal Investigations Division Building is located at 1734 South Rutherford Blvd. and is used for general office space for assigned staff, including the Victim Interview Room, Evidence Processing Room and limited storage.

There are two Community Policing Precinct Offices that are currently run by the MPD. They are in Franklin Heights (317A January St.) and Parkside (320M Vaughn Street). Both buildings have general office space for assigned staff and include citizen interview / meeting rooms. Both of these community precincts are designed to give the MPD a presence in perceived high crime areas of the city.

In addition to the MPD programs and activities mentioned in the following pages, MPD actively coordinates with the following agencies to provide additional community events for reasons of both public education and community involvement. These include, but are not limited to the following:

- ▶ Governor's Highway Safety Office (GHSO)
- ▶ Greenhouse Ministries
- ▶ Leadership Rutherford and Youth Leadership Rutherford
- ▶ Rutherford County Chamber of Commerce
- ▶ Rutherford County Child Advocacy Center
- ▶ Rutherford County Community Wellness Council
- ▶ Rutherford County Emergency Management Agency
- ▶ Tennessee Board of Probation and Parole
- ▶ Tennessee Department of Homeland Security

Programs / Activities

The MPD sponsors, co-sponsors and actively participates in a large number of community programs for purpose of connecting to the community, data collection, and employee training. Included below are current departmental programs or programs that the department actively coordinates with.

AUTOMATED PARKING VIOLATION ISSUANCE AND COLLECTION SYSTEM (APVICS)	<i>Handheld computers and software used for parking enforcement in the downtown central business district (CBD)</i>
BICYCLE PATROLS	<i>Specially equipped police bicycles combine mobility, efficiency, and increased citizen contacts for inner city areas</i>
CITIZENS POLICE ACADEMY	<i>Designed to introduce citizens to the MPD and provide a better understanding of the role of the police in providing law enforcement services to the community as a whole</i>
COLLEGIATE INTERNSHIP PROGRAM	<i>Designed for approved Criminal Justice students from Daymar Institute, Murfreesboro Campus and Middle Tennessee State University</i>
COMMUNICATIONS TRAINING AND EVALUATION PROGRAM (CTEP)	<i>Provides on the job training for incoming Murfreesboro Police/Fire Communications Dispatchers (twenty week program)</i>
COMMUNITY ANTI-DRUG COALITION OF RUTHERFORD COUNTY (CADCOR)	<i>Provides resources to combat and reduce substance abuse and violent crime; in conjunction with Murfreesboro Housing Authority</i>
COMMUNITY ORIENTED POLICING PROGRAM (COPS)	<i>Improving relationships and building community partnerships with local residents to find innovative solutions to the problems of crime</i>
CRIMEMAPPING.COM	<i>Provides a research tool for residents to analyze up-to-date crime information occurring in their neighborhoods or anywhere in Murfreesboro</i>
CRIME STOPPERS	<i>Provides a department sponsored intelligence gathering function for the anonymous submission of information concerning past and future crime. Civilian Board of Directors countywide in scope is operated from the Murfreesboro Police Department</i>
CELL PHONE AND TEXT MESSAGING	<i>Enhanced communication units aid in the reduction of radio air time and increase proactive crime prevention as well as enable direct contact for both sworn and selected civilian use</i>
DOMESTIC VIOLENCE PROGRAM	<i>Domestic Violence Unit provides victims with resources for ending the cycle of violence</i>
DRUG ABUSE RESISTANCE EDUCATION (DARE)	<i>Designed to help elementary children recognize and avoid the dangers of drugs and violence (emphasis at K and 5th grade levels)</i>
FATAL ACCIDENT CRASH TEAM (FACT)	<i>Investigates accidents involving or likely to result in fatalities</i>
FIELD TRAINING AND EVALUATION PROGRAM (FTEP)	<i>Provides on-the job training for incoming Murfreesboro Police Officers (18 week program)</i>
FINGERPRINTING SERVICES	<i>For a variety of citizen needs including applications, clearances, and compliances with regulatory guidelines; Fingerprinting for Kids used as a community outreach program.</i>
GANG RESISTANCE EDUCATION AND TRAINING (GREAT)	<i>A program designed to strengthen life skills and decision making for at-risk youth susceptible to gang recruitment</i>
GRAFFITI ERADICATION PROGRAM	<i>City funded program that uses police supervision (and occasional police labor) as well as inmate labor to eradicate graffiti on public and private buildings</i>
IMMEDIATE RESPONSE TEAM (IRT)	<i>Specially trained and equipped SOU members utilized in reducing response time to critical incidents and resolving those incidents in an expeditious manner</i>

Programs / Activities (continued)

LEADS ONLINE (REPORT IT)	<i>Residents can create a free and secure online personal inventory of their belongings in the event of loss, theft or damage. A link to the program may be found at www.murfreesborotn.gov (Police Department page under Police Partnerships)</i>
MOBILE AUDIO/VIDEO RECORDING	<i>Capabilities are included in all uniformed patrol vehicles, now migrating into digital storage media</i>
MOBILE DATA TERMINAL PROJECT	<i>All marked vehicles now contain laptops, Global Positioning Systems (GPS), Automatic Vehicle Location (AVL) systems, soon to add field-based reporting (FBR) and automated citations</i>
MURFREESBORO POLICE ALCOHOL COUNTER MEASURES TEAM (MPACT)	<i>Intensive enforcement of alcohol violations on the streets of Murfreesboro</i>
NATIONAL NIGHT OUT	<i>Designed to help the community help themselves by cultivating relationship with neighbors and law enforcement. The night targets crime and drug prevention and generates support in the Department's anti-crime efforts.</i>
NEIGHBORHOOD WATCH	<i>Assists residents in resisting home burglaries and thefts</i>
ONLINE POLICE REPORTING	<i>Similar to Project Teleserve, this new program allows citizens to file police reports online for certain types of incidents online using CopLogic</i>
PERFORMANCE EVALUATION SYSTEM	<i>Validated systems for all personnel and job descriptions developed in conjunction with Organizational Psychology Department professionals at Middle Tennessee State University (MTSU)</i>
PUBLIC HOUSING CRIME INTERDICTION	<i>Emphasis on crime prevention in public housing areas through increased patrols and partnerships with resident groups. Two (2) community policing sites (Franklin and Highland Height Precincts) in inner city housing areas staffed with bicycle officers and investigators sixteen (16) hours daily and equipped with time-lapse video for recording of drug transactions, criminal activity, etc.</i>
PROJECT GO!	<i>Joint project with the Murfreesboro Housing Authority and Murfreesboro Parks and Recreation Department that provides mentors to at-risk youth</i>
PROJECT TELESERVE	<i>This program is intended to enhance the level of emergency police services available to the community by handling low priority calls by telephone. By processing these calls in such a non-traditional manner, the Department will be able to increase officer and citizen safety by making patrol officers available to handle emergency calls for service and perform other proactive patrol related services while saving time and costs associated with sending a patrol officer and vehicle to each complainant's location</i>
RADKIDS	<i>Provides positive activities for children ages 8 - 12 years of age that enhance self- esteem and give them the knowledge to protect themselves from possible abduction</i>
RAPE AGGRESSION DEFENSE WOMEN (RAD)	<i>This program teaches realistic self-defense tactics and techniques for women that include awareness, prevention, risk reduction, avoidance, and hands-on self-defense</i>
ROBBERY AWARENESS AND PREVENTION	<i>Combined efforts of departmental personnel to increase awareness of local merchants to potential threats of robbery and associated violence</i>
SELECTIVE TRAFFIC ENFORCEMENT PROGRAM (STEP)	<i>Proactive enforcement program wherein patrol personnel are scheduled in overtime assignments to target high traffic areas (based on accident reporting) and areas of excessive speed complaints by residents</i>
TAKE HOME VEHICLE PROGRAM	<i>Vehicles are provided for police officers who are city residents, investigators and upper level command staff and reduces maintenance cost, improves visibility in neighborhoods, reduces down time during shift change, and improves morale.</i>

Strategy 2.10.1: Provide for the ongoing staffing and equipment needs of the MPD to ensure adequate protection of the City's projected population.

ACTIONS AND INITIATIVES

1. Periodically review the Police Department's personnel needs and hire additional officer and support staff to accommodate increased calls for service concurrent with population growth.
2. Continue and enhance an aggressive gang interdiction strategy using existing police resources as well as local, state, and federal partnerships, and any available funding which may expand these efforts.
3. Continuation of the Automated Traffic Enforcement program to include increased targeting of violators which contribute to traffic crashes.
4. Launch of Field-Based Reporting (FBR) for Police incident, arrest, and crash reports.
5. Continue to development and implement the wrecker ordinance.
6. Complete the construction of towers for the new communications infrastructure and begin the next phase of the radio improvement project.
7. Undergo the initial planning and development of public safety training facility, including a police K-9 training facility.

Strategy 2.10.2: Continue to maintain interlocal / joint agreements with other departments, agencies and institutions to provide effective policing services and crime prevention programs.

ACTIONS AND INITIATIVES

1. Continue to work with the Rutherford County Sheriff's Office in providing assistance with investigations, traffic-related issues or accidents, transporting juveniles and emergency detention, animals calls, Neighborhood Watch programs, service of warrants, jail management, home inspections, radio traffic equipment sharing, preparation of the Emergency Management Plan (EMP), and taking calls and other services as requested.
2. Partner with the Governor's Highway Safety Office (GHSO) to target traffic enforcement areas based on crash data.
3. Continue to work with Rutherford County Emergency Communications District (RCECD) to provide 911 service support and to increase regional incident response times.

Strategy 2.10.3: Continue to provide effective community-based, crime preventative programs, at little to no cost to area residents.

ACTIONS AND INITIATIVES

1. Continue to provide the community-based crime prevention programs currently in place.
2. Pursue grant funding for any new programs or dormant programs.

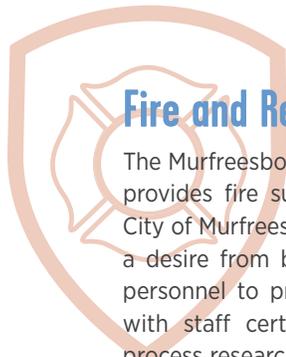


Murfreesboro Police on Bicycle Patrol

Source: MB



Murfreesboro Police Officer in Action
Source: MB



Fire and Rescue Department

The Murfreesboro Fire and Rescue Department (MFRD) provides fire suppression and fire prevention for the City of Murfreesboro jurisdiction. There currently exists a desire from both City Council members and MFRD personnel to provide medical services commensurate with staff certifications. MFRD is currently in the process researching and reviewing state law, its current contract with Rutherford County Emergency Medical Service (EMS), its current personnel training levels, and its operating costs in order to analyze the process relative to providing higher levels of care in the future. As of October 2014, this analysis has not been finalized and the plan is to begin training MFRD personnel accordingly and to revise their current job descriptions. Conversations with the Rutherford County EMS has begun in order to facilitate a move in this direction.

Specific tasks conducted by the MFRD include, but are not limited to:

- ▶ annual flow testing and maintenance of fire hydrants;
- ▶ arson investigations;
- ▶ fire inspections, code enforcement, and site plan review;
- ▶ fire coverage 24 hours a day, seven days a week;
- ▶ fire prevention and education programs; and
- ▶ tours and public appearances;

STAFFING

The MFRD employs 187 full-time employees and two part-time employees. Non-shift personnel includes one Fire Chief, one Deputy Fire Chief, three administrative staff positions, two clerks, three assistant fire chiefs, one fire marshal, two assistant fire marshals, and two

training coordinators. The Department maintains three shifts of 57 to 59 personnel per shift. Each shift consists of one shift commander, 11 captains, 16 Equipment Operators (drivers), and 30 firefighters. All personnel are certified at the structural firefighter level and at least the Emergency Medical Responders basic level. All personnel are trained to at least the Hazardous Materials (HazMat) operations level.

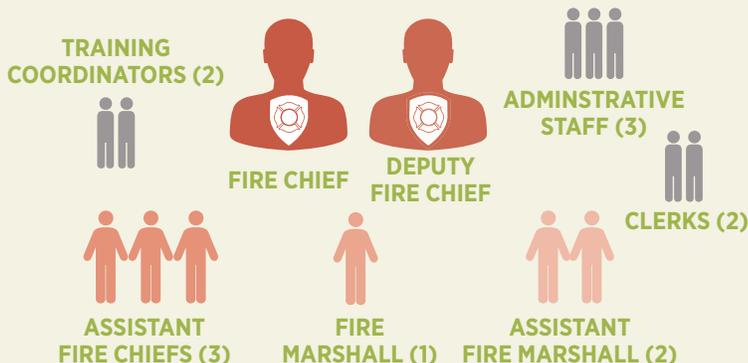
MFRD is organized into four divisions: Administration; Fire Suppression and Emergency Response; Prevention; and Training. The Administrative Division is responsible for the day-to-day management and supervision of the MFRD which includes but is not limited to the creation of general policies for the protection of life and property, evaluating future and present departmental needs, management of capital improvement projects, and making recommendations to the governing body on facilities and equipment for the MFRD.

The Fire Suppression and Emergency Response Division is responsible for the 24-hour per day provision of emergency services including medical first responder, extrication, structure fires, hazardous materials response, structural collapse response, water rescue, and major disasters. The Fire Prevention Division provides fire inspection, code enforcement, and site plan review and approval. The division conducts investigations to determine the origin and causes of fires, and receives and distributes smoke detectors within the City. The division leads in the education of youth and adults in fire prevention and safety.

The Training Division provides fire, medical, rescue, hazardous material and leadership training to meet all department, state, and federal standards. It conducts daily training to ensure that responding personnel are competent in their duties, safe in the manner of their response, and productive under difficult circumstances.

[Continued on page 2.112]

'Non-Shift' Personnel



'Shift' Personnel



FIGURE 2.35, MFRD SERVICE AREA

The jurisdiction for the MFRD covers the municipal city limits of Murfreesboro and the Veterans Administration Tennessee Valley Healthcare System, Alvin C. York Campus located directly off of US Highway 231, directly north of the current municipal limits. The MFRD maintains a local agreement with the Rutherford County Department of Fire and Rescue. This countywide department has recently been created by hiring 12 paid positions and combining all of the volunteer firefighter departments within the country.

NO.1

- ▶ Headquarters (Station No. 1) is located on 202 E. Vine St. The building has 22,711 square feet (sq. ft.) of living space and includes 4,016 sq. ft. of truck bays.
- ▶ Ladder 1, Engine 1, Car 24, Car 29

NO.2

- ▶ Station No. 2 is located on 2880 Runnymede Dr. The building has 3,600 sq. ft. of living space, and includes 2,600 sq. ft. of truck bays (two bays).
- ▶ Ladder 2, Rescue 2, Brush Truck

NO.3

- ▶ Station No. 3 is located on 1511 Mercury Blvd. The building has 1,820 sq. ft. of living space and includes 1,800 sq. ft. of truck bays.
- ▶ Engine 3, Engine 13 (Standby)

NO.4

- ▶ Station No. 4 is located on 1311 Jones Blvd. The building has 1,820 sq. ft. of living space and includes 1,800 sq. ft. of truck bays; and shift personnel office and living quarters.
- ▶ Engine 4, Engine 14 (Standby)

NO.5

- ▶ Station No. 5 is located on 3006 Florence Rd. The building has 3,600 sq. ft. of living space and includes 2,600 sq. ft. of truck bays; a bunker gear storage area; two mechanical repair rooms and one generator room and shift personnel office and living quarters.
- ▶ Engine 5, Tower, Rescue 15 (Standby)

NO.6

- ▶ Station No. 6 is located on 2302 Memorial Blvd. The building has 2,698 sq. ft. of living space and includes 2,652 sq. ft. of truck bays; and shift personnel office and living quarters.
- ▶ Ladder 6, Ladder 16 (Standby)

NO.7

- ▶ Station No. 7 is located on 2715 N. Thompson Lane. The building has 3,600 sq. ft. of living space and includes 2,600 sq. ft. of truck bays; and shift personnel office and living quarters.
- ▶ Ladder 7, Rescue 7, Confined Space Trailer, Rescue Boat, Polaris Ranger

NO.8

- ▶ Station No. 8 is located on 1730 E. Northfield Blvd. The building has 3,600 sq. ft. of living space and includes 2,600 sq. ft. of truck bays; and shift personnel office and living quarters.
- ▶ Ladder 8, Rescue 8, Rescue 18 (Reserve)

NO.9

- ▶ Station No. 9 is located on 802 Cason Lane. The building has 3,600 sq. ft. of living space and includes 2,600 sq. ft. of truck bays; and shift personnel office and living quarters.
- ▶ Ladder 9, Rescue 9, White Service Company

NO.10

- ▶ Station No. 10 is located on 2563 Veterans Parkway. The building has been built however it is not yet staffed. The building has 3,600 sq. ft. of living space and includes 2,600 sq. ft. of truck bays.
- ▶ Rescue 11, Ladder 17 (Reserve), Hazardous Materials Truck and Trailer

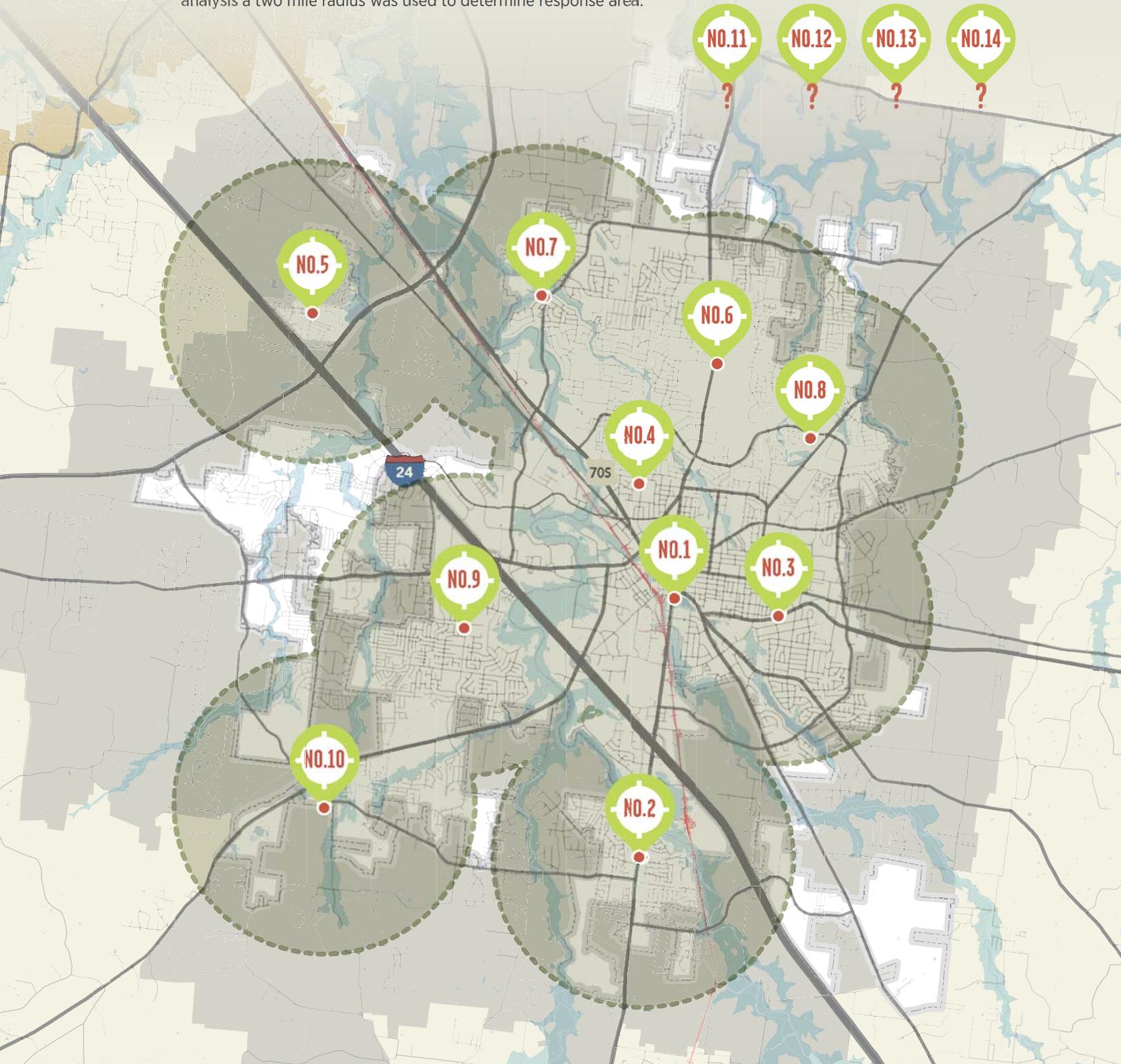
NO.11

- ▶ The proposed Station No. 11 facility program calls for 3,600 sq. ft. of living space and includes 2,600 sq. ft. of truck bays.



Fire Service FIRE STATION LOCATIONS AND SERVICE AREA

In evaluating a community's public fire protection, ISO considers the distribution of fire companies. Generally, ISO's criteria state that a built-upon area of a community should have a first-due engine company within 1.5 road miles of the protected properties and a ladder-service company within 2.5 road miles. Those benchmark criteria produce an expected response time of 3.2 minutes for an engine company and 4.9 minutes for a ladder-service company, based on a formula developed by the RAND Corporation. RAND conducted extensive studies of fire department response times. They concluded that the average speed for a fire apparatus responding with emergency lights and siren is 35 mph. That speed considers average terrain, average traffic, weather, and slowing down for intersections. For the purposes of this analysis a two mile radius was used to determine response area.



Source: John



FACILITIES

The MFRD maintains nine stations, all of which are located in the City of Murfreesboro. Station No. 10 has been built, but it is not yet staffed. The City currently does have plans to add an 11th. Station. The City has recently purchased land and utilities infrastructure is in place for the Station No. 11 building site. The new facility is budgeted within City's 2017 Capital Improvement Program (CIP).

NEW TRAINING FACILITY

A new joint training facility is currently being planned for by both the MFRD and MPD. The facility will include a training tower, burn building, emergency vehicle operations course, K-9 facility, and rifle shooting range. The training tower will be multi-story and will enable MFRD to conduct realistic training exercises. Personnel will receive hands-on training on different types of fire operations, aerial operations, sprinkler systems, and technical rescue (high/low angle, structural collapse, etc.). The burn building will be two stories and will have a maze of rooms that will be used for search and rescue scenarios, fire suppression, and overhaul. An area of 2.5 acres will be used for emergency vehicle driver training. The MPD will use the facility to house and train K-9s for departmental use. A 300 yard long rifle shooting range is planned for personnel to maintain their skill level. MFRD is also set to break ground on a new training facility by 2016.

EQUIPMENT / VEHICLES

MFRD currently has 10 frontline Engines/Ladders, two Heavy Rescues, two Medium Rescues, one Brush Truck,

one Polaris Off Road Vehicle, one Rescue Boat and Trailer, one Special Ops Trailer, one HazMat Trailer, one Fire Investigation Trailer, one Fire Safe House, and two trucks to haul trailers. The MFRD also has three Reserve Ladders, two Reserve Engines and two Reserve Medium Rescues. We anticipate adding two new Ladders, two new Engines, one Heavy Rescue and one Medium Rescue for the above-mentioned new stations. Between now and 2035, all of the MFRD's current equipment will need to be replaced due to attrition. National Fire Protection Act (NFPA) 1901 currently recommends that apparatus greater than 15 years old that have been properly maintained and that are still in serviceable condition, be placed on reserve status. Apparatus' that were not manufactured to the applicable NFPA fire apparatus standards or that are over 25 years old should be replaced. The MFRD is currently planning to replace equipment when it reaches the 15-20 year mark. The MFRD also has nine staff vehicles that are equipped for emergency traffic situations. It is presumed that the number of staff vehicles will need to increase as the number of staff members increases.

Currently, the MFRD's 10 stations and equipment are strategically placed around the City to allow for the quickest response possible for any emergency situation. Currently nine of the 10 stations are occupied and fully functioning. Station No.10 was completed approximately five years ago; however, due to the sudden slowdown in municipal growth, the station personnel were not hired at that time. It is the MFRD's intent to have Station 10 fully staffed and functioning in one or two years. In anticipation of the 2035 population projection, the

MFRD anticipates the addition of four new stations to accommodate the City's growth. With the four new stations and the opening of Station 10, MFRD estimates the need for an additional 75 shift personnel (15 per station) and 10 new staff members. We currently have 189 budgeted positions, so this would increase our total number to 274 shift personnel by 2035.

The MFRD stations each have various vehicles available for emergency situations. The type of vehicles are listed with their station number in the previous spread.

PROGRAMS AND ACTIVITIES

Throughout the year the MFRD hosts multiple fire and injury prevention programs. In 2012, MFRD educated approximately 37,262 children and adults on fire safety. The MFRD Fire Prevention Division receives and distributes smoke detectors to low income families and senior citizens on a fixed income. This division also staffs Fire Prevention Week in early October each year. Activities include fire safety educational programs for all school age children including preschool and daycare housed at schools within the Murfreesboro municipal limits. Topics frequently taught are learning about smoke detectors, escaping from windows, and safe places to meet. MFRD also makes station tours available to school groups throughout the year. Fire safety and prevention is taught during the tours.

MFRD also participates in a number of general public relations events throughout the year including but not limited to National Night Out, Annual Smoke Detector Program (Project SAFE), 9/11 Remembrance Ceremonies, 9/11 Memorial Stair Climb, Rutherford County Christmas Parade, Toys for Tots Campaign, Leadership Rutherford Emergency Services Event, and Dairy Day Annual Milking Contest. MFRD also has hosted regional and statewide continued educational programs to expand staff knowledge. These conferences include Fire Safety Inspector's Conference, Tennessee Advisory Committee on Arson Conference, and the Tennessee Public Fire and Life Safety Educators Association Conference.

In order to provide an organized and knowledgeable presentation to the public, the MFRD created a Special Events Team in 2012. The team consists of 30 personnel who are either trained first responders or emergency medical technicians (EMTs). This enables the team to provide medical and emergency assistance at the first responder level of care when necessary. In 2012 the team participated in 13 events. MFRD also maintains an Honor Guard.



MFRD'S NEW EMERGENCY MEDICAL SERVICES PROGRAM

In October 2013, MFRD began the rigorous training and credentialing process with the assistance of Rutherford County Emergency Medical Services. Each of the MFRD's licensed EMT-IVs, AEMTs, and Paramedics were required to complete a general knowledge written test, practical skills evaluation, eight hours of clinical training and evaluation on an ambulance with Field Training Officers, and eight hours of medical in-service training.

On July 28, 2014, the MFRD announced the launch of upgraded medical response services. The launch marked the beginning of MFRD's move to provide basic life support (BLS) services to the citizens and visitors of Murfreesboro. Until then, the MFRD was operating at a medical first responder level. MFRD became the first fire department in Rutherford County to provide BLS to its citizens.

New protocols for treatment were developed and advanced assessment equipment was purchased and placed on all fire apparatus. The MFRD's credentialed personnel are now able to perform tasks such as testing blood sugar and oxygen levels and administer medication to patients who complain of chest pain and other symptoms of a heart attack. MFRD continues to consult with Rutherford County EMS on the details of providing these important services.

SERVICE INDICATORS AND RESPONSE TIME

As of 2007, the MFRD has helped the City achieve an overall Insurance Services Office (ISO) rating of 2. This rating has recently been improved from a rating of 3 primarily due to improvements in equipment, training, communications, and water supply. The MFRD uses the Tennessee Fire Incident Reporting System (TFIRS) to report each emergency incident. TFIRS is a member of the National Incident Reporting System (NFIRS). The average travel response time in 2012 for the first arriving apparatus on an incident was four minutes and ten seconds (4:10). The estimated property and content loss in 2012 was \$1,583,129. The estimated property and content value saved was \$7,969,558.

NEEDS

The most significant issue facing the MFRD is planning and preparing for the next 20 years. MFRD is committed to adding to the services that they currently provide and maintaining their current services during Murfreesboro's rapid population expansion. The MFRD would like to add Advanced Life Support medical services in the

next seven to nine years. Any shifts and/or additions in service for City of Murfreesboro residents should be highly coordinated with Rutherford County EMS.

In order to add to the services listed above and plan for rapid population expansion, the MFRD has specific staffing and infrastructure needs that will have to be addressed. MFRD will need the budget to hire and train staff at both Station No. 10 and the planned for Station No. 11. Infrastructure needs include but are not limited to the building of Station No. 11, remodeling of Station No. 4, and the building of an apparatus and equipment storage building.

The MFRD estimates that the projected growth of Murfreesboro will have increased to a point where four new fire stations will be needed. Also, if the City leaders decide to move forward to providing Advanced Life Support medical services, the department will need to hire more Paramedics to support those services.

STRATEGY 2.10.5: *Provide for the ongoing needs of the Fire Department to ensure adequate protection of the population.*

ACTIONS AND INITIATIVES

1. Continue to adequately fund training and certification opportunities for fire personnel to improve job-related skills and departmental capabilities.
2. Periodically review the MFRD personnel needs and ability to accommodate increased calls for service concurrent with population growth.
3. Develop fire station facility replacement program, schedule and budget for all needs at the new training facility, Station No. 10, and Station No.11. Plans including the current availability of city-owned land should be created to analyze the potential relocation of Station No. 6.
4. To keep pace with state-of-the-art fire rescue technology and capabilities, establish a formalized replacement and procurement program for vehicles and equipment that is informed by the current City Capital Improvements Program (CIP). At a minimum, this should include a replacement schedule as follows:
 - Engines: 20 years;
 - Ladder trucks: 25 years; and
 - Command vehicles: 10 years.

5. Continue MFRD participation in the City's plan review process so that water supply and other emergency response considerations are incorporated into plans and plats for new development/ redevelopment.
6. Develop a method of review and consultation with city planning staff about proposed annexations and their potential impact to MFRD's current ISO rating of two.

Source: City of Murfreesboro



Rutherford County Emergency Communications District (RCECD)

The mission of RCECD is to provide the most reliable and efficient Enhanced 911 system as possible to all citizens of Rutherford County. RCECD offices do not serve as a central dispatch office rather the agency exists to provide coordination and funding to the individual call centers within the county in order to maintain the highest level of service available in conjunction with available technology. The specifics of what the call center provides to each local government is spelled out in the agency's inter-local agreement. RCECD also serves as a backup center for all local governments within Rutherford County. Should one of the call centers be down due to a natural disaster, the emergency calls would then be routed to RCECD offices.

The individual call center for the City of Murfreesboro is housed within the City of Murfreesboro Police Department (MPD). Incoming calls are routed to the call center based on the location of caller. Landline calls are very easy to pinpoint because of their fixed location. The irregular shape of the Murfreesboro's city limits are not significantly at issue here because the advanced mapping and routing technology will be able to route to the appropriate jurisdiction. However pinpointing the exact location of a cell phone call is much more challenging. Based on the closest cell phone towers available at approximate location of the caller is developed and the call is routed to the appropriate call center. The 911 caller at the appropriate center then takes the call and if he or she determines that the property in question is not within the city limits then the call is routed to the appropriate jurisdiction. The call center operator will stay on the line with the caller until the appropriate information is relayed to the new call center operator.

Rutherford County Sheriff's Department

There are a variety of functions that the Sheriff's Department is required to complete by law that MPD has no jurisdiction over within the City of Murfreesboro Municipal limits. These include but are not limited to inmate housing, transport of inmates to medical appointments, and service of civil process.

All individuals who are arrested by the City of Murfreesboro MPD are transported to the Rutherford County Detention Center to be housed. Currently

Rutherford County's Detention Center is severely overcrowded. According to the Sheriff's office the detention center was originally only built to be a 558-bed facility. The Sheriff's office has placed more beds into the facility than originally planned for and currently houses approximately 800 inmates at a time. The number of inmates is currently at such a high level that the Sheriff's office has been forced to put pads on the floor for inmates to sleep on. Although the overcrowding at this facility is highly problematic, the current situation is legal. The facility does not have to abide by certain state detention facility requirements due to being grandfathered in. Although there may not be a legal obligation to change there is currently a push to build a new prison facility in Rutherford County. The county has set aside land to build such a facility.

Because all inmates are housed at the Rutherford County Detention Center when there is a legal requirement that requires any inmate to see a medical doctor or mental health facility provider the county government has to fund the transportation cost for the trip. This cost of these trips can be significant because frequently an inmate will have to see a specialist in Nashville or even Memphis.

Another legal requirement that the Sheriff's office must deal with is the service of civil process. Tennessee State law requires the Sheriff's office to serve all civil warrants within Rutherford County. The MPD has no legal authority to serve these warrants.

The Rutherford County Sheriff's Department is currently in the process of determining how to manage and deal



with the expected population growth within their county. Population growth affects the Sheriff's Department in a variety of ways that one might not expect. For example, when more police are hired by the City of Murfreesboro it affects the work load at the Sheriff's Department; because the more arrests that are made there is that much more administrative process and paperwork for the county.

STRATEGY 2.10.6: *The Murfreesboro Police Department should work with the Rutherford County Sheriff's Office to secure funding to increase the size of the Rutherford County Detention Center.*

ACTIONS AND INITIATIVES

1. Under the authority of T.C.A. 41-4-140, work with the Tennessee Corrections Institute to develop a proposed program, schedule, budget and location for a new Rutherford County Detention Center.
2. Determine the feasibility of the MPD either assuming, or sharing responsibility for processing inmates.

Rutherford County Emergency Medical Services

Rutherford County EMS is the primary Advanced Life Support (ALS) provider for the County of Rutherford. EMS is funded by the property tax. Rutherford County EMS provides the citizens of Rutherford County with the following services:

- Advanced Life Support
- Dive Rescue/Recovery Medics
- Hazardous Material/Weapons of Mass Destruction Medics
- Public Event Medical Coverage
- T.O.P.S. Medics
- Bike Medics
- Public Service and Education Medics
- Special Rescue Operations Medics
- 911 Medical Communications/Dispatch
- First Aid/CPR Instructors

Number of response units:

- 12 Ambulance stations
- 13 ALS Ambulances
- 1 Interfacility Transport Unit
- 25 ambulances

- 1 Special Operations Building
- 1 Dive Rescue/Swift Water boat
- 2 Special Rescue Units
- 1 Tactical Response Unit
- 6 4x4 ALS First Response Units

Three twenty-four-hour shifts are responsible for all 911 operations and activities of the Ambulance Service. There are three Assistant Directors and three Supervisors, responsible for the day to day operations of Emergency Services in Rutherford County.

EMS Operations consists of twelve transport units operated from eleven substations around the county. These ambulances are responsible for the primary 911 medical response twenty-four hours a day. EMS units are staffed with a minimum of one EMT-Paramedic and one EMT who work twenty-four hour shifts. Crews have shift change at 7:00 am. Crews on the primary units are assigned stations throughout the county.

Each shift is assigned an Assistant Director and a Supervisor. The Assistant Directors are responsible for all daily operations of the shift and work twenty-four hour shifts. They are part of the administrative staff and are also available to respond to calls in an ALS equipped 4x4 vehicles.

Rutherford County EMS continues to work with MFRD to implement its new EMS program that was officially launched in July of 2014. Although MFRD is providing a higher level of care, Rutherford County EMS continues to provide patient transport.

Rutherford County EMS has as a policy that they will transport their patients to wherever the patient desires to go. The two most frequently used hospitals are St. Thomas in the City of Murfreesboro and StoneCrest in Smyrna. These two local hospitals provide a high level of care particularly for stroke and heart attack victims. Rutherford County EMS also frequently uses LifeFlight, a helicopter services to take patients to Vanderbilt University in Nashville for specialty services such as burn victims and trauma center patients that are not available locally.

Rutherford County EMS is aware of the fact that there is a large expected growth to the county's population that is expected. The department is committed to maintaining a ratio of one ambulance response station per 14,000 person population. The State of Tennessee estimates that a new station should be added for every 12,000 to 15,000 persons.

2.11 Education

Murfreesboro Schools

Murfreesboro City Schools (MCS) is a pre-Kindergarten – 6th grade educational system that is funded through the City of Murfreesboro. The Rutherford County School District (RCSD) system is Kindergarten – 12th grade educational system that is funded through Rutherford County Government using 50 percent of the County local option sales taxes and 50 percent property tax. There are 13 schools within the MCS system, including one preschool, eight elementary schools, and four academies (grades K-6). Typically students who attend elementary school at an MCS school will transfer into a RCSD school for grades 7-12, although there is an option to enroll students in RCSD schools in the 6th grade. Many parents choose this option because the MCS does not offer an athletic option. Consequently there are no sports fields or facilities within the MCS system. Few of the MCS and RCSD schools are within walking distance of their student bodies. Of the MCS schools, Cason Lane and Erma Siegel elementary schools enjoy a healthy proximity and walkability to existing neighborhoods. Together, the MCS and the RCSD represent one of the largest countywide school systems within the State.

MCS DEMOGRAPHICS SUMMARY

MCS has a current enrollment of 7,926 students. Over the past twenty-six (26) years, the district has grown on average one hundred forty-six (146) additional students each year. As outlined within Table 2.11, *MCS Student Enrollment: Percentage Change*, the pattern of growth has been uneven with the most prolific growth in the history of the district being the current 2014-2015 school year with a 6.49% increase over the 2013-2014 school year, equating to a 483 student increase.

significantly, MCS has four of the ten most racially and ethnically diverse elementary schools within the state of Tennessee, which brings its share of rewards but also a host of additional challenges.

TABLE 2.11, MCS STUDENT ENROLLMENT: PERCENTAGE CHANGE

SINCE 2010 - 2011	7.99%
SINCE 2005 - 2006	18.56%
SINCE 2000 - 2001	27.72%
SINCE 1994 - 1995	32.26%
PAST 25 YEARS	46.27%

TABLE 2.12, MCS CAPACITY

School	Design Capacity	Student Enrollment *	Delta
Overall Creek	1,000	570	400
Mitchell Nelson	800	790	FULL
Northfield	800	551	200
Erma Siegel	1,000	745	FULL
John Pittard	1,000	997	FULL
Reeves Rogers	500	456	FULL
Hobgood	500	439	FULL
Blackfox	850	823	FULL
Bradley	500	451	FULL
Cason Lane	1,000	709	250
Scales	1,000	889 avg	FULL
Discovery	500	417 avg	FULL
TOTAL	9,450		850

* does not include special needs students



WHAT DOES A PROJECTED POPULATION OF 228,090 PERSONS LOOK LIKE AND HOW WILL THIS AFFECT MCS AND RCSD?

According to the U.S. Census Bureau (www.childstats.gov), in 2035, 22 percent of the population will be composed of children up to 17 years in age. While this represents a 1.2 percent decrease in the estimated 2015 composition, it still equates to an additional 24,430 young people living within Murfreesboro’s city limits and 12,518 kids living outside the city limits but within the Urban Growth Boundary; for an estimated total of 36,948 future students enrolled in both MCS and RCSD schools.

It is assumed that of the projected 24,430 young people living within Murfreesboro’s city limits approximately 40 percent of this student population, or an estimated 9,773 children, will be enrolled in Murfreesboro City Schools (K-6). As identified within Table 2.11, *MCS Capacity*, MCS’ 12 schools have the capacity to accommodate approximately 9,500 students. There is space availability to accommodate an additional 850 students, which leaves a projected 2035 delta of approximately 8,923 children (refer to Table 2.13, *Student Enrollment*

Projections within the Planning Area). Utilizing average numbers over the 20 year planning horizon, the MCS district will grow by approximately 475 students per year; a demand of which equates, on average, to constructing at least nine new schools within the 20 year planning horizon; a land area requirement of approximately 225 acres (25 acres average per school); and a staffing requirement of over 475 additional teachers.

MCS SCHOOL REQUIREMENT: 9 ELEMENTARY SCHOOLS

There are few options. As outlined within Table 2.11, *MCS Capacity*, most MCS K-6 grade schools are either reaching or at full capacity (with a delta of less than 1,000 students. In the short term, the MCS could modify its 20:1 Pupil to Teacher Ratio (PTR) to align with Tennessee state maximum requirements, which is 25:1 for grades 4 through 6. Another short term option would be to incorporate portable classrooms onto existing school campuses (one portable provides the space equivalency of two classrooms, which would support 40 students), although this would require a change in MCS policy.

Source: City Project

TABLE 2.13, STUDENT ENROLLMENT PROJECTIONS WITHIN THE PLANNING AREA

	Projected Student Population within Murfreesboro City Limits	Projected Student Population within the Urban Growth Boundary	TOTAL
MCS	9,773		8,923*
RCSD Elementary School		5,007	5,007
RCSD Middle School	6,107	3,130	9,237
RCSD High School	8,550	4,381	12,931
TOTAL	24,430	12,518	36,948

* includes the 850 students that can be accommodated within existing MCS schools

RCSD Demographics Summary

The projected 2035 RCSD student enrollment within the planning area is equally as challenging. Of the estimated 24,430 young people living within Murfreesboro's city limits in 2035, 25 percent, or 6,107 students will be attending RCSD middle schools and 35 percent, or 8,550 students will be attending RCSD high schools. Additionally, of the projected additional 12,518 students living within the UGB, outside of the city limits, in 2035, 40 percent, or 5,007 students will be enrolled in RCSD elementary schools; 25 percent, or 3,130 students will be enrolled in RCSD middle schools; and 35 percent, or 4,381 students enrolled in RCSD high schools (refer to Table 2.13, *Student Enrollment Projections within the Planning Area*).

There are currently 46 elementary, middle and high schools within the RCSD system; of which 19 schools are within the planning area (Murfreesboro City limits and Urban Growth Boundary); including eight elementary schools, six middle schools, and five high schools.

In order to prepare for the expected population growth and the effect that it will have on Murfreesboro's schools, both school systems must be considered.

With respect to school facilities planning, RCSD has embraced the development of a vertically connected, community campus program, where elementary, middle and high schools are planned together as a complete campus. RCSD has several community campuses within the Urban Growth Boundary. RCSD's current five-year plan includes the future location of a new high school that will be located in proximity to either the Christiana Elementary / Middle School community campus, the Buchanan Elementary / Whitworth-Buchanan Elementary / Middle School community campus, or the Rockvale Elementary / Middle School community campus. The five-year plan also includes two to three 1,000 student elementary schools, one of which will be located to the south of Murfreesboro and two schools to the north of the City.

TABLE 2.14, RUTHERFORD COUNTY SCHOOL DISTRICT CAPACITY

School	Design Capacity	Student Enrollment *	Delta
Barfield Elementary School	930	936	FULL
Blackman Elementary School	950	878	72
Blackman Middle School	1,000	1,207	FULL
Blackman High School	2,250	2,026	224
Brown's Chapel Elementary School	1,000	682	318
Buchanan Elementary School	650	461	189
Whitworth-Buchanan Middle School	1,000	845	155
Central Magnet School	1,300	1,234	FULL
Holloway High School	150	123	FULL
Homer Pittard Campus School	310	247	FULL
McFadden School of Excellence	470	388	82
Oakland Middle School	1,000	1,043	FULL
Oakland High School	1,850	1,994	FULL
Riverdale High School	2,000	1,860	140
Rockvale Middle School	1,000	954	FULL
Siegel Middle School	1,000	1,033	FULL
Siegel High School	2,000	1,784	216
Walter Hill Elementary School	850	321	529
Wilson Elementary School	850	797	FULL
Total	20,560		1,925

* does not include special needs students

RCSD FACILITY PLANNING CRITERIA

With regard to school facilities programming, elementary schools are typically designed for 850 to 1,000 children, to be located on 20 to 25 acres of land. Middle schools are designed for up to 1,000 children and are sited to be located on 35 to 45 acres. High schools are designed for 2,000 to 2,200 kids and are sited on parcels up to 70 acres in area.

Based on the available space within RCSD schools within the planning area to accommodate the projected growth in student enrollment (refer to Table 2.14, *Rutherford County School District Capacity*), it is estimated that and additional four elementary schools (100 acres), six middle schools for students within the City limits and three middle schools for students within the UGB (360 acres) will be required; and four high schools for students within the City limits and two high schools for students within the UGB (420 acres) will be required.

RCSD SCHOOL REQUIREMENT FOR PLANNING AREA:

	<u>CITY LIMITS</u>	<u>UGB</u>
ELEMENTARY SCHOOLS		04
MIDDLE SCHOOLS	06	03
HIGH SCHOOLS	04	02

Strategy 2.11.1: Program educational facilities into all new development / redevelopment programs and projects.

Currently the City does not require developers to consider the programmatic requirements of City Schools within proposed developments. As a result, RCSD must locate schools in reaction to growth trends and patterns, which typically results in a two to three year lag behind demand. RCSD determines demand by housing type. For example, with two to three bedroom apartment complexes, RCSD projects that .03 percent of the population will be composed of children. So a complex of 250-300 units may consist of 60 children.

INITIATIVES AND ACTIONS

1. Encourage infill development to ensure neighborhood (RCSD and MCS) elementary schools have an equitable distribution of students, thereby fostering stable enrollment, walkability and sustaining schools' vital role in neighborhood preservation and integrity.
2. Coordinate between the City and development community to ensure that mixed-use and residential developments preserve land for future elementary school sites.
3. Design future residential subdivisions so there are ample sidewalks and recreational trails that link elementary, middle and high schools within walking or biking distance.
4. Support MCS and RCSD efforts to renovate and expand permanent buildings on site while respecting the character of surrounding neighborhoods.

5. Coordinate the location of future school sites with the *Future Land Use Plan, Parks and Recreation Master Plan*, and existing and future trails system.

Strategy 2.11.2: Continue to support partnerships with state, regional and local organizations to expand educational opportunities at MCS and RCSD.

INITIATIVES AND ACTIONS

1. The City should continue to support the growth and expansion of MCS through government cooperation, mutual planning, and coordination of infrastructure and public facilities.
2. The City should support MCS and RCSD along with other regional organizations to ensure that students are able to obtain the highest level of educational experience possible.

Strategy 2.11.3: Work with MCS and RCSD to facilitate successful and mutually beneficial capital improvement planning and implementation programs within the planning area.

INITIATIVES AND ACTIONS

1. Support and coordinate with MCS and RCSD efforts to renovate and expand buildings off-site while encouraging neighborhood compatibility and minimal traffic impacts.
2. Coordinate transportation planning and public works (including utilities infrastructure) improvements with MCS and RCSD expansion planning and programming.



Source: The Daily New

Middle Tennessee State University

Middle Tennessee State University (MTSU) is a public institution of higher learning which had 20,262 undergraduate and 2,467 postgraduate students enrolled in Fall 2014. MTSU is part of the Tennessee Board of Regents and the State University and Community College System of Tennessee, and is accredited by the Southern Association of Colleges and Schools. MTSU's primary campus sets on 466 acres (1.9 km²), features 234 permanent buildings with 3.1 million square feet (944,500 m²) of space. It is one mile (1.6 km) from the geographic center of Tennessee and 1.3 miles (2 km) east of downtown Murfreesboro. The university also has significantly large athletic fields such as the Johnny Floyd Football Stadium that has a capacity of 30,788.

STRATEGY 2.11.4: *Continue to support partnerships with state, regional and local organizations to expand educational opportunities at MTSU.*

MTSU is a source of community growth, both from the perspective of attracting students to the area and retaining graduates with the allure of professional employment.

ACTIONS AND INITIATIVES

1. Coordinate with Middle Tennessee State University (MTSU) concerning their projected enrollment growth and associated faculty/staff increases to plan effectively for the implications of further off-campus housing demand.

2. Continue to support the growth and expansion of MTSU through government cooperation, mutual planning, and coordination of infrastructure and public facilities.
3. In conjunction with MTSU and the Rutherford County Chamber of Commerce, develop ways to encourage increased MTSU graduate retention and employment in Murfreesboro. Professional employment opportunities should be identified and promoted to retain MTSU graduates.
4. As per MTSU's Academic Master Plan, Strategic Direction 4, work with MTSU to pursue innovative and creative public service opportunities that enhance learning, scholarship, and engagement and that further social, cultural, and economic development.

To accommodate space/facility demands, several properties adjacent to the MTSU campus have been approved by the State Building Commission for acquisition. As illustrated in Figure 2.X, MTSU Acquisition Program, several blocks west of Middle Tennessee Boulevard and south of Alumni Drive and Main Street have been identified as additional areas within which to accommodate campus facility expansion.

STRATEGY 2.11.5: *Improve the form and quality of off-campus student living, including housing and mixed-use, commercial / retail developments.*

ACTIONS AND INITIATIVES

1. Revise / Amend the Murfreesboro Zoning Ordinance (Appendix A) as follows:
 - Section 19, Residential Districts: The College and University (CU) district needs to be reviewed as to its boundaries and whether it too, should be expanded to encompass naturally fitting redevelopment areas. With the growth of the University, this seems to be another development node that could benefit from mixed use development project and higher density housing.
2. In partnership with MTSU, the proposed Redevelopment Commission should evaluate the feasibility of administering a special business improvement district financing program to incentivize the development of a vibrant, high-density, mixed-use, pedestrian-oriented, commercial / retail district immediately adjacent to the MTSU campus.
3. In partnership with MTSU, and private sector developers, developing an off-campus, high-density, mixed-use student housing "academic village"

MTSU's 2007-2017 
Academic Master Plan is
committed to three goals:

GOAL 1 - MTSU will promote academic quality by enhancing learning, teaching, scholarship, and service and by celebrating MTSU's distinctive strengths.

GOAL 2 - MTSU will promote individual student success and responsibility for accomplishments through fostering a student-centered learning culture.

GOAL 3 - MTSU will promote partnerships and public service to enhance educational, social, cultural, and economic wellbeing.

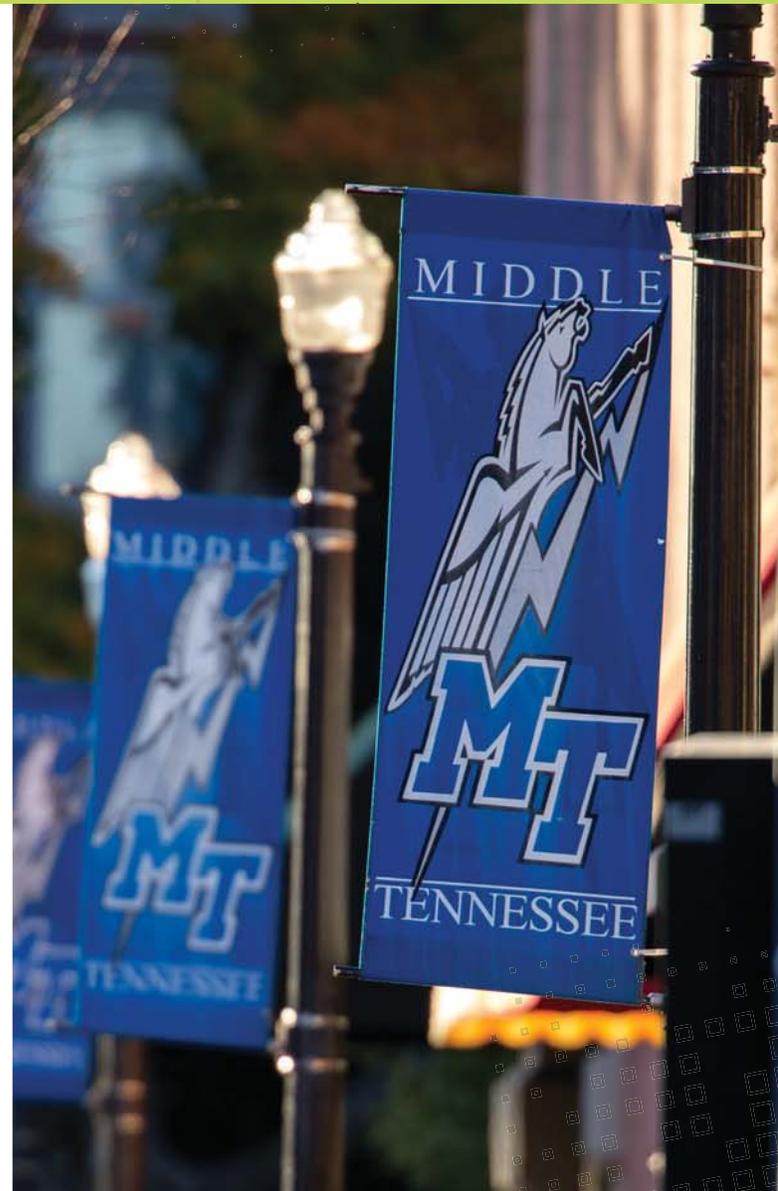
- development program in proximity to the MTSU campus; with transit linkages via an expanded Rover route.
- 4. Modify the City's residential zoning district regulations to accommodate the development of accessory dwelling units (ADUs) within established residential neighborhoods.
- 5. Work with MTSU to develop a comprehensive, mixed-use, redevelopment program for newly acquired lands -
 - to the south, between Alumni Drive and E. Main Street, eastward to just beyond N. Rutherford Boulevard; and
 - the blocks west of Middle Tennessee Boulevard.
- 6. Work with MTSU and the Rutherford County Chamber of Commerce to determine the feasibility of constructing a hotel immediately adjacent to the MTSU campus; and, if favorable, evaluate methods through which to incentivize its construction.
- 7. In conjunction with the next update of its facilities master plan, encourage MTSU to conduct a housing study regarding the demand, market for, and economics regarding on and off-campus housing.

An important objective of the University through its Master Plan is to create a pedestrian-oriented campus with more green space. To accomplish this, surface parking lots within the central campus will be removed and replaced with decked parking located around the perimeter of the campus. The extension of Alumni Drive eastward to N. Rutherford Boulevard, and the new roundabout at the intersection of North Raider Drive and MTSU Boulevard relegates vehicular circulation, including shuttle services, to the perimeter of the central campus rather than through the core, and reinforces N. Rutherford Boulevard as the principal vehicular entrance into the university. Pedestrian and bicycle circulation is thereby enhanced and made more safe and accessible within the campus core.

Around the perimeter of the campus, several pedestrian-automobile conflict areas have been identified, including:

- along eastern portions of Greenland Drive;
- key crossings along Middle Tennessee Boulevard;
- key intersections along N. Rutherford Boulevard, including MTSU Boulevard and Alumni Drive.

In connection with the proposed parking structure immediately west of the central campus and on axis



MTSU's Blueprint for Excellence

MTSU's Campus Master Plan was developed in 2007 and provides planning recommendations to future year 2017 regarding mobility and physical plant improvements, including the location of new buildings and facilities that will be required over time to support projected academic and student life activities. Following the construction of the approved projects identified within the Master Plan, and based on a projected future headcount of 27,000 (or 24,473 full-time equivalent student enrollment, the University will still need to construct an additional 1.6 million non-residential gross square feet (NRGSF) to meet the average 205 NRGSF per student. If the proposed projects in the Master Plan are factored-in, there still remains a substantial space deficit of over 400,000 NRGSF (based on the previously identified 24,473 FTE student enrollment).

Middle Tennessee State University

Source: Ken Robinson



with the main east-west pedestrian corridor through campus, a pedestrian bridge will span Middle Tennessee Boulevard, which will relieve in part some of the vehicular conflicts.

STRATEGY 2.11.6: *Develop a stronger mobility link (active transportation and public transit) between MTSU and the City's Central Business District and Court House Square.*

ACTIONS AND INITIATIVES

1. Evaluate the feasibility of an extending the Campus' east-west pedestrian spine further westward along one of three thoroughfares – E. Bell Street, E. Lytle Street, or E. Main Street. Additional pedestrian and streetscape amenities would include a widened pedestrian sidewalk, special paving, ornamental street lighting, street trees, benches, bollards, waste receptacles; enhanced bus stops, etc.
2. Evaluate the feasibility of either expanding Rover's Mercury transit route; beginning at MTSU Station A (Middle Tennessee Blvd. at Lytle) to run west on E. Lytle Street, to potentially Station H (Walnut at Burton), or earlier, where the route would loop back to Station A via E. Main Street.
3. Develop a transit hub for Rover and Relax and Ride bus services, in the vicinity of Greenland Drive and Middle Tennessee Boulevard, the program of which would include a shared park and ride parking lot
4. To create a greater sense of arrival and being within the University campus, strengthen the University's physical edge by developing a wayfinding and university district signage program.
5. Evaluate the feasibility of and opportunities associated with extending Alumni Drive eastward to connect with Lytle Street and Middle Tennessee Boulevard.

STRATEGY 2.11.7: Provide enhanced access and connectivity between the MTSU campus and adjacent, off-campus student housing; particularly in areas where there are significant pedestrian-vehicular conflicts.

ACTIONS AND INITIATIVES

1. Evaluate the feasibility of installing pedestrian refuges, signalized pedestrian crossings and crosswalks along portions of Greenland Drive and Middle Tennessee Boulevard.

STRATEGY 2.11.8: Strengthen MTSU's identity and presence within the Community.

ACTIONS AND INITIATIVES

1. The City's Communications Department, in partnership with MTSU and the Rutherford County Chamber of Commerce, should consider additional methods of co-branding the University and Downtown Murfreesboro.



An important objective of the University through its Master Plan is to create a pedestrian-oriented campus with more green space.

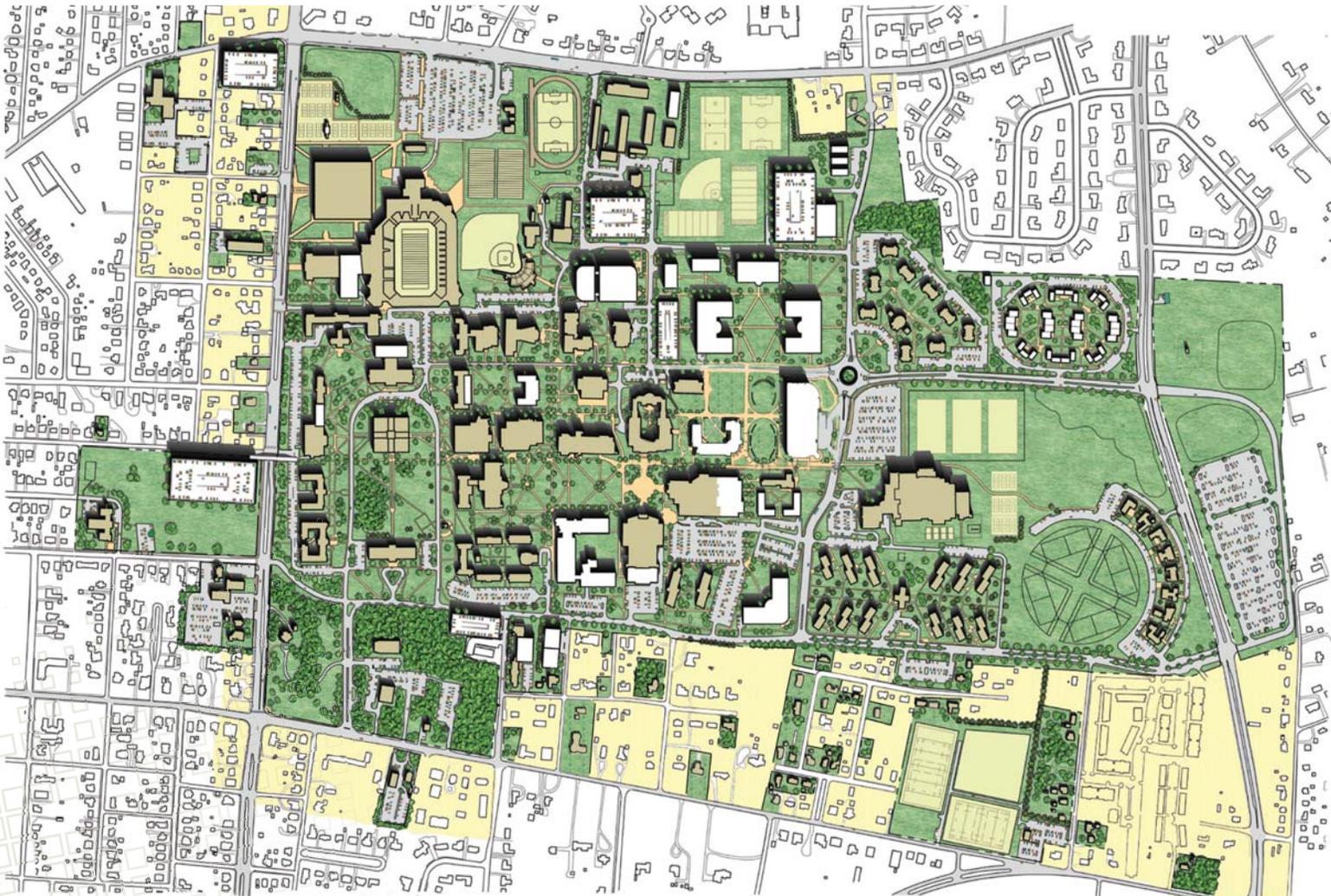


FIGURE 2.36, MTSU MASTER PLAN UPDATE (2009)

Source: MTSU

Linebaugh Public Library System

Linebaugh Public Library System is the regional library system that serves the majority of citizens within Rutherford County, not including residents served by the independent LaVergne Library. As of 2012-2013, Linebaugh served a population of 240,677. The library system consists of four locations, two of which are located in Murfreesboro, including the main branch, as well as one location in each Eagleville and Smyrna. In addition, the library system sponsors a regional bookmobile. The Library System supports 27 full-time and 30 part-time employees.

The Linebaugh Public Library System receives the majority of its funding from the cities of Eagleville, Murfreesboro and Smyrna as well as Rutherford County. Grant funding has also been utilized to sponsor some of the library's special projects and events.

In light of the growth projected for Rutherford County and the City of Murfreesboro, Linebaugh Library System has recognized that in order to continue to provide adequate library resources, attention must be paid to how library facilities, technology and staffing will expand with the growing needs.

STRATEGY 2.12.1: Pursue development of Community Technology Centers and the appropriate technological systems and staff needed to support the facilities.

ACTIONS AND INITIATIVES

1. Continue to pursue appropriate funding and land acquisition for the development of the community's first stand alone bookless library. This facility will provide additional computers, training, technology and meeting/study space for community residents as well as a template for future technology centers.
2. Continue to work with City staff to determine the appropriate criteria needed to identify underserved populations within Murfreesboro who would greatly benefit from access to these facilities.

Linebaugh: By the Numbers

TOTAL CIRCULATION – 5,040,839 books

Adult Circulation: 3,399,177

Child Circulation: 1,638,816

Average Daily Circulation: 2,846



COMPUTERS – 63 public computers; 37 staff computers.

MAGAZINE & NEWSPAPER SUBSCRIPTIONS – 135.

ANNUAL PROGRAMS – 3,226

PROGRAM ATTENDANCE – 70,987 attendees for 2013-14.

AN INVESTMENT IN KNOWLEDGE
ALWAYS PAYS THE BEST RETURN.

-Benjamin Franklin



Linebaugh Public Library System Strategic Plan 2015 - 2018

Library Service Responses:

- ▶ **Connect to the Online World:** Public Internet Access;
- ▶ **Create Young Readers:** Early Literacy;
- ▶ **Satisfy Curiosity:** Lifelong Learning;
- ▶ **Stimulate Imagination:** Reading, Viewing and Listening for Pleasure;
- ▶ **Visit a Comfortable Place:** Physical and Virtual Spaces.

Goals and Objectives:

- ▶ **GOAL 1:** Everyone will have attractive and welcoming places to meet and interact with others or work independently on personal projects;
- ▶ **GOAL 2:** Everyone will have free high-speed access to the resources and services available through the internet;
- ▶ **GOAL 3:** Preschool children will have programs, services, and materials designed to help them develop a lifelong love of books and reading;
- ▶ **GOAL 4:** Children will have programs and materials that stimulate their imaginations;
- ▶ **GOAL 5:** Teens and adults will have the skills and resources they need to explore the topics of personal interest;
- ▶ **GOAL 6:** Teens and adults will enjoy timely access to popular materials in current and emerging formats.

The Joint Board of Directors of the Linebaugh Public Library System approved the following library service responses, goals and objectives at their meeting on Monday, October 21, 2014.

3. Coordinate with the City's Public Transportation Department to ensure the community technology centers are situated along ROVER routes and/or greenways for ease of access for all residents.

While the development of new community technology centers will require additional resources, mainly in the form of facilities, up-to-date technology, and skilled IT staff, the framework of a virtual library is aimed at enhancing neighborhoods, helping residents with obtaining job skills, providing space for small businesses to grow, and giving students a place to work on group projects and tutors to meet with students to gain and increase literacy skills. As illustrated in the library system's *Strategic Plan*, increasing access to technology via public Internet access is a top priority.

STRATEGY 2.12.2: *Coordinate with the City on planning for additional satellite library campuses that serve a diverse population and are easily accessible.*

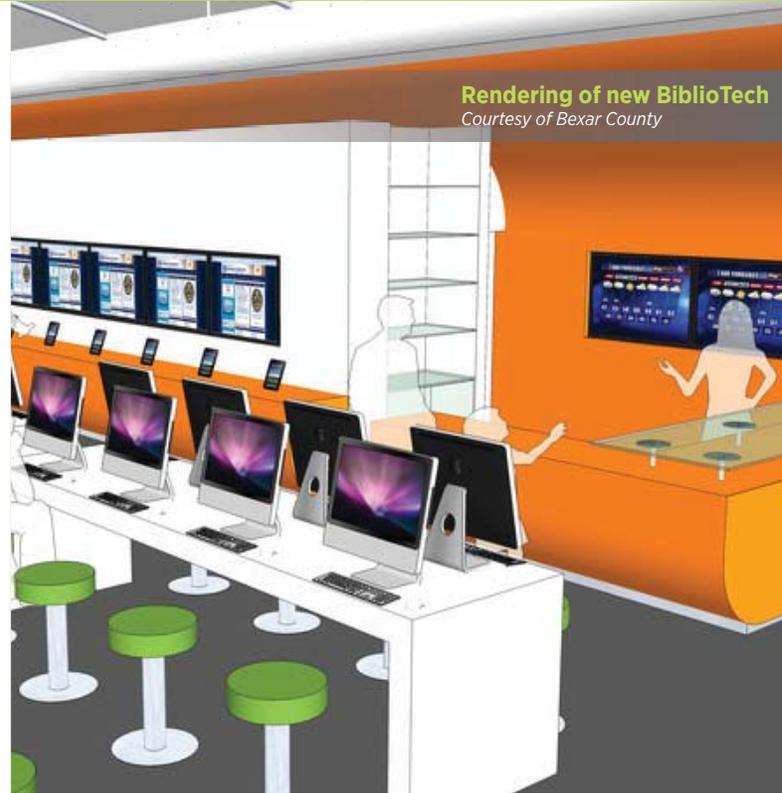
ACTIONS AND INITIATIVES

1. Coordinate with City staff to determine the most appropriate locations for additional library facilities to ensure accessibility and sharing of resources with other City facilities.
2. Coordinate with the City's transportation department to ensure new satellite campuses have access to ROVER routes or greenways to ensure the greatest level of access.

STRATEGY 2.12.3: *Continue to support partnerships with state, county and city governments to expand opportunities within the library system.*

ACTIONS AND INITIATIVES

1. Coordinate with City of Murfreesboro to ensure adequate funding is built into the Capital Improvement Program (CIP) to support the library's expansions of facilities, programs and staff.
2. Continue to coordinate with MTSU and its various departments to enable the sharing of resources and programs.
3. Coordinate with Murfreesboro City Schools and Rutherford County School District to ensure that resources, such as facilities, programs and staff are effectively shared.
4. Continue to monitor the migration of printed media to a digital format, particularly as additional home economics-related transactions become electronic. Prepare to expand the availability of electronic readers for use within the Library as well as for those to be checked out.



Virtual, Bookless Library



In September 2014, Bexar County, Texas opened its doors to a state-of-the-art all-digital public library. The facility offers 10,000 free books for the 1.7 million residents of the county. The library has a physical presence in the form of a brick-and-mortar location with 600 e-readers and 48 computer stations, in addition to laptops and tablets.

Linebaugh Public Library is looking to adapt Bexar County's bookless library concept both in Murfreesboro and Rutherford County.

"I don't think books will go away, but if people can come and use this technology, it'll make the City better."

- Gary Green, Vice Chairman of Linebaugh Public Library System Board



Chapter 2

COMP PLAN TASK FORCE DRAFT 1.26.2015



Statue Outside of Linebaugh Library Main Branch and City Hall

Source: Steve

Epilogue

The principal objective of this chapter is to consider and recommend how the City should accommodate development within the planning area and expand its provision of services to continue to support its rapidly growing population. This chapter does not profess to have all of the answers, or solutions, through which to address all of the issues associated with the magnitude of anticipated growth. However, through the application of a range of planning tools the City should be able to more effectively identify and track growth trends and development patterns, and remain ahead of development, to ensure it occurs according to a well-formulated growth sequencing strategy.

As summarized in Figure 2.4, *Land Utilization and Demand*, the area requirements to accommodate the projected population within the planning area (lands within the City limits and Urban Growth Boundary) exceeds the remaining area within the Murfreesboro City limits and Urban Growth Boundary. As illustrated within Map 2.3, *Environmental Constraints*, not all of the remaining vacant land within the planning area is suitable for development. The immediate trajectory of growth is not readily apparent, as all lands within the planning area must be considered for some form of development and/or management (including preservation of sensitive areas). For example, the development of the 2040 Major Transportation Plan will certainly have an impact on this growth equation by providing access to available lands to support future growth. In considering current development patterns and areas that have experienced unprecedented growth, the Murfreesboro City Schools system and Rutherford County School District play a significant role in influencing where development may occur. In the years to come, it is critical that strategic partnerships must be cultivated between the school districts, and City and County planning departments to ensure that decisions pertaining to the location of schools (as integral elements of municipal infrastructure and drivers of growth) is informed by the location of current and future utilities and transportation infrastructure.

Within the 20-year planning horizon of this Comprehensive Plan the City will need to seriously consider means through which increased development densities can be regulated and incentivized within certain areas of the City; through mixed-use development programs and the redevelopment of underutilized areas. Although Tennessee state law has made municipal annexation increasingly difficult, the City of Murfreesboro must develop a strategic annexation program and interdependent partnership with Rutherford County so the City can assist in managing the lands within the City's Urban Growth Boundary.

Making Lemonade

Despite the many challenges that lay ahead, addressing growth in a manner that is respectful of private property rights and sensitive lands can provide a new, interconnected, "green" development pattern for the City, as it expands into its Urban Growth Boundary. In the final analysis, Murfreesboro cannot maintain the same homogenous growth pattern that it has over the last century. It is too land consumptive and ultimately may not accommodate how a changing population demographic want to live. Incentivizing infill development and redevelopment and increasing densities in certain areas that include a more granular mix of commercial and retail development amidst residential, may create opportunities for more walkable, healthier neighborhoods, and less reliance on auto-oriented transportation.