



PART FOUR - ENVIRONMENTAL ANALYSIS

The transportation system provides tremendous benefits to the economy and to the quality of life enjoyed by Rhode Islanders. Unfortunately, past highway construction practices and the sheer volume of vehicles using the state's roadways also has various adverse impacts. This section begins with a discussion of the state's natural resources and broaches the concept of activities that can begin to mitigate any adverse impacts on a system-wide basis. This is followed by an analysis that looks at three scenarios of growth with respect to Rhode Island's recently adopted Land Use Plan and delineated urban services boundary and how that affects the transportation network. There is also an Environmental Justice section that examines the distribution of benefits and burdens of the transportation system on target populations (low-income and minority). The Air Quality Analysis section documents that the projects recommended by this Plan are consistent with the State Implementation Plan for Air Quality.

NATURAL RESOURCES AND ENVIRONMENTAL MITIGATION

The State of Rhode Island is endowed with a wealth of natural and historic resources. Several State Guide Elements, including Land Use 2025, exist to protect these resources. The State is also fortunate to have vast GIS data layers that policy makers can use to look at the environment on a system level. The National Environmental Policy Act (NEPA) has mandated analysis of environmental impacts on a project level, but SAFETEA-LU requires that this be studied on a system level as well.

Rhode Island Statewide Planning held an Environmental Mitigation Consultation in April of 2007 to gather interested parties and agencies to generate ideas for mitigation strategies. The agencies listed at the left participated in this session. Research on activities undertaken by other MPO's was presented as a platform from which to begin. *Transportation 2025*, Rhode Island's plan at the time, already contained many strategies and policies related to environmental stewardship. The chart below summarizes the discussion that was held during the Environmental Mitigation Consultation. Following the chart is a more detailed discussion of each topic area.

*Environmental Mitigation
Consultation*
Federal Highway Administration
Environmental Protection Agency
RI Department of Transportation
RI Public Transit Authority
*RI Department of Environmental
Management*
*RI Coastal Resources
Management Council*
*RI Historic Preservation and
Heritage Commission*
RI Statewide Planning Program
Narragansett Indian Tribe
Grow Smart RI
Sierra Club
Save the Bay

Environmental Mitigation Consultation					
Resource	Impaired by	Impact	Existing Recommendations & Programs	New Mitigation Strategy	Receiving Areas
Air	VMT increase Vehicle emissions / idling / congestion Construction dust/ off-road diesel activity Particulate matter from tires, brake pads, tailpipes Heat island effect	Public health (respiratory illness, including asthma) Vegetation Wildlife Climate change	En.2.a, En.3.c/g, D.3.b TIP Bicycle Pedestrian, CMAQ, and Transit Programs Open Space Acquisition	Open Space Acquisition (Plan) Diesel retrofits – State vehicles, rail, ferry, etc. Alternative modes Setbacks from state roads with vegetated buffer	Residences within 250' feet of state roads
Water / Wetlands	Sediment Storm runoff Particulate matter from tires, brake pads Leaking fuels, fluids, lubricants Snow removal (salt/sand) Erosion Wetland filling Impervious surface	Groundwater recharge Drinking water supplies Public health Marine and terrestrial wildlife Marine and terrestrial vegetation Flood storage Thermal impact on coldwater habitats	En.2.b, En.3.c/d, D.3.b TIP Open Space Acquisition Highway/Enhancement Programs: Stormdrain retrofit, landscaping	Pre-treat stormwater/infiltration Use of porous pavements/recharge Test stormwater for effectiveness of new technologies 2:1 wetland replacement (prefer on-site)	Drinking water supplies Vernal pools SCORP wetland priorities Commuter lots
Wildlife	Highways Traffic Invasive species	Coldwater fisheries (thermal impacts of highway runoff) Fragmentation of habitat Roadkills	D.2.d	Critter crossings Culvert design Deer reflectors Removal of non-native species Reduced mowing	Stream crossings (such as Rt. 4/Hunt River Crossing) that lack terrestrial crossings Vernal pools and surrounding lands – mapping underway – Statewide habitat restoration plan

Resource	Impaired by	Impact	Existing Recommendations & Programs	New Mitigation Strategy	Receiving Areas
Energy	Fuel consumption Electricity for transit/ highway operations	Climate change Economic Political stability Fiscal	En.3.j, En.2.a, En.3.e/f, D.2.f CMAQ	Incentives for efficient vehicles Encourage solar energy Encourage green design and construction practices Measure GHG emissions at project level	
Community	Noise Speed Traffic congestion Highways Solid waste (junk cars, tires, litter) Light pollution Snow removal, including sidewalks (salt/sand)	Economy Quality of life Fragmented open space and neighborhoods Landfill space	En.3.c, D.2.a/c/d/f, D.3.b Enhancement Program Transportation Community System Preservation Program (discretionary))	Use recycled materials as much as practicable ACI litter patrol crews Explore use of porous / quiet pavements Enforce sidewalk snow removal Use of "grassy strips" for snow storage/buffer	
Scenic and Historic Resources	Ceremonial stone landscapes Power lines Infrastructure Billboards Litter	Tribal resources / cultural / subsurface Visual quality Quality of life Fragmented forests/ open spaces	D.2.e, D.3.f, Lu.2.b Enhancement Program* Transportation Community System Preservation Program (discretionary)	Recognize stone landscapes in EIS/EA Support reduction in the number and billboards and other outdoor advertising	Graffiti removal

*Not an appropriate source for burial of overhead power lines.

AIR QUALITY

A well-known system wide impact of the transportation system is degraded air quality. Exhaust from cars and trucks contribute pollutants that are regulated by the Clean Air Act (most notable, volatile organic compounds, oxides of nitrogen, carbon monoxide and particulate matter). Through the air quality conformity process these emissions are well documented and modeled. Rules require that transportation plans and projects do not result in further degradation of air quality. The good news is that the vehicle fleet is becoming cleaner and air quality is expected to show marked improvements in the coming decades, despite increases in vehicles mile traveled (VMT). An executive summary of the air quality conformity demonstration for this plan appears later in this chapter. The Congestion Mitigation Air Quality Program (CMAQ) exists to improve air quality. Rhode Island will fund over \$10 per year in CMAQ projects that include bike/pedestrian projects, South County Commuter Rail service, transit service, commuter resources, and many others. In addition, the issue of residential proximity to highways was raised by this group. This has been further explored in the Environmental Justice section, but this should be considered a target area for mitigation measures, and a criteria under which additional points can be awarded in future CMAQ project solicitations.

WATER QUALITY AND WETLANDS

Water quality is a serious issue, although not as rigorously regulated by transportation planning regulations. Water quality suffers due to stormwater runoff from highways (as well as privately owned parking lots) that contains fuels, oils, lubricants, salt, sand, and particles from brake and tire wear. Sand, salt and soil erosion can also contribute large amounts of sediment and silt to runoff waters. Some of this runoff is filtered by natural means or treated in a wastewater facility, but some of it is collected in storm drains and runs untreated directly into water bodies. At a certain level this results in drinking water, public health, and ecological impacts. Design and construction of new projects do a much better job in treating and filtering stormwater. Rhode Island also has a program of retrofitting storm drains to reduce the pollutant load of water that is discharged. Mitigation sites should be considered around drinking water reservoirs and wellhead recharge areas. Porous pavements, although they can be maintenance issues during the winter, should be considered for certain overflow parking areas and in other low use situations by the state and municipalities.

*See Map # 4-1
Water Supply and
Wellhead
Protection Areas
and Map # 4-2
Wetlands*

Wetlands are now recognized for the many purposes they serve, including provision of habitat, flood storage, groundwater recharge, etc. There are few highway construction projects undertaken now that will have severe wetland impacts. However, when there are impacts, 2:1 wetland replacement should be the goal, preferably on-site. If that is not possible, off-site receiving areas should be considered. The State Comprehensive Outdoor Recreation Plan (SCORP) identifies wetland priorities. Additionally, RIDEM is undertaking an effort to map vernal pools in the state which could also be targeted for off-site mitigation. Vernal pools are seasonal bodies of standing water that typically form in the spring from melting snow and other runoff and dry out in the summer, providing habitat for semi-aquatic species.

Preventing runoff pollution from road, highway, and bridge construction and operation requires planning, education, inspection, and maintenance. Drainage designs that reduce overall runoff by maximizing infiltration should be encouraged. Erosion, sediment, and runoff control plans that incorporate the most appropriate and cost-effective “best management practices” are essential to effective pollution control. Highway personnel must be educated about the requirements of the erosion/sediment/runoff control plan. Inspection and enforcement authority are necessary to ensure awareness of and compliance with the adopted practices. Finally, best management practices require regular maintenance to ensure that they perform optimally. Once a system has been constructed or improved, responsibility for maintenance should be assumed by the state or the locality. The FY 2013-2016 TIP includes a combined total of \$4 million for drainage improvements statewide under the stormwater retrofit item in the Traffic Safety Program. It’s important to note that RIDOT has requested an additional \$2 million annually (not included in the FY 2013 – 2016 TIP) through the Capital Budget process to address highway drainage issues and is an important component of the overall RIDOT program.

WILDLIFE

Wildlife considerations are a new topic in Rhode Island’s long range transportation plan. The construction of the transportation system has fragmented forest habitat and provides few crossing areas for animals. Potential solutions include “critter crossings” that allow animals to safely go over or under a highway. One particular area that was noted for lack of terrestrial crossing is Route 4 where it crosses the Hunt River. Reduced mowing along roadsides (consistent with safety practices) can provide better cover for small animals. Habitat can also be degraded by introduction of invasive species. It has been noted that there is a possibility of thermal impacts to coldwater fisheries from highway runoff, but no locations were specifically noted.

*See Map # 4-3
Rare Species
Habitats and Map
4-4 Protected
Conservation and
Park Lands*

While the highway system can have adverse impacts on wildlife, the opposite is also true. Large animals also present a hazard to motorists. A motorist that strikes a large deer may or may not walk away. Swerving to avoid animals also results in crashes. While geographic data on roadkills is not readily available, particularly deer strikes, deer reflectors should be considered for rural highways in the state. Deer are attracted to lights, so these white reflectors, placed off the shoulder, divert deer away from headlights of moving vehicles. Vernal pool restoration (see wetland section above) as part of a larger statewide habitat restoration plan should be considered as appropriate.

ENERGY

It is becoming increasingly important during times of global political instability, climate change, and record high fuel prices to reinvigorate our efforts to drastically reduce our fossil fuel consumption and develop more reliable and renewable sources. This will provide tremendous benefits through economic independence and air quality. This concept is important not only for vehicle energy use, but also in transportation operations and facilities (green building design, solar powered detection equipment and signage, LED traffic lights). Most would agree that the level of fossil fuel use on this planet has resulted in carbon induced climate change. This in turn may be causing sea level rise that could threaten communities and transportation infrastructure in the future. Sea

level rise mapping has been undertaken in this Plan (Page 4-8). This Plan contains many strategies that encourage sustainable and responsible use of energy resources.

COMMUNITY IMPACTS

There are a multitude of community impacts from the transportation system, although these may be offset to a great extent by mobility and quality of life benefits provided. Noise, speed, traffic congestion, solid waste (junk cars, tires, litter), light pollution, and snow removal residue (salt/sand) can all be considered as adverse community impacts. To a certain extent these are unavoidable, but certain design techniques (cut-off light fixtures, quieter pavements) can mitigate these impacts without compromising safety. Operational activities (enforcement, traffic management, and street sweeping) should be enhanced. Lastly, the use of grassy strips between the street and sidewalk can provide for a much more enjoyable pedestrian experience as well as provide space for snow storage, groundwater recharge, vegetation, and beautification. Recycling transportation related waste (such as fuel oil) and use of recycled materials in construction (asphalt) is also strongly encouraged.

SCENIC AND HISTORIC RESOURCES

In addition to established historic sites and districts, lesser known historic resources include ceremonial stone landscapes which were used by Native American tribes for celebrations and rituals. As they are not identified in the NEPA process, the State should make every effort to identify and protect these sites from development. Many of the views of Rhode Island's forests, farms, and waterfronts are marred to some degree by outdoor advertising, utility structures, and litter. Outdoor advertising in particular should be limited as much as possible. Inmate crews should be used to the extent practicable for litter and graffiti removal. New or upgraded utility infrastructure should be placed as sensitively as possible. While there may be a visual impact, these facilities serve a public need.

*See Map # 4-5
Designated Scenic
Areas and Map #
4-6 Historic Sites
and Districts*

Since the Environmental Mitigation Consultation has occurred, staff has investigated two topics, dam safety and sea level rise, in which the environment has the potential to threaten transportation infrastructure. In both cases, more detailed investigation is required to really utilize this information.

DAM SAFETY

The RIDEM maintains a database of the State's 672 dams and has classified them by the severity of the consequences of dam failure. The three classifications include:

- Low - No probable loss of human life (468 dams)
- High - Probable loss of human loss (92 dams)
- Significant - No probable loss of human life, but can cause major economic loss, disruption of lifeline facilities, or may impact public health or safety (112 dams)

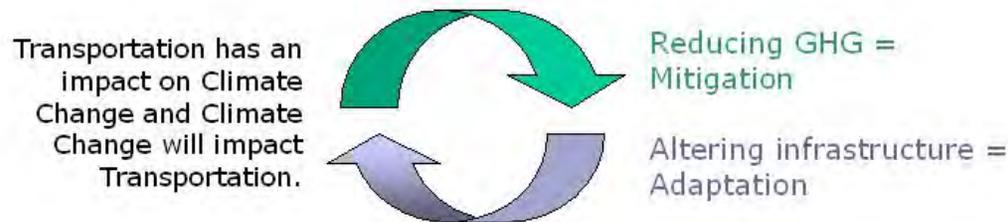
*See Map # 4-7
Roadways Vulnerable
to Dam Failure*

A map was prepared that shows 204 dams rated High or Significant that are within 1,000 feet of a roadway. In this particular exercise, the condition of the dam was not taken into account. The topic of dam safety should receive more attention in the future. Further analysis should screen the condition of the dam, as well as the importance of the roadway. In these instances, diversionary routes should be identified in the same manner they are for Interstate highways. A field should be added to RIDEM's database that identifies whether the dam is in fact integral to the roadway itself. The Gainer Dam is the most prominent example, but it is unknown how many others there are. Security, maintenance and inspection activities should be of paramount importance.

SEA-LEVEL RISE

The generally accepted theory of climate change and sea-level rise is no longer a situation that is considered to be preventable. It is happening, and as we work toward reducing our carbon emissions (mitigation measures), we must also plan for impacts to our infrastructure from sea-level rise. How much and when are still open for debate, but the RI Coastal Resources Management Council is currently using 3-5 feet as the likely rise in the next 100 years (1-2 meters). Rhode Island has over 400 miles of coastline and the low-lying areas are vulnerable to various levels of inundation. Steeply sloped shorelines will fare better as the horizontal impact will be minimal. Flat areas like beaches, however, are most vulnerable and flooding will affect a broader land area. At the time this plan was written, digital elevation data was available for areas in flood zones and below a 3 meter elevation. These areas were mapped for informational purposes; although it is not anticipated that a 3 meter rise would occur in the 2030 planning horizon. It is, however, entirely appropriate to consider a 100-year planning horizon as new bridges that are being built today have a life expectancy of 50-100 years.

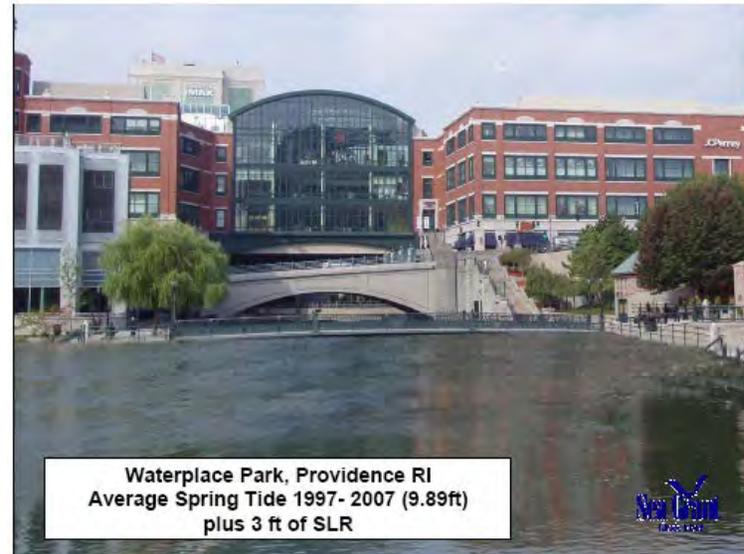
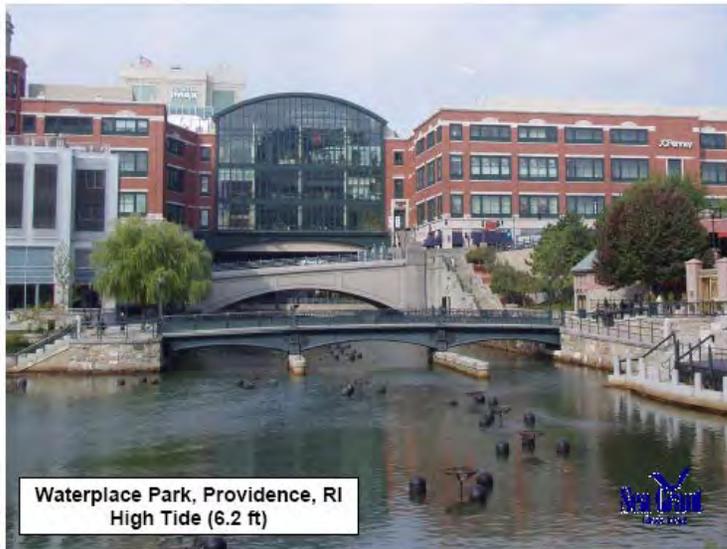
*See Map # 4-8
Sea Level Rise*



The mapped impacted areas included parts of all the Rhode Island coastal communities including such areas as Winnapaug Pond and Atlantic Avenue, Jerusalem and Galilee, Quonset State Airport, Conimicut, Port of Providence, and downtown Newport. Individual state highway segments lying within inundated areas should be identified and categorized as to their future status (these are considered to be “adaptation” strategies):

- Realign roadway on higher ground
- Elevate roadway -- bridge structure
- Elevate roadway – dike structure
- Accept loss of roadway and identify alternate route

It is also important to note that bridges may not be flooded, but the clearance under the bridges will be reduced making the deck more susceptible to storm surges and wave action. Visualizations of sea-level rise were performed by the University of Rhode Island for locations in Providence, Pawtucket, and Newport. Images of Waterplace Park in Providence appear below. More information can be found at http://seagrant.gso.uri.edu/coast/slr_tools.html.



It is expected that 1-meter data will be available in the near future. Statewide Planning will continue to collect the best available data and further develop mapping and identification of impacted facilities into a Technical Paper to be made available to the cities and towns to assist them in undertaking this same process for local roads.

LAND USE SCENARIO ANALYSIS

Land Use 2025, Rhode Island’s statewide land use plan, established a boundary called the Urban Services Area. Inside the urban area, public water and wastewater infrastructure exists to support more dense population growth. Outside this area, this infrastructure does not exist, and it is considered to be in the State’s best interest to maintain this area in more of a rural state for scenic, environmental, fiscal, and quality of life reasons. The urban area generally includes everything around Narragansett Bay and the Blackstone Valley, and small areas in Burrillville, Jamestown, and Westerly. Village scale Growth Centers are also permitted in certain rural areas.

A scenario planning exercise was completed by Rhode Island Statewide Planning Program that looks at varying degrees of density inside the urban area and then begins to investigate the transportation impacts that may have. The Travel Demand Model was used to analyze population and employment growth by assigning different percentages of population and employment growth to Traffic Analysis Zones (TAZ’s) inside and outside the urban area. The total numbers remain the same – only the distribution changes.

Population and Employment Growth		
Year	Population	Employment
2000	1,048,319	467,299
2030	1,140,543	516,048
Change	92,224	48,749

The three scenarios are as follows for Current Trend, Sprawl Scenario, and Compact Scenario:

CURRENT TREND

This reflects the current population and employment projections as assigned to the TAZ’s for use in forecasting VMT and emissions. This is considered to be the best available data. The current trend shows 55 percent of the growth going to TAZ’s inside the urban area and 45 percent outside (55 / 45 split).

SPRAWL SCENARIO

In this scenario, the rural area absorbs more of the population and employment growth (20 percentage points more of the 2000-2030 growth than in the Current Trend for a 35 / 65 split).

COMPACT SCENARIO

In this scenario, the urban area absorbs more of the population and employment growth (30 percentage points more of the 2000-2030 growth than in the Current Trend for an 85 / 15 split).

These scenarios were run in 2008 with a partially completed transit component of the travel model and based on current RIPTA ridership on individual routes. The results are as follows:

Growth Scenarios	Population 2030		Employment 2030		Daily Vehicle Miles Traveled (DVMT) 2030			Transit Ridership 2030		
	Urban	Rural	Urban	Rural	Urban	Rural	Total	Urban	Rural	Total
Current Trend 55/45	855,947	284,596	438,084	77,964	16,390,489	10,355,817	26,746,306	108,475	835	109,310
Sprawl Scenario 35/65	836,433	304,110	417,482	98,566	15,810,783	11,345,517	27,156,300	104,789	998	105,787
<i>change from current trend</i>	-19,514	19,514	-20,602	20,602	-579,706	989,700	409,994	-3,686	163	-3,523
<i>percent</i>	-2.3%	6.9%	-4.7%	26.4%	-3.5%	9.6%	1.5%	-3.4%	19.5%	-3.2%
Compact Scenario 85/15	882,545	257,998	441,857	74,191	16,502,947	9,970,877	26,473,824	110,765	778	111,543
<i>change from current trend</i>	26,598	-26,598	3,773	-3,773	112,458	-384,940	-272,482	2,290	-57	2,233
<i>percent</i>	3.1%	-9.3%	0.9%	-4.8%	0.7%	-3.7%	-1.0%	2.1%	-6.8%	2.0%

This analysis confirms what is widely believed in the planning profession: compact development is more sustainable. For example, In the Sprawl Scenario, a rural population increase of 6.9 percent leads to a larger rural VMT increase of 9.6 percent. Conversely, an urban population increase of 3.1 percent in the Compact Scenario produces only a 0.7 percent increase in Urban VMT.

The model also shows that total DVMT is actually reduced in the Compact Scenario (compared to the Current Trend) and increased in the Sprawl Scenario. Conversely, transit ridership decreases in the Sprawl Scenario and increases in the Compact Scenario. The reader should bear in mind that this is a daily model, and the changes on an annual basis are significant and meaningful in terms of congestion reduction and air quality benefits.

This cursory look at growth scenarios is deserving of further study when the transit component of the model is complete (including commuter rail) and is fully calibrated. At that time, further investigation into mode split, projected ridership, and travel time may reveal corridors where increased transit service is needed.

ENVIRONMENTAL JUSTICE ANALYSIS

The State of Rhode Island is committed to integrating the principles of environmental justice into all of our transportation planning programs and activities. This commitment to equity was first included in the Long Range Transportation Plan in *Transportation 2020* (completed in 2001). A full assessment of our planning process, including environmental justice actions undertaken, was conducted in 2005 and 2010 as part of a federal certification review. In 2008 Statewide Planning conducted a benefits and burden case study of the environmental justice population based on 2000 U.S. Census data and select elements of the 2008 transportation system. Quantification of burdens was conducted on a macro level using an equation termed the “Location Quotient.” The target population’s environmental justice proximity to an interstate and bus routes was used as a variable in the 2008 case study, along with access and air quality assumptions to calculate the measure of burden. It was determined that a higher proportion of minorities and populations below the poverty level live within the case study area and that there is a disproportionate burden, for example, poor air quality, with regards to the transportation systems studied. As part of this update, the location quotient analysis was employed using 2010 Census figures. This analysis found that a higher proportion of minorities and populations below the poverty level continue to live within the case study area and there continues to be a disproportionate burden with regards to the transportation systems studied.

The transit program recommended in this Plan is expected to benefit minority and low-income households by increasing transit service available to them and by increasing their access to jobs and other opportunities. As part of the 2008 Plan update, a benefits analysis was conducted to determine if target environmental justice populations have equitable transit access. Another demographic group that is considered in this analysis is “transit dependent” as defined by zero-car households. The same location quotient equation used in the burdens analysis was used for this analysis for combined minority and low income populations. It was found that Rhode Island’s environmental justice populations, along with transit dependent populations have greater access to transit than the state population as a whole. As part of this update, the same analysis was conducted using 2010 Census figures. The findings of this exercise concluded that environmental justice populations along with transit dependent populations continue to have greater access to transit than the state population as a whole.

As part of the FY 2013-2016 Transportation Improvement Program update, a quantitative analysis of the projects that are programmed for minority and low income areas was conducted. In summary, this analysis found that in nearly all cases, the percentage of transportation improvement projects in the categories of Highway, Pavement Management, Bicycle/Pedestrian, Enhancement, Traffic Safety Programs, and Major Projects with Multi Year Funding, in the minority and low-income census tracts far exceeds the percentage of the target population as it compares to the total state population. Overall, the implementation of these types of projects in the TIP is extremely equitable and beneficial to Rhode Island’s disadvantaged citizens as the rehabilitation of existing transportation infrastructure provides an overwhelming positive impact on a neighborhood in that it improves safety, increases mobility and may provide construction workforce opportunities for local residents; therefore benefits rather than burdens a community. The full results of this study are presented in the TIP (www.planning.state.ri.us/tip/TIP%20Full%207-12-12%20Final.pdf).

In examining the equitable distribution of transit services and projects, it has been determined that two-thirds of RIPTA's system serves minority neighborhoods. The route system has Providence as its hub, with additional intra-city service in Pawtucket, Woonsocket, and Newport. This corresponds well with areas where minority concentrations are the greatest. The paratransit service is now a statewide system. Additional information on RIPTA's commitment to Civil Rights, Title VI can be found at www.ripta.com/civil-rights--title-vi.

IDENTIFYING ENVIRONMENTAL JUSTICE POPULATIONS

The target populations for environmental justice are minorities, low-income individuals, and persons with disabilities. Minority is defined as including four ethnic groups: Hispanic, Black, Asian, and Native Indian, consistent with the Federal Environmental Justice Order. With the exception of persons with disabilities, these populations have been identified and mapped using data from the 2010 Census. For this update, the Census definition of minority was utilized which is the total population minus all white, non-Hispanic persons. The data for persons with disabilities has not yet been released. The updated environmental justice population mapping can be found at the end of this document.

*See E.J. Maps #4-9
Through 4-16*

In compliance with Executive Order No. 13166, Improving Access to Services for Persons with Limited English Proficiency (LEP), the purpose of which is to ensure accessibility to programs and services to eligible persons who are not proficient in the English language, Statewide Planning compiled data and mapping of LEP populations as part of a RIDOT Environmental Impact Statement (EIS) for the South County Commuter Rail Study. In addition, Statewide Planning is in the process of completing an LEP Plan for its own planning program services. These efforts were conducted using guidance that was issued by the U.S. Department of Transportation (DOT) to ensure that persons in the United States are not excluded from participation in DOT-assisted programs and activities simply because they face challenges communicating in English.

The mapping for these efforts is provided within this plan, a test case study, along with the other environmental justice mapping.

PRINCIPLES OF ENVIRONMENTAL JUSTICE

The State embraces the following three core principles to guide our efforts in environmental justice:

- **Outreach** - Reach out to involve target populations in the planning process.
- **Burdens** - Prevent disproportionately high adverse impacts.
- **Benefits** - Ensure an equitable distribution of benefits.

The discussion that follows is organized by these principles.

OUTREACH

Outreach activities are intended to provide input and guidance to the planning process to achieve environmental justice goals in both the Long Range Transportation Plan and the Transportation Improvement Program. The following outreach activities have occurred from 2007 to the current day in 2012:

- Transportation Advisory Committee (TAC) Membership: The Governor’s Commission on Disabilities and the Narragansett Indian Tribe are represented on the TAC.
- Environmental Justice List: An e-mail list consisting of 49 social advocacy groups (housing, elderly, Hispanic, etc.) for target populations was developed and is used in notifying the community of major planning activities.
- Bus Users Forum: The Accessible Transportation Advisory Committee (ATAC) provides an opportunity for transit dependent residents to discuss bus service issues directly with transit operators and planners.
- Flyers: Public participation brochures have been developed in Spanish and have been distributed and posted on our website.
- Open House: A major event was held in March 2007 at the Blackstone Valley Visitor Center (also a bus terminal) and advertised in Spanish and English.
- Inner City Students: Several lectures and planning exercises were held in 2007 – 2008 in conjunction with the University of Rhode Island at Feinstein High School in Providence.
- Coordinated Public Transportation - Human Services Plan: RIPTA brought together many agencies (Elderly Affairs, Human Services, Labor and Training, Commission on Disabilities) that were key to the development of this Plan. Statewide Planning assisted in this effort with extensive census mapping of target populations, mailings to our Social Advocacy Group list, and e-mail notifications to our EJ list.

Meeting the needs of the “underserved communities” is found in the goal of the Planning section of this Plan’s recommendations. The policies related to this goal run the spectrum of a program that is accessible, constructively engages, is inclusive, institutes outreach, and emphasizes all members of the environmental justice community.

BURDENS

Transportation systems exist to provide mobility and quality of life benefits. Unfortunately, the construction and operation of these systems can have adverse impacts such as excessive noise, degraded air quality, degraded water quality, and isolation or fracturing of neighborhoods. Equity and environmental justice goals seek to ensure that target populations do not bear a disproportionate share of these “burdens.” Quantifying burdens on a macro level can be accomplished with the following equation termed “Location Quotient:”

EJ population in the study area / total population in the study area (U.S. Census, 2000 or 2010)

EJ population in the reference area / total population in the reference area¹

A number greater than 1 indicates that there is a greater proportion of the EJ population in the study area. For the purposes of this plan and in consideration of the analytical tools available to staff, exposure to vehicle emissions was undertaken as a case study to determine if there is a disproportionate adverse impact on environmental justice populations.

Poor air quality can aggravate respiratory conditions such as asthma. On-road mobile sources of emissions (car, truck, and bus) contribute to degraded air quality, although point sources (power plants and factories) and area sources (lawn mowers and leaf blowers) contribute as well. Rhode Island has a rate of asthma that is 8th highest in the nation, and 1 in 10 households in Rhode Island has someone with this disease.² A University of Southern California (USC) study (part of the large California Children's Health Study) has found a link between asthma rates and how close the subjects live to a freeway. Specifically, the number of children who suffered asthma attacks increased as the distance between their homes and a major thoroughfare decreased. Those living within 82 yards of a freeway had the highest rates of asthma, while those living 83 to 166 yards away had the second-highest rates. A family's socioeconomic status, exposure to secondhand smoke and the type of housing did not explain the differences in asthma rates.³

The current 2012 bus fleet includes 235 buses, trolleys, and vans including 52 hybrid buses. All vehicles use ultra-low sulfur diesel to reduce emissions. The primary bus routes traverse many low-income, minority, and transit dependent neighborhoods as well as the state's freeways. Diesel emissions in particular can pose a health hazard in these urban neighborhoods where asthma rates are often higher than in suburban neighborhoods.

In an effort to determine the exposure of Rhode Island's environmental justice populations to excessive emissions, census tracts with greater than average concentrations target populations were mapped with a 250' buffer around Interstate highways and freeways. The 250' buffer (approximately 82 yards as noted in the USC study) becomes the study area. Vehicles on other roadways also contribute to poor air quality, but a principal arterial has mobility benefits that balance out the burdens (access to commercial areas, services, residential neighborhoods, sidewalks, bus routes, etc.) Interstate highways, however, provide mobility benefits only without providing access to property or allowing for non-motorized modes or transit stops. Therefore, close proximity to an Interstate is assumed in this case to be more of a burden than a benefit. The reference area is the entire State.

CASE STUDY: What percentage of RI's EJ populations live within 250 feet of Interstate highways compared to the population as a whole?

¹ Methodological Challenges of Environmental Justice Assessments for Transportation Projects, TRB, TRC #2013, 2007.

² Behavioral Risk Factor Surveillance System, 2002.

³ <http://www.cleanairchoice.org/outdoor/AsthmaFreeway.asp>

This mapping exercise presented the following Location Quotient equation for combined minority populations according to 2000 U.S. Census data:

$$\frac{8,073}{167,081} / \frac{30,218}{1,048,319}$$

The calculated ratio is 1.68 which indicates that in fact a higher proportion of minorities live within this study area and that there is a disproportionate burden.

This mapping exercise presented the following Location Quotient equation for combined minority populations according to 2010 U.S. Census data:

$$\frac{7,691}{248,882} / \frac{20,367}{1,052,567}$$

The calculated ratio is 1.60 which indicates that a higher proportion of minorities continue to live within this study area and that there is a disproportionate burden; however the ratio is just slightly smaller than that found in 2000 indicating a slight reduction in the transportation burden on minorities.

Similarly with population below the poverty level in 2000, the equation is:

$$\frac{5,938}{120,548} / \frac{30,218}{1,048,319}$$

The calculated ratio is 1.71 which, again, indicates a disproportionate burden.

Using the 2010 population below the poverty level, the equation is:

$$\frac{3,538}{123,396} / \frac{20,367}{1,052,567}$$

The calculated ratio is 1.48 which, again, indicates a disproportionate burden, however the burden has improved over the past 10 years.

This Plan presents the following recommendations to begin to address this concern. These recommendations are also found in Part Five with numbers noted in parentheses.

1. Amend CMAQ criteria to award more points to projects improving air quality in areas close to freeways. (EQ.3.d)
2. Through program implementation of diesel retrofits for school buses, begin with school districts in affected areas. (EN.3.e)
3. Increase use of vegetated buffers along the highway to trap particulates and improve air quality. (En.3.c)

*See Map # 4-15
Case Study: EJ
Populations within
250' of Interstates
and Freeways*

Additionally, in order to better understand this situation, further study is encouraged to attempt to obtain historic data from 1970, 1980, and 1990. Identification of a trend would determine whether the problem is getting better or worse. From the limited data that was analyzed (2000 and 2010), it does appear that the disproportionate burden is shrinking. Also, Statewide Planning has generated a map that identifies locations suitable for high-density housing. In future refinements of this map, the State should consider a new site screening criteria related to health impacts due to emissions exposure for all populations, not just target populations.

Rhode Island’s transportation plans, policies, and programs advance the goal of reducing diesel emissions by encouraging diesel retrofitting programs and the use of alternative fuels. All new RIPTA fixed route buses will be equipped with diesel particulate filters and engines with lower emissions levels. This plan also encourages non-motorized modes of transportation (bicycle and pedestrian) which help to achieve many goals related to improved air quality, physical fitness, reduced congestion, and are free or low-cost modes. It should be noted that overall air quality is improving and the passenger vehicle fleet is becoming cleaner. Additionally, the standards for transit bus engines have been getting more stringent on the amount of emissions that are acceptable, which results in improved air quality in areas with a lot of transit activity. Over time, living in proximity to a highway should have increasingly fewer health impacts.

It is beyond the scope of this Plan to investigate other potentially disproportionate adverse impacts to environmental justice populations, such as freeway noise and degraded water quality.

BENEFITS

Transportation provides a means to access shopping, gainful employment, health care and other services, and social and recreational activities. Without adequate means of transportation, quality of life can suffer. Transportation system investments should be equitably distributed, and access to transportation services should also be equitable such that disadvantaged populations can reasonably accomplish the activities of daily life. Public transportation service is not a convenience, but rather a necessity for transit dependent residents.

CASE STUDY: What percentage of RI’s target populations live in area served by transit compared to the population as a whole?

ACCESS TO TRANSIT

The transit program recommended in this Plan is expected to benefit minority and low-income households by increasing transit service available to them and by increasing their access to jobs and other opportunities. As part of this Plan update, an analysis was conducted to determine if target populations have equitable transit access. Firstly, a polygon coverage was created for geographic analysis by defining a half-mile radius buffer around transit stops. This transit service area coverage was then overlaid on target populations to determine the number of people in the access area. The same Location Quotient equation as used in the previous section was used for this analysis for combined minority and low income populations. Using the 2000 Census, the calculation is the following:

$$\frac{259,574}{310,434} / \frac{771,704}{1,048,379}$$

The calculated ratio is 1.14 which indicates greater access to transit for environmental justice populations.

Using the 2010 Census, the calculation is the following:

$$\frac{283,839}{372,278} / \frac{533,487}{1,052,567}$$

The calculated ratio is 1.50 which indicates that access to transit for environmental justice populations continues to improve.

Another demographic group that is considered in this analysis is “transit dependent” as defined by zero-car households, of which there were 38,422 in the transit service area in 2000:

$$\frac{38,422}{44,518} / \frac{771,704}{1,048,379}$$

The calculated ratio is 1.19 which indicates greater access to transit for zero-car households.

According to the 2010 Census, there were 37,563 zero-car households in the transit service area:

$$\frac{37,563}{38,137} / \frac{533,487}{1,052,567}$$

The calculated ratio is 1.94 which indicates that access to transit for zero-car households continues to improve.

Access to jobs is one of the most critical issues for low-income and transit dependent households in the State of Rhode Island. RIPTA administers several programs to meet this need including Jobs Access Reverse Commute and New Freedoms Initiatives. However, the growth of employment in suburban areas and the lack of adequate transit service to these areas often create barriers for transit-dependent residents searching for job opportunities. Additionally, developments that locate low cost and senior housing in areas with low land costs may serve the state’s affordable housing goals but put a great strain on RIPTA’s ability to serve these locations.

*See Map # 4-16
Case Study: EJ
Populations within ¼
Mile of a Transit Stop*

Transportation to jobs was raised as a key issue in the Coordinated Plan for Public Transportation and Human Services. This Plan continues to support bus service as part of its environmental justice program. RIPTA should also continue its efforts to give transit users a voice through a forum such as the New Public Transit Alliance (NUPTA) and continue its efforts to improve bus scheduling. Further development of the transit component of the travel demand model will enable analysis of other indicators such as travel time to work.

HOW THIS PLAN ADVANCES ENVIRONMENTAL JUSTICE GOALS

There are a number of transportation issues that this Plan identifies as important to minority, low-income, or transit dependent populations. There is an entire section of the plan recommendations that addresses Equity (described below). In addition, our commitment to environmental justice is pervasive throughout the recommendations section, and applicable references are also noted below.

EQUITY

The goal of equity is to “ensure that the transportation system equitably serves all Rhode Islanders regardless of race, ethnic origin, income, age, mobility impairment, or geographic location.” The objectives refer to equitable distribution of projects and access to services. The policies and strategies reinforce the need for outreach and avoidance of disproportionate adverse impacts. They also set forth the need for provision of travel training for non-English speaking populations.

BICYCLE & PEDESTRIAN

Pedestrian and bicycle safety is an important issue that affects minority, low-income households, and especially transit dependent households living in our more urbanized communities. According to the 2010 American Community Survey 10.2 percent of households in Rhode Island does not own a vehicle, and for many of them, walking, and riding a bike is an important means of travel. However, pedestrians and cyclists face many safety hazards in urban areas where traffic volumes are high. This Plan promotes pedestrian and bicycle safety in urban areas of the state.

DESIGN

Design policies stress the importance of pedestrian access to transit and the need for ADA improvements.

ECONOMIC DEVELOPMENT

Economic development objectives and policies deal directly with getting people to and from work sites.

EMERGENCY RESPONSE

Emergency response cites the special evacuation needs of those with mobility impairments, the elderly and transit dependent populations.

ENVIRONMENT

Environmental objectives identify the need to reduce air and noise pollution, which may impact target populations disproportionately.

FINANCE

Over a quarter of the policy recommendations within the Finance section are devoted to the enhancement of the economic well-being of the transit system service within the state. In addition, ADA improvements are singled out for special consideration for financial restructuring to provide long-term fiscal stability.

HIGHWAY AND INTERSTATE

None of the proposed freeway improvements are expected to adversely affect any minority or low-income neighborhoods. The design for the improvements to Route 6 evolved such that there were minimal adverse impacts to minority or low-income neighborhoods. The operational and safety improvements all occurred largely within existing rights of way and did not affect residential neighborhoods. RIDOT outreach during the design process was done in English and Spanish. The interstate system was examined along its entire length with respect to the proximity of environmental justice populations, as close proximity is being considered as a burden due to degraded air quality. And lastly, the FY 2013 – 2016 Transportation Improvement Program (TIP) includes an analysis that demonstrates that bicycle, highway, and enhancement projects are equitably distributed.

INTERMODAL

Intermodal planning emphasis is placed on transit and connections to and between modes. The creation of additional “mini transit hubs,” maintenance of Kennedy Plaza, provision of additional traveler information, travel training for the disabled, and expansion of private participation is all beneficial to the environmental justice populations.

LAND USE AND CORRIDORS

Land Use 2025, Rhode Island’s State Land Use Plan, calls for directing growth and investments within an “urban services boundary” and creating development that is more conducive to successful use. The majority of low income, minority, and transit dependent populations are found within this urban area and improved transit service will benefit all.

PLANNING

Planning aspects recognize the “needs of underserved communities” and “supports inclusive transportation planning and resource allocation processes that are accessible to, understood by, and constructively engage all population groups.”

SAFETY

The safety goals of the plan involve education, as well as engineering and enforcement. This is particularly important when addressing the needs of the environmental justice populations. The use of safety devices such as seatbelts and the routine state safety inspection of vehicles are lower within these demographics.

TRANSIT

Other transit recommendations in the Plan are specifically intended to improve mobility for low-income households. The Jobs Access Program is designed to help low income workers gain access to job site otherwise unavailable to them. The recommendation to extend hours of service for the bus system is intended to benefit the transit dependent person who often cannot access certain activities because bus service stops at 8:00 p.m. on many routes. Alternative transportation options need to be developed to address the challenges of providing access to job centers that are not located in areas with a lot of transit activity and of providing access to jobs that begin at staggered times. Fixed route public transit is not a viable service for low ridership travel like access to jobs that are located in remote areas and serve individual workers.

These many goals, policies, and strategies are critical components of Rhode Island’s environmental justice program that the State will strive to pursue and improve. The State of Rhode Island remains committed to involving minority groups and low-income groups in our planning process, and to developing plans and programs that provide an equitable distribution of benefits and burdens.

AIR QUALITY ANALYSIS

EXECUTIVE SUMMARY

As part of its transportation planning process, the State of Rhode Island conducted an air quality analysis for both the FY 2013-2016 Transportation Improvement Program (TIP) and *Transportation 2035*, the Long Range Transportation Plan 2012 Update. The air quality analysis included a statewide analysis for ozone precursor emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x).

In response to the Federal Highway Administration (FHWA) and Environmental Protection Agency (EPA) guidance, Rhode Island has developed a Long Range Transportation Plan 2035 Update that includes projects to reduce vehicle miles of travel and improve traffic flow. The air quality analysis evaluated the on-road air quality emissions for *Transportation 2035*.

The general modeling process involved two major inputs, traffic and emission factor data. The traffic data were obtained from the Rhode Island Statewide Model (RISM). The RISM was updated to include additional roadways, modeling zones, and current planning assumptions. Consistent with federal guidance, the model's traffic data were adjusted to account for the following factors, Highway Performance Monitoring System, seasonal adjustment for pollutants, and peak and off-peak period speed characteristics.

The vehicle emission factors were derived using the EPA's latest mobile source emission factor model, MOBILE 6.2, and reflect Rhode Island-specific conditions, such as the vehicle registration distribution and the statewide Inspection and Maintenance (I/M) Program. The traffic and emission factor data were calculated on a link-by-link basis in the EPA's Air Information Retrieval System (AIRS) format, which is consistent with air quality analyses for previous Long Range Transportation Plans and Transportation Improvement Programs (TIPs).

The air quality analysis performed for *Transportation 2035* demonstrates compliance to the Rhode Island State Implementation Plan, the Clean Air Act Amendments, and the Transportation Conformity requirements. The air quality analysis demonstrates that the mobile source emissions of ozone precursor (volatile organic compounds (VOCs) and oxides of nitrogen (NO_x)) for 2012 Existing, 2015 Build, 2025 Build, and 2035 Build conditions fall below the statewide 2009 SIP mobile source emission budgets of 22.75 tons per day (tpd) of volatile organic compounds and 25.29 tpd of oxides of nitrogen for all future years. The results of the air quality analysis are presented in the table below.

Rhode Island Statewide Ozone Results for the Long Range Transportation Plan			
	Daily Vehicle Miles Traveled (VMT)	VOC (tons/day)	NO_x (tons/day)
2009 SIP Budget	---	22.75	25.29
2012 Build	27,168,666	10.91	14.58
2015 Build	27,659,094	10.96	11.48
2025 Build	29,296,868	8.00	5.89
2035 Build	30,749,608	8.28	5.71

The complete Air Quality Analysis is on file at the RI Statewide Planning Program office.

December 2012