Environmental Planning and Pre-Environmental Screening 12

This chapter is divided into two main parts: Environmental Planning and Pre-Environmental Screening. The environmental planning section will deal with air quality planning as it relates to transportation planning and will have the following three emphasis areas:

- Air Quality Standards for Ozone
- Air Quality Standards for Fine Particulate Matter (PM 2.5)
- Global Warming/Greenhouse Gases

Specific pollutants and greenhouse gases (GHG) are related but discrete environmental issues. This chapter will deal with specific pollutants, and it will then examine GHG and global warming separately.

The Pre-Environmental Screening section will focus on applying pre-NEPA style environmental assessments to selected candidate projects from the financially constrained list of projects.

NEPA is the National Environmental Policy Act (NEPA) which is used by FHWA and the Federal Transit Administration to evaluate the environmental impacts associated with each individual transportation project. NEPA requires federal agencies to consider the environmental impacts of their proposed actions and reasonable alternatives to those actions.

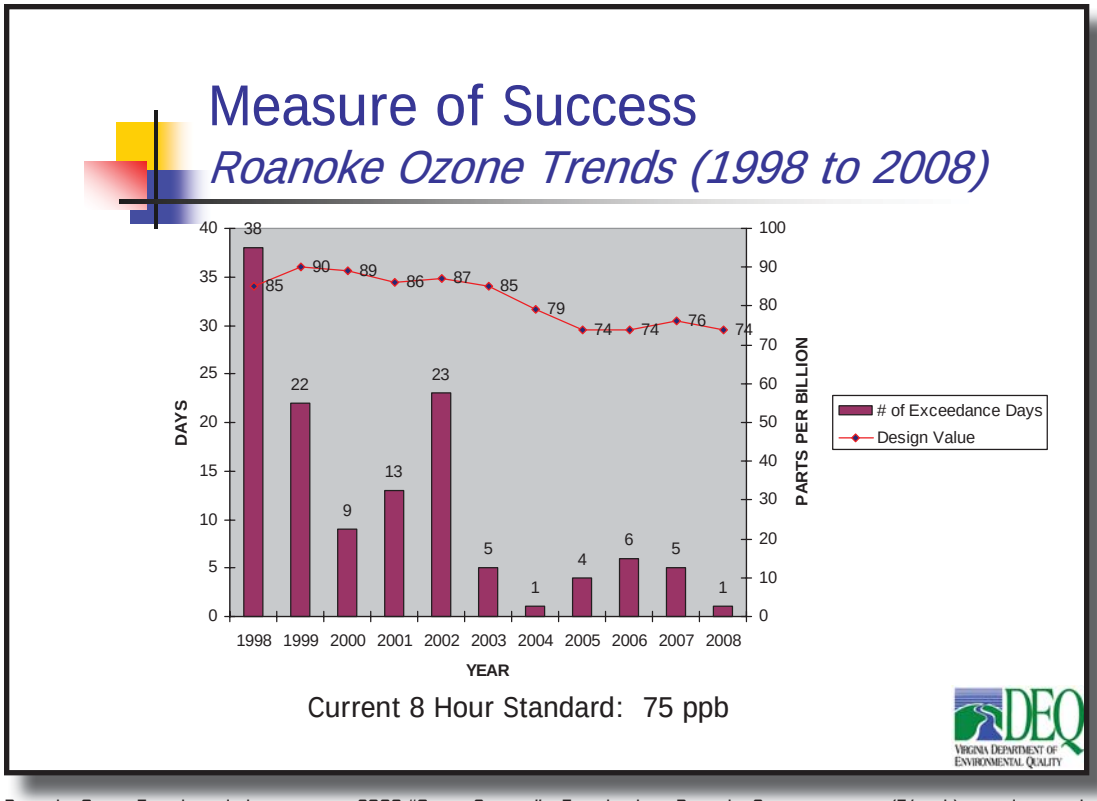
The purpose of pre-environmental screening in this plan is to help determine which projects advance to the programming stage by starting to catalogue available environmental data for those projects.

Environmental Planning

In describing environmental planning, it is useful to make a distinction between pollutants that affect air quality and the larger issue of global climate change. Pollutants such as ozone and fine particulate matter (PM 2.5) affect public health directly, especially in children and the elderly. The GHG that contribute to global warming do not achieve concentrations that affect public health and safety directly in the short run, but they have a host of long-term consequences.

Sometimes, pollutants and GHG come from the same source, and modifying or mitigating the source provides a double benefit. This is the case with energy conservation in regions where coal fired generators produce electricity. A reduction in the coal combustion reduces both GHG and pollutants.

Unfortunately, in other cases pollutant mitigation strategies do not reduce GHG emmissions. For example, when diesel engines are retrofit with equipment to reduce nitrous oxides (NOX), volatile organic compounds (VOC), or PM 2.5, the resultant reductions in pollutants do not mean less diesel is combusted or that fewer molecules of carbon dioxide are released. In fact, the retrofit engine may be slightly less efficient from a fuel combustion perspective. Likewise, the ozone reduction strategy of refueling in the morning or after 5:00 p.m. in summer months does not mean that less gasoline is eventually burned to produce carbon dioxide. This strategy is meant to postpone the release of the VOCs resulting from the pumping process so that they are not released in the heat of the day to react and form ozone.



Roanoke Ozone Trends including summer 2008 "Ozone Season" - Trends show Roanoke 3-year average (74 ppb) compliant with new federal 8 hour standard of 75 ppb.

Ozone Early Action Plan (EAP)

In 1997, the EPA acted to reduce ozone in the atmosphere by changing the national ozone standard from a 1-hour peak of 125 parts per billion (ppb) to an 8-hour average concentration of 80 ppb, with an effective "design value" of 85 ppb. The design value allows for the possibility of rounding errors in the data. The new 8-hour standard was in litigation for a number of years, but early in the new millennium the EPA implemented the new standard. In 1998, the Roanoke Region's ozone levels were above the allowable concentration. In 2002, RVAMPO learned through the Virginia Department of Environmental Quality (VDEQ) that Roanoke was eligibility to participate in the Ozone Early Action Compact/Early Action Plan (EAC/EAP) process, which was open to areas that were compliant with the older 1-hour peak standard but became non-compliant due to the lower 8-hour average standard. In exchange for a three-year deferral of an ozone "nonattainment" (not meeting) designation, regions participating in the EAC/EAP process agreed to immediately develop an air quality plan. At the end of the three year period, air quality data would be analyzed and a conformity determination made on the newer three year period. This allowed RVAMPO's CLRTP and TIP to proceed without having to perform the "air-quality conformity analysis" required of areas under the traditional nonattainment designation. However, a photo-chemical model analysis would be performed of the entire EAP to demonstrate its potential to bring the region into attainment for the new standard.

The EAC was signed at the end of 2002 and the EAP was developed by 2004. Most of the RVAMPO 2035 study area was covered under the regional EAP, which contained strategies ranging from transportation to lawn care equipment. A summary of the transportation related strategies follow:

- Reduce Locomotive Idling
- Limit Idling Times for School Buses
- Retrofit Roanoke County School Buses
- City of Roanoke - Purchase more efficient, Biodiesel compatible alternative fuel solid waste trucks
- City of Roanoke - Purchase/Use of ethanol compatible alternative fuel vehicles
- City of Roanoke – Purchase new cleaner fleet trucks that will operate using biodiesel as an alternative fuel to diesel
- City of Roanoke - Purchase/Use of hybrid vehicles
- Roanoke County - Purchase of more efficient, low-emission and alternative fuel vehicles
- Air Quality Action Days - Carpool Message and Refueling
- Workplace and Student Transit Pass Program
- Bicycle Infrastructure and Amenities
- New Bus Service between Roanoke, Salem, Blacksburg, and Christiansburg

The process succeeded. Based on 2005-2007 air quality data, the Roanoke Region was in compliance with the 85 ppb design value. In early March 2008, the EPA established a new nationwide 8-hour Ozone standard at 75 ppb with no design value. The Roanoke Region was reevaluated using 2006-2008 data and found to be in compliance with the new stricter. However, with a 3-year average of 74 ppb, the region is close to the upper limit. Although the CLRTP 2035 is not subject to an air quality conformity analysis, one goal of the plan is to help ensure that the region stays in compliance with the newest ozone standard.

Fine Particulate Matter - PM 2.5

Particulate matter pollution, or soot, is formed of very small particles from a variety of sources such as smoke from fires, dust kicked up from construction sites, vehicle emissions, and related sources. These particles do not always pose significant health risks, but in the case of very small particles of 2.5 microns or less, known as fine particulate matter or PM 2.5, the particles can become lodged in the lungs, contributing to or causing a variety of health problems. In the Roanoke Region, PM 2.5 is second only to ozone as our major air quality challenge.

In some cases, PM 2.5 sources overlap with GHG emissions and with those of ozone pollution. For example, vehicle emissions contain particles of soot, carbon dioxide (CO2), and volatile organic compounds, all of which are by-products of the internal combustion process and are components in PM 2.5, climate change, and ozone respectively. Reducing vehicle emissions – through the reduction in vehicle trips, moving to biodiesel and gas-electric hybrid vehicles, or increasing vehicle efficiency – can be an effective strategy for addressing each of these important issues.

However, even when one source affects multiple environmental and air quality challenges, care should be taken to address these sources individually as well as effectively. For example, strategies associated with ozone pollution, such as filling up your gas tank in the cool hours of the evening, are a function of heat being a necessary catalyst for the formation of ozone, and therefore would have no impact on climate change or PM 2.5. Another example would be the installation of scrubbing mechanisms on vehicle tailpipes, which would significantly reduce soot but would have zero impact on CO2.

As of February 2008, the primary local sources of PM 2.5 in the Roanoke area were wood stoves, fireplaces, unpaved roads (dust), construction (dust), and small boilers, in order of importance. Line haul and yard locomotives were also noted as significant sources, as was Roanoke Cement.

However, even high-producing local sources were relatively small in total pollutant output compared to sources outside the region. VDEQ analysis reveals that coal-burning power plants in far southwest Virginia, West Virginia, Tennessee and beyond constitute a major source of PM 2.5 pollution for the Roanoke region.

Emissions from mobile sources such as diesel trucks traveling the I-81, 220, and 460 corridors are also significant contributors as those emissions become trapped in the valley. Unfortunately, even though these out-of-region and mobile sources of pollution pose significant local air quality challenges, they are removed from the direct impact of local action. The dynamic of particulate matter pollution, therefore, can be described as "local source and small contributor" versus "outside source and large contributor."

Under current regulations, the Roanoke region is in compliance with EPA's annual standards of 15 micrograms of PM 2.5 per cubic meter (ug/m3), having exceeded this standard only in 2005 in both Roanoke and Salem. In 2006, the Salem monitor was discontinued due to interference from local construction and was moved to Round Hill Montessori School in Roanoke. Prior to 2006, both the Roanoke and Salem monitors showed a steady increase in PM 2.5 readings. While there was a drop in the 2006 Roanoke monitor readings, the overall trend for the last four years has been upward.

Indeed, VDEQ predicts a 10% increase in PM 2.5 levels by 2018, even as other air pollutants are expected to decrease from 20% to 40% from 2002 levels. With current PM 2.5 levels hovering just under the 15 ug/m3 standard, this projected increase would pull the region out of compliance. Furthermore, the current standards are under review by the EPA and may drop even lower.

In 2007-08, RVAMPO staff developed a voluntary plan to address PM 2.5 levels modeled on the Ozone EAP process. As of the writing of the CLRTP 2035 the EPA does not have an EAP framework for PM 2.5; therefore, the recently developed plan will remain voluntary and regionally driven.

The recommendations from the PM 2.5 plan were not limited to the transportation related recommendations as was done in the Ozone EAP. The recommendations are as follows:

- Broaden Air Quality Action Day e-mail list message to include PM 2.5
- Expand Air Quality Action Day e-mail list membership
- Compact Fluorescent Light Bulb (CFL) Giveaway and Education Program
- Voluntary Anti-idling Campaign
- Regional Education Campaign
- Training Opportunities for Local Business Leaders
- Implement Regional Ban on all Open Burning
- Implement Mandatory Wetting at Construction Sites
- Local/Regional Incentives or Mandates for Biodiesel

Global Climate Change and Greenhouse Gases

Air quality is defined by the level of various types of pollutants in our atmosphere which have a negative impact on human health and are primarily local in origin and impact. Ozone and PM 2.5 both fall into this category. Climate change is defined as instability in the global climate driven primarily by the build-up of carbon dioxide and other GHG in the atmosphere. The effects are long term and far-reaching, local in origin but global in impact. In other words, air quality is primarily a local challenge that can be addressed through local strategies, while climate change is a generalized challenge that requires global strategies (even if those strategies require cooperation and coordination at the local level).

There are three basic approaches to reducing GHG in the context of regional long-range transportation planning.

- Behavior change approaches
- Urban design and/or land-use approaches
- Carbon footprint oriented approaches

Behavior Change Approaches

Behavior change approaches use education, communication, and marketing to change behavior that will result in a reduction in GHG emissions. This approach is featured in the first goal listed in chapter 2, "Goal One: Improve transportation system performance, air quality and reduce growth in energy use related to transportation by reducing the growth rate of Vehicle Miles Traveled (VMT)." The challenge in behavior change marketing is to identify the target markets that will be most receptive to the message because of personal, ideological, or financial characteristics. Typical marketing strategies seek to market a financial transaction for a good or service. Behavior change approaches seek to market a beneficial behavior such as recycling, saying no to drugs, staying in school, or in our case reducing individual GHG emissions.

Urban Design And/Or Land Use Approaches

Urban design and land use approaches to global climate change usually focus on urban or rural activity centers in which development is compact and can be served by transit, walking, or biking in addition to passenger cars. The idea is both to reduce the distance traveled for some trips and to substitute alternative transportation modes for other trips. This can be accomplished by simultaneously encouraging greater development density with mixed residential, retail, and small commercial uses and by encouraging a "complete streets" concept that seeks to reorganize traditional rights-of-way to accommodate motorized vehicles, bicycles, and pedestrians.

Carbon Footprint Oriented Approaches

The National Environmental Policy Act of 1969 (NEPA) established a national environmental policy and provided a framework for environmental planning and decision-making by federal agencies. When federal agencies are planning, funding, or issuing permits for projects, NEPA directs them to conduct environmental reviews to consider the potential impacts on the human and natural environment by their proposed actions. The Council on Environmental Quality (CEQ) was created to oversee the administration of NEPA.

The NEPA process is now strongly embedded in the federal project development process and continues to have broad-based legislative support. Concerns about its effect on the timely completion of projects, however, led lawmakers to establish an emphasis on expedited transportation project delivery within the NEPA process. Executive Order 13274 in 2002 and language in the 2005 federal transportation legislation "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" (SAFETEA-LU) both addressed these concerns.

As a result, the FHWA has worked with states to implement an environmental streamlined process that uses inter-agency efforts to establish realistic time frames for the environmental review of transportation projects. FHWA has also encouraged transportation planning agencies (State DOT's, MPO's, and RPO's) to link planning and environmental review in order to streamline both processes. This section attempts to provide such a linkage by identifying human and natural resources that could be affected by future transportation projects along roadways in the Roanoke Metropolitan Service Area.

Linking Transportation Planning and NEPA

The Virginia Department of Transportation was awarded a grant from the FHWA to conduct a study to identify ways to support an efficient transition from long-range transportation planning to the NEPA process. The study, *Linking Transportation Planning and NEPA*, was published in March of 2006 and provided six high-priority recommendations for linking planning and NEPA:

1. Ensure that planning documents record purpose and need information at an appropriate and useful level of detail, both for planning level decisions and for future use in NEPA studies.
2. Ensure that planning documents include relevant reasonable alternatives at an appropriate and useful level of detail, both for planning level decisions and for future use in NEPA studies.
3. Ensure that planning documents include relevant environmental data (not just "window dressing") at an appropriate and useful level of detail for planning level decisions, recognizing that they likely will be updated and developed in greater detail for future NEPA studies.
4. Ensure that planning staff are invited to participate in NEPA studies at the earliest stages, and that environmental staff are invited to participate in planning studies.
5. Ensure that planning documents are available to NEPA practitioners, that NEPA practitioners are aware of the existence of such documents and that NEPA practitioners actually use the pertinent information from such documents.
6. For new-location projects in planning documents, give more careful consideration to the locations of conceptual alignments and how they are depicted on graphics or plan maps.

These recommendations are intended to provide a foundation for satisfying NEPA requirements during the planning process. The first three points in this list are discussed in greater detail below.

Purpose and Need

A project's purpose and need statement is used to frame the issue at hand so that project staff and stakeholders can effectively develop and evaluate alternatives. It should clearly demonstrate that a need exists and should explain how the proposed enhancements will correct the problem.

All transportation plans developed by VDOT and/or consultants must include a "Linking Planning and NEPA" Matrix to aid NEPA practitioners in the identification and documentation of purpose and needs.

A listing of the elements of this matrix and a completed sample are provided below:

Project Description

- **Route Number and/or Route Name**
- **Project Description:** Brief written statement that describes the recommended improvement, impacted local governments, additional project features, etc.
- **Termini:** Intersecting routes, boundaries, or land features that describe the limits of the proposed improvement
- **Proposed Typical Section:** Code that indicates whether the improvement is rural vs. urban, number of lanes and the median type (divided vs. undivided)
- **Length:** the length of the proposed improvement in miles
- **Cost**: The planning level cost estimate for the proposed improvement (Please indicate year of expenditure date of estimate). Planning level cost estimates should be shown as a range

Project Purpose

Briefly describe the key purpose of the proposed improvement that identifies the performance measures and/or goals to be achieved with the improvement

Needs

- **Existing Level of Service:** Existing peak hour level of service (Please indicate base year date)
- **Forecasted Level of Service:** Forecasted future peak hour level of service for both build and no build (indicate forecast year)
- **Current and Future AADT:** The current and forecasted average daily traffic volume in both directions
- **Existing Volume to Capacity Ratio:** Existing peak hour volume to capacity ratio
- **General Needs:** Capacity, Roadway, Safety, Route Continuity, Transportation Demand, or Modal Connectivity

Environmental Concerns

Document potential environmental concerns which may include wetlands, streams, agricultural/forest districts, cultural resources, conservation lands, Virginia Outdoor Foundation easements, and threatened & endangered species. Also, document any potential community impacts (environmental justice) using the Virginia Block Group Level Demographic Maps (maps located on VDOT's Civil Rights Division website) or similar map.

Alternatives Considered

Document reasonable alternatives (mode, scope, alignment) that were considered or eliminated during plan development and the reasons for elimination. Show planning level cost estimates for each alternative that was considered.

Project History

Briefly describe the origin of recommended improvement.

"Linking Planning and NEPA" Matrix Route I-95

Project Description	**Route**	I-95
	Project Description	Widen from 6 to 8 lanes from Route 3 to Route 17 in Spotsylvania and Stafford Counties. Reconstruct interchanges at x,y,z and bridge over Rappahannock River
	From	Route 3
	To	Route 17
	Proposed Typical Section	R10D
	Length (miles)	12.00
	Cost	200,000 (15)
Purpose	**Summary of Project Purpose**	Provide improved level of service C, facilitate movement of people and goods, and address high accident rates in corridor, existing LOS F and high V/C ratio. Project supports SHP Goal #1 and #3.
Needs	**Existing LOS / show base year**	F (05)
	Forecasted LOS -Build and No build / show years	C, F
	Existing year AADT	140000 (05)
	Future Year AADT	225000 (25)
	Existing Volume to Capacity Ratio	0.97 (05)
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, S
Environmental Issues	**Environmental Concerns**	Endangered Species, Cultural Resources, Wetlands
Alternatives	**Alternatives Considered**	Expansion of HOV lanes from Prince William County Line to Route 3, construction of CD lanes and slip ramps at major intersections.
History	**Project History**	Identified in I-95 Corridor Study

"Linking Planning and NEPA" Matrix Route I-581/ Valley View Blvd. Interchange

Project Description	**Route**	I-581/ Valley View Blvd. Interchange
	Project Description	Completion of interchange at Valley View Blvd. and associated improvements
	From	Hershberger Road Interchange
	To	10th Street Overpass
	Proposed Typical Section	Partial Diamond/Cloverleaf Intersection
	Length (miles)	2.30
	Cost	$69,165,000
Purpose	**Summary of Project Purpose**	Provide full movement access to both sides of I-581; extend Valley View Blvd. to the west as a local connector
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, TD
Environmental Issues	**Environmental Concerns**	Streams, Impaired Streams, Historic Resources, Greenway
Alternatives	**Alternatives Considered**	Single Point Urban Interchange, Diamond Interchange, Partial Interchange, several Partial Diamond/Cloverleaf designs
History	**Project History**	

"Linking Planning and NEPA" Matrix Route I-581/Elm Ave. interchange

Project Description	Route	I-581/ Elm Ave. interchange
	Project Description	Safety and operational improvements at Elm Ave interchange
	From	Elm Ave interchange area
	To	
	Proposed Typical Section	
	Length (miles)	
	Cost	$10,850,000
Purpose	Summary of Project Purpose	Improve LOS, reduce traffic backup on I-581
Needs	Existing LOS / show base year	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C, TD
Environmental Issues	Environmental Concerns	Historic Resources, Parks, Endangered Species
Alternatives	Alternatives Considered	Additional lanes on bridge and exit ramps, rerouting of NB ramp to 4th St., Single point urban intersection, SB exit flyover ramps
History	Project History	

"Linking Planning and NEPA" Matrix Route Elm Avenue

Project Description	**Route**	Elm Ave.
	Project Description	Widen Roadway
	From	Jefferson St
	To	6th St
	Proposed Typical Section	U6L
	Length (miles)	0.25
	Cost	$4,762,000
Purpose	**Summary of Project Purpose**	Increase roadway capacity, operational efficiency of I-581 interchange
Needs	**Existing LOS / show base year**	
	Forecasted LOS -Build and No build / show years	
	Existing year AADT	
	Future Year AADT	
	Existing Volume to Capacity Ratio	
	Capacity (C), Roadway (R) or Safety Deficiency (S), Route Continuity (RC), Transportation Demand (TD), Modal Connectivity (MC)	C
Environmental Issues	**Environmental Concerns**	Historic Resources, Parks, Greenway, Endangered Species
Alternatives	**Alternatives Considered**	
History	**Project History**	

Alternatives Analysis

It is important to document any alternatives considered formally or informally during the development of transportation plans and corridor studies. A preliminary alternatives analysis must be completed for major corridor studies (not including spot improvement projects or operational plans). During the creation of long range transportation plans, alternatives analysis must be completed for any projects whose facilities will be placed on currently undeveloped locations that have not been reviewed by previous project or corridor studies. Improvements to existing facilities are not required to include an alternatives analysis, but a list of the considered alternatives should be included in the planning matrix.

The alternatives analysis should include a full listing of the alternatives considered for the project, the types of professional and technical inputs that were used to analyze them, a listing of the judging criteria used during the selection process, and an explanation for why each alternative was not selected.

Appropriate Environmental Data in Plans and Studies

The amount and type of environmental data that needs to be reviewed in a transportation plan is dependent on the nature of the plan itself. Plans will fall in one of three categories:

Environmental Study Level 1: ***Constrained Long-Range Plans, VTrans***
These reviews provide a general overview of environmental issues facing the commonwealth and summarize the big picture/ policy level strategies that have been created to address them.

Environmental Study Level 2: ***Small Urban Area Transportation Studies, Regional Long-Range Plans, State Highway Plans***
These reviews contain a more comprehensive overview of the environmental resources that might be impacted by the planned transportation improvement projects. The Transportation Mobility Planning division will request that these reviews be made by their Environmental Division.

Environmental Study Level 3: ***Corridor Studies***
Similar to level two studies, a level three study is distinguished by the fact that an Environmental Staff member should be the chief member of the team conducting the environmental review.

Environmental Justice Screening 13

Environmental justice entered governmental parlance with the signing of Executive Order 12898 in 1994. Executive Order 12898 requires that federal agencies and other entities making use of federal funding avoid "disproportionately high and adverse" effects on minority and low-income populations and seek involvement of the public with a goal of ensuring environmental justice in governmental operations. The United States Environmental Protection Agency defines environmental justice as "…the fair treatment of all people, regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

Environmental justice does more than simply ban intentional discrimination. It requires that all organizations/agencies receiving federal funds evaluate the consequences of their activities for any disparate impacts upon special protected groups, which include racial minorities, Hispanics, low-income groups, those with Limited English Proficiency (LEP), the elderly, and the disabled.

The role of environmental justice in the CLRTP 2035 planning process revolves primarily around creating demographic profiles for the study area and overlaying potential "Financially Constrained List" projects to see which projects have the potential to negatively impact protected areas or groups. Projects with a potential impact will be further evaluated to list potential benefits or burdens to the community involved should the project proceed to engineering or construction.

Demographic Profiles

After an extensive review of existing evaluation methods for environmental justice in regional transportation programs, staff identified the Delaware Valley Regional Planning Commission's (DVRPC) as a national best practice. DVRPC serves the greater Philadelphia area including parts of Pennsylvania and New Jersey and is one of the few regional planning bodies that attempts to evaluate environmental justice using a quantitative method based on regional demographic information.[18]

DVRPC's quantitative evaluation method is based on US Census Bureau data at the tract level. Census data for racial minorities, Hispanics, Limited English Proficiency, disabled populations, elderly populations, and populations without access to vehicles is collected and a regional average for each of these variables is computed. Each tract is then given a score based on whether or not it exceeds this regional average or threshold. For each instance in which a tract exceeds the regional average, the tract is given one point or degree of disadvantage (DOD). The DODs are then totaled for each tract for its total DOD score, which can be made into a single layer for an environmental justice evaluation map base.

However, when DVRPC's DOD method was first attempted with local data, numerous issues were identified. Most importantly, since Roanoke is a much smaller urban area than the Greater Philadelphia Area, low regional averages of both Hispanic and Limited English Proficiency populations skewed the results and lessened the disparity in index scores between affluent areas and many low-income, minority areas.

At first, it was suggested that a system of weights or priorities might be utilized to place more emphasis on certain variables such as race and poverty to avoid this issue. It was understood, of course, that an arbitrary assignment of weights would be dangerous; therefore, the idea was abandoned. Instead, staff adopted the approach of measuring not only whether a block group exceeded the regional average, but also by how much a block group exceeded a regional average. All variables are given the same weight in this approach, but areas that are characterized overwhelmingly (i.e. two or three times the regional average) by low-income and minority residents are given a much higher score by virtue of their high concentrations, thereby solving the original problem. Overwhelming concentrations of any other variable would also function in this manner. However, it was observed that in Census 2000 data, individual sub-regions were more likely to have high concentrations of low-income populations or minority populations than they were to have high concentrations of any other environmental justice variable.

Indeed, many modifications were made to the DVRPC method before application to the RVAMPO region. When measuring elderly populations, for instance, RVAMPO staff measured concentrations of those who were 65 and over in 2000, as opposed to measuring those who were 85 or over (as did DVRPC). Also, more categories of the disabled population were considered in the RVAMPO analysis than in DVRPC's.

8. The DVRPC first applied this methodology in the 2001 document entitled "…and Justice for All" and has modified its approach on an annual basis as new issues arise and as new data becomes available.

The scoring structure was also changed. In the RVAMPO analysis, a block group received a zero only if it is below the regional average of all variables. However, if the block group exceeds the regional average of any given variable the score was based upon the percentage by which it exceeds the average (Index score = Percent Above Regional Average / 100). For example, a block group that has a disabled population 500% above the regional average received a score of 5.0 for the disabled component of the index score. Each component or score for each variable was then totaled into a composite index. This change was implemented after comment from stakeholders indicated that a more sensitive sliding scale was in order. Because of the aforementioned changes, RVAMPO staff labeled its quantitative measure of environmental justice sensitive areas as the environmental justice index or EJ index as opposed to DVRPC's degrees of disadvantage.

Data on racial minorities was originally derived from the census data at the block group level. Minority, as defined in this report, includes all racial categories other than 'White.' The regional average of racial minorities was computed at 16.6%. All block groups with higher minority concentrations were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average. Please note that the racial minority variable does not contain data on Hispanics, as Hispanics do not represent a racial group. Hispanics represent a cultural group, whose members may belong to numerous races. Hispanic ethnicity is the second variable included in this methodology. The regional average of Hispanics was computed at 1.13%. Block groups found to have higher concentrations of Hispanic populations were assigned points in the EJ index according to the percent by which they exceeded the MPO study area average.

Limited English Proficiency populations were considered next in the methodology. Federal guidance on the subject of Limited English Proficiency states that an LEP individual is someone who has a primary language other than English and must communicate in this language due to a limited proficiency in English. When completing the census survey form question on English proficiency, the respondent is asked whether he/she speaks English 'Very Well', 'Well', 'Not Well', or 'Not at All'. An LEP individual is defined here (for statistical purposes) as someone who stated that he or she speaks English 'Not Well' or 'Not at All'. The regional average of LEP individuals was found to be 0.71%. All block groups with higher LEP concentrations were assigned points in the EJ index according to the percent by which the block group average exceeded the MPO study area average.

Poverty is the fourth variable considered in this methodology. Census poverty data is based on whether an individual's household income is at or below the Department of Health and Human Services (HHS) federal poverty guidelines. Census 2000 poverty data was based on the 1999 poverty guidelines, which are listed in the table below for reference.

Size of Family Unit	1999 Household Income
1	$8,240
2	$11,060
3	$13,880
4	$16,700
5	$19,520
6	$22,340
7	$25,160
8	$27,980
Each Additional Person	Add $2,820

Source: Department of Health and Human Services, 1999.

The regional average of individuals with poverty status was found to be 9.7%. All block groups with higher concentrations of individuals in poverty were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average.

An additional variable considered in this methodology was that of the household without access to a motor vehicle. Given the nature of the CLRTP 2035 planning process, this variable is a good environmental justice indicator for transportation plans. The regional average of carless households was found to be 8.11%. Each block group with a higher concentration of households without motor vehicle availability was assigned points in the EJ index according to the percent by which the block group exceeded the MPO study area average.

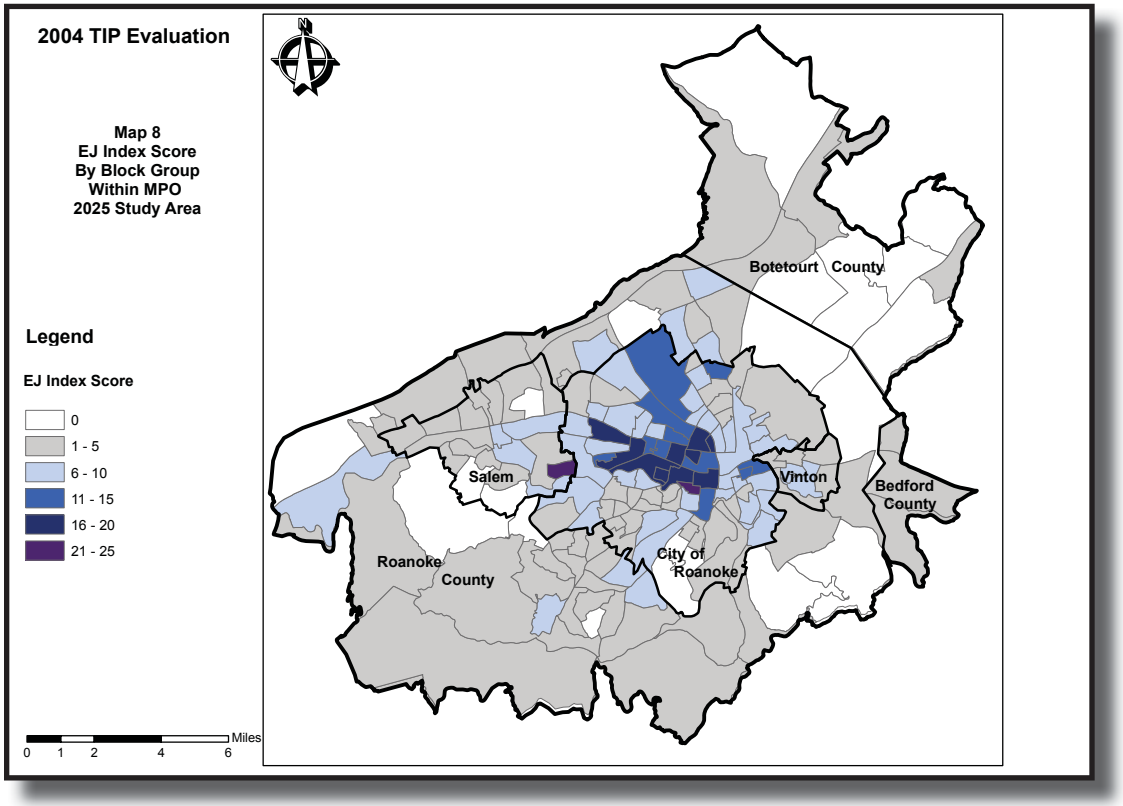
Next staff considered disability in constructing this methodology.[91] The regional average of the disabled is 20.8%. All block groups with higher disabled concentrations were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average.

The final variable considered in this methodology is that of the region's elderly. The regional average of those over 65 was found to be 15.9%. All block groups with higher concentrations of the elderly were assigned points in the EJ index according to the percent by which the block group averages exceeded the MPO study area average.

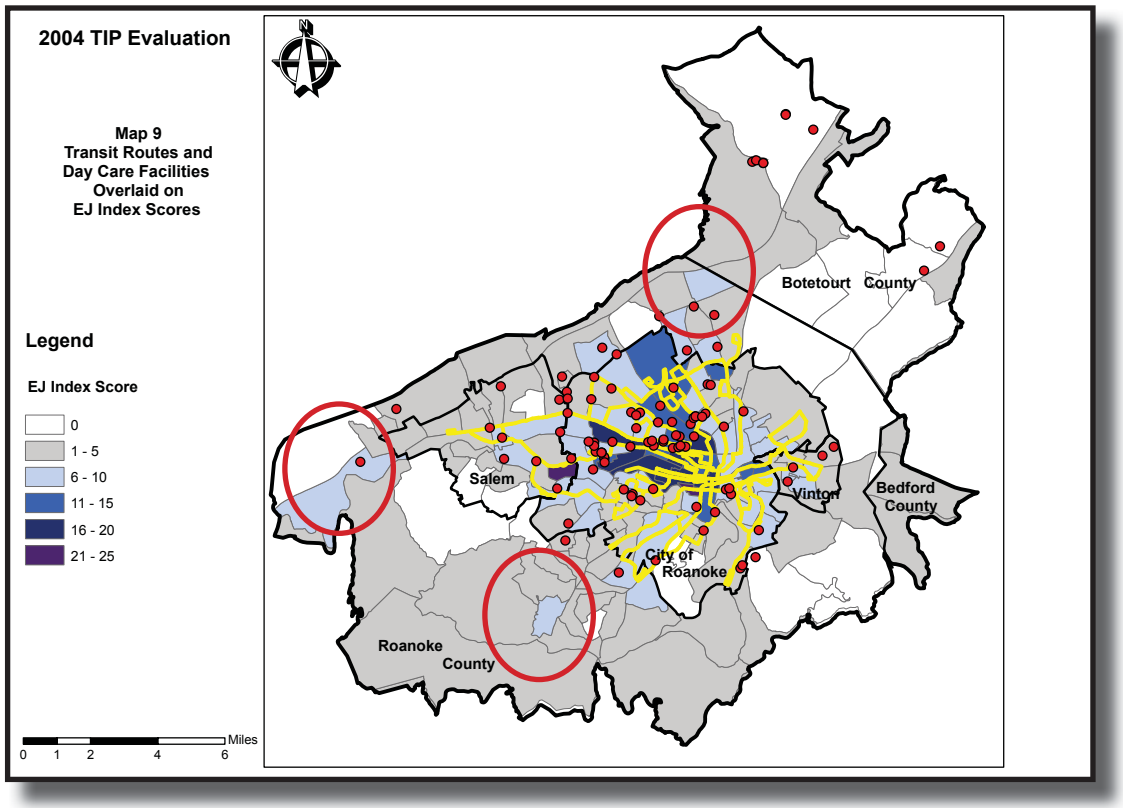
The following census block group level map of RVAMPO EJ index scores is from a 2004 evaluation of RVAMPO Transportation Improvement Program (TIP) projects. The map uses the then current 2025 study area boundary. Components of the EJ index score methodology will be shown on subsequent pages with maps updated to the 2035 study area boundary used in this plan.

9. Previous public involvement demographic analyses of the region have noted an unusually high percentage of disabled individuals. No explanation exists for this phenomenon presently, but it should be noted nonetheless. Please also note that disability defined here includes physical, mental, go-outside-home disability, self-care disability, sensory disability, and employment disability.

RVAMPO EJ index Scores

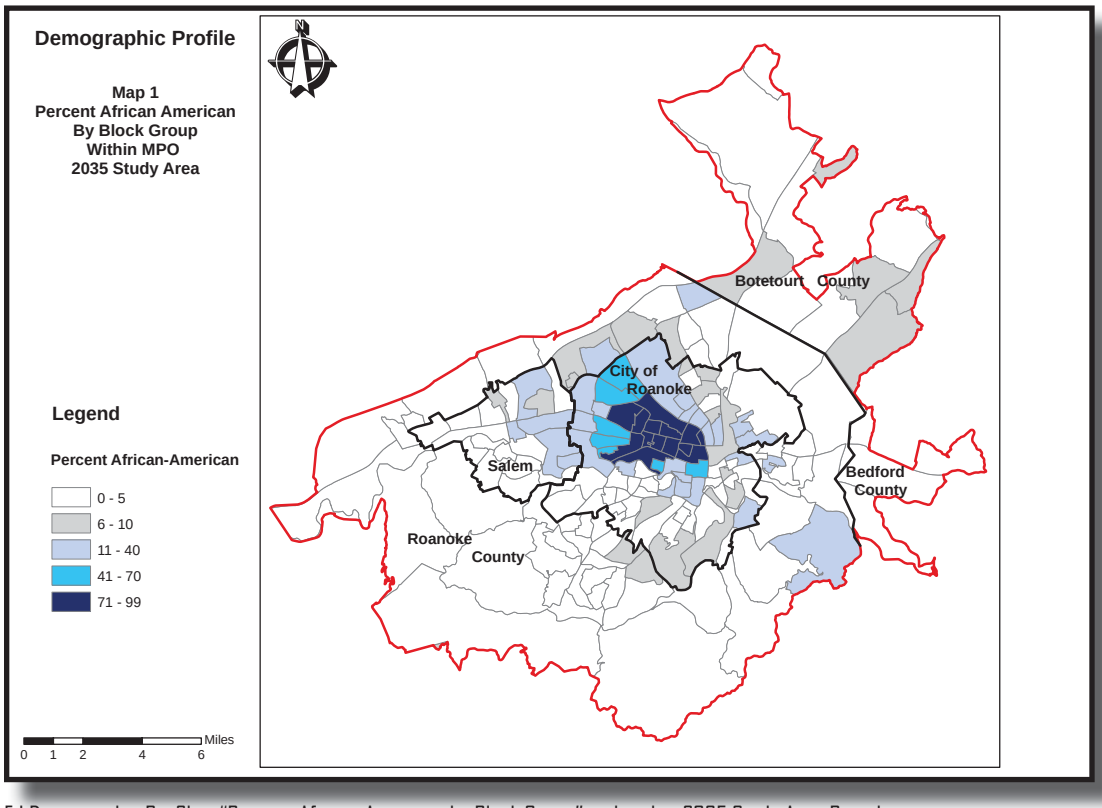


Environmental Justice Index Scores from 2004 evaluation using then current 2025 RVAMPO Study Area Boundary

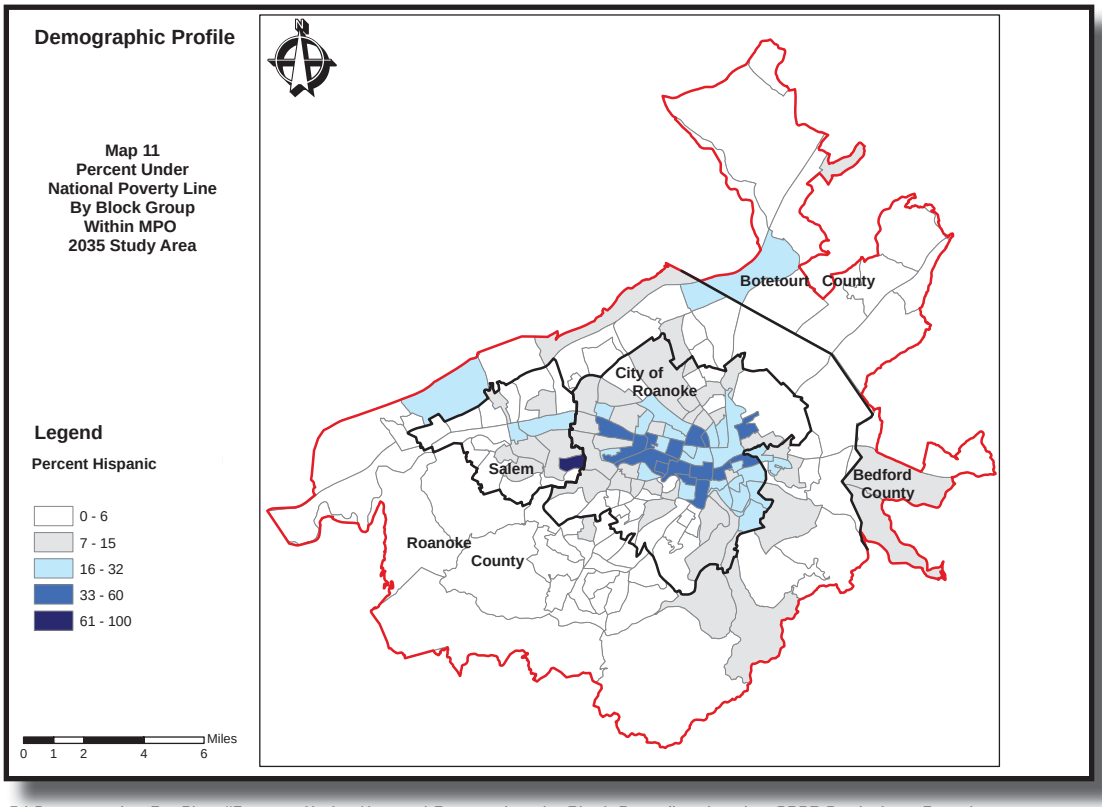


Fixed Route Transit System (yellow lines) and Day Care facilities (as of 2004) compared with EJ Index Scores. Most areas with high EJ index Scores are served by both fixed route transit and day care facilities. However, the areas that are not served (red circle) are similar to the areas cited in chapter 3, "Scenario Planning," under the Baby Boom Retirement scenario, indicating both current and future need for possible transit expansion or other transportation services.

2035 Boundary Profiles

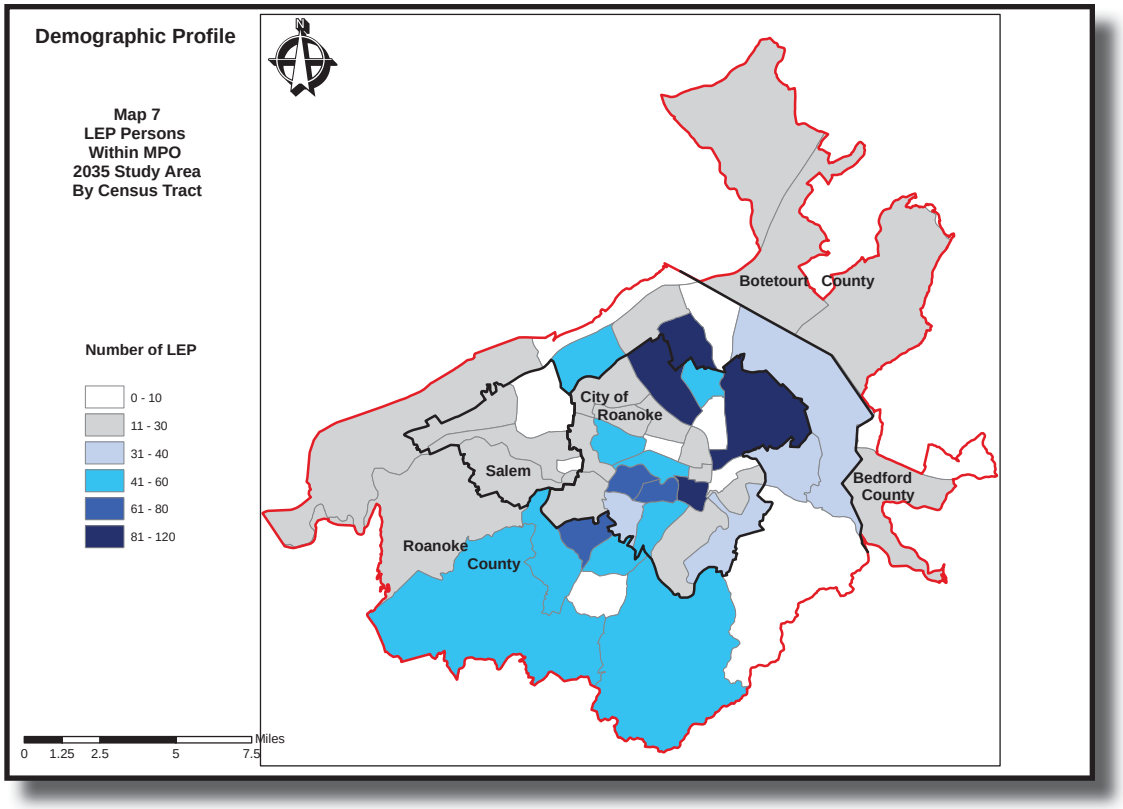


EJ Demographic Profile - "Percent African American by Block Group" updated to 2035 Study Area Boundary

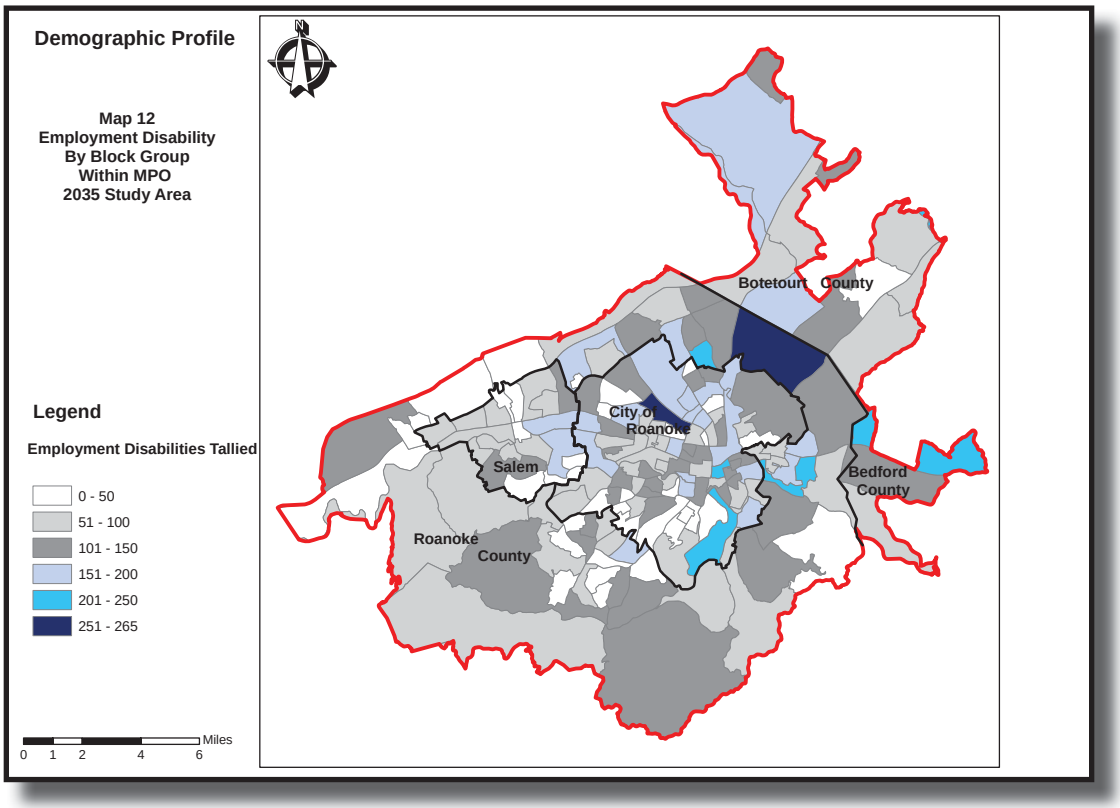


EJ Demographic Profile - "Percent Under National Poverty Line by Block Group" updated to 2035 Study Area Boundary

2035 Boundary Profiles



EJ Demographic Profile - "Limited English Proficiency (LEP)" updated to 2035 Study Area Boundary



EJ Demographic Profile - "Employment Disability" updated to 2035 Study Area Boundary