5 Systems-Level Analysis

5 Systems-Level Analysis of Proposed Projects

Metropolitan transportation planning is not solely concerned with the best way to move people and goods. In addition to mobility concerns, the planning process also examines the interaction of proposed transportation improvements with the natural and human environment. For the purposes of the metropolitan transportation plan, potential impacts on environmental resources and quality of life in the region are evaluated at a system-wide level. A more detailed analysis of the specific impacts associated with a project is typically performed later in the project development process to fulfill requirements under the National Environmental Protection Act (NEPA).

The primary goal of the systems-level analysis is to evaluate whether the proposed program of unconstrained potential transportation improvements may negatively impact the environment or result in disparate impacts to certain populations. It is intended to serve as a guide for implementing agencies and elected officials as projects progress through the development process. While it is not always possible to avoid negative impacts to environmentally sensitive areas, the goal of the environmental mitigation analysis is to balance the need for transportation improvements with environmental protection and quality of life considerations and, where possible, to increase access to natural and cultural resources in the region. Mitigation activities should be considered during all phases of project planning, design, construction, and maintenance.

In addition to environmental and cultural resources, the systems-level analysis addresses environmental justice considerations to ensure both the benefits and the burdens of the transportation system are distributed equitably across the region. The term environmental justice first emerged in the metropolitan transportation planning discussion in 1994 with the issuance of Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The executive order was based upon Title VI of the Civil Rights Act and is meant to ensure that minority and low income populations are not adversely affected by federal actions.

Identifying potential impacts on the environment, as well as low-income and minority populations, involves a three step process that includes:

- Defining and developing an inventory of environmental resources/minority and low-income populations;
- Identifying and assessing the potential impacts of proposed transportation improvements on these resources; and
- Addressing possible mitigation activities system-wide.

Environmental Mitigation Analysis

Located at the boundary between the Gulf Coastal Plains and Mississippi River bottomlands, the Monroe Urbanized Area is characterized by gently rolling, forested land in the western parts of Ouachita Parish and flat alluvial fields in the east. The Ouachita River and its numerous meandering bayou tributaries are the defining natural feature of the region, with six of Louisiana's Natural and Scenic Rivers located just north of the area in Union Parish.

Four national wildlife refuges lie just north of the cities of Monroe and West Monroe, comprising the North Louisiana Refuge Complex. D'Arbonne National Wildlife Refuge and Black Bayou Lake National Wildlife Refuge are located in Ouachita Parish, and preserve critical forested bottomland habitats for numerous species of flora and fauna. The parish is also home to two Louisiana Wildlife Management Areas (WMAs), which preserve natural areas in the parish while providing recreational opportunities for fishing, hunting, and hiking. In addition to natural areas set aside for recreation and preservation, the Monroe Urbanized Area boasts several historic and cultural resources, including the Biedenharn Museum and Gardens, which preserves the estate of the first bottler of Coca-Cola.

Source: Louisiana Travel (via Flickr)

The location of the region's environmental and cultural resources, including lakes and streams, wetlands, floodplains, parks, open space, recreational areas, and historic sites, were first inventoried as part of the environmental analysis. The data and information used to conduct the analysis included flood plain maps from the Federal Emergency Management Agency (FEMA), wetlands maps from the U.S. Fish and Wildlife Service, historic sites from the National Register of Historic Places, and state and federal wildlife and environmental protection resources.

Figure 5-1 shows the environmental, historical, and cultural resources in the region that were inventoried as part of the environmental mitigation analysis. Figure 5-2 shows the location of floodplains in Ouachita Parish

Figure 5-1: Environmental, Historical, and Cultural Resources

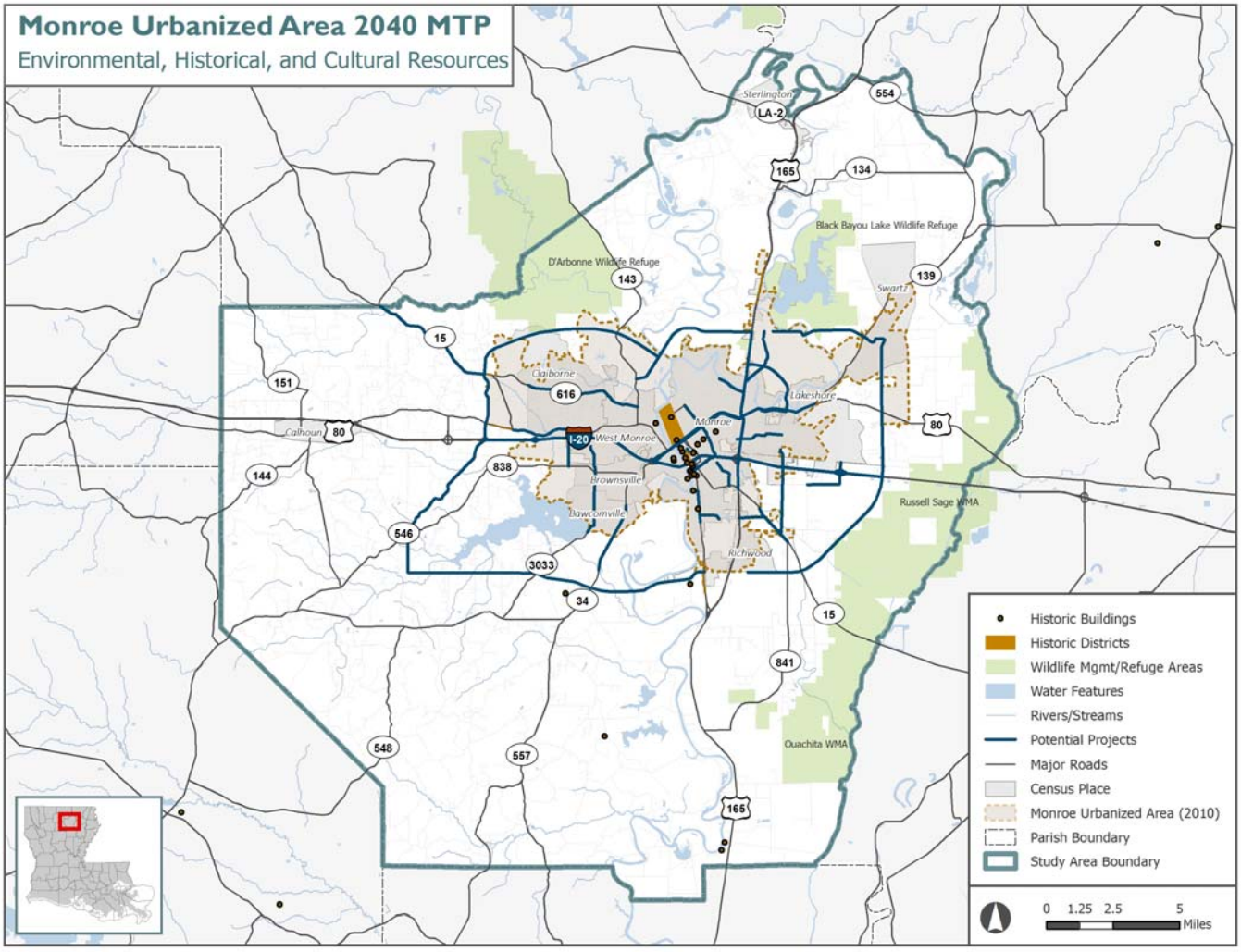
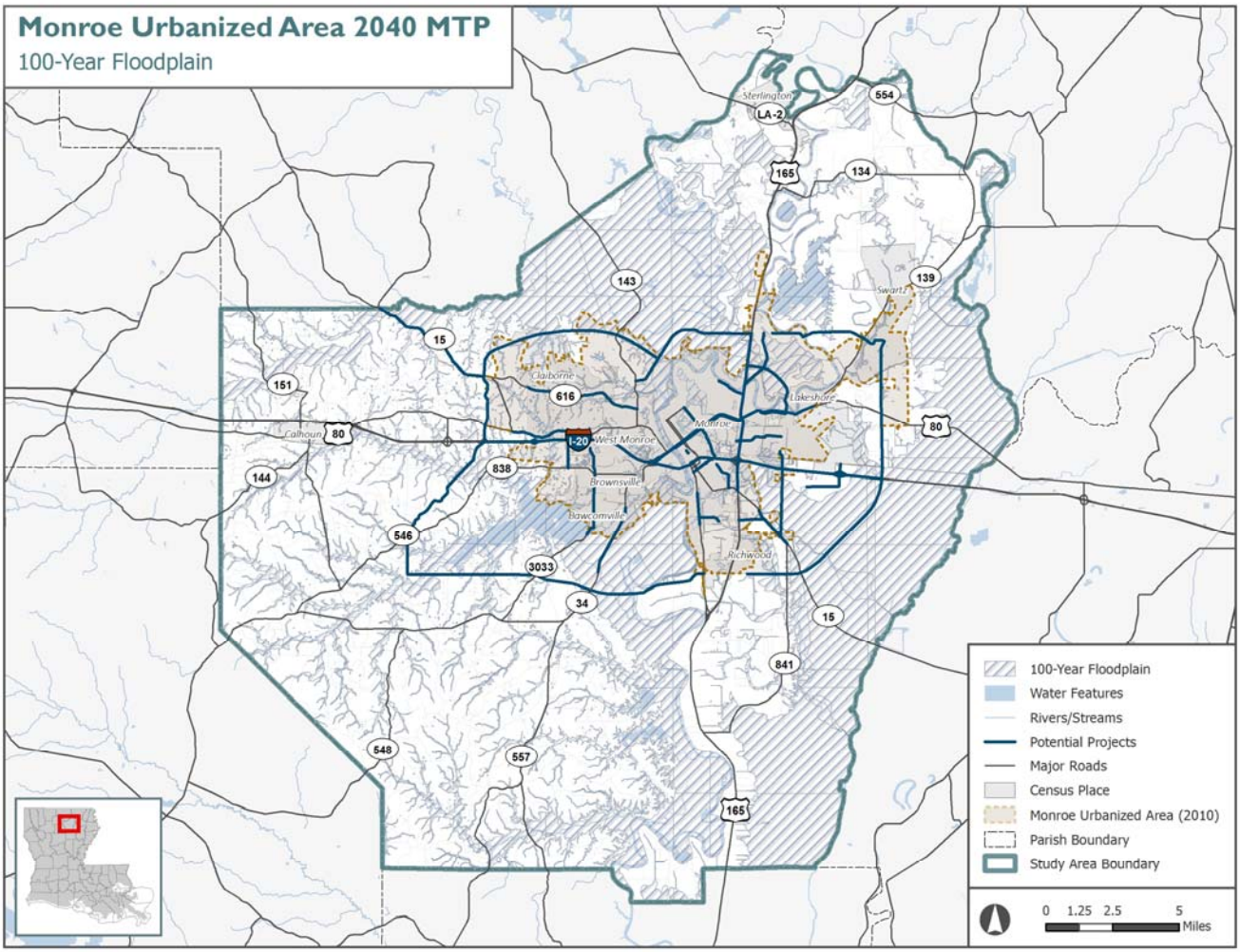


Figure 5-2: 100-Year Floodplain



In order to determine how projects identified in this plan might affect these resources, an FHWA-endorsed[1] GIS methodology originally developed by the Southeast Michigan Council of Governments[2] was employed. The analysis assembles projects into types, and then buffer zones are generated and mapped for each type of project. The six project types identified for this analysis include bridges, congestion capacity, congestion non-capacity, non-motorized, pavement, and rail projects. Table 5-1 presents the number of proposed projects for each type included in the systems-level analysis. Some projects, such as overlays, were excluded from this analysis; therefore the total number of projects explored in this section does not reflect the total number of projects in the 2040 MTP.

Table 5-1: Project Types Analyzed

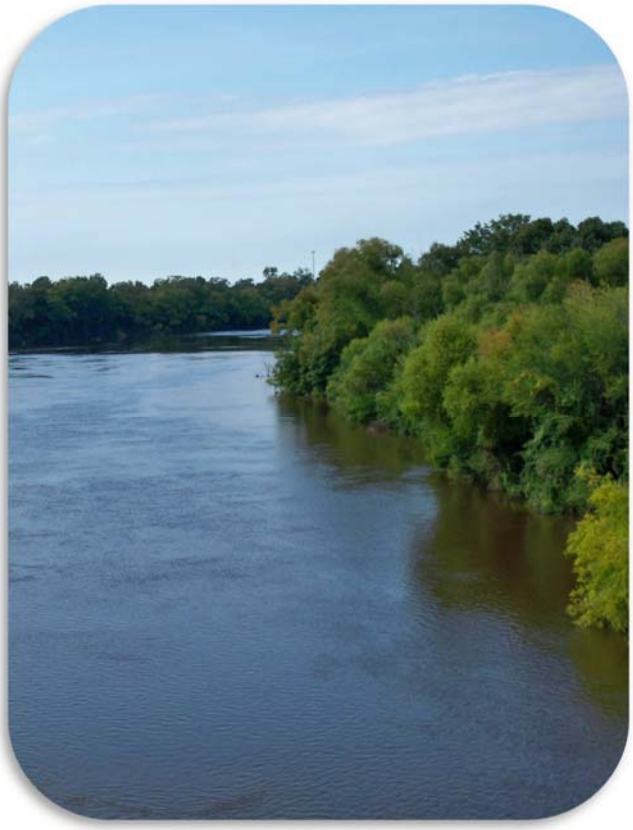
Project Type	Total Number Proposed Project Types Analyzed
Bridge	0
Congestion Capacity	32
Congestion Non-Capacity	14
Non-motorized	0
Pavement	1
Rail	1
Total	***48***

[1] http://environment.fhwa.dot.gov/integ/case_semcog.asp
[2] http://www.swmpc.org/downloads/enviro_transpo_guidance.pdf

Buffer sizes were determined based on the type of project and environmental resource being examined. Smaller "areas of influence" were computed for certain project types depending on the environmental resource. Some resources, such as recreation areas and historic sites, may only be impacted by projects in close physical proximity, while others (such as water resources) may still be impacted by a project some distance away. Table 5-2 summarizes the buffer sizes assigned to each project type according to the resource being examined.

Table 5-2: Project Buffer Sizes

Environmental Resource	Bridges	Congestion Capacity	Congestion Non-Capacity	Non-motorized	Pavement	Rail
Lakes and Streams	250 ft	0.25 mile	0.25 mile	250 ft	0.25 mile	0.25 mile
Wetlands	250 ft	0.25 mile	0.25 mile	250 ft	0.25 mile	0.25 mile
100-Year Flood Plain	250 ft	0.25 mile	0.25 mile	250 ft	0.25 mile	0.25 mile
Parks and Recreation Areas	250 ft	250 ft	250 ft	250 ft	250 ft	250 ft
Historic Sites	250 ft	250 ft	250 ft	250 ft	250 ft	250 ft



Once buffer sizes were determined, buffers and environmental resources were mapped to identify areas of overlap, as these are areas where an impact is possible. Figure 5-3 provides an example of the buffer analysis, showing proposed projects as well as areas of possible project impacts.

Table 5-3 quantifies the number of possible impacts to the inventoried environmental resources for each project type. The risk to wetlands and flood prone areas is the greatest with 45 and 47 projects, respectively, potentially impacting those resources. The list of proposed potential improvements presents few concerns regarding parks and recreation areas or historic resources with only four projects within close proximity of a wildlife management or refuge area and five potentially impacting a historic site or district. Table 5-4 lists the historic sites and districts that may be impacted by the proposed transportation improvements.

Figure 5-3: Example Buffer Analysis

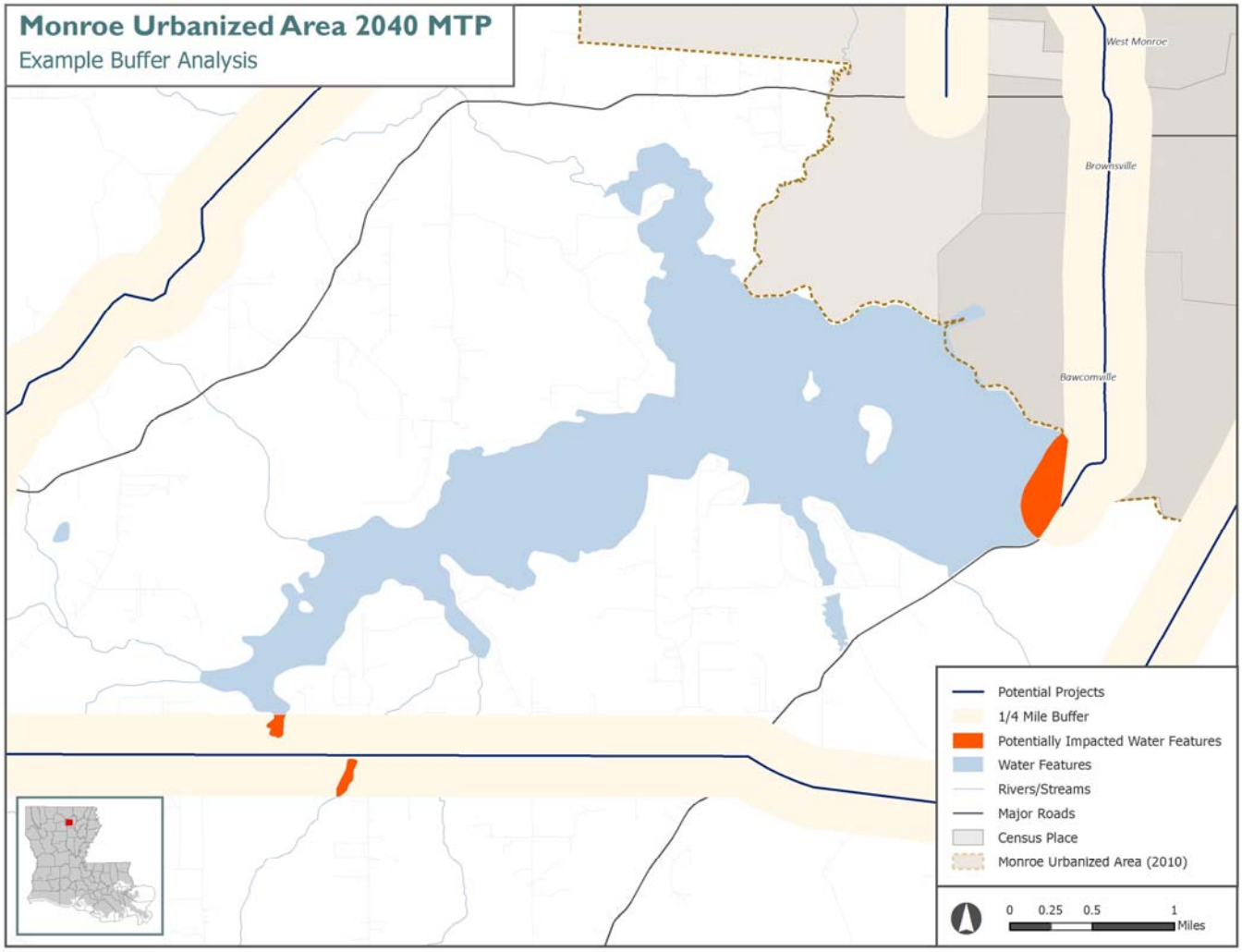


Table 5-3: Number of Possible Impacts to Inventoried Environmental Resources

Project Type	Water Resources	Wetlands	100-Year Flood Plain	Parks and Recreation Areas	Historic Sites
Bridges	n/a	n/a	n/a	n/a	n/a
Congestion Capacity	22	32	32	3	2
Congestion Non Capacity	8	12	13	1	2
Non-motorized	n/a	n/a	n/a	n/a	n/a
Pavement	1	0	1	0	0
Rail	0	1	1	0	1
Total	***31***	***45***	***47***	***4***	***5***

Table 5-4: Potentially Impacted Historic Resources

Roadway	Project	Resource
N 4th Street	Railroad Underpass	Downtown Monroe Historic District
US 80 (Louisville Ave)	Widening	Monroe Residential Historic District
I-20 East	Widening	Downtown Monroe Historic District
US 165-B (Jackson St)	Add Center Turn Lane	Robinson Business College
LA 34/US 80	ITS Improvements	Monroe Residential Historic District

The systems-level analysis of potential environmental impacts is intended to function as a resource for agencies and elected officials that will ultimately implement any of the potential projects. Detailed, project-level analysis is required in order to definitively identify adverse impacts from specific projects. The buffer analysis is a useful method for narrowing the focus of such studies, but it should be noted that proximity or overlap of a project buffer and environmental resource alone does not mean an impact is present (nor does the lack of an overlap indicate that an impact won't occur).

Potential Mitigation Activities

Federal regulations require the metropolitan planning process to include "a discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the plan." FHWA recommends an ordered approach to mitigation known as "sequencing" that involves understanding the affected environment and assessing transportation effects through project development. This ordered approach involves:

- 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; or
- Compensating for the impact by replacing or providing substitute resources or environments.

Recognizing that the type and the level of mitigation activities will vary depending on the scope of the project, OCOG proposes a toolbox of mitigation measures and general areas where these activities can be implemented. These measures, listed in Table 5-5, are intended to be regional in scope and may not necessarily address potential project-level impacts. As proposed projects progress through the project development process, mitigation should be an integral part of alternatives development and the analysis process from the start in order to maximize effectiveness.

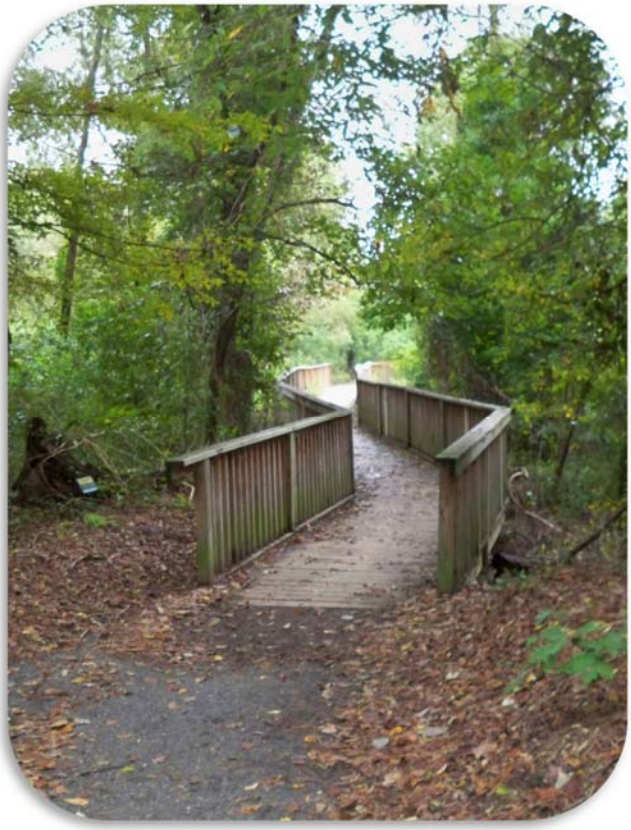


Table 5-5: Mitigation Measures Toolbox

Resource	Mitigation Measures

Wetlands or water resources	• Avoidance, minimization, compensation
	  o Preservation
	  o Creation
	  o Restoration
	  o In-lieu fees
	  o Riparian buffers
	• Design exceptions and variances
	• Environmental compliance monitoring

Forested and other natural areas	• Avoidance, minimization • Replacement property for open space easements to be of equal fair market value and of equivalent usefulness • Design exceptions and variances • Environmental compliance monitoring
Agricultural areas	• Avoidance, minimization • Design exceptions and variances • Environmental compliance monitoring
Endangered and threatened species	• Avoidance, minimization • Time-of-year restrictions • Construction sequencing • Design exceptions and variances • Species research • Species fact sheets • Memoranda of Agreements for species management • Environmental compliance monitoring
Ambient air quality	• Transportation control measures • Transportation emission reduction measures
Cultural resources	• Avoidance, minimization • Landscaping for historic properties • Preservation in place or excavation for archeological sites • Design exceptions and variances • Environmental compliance monitoring
Parks and recreation areas	• Avoidance, minimization, mitigation • Design exceptions and variances • Environmental compliance monitoring

Air Quality

Improving regional air quality and maintaining compliance with federal air quality standards is a fundamental consideration in the metropolitan transportation planning process. The construction of new transportation infrastructure increases the capacity for vehicles on regional roadways, which has the potential to increase traffic-related air pollutants in the Monroe Urbanized Area.

In 1963, in response to increasing air pollution, the U.S. Congress passed the original Clean Air Act which established a federal program for researching techniques to monitor and control air pollution. The Clean Air Act of 1970 increased federal enforcement authority and authorized the development of national ambient air quality standards to limit common and

widespread pollutants. These standards, known as the National Ambient Air Quality Standards (NAAQS), define the allowable concentration of pollution in the air for six "criteria" pollutants, including carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide.

The Clean Air Act identifies two types of national ambient air quality standards:

- Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly.
- Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The existing standards for each of the six "criteria" pollutants are listed in Table 5-6. The units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air (µg/m3). The existing standard for Ozone was established by a 2008 Final Rule. In November 2014, the EPA proposed to revise the primary and secondary standards to somewhere within the range of 0.065 and 0.070 ppm. After the proposed rule was published in December 2014, the EPA accepted written comments on the proposed rule until March 17, 2015. The EPA is scheduled to issue the Final Rule on this standard in November 2015.

Table 5-6: Existing Standards for Criteria Pollutants

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide[3]		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead[4]		Primary and Secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide		Primary[5]	1-hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb	Annual mean
Ozone[6]		Primary and Secondary[7]	8-hour	0.075 ppm	Annual fourth-highest maximum daily 8-hour concentration, averaged over 3 years
Particle Pollution[8]	$PM_{2.5}$	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
		Primary and Secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year, averaged over 3 years
Sulfur Dioxide		Primary[9]	1-hour	75 ppb	9th percentile of daily 1-hour maximum, averaged over 3 years
		Secondary[10]	3-hour	0.5 ppm	Not to be exceeded more than once per year

Regions are designated by the EPA as either in attainment or nonattainment for NAAQS. Attainment means the concentration of each pollutant does not exceed NAAQS. Non-attainment means the concentration of at least one pollutant exceeds the maximum defined threshold. If an area is designated

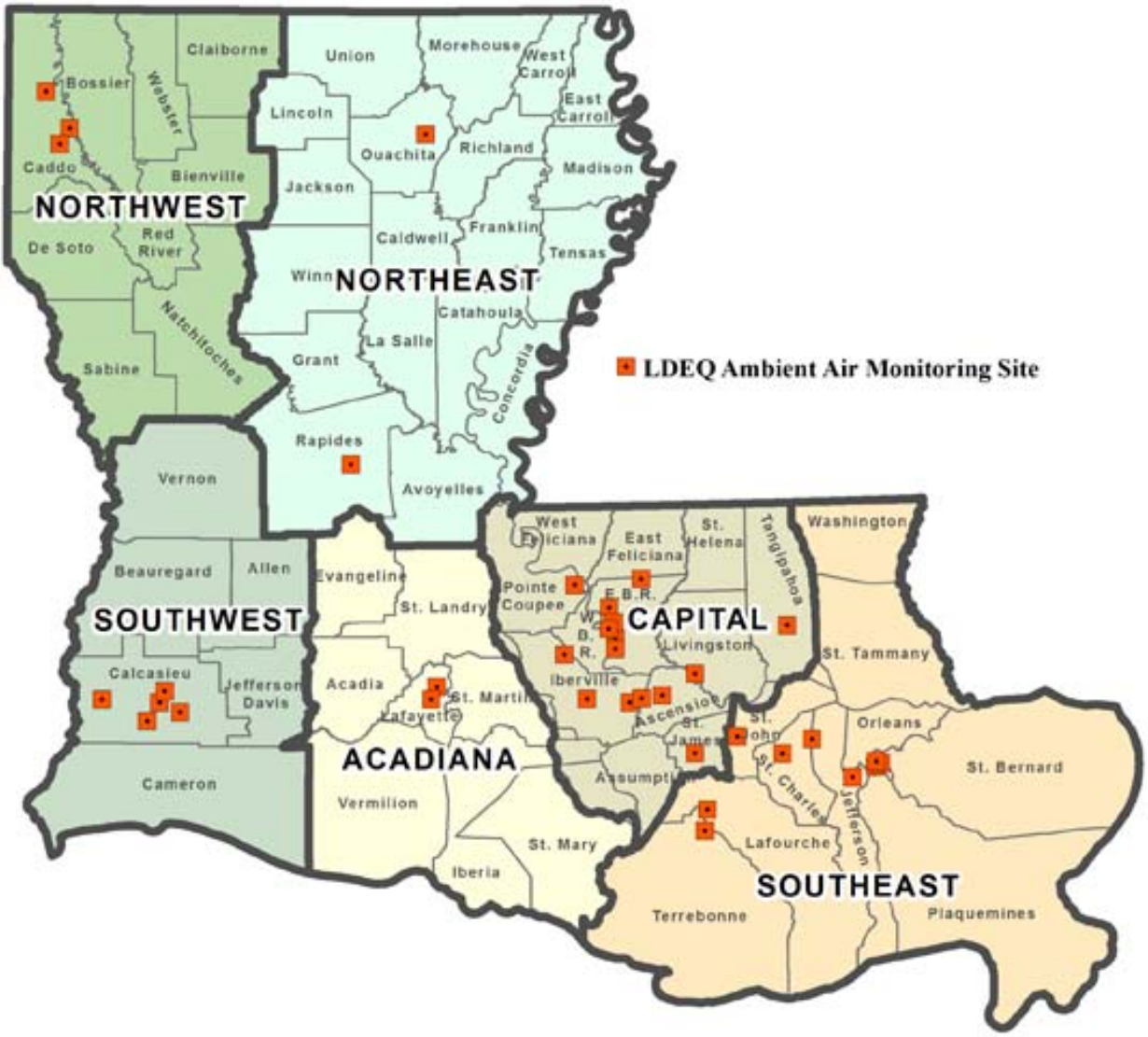
[3] 76 FR 54294, Aug 31, 2011
[4] 73 FR 66964, Nov 12, 2008
[5] 75 FR 6474, Feb 9, 2010
[6] 73 FR 16436, Mar 27, 2008
[7] 61 FR 52852, Oct 8, 1996
[8] Dec 14, 2012
[9] 75 FR 35520, Jun 22, 2010
[10] 38 FR 25678, Sept 14, 1973

as non-attainment, the State must develop and submit a State Implementation Plan (SIP). The SIP addresses each pollutant that exceeds NAAQS and establishes an overall regional plan to reduce air pollution emission levels, designed to return the area to, and maintain, attainment status. Once a nonattainment area meets the standards, EPA will designate the area to attainment as a "maintenance area." Maintenance areas are required to have a Maintenance Plan in place to ensure continued attainment of the respective air quality standard. The Clean Air Act defines specific timetables to attain air quality standards, and requires non-attainment areas to demonstrate reasonable progress in reducing air pollutants until the area achieves attainment.

Air Quality in the Monroe Urbanized Area

There is one air quality monitoring site in Ouachita Parish that forms part of Louisiana's monitoring network. This site monitors two air pollutants: Ozone, which it monitors continuously using a U.V. Absorption method, and fine particulate matter (PM 2.5), which it monitors for 24 hours every 3rd day using the sequential Federal Reference Method (FRM). Air monitoring for all sites, the locations of which are shown in Figure 5-4, is overseen by the Louisiana Department of Environmental Quality (LDEQ)'s Assessment Division.

Figure 5-4: Louisiana Air Monitoring Sites



Source: Louisiana Department of Environmental Quality (LDEQ)

Louisiana only has two areas designated as nonattainment: the five parishes of the Baton Rouge metropolitan area are nonattainment for ozone, while St. Bernard Parish is nonattainment for sulfur dioxide. Even though Ouachita Parish currently achieves attainment status, maintaining that status is a community priority that will rely on coordinated, proactive planning. Since transportation plays a prominent role in generating regional air pollution, this plan includes mobility-enhancing strategies that minimize negative impacts on air quality, such as reducing vehicle miles traveled, improving access to transit, and encouraging non-motorized modes of transportation. All of these issues were factored into the project selection process used to prioritize the final list of projects included in the 2040 MTP.

Environmental Justice

The term "environmental justice" first emerged into the discussion of metropolitan transportation planning in 1994 with the issuance of Executive Order 12898. Based upon Title VI of the Civil Rights Act, the executive order required that all federal actions comply with three primary principles:

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

Beginning with SAFETEA-LU and continued under MAP-21, transportation planning regulations have specifically codified the Environmental Justice (EJ) goal of including low-income and minority populations in the decision-making process. Using the guidance contained in these rules, the study team incorporated environmental justice considerations into the development of the 2040 MTP through the following steps:

1. The study team identified and mapped the locations of minority and low-income populations and performed a GIS-based analysis of the proximity of proposed transportation improvements to environmental justice communities;
2. Using the MPO's adopted public participation plan as a guide, the study team designed and implemented an early and meaningful public participation program that provided an opportunity for the public to be partners in the planning process;
3. In the development of the 2040 MTP, at least one public involvement meeting per round was held in an area defined by the 2010 census as being of low to moderate income or having a predominantly minority population;
4. The study team ensured that public transportation providers, upon which the environmental justice community is most dependent, were strong partners in the planning process;
5. Using socio-economic data layers from the US Census, transit system route layers from local transit providers, and geographic layers with the locations of major trip destinations, the study team performed a spatial analysis of the market coverage provided by the current transit system and identified potential gaps in service; and
6. The study team focused on developing a multimodal transportation system that served diverse travel markets and supported the trip purposes of various transportation consumers, including the identified environmental justice population.

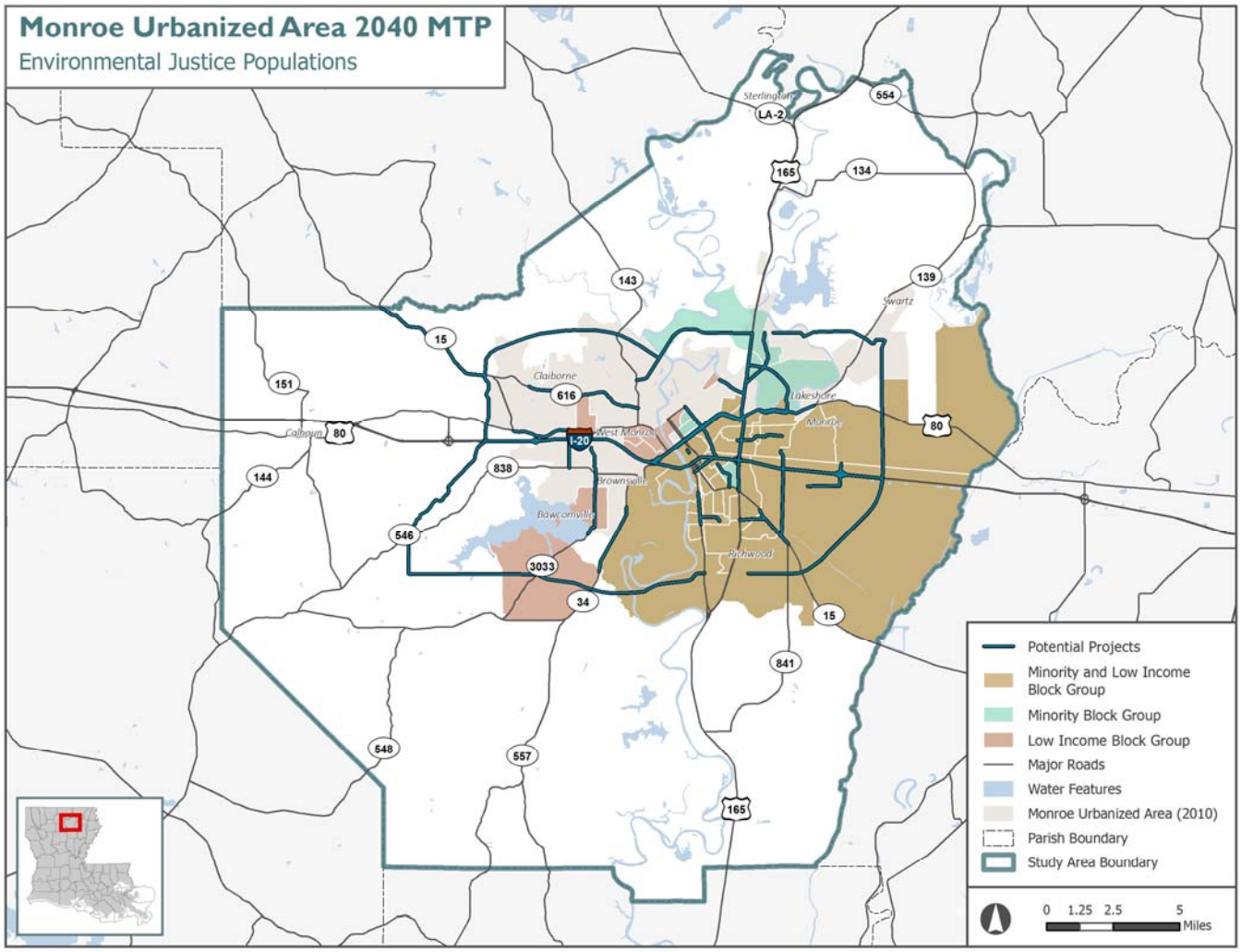
The process of identifying potential impacts on EJ communities mirrors the process used in the environmental mitigation analysis. The analysis is comprised of three steps: creating an inventory of minority and low-income populations; identifying and assessing potential impacts of proposed

transportation improvements on these communities; and, developing possible mitigation activities at a system-wide level.

OCOG identified the locations of minority and low-income environmental justice population concentrations using appropriate U.S. Census data. These populations were identified at the census block group level (based on 2009-2013 American Community Survey data). A block group is considered a minority census block group when the minority population of the block group is at least 50 percent of the total population. The concentrations of minority EJ populations are generally located in the central eastern portions of Ouachita Parish, particularly concentrated almost entirely east of the Ouachita River.

The Department of Housing and Urban Development defines low-income as "a family whose annual income does not exceed 80 percent of the median income for the area." Based on the 2009-2013 American Community Survey data, the median household income in Ouachita Parish is $38,955. Therefore, any census block group with a median household income equal to or less than $31,164 is considered to be a low-income, environmental justice population. Figure 5-5 shows the location of minority and low-income populations in the Monroe Urbanized Area in relation to the unconstrained program of potential projects.

Figure 5-5: Environmental Justice and Proposed Projects



Minority and low-income populations tend to inhabit the same areas in the Monroe Urbanized Area – generally in central and eastern potions of Ouachita Parish. At the system level, proposed projects appear to be fairly well distributed throughout the Urbanized Area, with roughly ¾ of the projects intersecting a minority or low-income Census block group. 71% of the proposed projects may impact a minority population, while 73% of the projects could impact a low-income population. Table 5-7 summarizes the results of the environmental justice analysis. A 250-foot buffer was used for all project types.

Table 5-7: Summary of EJ Analysis

Project Type	Minority	Percent Analyzed Projects	Low Income	Percent Analyzed Projects
Bridge	0	0%	0	0%
Congestion Capacity	20	63%	21	66%
Congestion Non-Capacity	12	86%	12	86%
Non Motorized	0	0%	0	0%
Pavement	1	100%	1	100%
Rail	1	100%	1	100%
TOTAL	***34***	***71%***	***35***	***73%***

Similar to the environmental mitigation analysis, a more detailed, project-specific analysis will need to be performed to better understand any potential impacts that could result from each transportation improvement on environmental justice populations. The proximity of projects to environmental justice populations may have both positive and negative impacts. For example, it is assumed that the mobility, access, and safety benefits of most projects accrue most strongly to those areas in close proximity to the project. Therefore, if the project objectives are consistent with the travel market needs of adjacent communities, the project is viewed as having a positive impact.

On the other hand, the physical impacts of project construction and footprint also have the greatest negative impacts on adjacent communities. Large infrastructure projects whose objectives are not consistent with community needs represent potential negative impacts. Examples include the construction of a new railway line that may create safety and noise pollution concerns, the construction of a new roadway that divides an existing community or creates barriers to other resources and/or activities, or improvements that may increase freight traffic or the movement of hazardous materials through minority or low-income areas.

The key consideration in determining unintended consequences or disparate impacts to environmental justice populations is how the project objectives match the community's transportation needs. OCOG is committed to working with project sponsors to mitigate negative impacts on environmental justice communities using measures such as impact avoidance or minimization and context-sensitive solutions (appropriate functional and/or aesthetic design features).

[This page intentionally left blank]