



Photo: Merrimack River at sunset, Lawrence (source: MVPC)

## Chapter 9

# Promote Environmental Sustainability

The MVMPO region’s cities and towns have had to reinvent themselves continually in response to economic and social change. Our region has boasted a heritage of innovation in agriculture, trading, seafaring, industrial production, and, most recently in health care and high technology. Communities have gone through transformative waves of industrialization, urbanization & suburbanization, industrial decline, urban renewal, immigration, and successive global revolutions in transportation, communications and information technology. And through all the

**Humanity** has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth.

*From The United Nations World Commission on Environment and Development “Our Common Future”, 1987 (The Brundtland Report)*

changes, the region’s resources of population, civil infrastructure and natural environment have provided the foundations for resilience and the next cycle of economic growth.

The region’s air and water quality, the landscape and physical features are central to our livelihoods, our sense of place and quality of life.



Photo: Plum Island, Newbury (source: MVPC staff)

The MVMPO region includes most of the Great Marsh, which is the largest continuous stretch of salt marsh in New England. The Great Marsh extends from Cape Ann to New Hampshire and is designated as an Area of Critical Environmental Concern (ACEC) by the Commonwealth. Its 20,000 acres of marsh, barrier beach, tidal river, estuary, mudflat, and upland islands extend across the Massachusetts North Shore from Gloucester to Salisbury. The Great Marsh serves as an incubator for fisheries, habitat for wildlife,

and buffer protector for coastal community development.

From its headwaters in the White Mountains of New Hampshire, the Merrimack River flows through a tapestry of forests, fields, farms, hilltops, and fresh water resources (lakes, ponds, aquifers, wetlands) and historic mill cities. In Massachusetts, the Merrimack River connects the MVMPO region's communities where the environmental landscape and urban development centers provide:

- **Habitat and migration corridors** for numerous wildlife species, birds, fish and shellfish, and plants;
- **Gateways to educational & economic opportunities** for residents;
- **Surface and ground water sources** for drinking water supply, irrigation, hydropower generation, and recreation;
- **Safe and affordable housing** for families;
- **Productive soils** for agriculture, horticulture, and tree farming; and

- **Natural buffers** for protection against flooding, high winds, coastal storm surges, and rising sea levels.



Photo: Merrimack River, Newburyport (source: MVPC staff)

Our 15-community region is part of the Essex Natural Heritage Area (ENHA), a Congressional geographic designation awarded in 1996 to communities within the former Essex County. This designation recognizes the unique heritage and important role of Essex County in the nation's history. Each year, more than 2.7 million tourists visit northeastern Massachusetts. According to

the North of Boston Convention & Visitors Bureau, the tourism sector in Essex County in 2013 generated \$906 million in economic activity and 7,095 jobs with total payroll of \$200.6 million.

Every generation faces obligations and distinct challenges in making policy and investment decisions that support the region's long-term economic vitality. Major transportation infrastructure decisions we make, or fail to make today, have implications for how the region grows and meets the opportunities and challenges generated by the next waves of change.

Chief among the sustainability challenges our generation confronts in the second half of the second decade of the 21<sup>st</sup> century:

- **Land Use Management:** The Merrimack Valley watershed, according to the U.S. Forestry Service, is the national watershed most endangered by potential development in the coming decades. The U.S. Forestry Service's Dec. 2009 study "Private Forests, Public Benefits-A Forests on the Edge Report", projects new development on more than 400,000 acres of forest in the

Merrimack’s MA-NH watershed from 2000 to 2030. With limited public resources for conservation land acquisitions, communities seeking to be proactive in guiding development responsibly are compelled to be creative in establishing partnerships with non-profit organizations and developers and prioritizing land areas for protection.

- **Clean Air & Clean Water:** Clean air and water are cornerstones of healthy communities and sustainable development. Runoff from roads, driveways and roofs carry grease, metals and other pollutants that put water supplies and fisheries in jeopardy. With major reduction of industrial pollution since the 1970’s, our region and the country have made much progress in cleanup of our air and waterways. The U.S. EPA advises that most of the pollution found in our region’s rivers and streams today is stormwater runoff – the source of 55% of the entire Commonwealth’s waterway impairments.

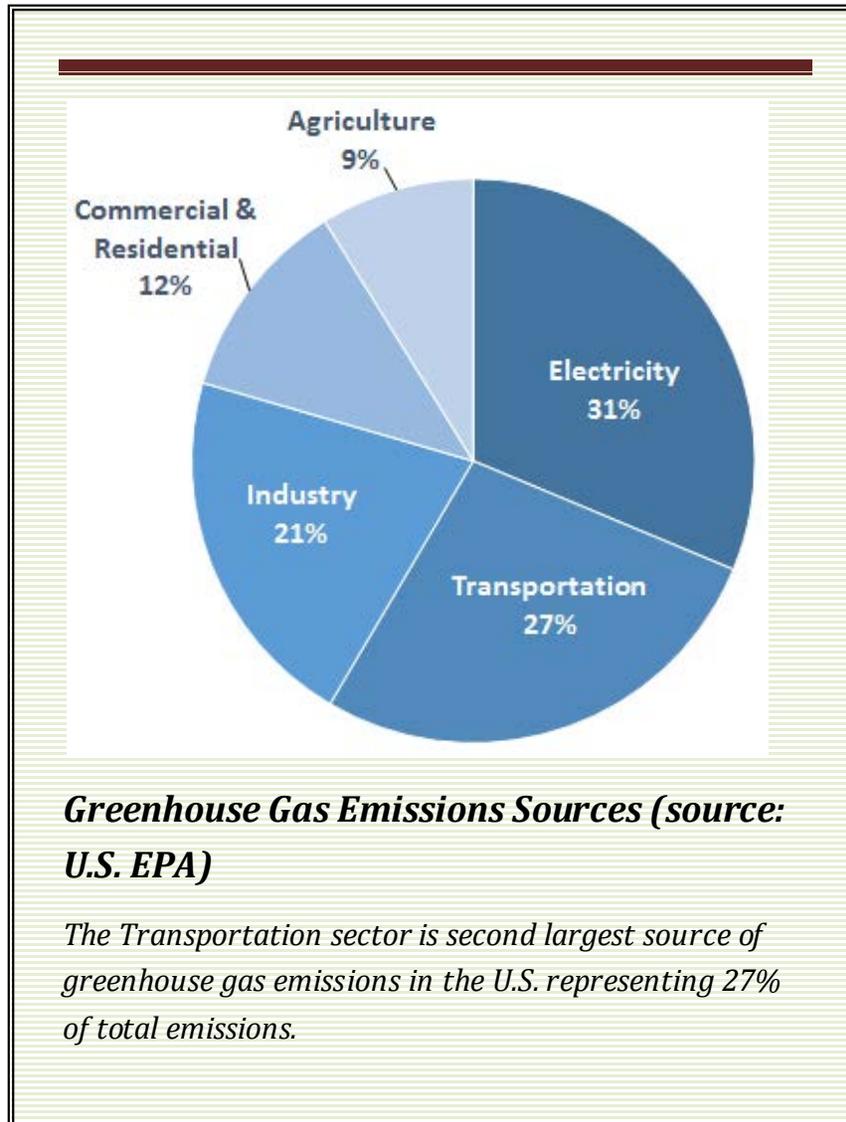
Dramatic air quality improvements have been made in the past forty years. Ozone and

particulate reductions are the result of point-source regulations and monitoring programs for power plants and motor vehicles; cleaner fuels, and increases in the use of non-motorized transportation. Even with these advances, nearly 138.5 million people or 44% of the country still live in places where air pollution levels are often too dangerous to breathe, according to the American Lung Association’s report, State of the Air 2015.



Photo: Newburyport boardwalk (source: MVPC staff)

Figure 9.1: Greenhouse Gas Emissions by Source



**Climate Change:** Climate change is a global challenge resulting in rising sea levels as well as increasing frequency and severity of storms, tidal surges, and flooding. The U.S. EPA reports that the average temperature on Earth rose 1.4 degrees Fahrenheit in the past century and projects that it will rise another 2 to 11.5 degrees in the next hundred years. It attributes the temperature increase to increased atmospheric greenhouse gas (GHG) emissions, largely due to human activities such as fossil fuel burning. Communities face a new reality of adapting to climate change and planning for resilience in infrastructure design, disaster response, and mitigation. In response to concerns about climate change, the Commonwealth of Massachusetts adopted its Global Warming Solutions Act (GWSA) in 2008. The GWSA contains ambitious statewide GHG reduction targets in all economic activities, particularly in transportation.

**Public Health:** How and what we build in transportation infrastructure has direct impacts on public health as well as climate change adaptation, air quality and water quality.

According to the 2013 Community Health Needs Assessment report prepared by Lawrence General Hospital, a number of MVPC communities report premature mortality rates significantly higher than the statewide rate. Communities and regions are compelled to develop data resources and networks to monitor and develop intervention responses to increasing rates of diabetes, asthma, heat-related illnesses and obesity while also planning and constructing transportation facilities that make positive contributions to healthy communities.



Photo: The City of Lawrence plans to breathe new life into this unused rail corridor (source: MVPC staff)

**Social Equity:** Transportation infrastructure investments should be distributed equitably so that all communities and residents benefit and have access to jobs, education, and the region’s amenities. Breaking down barriers to access is a challenge heightened when communities are divided by poverty and race. The poor and ethnic minorities are too often concentrated in communities and neighborhoods isolated from quality education and meaningful employment.

In the MVPC region, 84% of people in poverty reside in Lawrence, Haverhill or Methuen. And 62% of the 97,930 racial and ethnic minorities in the MVPC region reside in those three urban communities.

**Energy:** In 2013, Massachusetts generated 63% of its electricity from natural gas and 12% from coal; 9.3% of the state's electricity generation came from renewable energy resources, primarily from biomass and hydroelectricity. Energy markets over the past decade have been extremely volatile with price fluctuations and resources shifting away from coal and oil and into new sources of natural gas and renewables. Less than 10 years ago, only 20% of the region's electricity was fueled by natural gas. (Source: U.S. Energy Information Administration). While the New England region looks to diversify its energy sources and provide energy facilities to accommodate sustainable growth, cities and towns have environmental and fiscal incentives to conserve energy. Four of the Merrimack Valley region's communities---Amesbury, Andover, Newburyport and West Newbury--- have received Green Communities designations through the

Massachusetts Department of Energy Resources. To qualify for the program, these Green Communities are implementing energy saving retrofit programs and committing to conversion to fuel-efficient vehicle fleets.

**Livability:** Community livability has been a nationwide priority for over a decade. At the core of community livability is better coordination of housing, economic development, environmental protection, housing production/conservation, transportation, and utility planning. The nationwide focus on 'Smart Growth' is not only a reaction to inefficient, unsatisfactory development patterns – it is also a reaction to past planning practices in which decision making often occurred in virtual 'silos' - without cooperation among all stakeholders. The MVMPO's objective is to preserve and enhance the region's livability by promoting coordinated, place-based planning and programming that expands mobility access and transportation choices for all residents.

As outlined by the U.S. Department of Transportation and the Partnership for Sustainable Communities, and acknowledged by

the MVMPO, the livability principles guiding this Regional Transportation Plan are:

- **Provide more transportation choices** to decrease household transportation costs, reduce our dependence on oil, improve air quality and promote public health;
- **Expand location- and energy-efficient housing choices** for people of all ages, incomes, races, and ethnicities to increase mobility and lower combined cost of housing and transportation;
- **Improve economic competitiveness of neighborhoods** by giving people reliable access to employment centers, educational opportunities, services and other basic needs;
- **Target funding** -- through transit-oriented development and Brownfields redevelopment - to revitalize communities, reduce public works costs, and safeguard rural landscapes;
- **Align policies and programming of funds** to remove barriers to collaboration, leverage funding, and increase the effectiveness of programs to plan for future sustainable growth; and

- **Enhance the unique characteristics of all MVMPO communities** by investing in healthy safe and walkable neighborhoods.

MVPC Transportation and Environmental staffs provide the following planning and technical assistance initiatives that advance community livability:

- **Complete Streets Planning:** technical assistance to member communities in development of Complete Street policies and designing implementation plans;
- **Brownfields Redevelopment Initiative:** staff administers U.S. EPA Brownfields program environmental assessment funding awarded for eligible projects in the MVMPO communities. Staff also administers the Merrimack Valley Region Brownfields Revolving Loan fund, a financing option for site cleanups to eliminate environmental contamination as a barrier to urban neighborhood redevelopment.
- **Multi-Use Trail network** planning and implementation: feasibility studies, support during initial project development through

programming MVMPO funds for construction (if required)

- **Safe Routes to Schools planning**

**assistance:** includes traffic data collection, if required

- **Merrimack Valley Stormwater**

**Collaborative:** the MVPC staff is leading this regional initiative to deliver staff training, conduct public outreach, and promote stormwater management Best Practices in its communities in order to minimize stormwater runoff pollution. The staff's goal is to help all fifteen MVPC communities comply with new, more rigorous federal stormwater management requirements. In particular, local officials expect that the U.S. EPA will issue a new MS4 Permit for Commonwealth of Massachusetts urban communities under the National Pollutant Discharge Elimination System (NPDES).

- **Merrimack Valley Mayors and Managers:**

MVPC provides a forum for the region's chief elected officials to meet and address issues of regional concern in a cooperative effort throughout the year.

- **Merrimack Valley Means Business:**

Through MVPC, the region has organized marketing and promotion tools for use in matching developers and business entrepreneurs with available properties and programs.

- **Regional Multi-Hazard Mitigation**

**Planning:** MVPC in 2013-2015 coordinated update of a fourteen-community regional Multi-Hazard Mitigation Plan that includes action plan of adaptation action items to enhance capacity of infrastructure, critical facilities and properties and minimize community loss sustained in a hazard event. The greatest risk events in the MVPC region are associated with flooding, winter storm/high wind events.

- **Open Space & Recreation Planning:**

MVPC planning and GIS mapping assistance is available to member communities for Open Space and Recreation Plan preparation or updating. Notably, eight of the MVPC communities' Open Space plans have expired or are expiring this year. In addition, seven MVPC communities have adopted local option Community Preservation Act as a funding

source for open space/recreation, historic preservation, and affordable housing activities.

- **Housing Production Planning:** MVPC offers technical expertise to communities in development of housing production plans that foster creation of affordable housing accessible to jobs and transit.
- **Merrimack Valley Economic Development Assistance:** MVPC provides gap financing for businesses in the region seeking to expand facilities and increase employment.
- **Great Marsh Coastal Resiliency Project:** MVPC is a partner with MA Coastal Zone Management Agency, MassBays National Estuary Program, Ipswich River Watershed Association, National Wildlife Federation, Mass Audubon and U.S. Fish and Wildlife Service among others in protecting the Great Marsh Area of Critical Environmental Concern through coastal resiliency planning, invasive species management, and sediment transfer modeling. The partners will be carrying out most of this work with funding provided in a 2014 U.S. Department of the Interior Hurricane Sandy Resiliency Grant. The

partners expect to perform all Project-funded work by 2016.

In addition to the above activities, the MVPC and MVMPO staffs consult on a regular basis with state environmental agencies regarding policies, projects, and programs relevant to transportation. The MVPC has collaborated with the MA Department of Fish and Game's Ecological Restoration Initiative staff to aid that office's efforts in surveying culvert conditions throughout the region and promoting information on updated (October 2014) design guidelines for culvert installation and replacement. Additional project and program consultations take place with U.S. EPA, Parker River National Wildlife Refuge, local Conservation Commissions, MA Dept. of Environmental Protection, Ipswich River Watershed Association, Merrimack River Watershed Council, MA Historical Commission, and local historic district commissions. In addition, the MVPC Environmental Program Manager serves on the Management Committee of the MassBays National Estuary Program and on the Commonwealth's Ocean Management Advisory Commission.

## **Objectives**

This Regional Transportation Plan defines three objectives with strategies toward advancing the goal of Environmental Sustainability.

### **Objective 1: Improve Regional Air Quality**

#### **Metropolitan Planning Organizations and the Global Warming Solutions Act**

The Commonwealth's Global Warming Solutions Act (GWSA) of 2008 requires the following statewide reductions in greenhouse gas (GHG) emissions:

- 25% reduction 1990 GHG emissions between 1990 and 2020, and
- 80% reduction in 1990 GHG emissions by 2050.

As part of the GWSA, the Executive Office of Energy and Environmental Affairs (EOEEA) developed the Massachusetts Clean Energy and Climate Plan (CECP), which outlines programs to attain the 25 percent reduction by 2020 – including a 7.6 percent reduction that would be attributed to the transportation sector.

The Commonwealth's thirteen metropolitan planning organizations (MPOs) are integrally involved in helping to achieve greenhouse gas reductions mandated under the GWSA. The MPOs work closely with the Massachusetts Department of Transportation (MassDOT) and other involved agencies to develop common transportation goals, policies, and projects that would help to reduce GHG emission levels statewide. For example, one of the programs in the CECP is MassDOT's sustainability initiative known as GreenDOT. GreenDOT policy goals were developed in accordance with the GWSA, and are as follows:

- Reduce greenhouse gas (GHG) emissions;
- Promote the healthy transportation modes of walking, bicycling, and public transit, and
- Support smart growth development.

The MVMPO shares in these goals and is working to meet the specific requirements of the GWSA regulation – *Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (310 CMR 60.05)*. The purpose of this regulation

is to assist the Commonwealth in achieving their adopted GHG emission reduction goals by:

- Requiring MassDOT to demonstrate that its GHG reduction commitments and targets are being achieved;
- Requiring each MPO to evaluate and track the GHG emissions and impacts of its Regional Transportation Plan and Transportation Improvement Program, and
- Requiring each MPO, in consultation with MassDOT, to develop and utilize procedures to prioritize and select projects in its RTP and TIP based on factors that include GHG emissions and impacts.

Meeting the requirements of this regulation will be achieved through the transportation goals and policies contained in the 2016 Regional Transportation Plan, the major projects planned in the RTPs and the mix of new transportation projects that are programmed and implemented through the Transportation Improvement Program. The GHG tracking and evaluation processes enable the MPOs to identify the anticipated GHG impacts of the planned and

programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects. This approach by the MPO is consistent with the greenhouse gas reduction policies of promoting healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments; as well as supporting smart growth development patterns through the creation of a balanced multi-modal transportation system. All of the MPOs and MassDOT are working toward reducing greenhouse gases with plans, actions, and strategies that include (but are not limited to):

- Reducing emissions from construction and operations;
- Using more fuel-efficient fleets;
- Implementing and expanding travel demand management programs;
- Encouraging eco-driving;
- Providing mitigation for development projects;

- Improving pedestrian, bicycle, and public transit infrastructure and operations (healthy transportation), and
- Investing in higher density, mixed use, and transit-oriented developments (smart growth).

### **Regional GHG Tracking and Evaluation in RTPs**

MassDOT coordinated with MPOs and regional planning agency (RPA) staffs on the implementation of GHG tracking and evaluation in development of each MPO's 2012 RTPs, which were adopted in September 2011. This collaboration has continued for the MPO's 2016 RTPs and 2016-19 TIPs. Working together, MassDOT and the MPOs have attained the following milestones:

- Modeling and long-range statewide projections for GHG emissions resulting from the transportation sector for use before final RTP endorsement. Using the Boston MPO's regional travel demand model and the statewide travel demand model for the remainder of the state, GHG emissions

will be projected for 2020 no-build and build conditions, and for 2040 no-build and build conditions.

- All of the MPOs will include GHG emission reduction projections in their RTPs, along with a discussion of climate change and a statement of MPO support for reducing GHG emissions as a regional goal.

MassDOT, using its statewide travel demand model, will provide the MVMPO with statewide CO<sub>2</sub> emissions estimates built upon the collective list of all recommended projects in all the Massachusetts RTPs combined (and supplemented by CO<sub>2</sub> emission reduction results for smaller, "off-model" projects supplied by the MPO).

Emissions will be estimated using the new (2014) MOVES model, and also incorporate the latest planning assumptions including updated socio-economic projections for the Commonwealth.

The project mix from this RTP (and all other RTPs) – modeled for both 2020 and 2040 using an Action (Build) vs. Baseline (No-Build) analysis to determine the CO<sub>2</sub> emissions attributed to all MPO's mix of projects and smart-growth land use

assumptions – is expected to show a neutral impact toward meeting the statewide greenhouse gas emissions reduction goal of 25 percent below 1990 levels by the year 2020, and 80 percent below 1990 levels by 2050. The reason for the anticipated neutral impact is that early indicators have shown that major infrastructure projects, both individually and collectively, would not trigger a significant change in GHG emission levels.

The MVMPO staff continues to work closely with MassDOT to ensure that its transportation planning activities meet the GHG reduction targets and comply with the requirements of the GWSA. As part of this activity, the MVMPO will provide further public information on the topic and will continue to advocate for steps needed to accomplish MVMPO and the Commonwealth’s GHG reduction goals.

**Objective 2: Implement Effective Stormwater Management Programs**

As federally-designated “Urbanized Area” communities operating municipal storm drainage systems, the region’s fifteen municipalities are

required to comply with the Environmental Protection Agency’s Phase II stormwater management regulations. Compliance with these regulations requires the communities to apply for and obtain a discharge permit which is issued jointly by EPA and the Massachusetts Department of Environmental Protection. The first permit was issued in 2003 and remains in effect until the next “5-year” permit is issued. The latest draft permit was issued by EPA in 2014 and is expected to be finalized in 2015/2016. As a requirement of the permit, the region’s communities each prepared a Storm Water Management Plan (SWMP) that describes a series of best management practices (BMPs) the community is committed to implementing.

Together, these management practices are intended to prevent or significantly reduce



stormwater pollution through a combination of heightened local regulation and public education. When the initial five-year permit expires, the

communities will be required to obtain a new permit. Issuance of the new permit will require the communities to: 1) demonstrate significant progress toward addressing its stormwater problems, and 2) commit to implementing a new five-year management plan, with enhanced pollution control measures as warranted.

The fifteen Merrimack Valley communities in 2014 entered into a regional Collaborative supported by MVPC and designed to promote efficiencies and resource sharing in stormwater management compliance. Regional efforts included public education & outreach, staff training, joint procurements, equipment sharing and regional administration & monitoring.

### **Develop and Implement Community-wide Stormwater Management Standards**

As part of the Phase II Stormwater Management Program activities described above, communities should adopt minimum stormwater management standards that would apply to all new development and redevelopment projects requiring engineered drainage systems. The stormwater standards should be applicable *community-wide* (not just within regulated

Wetland Resource Areas), and should address suspended solids removal, stormwater infiltration, and peak discharge rates.

The Massachusetts Stormwater Management Policy adopted by the Department of Environmental Protection (DEP) can serve as a useful starting point for the local ordinance or bylaw. In addition, various model stormwater bylaws have been developed and were evaluated by the state Low Impact Development (LID) Task Force for their consistency with state and federal stormwater standards and for their suitability for local adoption and implementation. The DEP, Massachusetts Coastal Zone Management Office, and MVPC can be consulted for further information and assistance.

### **Integrate Low Impact Development (LID) Techniques in New Development, Redevelopment, and Municipal Infrastructure Improvement Projects**

The region's communities, acting primarily through their Planning Board, Conservation Commission, and Public Works/Highway Department, should work to maximize the integration of Low Impact Development (LID)

techniques in all public and private development and redevelopment projects, including the construction/reconstruction of municipal buildings, roads, and drainage infrastructure.

Until recently, the standard approach to site development in Massachusetts and across the country has been “clear it, grade it, and pave it”; then collect the resultant stormwater and “dispose” of it through a centralized system of pipes and detention ponds. Low Impact Development presents another, more ecologically-sensitive option. Rather than collecting stormwater en masse from across an entire subdivision, LID employs multiple small stormwater management techniques in series *on each individual property parcel* in the subdivision in order to take full advantage of the parcel’s own rainfall retention, infiltration, and treatment capabilities. By keeping stormwater on site, downstream flooding is averted or minimized and groundwater recharge is maximized, thereby helping to sustain well yields and streamflows during periods of drought. Depending on the nature of a development site, LID techniques may or may not eliminate entirely the need for some sort of centralized stormwater collection facility.

However, they can go a long way toward minimizing the size (and thus cost) of such a facility and extending its operating life and efficiency.

LID principles are simple and straightforward:

- **Work with the landscape.** Identify environmentally-sensitive areas and features, and then outline a development envelope that protects those areas. Maintain existing slopes and flow paths. Minimize grading and tree clearing.
- **Focus on prevention.** Minimize runoff by building narrower roadways and smaller parking areas. Use permeable surfaces (gravel, cobble, pavers) on driveways, sidewalks, and parking overflow areas. Where feasible on commercial buildings, use “green” rooftops to store and evaporate rainfall before it even leaves the roof.
- **Micromanage stormwater.** Design the site to create numerous sub-watersheds, and “micromanage” stormwater close to where it is generated using small, decentralized facilities (rain barrels, cisterns, vegetated swales, etc.). Employ a “treatment train” of multiple

techniques to maximize infiltration and recharge.

- **Keep it simple.** Before resorting to expensive piped drainage systems that can carry high maintenance costs, maximize the use of less costly, non-structural practices such as bioretention areas (rain gardens).

- **Practice multi-tasking.** Create a multi-functional landscape with integrated stormwater management components that simultaneously provide stormwater collection, filtration, *and* infiltration. In doing so, create features that are aesthetically pleasing and function as open space, wildlife habitat, and rain and snow storage areas.

**Table 9.1: Common Low Impact Development (LID) Techniques**

LID Technique	General Description
Low Impact Roadways	Narrower roadways and cul-de-sac alternatives that reduce runoff
Permeable Driveways/ Parking Surfaces	Vehicular surfaces that allow rainwater to percolate into the ground
Bioretention Areas/Rain Gardens	Vegetated areas that collect, treat, and infiltrate rainwater
Vegetated Swales	Shallow vegetated drainage channels that slow and filter runoff
Cisterns and Rain Barrels	50-50,000-gallon tanks that capture and store rainwater for landscape watering
Green Roofs	Vegetated roof systems that intercept rainfall and return it to the atmosphere via evapotranspiration

Applying the strategies above, the MVMPO commits to the following targets:

- All 15 communities will have approved/complaint MS4 permit programs.
- 10% reduction in impaired waterways within 5 years.

### **Objective 3 Adaptive Planning for Climate Change**

**Work with communities to incorporate climate change adaptation into Natural Hazard Mitigation plans that assess vulnerabilities, identify critical facilities at risk, and develop cost-effective projects and policies to minimize and/or mitigate potential damage risks.**

Effective planning and adapting to climate change impacts on the MVMPO region’s transportation network requires detailed identification and assessment of specific geographic areas—both coastal and inland—that are projected to be at risk including transportation facilities and services.

The MVMPO staff has worked with 14 of the 15 communities in updating the 2008 Natural Hazard Mitigation Plan (draft complete 2015 and pending FEMA review) and is assisting the City of Amesbury in its Natural Hazard plan development to be completed in 2015/2016. The MVMPO target is to complete coastal resiliency plans for 5 communities by 2017.

As part of the Natural Hazard Mitigation plan, MVPC staff identified transportation infrastructure most vulnerable to natural hazards. Additionally, potential “choke points” or local flooding hotspots identified by each community were mapped. Strategies for addressing these choke points were also identified. By 2018, the MVMPO will complete a regional inventory and assessment of barriers in order to address choke points that impact transportation infrastructure.



**Host workshops and partner with regional and Commonwealth organizations, including watershed associations and community non-profits, to train municipal staff and educate public about climate change impacts and appropriate adaptation strategies.**

With \$2.9 million in Hurricane Sandy Coastal Resiliency Funding, MVPC is a partner on the Great Marsh Risk Reduction & Resiliency Enhancement Project with the National Wildlife Federation, and organizations including the Ipswich River Watershed Association, coastal

communities, MA Dept. of Conservation & Recreation, MA Coastal Zone Management, the MassBays National Estuaries Program, Parker River National Wildlife Refuge University of New Hampshire, and U.S. Geological Survey.

The project involves community outreach and planning workshops including the annual Sea Level Rise Adaptation Symposium held annually on the North Shore and presentation to local environmental and community groups.

Project partners are working with scientists from the Woods Hole Group and University of New Hampshire in developing models of hydrodynamic sediment transport taking place off Plum Island. The modeling is to be used as a tool for government policy makers to assess impacts of projected sea level rise on the built environment and public infrastructure over time.

Additional Great Marsh project management efforts involve restoration of native eelgrass plantings and control and monitoring of invasive species such as phragmites, pepperweed and green crabs, species that threaten the long-term health of the marsh ecosystem.

This page was intentionally left blank.