4.0 | The Environment

4.1 | The Environment and the MTP

Transportation planning must account for the impacts of transportation on both the natural and human environment. By considering environmental impacts early in the planning process, the MTP increases opportunities for inter-agency coordination and enables an expedited project delivery process.

EARLY CONSIDERATION OF THE ENVIRONMENTAL IMPACTS WILL PROMOTE OUTCOMES THAT ARE MORE ENVIRONMENTALLY SUSTAINABLE.

Federal Requirements

Federal regulations require that the MTP addresses environmental concerns through two particular actions.

First, the development of the MTP must involve consultation with state and local agencies responsible for:

- land use management,
- natural resources,
- environmental protection,
- conservation, and
- historic preservation.

This should include a comparison of the MTP with state conservation plans or maps, as well as inventories of natural or historic resources, if this information is available.

Next, the MTP must discuss the types of potential environmental mitigation activities related to the implementation of the MTP. This includes potential areas for these activities to occur and activities which may have the greatest potential to mitigate the effects of the MTP projects and strategies. Mitigation activities do not have to be project-specific and can instead focus on broader policies, programs, and strategies.

The discussion must involve consultation with:

- federal,
- state,
- tribal land management,
- wildlife, and
- regulatory agencies.

THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) (1970) ESTABLISHED THE BASIC FRAMEWORK FOR INTEGRATING ENVIRONMENTAL CONSIDERATIONS INTO FEDERAL DECISION-MAKING.

Federal regulations relating to NEPA (40 C.F.R. 1508) define mitigation as:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Section 4(f) of the U.S. Department of Transportation Act of 1966 provides additional environmental protection for property in:

- **publicly owned parks,**
- **recreational areas,**
- **wildlife and waterfowl refuges, and**
- **historic sites.**

It protects these properties by preventing them from being used for transportation purposes unless there is no feasible and prudent alternative, or a ***de minimis*** impact determination is made. When such an action is necessary, it must include all possible planning to minimize harm to the property.

In 1994, President Clinton signed Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations. The Executive Order seeks to reaffirm the intent of Title VI of the Civil Rights Act of 1964; NEPA; and other federal laws, regulations, and policies. It establishes the following Environmental Justice (EJ) principles for all federal agencies and agencies receiving federal funds, such as MPOs:

- **To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects; including social and economic effects on minority and low-income populations.**
- **To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.**
- **To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.**

MTP Project Environmental Screening

Detailed, project-specific environmental impact evaluations are beyond the scope of an MTP. However, the 2045 MTP used an environmental screening process to evaluate the likelihood of significant environmental impacts for all of the considered MTP test projects (see Chapter 10). This process utilized inventories from various local, state, and federal sources for all of the relevant natural and cultural resources. Socioeconomic and demographic data from the U.S. Census Bureau was used to conduct the EJ analysis.

Table 4.1 shows the resources and issues typically considered in environmental impact evaluations. The environmental screening process utilized by the 2045 MTP will be described in detail later.

TABLE 4.1 TYPICAL ENVIRONMENTAL RESOURCES AND ISSUES EVALUATED

RESOURCE	IMPORTANCE	RELEVANT REGULATIONS
HAZMAT Sites	Health hazards, costs, delays, liability for both State & federal projects on either existing or acquired right-of-way	Various federal regulations
Air Quality	Public health, welfare, productivity, and the environment are degraded by air pollution	Clean Air Act of 1970; 40 CFR Parts 51 & 93; State Implementation Plan
Noise	Noise can irritate, interrupt, and disrupt, as well as generally diminish the quality of life	Noise Control Act of 1972; 23 CFR 772
Wetlands	Flood control, wildlife habitat, water purification; applies to both State and federally funded projects	Clean Water Act of 1977; Executive Order 11990; 23 CFR 777
Threatened and Endangered Species	Loss of species can damage or destroy ecosystems, to include the human food chain	Endangered Species Act of 1973; 7 CFR 355
Floodplains	Encroaching on or changing the natural floodplain of a water course can result in catastrophic flooding of developed areas	Executive Order 11988; 23 CFR 650; 23 CFR 771
Farmlands	Insure conversion compatibility with State and local farmland programs and policies	Farmland Protection Policy Act of 1981; 7 CFR 658
Recreation Areas	Quality of life; neighborhood cohesion	Section 6(f) of the Land and Water Conservation Fund Act; Section 4(f) of the DOT Act of 1966 (when applicable); 23 CFR 771; 23 CFR 774
Historic Structures	Quality of life; preservation of the national heritage	National Historic Preservation Act of 1966 (Section 106); the DOT Act of 1966 [Section 4(f)]; 23 CFR 771; 36 CFR 800; 23 CFR 774
Archaeological Sites	Quality of life; preservation of national and Native American heritage	National Historic Preservation Act of 1966 (Section 106); the DOT Act of 1966 [Section 4(f)]; 23 CFR 771; Executive Order 13175; 23 CFR 774
Environmental Justice	To avoid, minimize, or mitigate disproportionately high impacts on minorities and low-income populations; basic American fairness	Title VI, Civil Rights Act of 1964; Executive Order 12898

4.2 | Regional Context

Climate, Topography, Soils, and Vegetation

Climate, topography, soils, and vegetation are all factors that must be considered during project and program design. While these characteristics vary within any area, areas with similar characteristics are grouped into ecoregions. In this manner, understanding the characteristics of the region's ecoregions provides insight into potential environmental issues to consider when developing transportation projects or programs.

The climate in the MPA is classified as Humid, Subtropical (Cfa) according to the Köppen Climate Classification System. According to the National Oceanic & Atmospheric Administration data at the Clarksville Sewage Plant, from 1971 to 2000, the average July high temperature was approximately 90 degrees Fahrenheit. The region's average January low temperature was approximately 25 degrees Fahrenheit. The average annual precipitation during this period was approximately 52 inches.

The MPA is considered part of the Inner Plateau, and is located within two of the Level IV ecoregions defined by the EPA: the Western Highland Rim ecoregion and the Western Pennyroyal Karst. The characteristics of these ecoregions are described in Table 4.2.

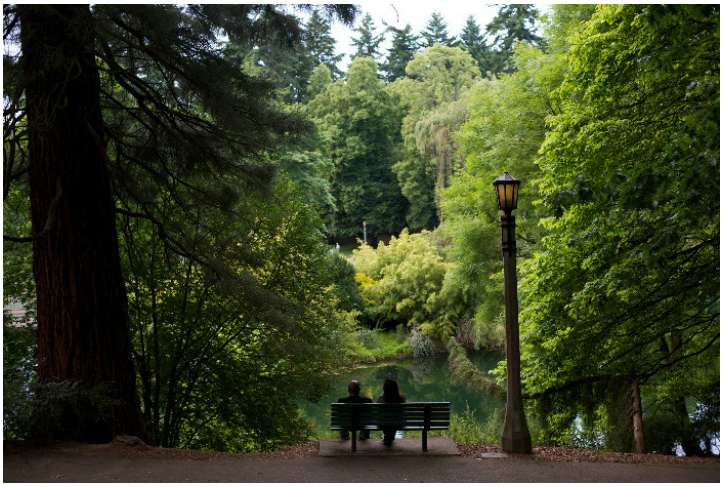
Table 4.2 Ecoregion Characteristics in the Metropolitan Planning Area

LEVEL IV ECOREGION	EPA DESCRIPTION
Western Highland Rim	The Western Highland Rim is characterized by dissected, rolling terrain of open hills, with elevations of 400-1000 feet. The geologic base of Mississippian-age limestone, chert, and shale is covered by soils that tend to be cherty, acid, and low to moderate in fertility. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. The oak-hickory natural vegetation was mostly deforested in the mid to late 1800's, in conjunction with the iron-ore related mining and smelting of the mineral limonite, but now the region is again heavily forested. Some agriculture occurs on the flatter interfluves and in the stream and river valleys: mostly hay, pasture, and cattle, with some cultivation of corn and tobacco
Western Pennyroyal Karst	The Western Pennyroyal Karst is a flatter area of irregular plains, with fewer perennial streams, compared to the open hills of the Western Highland Rim (71f). Small sinkholes and depressions are common. The productive soils of this notable agricultural area are formed mostly from a thin loess mantle over residuum of Mississippian-age limestones. Most of the region is cultivated or in pasture; tobacco and livestock are the principal agricultural products, with some corn, soybeans, and small grains. The natural vegetation consisted of oak-hickory forest with mosaics of bluestem prairie. The barrens of Kentucky that extended south into Stewart, Montgomery, and Robertson counties, were once some of the largest natural grasslands in Tennessee.

Source: EPA, Ecoregions of Tennessee, Ecoregions of Kentucky

Land Cover

The land cover of the MPA is illustrated in Figure 4.1 and summarized in Figure 4.2. According to this information, developed areas only account for just above 14 percent of the land in the MPA. Forested lands dominate the landscape, making up nearly 46 percent of the land area. The portion of the MPA in Christian County is mostly pasture/hay and cultivated crops, while the bulk of the MPA in Montgomery County is pasture/hay, cultivated crops, and forested lands.



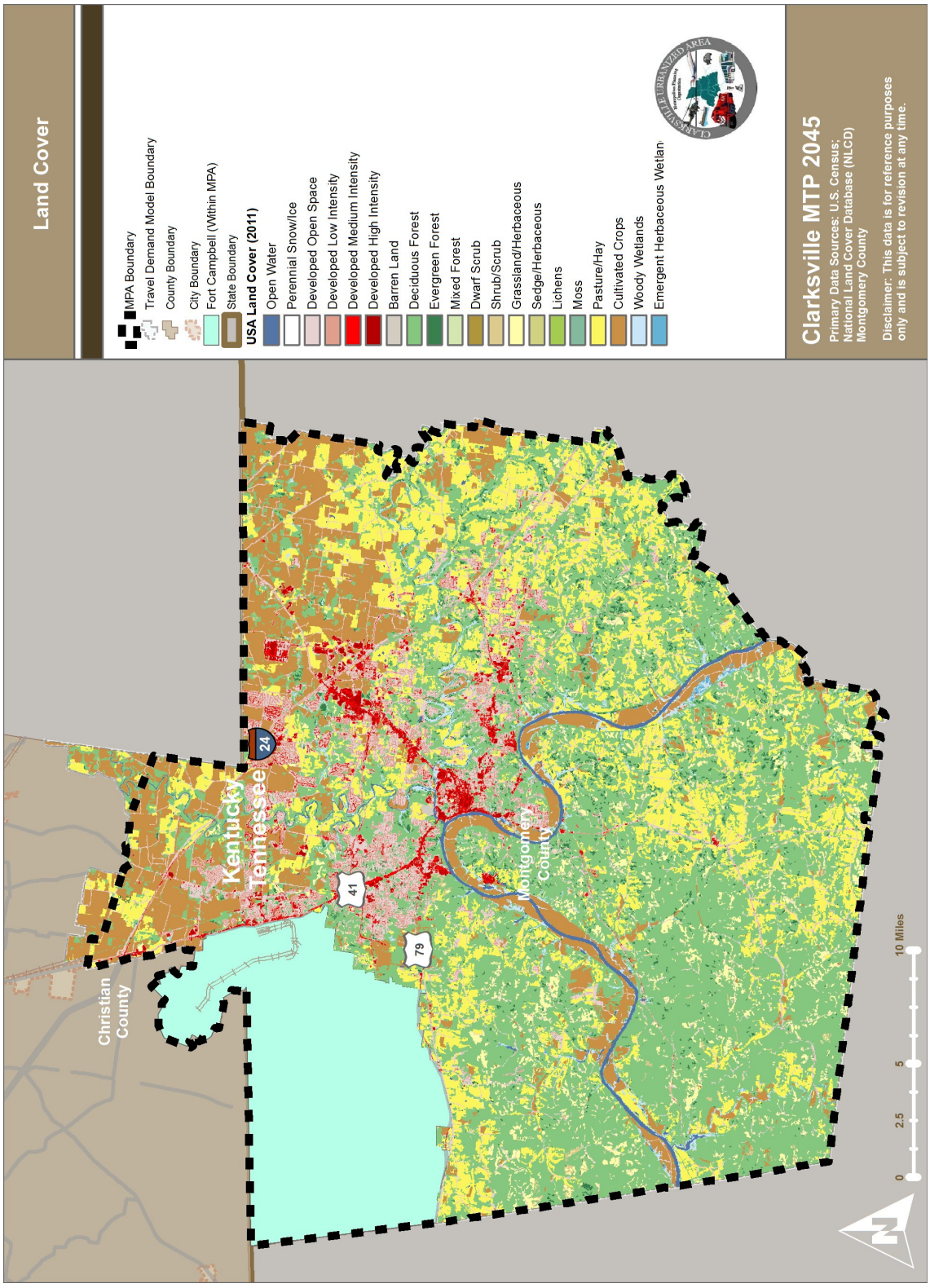
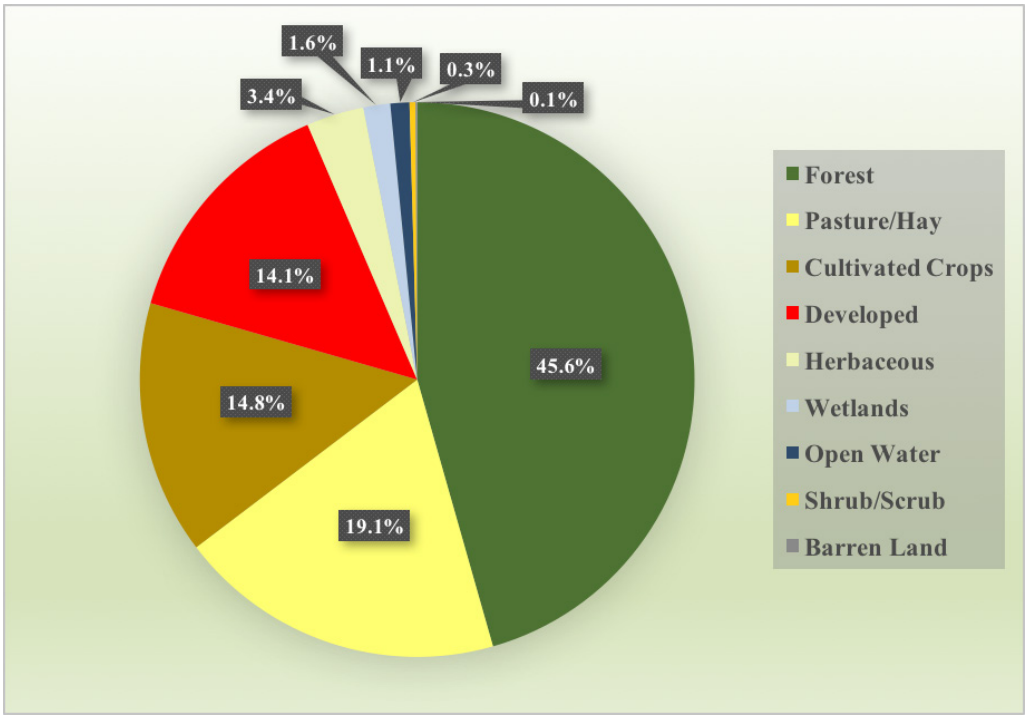


FIGURE 4.1 STUDY AREA LAND COVER

FIGURE 4.2 LAND COVER CLASSIFICATION BREAKDOWN



Source: USGS, 2011 National Land Cover Database

HISTORICAL URBAN DEVELOPMENT

The historical urban development of the MPA offers insights into the likely distribution of historic and other cultural resources. Figure 4.3 shows that the areas with the greatest concentrations of historical housing structures are in the center of the City of Clarksville and in the Bel-Air Estates area. Historical housing structures are those that are at least 50 years old. There are likely smaller concentrations that are not revealed by this information in the historic centers of many of the smaller municipalities within the MPA. This information is merely intended to illustrate general patterns.

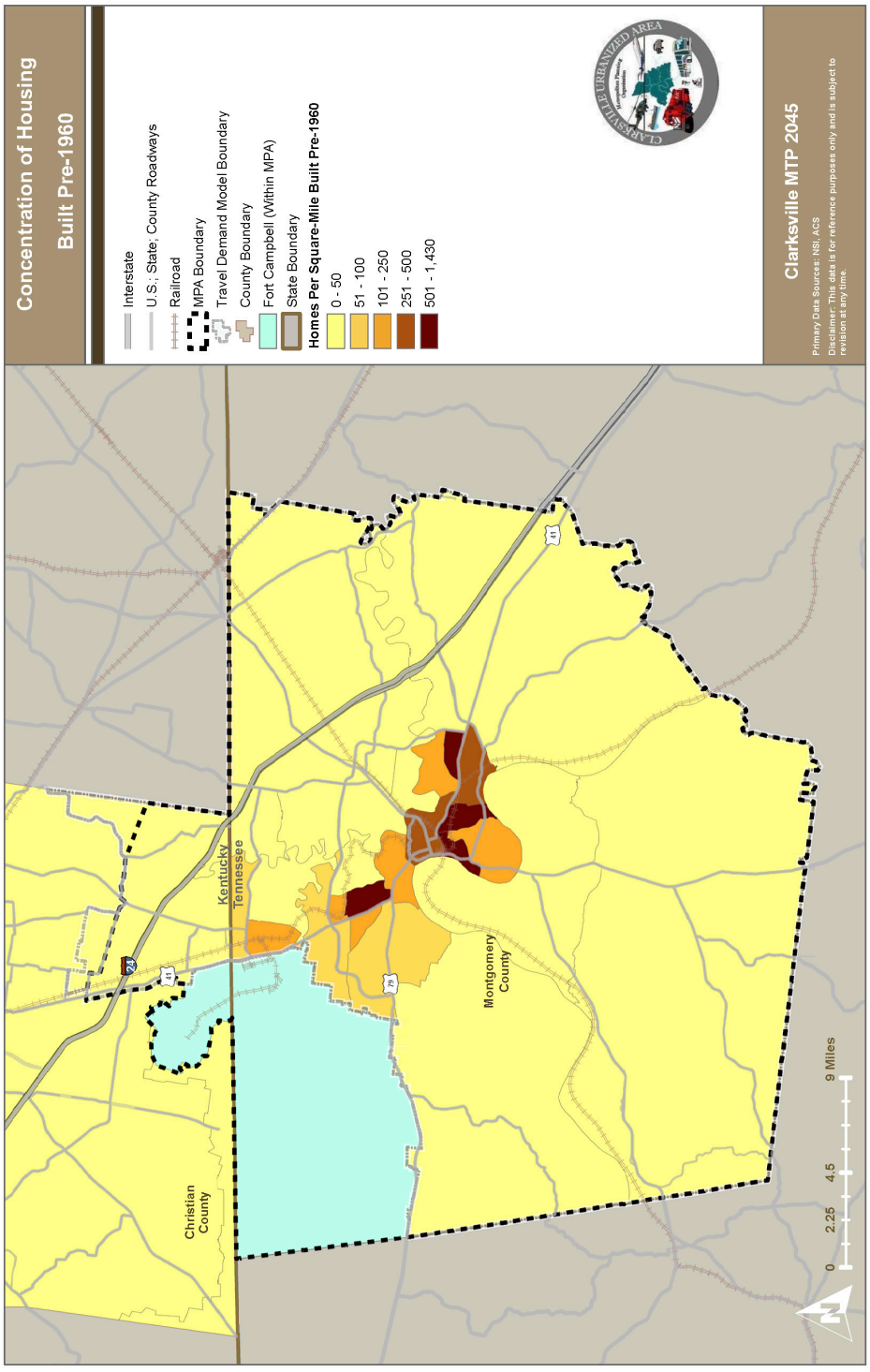


FIGURE 4.3 CONCENTRATION OF HOUSING BUILT PRE-1960

4.3 | Air Quality and Emissions

Air Quality and Transportation

Highway vehicles and non-road equipment are mobile sources of air toxins. These are compounds which are known, or suspected, by the EPA to cause cancer or other serious health and environmental effects. Mobile sources of emissions, via the combustion of fossil fuels, release nitrogen dioxide and Volatile Organic Compounds (VOC). These agents chemically react in the presence of heat and sunlight to form ground-level ozone. Ground-level ozone can trigger a variety of health problems, such as asthma, and can also have harmful effects on sensitive vegetation and ecosystems.

The EPA regulates vehicle emissions and fuel efficiency through its vehicle Greenhouse Gas Emissions standards. Vehicle emissions are also controlled by the National Highway Traffic and Safety Administration's Corporate Average Fuel Economy (CAFE) standards. The EPA also regulates and monitors pollutants considered harmful to public health and the environment. This is accomplished through the National Ambient Air Quality Standards (NAAQS), authorized by the Clean Air Act (1970). The EPA has set NAAQS for six "criteria" pollutants. These are listed in Table 4.3 along with the current standards.

The MPA is currently designated as an attainment areas under the NAAQS, but is required to conduct conformity analysis as an anti-backsliding measure.

TRANSPORTATION CONFORMITY IS A PROCESS THAT IS REQUIRED OF MPOS PURSUANT TO THE CLEAN AIR ACT AMENDMENTS OF 1990 (CAAA OF 1990).

This process ensures that federal funding and approval are given to those transportation activities that are consistent with air quality goals. The CAAA requires that FHWA funded or approved transportation plans, programs, and projects in nonattainment or maintenance areas be in conformity with the State Implementation Plan (SIP). The SIP represents the state's plan to either achieve or maintain the NAAQS for a particular pollutant.

On July 18, 1997, the Environmental Protection Agency (EPA) developed a revised 8-hour ozone standard of 0.08 parts per million (ppm), which was more stringent than the previous ozone standard. As a result of the change, the EPA designated the Clarksville-Hopkinsville area (which is made up of Montgomery County, Tennessee and Christian County, Kentucky) as nonattainment for the 8-hour average ozone NAAQS, and designated a basic ozone nonattainment area.

However, both counties have since been redesignated as Attainment with a Maintenance Plan for 8-hour National Ambient Air Quality Standard (NAAQS) ozone standard. The Travel Demand Model, which forms the basis of transportation decision-making, provides numeric outputs that are be utilized in regional air quality modeling. The FHWA and FTA are the agencies responsible for determining if the MTP complies with air quality conformity regulations.

TABLE 4.3 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) AS OF 2017

POLLUTANT		PRIMARY/ SECONDARY	AVERAGING TIME	LEVEL	FORM
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		primary and secondary	Rolling 3 month average	0.15 µg/m3	Not to be exceeded
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	Annual	53 ppb	Annual mean
Ozone		primary and secondary	8-hour	70 ppb	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution	PM2.5	primary	Annual	12 µg/m3	Annual mean, averaged over 3 years
		secondary	Annual	15 µg/m3	Annual mean, averaged over 3 years
		primary and secondary	24-hour	35 µg/m3	98th percentile, averaged over 3 years
	PM10	primary and secondary	24-hour	150 µg/m3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: EPA

4.4 | Public Health

There is a growing number of local and state governments that are performing health impact assessments for transportation projects and programs in order to more comprehensively address public health outcomes. Transportation can affect public health in many ways, but the most commonly discussed include:

- **Safety:** Roadway design can affect the risk for traffic related injuries and fatalities.
- **Air Quality:** Air pollution from vehicle emissions worsens chronic respiratory diseases, such as asthma.
- **Noise Pollution:** Noise pollution can cause hearing loss, stress related illnesses, high blood pressure, speech interference, and sleep disruption.
- **Physical Activity:** A lack of sufficient bicycle and pedestrian infrastructure can limit opportunities for physical activity.
- **Accessibility:** Transportation can limit access to healthy food, recreational opportunities, and healthcare facilities.

Transportation-Related Health Statistics in the Region

The role of transportation in public health outcomes is especially important in the MPA. Table 4.4 shows county public health indicators that are influenced by the transportation system. For the most part, the counties in the MPA lag far behind the 90th percentile of U.S. counties in all selected measures.

Table 4.4 Selected County Public Health Indicators

Place	Percentage of Adults Reporting Poor or Fair Health	Average Number of Physically Unhealthy Days in Last 30 Days	Average Number of Mentally Unhealthy Days in Last 30 Days	Percentage of Adults that are Obese	Percentage of Adults Reporting as Physically Inactive	Percentage of Population With Access to Exercise Opportunities
Montgomery County	22.0%	4.8	4.3	29.0%	26.0%	51.0%
Christian County	23.0%	4.7	4.2	37.0%	30.0%	62.0%
Top U.S. Performers*	12.0%	3.0	3.0	26.0%	19.0%	91.0%

Note: * 90th percentile, i.e., only 10% are better.
Source: 2017 County Health Rankings, University of Wisconsin Population Health Institute

Transportation and Physical Activity

Historically, transportation planning typically focused on mobility, safety, air quality, noise pollution, and accessibility.

The planning process has recently begun to consider the impact of transportation on physical activity.

Of particular focus in transportation planning is the impact of the built environment on walking and biking.

Walking and cycling are important physical activities because they are regular, light to moderate, physical activities which can significantly decrease a person's risk for severe health issues. These include:

- cardiovascular disease,
- colon cancer,
- type 2 diabetes,
- obesity,
- osteoporosis, and
- depression.

Walking and cycling can also improve psychological well-being and quality of life. Therefore, providing convenient and attractive pedestrian and bicycle infrastructure and encouraging walking and biking can improve public health outcomes for a community.

4.5 | Project Development Considerations

This section outlines how the MTP addresses environmental mitigation of proposed transportation projects.

Wetlands, Waterways, and Flooding

The transportation projects were evaluated for their proximity to wetlands, impaired waters, flood zones, and navigable waters. While transportation projects should be sensitive to all bodies of water, these water bodies merit special attention for the following reasons:

- water purification,
- flood protection,
- shoreline stabilization,
- groundwater recharge,
- streamflow maintenance, and
- fish and wildlife habitats.

Wetlands are protected by the Clean Water Act. They have many environmental protection needs, notably:

- Impaired waters are already too polluted, or otherwise degraded, to meet the state water quality standards.
- Encroaching on or changing the natural floodplain of a water course can result in catastrophic flooding of developed areas. This can be particularly problematic in the MPA due to its karst terrain.
- Structures built across navigable waterways must be designed in consultation with the Coast Guard, as required by the Coast Guard Authorization Act of 1982.

Figure 4.4 displays the proposed MTP transportation projects along with the location of wetlands. Figure 4.5 displays the proposed MTP transportation projects and flood zones.

Preliminary findings indicate that there are no impaired waterways within the MPA, though many of the Cumberland River's tributaries have been affected in the past. The Cumberland River is part of the U.S. Army Corps of Engineers Navigable Waterway Network. Navigable waterways are defined as waters that have been used in the past, are now used, or are susceptible to use, as a means to transport interstate or foreign commerce up to the head of navigation. Projects that cross or affect this waterway must be coordinated with the Coast Guard.

Mitigation

This early in the planning stage, there are not enough resources available to assess project level impacts to specific wetlands. As individual projects proceed through a state's project delivery process and the NEPA process, it is anticipated that project sponsors will:

- Ensure that transportation facilities constructed in floodways will not increase flood heights.
- Take steps to avoid wetland and flood zone impacts where practicable.
- Consider strategies which minimize potential impacts to wetlands and flood zones.
- Provide compensation for any remaining unavoidable impacts through activities to restore or create wetlands.
- Projects near impaired waters should consider measures to improve the quality of these waters.

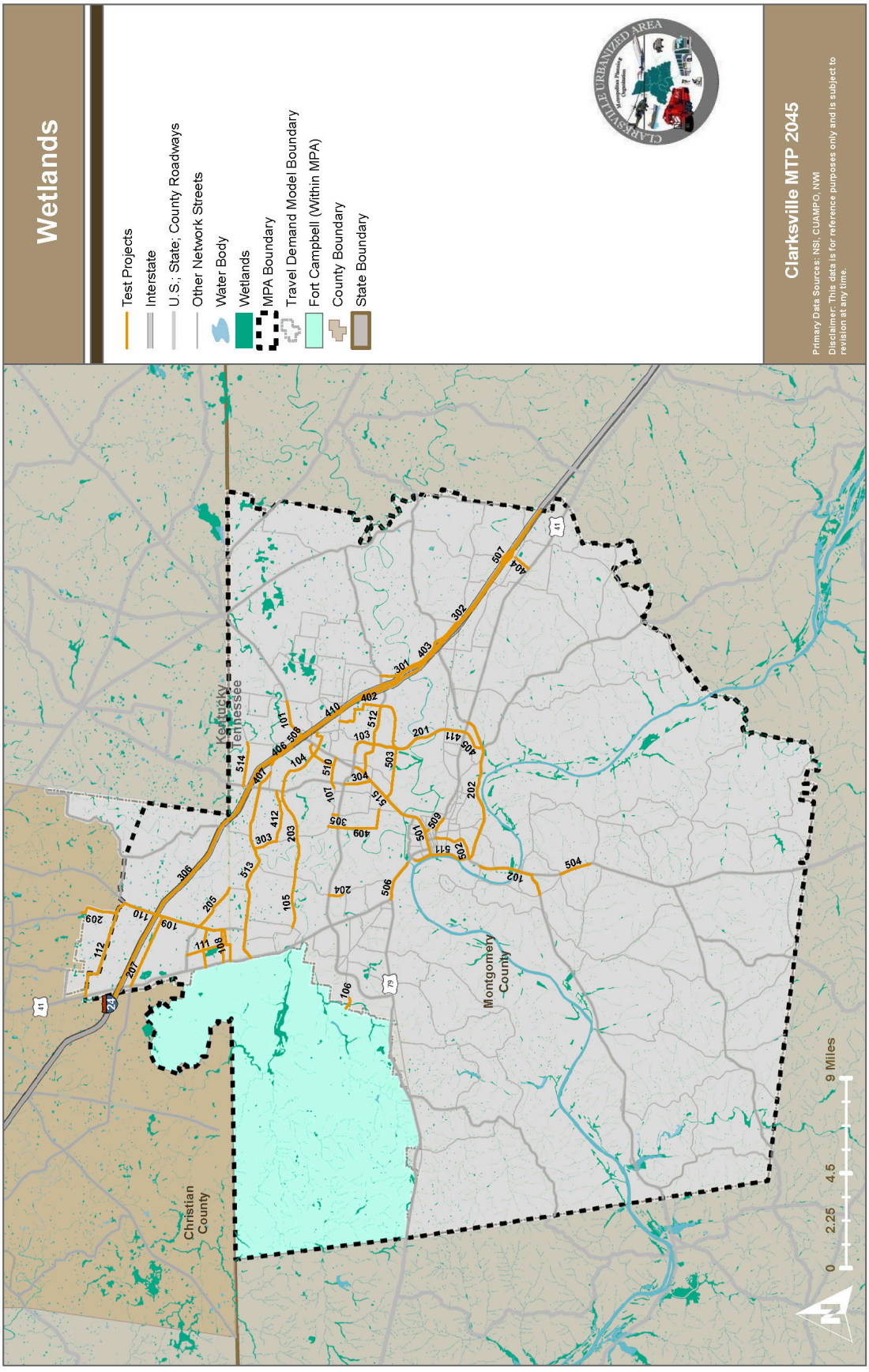


FIGURE 4.4 WETLANDS

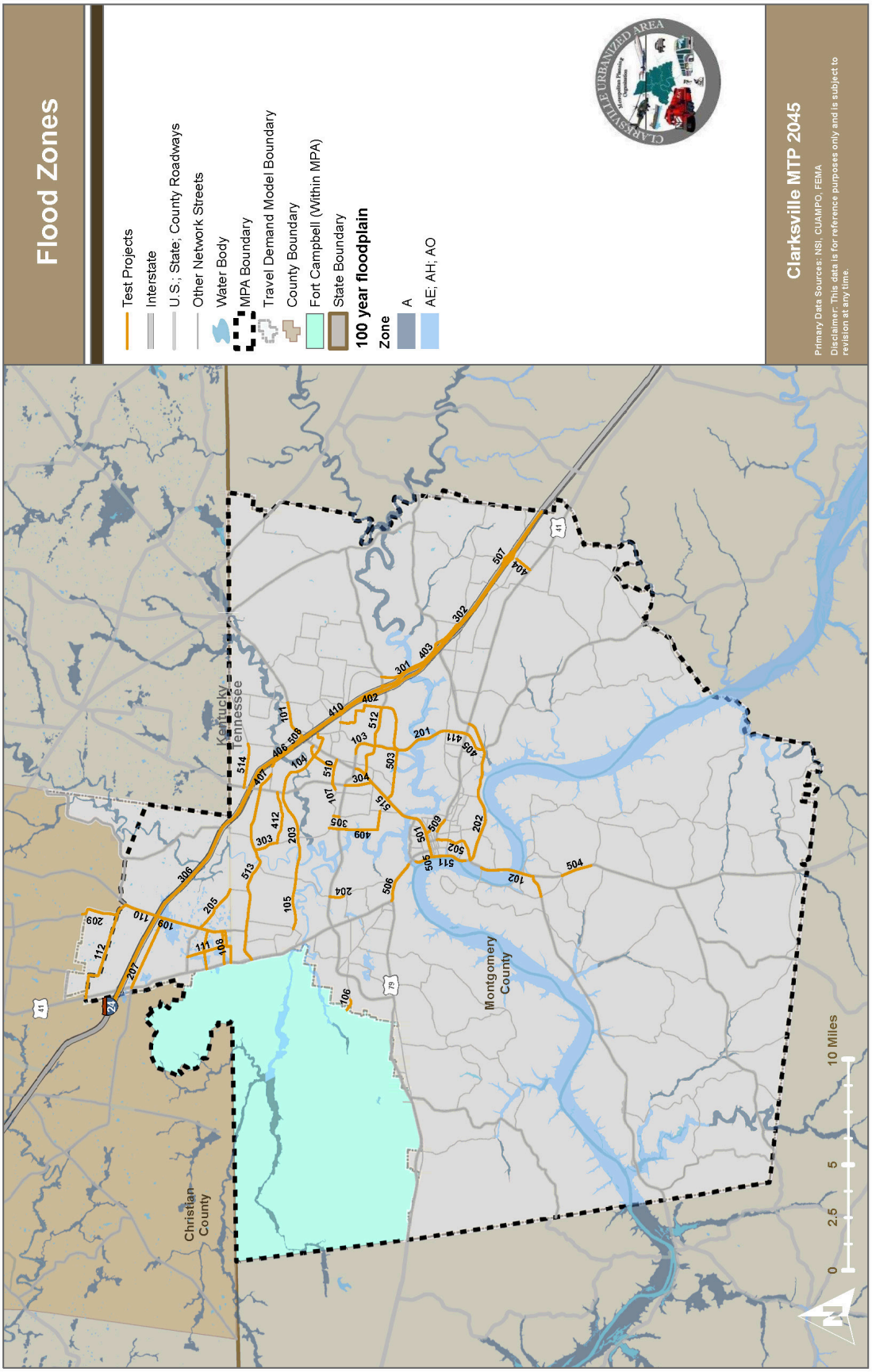


FIGURE 4.5 FLOOD ZONES

Table 4.5 displays the MTP test projects that would impact wetlands and/or flood zones within the study area. The MTP test projects are those that were analyzed for potential inclusion in the Staged Improvement Program.

TABLE 4.5 TEST PROJECTS IMPACTING WETLANDS OR FLOOD ZONES

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	WETLANDS	FLOOD-PLAINS
101	US 79/SR-13 (Guthrie Hwy	Widen from 2/3 to 5 Lanes	Cracker Barrel Dr to International Blvd	Yes	No
102	SR-149/SR-13	Widen from 2/3 to 5 Lanes	River Rd to Zinc Plant Rd	Yes	Yes
103	SR 374 (Warfield Blvd)	Widen from 2 to 5 Lanes	Dunbar Cave Rd to Stokes Rd	No	Yes
104	North-East Connector Ph 1	New 4/5 Lane Roadway	Ted Crozier Blvd to Wilma Rudolph Blvd to Trenton Rd	Yes	Yes
105	Jack Miller Blvd Ext	New 4 Lane Roadway	Tobacco Rd to Peachers Mill Rd	Yes	Yes
106	Lafayette Rd	Widen from 2 to 5 Lanes	Walnut Grove Rd to Ft Campbell Gate	Yes	No
111	Oatts-Riggins Rd	New 3 Lane Roadway	KY-400 (State Line Rd) to KY-911 (Thompsonville Ln)	Yes	Yes
201	SR-374 (Warfield Blvd)	Widen from 2 to 4 Lanes	Memorial Dr to Dunbar Cave Rd	Yes	Yes
202	US 41A Bypass (Ashland City Rd)	Widen from 2/3 to 5 Lanes	US 41A/SR-112 to SR-13	Yes	Yes
203	North-East Connector Ph 2	New 4 Lane Roadway	SR-48 (Trenton Rd) to Peachers Mill Rd	Yes	Yes
204	Peachers Mill Rd	Widen from 3 to 4 Lanes	Pine Mountain Rd to Stonecrossing Dr	Yes	No

Continued

TABLE 4.5 TEST PROJECTS IMPACTING WETLANDS OR FLOOD ZONES

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	WETLANDS	FLOOD-PLAINS
206	Ft Campbell Gate 4 Ext	New 2 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	No	Yes
207	KY-117	New 5 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Yes	Yes
208	Ft Campbell Gate 5 Ext	New 2 Lane Roadway	US 41A (Ft Campbell Blvd) to KY-115 (Pembroke-Oak Grove Rd)	Yes	Yes
301	I-24	Widen from 4 to 6 Lanes	KY/TN State Line to SR-76	Yes	Yes
302	I-24	Widen from 4 to 6 Lanes	SR-76 to SR-256 in Robertson County	Yes	No
304	SR-48 (Trenton Rd)	Widen from 2 to 5 Lanes	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Yes	No
306	I-24	Widen from 4 to 6 Lanes	US 41A (Ft Campbell Blvd) to TN State Line	Yes	Yes
401	New Roadway	New 3 Lane Roadway	Fair Brook Place to Needmore Rd	Yes	No
402	Professional Park Dr Ext	New 2 Lane Roadway	Extension to Cardinal Ln	Yes	No
403	International Blvd Ext	New 2 Lane Roadway	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	Yes	Yes
405	SR-374 (Richview Rd) Ext	New 4 Lane Roadway	SR-112 (Madison St) to US 41A Bypass	Yes	No
406	Kennedy Ln Ext	New 2 Lane Roadway	Extension to Meriwether Rd	Yes	Yes
409	8th St connector	New 2 Lane Roadway	Needmore Rd to Peterson Ln	Yes	Yes

Continued

Table 4.5 Test Projects Impacting Wetlands or Flood Zones

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	WETLANDS	FLOOD-PLAINS
411	SR-374 (Richview Rd)	Widen from 3 to 5 Lanes	Memorial Dr to US 41A (Madison St)	Yes	No
412	Hazelwood Rd	Widen from 2 to 5 Lanes	Trenton Rd to Needmore	Yes	No
502	Cumberland Dr	Widen to 4 Lanes	Ashland City Rd (SR 12) to Madison St (SR 76)	Yes	Yes
503	Dunbar Cave Road	Widen to 4 Lanes	Wilma Rudolph Rd (US 79/SR 13) to Rossview Rd (SR 237)	Yes	Yes
505	College St (SR 48)	Widen to 4 Lanes	Riverside Dr to N 2nd St (US 41A)	No	Yes
511	Riverside Drive	Road Diet	Providence Blvd to Cumberland Dr	Yes	No
513	Tiny Town Road	Widen to 6 Lanes	US 41A to Trenton Rd	Yes	Yes
514	Tylertown Road	Widen to 4 Lanes	Trenton Rd to Oakland Rd	Yes	No
515	Wilma Rudolph Boulevard	Widen to 6 Lanes	Kraft St to SR 374	Yes	Yes

Wildlife

The transportation projects were evaluated for their proximity to identified critical habitat areas for threatened and endangered species and wildlife refuges.

The Endangered Species Act (ESA) [16 U.S.C. 1531 et. seq.] of 1973, as amended, was enacted to provide a program for the preservation of endangered and threatened species. The act also provides protection for the ecosystems upon which these species depend for their survival.

ALL FEDERAL AGENCIES, OR PROJECTS UTILIZING FEDERAL FUNDING, ARE REQUIRED TO IMPLEMENT PROTECTION PROGRAMS FOR DESIGNATED SPECIES AND TO USE THEIR AUTHORITIES TO FURTHER THE PURPOSES OF THE ACT.

An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those which have been formally submitted to Congress for official listing as threatened or endangered.

Species may be considered endangered or threatened when any of the five following criteria occur:

1. The current/imminent destruction, modification, or curtailment of their habitat or range
2. Overuse of the species for commercial, recreational, scientific, or educational purposes
3. Disease or predation
4. The inadequacy of existing regulatory mechanisms
5. Other natural or human-induced factors affect continued existence.

Section 4(f) of the Department of Transportation (DOT) Act of 1966 affords protection to wildlife or waterfowl refuges when USDOT funds are invested in a project. There are no wildlife management areas or refuges within the MPA.

Table 4.6 lists species classified as endangered or threatened within the MPA counties. Species with ranges unrefined beyond the state level are not included.

TABLE 4.6 SPECIES IDENTIFIED UNDER ENDANGERED SPECIES ACT IN REGION

GROUP	NAME	STATUS	MONTGOMERY COUNTY	CHRISTIAN COUNTY
Clams	Yellow blossom (pearlymussel) (Epioblasma florentina florentina)	Endangered	Yes	No
Clams	Tan riffleshell (Epioblasma florentina walkeri (=E. walkeri))	Endangered	Yes	No
Clams	Slabside Pearlymussel (Pleuronaia dolabelloides)	Endangered	Yes	Yes
Clams	Rabbitsfoot (Quadrula cylindrica cylindrica)	Threatened	Yes	No
Flowering Plants	Short's bladderpod (Physaria globosa)	Endangered	Yes	No
Flowering Plants	Price's potato-bean (Apios priceana)	Threatened	Yes	No
Insects	Coleman Cave beetle (Pseudanophthalmus colemanensis)	Under Review	Yes	No
Mammals	Indiana bat (Myotis sodalis)	Endangered	Yes	Yes
Mammals	Gray bat (Myotis grisescens)	Endangered	Yes	Yes
Mammals	Northern Long-Eared Bat (Myotis septentrionalis) 	Threatened	Yes	Yes

Source: U.S. Fish and Wildlife Service, Environmental Conservation Online System

Mitigation

Preliminary planning undertaken within the context of the development of the MTP does not include resources sufficient to assess project specific impacts to species habitats. Table 4.6 is incorporated in order to establish the potential need for further study as projects are carried forward through each state's project delivery process, the NEPA process, design, and construction. Projects will be developed in consultation with U.S. Fish and Wildlife Service, the Kentucky Department of Fish & Wildlife Resources, and the Tennessee Wildlife Resources Agency (TWRA). To the extent practicable, actions which impact critical habitats will be avoided.

In addition to the federally protected species, transportation projects should be sensitive to species that are protected by state law. Both Kentucky and Tennessee maintain a statewide database of threatened and endangered species. The Kentucky Department of Fish & Wildlife Resources displays all federally and state listed species on their website[1]. The TWRA lists all endangered species as well as providing a list of those in need of management[2].

Historic and Recreational Resources

The transportation projects were evaluated for their proximity to historic sites and publicly owned recreational facilities. Section 4(f) of the Department of Transportation (DOT) Act of 1966 affords protection to publicly owned parks and recreation areas, and all historic sites listed or eligible for listing on the National Register of Historic Places when USDOT funds are invested in a project.

In order to be eligible for the National Register of Historic Places (NRHP), a district, site, building, structure, or object must possess:

- integrity of location,
- design,
- setting,
- materials,
- workmanship,
- feeling, and
- association.

1 http://app.fw.ky.gov/speciesinfo/speciesList.asp?strGroup=3&strSort1=Class&strSort2=CommonName

2 https://www.tn.gov/twra/topic/species-list

Generally, these locations must be at least 50 years old. Locations will also be evaluated by the following criteria:

- Association with events that have made a significant contribution to the broad patterns of our history; or
- Association with the lives of significant persons in or past; or
- Embodiment of the distinctive characteristics of a type, period, or method of construction, or representative of the work of a master, or possession of high artistic values, or representative of a significant and distinguishable entity whose components may lack individual distinction; or
- Provision or likelihood to provide information important in history or prehistory.

Figure 4.6 shows the historic sites and districts within the MPA listed on the National Register, as well as local historic districts. It is important to note that the local historic districts are not necessarily protected by 4(f) regulations unless they meet NRHP eligibility. Furthermore, there may be additional properties not listed on either register which are eligible for the NRHP. There are six historic districts within the MPA area, which are shown in Table 4.7.

TABLE 4.7 MPA HISTORIC DISTRICTS

DISTRICT	YEAR ADDED	LOCATION	COMPOSITION
Clarksville Architectural District	1976	Public Square, Legion, 3Rd., Franklin, and Commerce Streets	174 acres, 26 buildings
Clarksville Industrial District	1976	Bounded by Washington St, Crossland Ave, the ICG railroad (abandoned), and the Cumberland River)	213 acres, 3 buildings, 2 structures
Dog Hill Architectural District	1980	Washington St., 1st St, Union St, Madison St, and 2nd St	130 acres, 36 buildings
Glenwood Historic District (Glenwood Park)	1996	101-109 Glenwood Dr., 110-182 E Glenwood Dr., 111-179 W Glenwood Dr.	260 acres, 67 buildings
Madison Street Historic District	1999	Address Restricted	170 acres, 27 buildings
McCauley Hill Farm	1995	1535 Harville Road	5,180 acres, 18 buildings, 8 structures

Source: City of Clarksville

Figure 4.6 excludes historic features that have been deemed 'restricted' or 'sensitive', such as sensitive archaeological sites. The figure also displays the major publicly owned parks and recreation areas.

Mitigation

Roadway projects will be developed in consultation with the State Historic Preservation Office (SHPO). To the extent practicable, actions which adversely impact NRHP properties and publicly owned recreation areas will be avoided. When historic properties are adversely affected, mitigation will include data recovery, as appropriate, to document the essential qualities of the historic resources. When publicly owned recreation areas are adversely affected, appropriate compensation will be provided.

Table 4.8 displays the test projects that will likely impact local recreational resources or historic sites or districts.

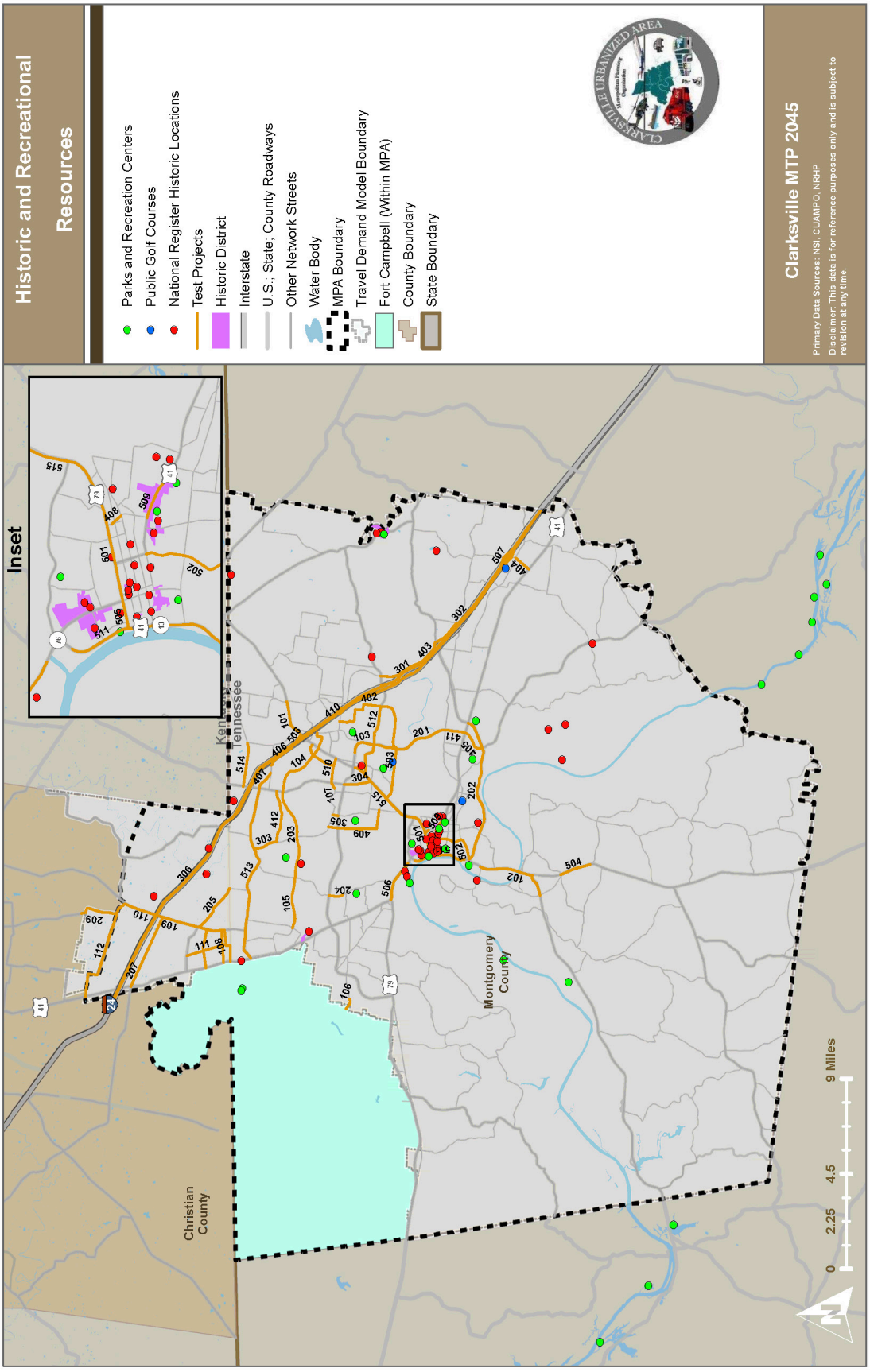


FIGURE 4.6 HISTORIC AND RECREATIONAL RESOURCES

TABLE 4.8 TEST PROJECTS IMPACTING HISTORICAL OR RECREATIONAL RESOURCES

PROJECT ID	ROUTE	DESCRIPTION	LOCATION	HISTORIC SITE/ DISTRICT	REC AREA
202	US 41A Bypass (Ashland City Rd)	Widen from 2/3 to 5 Lanes	US 41A/SR-112 to SR-13	Yes	No
203	North-East Connector Phase 2	New 4 Lane Roadway	SR-48 (Trenton Rd) to Peachers Mill Rd	Yes	No
306	I-24	Widen from 4 to 6 Lanes	US 41A (Ft Campbell Blvd) to TN State Line	Yes	No
402	Professional Park Dr Ext	New 2 Lane Roadway	Extension to Cardinal Ln	No	Yes
409	8th St Connector	New 2 Lane Roadway	Needmore Rd to Peterson Ln	No	Yes
501	College St (SR 48)	Widen to 6 Lanes	N 2nd St (US 41A) to Kraft St	Yes	No
502	Cumberland Dr	Widen to 4 Lanes	Ashland City Rd (SR 12) to Madison St (SR 76)	Yes	No
503	Dunbar Cave Road	Widen to 4 Lanes	Wilma Rudolph Rd (US 79) to Rossview Rd (SR 37)	No	Yes
505	College St (SR 48)	Widen to 4 Lanes	Riverside Dr to N 2nd St (US 41A)	Yes	No
506	Providence Blvd (US 79)	Widen to 6 Lanes	US 41 to Red River Providence	Yes	No
509	Madison Street	Widen to 4 Lanes	10th Streetreet to Pageant Lane	Yes	Yes
511	Riverside Drive	Road Diet	Providence Blvd to Cumberland Dr	Yes	Yes
512	Rossview Road	Widen to 5 Lanes	Wilma Rudolpf Blvd (US 79) to Dunbar Cave Rd	Yes	No

Potentially Hazardous Properties

The transportation projects were evaluated for their proximity to potentially hazardous sites identified by the Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), commonly known as Superfund. Addressing these early on in the process can reduce costs, delays, and liabilities.

CERCLA was enacted in 1980 and established prohibitions and requirements concerning closed and abandoned hazardous waste sites. It provided for liability of persons responsible for the release of hazardous waste at these sites, and established a trust fund to provide for the cleanup when no responsible party could be identified. CERCLA also enabled the revision of the National Contingency Plan, which established the National Priorities List (NPL).

The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is primarily intended to guide the EPA in determining which sites warrant further investigation.

Using the NPL website, it was determined that there are no sites in the MPA listed on the NPL or proposed to be listed on the NPL.

Mitigation

At this stage in project development, not enough information is available to determine any potential impacts and mitigation. However, transportation projects affected by or affecting potentially hazardous properties will be evaluated during a state's project delivery process, the NEPA process, design, and construction.

Karst Areas

As noted in Section 4.2, the MPA is located within two ecoregions identified by the MPA: the Western Highland Rim ecoregion and the Western Pennyroyal Karst. The MPA is heavily influenced by karst terrain and has a larger presence of caves and sinkholes due to these unique areas. Karst terrain is a topology that

is formed as a result of soluble rock such as limestone, dolomite, and gypsum. This soluble rock is worn away by water, which leads to the formation of the caves and sinkholes in the area.

These regions experience unique problems with sinkhole collapses and flooding. Groundwater pollution is also a major concern since the springs in karst areas can be a major source of groundwater.

FIGURE 4.7 DISPLAYS THE KARST AREAS NEAR THE MPA, WHICH SHOWS THAT ALMOST THE ENTIRE MPA AND THE SURROUNDING AREA ARE IN A POTENTIAL KARST TOPOLOGY. ANY PROJECTS CONSTRUCTED WITHIN THE MPA WILL NEED TO BE AWARE OF THESE UNIQUE CHALLENGES AS THEY GO THROUGH THE PROJECT DELIVERY PROCESS

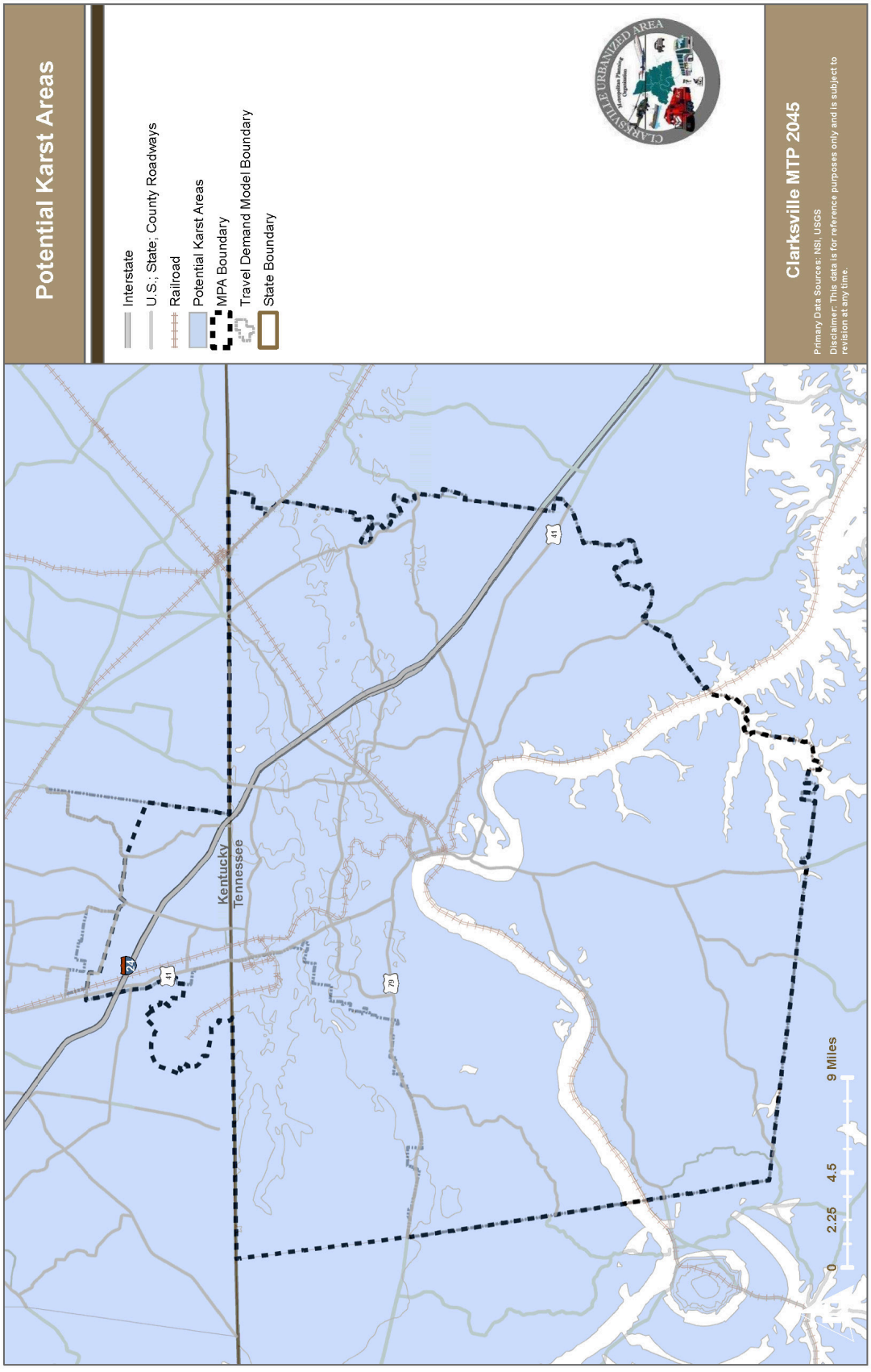


FIGURE 4.7 POTENTIAL KARST AREAS

Community Impacts

A transportation project may produce various impacts to public spaces, residences, and businesses. Each project possesses its own individual challenges and is beyond the scope of the MTP process.

Mitigation

Impacts associated with specific projects will be assessed in conformance with local, state, and federal regulations, NEPA guidance, and each state's project delivery process.

Certain impacts, such as those associated with an increase in traffic related noise, can potentially be mitigated. Also, to the extent practicable, projects should be developed using Context Sensitive Solutions.

Environmental Justice

Executive Order 12898 establishes guidance on federal actions, which includes projects receiving federal funds, to address EJ for minority and/or low-income populations (February 11, 1994). The order specifies actions to be taken on a range of issues that are intended to:

- promote nondiscrimination in federal actions,
- provide minority and low-income communities equal access to public information regarding a federal action, and
- provide an opportunity for public participation in the evaluation of a federal action in matters relating to human health and the environment.

In particular, the order stipulates that:

"To the greatest extent practicable and permitted by law… each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations… (Order Section I-101)

Each Federal Agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons… from participation in, denying persons the benefits of, or subject persons… to discriminations under such programs, policies, and activities, because of their race, color, or national origin (Order Section 2-2)."

Figure 4.8 shows the block groups in the MPA with higher concentrations of minority persons. Figure 4.9 shows the block groups in the MPA with a higher concentration of low income persons. Projects near or passing through these block groups may not necessarily have a disproportionate impact on EJ populations. Such projects received additional analysis in order to ensure compliance with federal laws.

Mitigation

In order to prevent disproportionately high and adverse effects on EJ populations, the 2045 MTP determines the relative likelihood for EJ issues for all transportation projects. Projects with a comparatively higher likelihood for EJ issues were awarded fewer points in the project prioritization process. Using data from the American Community Survey, analysis was used to determine if these projects affect a disproportionately high concentration of minorities or persons living in poverty. The needs of the EJ community, and the desire of the EJ community for a project to be implemented, are also considered. This is a planning-level exercise, and is not intended to be as detailed as a project-specific environmental analysis.

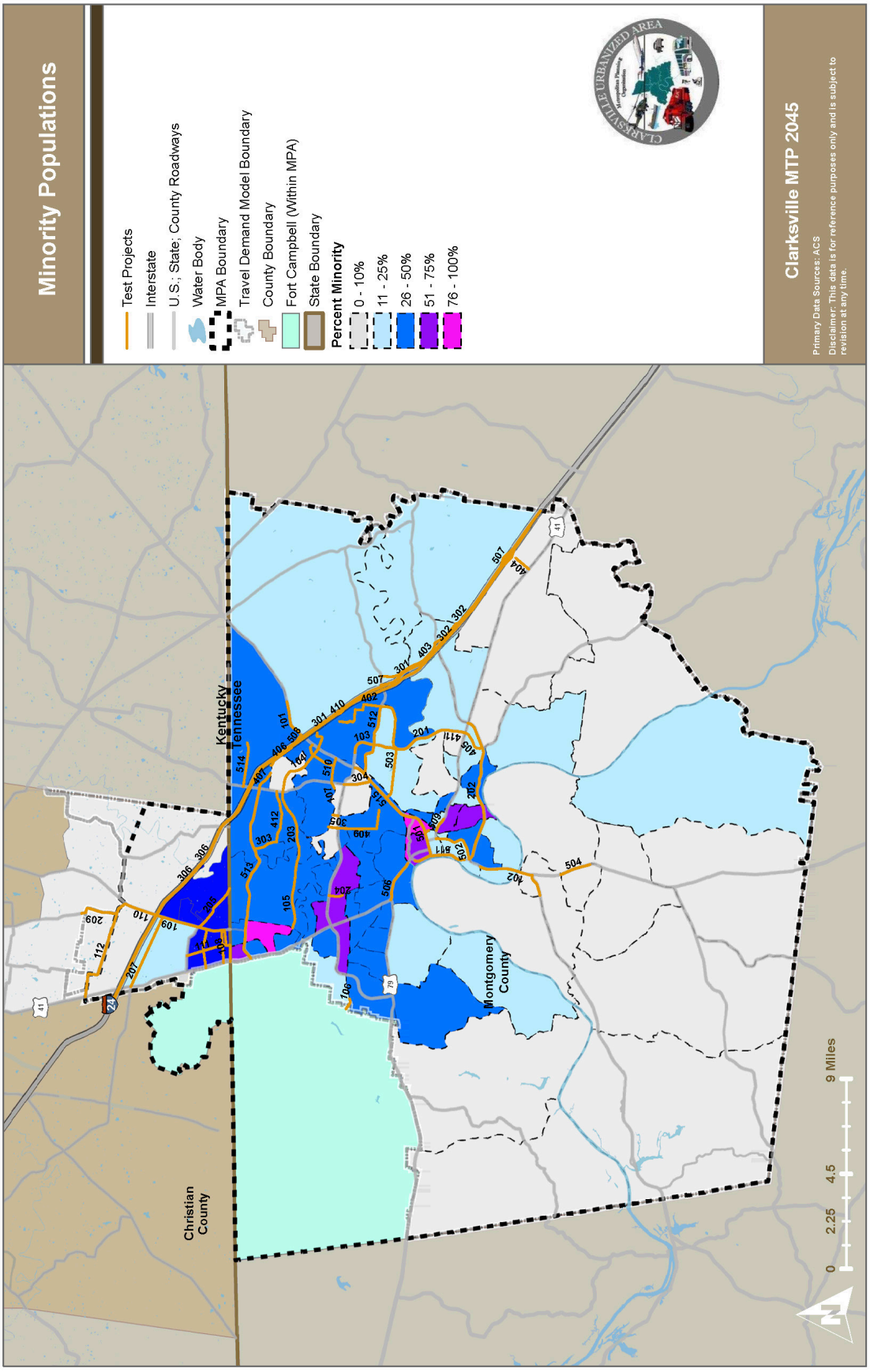


FIGURE 4.8 MINORITY POPULATIONS

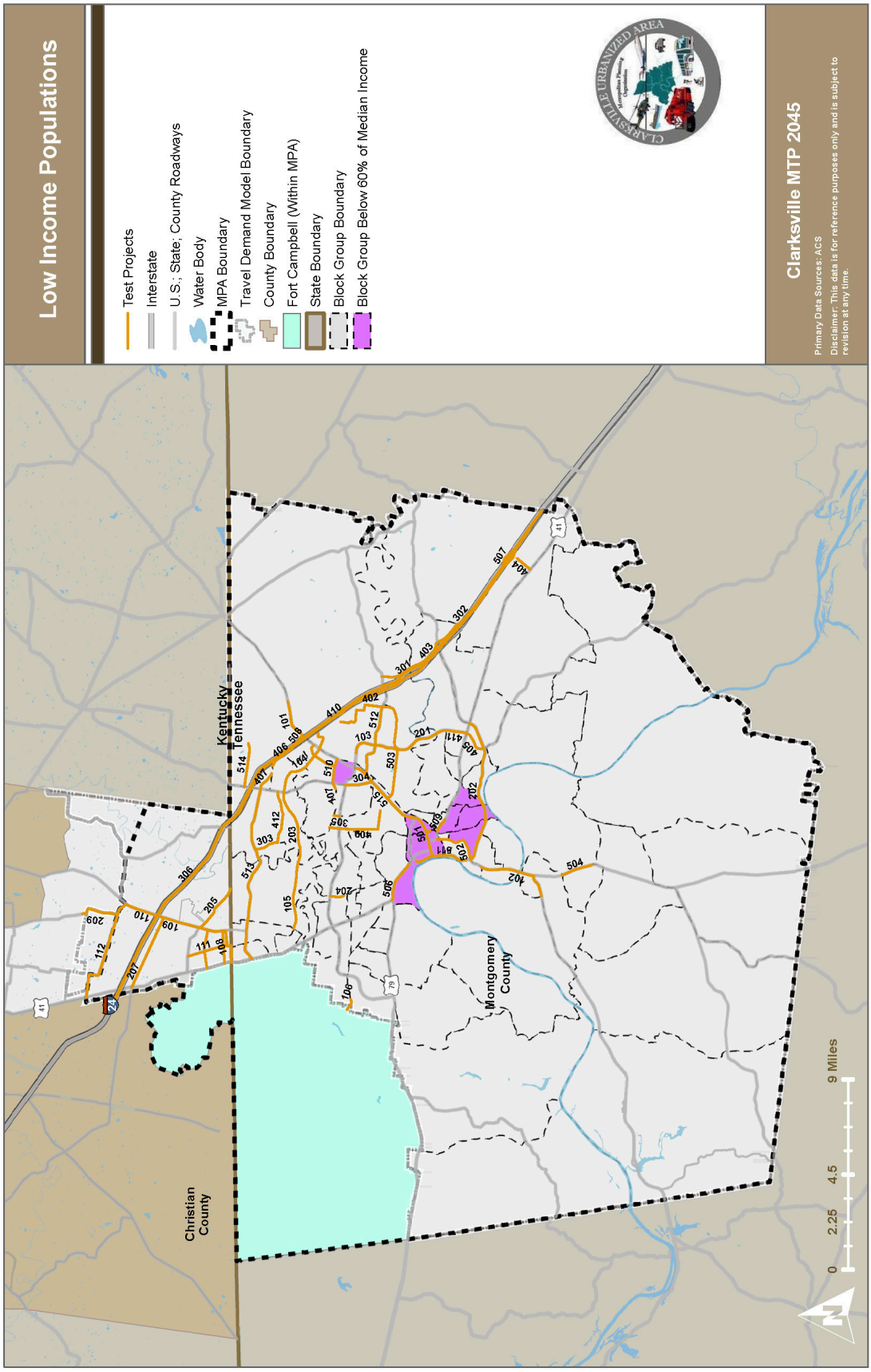


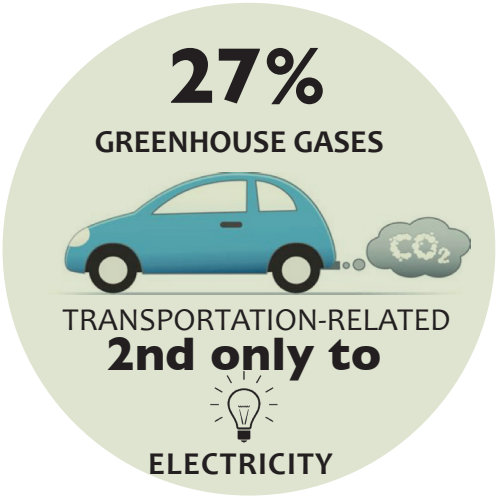
FIGURE 4.9 LOW INCOME POPULATIONS

4.6 | Climate Change and Extreme Weather Events

The current scientific belief holds that the planet is going through a period of warming. This changing trend in climate is believed to be caused by the increase in greenhouse gases (GHGs), which are also influenced by human behavior through the use of fossil fuels. According to the EPA, 27 percent of the GHGs released are from transportation purposes, second only to the use of electricity. The MPO understands the need for air quality within the area and is taking several steps to address this new challenge.

Climate Change Strategies

The transportation system is one of the largest contributors to GHGs, contributing over one-quarter of the total amount. These gases come from vehicle emissions and air conditioning. Vehicle emissions are increased when a vehicle is idling and less efficient. This contribution to GHGs makes the transportation sector a priority to address climate change. There are several strategies that may be employed in order to reduce the impact of transportation on climate change.



Introducing Low-Carbon Fuels

This strategy explores the use of fuels from alternative sources which produce less carbon and are more efficient. These fuels include ethanol, biodiesel, natural gas, and more. Additional low-carbon fuels include alternatives such as hybrids, electric vehicles, and hydrogen fuel. The CUAMPO provides a link to the U.S. Department of Energy Alternative Fueling Station Locator in an effort to promote this strategy. In an effort to reduce emissions, the local transit systems have been making the switch to hybrid buses.

Reduction of High-Carbon Activities

Single occupancy vehicles and motorcycles are comparatively inefficient modes of transportation that produce GHGs. Strategies can be implemented that encourage transportation users to choose alternative transportation modes which reduce the emissions on the transportation system. These include the use

of carpooling, increased transit ridership, and the reduction of unnecessary trips. The CUAMPO has made strides in the development of a cleaner transit system and has created a network between Clarksville and other cities that provides transportation users alternatives to single occupancy vehicle travel.

The construction and maintenance of the transportation system can also contribute to GHGs, as many of the products used in these processes are carbon-based. The use of lower-carbon materials during construction and maintenance would aid with this strategy.

Improving System Efficiency

The transportation network is the system by which people, goods, and services are moved through the area. This strategy encourages the use of an efficient transportation system to reduce travel time, reduce idling vehicles, and increase quality of traffic operations. This can be achieved through the use of:

- ITS,
- traffic signal retiming and coordination,
- TDM, and
- other means to reduce congestion and idling vehicles.

Additional Strategies

The strategies listed above cover the key methods that can be used to reduce the effect of GHGs from transportation sources. The following strategies may also be deployed:

- Reducing the amount of travel necessary for transportation users
- Increasing vehicle occupancies for all modes
- Establishing transportation pricing
- Encouraging non-vehicular travel
- Promoting trip-chaining
- Improved freight logistics
- Using LED lights in traffic signals

Adaptation to Climate Change

As the Clarksville MPA is inland and away from the coast, rising sea levels and hurricanes are not considered a direct concern of the area. However, these events can impact the area over time. The most obvious and immediate effect of climate change has been the increased global temperature, which has a large impact on the transportation system. The increased heat warps the steel of railroad tracks, stresses bridge joints, and affects pavement conditions. Pavement that has been softened by heat to which it was never designed can buckle and rut under high truck volumes. This in turn creates a need for further maintenance and the use of more material, which itself is carbon-based.

The rising temperatures are not the only major impact that has been observed with the recent climate change. Storms have been rising in intensity with the shift in the climate and "Superstorms" such as Katrina, Sandy, and Harvey are becoming a more regular occurrence. Localized flooding has also worsened across the United States and the Clarksville region was affected by a "Superflood" in 2010.

RECENT STORMS WITH A HIGH INTENSITY OVER A SHORT PERIOD OF TIME ARE BECOMING COMMON AND CAN RESULT IN FLASH FLOODS.

These flash floods trap motorists and deposit large amounts of water on the impervious surfaces of the roadways. This water eventually becomes surface runoff, which can pool and damage a roadway's substructure. This impact is worse in karst areas since the rock that composes them is soluble, leading to further potential for sinkholes and other potential disasters that can affect roadways and other infrastructure.

A strategy that the MPO can employ to deal with this need is the increased inspection of bridges and roadways. This will ensure that the infrastructure is structurally sound and that erosion from storms has not degraded it. Drainage for the infrastructure is also important, and should be inspected to ensure that roadways will not contribute to runoff that can damage karst areas or allow pooling.

4.7 | Stormwater Mitigation

As an area grows and changes, its land use and infrastructure change with it. These changes affect how precipitation events, the product of which is stormwater, within an area, affect roadways, homes, runoff, groundwater, and more. Stormwater can become ground water through runoff or evaporation. When stormwater becomes runoff, it ends up in nearby streams, rivers, or other water bodies as surface water.

The precipitation from a storm is heavily influenced by land use and impervious surfaces such as roadways. Any change in these factors will change how stormwater behaves within the area. As areas develop, they replace more pervious surfaces such as grass, wetlands, and wooded areas with impervious surfaces such as asphalt, concrete, and more. With climate change impacting the frequency and severity of storms, stormwater mitigation has become an important need for all communities.

In a developed, urban environment, unmanaged stormwater can create flooding and introduce pollutants and other contaminants to the areas that the water flows. The flooding can damage homes and roadways, while the contaminants create environmental hazards and affect nearby drinking water sources. The MPA's karst terrain is also particularly vulnerable to stormwater that leeches into the soluble rocks that make up the region. An increase in impervious area from new roadways or developments without proper drainage can significantly decrease the runoff time in an area. This would lead to increased flooding, while allowing contaminants from the roadways, such as oil on the surface, to mix with the water and be carried to other areas. These contaminants could eventually lead to water pollution and a violation of federal laws.

Current Policies

The State of Tennessee has a statewide stormwater mitigation plan that has been published through TDOT. This plan outlines the planning, design, construction, and maintenance of Tennessee state roadways in order to minimize stormwater impacts. Currently, no local jurisdictions within the MPA have their own stormwater mitigation plans. The development of a Standard Urban Stormwater Mitigation Plan

(SUSMP) by the CUAMPO would allow the MPA to mitigate the impacts from precipitation events, preserve the transportation system, reduce erosion, and promote health and safety. This development should be done in conjunction with the local jurisdictions, KYTC, and TDOT.

Additional Strategies

Additional strategies that can be taken in order to mitigate the effects of stormwater include:

- **A reduction of alterations to natural landscapes.**
- **Promote the use of "green infrastructure" and other low-impact development practices.**

  Examples include the use of rain barrels, rain gardens, buffer strips, bioswales, and replacement of impervious surfaces on property with pervious materials such as gravel or permeable pavers.
- **Develop a SUSMP at multiple levels; including state, region, and municipality.**

  Efforts should be made to coordinate these plans, even though multiple agencies would have them in place
- **Educate residents, business owners, elected officials, and developers on the impacts of stormwater and how they can assist with mitigation.**
- **Identify the area's most likely to flood during heavy storm events and prioritize mitigation efforts in that area and areas upstream from it.**
- **The adoption of open space preservation plans, which will balance land use and local developments with preservation and conservation of the existing open space.**
- **The establishment of stormwater fees to support the funding of stormwater management projects and practices.**
- **Reduce the amount of impervious surfaces on residential, commercial, and public properties and offer incentives to encourage the change.**
- **Adopt ordinances that include stormwater mitigation practices, including landscaping standards, tree preservation, and "green streets".**

5.0 | Current Land Use, Population, Economic, and Travel Patterns

5.1 | Regional Context

The U.S. Office of Management and Budget (OMB) is responsible for the definition of Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas. These areas are core-based statistical areas that include the county or counties containing a core urban area, and any adjacent counties that have a high degree of social and economic integration. For this reason, these geographic areas are useful for understanding the broader context of land use, population, economic, and travel patterns in a region.

The Clarksville MPA contains the Clarksville MSA's core urban area, the Clarksville urbanized area, and is situated entirely within the MSA. The Clarksville MSA consists of Montgomery and Stewart Counties in Tennessee, and Christian and Trigg Counties in Kentucky. These areas are illustrated in Figure 5.1.

Beyond the MSA, the Clarksville MPA is typically not considered to be a part of a U.S. megaregion, or a large geographic area encompassing multiple major and minor metropolitan areas. However, according to the America 2050 project by the Regional Plan Association, it is within the area of influence of the Piedmont Megaregion as illustrated in Figure 5.2.

While the definition and classification of megaregions varies, they are important for transportation planning. Megaregions indicate strong economic and social ties in a geographic area that is larger than MPAs. Because of this, regional planning coordination becomes increasingly important in the megaregions. In the future, the CUAMPO will more than likely begin to coordinate transportation planning efforts with nearby MPOs in the Piedmont Megaregion.

FIGURE 5.1 COMPONENTS OF CLARKSVILLE, TN METROPOLITAN STATISTICAL AREA

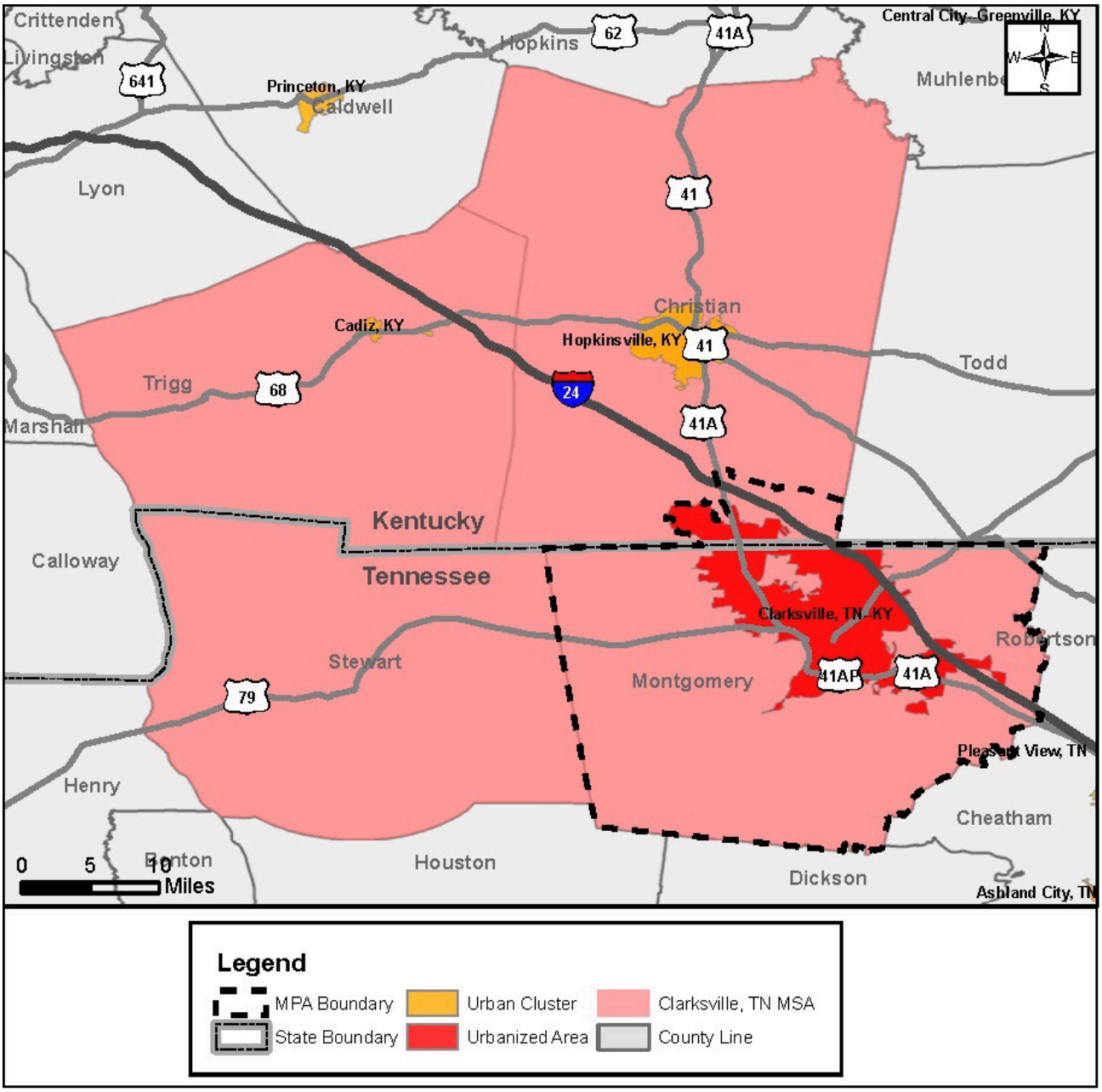
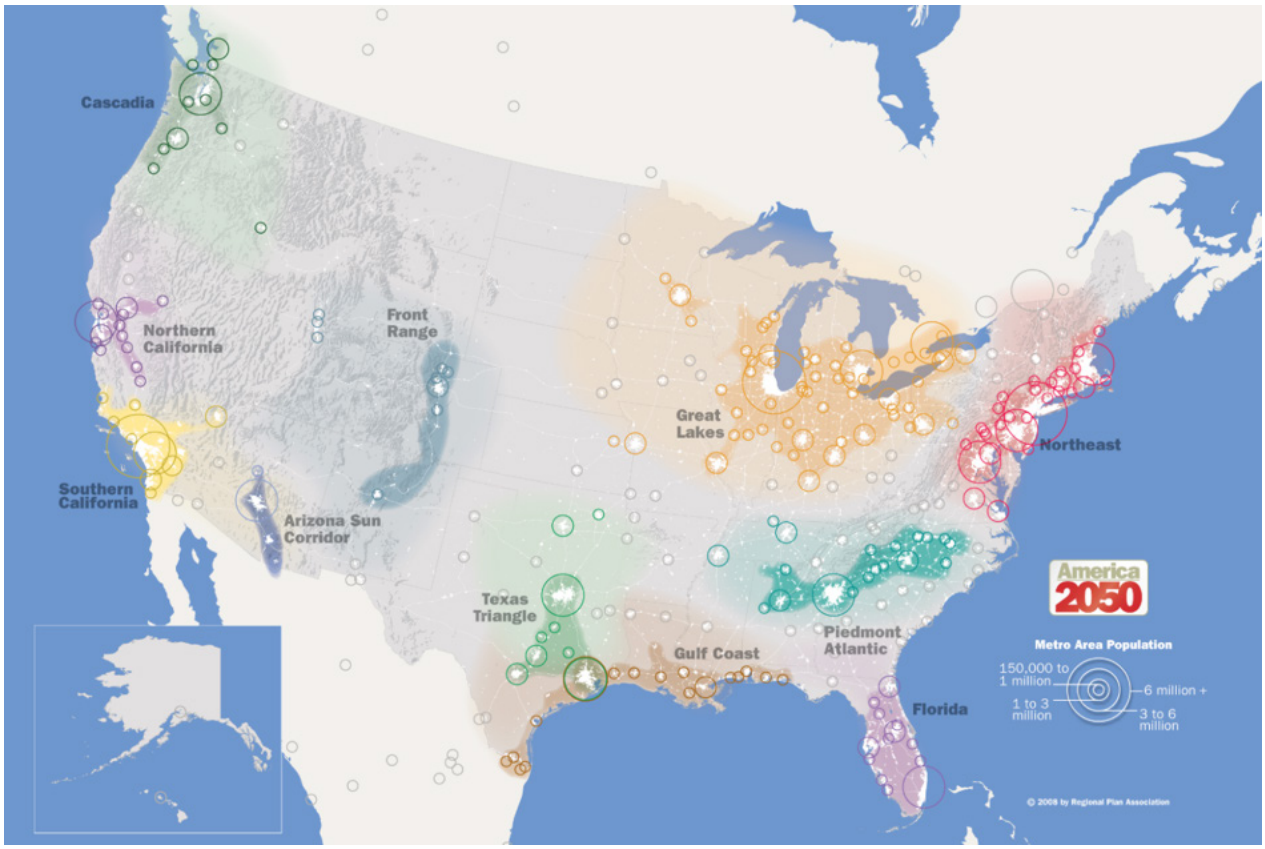


FIGURE 5.2 MEGAREGIONS IN THE UNITED STATES



5.2 | Land Use Patterns

As indicated in Chapter 4, Figure 4.1, most of the developed land in the MPA is centered around the City of Clarksville. Areas that have been classified as urban by the Census Bureau are similarly concentrated around these cities, as illustrated in Figure 5.1 earlier.

The population densities, employment densities, and activity densities within the MPA are illustrated in Figures 5.3 through 5.5.

THE POPULATION DENSITIES IN THE MPA ARE THE GREATEST WITHIN THE DOWNTOWN AREA OF THE CITY OF CLARKSVILLE.

There are also smaller concentrations occurring near the City of Clarksville along US 41A going southeast, and the subdivisions near Fort Campbell at the state line.

The employment densities within the MPA are greatest in the Central Business District.

An area's activity density is based on the combined total of population and employment. This statistic reveals areas that may not have a significantly high population or employment density alone, but still generate significant activity overall. By looking at these two factors together, one gets a better understanding of the impact of mixed-use areas. The greatest activity densities in the MPA are the downtown area of the City of Clarksville and Austin Peay State University.

THE GREATEST ACTIVITY DENSITIES IN THE MPA ARE THE DOWNTOWN AREA OF THE CITY OF CLARKSVILLE AND AUSTIN PEAY STATE UNIVERSITY.

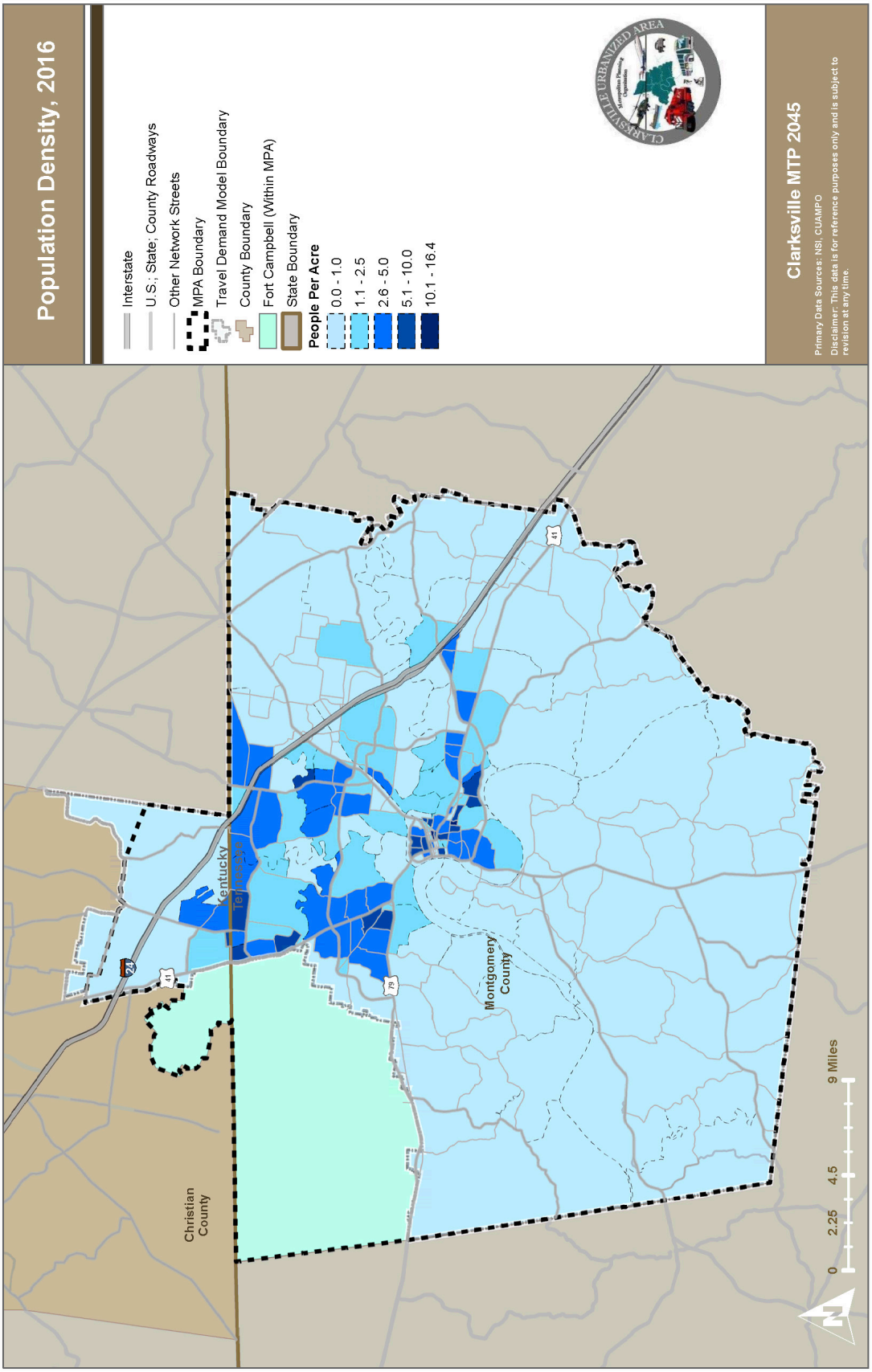


FIGURE 5.3 POPULATION DENSITY, 2016

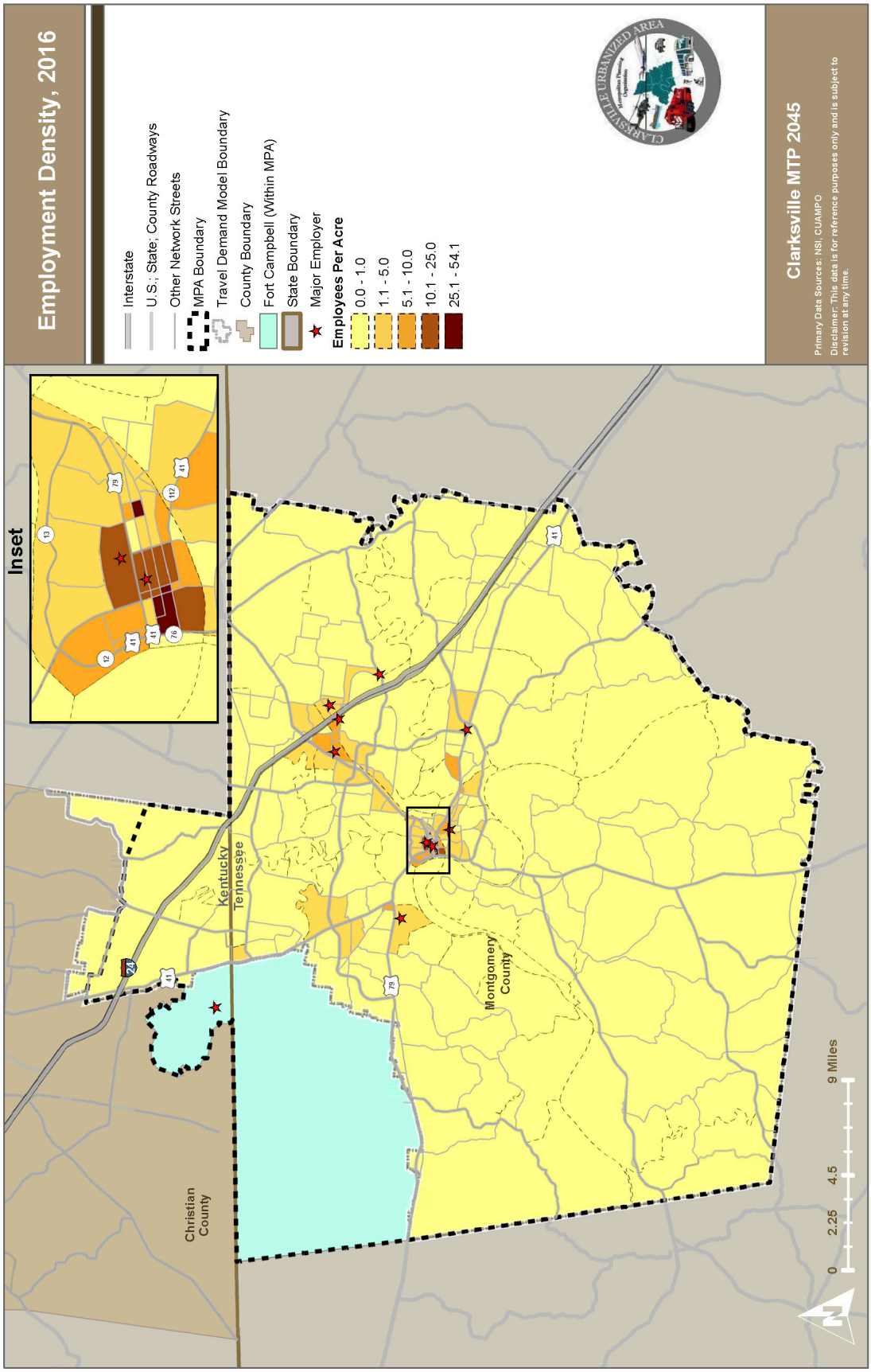


FIGURE 5-4 EMPLOYMENT DENSITY, 2016

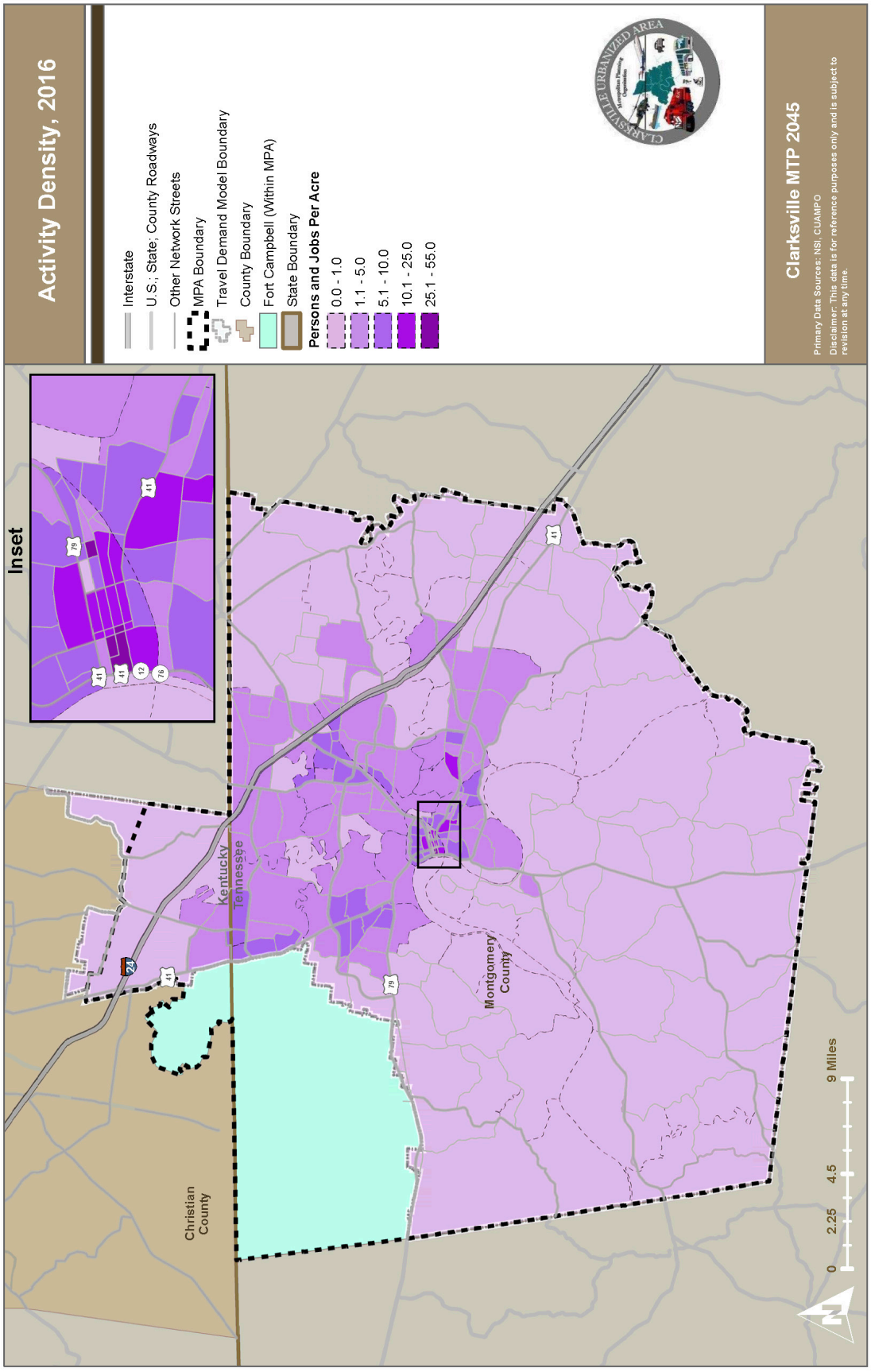


FIGURE 5.5 ACTIVITY DENSITY, 2016

5.3 | Population and Economic Trends

Population Trends

Historical Trends

BETWEEN 2000 AND 2010, GROWTH IN THE MPA GREATLY OUTPACED KENTUCKY, TENNESSEE, AND THE COUNTRY AS A WHOLE.

However, population growth has been much more rapid in Montgomery County than in Christian County. Table 5.1 displays the population changes in the Clarksville MPA and associated jurisdictions.

Table 5.1 Population Change in MPA and Local Jurisdictions, 2000 to 2010

Place	2000	2010	Change 2000 to 2010		
			Number	Percent	Annualized Growth Rate
Clarksville	103,455	132,929	29,474	28.49%	2.85%
Hopkinsville	30,089	31,577	1,488	4.95%	0.49%
Christian County	72,265	73,955	1,690	2.34%	0.23%
Montgomery County	134,768	172,331	37,563	27.87%	2.79%
Metropolitan Planning Area	121,189	174,229	53,040	43.77%	4.38%
Kentucky	4,041,769	4,339,367	297,598	7.36%	0.74%
Tennessee	5,689,283	6,346,105	656,822	11.54%	1.15%
United States	281,421,906	308,745,538	27,323,632	9.71%	0.97%

Source: U.S. Census Bureau

Recent Trends

Population estimates from 2016 largely suggest a continuation of historical trends. Montgomery County is outpacing the U.S. in population growth while Christian County is experiencing a population decline. Figure 5.6 shows the change in households from 2010 to 2016 by TAZ. Table 5.2 displays the population change in the MPO jurisdictions from 2010 to 2016.

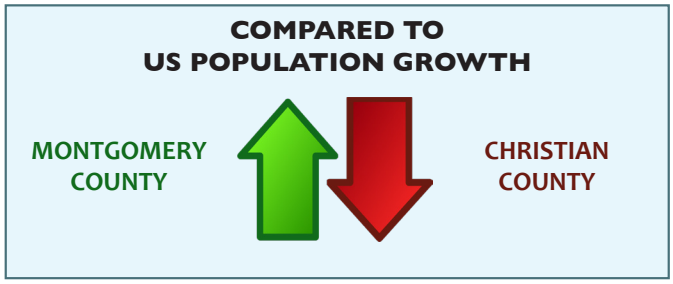


Table 5.2 Estimated Population Change in MPO Jurisdictions, 2010 to 2016

PLACE	2010	2016 (Estimate)	CHANGE 2010 TO 2016		
			Number	Percent	Annualized Growth Rate
Clarksville	132,929	150,287	17,358	13.06%	2.18%
Hopkinsville	31,577	31,811	234	0.74%	0.12%
Christian County	73,955	72,351	-1,604	-2.17%	-0.36%
Montgomery County	172,331	195,734	23,403	13.58%	2.26%
Metropolitan Planning Area	174,229	196,758	22,529	12.93%	2.16%
Kentucky	4,339,367	4,436,974	97,607	2.25%	0.38%
Tennessee	6,346,105	6,651,194	305,089	4.81%	0.80%
United States	308,745,538	323,127,513	14,381,975	4.66%	0.78%

Source: U.S. Census Bureau

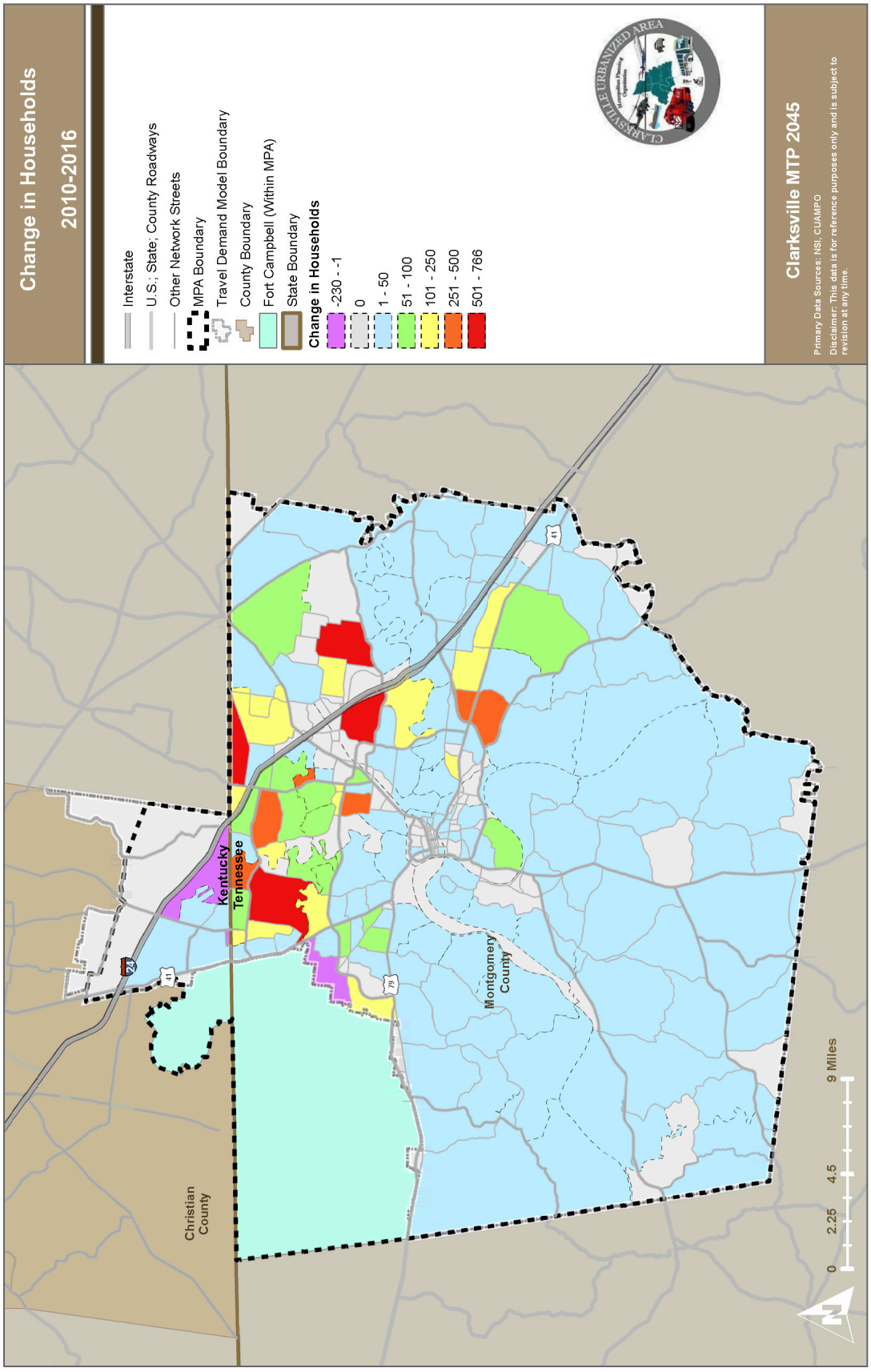
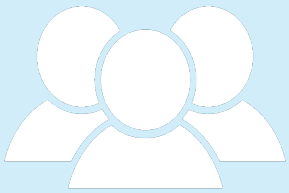


FIGURE 5.6 CHANGE IN HOUSEHOLDS, 2010-2016

Employment Trends

THROUGHOUT THE 2008 RECESSION, THE CLARKSVILLE AREA MAINTAINED A STRONG REGIONAL EMPLOYMENT GROWTH WHICH IS EXPECTED TO CONTINUE INTO THE FUTURE.



The study area had 66,205 employees in 2010.

This has grown to 68,326 employees in 2016.

Figure 5.7 shows the change in total employees from 2010 to 2016 by TAZ. Table 5.3 displays the ten largest employers within the MPA, which are shown in Figure 5.4.

Table 5.3 Top 10 Largest Employers in the MPA

EMPLOYERS	EMPLOYEES
Fort Campbell	27,600
Clarksville-Montgomery County School System	4,000
Tennova Healthcare	1,150
Trane Company	1,100
City of Clarksville	1,050
Austin Peay State University	860
Montgomery County Government	850
Agero	750
Convergys	600
Akebono	500

Source: Clarksville Area Chamber of Commerce, Bureau of Economic Analysis

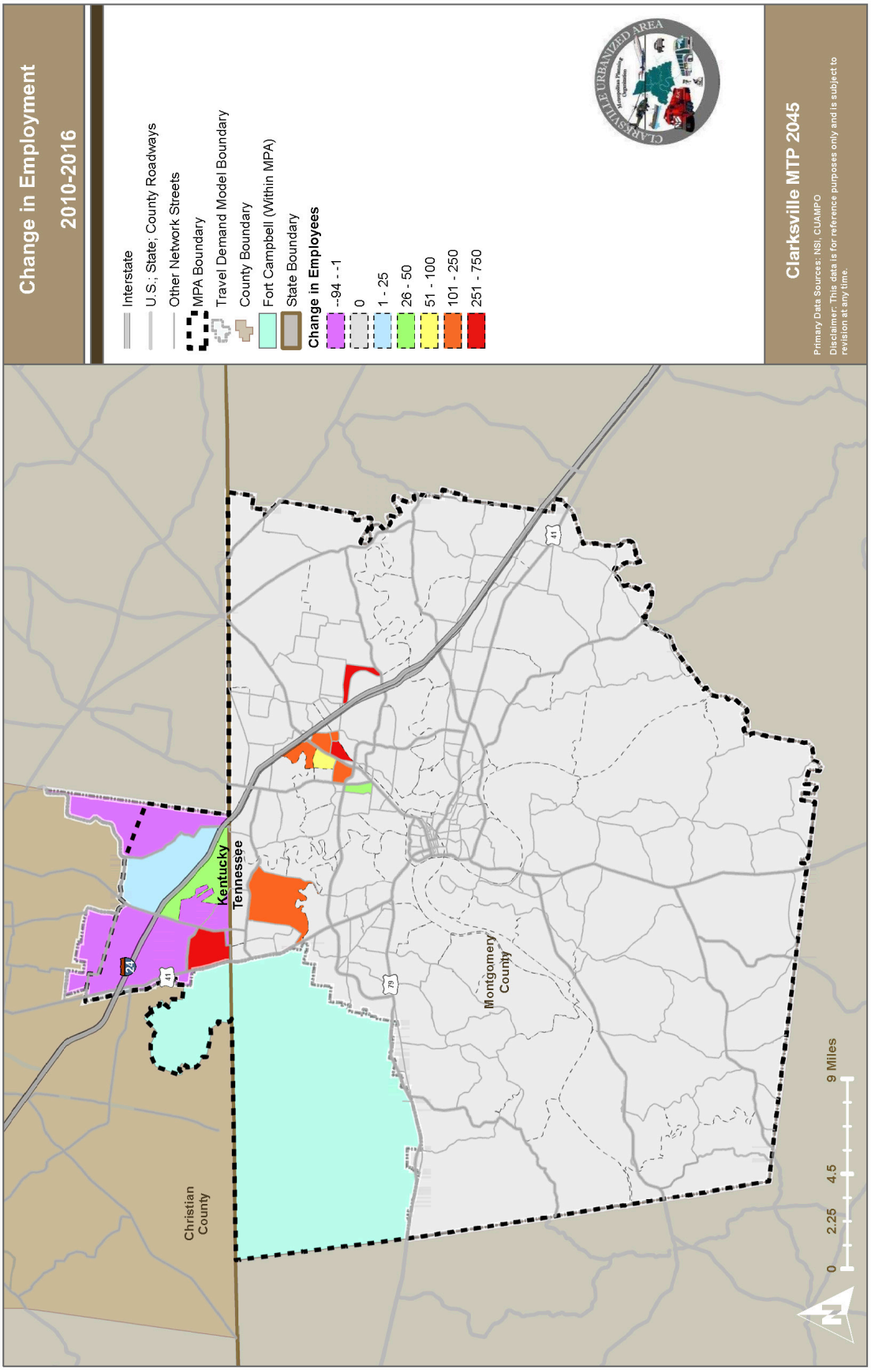


FIGURE 5.7 CHANGE IN EMPLOYMENT, 2010-2016

There is no additional historic employment data available at a geographic level that would allow for a more detailed analysis of employment trends within the MPA. However, county-level data from the Bureau of Economic Analysis (BEA) for select industries was obtained for Christian and Montgomery counties. The change in total employment (full-time and part-time) from 2010 to 2016 in the MPA counties by industry is shown in Table 5.4.

GENERAL TRENDS FROM THE BEA DATA SHOW THAT:

- ***THE RETAIL INDUSTRY HAD THE GREATEST ABSOLUTE INCREASE, WITH OVER 2,200 JOBS ADDED***
- ***THE ACCOMMODATION AND FOOD SERVICES INDUSTRY ADDED JUST OVER 2,000 JOBS.***
- ***THE MILITARY INDUSTRY HAD THE GREATEST DECREASE WITH A LOSS OF APPROXIMATELY 5,300 EMPLOYEES. THIS IS DUE TO THE FLUCTUATING DEPLOYMENT LEVELS OF FORT CAMPBELL.***

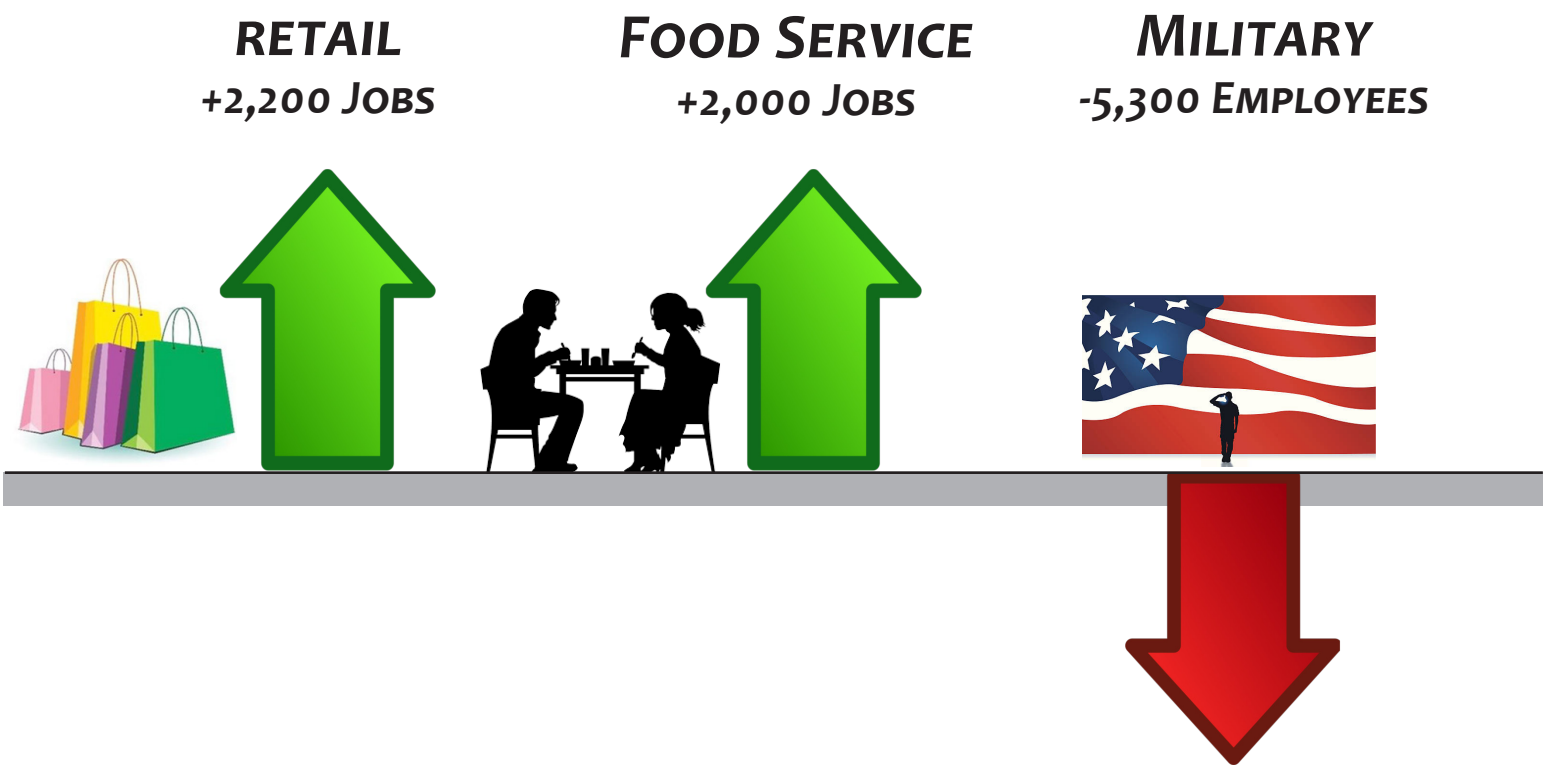


Table 5.4 Change in Employment in MPA Counties by Industry, 2010-2016.

DESCRIPTION	2010	2016	CHANGE	
			Number	Percent
Total employment (number of jobs)	134,056	140,182	6,126	4.57%
Farm employment	2,263	2,204	-59	-2.61%
Forestry, fishing, and related activities	(D)	389	(D)	(D)
Mining, quarrying, and oil and gas extraction	(D)	427	(D)	(D)
Utilities	(D)	(D)	(D)	(D)
Construction	5,436	5,219	-217	-3.99%
Manufacturing	9,385	10,598	1,213	12.92%
Wholesale trade	(D)	(D)	(D)	(D)
Retail trade	12,530	14,770	2,240	17.88%
Transportation and warehousing	(D)	(D)	(D)	(D)
Information	1,074	1,369	295	27.47%
Finance and insurance	2,769	3,049	280	10.11%
Real estate, rental and leasing	3,830	4,610	780	20.37%
Professional, scientific, and technical services	4,786	3,847	-939	-19.62%
Management of companies and enterprises	262	404	142	54.20%
Administrative, support, waste management, and remediation services	6,206	7,656	1,450	23.36%
Educational services	1,761	1,962	201	11.41%
Health care and social assistance	10,307	11,932	1,625	15.77%
Arts, entertainment, and recreation	1,060	1,198	138	13.02%
Accommodation and food services	8,782	10,800	2,018	22.98%

Note: (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Continued

Table 5.4 Change in Employment in MPA Counties by Industry, 2010-2016.

DESCRIPTION	2010	2016	CHANGE	
			Number	Percent
Other services (except public administration)	6,510	7,339	829	12.73%
Federal, civilian	6,029	5,586	-443	-7.35%
Military	32,959	27,647	-5,312	-16.12%
State government	(D)	3,394	(D)	(D)
Local government	(D)	9,706	(D)	(D)

Note: (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Source: U.S. Department of Commerce, Bureau of Economic Analysis

5.4 | Freight Demand

UNDERSTANDING THE LOCAL DEMAND FOR FREIGHT WITHIN THE MPA IS CRITICAL FOR ENSURING THAT THE REGION'S TRANSPORTATION SYSTEM IS MOVING GOODS IN AN EFFICIENT MANNER. IT ALSO ENABLES THE REGION TO BE ECONOMICALLY COMPETITIVE.

Specialized Freight Generating Industries

As a region that contains numerous manufacturing facilities, the Clarksville MPA contains several freight-generating establishments that have located within its boundaries. The development of an intermodal network that would create better access to these industries and move their goods would spur economic growth. However, in order to better understand the magnitude of certain freight-generating industries within the MPA, it is necessary to compare the relative size of freight-generating industries in the study area to that of Kentucky, Tennessee, and the United States as a whole.

The industries of particular interest to freight planning are the:

- mining,
- construction,
- manufacturing,
- wholesale trade,
- retail trade,
- transportation and warehousing, and
- accommodation and food services industries.

THE DEVELOPMENT OF AN INTERMODAL NETWORK THAT WOULD CREATE BETTER ACCESS TO THESE INDUSTRIES AND MOVE THEIR GOODS WOULD SPUR ECONOMIC GROWTH.

This section will focus on these industries and subsectors within these industries.

In order to identify the specialized freight-generating industries in the MPA, location quotients were calculated for the counties in the MPA. Location quotients are ratios that compare an industry's percentage of total employment in one area to that same industry's percentage of total employment in a larger, more all-encompassing area, such as a state or country. Location quotients highlight specialized industries by pointing out which industries employ a disproportionately high number of people when compared to the state or country as a whole. Typically, a location quotient of 1.2 or higher indicates a specialized industry.

Specialized Freight-Generating Industries

The location quotients for broadly defined freight-generating industries are provided in Table 5.5. The data source for this information is the Bureau of Economic Analysis' (BEA) Local Area Personal Income and Employment. The BEA data is the most complete, publicly available source for employment.

The data indicates that Christian County is specialized in the manufacturing industry when compared to the nation. Montgomery County is specialized in the mining industry when compared to the State of Tennessee. The county is also specialized in the retail trade and accommodation and food services industries when compared to the State of Tennessee and the nation. Aside from these industries, it does not appear that the MPA is specialized in any other broadly defined freight-generating industry.

TABLE 5.5 LOCATION QUOTIENTS FOR FREIGHT-GENERATING INDUSTRIES IN THE MPA, 2016

INDUSTRY	CHRISTIAN COUNTY EMPLOYMENT	MONTGOMERY COUNTY EMPLOYMENT	KY LOCATION QUOTIENT	TN LOCATION QUOTIENT	CHRISTIAN U.S. LOCATION QUOTIENT	MONTGOMERY U.S. LOCATION QUOTIENT
Mining (NAICS 21)	74	353	0.14	2.02	0.15	0.66
Construction (NAICS 23)	1,222	3,997	0.37	1.05	0.35	1.04
Manufacturing (NAICS 31-33)	6,211	4,387	0.91	0.65	1.38	0.88
Wholesale trade (NAICS 42)	(D)	1,644	(D)	0.63	(D)	0.62
Retail trade (NAICS 44-45)	3,838	10,932	0.55	1.41	0.57	1.49
Transportation and warehousing (NAICS 48-49)	1,796	(D)	0.56	(D)	0.73	(D)
Accommodation and food services (NAICS 72)	2,468	8,332	0.51	1.45	0.50	1.52
Total employment	66,699	73,483	N/A	N/A	N/A	N/A

Note: (D) = Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Source: U.S. Bureau of Economic Analysis, Table CA25N

Major Commodities Transported

Commodity flows from the FHWA's Freight Analysis Framework tables are not available for the Clarksville area. However, TDOT purchases commodity flow data from Transearch.

ACCORDING TO THE DATA, IN 2012, APPROXIMATELY 50 PERCENT OF THE TOTAL FREIGHT TONNAGE GENERATED BY MAJOR FREIGHT-GENERATING ESTABLISHMENTS IN THE COUNTY CAME FROM:

- **gravel and crushed stone,**
- **soy beans,**
- **mixed freight,**
- **and other non-metallic mineral products.**

Generation of Freight Trips in MPA

There are many industrial, wholesale trade, and commercial establishments in the MPA that generate freight truck trips. Figure 5.8 illustrates the number of freight trips generated by TAZ.

THIS MAP SHOWS THAT THERE ARE SEVERAL CLUSTERS OF RELATIVELY HIGH FREIGHT DEMAND IN THE MPA. THESE AREAS INCLUDE:

- **the US 79 commercial and industrial corridor from 101st Airborne Division Parkway to Hampton Station Road,**
- **the area east of US 41A and 101st Airborne Division Parkway, and**
- **the US 41A commercial corridor in the Kentucky portion of the MPA**

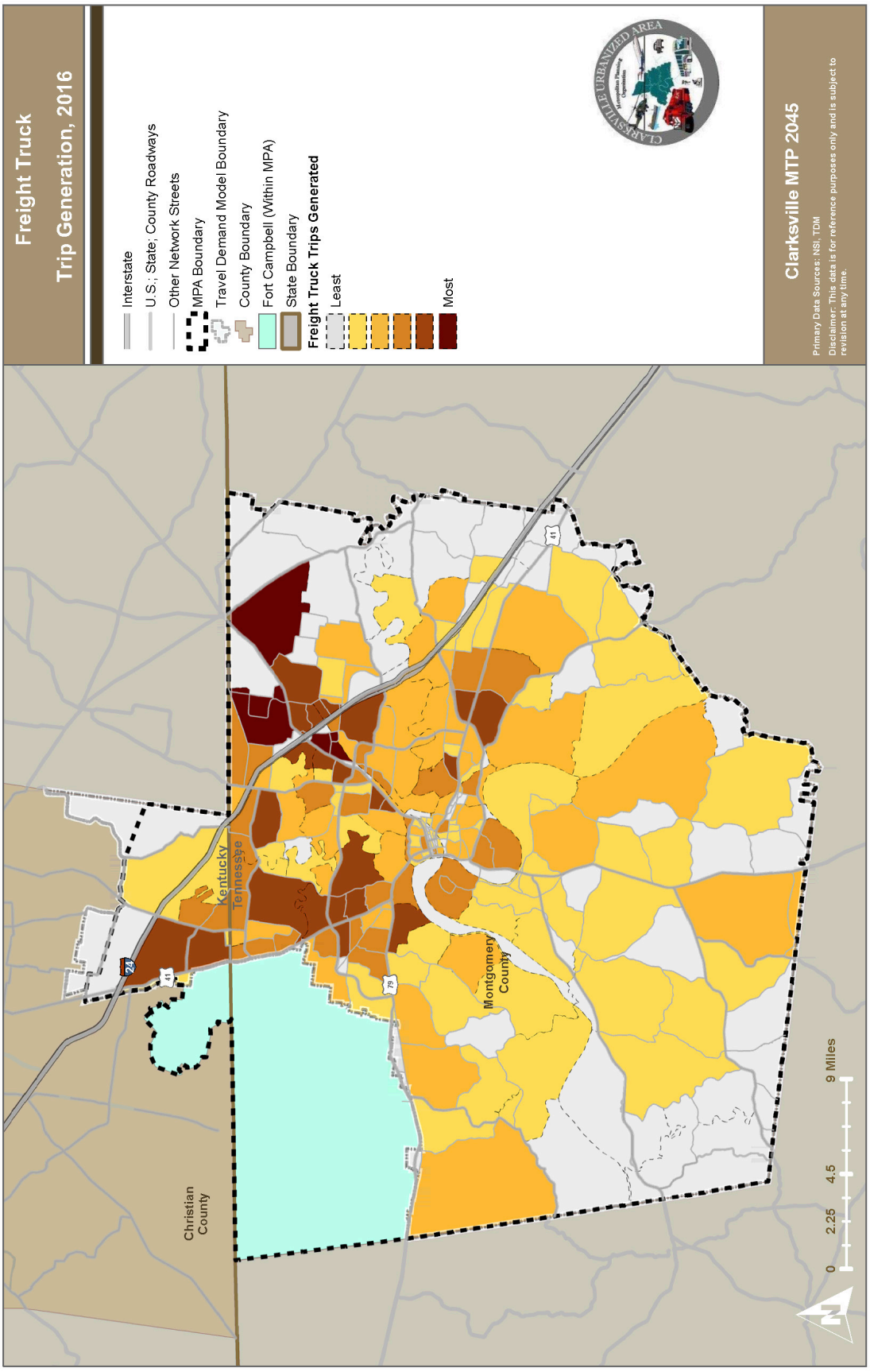


FIGURE 5.8 FREIGHT TRUCK TRIP GENERATION, 2016

5.5 | Travel Patterns

Commuting patterns shed some light on overall travel patterns. Data obtained from the American Community Survey (ACS) 5-Year Estimates shows that the travel time to work is relatively short within the MPA. Virtually all workers reside in tracts that have mean commute times under 30 minutes. The largest commute time within the MPA is in Montgomery County, Tract 1017 at just under 40 minutes.

The same data reveals that less than 10 percent carpooled. Walking or biking to work was uncommon, as was commuting by transit. However, there are areas where commuting by walking or by public transit are more likely to occur, as illustrated in Figure 5.9.

Areas with higher rates of commuting by transit and walking are mostly located around Austin Peay State University and the area immediately surrounding the City of Clarksville. These areas appear to somewhat relate to areas where a high percentage of households lack regular access to a vehicle, as shown in Figure 5.10. There are some areas in the MPA where over 20 percent of households do not have regular access to a vehicle.

TABLE 5.6 MEANS OF TRANSPORTATION TO WORK IN METROPOLITAN PLANNING AREA COUNTIES

	COMMUTERS	PERCENT OF TOTAL
Total	116,401	100.00%
Drove Alone	97,177	83.48%
Carpooled	9,181	7.89%
Public Transportation	915	0.79%
Taxi	132	0.11%
Motorcycle	359	0.31%
Bicycle	86	0.07%
Walked	4,637	3.98%
Other	1,298	1.12%
Worked at Home	2,616	2.25%

Source: Census Bureau, 2012-2016 ACS

Table 5.6 shows that, based on the 2016 5-year ACS, over 80 percent of commuters in the MPA counties drove alone to work.

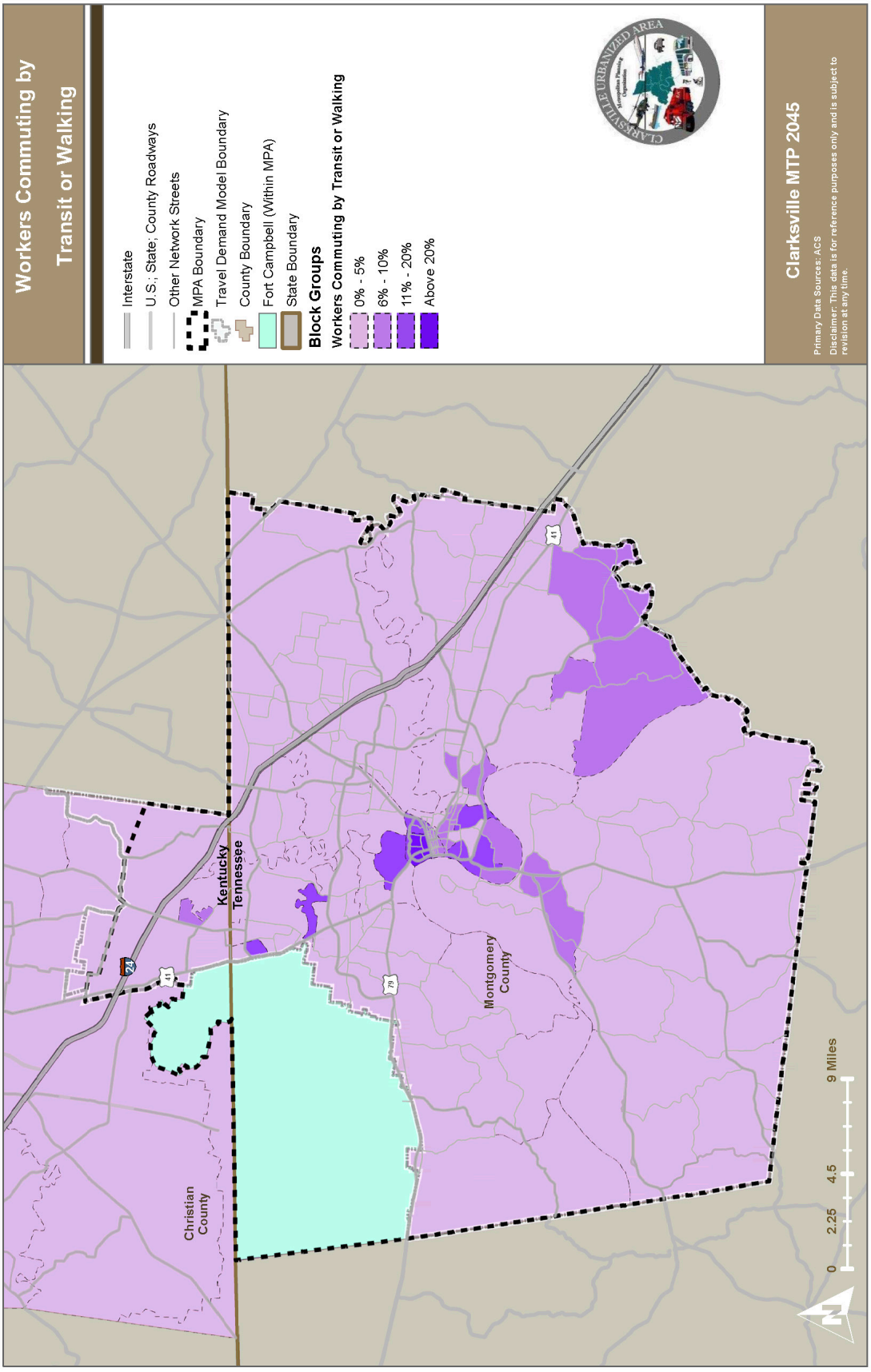


FIGURE 5.9 WORKERS COMMUTING BY TRANSIT OR WALKING

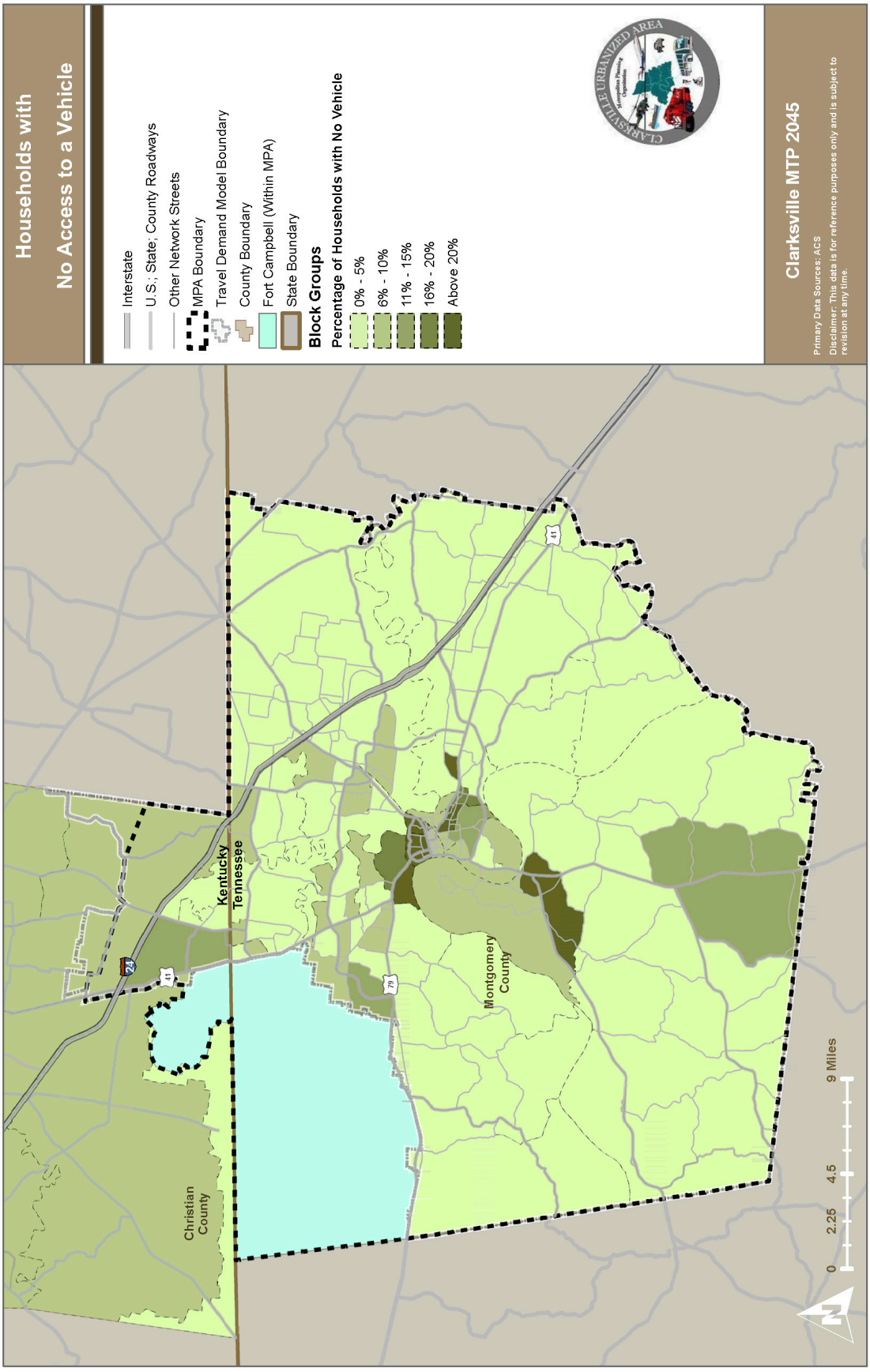


FIGURE 5.10 HOUSEHOLDS WITH NO ACCESS TO A VEHICLE