

# Climate Action Plan

2015-  
2020



Executive Summary

Climate Action Program History

2020 GHG Emissions Targets

Resiliency and Preparedness Planning

City of Roanoke, Virginia

**The City of Roanoke - Climate Action Plan**  
January 1, 2015 through December 31, 2019

**Table of Contents**

Executive Summary	2
Building & Energy	10
Transportation	18
Waste Management & Recycling	34
Water Resources & Stormwater Management	39
Land Use & Conservation	52
Tree Canopy and Conservation	57
Open Space and Recreational Areas	58
Local Food Access and Systems	60
Climate Plan Summary	67
Moving Forward	68
Opportunities on the Horizon	73

# The City of Roanoke Climate Action Plan

January 1, 2015 through December 31, 2019

## I. Executive Summary:

### Introduction:

The natural environment of the City of Roanoke and the surrounding region is a true asset for residents, businesses and visitors. The City's location amid the Blue Ridge Mountains, combined with access to natural resources such as the Roanoke River, Blue Ridge Parkway, Smith Mountain Lake, Carvins Cove and over 50 parks, provides a natural environmental quality in an urban setting. Consequently, how the region conserves and protects the natural environment is particularly important to the quality of life for Roanoke's residents.

Protection of such assets as air, rivers and lakes, mountains, trees, open space, and important views is critical to maintaining and enhancing Roanoke's quality of life. The quality of the physical environment – attractive streets, buildings, parks, and open space – has a direct impact on Roanoke's economy, the sustainability of its neighborhoods, and the successful stewardship of its unique natural and cultural resources. The community expects the highest level of excellence in building design, streetscapes, pedestrian amenities, and preservation of special places, conservation of natural resources and enhancement of community distinctiveness. Protecting our natural environment, supporting a wide range of social and cultural amenities, and providing ongoing educational opportunities are the building blocks for attracting new residents and businesses.

On September 2, 2008, Roanoke City Council unanimously approved a resolution to adopt greenhouse gas reduction targets for the City and community as a foundation for protecting our environment. Council committed by resolution to reduce greenhouse gas emissions from municipal operations by a total of 12.5% over a 5-year period between January 1, 2009 and December 31, 2014. Council also established a goal to reduce community-wide greenhouse gas emissions by 10% over a 5-year period during the same time frame. With these emission reduction targets in mind, City staff was charged with developing a Climate Action Plan for the Roanoke community and implementing the programs, initiatives and best practices to the extent practical and achievable within available funding and resources.

Developing a comprehensive planning document, which outlines a series of environmental goals, targets and prioritized strategies for community sustainability, represents an all-inclusive approach to enhancing the quality of life for our citizens. Accomplishing this goal for the City and region implies establishing a continuing evaluation of economic, social, environmental, and quality-of-life indicators — an ongoing assessment of conditions and progress toward the City's collective efforts to decrease its carbon footprint. This Climate Action Plan builds on the

strategies that City Administration has already developed and implemented in the City's Vision 2001-2020 Comprehensive Plan to improve Roanoke's preparedness and resilience.

Roanoke's Vision 2001-2020 Comprehensive Plan is an integrated set of policies, actions, and strategies designed to successfully position Roanoke as a progressive, model city for urban development life in the future. A significant number of policies included in this plan are essential to maintaining the City's natural environment, protecting its economy and natural resources, investing in more resilient infrastructure, providing sound support systems to manage climate impacts, and ensuring that Roanoke's operations and facilities protect and serve the citizens of the community. The goals and strategies addressed in the City's Climate Action Plan will closely align with the strategic priorities identified in the City's comprehensive plan and have been brought forward as part of the planning process that will guide investment and decision-making over the next 10 to 20 years.

Roanoke's ultimate vision is to be a sustainable and livable community. By sustaining and developing our local assets, the City will in essence revitalize its economy, limit waste and pollution, conserve natural resources, and promote cooperation and efficiency. Like most other urban communities, the City faces enormous challenges as its resources are limited. Today's societal pressures, such as an unstable national economy, climate change, access to adequate water supplies, safe food, national security, and continuing environmental degradation require new and innovative strategies to strengthen our community and build a bridge to a sustainable future.

Through the development of this Climate Action Plan, Roanoke is on the right path to reducing its carbon footprint. However, the City is ever-mindful that the key is not reducing emissions in "Roanoke, the Municipality", but rather reducing emissions in "Roanoke, the Community". Of course, this will not happen all at once. Yet, with the use of a developed Climate Action Plan template, the City will work with the community to promote timely and consistent action, programs, and policies that will result in reduced annual emissions.

## **II. Climate Change**

Concerns about the causes and effects of climate change fill the media daily. A great majority of the scientific community believes climate change is real and caused primarily by human activity. Many Americans believe that climate change is real, yet are split over its primary cause. Notwithstanding differing perspectives, Roanoke is hedging its bets on the climate change discussion and is moving forward to reduce energy use and greenhouse gas emissions in municipal operations and the broader community. From Roanoke's perspective, there is a natural link between quality schools, vibrant neighborhoods, cultural programs, diversity, good government, economic development and reducing the impact of climate change.

Sustainability is also about difficult choices and trade-offs today in an attempt to improve quality of life in the future. The City is constantly preparing for the impacts of climate change to reduce community vulnerability and strengthen its resiliency against adverse impacts imposed by

climate change. It is faced with numerous challenges such as flooding, extreme fluctuation in weather, aging stormwater infrastructure, increased energy costs, and a decreasing water supply. If the community does not prepare for these challenges, its future safety, prosperity, and preparedness may be impacted significantly.

Effectively preparing for and responding to current and projected climate change requires an ongoing evaluation and series of action steps, not a one-time assessment. It calls on our community to adopt policies that make the impacts of climate change a part of the comprehensive planning of our community. It also calls on us to strengthen existing efforts and build partnerships throughout the community to reduce Roanoke's vulnerability to the impacts of climate change. The City's development of a Climate Action Plan is designed to accomplish this goal.

Staff continues to develop a number of strategies to address key resiliency and adaptation goals. Strategies such as Low Impact Development (LID), conservation of natural habitats and resources, water supply planning, the development of infrastructure improvements to the public water system, landscape connectivity, and efficient land management behaviors all serve as vital components of municipal preparedness planning. The City has also implemented stormwater management and energy efficiency programs and has continually explored renewable energy strategies. Given the increase in frequency and intensity of natural hazards, it is extremely important that resiliency, adaptation, and preparedness planning work in concert with greenhouse gas mitigation efforts identified in the City's Climate Action Plan.

### **III. Overview of Existing Plans and Initiatives**

#### Introduction:

There is much discussion about the impact that climate change will have on local governments, and consequently, the role that such governments should assume in developing coherent policy direction to lessen the potential unintended consequences. Clearly, local governments are taking action, as noted in a caption from the *County News Online*:

“Whether counties are motivated by global warming, air quality, national security, sustainability or financial savings, they are taking action to reduce harmful greenhouse gas emissions (GHG). Environmental risks and potential costs for inaction, meeting shrinking budgets and saving taxpayer dollars, moving the country toward energy independence – pick the goal you'd like, but the bottom line is counties are more aware today of emissions than ever before.”

There have been few mandates promulgated at either the state or federal level for curbing greenhouse gas emissions, which begs the question: What should local governments do? Go along with the leading climatologists and spend taxpayer dollars on global climate change initiatives although some may not perceive that climate change is occurring? Request your local

electricity company to stop burning coal for power generation? Stick your head in the sand and say that climate change will not impact our community?

### Internal Analysis

The City of Roanoke realizes how extremely important it is for local governments to take the lead on environmental issues and make a concerted effort to share environmentally sound practices with citizens, local businesses and nonprofit organizations. Since 2005, the City has been informally developing a Climate Action Plan from which all City efforts have derived. Conducting a carbon inventory and implementing energy saving measures such as HVAC improvements, lighting retrofits and upgrades, the purchasing of fuel efficient or hybrid vehicles, and established environmental policies within the organization, have all served as instrumental components of the City's Climate Action Plan.

In July 2005, City staff conducted an internal, comprehensive analysis of major energy use within municipal operations as a first step. During this analysis, an Energy Improvement Plan (EIP) was developed, which involved two major components: (1) the hiring of facility workers with HVAC expertise (not performance contractors) tasked with evaluating heating, lighting, & fuel expenses, exploring opportunities to cut expenses, and discovering alternatives to control heating and fuel costs by 10%; and (2) conducting an enterprise-wide HVAC analysis, incorporating a 5-step process as follows: Step 1 - HVAC Component Evaluation (what can be repaired, replaced or recalibrated); Step 2 – Testing and balancing by internal staff which included filter replacement, coil cleaning and air delivery component calibration, cleaning water strainers, water balancing and resetting valves; Step 3 – Upgrade of controls which included an analysis of pneumatic controls with upgrades to digital controls, as appropriate; Step 4 – Equipment Upgrades through analysis of existing equipment that was operational but may have been inefficient and/or exceeded its useful life; and Step 5 – Innovation which included a number of discoveries particularly related to older equipment that remained operational during periods when it was unnecessary.

This five-step process resulted in numerous efficiencies, including: HVAC (Heating, Ventilation & Air Conditioning) upgrades; the City's use of B5 (blend of 5% bio-diesel) fuel and E10 (10% ethanol & 90% gasoline) fuel in City fleet; replacement of over 700 incandescent lights with Compact Fluorescent Lights (CFL's) and light emitting diodes (LED's); the installation of motion sensors in conference room and restroom areas throughout municipal facilities; mandated recycling in all city buildings; and the purchasing of recycled products. These changes would be the City's first efforts toward reducing energy consumption and implementing a number of best practices in sustainability to improve operational efficiency.

### ICLEI's Five Milestone Process for Sustainability

With community benefit in mind, the City believes that development of a long-term Climate Action Plan involving multiple stakeholders and engaging in a combination of activities and programs is the appropriate action to take. Toward that end, on Sept. 18, 2006, Roanoke City

Council passed a resolution to join ICLEI -Local Governments for Sustainability, an organization dedicated to improving the global environment through local government initiatives. Roanoke was the first city in Virginia to join ICLEI, and by virtue of its membership engaged in ICLEI's Five Milestones process for identifying greenhouse gas emissions and developing strategies for their reduction in both local government operations and the broader community.

The Five Milestone Model includes the following action steps: (1) Conducting a baseline emissions inventory and forecast; (2) adopting an emissions reduction target for the forecast year; (3) developing a Local Action Plan; (4) implementing policies and measures; and (5) monitoring and verifying results. By engaging in this ICLEI process, Roanoke pledged to do something about global climate change, not just talk about it. The template for success was developed, making available the proper tools to evaluate progress.

### Conducting a Baseline Emissions Inventory

Using ICLEI software, city staff worked with the Center for Energy and Sustainability at James Madison University's Shenandoah Valley Air Quality Initiative (SHENAIR) and the Green Engineering Program at Virginia Tech to evaluate and determine the City's baseline carbon footprint. Through this process, city staff was able to quickly identify and implement practical measures that would reduce municipal greenhouse gas emissions and promote energy conservation and the use of alternate fuels in the city's business practices.

On Jan. 22, 2008, Roanoke's 2005 baseline municipal emissions inventory report was presented to City Council by Dr. Sean McGinnis, Director of Virginia Tech's Green Engineering Program. This report detailed the community's greenhouse gas (GHG) and criteria air pollutant (CAP) inventory for the City. During his presentation to Council, Dr. McGinnis indicated that the "total greenhouse gas emissions for the City of Roanoke were approximately 2.9 million tons of carbon dioxide equivalent." (Source: Baseline Municipal Emissions Inventory and Analysis for the City of Roanoke: Parts 1 & 2 by Ann Albrecht, Undergraduate Research Assistant, CEES-SHENAIR, JMU, and Sean McGinnis, Director, Green Engineering Program, VT). The initial data and inventory modeling was divided into three (3) main sectors: city buildings, vehicles and public lighting. The inventory included 63 city buildings (inclusive of pedestrian walkways, employee parking lots, and the police impound lot), fleet (inclusive of the City's main fleet, fire/emergency services vehicles and school buses), and lighting (inclusive of athletic field lights, streetlights and traffic signals).

Of the three main sectors, the results revealed somewhat the obvious - the building sector produced the most greenhouse gas emissions at 60 percent and had the most energy use and costs associated at 50 percent. The results further revealed that electricity accounted for 57 percent of carbon emissions due relatively to the higher carbon intensity of electricity provided to the Roanoke Valley and Southwest Virginia with 88 percent of its electricity generated from coal. As Roanoke's emissions came primarily from buildings, streetlights and vehicles, a number of scenarios were presented relative to alternative energy use, installation of more

energy-efficient lighting, and other building retrofits as viable solutions to reducing the local government's contribution to the overall community's greenhouse gas emissions.

While all of the data presented was very important, the key learning point is that only 1.9 percent of total carbon emissions were contributed by City government with the remainder 98.1 percent contributed by the residential, commercial and industrial sectors of the City (Refer to Baseline Results chart above). Consequently, if the City really desired to mitigate the impact of global climate change on the City, increased education and collaborative efforts with the residential, industrial and commercial sectors of the community would be essential to successfully reducing the City's carbon footprint. With this in mind, McGinnis suggested an immediate plan of action to decrease carbon emissions by enhancing municipal and community recycling efforts and, more importantly, engaging residents and the business community in efforts toward environmental stewardship.

### Community Outreach Efforts

With initiatives already in place to address municipal emissions, in 2007 a "Clean and Green" initiative was implemented by Council Member Gwen W. Mason to amplify the City's efforts in "greening" its internal operations and launch a community-wide effort to raise awareness among the residential, commercial and industrial sectors. The campaign's goal was to focus the community on the importance of reducing the community's collective carbon footprint through energy conservation, greenhouse gas reduction, waste management and recycling. On September 17, 2007, City Council adopted a formal resolution endorsing the campaign, and on September 18, the campaign was officially launched with the goals of engaging the community in sustainable residential and business practices, promoting environmental stewardship and cleaning up the City. The City's vision was to encourage sound environmental practices and stewardship that the entire Roanoke community could embrace as it looked toward the future.

During the campaign, City staff worked with citizens, civic organizations, businesses and other environmental organizations on initiatives to enhance both municipal and community sustainability efforts. Some of these initiatives included expanding the city's recycling program, increasing cleanup activities, enhancing public education on environmental issues, developing environmental outreach opportunities for citizens, schools and businesses, and encouraging and assisting citizens and businesses in measuring and reducing carbon emissions. Efforts resulted in an increase in city and community-wide recycling, a decrease in energy consumption and, most importantly, community awareness as to how individual behaviors impact the environment.

In 2008, the City of Roanoke held an Environmental Summit to educate the public on environmental issues and to request public feedback on how to better engage the community in environmental efforts. A presentation, which strategically outlined specific actions for carbon dioxide reductions and the associated environmental impacts, was provided by Dr. Sean McGinnis.. Over 200 citizen and business representatives from Roanoke and surrounding jurisdictions in Southwest and Central Virginia attended and participated in roundtable



discussions regarding “what specific steps Roanoke should take to engage the residential, commercial and industrial sectors of the community to reduce its carbon footprint”. Ideas emerged from the discussion which focused on the following six (6) priorities: Energy efficiency, transportation, waste management and recycling, education and public awareness, building tax credits and other incentives, and beautification and conservation efforts.

The synergy of the participants was palpable and resulted in the establishment of the “Citizens for Clean and Green” (CCG) Committee. This committee is composed of concerned citizens, business leaders, and environmental enthusiasts and was tasked with developing a plan of action for community engagement on environmental issues. The group has met since January 2009 and has focused on evaluating the community GHG emissions report (ICLEI Milestone I) and making recommendations on ways to reduce emissions in the commercial and residential sectors through the development of innovative and practical programs.

To date, the CCG has worked with the Association for Energy Conservation Professionals and the Community Association for Energy Efficiency (Café 2) to establish market-based energy efficiency initiatives within the City. Members have developed a “Citizens for Clean and Green” Campaign pledge for citizens, aimed at reducing lifestyle impacts of the residential sector on the environment. They have conducted four City of Roanoke “Green” Academies, which is intended to educate citizens about energy conservation, weatherization, renewable energy and water conservation. Finally, the group helped to establish saveaton.org (a product of the Save-a-Ton program), an interactive web-site intended to provide citizens with information to help make informed decisions about energy conservation.

Another significant accomplishment of the City’s sustainability outreach efforts was the formation of the City’s Business Environmental Leadership Coalition. On March 14, 2008, twelve major businesses in the city joined forces with the City to create the Business Coalition. The mission of the Coalition was to identify and implement environmentally sound business practices. These practices included the development of sustainable business plans, the tracking of carbon emissions, recycling, and mentoring other businesses in the community with regards to sustainability practices. With the assistance of Dr. Sean McGinnis, each business measured its 2007 carbon footprint and identified and implemented sustainable business practices in an effort to reduce carbon emissions. In 2008, the coalition announced a goal of 20% carbon emissions reduction collectively over a period of five (5) years (an average of 4% per year). With this goal, the Coalition doubled the community-wide carbon reduction goals by committing to a 4% reduction collectively in their carbon footprint over a 5-year period.

In 2008, Coalition members began measuring their carbon footprints annually to evaluate the effectiveness of business practices instituted to decrease their carbon footprint. Members reduced their carbon footprint collectively by approximately thirteen (13) percent. Recycling efforts were tripled, energy consumption declined, heating and cooling systems improved, and lighting was retrofitted. Individually, the accomplishments of the businesses included, but were not limited to, the following: Berglund Auto reduced use of high wattage outdoor lights on display lots, which resulted in a reduction of 58,000 kilowatts of electric usage in 2009; Breakell

Inc. purchased a company fleet of Toyota Prius hybrid vehicles, thus greatly reducing gas consumption; Carilion Clinic almost tripled their recycling efforts and reduced energy consumption with guidance from consultant services despite adding new medical facilities; Gentry, Locke, Rakes & Moore upgraded to energy efficient lighting, installed eco-friendly carpeting, and improved heating and cooling systems; Landford Brothers Co. recycled asphalt and metals and is currently at the LEED GOLD certification level through U.S. Green Building Council; Orvis reduced kilowatt usage by thirty-three (33) percent by changing lighting and adding motion sensors and reduced landfill tonnage by fifty (50) percent through an agreement with the Rescue Mission to send customer returns to the mission; the Roanoke Gas Company initiated a mandatory recycling program; and Virginia Western Community College saved \$30,000 per year by turning off CPU monitors at the college labs instead of leaving them in sleep mode overnight.

To promote these best practices more effectively throughout the community, the City's Director of General Services/Sustainability hired a Sustainability and Outreach Coordinator in 2012. The Coordinator serves as the City liaison for the Business Coalition and the "Citizens for Clean and Green" and has been instrumental in facilitating both the City's and the community's sustainability efforts. The business community and citizens are duplicating many of the energy and fuel conservation measures implemented by the City, and members of the community's residential, commercial and industrial sectors have pledged tiered commitments toward sustainability.

The City of Roanoke has determined that the window of opportunity to act on the potential impact of climate change is now. Increased energy consumption and costs, limited natural resources, and budgetary challenges have all contributed to the City's environmental consciousness. City government has ramped up its efforts to share environmentally sound practices to residents and the business community to enable them to implement and emulate the measures and sustainability efforts that are realistic and cost effective to their particular business. Thus far, the City has maximized opportunities to make its sustainability efforts more transferable to citizens, businesses, civic organizations and other governmental and non-governmental entities.

With the current efforts in place, developing a more comprehensive plan of action to address greenhouse gas emissions and other environmental issues seemed to be the next natural step in the City's process. This planning process will enable the City to amplify internal and community-wide sustainability efforts in the community, engage the community in energy conservation, provide opportunities for the residential, commercial, and industrial sectors to advance their commitments toward environmental practices, and expand public education and awareness as it relates to sustainability.

## **BUILDINGS & ENERGY**

### **Overview:**

According to the United States Green Building Council (USGBC), commercial and residential buildings account for 39 percent of carbon dioxide (CO<sub>2</sub>) emissions in the United States annually, primarily due to heating, cooling, lighting, and powering electrical equipment. The Council reports that commercial and residential buildings are tremendous users of electricity. In 2005, buildings consumed seventy (70) percent of the electricity load in the United States, an equivalent of 40 quadrillion Btus (British Thermal Units) of energy at a cost of over \$300 billion. The Council projected that energy use in the commercial and residential sectors will increase to 50 quadrillion Btus by a cost of \$130 billion by 2025.

Buildings are also the largest municipal contributor to both carbon emissions and energy, as 72 percent of the electricity in the Southwest region comes from coal (AEP 2012 Environmental Information Insert - 2012 Summary Report). The City of Roanoke is a significant contributor to the region's carbon footprint due to carbon emissions from its buildings' electricity use. The municipality currently owns and maintains over 50 facilities, including office buildings, garages, libraries, fire stations, recreation centers, jails, pools, and the public work service center, which vary in size and equate to 1.8 million square feet, 30.4 million kilowatts of electricity, and over \$1.2 Million in electricity costs.

The City has taken numerous measures to improve energy efficiency of its facilities, leading by example and providing a sustainability template for the broader community. Beginning in 2006, the City hired an internal HVAC team to conduct energy audits of City-owned facilities and implement necessary actions to reduce energy consumption and cost. With the implementation of these strategies, municipal operations would be on a path to reducing carbon emissions.

In terms of commitment, the City continues to develop policies and programs that ensure that both the City and the broader residential, commercial, and industrial sectors meet their carbon emissions reduction targets. Assessing current energy use and emissions levels, prioritizing what energy and emissions to target, and selecting the most cost-effective reduction measures have all been vital components of determining the most appropriate strategy to address the energy consumption of City facilities as well as residential and commercial facilities. Implementation of sustainable building practices, standards for development and major redevelopment, and other comprehensive strategies have also played a fundamental role.

Moving forward, the City will promote green building practices, share information regarding best practices, and provide educational, technical, and financial assistance to the residents, businesses, and the building industry to ensure continued progress toward a sustainable community. By transforming the built environment to be more energy-efficient and climate friendly, the building sector can play a major role in reducing the overall carbon emissions from the environment.

**GOAL:** Reduce energy consumption and its impacts within the Roanoke community through conservation, the adoption of emerging tools and technologies, and policies and programs designed to mitigate greenhouse gas emissions.

**TARGETS:**

- 1) **Achieve a 3 percent annual reduction in greenhouse gas emissions from City facilities by 2020.**
- 2) **Decrease Energy Use Intensity (EUI) of existing City buildings by an average of 20 percent by 2020 using a 2009 baseline.**
- 3) **Achieve a 3 percent aggregate reduction of energy use in residential buildings by 2020 using a 2009 baseline.**
- 4) **Achieve a 3 percent aggregate reduction of energy use in commercial/industrial buildings by 2020 using a 2009 baseline.**
- 5) **100 percent of qualified new construction projects will achieve one of the following green building standards by 2020: LEED or comparable green certification.**

**Strategies:**

**Internal Practices:**

**Ensure that City facilities and infrastructure are models of energy-efficiency.**

Improving the efficiency of municipal buildings is one of the most effective ways to protect the climate and provide abundant opportunities for saving energy and reducing carbon emissions. To assist in this process, the City utilizes the Clean Air and Climate Protection (CACP) Campaign Greenhouse Gas Emission Software to analyze emissions and emissions reductions on both municipal operations and residential, commercial and industrial sectors. In addition to computing greenhouse gas emissions, the CACP software estimates reductions in criteria air pollutants, changes in energy consumption, and financial costs and savings associated with energy use reduction. The software's analysis has identified City buildings (the Courthouse, the Municipal South Building, the Public Works Service Center, the Main Library, the City Market Building, the Berglund Center, and the Main Jail) as primarily responsible for high energy consumption and has assisted staff in developing cost-effective action plans to monitor progress on the buildings.

In 2009, the City utilized Energy Efficiency and Conservation Block Grant (EECBG) funding from the American Recovery and Reinvestment Act (ARRA) to execute five energy retrofit projects. The projects included T-lighting retrofits and installation of direct digital controls in the Courthouse, LED lighting retrofits for the City market garage, and lighting retrofits of the jail and

designated areas of the Roanoke Civic Center. All new T-8 fluorescent lighting replaced the existing F-40 lights in the Courthouse to enhance light output, efficacy, rated life, and quality of illumination. Installation of a modern direct digital control (DDC) system in the Courthouse reduced energy costs by enabling mechanical systems to operate at peak efficiency, allowing staff users to perform intricate scheduling of the building, and collecting alarms and trend data for problem troubleshooting. The 320-fixture Market Garage LED retrofit expanded the life of the fixtures to three to five times longer than its High Pressure Sodium (HPS) and Metal Halide (MH) ceiling mounted fixtures, reduced energy costs and maintenance for public garage lighting, and resulted in less energy consumption and bulb replacements. These efforts, implemented over the course of 18 months, increased overall operational efficiency and resulted in sustainable and measurable energy savings.

**Identify system-wide best practices and techniques that reduce energy consumption across all City facilities.**

Currently, all facilities operated by the City of Roanoke are being entered into an Energy Star Portfolio Manager Program as well as Facility Dude Utility Trac for regular monitoring and analysis of building performance. This data is the cornerstone of the City's commitment to reduce its energy use in all buildings by 20 percent by 2020. In most cases, baseline data from 2005 to the current period will be evaluated to more accurately capture all the changes and improvements that have occurred in the City's building operations over the last nine years. The new data will allow the City's internal energy team to identify problems earlier, assess which buildings require capital improvements based on performance need, and identify potential sources for immediate and significant emissions reductions.

**Decrease the City's portfolio-wide source energy use intensity (EUI).**

The City is a member of the Better Buildings Challenge Partners and is committed to decreasing its portfolio-wide source energy use intensity (EUI) and increasing its percent of improvement compared to a set baseline. Roanoke's portfolio consists of more than 25 buildings and 1 million square feet. Since 2009, energy performance has improved by 16 percent at nearly half of its facilities. However, there are five facilities that have experienced an increase in Source EUI. In order to continue to improve building performance of all facilities, the in-house energy team developed a Preventive Maintenance Plan and Capital Repair Program that prioritize improvements for lighting retrofits, HVAC, and mechanical systems.

The City seeks to reduce building energy intensity by at least 20% by 2020. To achieve this, the City will focus on updating/retrofitting HVAC systems and lighting. Some of these projects include: continuing lighting upgrades in fire stations, libraries and recreation centers; installing direct digital controls in numerous buildings; installing plate exchangers to obtain cooling without electric powered mechanical chillers; designing and installing a solar panel array to recharge batteries thus reducing the total number of alkaline batteries used; installing a magnetic chiller and new lighting at the Berglund Center.

**Recommend City-financed projects to meet an energy efficiency standard, such as LEED, Energy Star standards, National Home Builders Association (NHBA) Green Building, and Earthcraft.**

In 2007, the City established a requirement to achieve Leadership in Energy and Environmental Design (LEED) certification for all new government buildings. Since then, the City has constructed four new buildings - the Roanoke Police Academy, Fire-EMS Stations No. 3 and No. 5, and the renovated City Market Building - all of which have been LEED certified. LEED Certification as well as other appropriate environmental certifications, for new construction is standard procedure for all newly constructed City buildings. Energy and water usage on these buildings are tracked via data populated through the Energy Star Portfolio Manager.

**Continue to review the City's "Preventative Maintenance Plan" and "Capital Repair Program" to guide efficiency investments in City facilities.** (no additional text)

**Explore the purchase of electricity from solar photovoltaic systems (solar infrastructures) hosted on government facilities and assist with the recruitment of businesses in the community to adapt similar strategies.** (no additional text)

**Residential and Commercial Sectors:**

**Assist with and support transitioning the Community Alliance for Energy Efficiency (Cafe<sup>2</sup>) program to an established program that assists residents with home energy efficiency upgrades.**

In 2009, an American Recovery and Reinvestment Act (ARRA) grant was awarded to Community Housing Partners (CHP) to develop and implement a residential program that would provide low cost home energy audits and affordable retrofits for local citizens through special financing, tax credits, special incentives, and rebates. As a result, an Energy Alliance developed between the City of Roanoke, the Town of Blacksburg, the Association of Energy Professionals (AEEP), and Community Housing Partners to implement the Community Alliance for Energy Efficiency (Cafe<sup>2</sup>) project. Cafe<sup>2</sup> has been highly successful in providing low cost energy audits to the community. To date, Cafe<sup>2</sup> has provided 236 audits and 126 retrofits throughout the Southwest region. The participating clients averaged an overall energy reduction of 26 percent.

Although funding for the Cafe<sup>2</sup> program has been depleted, CHP currently provides residents an opportunity to participate in its Home Performance with Energy Star program. Residents complete an on-line self-assessment about their homes to get a free report on their potential energy and cost savings. They are then given the option for a home evaluation to explore issues of poor insulation, duct issues, air leakage, equipment and appliance conditions, window integrity, and moisture and indoor air quality concerns. Rebates, low- or no-interest loans, and tax credits are sometimes made available depending on the work to be done by an Energy Star

service provider. The City will continue to work with community partners to advance opportunities of similar programs in the community.

**Assist City of Roanoke homeowners in participating in energy efficiency retrofit programs.**

In 2011, the City, along with other regional partners interested in reducing greenhouse gas emissions, created Save-a-Ton, a regional energy conservation education and awareness program. The partnership program was created to connect residents of the greater Roanoke Valley to local businesses and services that could assist them with reducing their energy consumption. The premise of the program is that of the 100,000 households in the Valley, if every household saves a ton of energy, it could have a major impact on the health of the environment. During the next decade, the City of Roanoke has committed to 3% reduction in community carbon dioxide emissions.

Save-a-Ton is currently managed by the Roanoke Valley Allegheny Regional Commission that uses a wealth of marketing strategies, including Save-a-Ton's website and social media presence on Facebook and Twitter, to share information about local energy efficiency and conservation programs and to connect citizens with businesses that provide energy-related goods and services across the Roanoke Valley. The Save-a-Ton program received a 2012 Innovation Award from the National Association of Development Organizations (NADO). The campaign was recognized for its regional approach to energy conservation education and awareness program and its effort to reduce duplication across local governments. This effort demonstrates the City's commitment to preserving the environment and natural resources that enhance our quality of life.

**Provide technical assistance to help residential and commercial owners retrofit historic buildings, recognizing the emission-reduction benefits of retaining existing buildings instead of building new ones.**

The City of Roanoke provides substantial relief from real estate taxes to property owners who rescue, repair and rehabilitate qualified older buildings. Subject to the certain qualifications, real estate tax is deferred on the value of the improvements to the property. The Office of Real Estate Valuation provides eligibility and application requirements for both residential and commercial real property.

**Support and promote the community's commitment to low-income weatherization programs, such as Total Action For Progress' (TAP) Home Weatherization Assistance program.**

TAP's Energy Conservation and Housing Rehabilitation Program provides home weatherization services to the citizens of the City of Roanoke, Roanoke County, Salem City, Botetourt County, Craig County, and the Allegheny Highlands. Weatherization services are funded by the US Department of Energy and the Virginia Department of Housing and Community Development

and designed to reduce the cost of heating and air conditioning costs for low-income families. Priority is given to the elderly, individuals with disabilities, and families with children. The program provides direct installation of energy-saving measures such as: sealing air-leaks with insulation, caulking, and weather-stripping; repairing leaky duct systems; repairing and/or replacing inefficient or unsafe heating systems; and installing carbon monoxide and smoke detectors.

### **Connect and collaborate with other sustainability efforts.**

In an effort to promote economic opportunity and a greater quality of life, the Roanoke Valley-Alleghany Regional Commission accepted a \$9 million Sustainable Communities Regional Planning Grant to fund a 3 year comprehensive economic, environmental and housing plan for the region. The City of Roanoke is one of over 50 partners - including local governments, non-profits, businesses and educational providers - in the Southwest Region that are participating in the planning process. Throughout this comprehensive planning process, the City will work collaboratively with other municipalities and community stakeholders to determine how best to target infrastructure and capital investments that would promote energy efficiency.

### **Promote permitting processes that encourage green building.**

#### General Strategies:

#### **Identify and target the potential energy savings from the commercial and industrial sectors.**

Roanoke continues to encourage businesses to track and reduce their energy consumption by providing tools and resources to support energy efficiency. To date, five private sector buildings have completed baseline data in Portfolio Manager. The intent is to collect this information, share results (as appropriate) and create an ongoing dialogue about best practices related to energy efficiency.

#### **Promote public-private partnerships in order to organize and reach out to the residential and business sector, necessitating efforts that businesses can undertake to reduce their energy usage.**

The City has served as a conduit for change in the business community by promoting the adoption of sustainability best practices in the commercial sector. Roanoke established a Business Environmental Leadership Coalition (later known as the Clean & Green Business Coalition), a consortium of local businesses and employers that would serve as pacesetters in implementing environmentally sound practices in support of the city's Clean and Green mission. By joining the city in monitoring greenhouse gas emissions, recycling, developing sustainable business plans, and practicing conservation in business routines and processes, the private sector has demonstrated true leadership in environmental stewardship.



Each participating business was asked to take the following actions: 1) Conduct a carbon inventory; 2) encourage conservation through business practices; 3) purchase environmentally sound products and supplies and use their power as a consumer to increase vendor awareness; and 4) designate a staff member to serve as a champion for the environment on behalf of the business.

In November 2008, the Coalition announced a goal of collectively reducing its carbon emissions by 4 percent per year for 5 years. By 2014, the Business Coalition had achieved a 33 percent absolute combined business reduction goal, concluded with 20 percent real energy savings, reduced carbon emissions by 16,300 tons, and prevented more than \$2 million dollars in avoided energy costs.

The City will continue to support and facilitate the sustainability efforts of the coalition. Also, staff will explore opportunities to work collaboratively with the Roanoke Regional Chamber of Commerce in engaging the business community in sustainable business practices.

**Support and promote programs, policies, and enabling legislation that strengthen sustainability initiatives in the community.**

At the request of the City of Roanoke, the Virginia General Assembly enacted enabling legislation allowing localities to provide relief from local property taxes for “going green.” Subsequently, the City sought enabling legislation from the General Assembly to set up a separate class of real property for energy-efficient buildings. During the 2007 General Assembly, energy-efficient buildings were declared to be considered a separate class of real property for the purposes of taxation. Effective July 1, 2007, Roanoke became the first community in Virginia to adopt a special tax rate for energy-efficient buildings. This tax incentive provides a four-year, 10 percent real estate tax decrease if the building is 30 percent more efficient than required by the Virginia Uniform Statewide Building Code. This tax break applies to residential and commercial properties. To date, 38 applicants have taken advantage of this special tax credit.

Another incentive adopted by City Council was the tax exemption for use of certified solar energy equipment. The City amended Sections 32-103.5 through 32-103.17 of the code of the City of Roanoke, addition of new Division 8, owners of real estate to which certified energy equipment, facilities, or devices to permit a tax exemption for properties with solar equipment. This exemption is effective for 5 years and applies to properties where the owner has installed new solar equipment, facilities or devices, as well as to properties that have existing solar equipment, facilities or devices. Property owners may apply for either of these incentives through the city’s Real Estate Valuation office.

**Support the adoption and implementation of emissions reductions plans by other entities and institutions.**

The Roanoke Valley Cool Cities Coalition, a local organization in the Roanoke Valley that is tackling energy policy and the complex problem of global warming through education, outreach, and community actions. The organization engages citizens, businesses, organizations, and governments in Southwest Virginia to reduce their greenhouse gas emissions and provides a network for local governments to stay engaged in discussion with one another as it relates to sustainability practices.

As members of ICLEI – Local Governments and the Virginia Municipal League’s Go Green Virginia program, the City and surrounding jurisdictions engage in a series of regional educational forums designed to advance energy savings and sustainability efforts in the Roanoke Valley. In addition, the City and its regional partners are able to maximize the value of energy efficiency projects to be realized in the region through sharing and developing best management practices and through collaborating regionally on specific environmental policies and practical actions that reduce carbon emissions.

As the Roanoke Valley embraces sustainable community initiatives, local economic development organizations are searching for ways to include sustainable features of the community into their economic development messages. The partners include the economic development staff from the Roanoke Regional Partnership, Roanoke County, City of Salem, City of Roanoke, and Roanoke Valley – Alleghany Regional Commission. The City’s Sustainability Coordinator and members of the City’s Economic Development Office are facilitating the process of crafting a sustainability message that will showcase the valley’s commitment to the environment.

**Provide education and outreach efforts designed to promote the reduction of community-wide energy use.**

The City’s Green Academy is a 15 hour environmental awareness program that gives City residents a chance to learn from regional experts on important environmental issues of the day. The academy provides an overview of energy conservation, weatherization, renewable energy, water conservation, storm water, wastewater, local foods, green building and local government initiatives offered to the community. Since 2011, the Citizens for Clean and Green Committee have hosted four separate sessions with the most recent academy held in March 2014.

**Support and promote demand response strategies and other technologies in the community to help meet consumer demand, detect system overloads that could be caused by heat events or other issues, and reroute power to improve system reliability.**

The City is currently participating in a “Demand Response Program” that offers incentives for organizations that curtail their facilities’ energy use during times of peak demand. In this program, the City generates revenue through an energy load shedding strategy called

“emergency demand response” and is paid to switch to on-site generators, or otherwise reduce electrical use, when the electrical grid experiences spikes in demand or shortages of supply. The service is generally utilized during high energy demand periods that are often created during excessively high summer temperatures. This program allows the City an opportunity to manage and aggregate the load during high-capacity periods, generate high quality data through state of the art energy monitoring equipment, and promote staff training in energy reduction strategies.

For businesses able and willing to curtail energy use in response to various grid conditions, demand response programs (commonly known as load response) can deliver revenue and energy offsets, increase reliability of the electrical grid, and provide advanced notice of irregular conditions on the grid while minimizing the risk of sudden disruptions. In order to meet the necessary conditions for the program, customers are supplied with energy monitoring equipment to provide access to real-time, meter data through web-based energy management software. This is an invaluable tool for identifying energy efficiency opportunities and maximizing demand response payments.

**Support and incentivize, when possible, the renewable energy market in the commercial sector.** (no additional text)

**Continue to support the annual “Green Living and Energy Expo” and related community green living events.**

The Association of Energy Conservation Professionals (AECF) is a non-profit energy education and advocacy organization that believes a better-educated general public is the path to a more secure, clean, independent and healthy energy future. Since September 2000, the AECF has hosted the annual Green Living and Energy Expo which is the longest event of this type in the United States. The event began as an energy conservation fair at Virginia Tech with 13 exhibits and 250 attendees. Fourteen years later, the renamed Green Living and Energy Expo has grown to 90 exhibits and over 2,000 people in annual attendance. This successful growth is the result of community support, additional sponsorships, and an ever increasing demand for smart, efficient, and sustainable solutions in managing our resources and energy needs. The City of Roanoke has been a Gold Sponsor for the last 5 years and will continue to support this endeavor.

## **TRANSPORTATION**

### **Overview:**

Roanoke’s transportation system is a network of local and regional roads, freight rail (east-west, north-south), airport, transit, and an evolving system of greenways and bikeways. Several major interstates and regional routes frame the region with Interstates I-81 and I-581 running

north-south through the region, I-64 running east-west, U.S. 460 running east to the Tidewater Virginia area, and U.S. 220 running southward toward Greensboro, N.C. Norfolk Southern provides freight rail service. Passenger and freight air service are provided through the Roanoke Regional Airport. Greater Roanoke Transit Service, also known as Valley Metro, provides bus transit and paratransit service.

The road system is an interconnected grid providing easy access via multiple routes throughout Roanoke. The City, with cooperation and funding from the Virginia Department of Transportation (VDOT), is responsible for planning and maintaining its roads, greenways, bikeways, and other transportation facilities. Roanoke participates in a regional Metropolitan Planning Organization (MPO) that is responsible for the development of a long-range transportation plan, regional greenway plan, regional bikeway plan, transportation improvement program, and other transportation plans.

According to the U.S. Environmental Protection Agency, in 2012, greenhouse gas emissions from transportation accounted for about 28% of total U.S. greenhouse gas emissions, making it the second largest contributor of U.S. greenhouse gas emissions after the electricity sector. Emissions from transportation have increased by about 18% since 1990, and sources reveal that this historical increase is largely due to increased demand for travel and the stagnation of fuel efficiency across the U.S. vehicle fleet. The EPA also indicated that the number of vehicle miles traveled by passenger cars and light-duty trucks increased 34% from 1990 to 2012, which is attributed to population growth, economic growth, urban sprawl, and low fuel prices during the evaluative period.

In 2005, the City worked with Dr. Sean McGinnis, to measure and analyze Roanoke's municipal and community greenhouse gas and criteria air pollutant emissions as part of the ICLEI - Local Governments for Sustainability process. Results of Roanoke's carbon emissions baseline study revealed that transportation was the largest contributor to carbon and other criteria air pollutant emissions with 928,932 (over 32.2%) tons of carbon dioxide and 3,192 (over 50%) tons of nitrogen oxide emitted. The results also revealed that diesel and gasoline accounted for fifty (50) percent of nitrogen oxide criteria air pollutant emissions.

The report findings indicated that there were numerous opportunities for Roanoke to reduce greenhouse gas emissions associated with transportation. As a result, several transportation initiatives were implemented as follows: signal synchronization of high traffic corridors, purchase of bio-diesel, propane and other clean fuels for municipal vehicles, purchase of hybrid and electrical vehicles, replacement of incandescent lights with LED bulbs at major intersections, and other transportation initiatives. These amplified sustainability efforts yielded significant and quantifiable results. The City replaced incandescent lights with LED lights of the City's major intersections, by 2014 154 of the 158 traffic signals had been replaced yielding and energy savings of 78.5%.

In July 2008, the City improved signal coordination in three high traffic corridors - Hershberger Road, Williamson Road and Orange Avenue. This effort involved updating and improving signal

timings and installing equipment necessary to maintain coordination among 30 signalized intersections. The total length of the affected travel corridors was approximately nine miles, and an analysis of the benefits of this signal coordination by the Transportation Department indicated that during peak traffic periods, travel time was reduced by up to 11 percent, delays were reduced by up to 20 percent, the number of stops declined by up to 15 percent, and fuel consumption was reduced by up to 10 percent.

Roanoke also considers its streets as an important part of the livability of its community. Subsequently, it expects planners and engineers to build road networks that are safer, more livable, and welcoming to everyone. In 2001, Roanoke's comprehensive plan set a goal of creating an integrated, multimodal transportation system for automobiles, bicycles, pedestrians, and transit. The plan called for new street design guidelines based on a classification system that would balance the purpose of the roadway with the impacts on surrounding areas.

In 2007, the city planning commission adopted new street design guidelines as an internal guidance document. In 2008, the City adopted a "Complete Streets" policy to ensure that transportation planners and engineers would consistently design and operate the entire roadway with bicyclists, public transportation vehicles and riders, and pedestrians of all ages in mind. By adopting this policy, Roanoke City Council ensured that the City would routinely plan, fund, design, construct, operate, and maintain its streets according to the principles of the City's "Street Design Guidelines" with the goal of creating an attractive and connected multimodal network that balances the needs of all users.

The City of Roanoke places high value and emphasis on green space and bicycle connectivity of the natural beauty in the area. Emphasis is also placed on how to best offer citizens alternative transportation options that may include public transportation or non-auto modes of transportation. By moving more people with fewer vehicles or no vehicles, the City is able to reduce environmental impacts of transportation.

In Roanoke, there are numerous studies that have been conducted or are currently underway as part of an "Urban Green Infrastructure" movement. These studies include analysis of the Regional Pedestrian Plan, the Greenway Plan, the Roanoke Valley Long-Range Transportation Plan, the Tinker Creek Watershed and Greenway Location studies, the Roanoke River Linear Park study, the Lick Run Watershed and Neighborhood Green Infrastructure studies, Outlook Roanoke – the Downtown Area Plan, the Mill Mountain Management Plan, and the Riverside Park, the Biomedical Complex Master Plan, and a myriad of others. These studies and the city's desire to create a multimodal transportation network are providing opportunities for educating the public, providing community outreach and building a network of organizations and other local governments to fully realize the potential of conservation, connectivity, and green infrastructure planning in Roanoke.

**GOAL:** Roanoke will provide a safe, efficient, accessible, user-friendly, and connected multi-modal transportation network of well-designed streets and other infrastructure that accommodates auto, mass transit, rail, pedestrian, and bicycles, while providing greater

connectivity, improving mobility, reducing greenhouse gas emissions, and promoting fuel efficiency. (The Goal includes elements of the Comprehensive Plan 2020)

#### **TARGETS:**

- 1) Reduce daily vehicle miles traveled in Roanoke by 5 percent by 2020 while increasing transportation choices and improving accessibility.**
- 2) Increase public transportation and non-auto modes of transportation for commuting to work by at least 5 percent of City residents by 2020 based on data from the American Community Survey.**
- 3) Reduce car reliance and promote cycling, walking, and transit use.**
- 4) Construct or designate 20 additional miles of on-street, protected bike lanes by 2020 to allow safe and efficient travel for all types of cyclists.**
- 5) Construct 6 miles of paved greenway infrastructure and 11 miles of natural surface greenway on city-owned land by 2020 to provide greater connectivity to housing, public areas, transit facilities, recreational centers, and cultural amenities.**
- 6) Increase the education and outreach regarding the use of hybrid and electric vehicles in the community.**
- 7) Increase the number of electrical charging stations in the community from 2 to 10 by 2020.**
- 8) Expand the use of clean fuels in all City-owned fleet vehicles by 2020.**

#### **Strategies:**

##### **General Strategies:**

**Ensure that all transportation agencies within the City routinely plan, fund, design, construct, operate, and maintain streets according to the “Complete Street” principles of the City’s “Street Design Guidelines”.**

In 2008, the City of Roanoke adopted a “complete streets” policy requiring all subsequent transportation and rehabilitation projects to incorporate infrastructure for bicycles, pedestrians and mass transit service. Through this policy, the City seeks to ensure that all transportation agencies within the City routinely plan, fund, design, construct, operate, and maintain their streets according to the Complete Street principles of the City’s Street Design Guidelines, while

creating an attractive and connected multimodal network that balances the needs of all pedestrians, bicyclists, transit riders, and motorists.

More specifically, the *Street Design Guidelines* encourage bicycle accommodation along all arterial and collector streets. The policy reinforces the development of pedestrian and bicycle infrastructure as critical amenities for well-designed cityscapes and recreational opportunities. It also emphasizes the role that transportation infrastructure has in attracting sustainable economic development and population growth, improving environmental stewardship, reducing fuel consumption, and reducing demand for motor vehicle infrastructure.

To help implement the new complete streets policy, Roanoke formed a street design team to ensure that new projects contained the appropriate pedestrian, bicycle, and transit accommodations. The interdepartmental team has representatives from the departments of Planning, Building, and Development, Parks and Recreation, and Neighborhood Services, as well as from the Transportation and Engineering Divisions of the Public Works department. Having a street design team ensures that repaving and restriping projects are now routinely considered as a method for providing accommodations. This is particularly important as Roanoke's street projects primarily involve redesign of existing streets and major new street projects are rare. City staff will continue to carry the "Complete Streets" approach into the City's downtown and neighborhood planning.

**Promote bicycling, walking, mass transit, carpooling, telecommuting, and emergency ride home programs as attractive alternatives to driving.**

Over the years, the City has worked closely with local stakeholders to develop a transportation network that encompasses an array of alternative transportation options. In the Roanoke community, these efforts have been spearheaded by Ride Solutions, a Transportation Demand Management (TDM) Agency, dedicated to expanding the efficiency and life of the roadway network and reducing the environmental impacts (air pollution) of vehicle emissions.

Ride Solutions is a grant-funded agency that provides alternative transportation options – ridesharing (carpooling and vanpooling), biking, public transit, walking, and guaranteed ride home services – to residents living within the New River Valley, Roanoke Valley, and Region 2000 regions of southwestern Virginia. The efforts of Ride Solutions are made possible through the strategic planning efforts of several partnership agencies, including Roanoke Valley-Alleghany Regional Commission, New River Valley Planning District Commission, Regional 2000 Local Government Council, and Virginia Department of Rail and Public Transportation (VDRPT). By helping to promote and connect individuals and businesses to transportation options, the agency helps to reduce traffic on local roads and ultimately improve air quality by reducing the impacts of vehicle emissions.

In March 2014, Ride Solutions hosted its first annual Sustainable Transportation Summit at Virginia Tech School of Medicine and Research Institute. The summit provided a broad educational program to address the economic, environmental, and social value of implementing

and encouraging transportation choices in the region. It further offered best practices, incentives, and success stories from within and outside the Roanoke Valley to demonstrate how investments in sustainable mobility options could improve the region's vitality and economic competitiveness. The City will continue to support Ride Solution's efforts to promote alternative transportation options.

### **Improve interdepartmental and interagency collaboration in urban transportation planning.**

The City supports and promotes the urban transportation planning of the Roanoke Valley Metropolitan Planning Organization (MPO), which includes long-range planning, transit planning, corridor studies, alternative transportation planning, bicycle and pedestrian planning, and land use planning. Currently, representatives from City Council and City Administration serve and participate on the MPO Policy Board. The Board is responsible for reviewing and recommending plans of action for urban and regional transportation projects. For example, board members were able to provide feedback regarding the Downtown Roanoke Multimodal Study, which is a study of the impact of the Amtrak train service and how best to prepare for the transportation and station needs associated with the new service. The study is being funded by the Regional Surface Transportation Program (RSTP) projects.

In the next several years, the MPO will work closely with local stakeholders to develop a bicycle and pedestrian network that compliments public transportation services, commuter program locations, and the local roadway system. The planning process is led by a Working Committee that reports to the MPO and includes local governments, transit agencies, university and college representatives, local organizations, and additional community partners. City leaders and citizen representatives will continue to actively participate in regional transportation planning through the MPO to appropriately develop regional plans that support compact urban development, discourage sprawl, and emphasize multi-modal forms of transportation that prioritize facilities for bicycles, pedestrians, rail, and transit.

### **Secure grants and other financial and non-financial incentives to support sustainable transportation initiatives.**

The City will continue to seek funding opportunities and incentives to improve alternative transportation options. Several years ago, the City received a Safe Routes to School (SRTS) grant through the Virginia Department of Transportation (VDOT) in the amount of \$325,982 for infrastructure improvements at Addison Middle School and \$25,000 to purchase bikes in order to facilitate walking and biking to school. The initial project at Addison provided a multi-use trail extension to connect Villages of Lincoln and surrounding residential development to the Lick Run Greenway, Lincoln Terrace Elementary School, and Addison Middle School (all connectors to Washington Park), provide sidewalk connections along Carver Avenue, and provide sidewalk improvements in neighborhoods surrounding Addison Middle School.



In 2012, the City was awarded another Safe Routes to School grant in the amount of \$417,000 for the Garden City Safe Routes to School project. The project included funding for the design and construction of a pedestrian and bicycle shared use trail, new curb and gutter, drainage improvements, and repaving and restriping the roadway in Garden City. The project design and Phase I of the construction were recently completed but will require additional, supplemental funds to complete the project. The City pursued "Transportation Alternative" funding through the MPO and was recently awarded \$160,000 in additional funds to complete the Phase II of the project construction.

A subsequent Safe Routes to School project was also completed in Preston Park during summer 2013. The City will continue to seek funding opportunities to improve pedestrian connections to schools, transit, and neighborhood business districts.

In 2009, the City used approximately \$300,000 in Energy Efficiency and Conservation Block Grant funding to purchase LED signal heads for approximately 80 of its 158 traffic signals and to secure contractors for the installation of LED equipment at approximately 40 intersections. The City leveraged \$36,000 in staff labor costs for the installation of LEDs at the remaining 40 intersections. Although the initial purchase and installation cost for LED signals are higher than incandescents, LEDs generally yield a return on investment in about 3 years and save an enormous amount of money over the long haul. According to the ICLEI Municipal Emissions Inventory 2012 Summary Report completed by Dr. Sean McGinnis on July 24, 2013, there was an 80% reduction in traffic signal electricity use and a corresponding cost reduction of nearly 50%. This was primarily due to the change in all except a few of the City's 163 traffic signals from standard incandescent technology (155 traffic signals in the 2005 baseline) to light-emitting diodes (LED) technology.

In 2011, additional funding was granted to purchase school zone solar powered flashers that utilize state of the art technology and maximum energy efficiency to provide optimum school zone safety with positive environmental impact.

**Support and promote innovations in alternative transportation.** (no additional text)

**Continue to explore changes to signal timing to reduce idling, improve traffic flow and accommodate non-auto modes.**

Traffic signal synchronization is a coordinated set of timing plans for a group of signals on an arterial used to facilitate smooth traffic flow. It is a component of the City's long range planning for transportation and land use. The objective of the signal synchronization is to allow progression through the arterial with the fewest stops at intersections, while minimizing delays for the side street. Signal synchronization can create more uniform speeds along streets, increase the ability to move traffic, reduce time delays at the intersection, and create opportunities for traffic from the side streets to safely enter the main street.

According to a study completed in August 2007 by Rupangi Munshi of the University of Texas at Arlington, nearly 56% of total nitrogen oxide (NOx) emissions are produced by mobile sources. The study indicated that transportation and air quality managers at the state and regional level have the responsibility of developing and evaluating Transportation Control Measures (TCMs) and Transportation Improvement Plans (TIPs) to improve air quality of the region. In the study, signal synchronization was considered to be an effective TCM to reduce corridor congestion and maintain air quality in the region. In the Roanoke Valley-Alleghany Planning Commission's "Intelligent Transportation Systems (ITS) planning study, recommendations were made to support traffic signal synchronization projects as viable strategies to positively impact air quality and quality of life.

In July 2008, the City improved signal coordination in the Hershberger Road, Williamson Road and Orange Avenue corridors, all high traffic areas. This effort involved updating and improving timings and installing equipment necessary to maintain coordination among 30 signalized intersections, with approximately nine (9) miles as the total length of the affected travel corridors. According to the city's Transportation Department, these signal re-timing projects yielded the following improvements during peak traffic periods: travel time was reduced by up to 11 percent, delays were reduced by up to 20 percent, the number of stops declined by up to 15 percent, and fuel consumption was reduced by up to 10 percent.

With the success of the City's signal re-timing projects, the City continues to seek funding to modify and update existing traffic signal timings for 45 traffic signals that currently exist on a coordinated downtown signal system. Over the past decade, the downtown has changed dramatically and the infrastructure that serves the downtown has also changed in significant ways. Many street improvements have been implemented in the last ten years, such as two-way traffic along Salem and much of Campbell Avenue. However, more work remains. The emergence of the downtown as a destination for cultural events, shopping and entertainment activities creates a need for improved ease of access on city streets. To that regard, the current traffic signal timing patterns are not compatible with the growth of Roanoke's downtown, resulting in a decline in traffic efficiencies.

The last downtown signal re-timing study was completed approximately ten (10) years ago. In the City of Roanoke's Comprehensive Plan, it is noted that one of Roanoke's characteristics in the region is that it is an urban community with a compact development pattern and effective street grid. The plan indicates that the street grid should be preserved and new development and technologies should tie into the existing road network, completing the street grid where possible. The plan further indicates that transportation and land use planning should be integrated to promote compact urban development and reduce the frequency and length of automobile trips. Securing funding to complete the downtown traffic signal re-timing project will support the Comprehensive Plan's goals, while greatly improving quality of life and development opportunities on adjacent sites. Transportation staff estimates a 7 to 16 percent reduction in fuel consumption by reducing stops and travel time during off-peak hours and as much as 50 percent during peak hours.

## **Pursue opportunities to purchase and install LED street lights and traffic signals.**

Appropriate lighting levels are an essential component to ensuring safety and security for the Roanoke citizens. Lighting contributes to attractive communities and quality amenities through the addition of appropriately located lighting, which helps to ensure safety and vibrant neighborhoods. The City and American Electric Power (AEP) have an executed agreement which requires the City to pay for the electric service of approximately 450 City-owned street lights and 150 bridge and industrial park lights. The agreement also provides coordination of all activities with AEP, which owns and maintains approximately 10,000 street lights within the City. As part of the agreement, the City must pay the power bill for streetlights owned and maintained by AEP.

Staff continues to focus efforts on changing City-owned street lights to LED bulbs. Most recently, the Transportation Division converted 53 streetlights at the Blue Hills Industrial Park and is considering extending the LED street lighting program to bridge lighting. Energy consumption and corresponding power bills continue to decrease as a result. In 2012, the City's electric bill for City-owned street lights was approximately \$22,000. However, in 2013, the City experienced cost savings of approximately \$3,000 as a result of LED bulb replacements in spite of increases in electricity costs, an 11 percent reduction in actual kilowatt usage, and a 15 percent reduction in greenhouse gas emissions. As the majority of the street lights are owned by AEP, City staff will continue to urge AEP to develop and implement more LED technology within its facilities.

## **FLEET:**

### **Support the transition to more efficient vehicles and cleaner fuels through local initiatives and federal and state legislation.**

The City's fleet consists of over 650 vehicles. For several years, the City has been supportive of strategies implemented in Fleet Management that reduce fuel consumption and carbon dioxide emissions. Since 2006, the City has been operating all school buses and some 350 pieces of heavy equipment on B-5 biodiesel (fuel that has 5 percent biodiesel content), as well as all gasoline-powered vehicles on E-10 ethanol. Currently, Fleet Management purchases and utilizes B-5 bio-diesel, E-10 ethanol, or propane as the fuel source for most other City vehicles and equipment. The alternate fuels purchased by the City ensure the decrease of its carbon footprint while preserving sustainability. Thus far, prices for these alternative fuels have proven comparable to regular gas and diesel due to fuel futures contracting.

#### Propane

The City began using propane-powered mowers in 2006 and negotiating propane refueling stations to further reduce emissions and the City's carbon footprint. The City purchased 3 propane mowers to replace gas powered mowers and has planned new equipment purchases that will be capable of using propane or the best available choice for clean fuels. Fleet

Management is currently converting several vehicles with propane kits to use either propane or gasoline, success of this program will lead to further conversions.

### Compressed Natural Gas

Natural gas is a mixture of hydrocarbons, primarily methane, which is a relatively nonreactive hydrocarbon. It is one of the cleanest burning alternative fuels available and offers a number of advantages over gasoline. Because of the gaseous nature of natural gas, natural gas must be stored on-board a vehicle in either a compressed natural gas state (CNG) or in a liquefied natural gas state (LNG). Natural gas vehicles can easily be fueled at public stations, or an on-site refueling container can be built.

There are currently no public Compressed Natural Gas (CNG) stations within 50 miles of Roanoke. As a result, the City is working to engage local municipalities and private sector businesses in discussion regarding the importance of committing to CNG fleet conversions and its overall environmental impact. Over the last year, the City has also engaged in discussion with a provider to install a Compressed Natural Gas (CNG) station in the Roanoke Valley. Although a specific location has not been determined, the Roanoke Valley is scheduled to have a CNG facility in the near future, and as a result, Fleet Management is preparing its facility and fleet for the conversion.

### Nitrogen

The City's Fleet Management recently began filling city vehicle tires with nitrogen as opposed to compressed air. This process has already saved the City roughly 400 tires, as the nitrogen-filled tires last up to 30% longer than compressed air. Nitrogen is non-corrosive, reduces oxidation and rust, and maintains tire pressure more effectively thereby increasing fuel efficiency. It also minimizes wheel corrosion to promote better bead sealing, thus promoting the life and proper operation of the tire. When tires are removed from City vehicles, they are inspected for quality. If the tire is in good overall condition and only needs tread, it is sent to be re-capped and re-used. However, if the tire's service life has expired, it is recycled by a contracted vendor.

Fleet Management has also implemented green practices such as recycling antifreeze and properly disposing of oil filters. The Fleet Division will continue to incorporate sustainability principles in its day to day activities and operations and integrate environmental, social, and economic considerations in its fleet policies.

### **Support the purchase of electric vehicles (EVs) and provide electric vehicle charging stations and other alternative fueling options at City-owned facilities where feasible.**

Currently, the City has 8 hybrid vehicles in its fleet, as well as 3 all-electric vehicles for appropriate uses. Parking Enforcement personnel utilizes the Firefly, the newest addition to the City's growing fleet of alternative-powered vehicles and equipment. This zero-emission electric vehicle operates on the newest battery technology (Lithium Iron Phosphate) for improved energy-efficiency, reliability, and an expected battery lifespan of more than four years. It is also

virtually maintenance free, has significantly reduced operating costs, and has one of the best “Miles Per Charge” in its class with a range of 60 MPC.

In March 2014, Virginia Clean Cities Inc. (VCCI) partnered with the Hybrid Electric Vehicle Team of Virginia Tech to host an alternative fuel vehicle car show featuring the latest hybrid and electric vehicle models on the market. The purpose of the event was to raise awareness of advanced vehicle technologies and increase buyer consideration of alternative fuel vehicles. The City will continue to explore collaborations with VCCI, Virginia Tech and other entities to enhance strategic planning efforts for access to charging stations and benefits to impacts on energy demand.

**Promote collaboration and coordination between the public and private sector to expand the region’s electric vehicle (EV) charging stations.**

The City has two 240 volts, “Level 2” electric vehicle (EV) charging stations located at the Virginia Museum of Transportation at 303 Norfolk Avenue SW and the River House at 806 Wasena Avenue SW. On April 7, 2014, Roanoke City Council accepted the donation of a third electric vehicle (EV) charging station from VCCI, a non-profit organization dedicated to promoting and facilitating increased use of alternative fuels and vehicles. This CHAdeMo “quick charger” station has the ability to charge an EV battery to 80 percent capacity in 30 minutes, thus making it very desirable in an urban setting. The charger was placed curbside adjacent to Wells Fargo Plaza between Norfolk and Salem Avenues to provide high visibility to potential users and the public. This station fulfilled the need of having quick charge capability downtown, which was not available in the core downtown area.

**TRANSIT & RAIL:**

**Support the enhancement and upgrades of regional and local transit.**

The City realizes the vital role that public transportation plays in addressing the Roanoke Valley’s environmental challenges and realizes that with the appropriate transportation alternatives and initiatives in place, the community is able to minimize the environmental impacts of greenhouse gas emissions and automobile pollution. With these goals in mind, the City has worked with the Greater Roanoke Transit Company, also known as Roanoke Valley Metro, to offer transportation alternatives that ultimately reduce overall vehicle emissions and pollutants.

Currently, Roanoke Valley Metro offers a continuum of transportation options for the Roanoke Valley community that reduce the need for many separate trips by private vehicles in dense urban areas and high traffic corridors, such as Interstate 81. These options include fixed route bus services, Smart Way Connector services, Star Line Trolley Downtown Circular services, and Amtrak connector services between Lynchburg, Roanoke and Blacksburg.

In 2004, the City worked closely with Valley Metro to implement the operation of the Smart Way Commuter Bus, a regional public transportation service operated by Valley Metro that links the

Roanoke Valley and the New River Valley for a fare of only \$4.00 one-way. The Smart Way service begins at Valley Metro's Campbell Court Transfer Station with stops at the Hotel Roanoke, the Roanoke Regional Airport, two 'Park and Ride' lots along Interstate 81 at exits 140 and 118-A, the Virginia Tech Corporate Research Center, Main Street in downtown Blacksburg and the Squires Student Center on the Campus of Virginia Tech. This service is highly utilized and serves its purpose of connecting constituents within the region.

In January 2009, Valley Metro in cooperation with Carilion Clinic, City of Roanoke, and Downtown Roanoke, Inc. began operating the Star Line Trolley - a new downtown circulator. The service is free and operates weekdays from 7:00 a.m. until 7:00 p.m. at 15 minute frequencies with more frequent service provided during peak hours. Its initial purpose was to connect the downtown market with the Carilion Roanoke Memorial Hospital. However, the success of the trolley service has resulted in its expansion beyond the Crystal Spring Medical Center and the Jefferson Rehab Center Downtown. This service has also assisted with alleviating downtown parking problems during lunch rush hour and has enabled hospital employees to commute to Carilion Clinic from the downtown parking decks.

As a regional effort, in 2012, RIDE Solutions partnered with regional transit providers Valley Metro and RADAR to provide up-to-date routing and scheduling information via Google Maps. RIDE Solutions worked with Portland, Oregon-based Trillium Transit to build the data that supports the Google Maps tool. The tool provides transit options for trips anywhere in the Roanoke Valley and Alleghany Highlands region in addition to the Smartway and Smartway Connector routes between Blacksburg and Lynchburg. It is designed to allow citizens to plan a single bus trip from Blacksburg, to Roanoke, and to Lynchburg, and is intended to attract new customers to transit services and other alternative transportation options.

The trip planner can be found at [ridesolutions.org](http://ridesolutions.org), [valleymetro.com](http://valleymetro.com), [radartransit.org](http://radartransit.org), or directly through Google Maps. It can also be accessed through smartphones and tablets through the Google Maps app or web browser. It currently supports Valley Metro, the Smart Way Bus, the Smart Way Connector, the Star Line Trolley, the Mountain Express, and the shuttles for Ferrum and Hollins universities. To date, Google Transit is set up for every transportation service in the region.

The City will continue to support Ride Solutions and other regional transportation plans strategically designed to encourage utilization of existing transit services, improve the citizens' access to multimodal transportation options, collect information to enhance routing schedules of commuter and connector services, and investigate opportunities to improve access to technology.

**Work with regional and state partners to adopt a funding strategy and advocate for an increase to a dedicated funding stream for transit operations and passenger train service at the local, state, and regional level to meet current and future transportation needs.**

On January 9, 2014, Gov. Bob McDonnell announced a signed agreement between the state and Norfolk Southern Corporation to improve tracks and build a rail station to extend Amtrak passenger-rail service from Lynchburg to Roanoke. The agreement stipulates that Amtrak service to Roanoke will begin no later than fall 2017, resulting in the first time in 34 years that Roanoke has had Amtrak service. With the signing of this agreement, the state will be able to extend Amtrak Virginia daily intercity passenger train service to Roanoke within four years with direct, same-seat service to as far north as Boston. This will better connect the cities, increase Amtrak ridership, and significantly reduce emissions.

Completion of the Trans-Dominion Express (TDX) Passenger Rail service from its current terminus in Lynchburg to include Roanoke will be funded in Virginia's six-year transportation plan at a cost of \$92.7 million to cover the total project cost. The City will be responsible for building a station and parking facilities, so included in the cost is \$10 million to help Roanoke build a station, platform and track, including terminal train storage and a servicing facility. State officials and Norfolk Southern staff are studying the track and signal upgrades needed to safely handle passenger traffic. Under a separate agreement, Virginia is providing \$3 million toward the estimated \$6 million cost of a culvert to carry the Trout Run stream beneath the proposed station platform and track facility in Roanoke.

For two years, Roanoke has operated a bus connection to Lynchburg's Amtrak service as an interim step to bringing rail service to the Roanoke Valley. The 16-seat Smart Way Connector shuttle began operations on July 19, 2011 and operates 7 days a week, twice daily from Roanoke to Lynchburg, with a stop in Bedford, at \$4 one-way fares. Free parking is available at park-and-ride lots at the Roanoke Civic Center parking lot, where the shuttle departs, and schedules are synched to meet arriving and departing trains in Lynchburg. The shuttle bus also connects the New River Valley with stops in Salem, Christiansburg and Blacksburg on Fridays and weekends.

In 2013, the Connector's average ridership was about 21 riders each way daily. The service was a result of grant funding from the Federal Transit Administration and the Virginia Department of Rail and Public Transportation. A \$150,000 grant was secured from the General Assembly by State Senator John Edwards to demonstrate the Roanoke Valley's demand for intercity passenger rail service. The region is excited to move the concept of intercity passenger rail service forward as it will be central to the Roanoke Valley's economic growth, vitality and competitiveness in the region.

#### **ACTIVE TRANSPORTATION:**

**Provide a coordinated and strategic approach to the development of a regional pedestrian and bicycling network that provides greater connectivity between activity centers and cultural amenities.**

In September 2012, the City of Roanoke, with assistance from the Virginia Department of Transportation and the Roanoke Valley Area Metropolitan Planning Organization (RVAMPO), participated in the National Bicycle and Pedestrian Documentation Project (NBPD). The overall goal of the 2012 Roanoke NBPD was to provide baseline cycling data for use in bicycle and pedestrian accommodations planning, funding, implementation, maintenance, and promotion by the City of Roanoke, RVAMPO, and other stakeholders. The 2012 NBPD was the initial year of the City's participation in the NBPD which is conducted annually each September.

Staff continues to work with the RVAMPO, key stakeholders, and citizens to develop a MPO area Regional Pedestrian Plan that combines proposed elements from the regional greenway master plan, regional corridor and area studies, and existing pedestrian network into one overall pedestrian plan. The plan will include recommendations related to sidewalks, greenways, trails, paths and other pedestrian related infrastructure and is modeled on the Virginia Department of Rail and Public Transportation's new "Multimodal System Design Guidelines". The guidelines outline effective techniques for integrating land use and economic development factors into multimodal planning by comprehensively considering the whole complex of factors that go into a Multimodal System Plan, including land use, built form of development, corridor design and Transportation Demand Management (TDM).

**Promote and strengthen green infrastructure and natural systems that can build sustainability, reduce emissions, and improve neighborhoods.**

The Roanoke Valley Greenway program surfaced in 1995 as a citizen initiative to improve quality of life in the region. Citizens desired to develop an interconnected greenway network that would provide a myriad of benefits to the community, including transportation, economic, environmental, health and cultural amenities. The greenway initiative received widespread support from citizens, neighborhood groups, businesses, civic organizations, and adjoining governments and has become a focal point for outdoor recreational opportunities and special events for citizens and organizations throughout Roanoke Valley.

The development of greenways has been one of the most successful efforts toward regionalism and public-private partnerships in the Roanoke Valley. The City of Roanoke, Roanoke County, Salem and the Town of Vinton established the Roanoke Valley Greenway Commission in 1997 with the signing of an Intergovernmental Agreement. At the same time, greenway founders set up Pathfinders for Greenways, Inc., a non-profit organization of volunteers committed to greenway development. While the Commission and local governments have focused on the planning and construction of the greenways, volunteers, support groups and businesses have provided amenities such as benches, kiosks, signage, mile markers and art to enhance the greenways. These amenities have been noted by the Roanoke Valley Greenway Commission as a sign that "...as the greenway network grows, so does the opportunity for special places along the way."

The City of Roanoke is an avid supporter of greenways in the Roanoke Valley and has taken significant steps in recent years to improve both pedestrian and bicycle accommodations on the



greenway. To date, the Roanoke Valley has developed over 26 miles of paved and cinder surface greenways with pedestrian/bicycle trails and additional hubs of natural surface trails at Mill Mountain, Carvins Cove, and Read Mountain. The update to the Roanoke Valley Greenway Plan in 2007 includes 35 greenway routes that provide linkages throughout the Roanoke Valley. Each of the routes has gone through the stages of planning, engineering, right-of-way acquisition, funding, and construction.

The Roanoke Valley Greenway Commission has an immediate goal to connect all sections of the Roanoke River Greenway through the urban portion of the valley. Funding has been secured for all segments of the route, except the 4-mile “gap” that lies between Roanoke and Salem. The Commission has made funding of this section a priority and has raised over \$7 million that will be needed to “Bridge the Gap”. When this section of the path is finished, the Roanoke River Greenway will provide a continuous route from Green Hill Park to Tinker Creek Greenway, a distance of more than 18 miles.

Through the greenway development, a distinctive sense of community is being cultivated in the Roanoke Valley, and a “green infrastructure” movement is currently underway. This movement is providing opportunities for educating the public, providing community outreach, and building a network of organizations and other local governments to fully realize the potential of conservation and green infrastructure planning throughout the Roanoke Valley. Residents are clearly using these trails, and it has become an important component of the City’s quality of life and economic vitality.

The City continues to budget annually for greenway construction to demonstrate its commitment to greenway development as an important component to transportation, quality of life, environmental sustainability, and economic development. Our local, state and federal officials are also working cooperatively to ensure the continued development of the greenway system prioritized by the citizens of the Roanoke Valley.

### **Maintain and improve the certification level of the City’s Bicycle Friendly Community Designation.**

There is a diverse and growing number of cyclists and interest in bicycling in Roanoke, and as a result, the City has taken significant steps in recent years to improve the Roanoke community’s bicycle and pedestrian accommodations. Both the economic and health benefits of active, walkable and bikeable neighborhoods, greenways, and trails are well recognized in Roanoke’s Vision 2001-2020 Comprehensive Plan and other urban design standards.

In 2010, Roanoke achieved the bronze level designation as a Bicycle Friendly Community by the League of American Bicyclists. Communities receiving such designation have set the standards for what constitutes a real bicycling culture and environment; have inspired action, involvement and coordination among people that want to improve conditions for bicyclists; have guided progress by acting as a roadmap for what communities, businesses, universities, and

states should do next; and have raised expectations as to what really is expected and involved in making a great place for bicycling.

In 2012, the League of American Bicyclists announced that the City retained its bronze-level designation status as a Bicycle Friendly Community. Subsequently, the League will continue to provide the city with feedback and review its designation status. To maintain and even improve its designation status the City will continue its strategic efforts to reinforce its “Complete Streets” policy and implement the following initiatives: 1) Improve bicycle accommodations as streets are resurfaced, widened or improved; 2) pursue additional Safe Routes to School funding opportunities and Transportation Enhancement grants for bicycle accommodations; 3) continue to expand on and off road-paved bike lanes and shared use paths and modify existing streets when they are improved to accommodate cyclists; 4) expand and enhance bicycle facilities; 5) complete the development of the greenway system; and 6) develop bike routes that use low traffic neighborhood streets to encourage and enable more citizens to cycle for transportation and recreations.

The City of Roanoke continues installation of bicycle lanes through the annual paving and resurfacing program. In 2013, 7 miles of bicycle lanes were added along Melrose Avenue/460 and Brandon Avenue. Additionally, more than 11 miles of bicycle lanes were installed as part of the 2012 paving program (Peters Creek Extension, 13th Street, and Brandon Avenue) bringing the total bicycle lane mileage in the City of Roanoke to more than 25 miles (nearly 750% increase since 2005). To increase bicycle safety, the city has also installed shared lane markings or “sharrows” on a number of streets, most recently on Campbell Avenue just east of Williamson Road.

### **Support and promote the expansion of on-street bicycle racks, off-street bicycle parking, and bike sharing.**

In support of continued efforts to make Roanoke more bicycle friendly, in 2013, the Transportation Division installed the city's first bike corral, an in-street space dedicated to bicycle parking, at the intersection of Market Street and Campbell Avenue. This installation accommodates up to 8 bicycles, increases the availability of bicycle parking in the Market Area, and did not require the removal of any on-street parking or valuable sidewalk space around the Market Building. Valley Metro also equipped many of its buses with bike racks.

To support bicycling as a viable choice for downtown business commutes, the City also added parking for bicycles in its 7 public parking garages. Cyclists may now park their bikes at no charge in the covered secured parking areas. In addition, Norfolk Southern, in collaboration with Ride Solutions, contributed a “Fix It Station” that was installed in the Market Garage, where riders can make repairs to tires or other adjustments to their bikes. These improvements enhance Downtown Roanoke’s growing reputation as the region’s most accessible business destination for alternative transportation.

The City of Roanoke has created an internal Bicycle Advocacy Committee of employees who are interested in improving accessibility to bicycle racks, locker facilities, and activities for those who bike to work. As a result, the City installed an in-door bicycle rack with day locker accommodations and shower facilities. The committee also plans to explore what is needed to obtain a "Bicycle Friendly Business" designation. Departments are participating in Ride Solutions' Clean Commute Month Challenge, as well as partner with businesses for discounted bike rates in order to promote bicycle rides during lunch and other educational activities.

## **WASTE MANAGEMENT AND RECYCLING**

### **Overview:**

Local governments are mandated by §Section 10.1-1411 of the Code of Virginia to develop, adopt and implement comprehensive regional solid waste management plans, either by jurisdiction or regionally. Virginia requires the plan to address all aspects of solid waste management, including waste reduction, recycling and reuse, storage, treatment, and disposal and to give consideration of the handling of all types of nonhazardous solid waste generated in the locality. Virginia also requires that each solid waste planning unit maintain a minimum recycling rate of 25 percent for municipal solid waste generated, although Virginia does not mandate municipal recycling nor can local governments mandate residents or businesses to recycle. Once every four years, the City is required to prepare and submit a recycling survey report to the Virginia Department of Environmental Quality, an organization that addresses a hierarchy of solid waste management strategies which include source reduction, reuse, recycling, resource recovery (waste to energy), incineration, and landfilling.

The City's Solid Waste Management Division is responsible for weekly collection of residential refuse, bulk & brush, recycling, commercial refuse collection, and seasonal collection of bagged leaves. It is a member of the Roanoke Valley Resource Authority (RVRA) which was created in 1988 to properly manage solid waste disposal for the residents and businesses of the City of Roanoke, Roanoke County, and Town of Vinton. Solid waste management and recycling programs of the three jurisdictions have developed and operated under the auspices of the Roanoke Valley Resource Authority since its establishment. The City of Salem and Montgomery County, adjoining jurisdictions, are listed as landfill users but are not participating in the Authority at this time.

Waste management is a major public policy issue, which will not be readily solved without significant changes in the waste generation and disposal practices of area citizens, businesses, and governments. During fiscal year 2012-2013, City residents and businesses produced over 43,974 tons of municipal solid waste at a cost of \$2,122,100 for tipping fees. The level of waste generated is anticipated to continually increase annually. According to the City's 2009 Carbon Emissions and Energy Summary, waste constituted approximately 2 percent of the community's

carbon emissions. Thus, how to properly and cost-effectively manage this increasing level of waste is a significant challenge facing the area and local government.

The City realizes the important role that recycling plays in waste management and reducing its carbon footprint. For over a decade, the City's Solid Waste Management Division has amplified its efforts to promote waste management and recycling in order to bring environmental concerns to the forefront. Prior to fiscal year 2000, the City's recycling program was antiquated. Not all city residents had the opportunity to recycle, and the program only included newspapers, plastics, and cans. At that time, the program yielded a recycling rate of only 7 percent.

Currently, all City residents have the opportunity to recycle by participating in the City's dual stream curbside recycling program. Residents are provided two free recycling bins to place glass containers, aluminum cans, plastic containers (#1 through #7), and paper products out for collection on alternating weeks. From 2000 to 2012, citizen participation in the city's recycling program increased from 7 to 37 percent and has helped the city divert some 46,000 tons of material from the waste stream. To date, Roanoke remains the only local government in the Roanoke Valley that provides curbside recycling services to residents.

Besides the obvious environmental and inherent economic benefits of recycling, recycling has reduced the city's waste disposal costs, diverted valuable materials from the waste stream, and reduced the burden on landfills and incinerators. In 2013, the recycling rate was 42 percent with a 40 percent participation rate. The City continues to encourage residents, businesses, civic organizations, and other regional municipalities to join the City's efforts in recycling.

**GOAL:** The City of Roanoke will provide quality waste management services to the citizens and businesses of Roanoke by promoting waste management practices, minimizing waste generation, increasing diversion of solid waste as appropriate, encouraging recycling and reuse, ensuring proper management of generated waste, ensuring the adequate and timely cleanup of the environment, reducing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of by the agency, and implementing landfilling alternatives.

**TARGETS:**

- 1) Increase the City's recycling *participation rate* from 40 percent in Calendar Year 2012 to 50 percent in Calendar Year 2020.**
- 2) Increase the *overall recycling rate* from 34.1 percent in Calendar Year 2012 to 45 percent in Calendar Year 2016 and 50 percent in Calendar Year 2020.**
- 3) Decrease the amount of tonnage delivered to the landfill of the Roanoke Valley Resource Authority from 43,974 to 40,000 tons.**
- 4) Increase awareness of the lifecycle impacts of products to address greenhouse gas emissions (GHGs) occurring in the community.**

## **STRATEGIES:**

### **REDUCING WASTE**

#### **Strengthen existing hazardous waste collection and recycling efforts for hazardous items.**

In 2010, the Roanoke Valley Resource Authority began operating a permanent household hazardous waste (HHW) facility, which accepts latex paint, used motor oil, used anti-freeze, alkaline and lead-acid batteries, and aerosol cans during regular operating hours. As a result, the Authority conducts twelve monthly household hazardous waste collection events for its member communities. These events accept other hazardous materials not accepted during regular working hours. Since its inception, participation in the HHW program has more than doubled, and costs have been reduced by more than 70 percent, nearly a \$70,000 savings.

#### **Work with partner organizations to encourage residents and businesses to purchase reused and reusable goods.**

The City works collaboratively with the Roanoke Clean Valley Council and other organizations to promote the concept of “Reuse, Reduce, Recycle”. At the “City of Roanoke Green Academy”, experts address environmental topics such as “Say ‘No’ to Plastic”, “Don’t Support Poor Packing”, “Say ‘No’ to Single-Use Disposables”, “Repair for your Despair”, “Donate and Give Away Items to Goodwill and The Salvation Army”, and food composting. Staff will continue to emphasize the importance of the purchase of reused and reusable goods at future Green Academies conducted annually and at other venues where sustainability practices are introduced.

#### **Reduce paper use through duplex printing requirements and purchase printing paper with 30 percent postconsumer content.**

The City of Roanoke has instituted numerous initiatives to model environmental stewardship. The City instituted a purchasing policy that requires departments to purchase only 30% recycled, postconsumer content paper. Also, the city’s Department of Technology (DoT) deployed multi-functional devices (copiers, printers, scanners, and fax machines) that utilize biological toners rather than chemical toners. In addition, the machines use less energy, are Energy-Staff approved, operate efficiently with recycled paper, and permit DoT to set the default to two-side copying from the desktop (where possible).

## **Support and promote the Roanoke Valley Resource Authority's (RVRA) efforts to convert landfill gas to electricity.**

On September 22, 2009, the Environmental Protection Agency (EPA) promulgated a new federal law under the Clean Air Act (CAA) requiring operating entities, including municipal solid waste landfills that emit over 25,000 tons of greenhouse gases (GHG) a year, to report their greenhouse gas (GHG) emissions on an annual basis. Facilities meeting the established measures were required to begin monitoring emissions on January 1, 2010 and file their first annual reports by March 31, 2011. This reporting rule would cover about 85 percent of GHG emissions in the United States and would assist with better understanding where GHG emissions are generated in order to improve EPA's ability to make informed policy, business, and regulatory decisions.

On June 22, 2011, the RVRA's Board authorized staff to enter into a one-year agreement with Richardson, Smith & Gardner (RSG) and Associates, Inc. to provide regulatory environmental monitoring services of landfill gas and conduct a beneficial use study for the landfill gas. RSG provides landfill gas (LFG) management and carbon credit advisory and verification services for solid waste facilities throughout the nation. RSG provided data collection, gas utilization (i.e. beneficial use study), training, carbon credit utilization, trouble-shooting, and maintenance of the new LFG collection and flaring system. The company also assisted RVRA with evaluating proposals from project developers to implement landfill gas to energy projects at two RVRA-owned landfills. In addition, RSG performed an analysis of the amount and validity of historic and future landfill methane offset carbon credits.

In 2011, the Roanoke Valley Resource Authority (RVRA) installed an active landfill gas collection and control system (GCCS). The Authority's GCCS is currently collecting and preventing the annual emissions of approximately 60,000 tons of carbon dioxide equivalent (CO<sub>2e</sub>) into the atmosphere, thereby greatly reducing greenhouse gas emissions. The Authority is a registered member of the California Climate Action Registry which qualifies its destruction of greenhouse gases for emission credits to be sold on the market to help offset the initial cost of installing the GCCS.

The RVRA has also been in contract negotiations with Richmond-based INGENCO Distributed Energy Inc. to permit, construct, and operate a turn-key project to convert landfill gas to electricity. This proposed landfill gas to energy project is a means of controlling landfill odor and meeting regulatory requirements to control decomposition gases. INGENCO has proposed installing several small generators that burn landfill gas and diesel (90-10 split) to produce up to four megawatts of electricity with the capability to expand once more landfill gas is generated at the landfill. The company will buy the gas and use it to generate electricity in a deal that could yield an additional \$120,000 per year to the regional landfill operator by reducing the amount the Authority pays to America Electric Power (AEP) to buy electricity. The company has proposed a 4-megawatt plant at the Smith Gap landfill that would produce enough electricity to power more than 1,300 homes.

**Expand Green building programs to promote a reduction in construction and demolition waste.** (no additional text)

## **INCREASE RECYCLING**

**Continue to expand the types of materials accepted by the City's recycling program.**

For over a decade, Solid Waste Management has concentrated its efforts on improving and expanding the City's recycling program. In December 2009, Solid Waste partnered with a new recycling vendor, Recycling and Disposal Solutions of Virginia, Inc. (RDS), whose corporate headquarters is located in Portsmouth, Virginia. RDS established a second facility in Roanoke, Virginia to meet the needs of the City's recycling programs offered to residents. In accordance with the agreement, RDS accepts all plastics #1 through #7, metals, paper (all grades), and cardboard. With RDS's new location in Roanoke, it is the City's hope that adjoining jurisdictions will adopt recycling programs to help develop recycling as a regional collection program. The scope of the City's contractual agreement with RDS will also allow the partnership to work toward a single stream collection program.

**Support the implementation of single-sort recycling program for curbside pickup.**

In the fall of 2015, the City is planning to implement a single stream recycling program. Single stream is a system in which all paper, plastics, metals, and other containers are mixed or commingled, instead of being sorted by the depositor into separate commodities and handled separately throughout the collection process. In single-stream, both the collection and processing systems are designed to fully handle the commingled mixture of recyclables with materials being separated for reuse at a Materials Recovery Facility (MRF).

The Southeast Recycling Development Council (SERDC) and their partner Curbside Value Partnership has awarded the City of Roanoke a \$125,000 grant for a single stream implementation and outreach grant. This \$125,000 grant is a combination of cash and services is designed to strengthen the marketing and outreach to improve the effectiveness of the new program as well as assist in tactical implementation of the program.

**Continue to support the establishment of a Material Recycling Facility (MRF) by the Roanoke Valley Resource Authority.**

The City and Recycling and a selected vendor will partner to bring the citizens of Roanoke single stream curbside recycling in 2015. This vendor will be expected to provide single stream with advanced sorting equipment such as a Materials Recovery Facility (MRF) in Roanoke or the surrounding area.

**Work with the Planning, Building, and Development Department to increase the rate of recycling of construction and demolition debris in the city.** (no additional text)

**Enhance outreach and education about recycling and composting to residents and businesses.**

The Solid Waste Division continually meets with citizens, neighborhood organizations and local businesses to assist with waste management audits, recommend appropriate recycling practices, and inform citizens and business leaders regarding available services. In the past, staff implemented innovative initiatives, such as quarterly neighborhood recycling competitions to promote community recycling efforts.

In 2012, the “Citizens for Clean and Green” began hosting the “City of Roanoke Green Academy” - a 5-week session which provides a series of informational sessions from area experts on various sustainability topics. The Academy is organized and facilitated by members of the City’s Sustainability Office and is conducted at least once annually and free of charge to the citizens. During the March 2014 session, the Executive Director of the Clean Valley Council presents the environmental impacts of Waste and Recycling to academy participants. The City will continue its efforts to organize and facilitate the Green Academy in an effort to promote awareness on important environmental issues.

**Support incentive programs that mandate the recycling of plastic bags or programs that assign an additional cost for consumers who wish to continue to use plastic bags.**

As part of its 2014 Legislative Program, Roanoke supported legislation that would enable the City to charge and collect a fee for the use of plastic shopping bags provided by retailers to its customers. The goal of such legislation would be to provide the City with a revenue source to fund clean-up actions and activities associated with persistent littering. These clean-up activities would assist the City in meeting its mandated MS4 stormwater permit requirements, as well as enhancing the livability and attractiveness of the community. So-called “plastic bag bills” cannot be implemented at the local government level unless enabling legislation is approved by the Virginia General Assembly.

**WATER RESOURCES & STORMWATER MANAGEMENT**

**OVERVIEW:**

Making Roanoke's water supply clean, safe and more sustainable is a key foundation and critical component to sustaining and enhancing the citizens’ quality of life. The City has 13 major rivers and streams within its boundaries. Most notably, the Roanoke River is a 410 (660 km) mile long river that flows through the City of Roanoke and serves as the main stem river of the southeastern United States. It stretches through parks, natural settings, and many industrial areas and is joined by several secondary streams, most notably Peters Creek, Tinker Creek,



and Mud Lick Creek. The combined stream flows northeast between mountain ridges through the Roanoke Valley, approximately 10 miles to Salem, then east through the City of Roanoke.

Like many rivers across the country, seven of Roanoke's major rivers and streams are listed as impaired by the Department of Environmental Quality (DEQ) due to pollution. These urban waters take on large amounts of pollution from a variety of sources, including industrial discharges, mobile sources (i.e. motor oil from cars/trucks), residential/commercial wastewater, animal waste, cigarette butts, pesticides, trash, polluted stormwater runoff from urban landscapes, and other contaminants. As urban populations often share centralized water sources, this pollution creates public and environmental health hazards such as poor quality of drinking water and rivers and streams with limited recreational use. Beneficial uses such as swimming, fishing, and drinking are diminished, and several areas cannot support normal wildlife populations. These problems create adverse impacts on the community in terms of reduced livability and suppressed economies and make the use of water as a natural resource more expensive.

In an effort to sustainably manage the region's water infrastructure, on July 1, 2004, the Roanoke City Council and the Roanoke County Board of Supervisors formed the Western Virginia Water Authority (WVWA). The Authority establishes and operates a water and sewer disposal system and related facilities in the Roanoke Metropolitan Statistical Area (RMSA), which includes the Cities of Roanoke and Salem and the Counties of Roanoke, Botetourt, Franklin, and Craig. Major water sources include the Carvins Cove Reservoir, the Spring Hollow reservoir, and the Falling Creek and Beaver Dam Creek reservoirs with various groundwater wells and water purchased from the Bedford County Public Service Authority.

The Authority provides a dependable supply of water to approximately 80 percent of an estimated population of 309,000 in the Roanoke Metropolitan Statistical Area. Each day, it treats 28 million gallons of wastewater for residents and delivers 19 million gallons of drinking water for over 155,000 residents in the Roanoke Valley. The Authority also maintains 1,098 miles of water mains, 87 pumping stations, and 5,221 fire hydrants in the service area.

The Roanoke Regional Water Pollution Control Plant (WPCP) regularly treats more than one-billion gallons of water per month. During the maximum treatment month for 2013, the facility produced enough clean water to fill 97 Olympic-sized pools every day of the month. In 2013, the facility removed an average of 128,514 pounds of pollution from the water daily and 46,907,610 pounds of pollution for the total year.

Stormwater pollution is one of the major environmental and public health issues impacting the water quality of the Roanoke region. Stormwater is not treated or filtered like sanitary sewage, so without proper protection, the storm sewers (utilized to prevent flooding by collecting and draining away stormwater run-off) become systems for concentrating pollution and harming the environment. In Roanoke, the storm sewer system discharges all of the stormwater it collects to the Roanoke River or one of its many tributaries, such as Peters Creek or Lick Run, leading to

unhealthy surface waters, such as streams, rivers, and lakes, and neighborhood flooding during the rainy season.

The City's stormwater system of 50 years is now in decay and has experienced few capital improvements. At the same time, the City's impervious surfaces (areas that cannot absorb rainfall, such as paved driveways, access roads, rooftops, parking lots, sidewalks, etc.), have increased as the City has developed into a regional hub for commerce, healthcare, retail, entertainment and the arts. These surfaces are the single most important factor influencing stormwater runoff. During development, natural ground surfaces are replaced with impervious surfaces that cause more stormwater to run off the land rather than soak into the soil. This runoff results in increased stream flows and potential flooding and contributes pollutants to the region's water sources.

Currently, the City has a backlog consisting of hundreds of stormwater projects estimated to cost tens of millions of dollars. These projects need to be addressed to effectively minimize flooding and control pollutants before they enter the local waterways. When combining these infrastructure demands with the need to provide on-going maintenance of hundreds of miles of existing stormwater pipes and the requirement to meet increasing Federal Clean Water Act stormwater permit requirements, the City faces both a significant environmental and financial challenge. It is no doubt that additional resources and investments need to be made in capital improvements, system maintenance, and regulatory compliance to ensure that environmental standards are met and the region's valuable natural water resources and property values are protected.

To help combat these problems, federal and state agencies have implemented expanded regulations to control and eliminate stormwater pollution from three main areas: municipal storm sewer systems, construction sites, and industrial activities. The Virginia Department of Conservation and Recreation (DCR) is required by the Virginia Stormwater Management Law and Regulations (VSWML&R) to regulate land development activities to prevent water pollution, channel erosion of streams, depletion of groundwater resources, and localized flooding. The Virginia Water Control Board adopted final Virginia Stormwater Management Program Regulations (9VAC25-870) which would require amending the City's stormwater ordinance.

Subsequently, a regional effort began in October of 2012 with area localities working together to coordinate stormwater compliance, procedures, and processes and to understand how the regulations affected the region's programs. Localities present at the meetings were: City of Roanoke, City of Salem, Roanoke County, Town of Vinton, Town of Christiansburg, and Town of Blacksburg. Although each municipality is individually permitted by the Department of Environmental Quality, efforts were made to remain consistent and share best practices and policies to achieve maximum results.

Since then, the City and Roanoke County have worked together to develop stormwater ordinances with similar requirements to provide as much consistency as possible for property owners, developers, and designers working in the region. On November 18, 2013, the City

adopted its Stormwater Management Ordinance that would permit implementation of a local program that is advantageous to both property owners and developers during the review of the stormwater management practices.

To assist citizens with the new regulations, the City developed a Stormwater Management Design Manual which provides a detailed description of the process and requirements for the submittal, review, and approval of stormwater management plans, as well as requirements for the long-term maintenance of stormwater management facilitation. The City also developed additional resources to better address its stormwater needs, meet customer demands, and comply with unfunded federal and state regulatory compliance mandates.

Realizing that any stormwater management solution would require focused efforts and an ongoing dedicated level of funding, Roanoke City Council adopted the Stormwater Utility Fee Schedule in May 2014, approving the implementation of a Stormwater Utility Fee effective July 1, 2014 to fund the City's public stormwater management program. This stormwater utility fee is charged to all developed properties within the City based on the amount of impervious surface on the parcel. While taking stormwater management issues under consideration, the City found this method to be more equitable for funding future stormwater services, as it requires all property owners to pay their fair share for stormwater services received.

**GOALS:** Sustain and enhance the integrity of the Roanoke Valley water resources and waterways through innovative water management practices, protection of the community's natural resources, promotion of citizen awareness through education and outreach efforts and programs, and the compliance of regulatory requirements of the Municipal Separate Storm Sewer System (MS4) permit.

**TARGETS:**

- 1) **Reduce non-revenue (unbillable) water from 25 percent to 10 percent by 2020.**
- 2) **Reduce the tonnage of trash debris collected from water systems and waterways during community clean-up activities.**
- 3) **Continue to support community leaders in increasing the number of volunteers involved in community waterways clean-up activities from 1,500 to 2,000 by 2020.**
- 4) **Stencil a minimum of fifty (50) storm drains annually as documented by an annual record of the number and location of marked drains and all participating groups/persons.**
- 5) **Decrease the number of stormwater violations by 50 percent by 2020 (2013 Baseline)**

- 6) **Increase the number of citizens that participate in community-sponsored storm water workshops or activities.**
- 7) **Increase the number of citizens applying for and receiving approval of Stormwater Utility Fee tax credits for permeable or pervious pavement from the City.**
- 8) **Annually increase the number of citizens adopting stormwater best management practices for a single family residence.**

#### **STRATEGIES:**

**Support and promote the adoption of water management practices that will reduce water consumption by City facilities and promote water conservation.**

#### LEED-Certified Construction:

The City of Roanoke has instituted numerous initiatives and environmentally sound practices in the area of water conservation in an effort to model its strong commitment to environmental stewardship. In 2009, the U.S. Green Building Council recognized the City's Williamson Road Fire-EMS Station (Fire Station #3) with Gold LEED (Leadership in Energy and Environmental Design) certification. The LEED-certified facility includes a 10,000-gallon rainwater harvesting tank buried on-site that collects rainwater run-off from the fire station. This collected water is pumped from the tank to flush toilets, water landscapes, and wash fire vehicles, greatly reducing the use of potable water. It also includes a bio-retention pond that is populated with native plants to provide a rain garden to collect stormwater run-off. The pond is designed to reduce the amount of water flowing directly into the storm drain system and filter impurities from the run-off through layers of subgrade material before it eventually reaches the storm drain. Design elements of Fire Station #3 also include pervious concrete pavement in lieu of traditional concrete pavement to allow surface water run-off to seep or filter through the pervious concrete and low flow lavatories and shower heads assist in reducing water consumption by approximately 13,000 gallons per year.

In 2010, the Melrose Fire-EMS Station #5 (Fire Station #5) was the second fire station and City facility to receive LEED Gold. A rainwater harvesting system, a bio-retention pond, and a permeable paver parking lot are among a few of the "green" features incorporated in the design and construction. The design features of both facilities have significantly reduced operating and maintenance costs. During the planning of future capital projects such as renovations to the Library branches, the City will go forward with LEED standards in mind.

As a component of its environmental efforts, the City has also implemented a variety of water conservation measures in its municipal facilities. Staff has installed low-flow urinals, dual flush

toilets that use a pint of water per flush, and water-efficient aerators. These low-flow fixtures have yielded annual savings.

#### City's Greenroof:

In May 2012, the City installed a 6,700 square foot green vegetated roof on its Noel C. Taylor Municipal Building. The roof has 2,900 square feet of plants with 14 species of water-conserving sedum plants that provide a colorful and hearty landscaping. The roof has an automated irrigation system to determine the watering needs of the plants, and a rainwater harvesting system which includes six 500-gallon tanks for watering the roof via the automated irrigation system. The system provides plants with adequate water as needed through its solar powered weather station that calculates the evapotranspiration value, a calculation indicating watering needs.

Transportation Division's Landscape Maintenance staff, with assistance from General Services' facilities staff, has performed routine spring maintenance activities including annual mowing, soil testing, and rainwater harvest/irrigation system activation. In addition, the greenroof weather station data is now available on-line via the city's new greenroof webpage: <http://ht.ly/kZxNh>. The irrigation controller uploads this weather station data to assist staff in efficiently using the harvested rainwater.

The City projects that the green roof will increase the life of the existing roof membrane from 20 years to 60 years. Staff also anticipates that the system will reduce noise transmission, the amount of storm water runoff by 44 percent per one inch of rain, and heating and cooling loads by increasing insulation.

#### Parks and Recreation Initiatives:

In spring 2010, Parks and Recreation undertook efforts to re-naturalize certain areas of the city's parks and greenways with the goal of helping to buffer and filter storm water runoff and improve air quality by reducing fossil fuel use. The department partnered with the Upper Roanoke River Roundtable to begin phasing in a riparian buffer along portions of the Roanoke River Greenway. This effort has allowed the higher slopes of certain parklands, not subject to programmed activity, to self-propagate and return to a more natural state.

In 2013, Parks and Recreation worked with participants of Leadership Roanoke Valley to build a rain garden at Vic Thomas Park designed to curb the stormwater of the parking lot in order to help mitigate stormwater runoff. The rain garden serves as a planted depression that allows rainwater runoff from impervious surfaces (such as parking lots, walkways, and compacted lawn areas) to be absorbed. It is designed to improve water quality and reduce rain runoff by allowing stormwater to soak into the ground as opposed to flowing into storm drains and surface waters which causes erosion, water pollution, and flooding.

Also, as a first step toward a pet waste management program, Parks and Recreation has worked with the Department of Environmental Quality to install over 20 pet waste stations in parks along the Roanoke River and Murray Run. These efforts encourage pet owners to properly dispose of their animal's waste and educate citizens about the harms that pet waste has on water quality. Collaborative efforts with DEQ are currently underway to post additional signs in parks and other pet-frequented areas. The City is also in the progress of amping up local efforts to educate pet owners regarding pet waste bacteria and its impacts.

#### Public Works Initiatives:

The City's Transportation Division administers a storm drain stenciling/marketing program with work completed by volunteer groups. The stenciling program is the finishing step to clean, repair, and maintenance drain inlets and was established to raise awareness about the function of storm sewer drains and how they must be maintained to function properly.

By using volunteers and civic groups to perform some of the work, the City is able to provide hands-on education and training about the linkage between storm sewer inlets and the water quality of the region's streams, creeks, and the Roanoke River. In fiscal year 2013/2014, a total of 81 storm drains were marked by stencil and spray painted in the City. The storm drain markings have been coordinated by the Clean Valley Council.

#### Conservation Easements:

In 2008, the City placed 6,185 acres of Carvins Cove under a conservation easement. Roanoke City Council's desire to protect water quality for its citizens was without a doubt the primary impetus for the donation of the Carvins Cove easement. The 800-acre reservoir located within the Cove comprises the primary watershed for the largest sources of public drinking water for nearly all of the Roanoke Valley, including the City of Roanoke, Roanoke County, and the Town of Vinton. Environmentally, the easement permanently protects the land for the Roanoke River watershed preservation. The watershed is 6,275 square miles, and parts of Carvins Cove, including the Reservoir, are owned by the Western Virginia Water Authority. The preservation of the Cove will help protect water quality in the drainage area of the Carvins Cove Reservoir water source serving the Roanoke region.

In September 2009, the City followed up with a second easement of 5,178 acres at the Cove. This second easement also protects the watershed that surrounds one of the City's main sources of fresh water and preserves wildlife habitat, scenic views, forest resources, etc.

**Encourage and promote the Western Virginia Water Authority's (WVWA) regional efforts to protect the water quality and resources in the Roanoke Valley and to utilize best management and innovative practices to reduce its greenhouse gas (GHG) emissions.**

The Authority's mission is to protect and manage essential water resources through the delivery of quality water and wastewater service to its customers. Its ultimate goal is to enhance the

quality of life in the Roanoke region through regional cooperation, innovative technology and water best management practices, and protection of the region's natural resources via education and conservation efforts. The Authority understands the importance of reducing its carbon footprint and has implemented various programs and initiatives that are beneficial to the environment as follows:

#### Energy Performance-Based Contracting:

In December 2011, the Authority signed a \$32 million energy performance based contract with Honeywell, Inc. for a meter replacement project. The project involved the conversion of all meters in the City of Roanoke and Roanoke County with new wireless Sensus iPerl meters designed to increase meter readings and give more visibility on usage and network conditions to consumers and utilities. The system provides increased meter readings and accurate data and allows staff to better identify leaks in the distribution system in order to prevent water loss and incurred costs for the end-users.

The new metering system has served as an integral component of the Authority's water leak detection program. The system has already reduced unbilled water and has aided the Authority in targeting Capital Improvement Program funding by comparing meter readings to production statistics on a neighborhood (broad) scale. These improvements will assist the Authority with reducing real and apparent water loss from 25 percent to 10 – 12 percent and is projected to help the Authority save more than \$1 million in annual electrical and other operational costs, as well as add approximately \$1.5 million in revenue through increased water meter accuracy guaranteed by Honeywell.

Under the contract, other critical projects have included: 1) Installation of energy-efficient lighting; 2) a new roof top chiller to improve energy efficiencies; 3) installation of a natural gas pipe line to serve the peak shaving generator; 4) new space heaters at the Spring Hollow water treatment facility; and 5) installation of new pumps at the Crystal Spring Pumping Station. These comprehensive projects were backed by guaranteed savings in operational costs from the contractor and were designed to increase meter accuracy, improve leak detection, and reduce energy costs and carbon dioxide emissions for the Authority – all without adverse impact to the Authority's operating budget.

#### Methane to Electricity:

Methane is a natural substance that is composed of one carbon surrounded by four hydrogen molecules (CH<sub>4</sub>). It is a renewable resource that burns cleaner than coal (which is burned to make the majority of Roanoke's electricity), and is an attractive resource due to its abundance. When methane is released directly into the atmosphere, it is a potent greenhouse gas, and its global-warming potential is 21 times greater than that of carbon dioxide. Therefore, using it to generate energy encourages more efficient collection of the substance and reduces emissions in the atmosphere.

Where economically viable, energy recovery from methane is of considerable benefit to the environment. Approximately 246 million British Thermal Units (BTUs) per day of methane gas is produced as a waste by-product of the Western Virginia Water Authority's solids treatment process. In 2012, the Authority installed two 500 kilowatt co-generation generators designed to run on waste methane produced at the Roanoke Regional Water Pollution Control Plant. This combined heat and power (CHP) system converts waste methane gas into electricity, supplies thermal energy to heat the existing digesters, and creates electrical power that is used to reduce the plant's electricity usage. Excess heat produced by the system is also used to supply thermal energy to absorption chillers to heat and cool the buildings, further reducing electricity costs.

According to the Authority, the CHP generation system offsets approximately 7,577 MW hours of electrical power annually. Generators offset the plant's heating needs and 20 percent of the plant's current electrical demand. Depending upon facility flows, the generation capacity can cover up to 30 to 50 percent of the plant's energy usage. The system is estimated to reduce greenhouse gas emissions by 4,600 metric tons annually and is a more efficient and clean approach to generating electric power and useful thermal energy from a single source. The project's total cost of approximately \$3 million is expected to pay for itself in seven years.

#### Biosolids Recycling:

The Authority is reclaiming safe, nutrient-rich organic material from the millions of liters of wastewater it treats each year. This reclamation process results in the production of biosolids that are delivered and applied at no cost onto participating farmers' land. The biosolid nutrients are recycled rather than put in landfills or incinerated. Biosolids recycling has been shown to produce significant improvement in crop growth, be a cost-efficient complement to chemical fertilizers that contain inorganic chemicals with biosolids, and enables local governments to market biosolids products to help offset the costs of ensuring clean water quality to the Roanoke citizens.

#### Saving Energy by Preventing Water Loss:

The Authority's goal is reduce non-revenue water from 25 percent to 10 – 12 percent. This is being accomplished through the implementation of system-wide leak detection programs and by replacing older, inefficient pumps with new premium efficiency motors to save energy and money. Over 57,000 residential meters were replaced and installed with wireless transmitters, which allows real time readings to assist the Authority with identifying leaks and answering customers' questions about consumption and demand. The Authority also conducts educational outreach programs at which time citizens are encouraged to check and repair toilet leaks, fix leaking faucets, and use water wisely. These innovative programs of the water authority have proven successful and cumulatively have reduced water consumption in the City by millions of gallons per day.



### **Support responsible consumption of water by residents and visitors.**

The City of Roanoke participates in the Roanoke Valley Alleghany Regional Commission's (RVARC) regional water supply planning group. The group is comprised of twelve local governments and the local water authorities and was tasked with the development of local, regional, and state water supply plans pursuant to the State Water Control Board's regulation 9 VAC 25-780. The comprehensive water supply planning process was designed to ensure the following: 1) Adequate and safe drinking water available to all citizens within the region; 2) protection of all other beneficial uses of the region's water resources; 3) support and promotion of the development of incentives for alternative water sources; and 4) conservation.

According to the Regional Water Supply Plan, the Western Virginia Water Authority currently has a water surplus of 21.00 MGD, which is an adequate supply until approximately 2056 when the Authority will potentially experience a water supply deficit of approximately 0.02 MGD. The report indicates that the supply deficit may increase by approximately 0.92 MGD by 2060 with an additional 3.75 MGD of supply required by 2060 to meet growing private water supply needs in the Valley. The regional commission will continue to facilitate discussion with the regional water supply planning group regarding potential alternatives to meet future water supply needs for the Western Virginia Water Authority and the Roanoke Valley.

### **Establish citizen stream monitoring and clean-up programs and encourage active participation from community volunteers, governmental entities, and environmental enthusiasts.**

Annually, the Roanoke Clean Valley Council hosts community-wide waterway clean-ups in the spring and fall of each year. Each April, the Council organizes Clean Valley Day to clean-up the roads and waterways in the region. In April 2013, over 1,500 community volunteers participated in Clean Valley Day, and over 61 tons of trash debris was collected. Every October, the Council also conducts a Fall Waterways Cleanup to remove trash from the streams, creeks, rivers, and their vicinities. In October 2013, over 800 community members participated in the Roanoke River clean-up, and over 41 tons of trash was collected from the event. The City will continue to support these efforts through financial donations and in-kind support of the park and picnic facilities and collection of the trash and tires by the City's Solid Waste Management Division.

### **Continue compliance with the Commonwealth and Federal Statutes and continue to improve the City's Municipal Separate Storm Sewer System (MS4)**

Pursuant to the Virginia Stormwater Management Act, the Virginia Stormwater Management Program (VSMP) Permit regulations, and the Clean Water Act, the City is mandated to comply with six Minimum Control Measures as required by the General Permit for Discharges of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4). Small MS4s include storm sewer systems operated by cities, counties, towns, federal facilities, and state facilities and, under the general permit, must develop, implement and enforce a program that includes the following six "minimum control measures" (MCM): 1) Public education and outreach on

stormwater impacts; 2) public involvement and participation; 3) illicit discharge detection and elimination; 4) construction site stormwater runoff control; 5) post-construction stormwater management in new development and redevelopment; and 6) pollution prevention/good housekeeping for municipal operations.

Annually, the City's environmental administrator submits a MS4 Annual Report and Program Plan Update to the Virginia Department of Environmental Quality. The report outlines the City's measurable goals, schedules, strategies, and other best management practices (BMPs) to reduce the discharge of pollutants from the storm sewer system in a manner that protects the water quality of nearby streams, rivers, wetlands, and bays. Compliance with these regulations permits the City to obtain a permit to discharge stormwater from its outfalls (every point where a conveyance of storm water system discharges into a stream).

The City remains committed to maintaining a comprehensive MS4 program. In addition, its Office of Environmental Management continues to work collaboratively with our neighboring MS4s and other partners to improve stormwater issue and regulation awareness throughout the Roanoke Valley and beyond.

**Continue to promote cooperation with neighboring jurisdictions to achieve and maintain water quality standards in the City's and region's streams.**

The Roanoke Valley-Alleghany Regional Commission is working with the region's local governments and state agencies to assess ways to work cooperatively to address stormwater issues affecting the region. In 2009, the Regional Commission, local governments, and stakeholders established a Regional Stormwater Management Committee and a Regional Stormwater Technical Committee to examine opportunities to work regionally in determining mechanisms that would lead to an effective and efficient way of helping to reduce flooding, while at the same time, improving the water quality of the rivers and streams in the region and assisting local governments in meeting mandated stormwater management activities. To aid in the regional planning process, the City is working with Roanoke County, City of Salem, and the Town of Vinton to coordinate stormwater compliance, procedures, and processes. Each municipality is individually permitted by the Department of Environmental Quality. However, in order to maintain consistency and achieve maximum results, the jurisdictions are working together to share best management practices and policies.

The City is also working collaboratively with the Upper Roanoke River Roundtable, an advisory group that identifies and addresses water quality and quantity issues and makes recommendations about management solutions to those whose decisions impact the upper basin of the Roanoke River. The group includes the City of Roanoke and other governmental entities, the Department of Environmental Quality, Virginia Department of Health, Virginia Department of Transportation, and the Western Virginia Water Authority and is currently developing a Roanoke River Watershed Clean-up Plan. The plan addresses sewage handling and disposal, septic systems, stormwater programs (urban runoff), sewage overflows related to grease, and pet waste.

**Establish long-term dedicated funding mechanisms, such as storm water utility fees or other taxes to improve and maintain stormwater infrastructure.**

On November 18, 2013, Roanoke City Council adopted an amended Stormwater Utility Ordinance (Chapter 11.5, Stormwater Utility) to the Code of the City of Roanoke. This ordinance authorized the City Manager to take appropriate actions to facilitate an effective transition of the ordinance by developing policies, procedures, and manuals necessary to implement the Stormwater Utility Chapter, accepting applications for stormwater utility fee credits, and proposing to City Council a stormwater utility fee. Council provided that any proposal for a stormwater utility fee proposed by the City Manager would be considered and acted on by City Council Resolution or with the adoption of the fiscal year 2014-2015 budget. Council further provided authorization for the City Manager to take such actions necessary to establish, implement, and enforce the Stormwater Utility fee.

Effective July 1, 2014, the amount of the stormwater fee will be based on the amount of impervious area on each developed property in the City, and for billing purposes, the fee will be based on each 500 square feet of impervious area identified. The average residential monthly fee is \$5.76, and the average non-residential fee is \$55.60 based on the fee rate of \$0.90 per 500 square feet of impervious surface. The monthly fee will be phased in over a three-year period beginning July 1, 2014 at \$0.30 per 500 square feet, increasing to \$0.60 per 500 sq. ft. on July 1, 2015, and reaching the full rate of \$0.90 per 500 square feet on July 1, 2016. The projected annual revenue from the stormwater utility is \$5.4 million and will provide dedicated funding to address storm drain capital projects, water quality regulatory compliance and improvements, and increased maintenance and repair of storm drain infrastructure.

**Maintain a GIS map and object file database for the City storm sewer system, including catchments and outfalls.**

The City developed a storm sewer system map using Global Positioning System (GPS) technology that readily identifies MS4 features, termination points, and outfalls. The system provides centralized graphical information and data source that assist City departments, developers, and the general public with understanding the presence and orientation of existing infrastructure. It also provides ready access to potential pollutant migration pathways in the event of hazardous material spills and/or disasters. In 2013, the City developed a new on-line GIS website that provides more information regarding the individual identifiers for each storm drain feature (inlet, outfall, etc.).

**Improve public outreach to promote efficient use of available water resources and promote best management practices for stormwater through educational programs, workshops, and demonstrations.**

The City of Roanoke and its local and regional partners have committed to serving as an avenue for public education and outreach related to stormwater pollution prevention,

regulations, and over-all general awareness. Public education and outreach efforts regarding stormwater quality have included various media outlets such as periodic informational articles in the Roanoke Citizen magazine, video segments pertaining to storm water quality and pollution prevention for Inside Roanoke, a local cable program, and publications and programs targeted to unique stakeholder groups.

The City and Town of Vinton have collaborated with Clean Valley Council to provide a stormwater education program to area schools. The program reaches out to elementary, middle, and high school students with a Standards of Learning-based program about the challenges of managing stormwater and the effects of stormwater runoff. During the 2013-2014 school years, the Council provided 88 programs to 1,769 students and 81 adults and teachers in the City, and over 600 articles of take-home education materials were distributed to participants. Also, during this period, 61 stormdrains were stenciled by volunteers.

The Western Virginia Water Authority provides an education outreach program to students K – 12, area colleges, community groups, and civic organizations. The Authority has sponsored hands-on classroom demonstrations, teacher workshops, guest speakers, videos, and interactive field trips. In fiscal year 2013, over 10,000 students participated in the classroom presentations on a wide range of topics, including water supply, watersheds, water conservation, and properties of water. Over 2,700 of those students actually visited one of the Authority's treatment facilities.

Also, in 2013, the Western Virginia Water Authority (WVWA) developed a subsequent public information campaign to educate customers about their role in backflow prevention and to survey customers regarding potential locations in the service area where backflow could possibly occur. The information brochure and links to the online survey were included with each utility bill, and any customer that indicated a potential cross-connection source on their property was contacted by the Authority to either determine that there was no concern for contamination or fix the defect.

In 2013, a citizen advisory committee, comprised of citizens and business representatives, was established to review and provide feedback on the City's stormwater management program. The advisory committee meets quarterly with sessions coordinated and facilitated by the Clean Valley Council. The advisory members serve as channels of communication to each participant's respective neighborhood organizations and provide feedback on proposed initiatives and activities related to storm water quality within the City. The committee also sponsors and receives educational programs and presentations related to stormwater management and other water quality topics.

In 2014, Clean Valley Council (CVC) held its first Recycled Regatta Watershed Awareness Day to promote the protection of the local Roanoke River and watershed and natural resource stewardship. The Watershed Festival was a collaborative effort of the CVC, the Department of Environmental Quality, Western Virginia Water Authority, Blue Ridge Land Conservancy, Roanoke Outside, the Upper Roanoke River Roundtable, and numerous other partners.

Annually, the City hosts a Roanoke Green Academy and conducts 2 sessions to specifically address water quality and consumption, stormwater management, water pollution, and water conservation. The Western Virginia Water Authority and Clean Valley Council partner with the City to facilitate the discussion on these topics, as well as to address innovative water best management practices. In addition to the Academy, the City produced an educational video with local experts discussing the challenges and opportunities of understanding and managing stormwater run-off in an effort to better educate its citizenry.

## **LAND USE AND CONSERVATION**

### **OVERVIEW:**

In the United States, there has been a dramatic increase in urban sprawl during the past 10 years. Residents have migrated from the City into remote and suburban areas, resulting in low-density communities reliant heavily upon automobile usage. Like most urban areas, Roanoke has been impacted socially, economically, and environmentally by urban sprawl yet has limited land availability for new residential and commercial development in the City to address this challenge. For that reason, the City has instituted numerous measures to ensure that land development patterns and their potential consequences are closely considered, while effective plans are implemented to move toward urbanization.

In the City of Roanoke's Comprehensive Plan, *Vision 2001–2020*, City staff has established a series of strategic initiatives and specific action items for implementing Roanoke's vision of a sustainable and livable city. This plan looks at the bigger picture and connects the strategies and action steps of land use, development, conservation, and preservation to other essential components of the community. Shaped by smart growth principles, the plan addresses sustainable land use through various implementation strategies, including mixed-use commercial and residential land uses (particularly in the City's Downtown); development or redevelopment where infrastructure already exists; village commercial centers; a range of housing choices; connectivity and alternative transportation options; and preservation of open space, farmlands, natural beauty and critical environmental areas.

Land use, development, and conservation strategies are critical to sustainability. How they are approached have both direct and indirect effects on the community's carbon footprint. These decisions impact the natural environment, citizens' transportation choices, the connectivity and walkability of neighborhoods, and wildlife habitat. Consequently, this makes it essential that the City and community stakeholders take an integrated, holistic approach to land use planning to make optimal and informed choices on future land use and its impact on the environment.

Long term strategies have been developed for investment in the City's existing infrastructure, renovation of historic buildings, and expansion of existing community assets. The City's comprehensive plan and all neighborhood plans call for the concentration of higher density development around existing and planned mixed-use neighborhoods and commercial areas that will produce the greatest sustainable benefits. Planning, Building, and Development continues to seek opportunities to redevelop underutilized commercial and industrial sites based on market demand and innovative design potential. These strategies include compact building design, brownfield remediation and development, neighborhood-oriented commercial activity in well-defined village centers, urban flex zoning districts, mixed use downtown, greenfield development, low impact development and others.

Equally important is the protection and preservation of natural lands, open spaces, green spaces, and critical environmental areas. Open spaces - often defined as unbuilt land within the City such as green space (parks and gardens), play areas, civic spaces, or green corridors - contribute immensely to Roanoke's quality of life and urban sustainability. Safeguarding and preserving these environmentally sensitive areas provide environmental, social, and economical benefits to our community. It encourages the use of outdoor spaces, increases social interaction among neighbors, improves recreational activities, and enhances sustainable development. Having sustainable land use policies recognizes that land and the natural resources associated with it are limited and invaluable resources to the community.

Tree canopy is another essential component of urban environments. Roanoke's urban forestry program maintains approximately 12,000 street trees and 5,000 park trees. Along with their visual appeal, these trees provide a wealth of environmental and economic benefits to the community, such as beautifying the built environment, enhancing property values and community livability for residential and business areas, reducing stormwater runoff, improving air quality, and conserving energy. Tree cover has been identified as an important measure of the City's sustainability efforts and has resulted in the adoption of Roanoke's Urban Forestry Plan by City Council as an element of the City's comprehensive plan. The plan recommends an overall 40 percent tree canopy within the City to be achieved through public and private tree planting and tree requirements during new land development.

Now and in the future, City planners will continue to encourage sustainable development by recognizing the connections between development and quality of life, facilitating decision-making processes regarding land use and development that provide the greatest sustainable benefits, and placing infill, redevelopment, and densification strategies as community priorities. With such a fine line between building the economy and preserving or conserving the environment, planners and stakeholders will fully explore the broader impacts of their decision-making as it relates to land use and will move forward to develop and implement land use, development, and zoning policies and practices that strive to balance these contrasting priorities.

**GOAL:** As outlined in the Vision 2001-2020, Comprehensive Plan, Roanoke will work to ensure sustainable land use and urban development, while closely considering the potential

consequences of land development patterns and effectively planning to reduce these negative impacts.

#### **TARGETS:**

**Increase the number of Urban Village Centers by 2020 and improve the existing Village Centers in key locations through the neighborhood planning process.**

**Increase urban density to accommodate future population growth within the City's existing urban area.**

#### **STRATEGIES:**

**Incorporate best practice sustainability principles into neighborhood planning.**

The City's Department of Planning, Building, and Development has adopted and implemented "smart growth principles" to ensure that Roanoke's land use, development, and growth is socially, environmentally, and fiscally responsible. These principles create and maintain sustainable neighborhoods based on ten basic principles: 1) Mix land uses; 2) the use of compact building design; 3) creation of a range of housing opportunities and choices; 4) creation of walkable neighborhoods; 5) fostering distinctive, attractive communities with a strong sense of place; 6) preservation of open space, farmland, natural beauty, and critical environmental areas; 7) strengthening and directing development toward existing communities; 8) providing a variety of transportation choices; 9) making development decisions predictable, fair, and cost effective; and 10) encouraging community and stakeholder collaboration in development decisions. City staff will amplify efforts to apply Smart Growth principles in order to strengthen and direct sustainable urban development.

**Inventory and market vacant lots and underutilized land throughout the City for higher-density, mixed-use development.**

Redevelopment of underutilized land areas is critical for the City of Roanoke as almost 95 percent of the City's property is already developed. Given this fact, the City has worked to increase its use of abandoned or underutilized land in major community corridors. The reuse of underused land represents a strategic opportunity for growth, community development, economic investment, and environmental restoration for the City of Roanoke.

Brownfields, often defined by urban planners as land previously utilized for industrial purposes or commercial uses and often complicated by the presence or potential presence of hazardous substances, pollutants, or contaminants, have been the prime candidates for redevelopment and reinvestment in the Roanoke community. These real properties are often located in close proximity to major transportation corridors and commercial and industrial activity. Recycling

these properties offers a number of opportunities, including creation of green space and mixed residential and commercial development along the Roanoke River corridor, better utilization of other industrial and commercial-zoned property, opportunities for new jobs and housing stock, an increased tax base, and correction of environmental issues that may otherwise remain uncontrolled.

As identified in its Comprehensive Plan, Roanoke's brownfield program is one component of the City's efforts to encourage investment in and rejuvenation of its core neighborhoods. The brownfield program, when coupled with the City's economic development, housing, and community development programs, offers a holistic package to spur new uses in the City. Through this program, City staff can assist owners and developers with establishing liability limitations/amnesty for environmental issues and can access state and federal funds to help address those issues. This approach allows the City to maintain its existing industrial base while providing opportunities to attract new business and residents.

The sustainable reuse of the City's brownfield sites has involved three basic approaches: 1) Converting underused industrial property along the Roanoke River to a green corridor with a supporting mix of commercial and residential uses; 2) revitalizing brownfield sites in or immediately adjacent to residential neighborhoods as neighborhood scale commercial operations that reinforce Village Centers, provide opportunities for technology and entrepreneurial business, and create opportunities for housing clusters and other mixed development; and 3) reinforcing industrial corridors by reusing property for new operations for more efficient land use to strengthen the industrial base of the City.

In 2002, federal and state laws were passed to remove barriers to reusing sites with environmental issues. Hence, the City developed a City-wide Brownfield Redevelopment Plan which established the City's role as a clearinghouse and facilitator for redevelopment that meets the goals of the Comprehensive Plan and supporting documents. The plan identifies the City's responsibility in leveraging projects that support redevelopment efforts through "developing partnerships with property owners, prospective developers, and community stakeholders, and providing financial resources through various grants and other financial programs".

Since 2006, the City has been awarded the U.S. Environmental Protection Agency's Brownfields Assessment Grants totaling \$600,000. These funds have been and are currently available to public, private, and non-profit entities to perform Phase I and Phase II Environmental Site Assessments, clean-up planning, and related activities. Most recently, the City was one of 23 localities chosen to participate in a 2010 Brownfields Area-Wide Planning Pilot Project Grant to conduct Phase I and Phase II environmental site assessments, inventory and prioritize brownfields in at least 2 targeted corridors, and support community outreach activities. The pilot program will help further community-based partnership efforts within underserved or economically disadvantaged neighborhoods by confronting local environmental and public health challenges related to brownfields, while creating a planning framework to advance economic development and job creation.



City staff will continue to explore outreach efforts and compile background information on potential brownfield areas to identify prospective development opportunities and to match and market those opportunities to prospective developers. Staff will also continue to evaluate land use and administrative policies that encourage reuse of brownfield sites and make such reuse competitive with development of greenfield sites developers.

**Plan for and encourage “Village Centers” in neighborhoods containing a mixture of higher density residential uses and neighborhood commercial uses.**

Support for sustainable land uses is critical to Roanoke’s quality of life and opportunities for residents to live, work, shop, and play. In its Vision 2001-2020 Comprehensive Plan, the City established broad policies to guide housing and neighborhood decisions and put specific actions in place to realize Roanoke’s vision of a sustainable and livable city. Twenty-six (26) neighborhood plans, which cover almost 50 neighborhood areas and address land use, economic development, transportation, streetscape improvements, and other specific sustainable elements, have been completed and adopted. Potential village center locations are identified in these neighborhood plans and mapped accordingly on the zoning map. Recommendations have been made that many of the properties be developed as new mixed-use neighborhoods that are set within the context of other neighborhoods and existing development.

Also, in 2009, City Council established the Urban Flex District (UF) to encourage mixed-used development in underperforming industrial areas. The UF district is designed to promote high intensity, mixed-used development that is economically viable, pedestrian-oriented, and attractive and contributes to the district’s sense of character. The district provides new development and redevelopment opportunities in the form of mixed-use structures that offer a wide range of sustainable land uses. These new or enhanced village centers can create more attractive, decentralized multi-use development sites for commercial activity and higher-density housing

Moving forward, City planners will place more emphasis on Village Center master planning and will address many of the strategies and action items identified in the city’s Comprehensive Plan as follows: 1) Revise zoning ordinances to permit higher-density residential and mixed-use development for housing clusters and encourage quality infill development that reflects the character of the neighborhood; 2) develop design guidelines for village centers as part of specific area plans; 3) revise zoning ordinance to establish maximum parking limits and restrict surface parking lots for large developments; 4) establish land use regulations which allow for a flexible range of development options while still accounting for the needs of the City; and 5) focus growth along community corridors designated in the City’s Vision 2001-2020 plan.

City planners are transforming key transit corridors and core commercial areas as mixed-use neighborhoods that foster active, walkable, and community living. For example, in 2013, developers broke ground on a 22-acre mixed-used development project referred to as “The Bridges” adjacent to the City’s Riverside area. This development includes news apartments,

restaurants, offices, and retail space on the site of the former Mennel Mill and Virginia Scrap and Metal Co. year and is the largest development of its kind in the City. Over the course of 10 years, “The Bridges” is projected to grow to 1 million square feet of residential, retail, and office space and will connect Downtown Roanoke with the Roanoke River to create a public destination that will include a public river walk, a kayak launch, and riverfront dining. The City will continue to capitalize on opportunities such as this while carefully mitigating the social, economic, and environmental impacts of new development through creative planning and design.

## **TREE CANOPY & PRESERVATION**

**GOAL:** The City of Roanoke will take action to achieve an average tree canopy of at least 40% within ten years through specific policies and actions for three primary themes of the Urban Forestry Plan: (A) Tree Planting on Public Land, (B) Public Tree Management, and (C) Trees on Private Property. The City will work regionally to promote tree planting and tree preservation valley-wide in an effort to improve air quality.

### **TARGETS:**

**Maintain an overall tree canopy of 40 percent- plus over the course of the next ten years through implementation of the actions recommended in the Urban Forest Plan update.**

### **STRATEGIES:**

**Continue to expand the urban tree canopy and achieve an equitable percentage of tree canopy across residential neighborhoods, City parks, street medians, school properties,**

Roanoke’s tree canopy is critical to its future and should be protected and expanded for Roanoke to be a sustainable, economically competitive, and livable City. Consequently, City Council adopted Roanoke’s Urban Forestry Plan on April 21, 2003 as an element of Vision 2001-2020. The plan recommends an overall 40 percent tree canopy within the City to be achieved through public and private tree planting, in addition to requirements for more tree planting and tree protection during new land development. In the City’s comprehensive plan, Vision 2001-2020, it was quoted that “trees and other vegetation represent both an environmental resource and an important landscape feature in the quality of life in the City. Maintaining and increasing the City’s tree canopy will have a beneficial impact on air quality, stormwater control, noise levels, temperature, and visual appearance”.

The City of Roanoke partnered with AMERICAN FORESTS to conduct an Urban Ecosystem Analysis which provided a detailed assessment of tree cover in Roanoke and the surrounding

communities. The analysis used Geographic Information Systems (GIS) technology and high-resolution satellite imagery to measure the structure of the landscape with emphasis on tree cover. As part of the analysis, the AMERICAN FORESTS' CITYgreen software was used to calculate the environmental and economic values of Roanoke's urban forestry. The software calculates tree benefits from information stored in the City's GIS to help determine the effects of removing trees or planting new trees. It also calculates the economic value of a particular neighborhood greenspace, providing measurements of the trees' contributions to stormwater runoff reduction, energy conservation through shading, air pollutant removal, carbon storage, and urban wildlife habitat.

Quantification of these tree-related benefits has been useful for assessing current conditions and providing the opportunity for much better land use and development decisions than in the past. The analysis completed in 2010 revealed that Roanoke had achieved a tree canopy of 48.1 percent. An earlier analysis revealed that Roanoke's trees provided \$2.3 million in air quality benefits each year and if Roanoke did not have its trees, the cost of building the infrastructure to handle the increase in stormwater runoff would be \$128 million.

Roanoke was designated as a Tree City USA with a current tree canopy of 48 percent of its land area. In a recent assessment, it was noted that the benefits that come from Roanoke's trees includes the following: the removal of 304 tons of air pollutants each year for a total annual value of \$2.27 million; an annual energy benefit of \$511,000; increased property value by \$913,127; an annual stormwater management benefit of street trees of over \$1 million; and a benefit-cost ratio of street of 6.61 to 1.

**Provide educational opportunities to inform citizens about tree preservation, planting, and maintenance.**

Since 2009, Roanoke has sponsored the Roanoke Tree Stewards program through its Department of Parks and Recreation. The program trains volunteers to promote and protect the health and well-being of Roanoke's urban forestry, so that they are available to plant, care for, and maintain public trees in the city and surrounding area, educate the public regarding the benefits and needs of the trees in the community, and provide assistant to the City's urban foresters. Annually, twelve-week training sessions are provided to the volunteers. Since the program's inception, the City has trained over 70 volunteers.

## **OPEN SPACE & RECREATIONAL AREAS**

**GOAL:** The City will protect its forest, agricultural lands, and recreational areas, as well as its streams, creeks, and rivers from future development through the best conservation approach for each space and based on the following principles: protecting natural resources, maintaining or enhancing air or water quality, preserving the historic or architectural aspects of real property,

retaining or protecting the natural or open-space values of real property, and assuring availability of real property for agricultural, forestall, recreational, or open-space use.

#### **TARGETS:**

**Increase green infrastructure, open, recreational, or natural spaces that are within a 10-minute walk of all residents by 2020.**

#### **STRATEGIES:**

**Create parks and/or recreational and green spaces in areas with inadequate open space.**

The City continually seeks opportunities to preserve and enhance urban green space and maximize recreational opportunities for its citizens. Parks and Recreation has numerous strategic plans that are designed to manage the City's unique parks, green spaces, and natural and cultural resources, while improving the environmental health of the region. These plans include the Parks and Recreation Comprehensive Master Plan updated and adopted by Roanoke City Council on July 15, 2013, Carvins Cove Park and Trail Management Plans, Mill Mountain Park Management Plan, Roanoke Valley Conceptual Green Way Plan, and numerous others.

Most recently, the City developed and adopted the Countryside Golf Course Plan, which involved a \$1.5 million project to add recreational amenities and elements to the former City-owned golf course. The planning approach for the Countryside development was guided by the development principles and policies of the Vision 2001-2020 Comprehensive Plan and identified many of the following urban design principles as critical to the process: 1) Efficient land use; 2) preservation of existing wooded areas, riparian buffers, wetlands, and steep slopes (reverted to its natural state); 3) street connectivity and pedestrian amenities; 4) streets as public places; 5) urban agriculture; and 6) integration of recreational facilities into the neighborhood fabric.

In future planning processes, City staff will continue to identify distinct recreational areas, evaluate the development potential of these areas, and use the best design principles to guide new development that complements and adds value to existing neighborhoods. Staff will focus on creating walkable communities, thus expanding transportation options, creating streetscape for a range of users, and ensuring safe and pedestrian-friendly communities. Land use and community design will play a pivotal role in establishing a distinctive "sense of community" in existing and future communities.

**Continue to support efforts that preserve open spaces, farmland, natural beauty, and critical environmental areas throughout the City and conserve significant forested areas using a variety of methods, including conservation easements, etc.**

Carvins Cove Natural Reserve is public land, owned by the City and comprised of approximately 12,000 acres of forested land and 1,072 acres of land in the watershed, owned and managed by the Western Virginia Water Authority. In 2008, the City of Roanoke granted a perpetual conservation and open-space easement to the Virginia Outdoors Foundation and the Western Virginia Land Trust covering approximately 6,185 acres at the Carvins Cove Natural Reserve. In 2009, the City placed another 5,178 acres of the Cove under easement. These easements outline the restrictions of future use on the Cove property, including limiting grading, blasting or mining, forest management, and the amount and nature of any future buildings or signage erected within the easement area.

The City of Roanoke's conservation easement in Carvins Cove Natural Reserve represents the single largest easement donation in the history of the Commonwealth. The necessity for protecting this land was evident for many years, and Roanoke City Council demonstrated tremendous courage in dedicating itself to the protection of its citizens' water source by protecting the watershed from which it originates. Roger Holnback, Executive Director of the Western Virginia Land Trust once quoted that "Roanoke is looking for a way to sustainably grow and attract new business and new residents... Permanently protecting these natural features makes a bold statement about Roanoke's commitment to its quality of life that no other city in Virginia can make."

Placing a conservation easement on Carvins Cove completely prevents even minimal development from occurring on such an outstanding scenic and green infrastructure resource. In fact, the portion of Carvins Cove under easement allows almost no substation buildings and limits permitted buildings to such structures as restroom facilities, small stables and trail shelters, which are imperative for both the protection of scenic views enjoyed by the public and for water quality.

The Carvins Cove conservation easement project fostered the United States Environmental Protection Agency's (EPA) smart growth principles in that it preserved open space, farmland, natural beauty and critical environment areas and encouraged community and stakeholder collaboration in development decisions. It is just one example of many conservation and preservation strategies that has been implemented by the City with the support of community stakeholders and environmental enthusiasts. As future uses and management of open spaces and forestry areas are evaluated, the City along with community stakeholders will implement conservation strategies that will preserve and protect these valuable, natural resources from development.

## **LOCAL FOOD ACCESS AND SYSTEMS**

### **Overview:**

The food system directly and indirectly connects to other sustainability systems, such as water, transportation, land use, energy and economic systems. Every community's food system supports and enhances the overall public, social, ecological, and economic health of the community and is generally defined by a cycle of processes that include production, processing, distribution, access and consumption, and waste and resource recovery. Access to healthy and affordable food is viewed as not only a key component to healthy, sustainable local food systems but also healthy, sustainable communities.

According to the American Planning Association, planners in local governments play an important role "in developing and implementing local and regional land-use, economic development, public health, and environmental goals, programs and policies to:

- Preserve existing and support new opportunities for local and regional urban and rural agriculture;
- Promote sustainable agriculture and food production practices;
- Support local and regional food value chains and related infrastructure involved in the processing, packaging, and distribution of food;
- Facilitate community food security, or equitable physical and economic access to safe, nutritious, culturally appropriate, and sustainably grown food at all times across a community, especially among vulnerable populations;
- Support and promote good nutrition and health; and;
- Facilitate the reduction of food-related waste and develop a reuse, recovery, recycling, and disposal system for food waste and related packaging."

With this role in mind, City planners and community organizations are utilizing various tools to address complicated societal issues such as food access, land use, food system plans, and healthy community plans. The City and its stakeholders have identified the significant correlation between public health and the development of land use for sustainable agriculture. At one time, the creation of community gardens and urban farms was not viewed as an urban activity. However, this perception has changed significantly as individuals and communities have realized the broad-reaching benefits of community gardens as quasi "community centers" or meeting spaces. Agricultural landscapes and programming are now seen as opportunities for education, personal health and development, active living, community cohesion and pride, economic improvement, and increased livability of a community.

For years, considerable attention has been paid to disparities in food access in rural and urban areas. According to the U.S. Department of Agriculture, more than 50 million people nationwide are food insecure (hungry or face the threat of hunger), and approximately 23.5 million people live in food deserts (areas where affordable and nutritious food is difficult to obtain). Most

Americans do not meet the nutritional guidelines, especially in the area of fruit and vegetable consumption.

In Roanoke, obesity and diet-related diseases have become increasingly problematic. In 2013, Roanoke ranked 126<sup>th</sup> out of 132 localities in Virginia in at-risk health behaviors. Childhood obesity was at twenty-eight (28) percent, 6% above the state average, and adult obesity was thirty-four (34) percent, 6% above the state average and 8% above the national benchmark. As of April 2014, the City had 12,107 households certified to receive Supplemental Nutrition Assistance Program (SNAP) benefits, constituting 25,102 participating members (approximately 26% of the City's population). Many Roanoke citizens who reside in low-income neighborhoods have limited access to fresh affordable produce and other healthy food choices, which may be directly correlated to diet-related diseases in the urban community.

For several years, the City has spearheaded collaborative efforts to improve health and wellness and has developed quality recreational programs, facilities, pathways, creative land uses, and green spaces that promote and encourage active living and address the health of the community. Roanoke's citizens have become increasingly interested in growing their own food and caring for their personal landscape and health than ever before. Numerous community organizations have committed to educating and informing citizens about growing and purchasing local foods, improving nutrition, creating sustainable urban landscapes, and preserving green space.

City efforts toward promoting healthy food access and wellness have included partnerships with the Virginia Cooperation Extension, the Roanoke Health Department, the Roanoke Community Garden Association, volunteers of the "Food for Thought" school garden project, and other community organizations. New partnerships with the LEAP for Local Food and Healthy Roanoke Valley have also emerged. In its Roanoke Valley Community Health Needs Assessment, focus group participants of Healthy Roanoke Valley identified a "Culture of Wellness" as a priority community need. The participants also identified access to affordable, healthy foods (especially in low-income neighborhoods), increased physical activity, and nutrition education in both the schools and community at large as priority needs.

**GOAL:** The City will work to support and promote a sustainable food system that contributes to the health, economic vitality, and social well-being of the Roanoke Valley through collaborative efforts with environmental and food system stakeholders interested in improving access to local and regional food.

**TARGETS:**

- 1) Increase urban agricultural land uses within the Roanoke community.**
- 2) Establish five (5) additional community gardens by 2020.**

## **STRATEGIES:**

### **Support and promote new opportunities for commercial urban agriculture.**

The Roanoke Natural Food Co-op is the largest cooperatively owned natural foods grocery store in Virginia. For over 35 years, it has offered organic, natural, and local products to the Roanoke Valley. Its business has supported sustainable environmental practices, local farmers, local businesses, and the community under the guidance of cooperative principles.

In October 2012, the Co-op purchased farm land from the City of Roanoke to establish Heritage Point, a 25-acre cooperative urban farm located in the Roanoke Centre for Industry and Technology. Heritage Point was established as the largest contiguous urban farm in the United States and includes a fruit orchard, honey, cut flowers, nursery and bedding plants, and off-season vegetable production. On the farm, the Co-op utilizes sustainable farming techniques with no harmful commercial fertilizers or pesticides and supplies fertilizer and egg production for the farm from free-range chickens. Heritage Point farm will serve to strengthen and improve the local food infrastructure in Southwest Virginia.

### **Support and improve access to farmers markets in neighborhoods with poor access to fresh foods.**

Community leaders are in a unique position to improve family health outcomes by promoting healthy eating, active living, and neighborhood connectivity. In the Roanoke community, LEAP for Local Foods is a community organization that strives to develop, support, and maintain a sustainable local food system in the greater Roanoke region that is inclusive of healthy, local food accessible to everyone. The organization currently organizes and operates three farmers markets and one farmers table, which include the Grand Village Community Market, the West End Community Market, the Lick Run Community Market, and the Carilion Clinic Farmer's Table. These markets support local sustainable agriculture by connecting the public to local farmers, artisans, and other producers in vibrant and economically viable marketplaces.

Established in 2009, the Grandin Village Community Market is comprised of 18 farmers and food producers and operates on Saturday from April through October. The West End Community Market (WECM) celebrated its grand opening in 2010. WECM operates every Wednesday from June through September and features many of the vendors from the Grandin Village Community Market. The Lick Run Community Market (LRCM) is located in the City's historical Washington Park neighborhood and operates on Saturdays from May through October. Products sold at the market are produced on the Lick Run Urban Farm. As a collaborative effort between Carilion Clinic and Good Food – Good People, the Carilion Clinic Farmer's Table (CCFT) provides local, sustainable produce, fruits, herbs, and seasonal products. LEAP facilitates the SNAP/EBT program for the CCFT.

All items sold at LEAP's markets are produced within 100 miles of the Market location to promote the motto of "Local is Good." Currently, 90 percent of the vendors are from within 50



miles of the markets. The markets also accept and double the Supplemental Nutritional Assistance Program (SNAP), Electronic Benefits Transfer (EBT), and WIC as payment for food items. Using the money donated by its grantors, LEAP matches each SNAP purchase dollar for dollar.

Finally, the Historic Roanoke City Downtown Market (popularly known as the Farmer's Market) is the oldest continuously operating open-air market in the Commonwealth of Virginia. It began in 1882, when licenses were issued to 25 area vendors, and has since gained popularity for its diverse selection of locally grown plants, fresh fruits, and vegetables. The Farmer's Market is managed and operated by Downtown Roanoke, Incorporated.

**Expand current community gardening and support new opportunities for noncommercial urban agriculture throughout the community.**

The Roanoke Community Gardens Association (RCGA) was established by a Roanoke native in 2007 and is currently operating four permanent gardens as follows: 1) The Frank Roupas Community Garden in SE Roanoke, established in 2009; 2) the Hurt Park Community Garden in Southwest Roanoke, established in 2011; 3) the Campbell Avenue Community Garden, established in 2012 as a collaboration between RAM House, Commonwealth Catholic Charities Refugee and Immigration Services, RCGA, and nearby residents; and 4) the Mountain View Community Garden, developed in 2013 and experiencing its first growing season in 2014.

In its 2014-2017 Strategic Plan, RCGA committed to “growing people and building the community one garden at a time through opportunities for healthy food, education, and sustainable living”. Through the development of community gardens, the organization recognizes that it is creating and building viable communities through advocacy, partnerships, outreach, and the preservation of green space. Currently, RCGA partners with the Virginia Cooperative Extension to offer garden training, coaching, and resource identification to city residents who produce food for their families in these urban gardens. RCGA continues to set goals to establish more gardens, an urban orchard, and an edible food forest and seek vacant property in the City to spur further revitalization activities in the community.

In October 2013, Virginia Western Community College, Roanoke City Public Schools and the City of Roanoke broke ground on a garden learning center at James Madison Middle School as a result of the “Food for Thought: An Edible Educational Partnership”. The schoolyard garden, located between Madison Middle and Fishburn Park Elementary Schools, was an exciting opportunity to create a valuable asset for the schools and neighborhood. The garden, a localized “community center”, was designed to engage children and their families in an educational process that would create a more healthy and vibrant community by focusing on gardening and cultivating local produce, nutrition, physical activity, community engagement, safety and economic vitality.

The garden project educates youth about healthy foods, the environment and the impact of their personal choices. The project also includes a learning center, raised garden beds and fruit

trees, a greenhouse, water conservation, a composting center, and an amphitheater. The coursework for the Food for Thought program is specifically designed with consideration towards Science, Technology, Engineering, Mathematics and Healthcare (STEM-H) education and the Virginia Standards of Learning (SOL) tests. It also includes elements of agriculture, earth science, ecology, anthropology, biology, nutrition and hands-on chemistry and math as related to gardening and cooking.

To better promote and achieve a healthy and vibrant community, the City needs the community's support in collaborative initiatives such as the innovative "Food for Thought" garden project. Through the collaborative efforts of the Roanoke Community Garden Association, Roanoke City Public Schools, Virginia Western Community College, and other community stakeholders, the community is exposing fruit and vegetable gardens and local produce to students and adults, laying the groundwork for future cross-system collaboration and developing meaningful programs that will improve the Roanoke region.

**Expand current grant opportunities to allow organizations to establish and support urban and community gardens, mobile markets, community kitchens, and food hubs.**

The City continues to work with community organizations to explore the best means to leverage funding in support of the development of urban agriculture in targeted, low income areas. Annually, the Roanoke Neighborhood Advocates, in partnership with the City of Roanoke's Office of Neighborhood Services, offer the Neighborhood Development Grant program to community organizations to make their neighborhoods safer, cleaner, and healthier. Grant funding ranges from \$250.00 to \$25,000 annually for eligible projects such as community gardens, gateway signs, tree planting, arts and cultural activities, and other projects that address neighborhood preservation, health, blight, safety, and/or security. Through this grant, organizations are encouraged to support and develop projects that complement the City of Roanoke's Vision 2001-2020 Comprehensive Plan and its neighborhood plans.

Most recently, the Community Garden Association received a \$70,000 grant from the Roanoke Women's Foundation to assist with the development of the Mountain View community garden, which was developed via a five-year lease on approximately 1/3 acre of vacant city-owned property.

**Support and promote the reduction, reuse, or recycling of food-related waste (food composting)**

Since 2008, the Roanoke City Public Schools (RCPS) has engaged in a food composting program to significantly reduce cafeteria waste. The program initially began as an Environmental curriculum at Fishburn Park Elementary School and involved six RCPS schools that composted more than 13 tons of waste in 2008. With the composting program implemented division-wide during the following year, RCPS composted 132 tons of waste in 2010, 259 tons in 2011, and 298 tons in 2012. These efforts have decreased waste dumps by 50 percent and

have returned some of the waste into a form of soil that is used in the school gardens and worm farms.

RCPS also adopted informal protocols for purchasing products produced in environmental friendly manners. The protocol directs that school purchasing decisions lean to the most energy and water efficient vendor when other factors such as cost or vendor status are equal. Cardboard and paperboard, in lieu of Styrofoam products, in the cafeteria are now the standard for the entire school division. RCPS is able to compost food and food-related waste through a contractual agreement with Poplar Manor Enterprises located in Floyd, Virginia.

With the implementation of single-stream recycling in the near future, the City desires to join RCPS and amplify its efforts to promote and encourage food composting to significantly reduce the amount of food-related waste that is placed in the landfill. Reducing the amount of food wasted will have significant social, economic, and environmental benefits.

**Establish and facilitate programs that educate the public about food choice as part of a climate-friendly lifestyle.**

The City of Roanoke enthusiastically supports youth and adult learning opportunities in regards to agriculture and natural resources. Agricultural programming and educational efforts in Roanoke currently focus on the central theme of “local food”. Roanoke’s Virginia Cooperative Extension (VCE) provides a year-long educational program focusing on production and consumption of local food to increase demand for locally grown food and to educate producers on sustainable agricultural practices. During fiscal years 2013 and 2014, the City provided Virginia Cooperative Extension (VCE) approximately \$67,000 in funding to support their efforts in designing, implementing, and evaluating educational programs in the areas of Agriculture and Natural Resources, Family and Consumer Sciences, and Community Viability. VCE partnered with the Roanoke Public Libraries to hold various educational sessions, which included: nutrition, healthy lifestyle education, seasonal food cooking demonstrations, healthy eating, gardening and landscape practices, pesticides, organic gardening, pruning, and other agricultural and natural resource topics.

As part of its programming, VCE has provided Master Gardener volunteers who respond to community requests for gardening presentations on topics such as vegetable gardening, bulbs, composting, perennials, turf, and more. On average, thirty (30) presentations are offered annually by this volunteer team, in addition to specialty workshops offered in partnership with the community Arboretum at Virginia Western Community College. The VCE’s Family and Consumer Sciences program also responds to current health, nutrition, wellness, family, and consumer needs of individuals, families, groups, and organizations of the Roanoke Valley through the development of programs, seminars, educational materials, and community partnerships.

The Roanoke Community Garden Association (RCGA) is also working to improve nutrition and physical activity in the community by providing education about gardening, diet, and nutrition

through its Seed2Feed Children's Education Program. The Seed2Feed program serves over 200 Roanoke city children by providing age-specific curriculum about gardening and eating fresh fruits, vegetables, and legumes. RCGA partners with the Healthy Start Initiative of TAP Head Start, Hurt Park Elementary School and the Positive Action towards Health (PATH) Coalition, the West End Center for Youth, and a new partnership with Acts 2 Ministry to increase student knowledge on the importance of healthy produce in the community.

**Improve the variety of healthy foods offered by mobile vending.**

To improve access to local and healthy food throughout the community, LEAP is working with Roanoke-area organizations to start a mobile farmers market. The market will involve a mobile vehicle pulling up to pre-designated locations throughout the City and permitting residents to climb aboard to purchase fresh produce and fruits at affordable prices. This initiative will connect the community to local farmers and benefit many residents in the community who lack adequate access to transportation.

**Climate Action Plan Summary:**

Roanoke's Comprehensive Plan, *Vision 2001 – 2020*, serves as a guiding document for our community and includes a series of goals, strategic initiatives, and action steps that were established for the development of the City over a 20 year period. In the plan, City staff integrated aspects of sustainability throughout the existing plan elements of Housing and Neighborhoods, Environmental, Cultural and Historic Resources, Economic Development, Transportation and Infrastructure, and City Design, all of which serve as a unifying theme to implement Roanoke's vision of a sustainable and livable city. By doing so, the City has ensured that priorities for a sustainable future are an integral part of our community's long term vision.

Development of the Climate Action Plan (CAP) is the City's attempt to establish sustainability as another specific vision area and create the foundation for programs, policies, and action items needed to achieve this vision. The plan provides global environmental perspectives and elements that are missing from the comprehensive plan framework adopted on August 20, 2001. The plan also builds on other local and regional planning documents that incorporate strategies for energy use, building and construction, transportation, water quality, and land use that will move sustainability from a City government responsibility to a community-wide call to action.

The CAP serves as a blueprint for moving City government, the commercial and industrial sectors, and citizens of Roanoke forward toward a more sustainable future. The plan offers both specific and broad-spectrum solutions in the built environment, transportation, waste management and recycling, local food access and urban agriculture, water resources and stormwater management, conservation, and land use. While City staff endeavored to make the document as comprehensive as possible, the document is meant to be fluid with strategies

reassessed and refined as the sustainability team and stakeholders deem appropriate and based on best management practices (BMPs) identified in the respective areas.

Annually, the City partners with Virginia Tech's Green Engineering Program to track and report its greenhouse gas (GHG) inventory for the community at large. The Department of General Services/Sustainability calculates the municipal greenhouse gas emissions bi-annually, while tracking numerous energy data monthly for analysis and tracking. This activity report is then utilized as the framework for focusing on activities and programs that will achieve the relatively greatest emission reduction in the most cost effective manner. Through the use of this framework, the City is regularly tracking and assessing its progress to continually improve its sustainability efforts, adopting best management practices, and adapting strategies to address identified challenges. This process will ensure that changing environmental mandates and gaps in the CAP are identified and addressed.

### **Climate Action Plan Implementation:**

The City of Roanoke has a responsibility to lead the charge toward sustainability within the community, convey sustainability goals and strategies, and develop more practical actions for community partners to reduce greenhouse gas emissions. City staff will continue to take the appropriate steps to improve the City government's culture of sustainability as an example for all members of the Roanoke region to follow. The City's Sustainability staff will utilize the CAP as a comprehensive roadmap outlining specific activities that both City and community stakeholders may undertake to reduce greenhouse gas emissions. Sustainability staff will be primarily responsible for ensuring that City operations, facilities, and programs follow the goals and strategies identified in the CAP, while also providing leadership throughout the implementation process, facilitating cooperation among adjoining jurisdictions, and engaging stakeholders across sectors in a broad range of sustainability topics.

Strategic efforts will need to cut across the City's organizational structure and will require the collaborative efforts of intergovernmental entities and other environmental enthusiasts. All City departments, business stakeholders, non-profit organizations, neighborhoods, and citizens will have a role to play in advancing the sustainability vision and putting the vision and guiding principles of energy efficiency and conservation as a key priority in daily operations.

### **Moving Forward**

The City of Roanoke has served as a pioneer in improving the global environment through various local government strategic plans and initiatives. Prior to the development of the Climate Action Plan, the City and its community stakeholders had undertaken a number of sustainability initiatives that have worked in tangent with the strategies identified in the City's Comprehensive

Plan and the newly developed CAP. In 2006, Roanoke was the first city in Virginia to join ICLEI – Local Governments for Sustainability, agreeing to complete a greenhouse gas emissions (GHG) inventory, formulate an action plan for GHG mitigation, implement the changes, and monitor the resulting progress. In December 2006, Roanoke began using B2 biodiesel fuel (2 percent biodiesel and 98 percent diesel fuel) in diesel powered fleet vehicles, converting 365 pieces of equipment – 100 percent of its diesel vehicles and equipment – to biodiesel, including school buses, trucks, fire trucks, front-end loaders and assorted smaller equipment.

In May 2007, Roanoke was the first to amend Section 32-103.23 (Real Estate Taxes Generally) of the City Code to conform to State enabling legislation to establish a special tax rate on the use of energy efficient buildings that exceed energy efficiency standards by 30 percent as prescribed by the Virginia Uniform Statewide Building Code. Two years prior, Roanoke City Council adopted a City ordinance which allowed tax exemption for the use of certified solar energy equipment. In June 2012, Roanoke was, and still remains, one of only two municipalities in Virginia to join the U.S. Department of Energy's Better Buildings Challenge as a partner, pledging to reduce energy usage in 1.16 million square feet of its public facilities by 20 percent and showcasing the solutions used and results achieved. Through this partnership, City staff will continue to engage other local business leaders, organizations, and building owners to increase their energy and water efficiency. As a result of these efforts, Center in the Square, a non-profit organization in Roanoke, will soon join the City as a partner of the Better Buildings Challenge.

Most recently, Roanoke was the first municipality in the region to accept the Department of Environmental Quality's Virginia Environmental Excellence Program (VEEP) as a Sustainability Partner. The program acknowledges the City's demonstrated commitment to continual, measurable and verifiable conservation efforts which lead to direct and indirect improvements in energy usage, water usage, waster generation, and other environmental benefits. It also acknowledges the City's commitment to demonstrate a culture of environmental sustainability, including policies, awards, and recognition, collaborative partnerships, community involvements, and commitments to future projects.

Moving forward, the City plans to build on existing plans, policies, and programs in a concerted effort to focus on municipal, local, and regional environmental behaviors. For many strategies, it will require community outreach to engage organizations, businesses, and residents. For others, it will be especially important to identify and support regional and state collaborations to address emissions reductions. With the range of challenges faced, the City's approach will require both traditional and innovative strategies and broad partnerships to address issues of sustainability in our community. Examples of these efforts include, but are not limited to, the following:

#### **Environmental and Sustainability Management System (ESMS):**

In 2013, the City's ESMS Core Team successfully completed all criteria for Virginia Tech's ESMS program to qualify for the Department of Environmental Quality's (DEQ) Virginia Environmental Excellent Program (VEEP), level E3 certification. The ESMS Team was organized to create a program that would ensure regulatory and environmental compliance,

address operational impacts related to environmental health, support operational best practices, prevent pollution, and provide a “life-cycle” view of decisions and actions. The team is comprised of representatives from Environmental Management, Facilities, Fleet, Transportation, Parks and Recreations, Radio Shop, the Office of Sustainability, and Solid Waste Management, ensuring awareness of environmental impacts at all levels of the organization.

During the establishment of the City of Roanoke's ESMS, City personnel created a list of operations performed that may have environmental impacts. Of the 97 identified, four aspects were identified as the City's priorities as follows: 1) Bulk petroleum storage and delivery; 2) regulated waste management; 3) prevention of stormwater pollution; and 4) vehicle and equipment fueling. The ESMS team has developed policies and operating procedures that limit the environmental impact of these aspects while ensuring compliance with any applicable regulations. Additionally, the team has developed a carbon footprint reduction target action plan for one of its aspects. Eventually, controls for all 97 aspects will be implemented through the ESMS. The Sustainability staff is represented on the ESMS team and will work collaboratively to integrate the policies of the identified priorities as action items in the CAP.

### **Resiliency and Preparedness Planning:**

Roanoke incorporates all climate action activity into a broader scope of emergency preparedness and resiliency planning. The City recognizes that changes in the climate yields extreme weather and more intense storm activity. Roanoke will be prepared by improving infrastructure and emergency services to better response to changing environmental conditions.

### **Green Building:**

Roanoke leads by example in promoting green building practices. The City established a policy that all development, either new buildings or renovation, should be constructed with the lowest impact as is reasonably practical through energy-efficient green construction. The City of Roanoke has strived to design, contract, and build all new, occupied City-owned buildings to incorporate measures that would allow them to be certified at a minimum of Leadership in Energy and Environmental Design (LEED) Silver certification and LEED Gold certification whenever possible. Examples of such efforts include the newly renovated historical City Market Building and soon to be renovated Williamson Road Branch, Raleigh Court Branch, and Melrose Branch libraries. Green building and low impact development will help reduce the environmental impacts of new buildings. However, staff will continue to explore strategies to improve energy performance of existing buildings, particularly with limited funding available for sustainability initiatives.

### **Renewable Energy:**

In an effort to promote renewable sources of energy in the community, the City has partnered with Community Housing Partners to provide an innovative energy initiative, “Solarize Roanoke”, for the citizens of Roanoke. The “Solarize Roanoke” program is designed to

encourage solar energy use on a community-wide scale by permitting installers across the state to bid on groups of installations, thus helping to drive down costs of solar with group rates for materials and favorable financing. It will provide free site evaluations to assess if citizens' homes are good candidates for solar energy and, if eligible, will offer solar financing at a discounted program rate.

In July 2014, Mayor David A. Bowers launched the "Solarize Roanoke" program. As part of this initiative, the City offers a tax exemption on the citizen's property tax for the equipment which will save citizens approximately \$70.00 for five years based on a 3 Kilowatt system.

In conjunction with "Solarize Roanoke", the City has issued a Request for Information (RFI) seeking information on solar services that will allow the City to better evaluate what is available in the market for solar services and obtain more specific information as follows: Conducting and/or performing solar feasibility studies for sizing of potential solar projects on City property; interconnection agreements with local utilities; electricity generation and sales in the Commonwealth of Virginia; financing sources to support the City's solar projects; solar engineering, procurement, and contracting services; solar building, ownership, operation, and maintenance services; federal and state permits necessary to execute solar projects; and decommissioning and removal of solar systems at the end of the service life. The RFI will permit the City to explore the feasibility of third party installers of solar technology on City property.

### **Stormwater Management:**

With the recent changes to stormwater management regulations, the City created a centralized Stormwater Division to integrate stormwater management, capital projects, water quality, and other stormwater related issues. The division includes approximately 30 employees and will be responsible for the implementation of the City's new Stormwater Utility Fee and management of Roanoke's stormwater infrastructure challenges, including maintenance and repair of the City's aging infrastructure, stormwater quality regulatory requirements, and prioritization of capital improvements.

Throughout the development of the stormwater program, Roanoke has incorporated government coordination, legal authority, comprehensive planning, funding and staffing, and public education as best management practices. The City will continue to play an integral role in the planning, regulation, administration, financing, and education of stormwater management. In the past, projects were driven by complaints rather than strategically scheduled. During program implementation, staff will work strategically to utilize resources more effectively and efficiently, while minimizing future maintenance costs on all remedial and preventative initiatives tackled. Staff will also increasingly engage in comprehensive stormwater management and control *Best Management Practices*. Planning, financing, and educating our community about stormwater management will be one of the priority sustainability initiatives.



## **Fiscal Challenges:**

Although local government has led the charge on sustainability, it is important that ownership of Roanoke's environmental efforts is extended to all sectors of the community. For the City, sustainability initiatives and programs continue to evolve, and the City stands firm in its commitment to accelerate the advancement of sustainable best management practices. Yet, in most cases, implementation of sustainability initiatives and programs is often limited to what the City is able to fund with its existing department operational budgets, cost sharing with adjoining municipalities and regional planning commissions, or the limited amount of grant funding allotted to sustainability projects.

Throughout the budgetary process, City Administration, City Officials, and subject matter experts carefully considered and weighed in on the funding priorities for environmental compliance and sustainability, given the City's limited funding for non-mandated services. Many of the strategic investments in this budget cycle will allow for infrastructure improvements that will expand the City's greenways, lessen pollution of our parks, streets, and waterways, and improve the quality of our environment. As noted by the City Manager in the FY 2014-2015 budget document, "sustainability efforts have prevented an increase of more than \$500,000 in electrical, natural gas, gasoline, and diesel fuel costs". During the 2014/2015 budget cycle, City staff will continue to carry out projects that will result in significant utility cost reductions for City facilities.

In the City's Fiscal Year 2014-2015 adopted budget, numerous strategic investments were made in the operational budgets of the Transportation Division, Fleet, Facilities Management, Parks and Recreation, Solid Waste Management, and Environment Management to assist with environmental compliance and coordination of sustainability efforts related to infrastructure, livability, economic development, and public safety. In addition, over \$200,000 was allocated to General Services specifically for community sustainability programming and outreach. Also, in this year's budget, the City has included funding for on-street bicycle routes, expanded urban forestry for city-wide tree plantings, greenway amenities, maintenance, and construction, increased landscape maintenance of new and redeveloped parks, retrofit lighting, and HVAC improvements and preventative maintenance – just to name a few. Annually, the City will continue to set aside fiscal resources for programs and action items identified in the CAP, when possible, and will utilize these financial resources on designated projects that will have the greatest benefit toward the City's sustainability efforts.

The City adopted a stormwater utility fee which took effect on July 1, 2014. This fee has the capacity to generate \$3 million in revenue annually for new projects and will provide a stable source of revenue to fund the operations and maintenance of stormwater management activities. Projects have been identified for the first 3 years of the program and will be addressed utilizing an incremental approach to correcting the City's stormwater problems. As a component of the program, the City will offer incentives and/or credits for citizens willing to go beyond regulatory requirements or willing to retrofit existing facilities.

For projects of a much broader scale, the City has collaborated with various outside entities to secure funding for sustainability projects impacting the region. In an effort to bring passenger rail to Roanoke, the Roanoke Valley Metropolitan Planning Organization allocated \$300,000 through the Regional Surface Transportation Program toward the study of a multi-modal rail facility in the City. In conjunction with that funding, the Commonwealth Transportation Board approved Intercity Passenger Rail Operating and Capital funding of \$3 million for the design and construction of infrastructure improvement necessary to accommodate the Passenger Rail Station Platform. The City also accepted a donation from the Virginia Clean Cities, Inc. for an electric vehicle (EV) charging station. The City continues to seek “Transportation Alternative” funding through the Metropolitan Planning Organization to address improvements to transportation infrastructure.

As it relates to the built environment, Roanoke utilized approximately \$1 million in American Recovery and Reinvestment Act (ARRA) funding to retrofit lighting, HVAC, and boilers and chillers in some of its largest municipal facilities, including the Roanoke City Courthouse, the Jail, and the Roanoke Civic Center. City staff collaborated with Community Housing Partners (CHP) to utilize over \$350,000 from various grants to provide low cost home energy audits and affordable retrofits for citizens by offering special financing, tax credits, special incentives, and rebates. The City is also leveraging planning resources through the \$100 million Sustainable Communities Regional Planning Grant provided to fund the Roanoke Valley-Alleghany Regional Planning Commission’s 3 year comprehensive economic, environmental, and housing plan for the region. These funding opportunities with community partners have worked to advance sustainability efforts and strategic planning in the broader community and region.

Implementation of the CAP will require a coordinated effort from staff to identify appropriate funding sources whether internal or external to the City. Some strategies may require additional federal or state funding sources that have not yet been identified. While other strategies will require that the City explore grant, philanthropic opportunities or foundation appeals to supplement funding to support sustainability programming. For example, staff applied for and received grant funding to assist with the marketing effort of single stream recycling scheduled for 2015.

## **Opportunities on the Horizon**

Solutions toward a sustainable community demand more than politics or business as usual to change the trajectory of our community’s carbon emissions. Instead, it requires the City and environmental experts to anticipate emerging issues, develop innovative strategies, use appropriate technologies and resources, and track environmental trends critical to accelerating sustainability in our community in the years ahead. It also requires that our community utilize these complex sustainability challenges to capitalize on opportunities to think differently and more strategically to develop innovative solutions.

In keeping with that philosophy, the City has developed a list of strategic focus areas and future trends that staff and environmental enthusiasts in the community plan to further explore to move the City's sustainability efforts forward. This list includes, but is not limited to, the following:

- 1) Roanoke will consider joining the Virginia Energy Efficiency Council (VAEEC) to better assess and support programs, innovation, best practices, and policies that enhance the implementation of energy efficiency in Virginia and provide a forum for stakeholder interaction. Of particular interest to the City is VAEEC's willingness to embrace recommendations such as enabling the creation of a statewide Commercial Property Assessed Clean Energy (PACE) program for non-residential buildings, expansion of state support for the residential Home Performance with ENERGY STAR program, and expansion of performance-based contracting in state-owned buildings.
- 2) Roanoke will continue to explore the regionalization of the Roanoke Valley Resource Authority (RVRA). The original plan exploring regionalization of the Authority was completed in 2000. However, both the City and Roanoke County would need to invest in equipment replacement for the Authority to take over. Unfortunately, the plan was not feasible due to financial constraints, but the Authority was able to make the case of return on investment for the City, County and Town of Vinton. The cost of waste and recycling collection would ultimately decline due to the reduction in staffing resources and equipment, such as the automated trucks, packers, and knuckle booms. Staff will suggest that the Authority continue to explore regionalization of waste and recycling and provide the findings and recommendations to members of the Authority.
- 3) Roanoke will implement single stream recycling in 2015. Staff will target the expanded recycling outreach and services to commercial and multi-family residential building owners and occupants, including local businesses, apartment buildings and student housing. The Solid Waste Division and Office of Sustainability will work collaboratively to explore grant opportunities for marketing and outreach efforts for the single stream recycling program through organizations such as the Southeast Recycling Development Council (SERDC). The goal will be to launch a 6-month educational campaign on single stream recycling prior to the program's official launch.
- 4) Roanoke will work to equip all Solid Waste heavy-duty vehicles to run on Compressed Natural Gas (CNG). The City has applied for grant funding to install a tank and slow fill CNG system. The use of CNG will significantly reduce the cost of diesel from \$2.75 per gallon to \$1.75 per gallon. Also, staff eventually desires to obtain CNG use for City vehicles from the land fill.
- 5) Roanoke will investigate options for eligible residential or commercial property owners to access affordable financing to fund energy efficiency, renewable energy, and water efficiency improvements to their properties.

- 6) Roanoke will explore advanced and innovative technologies, such as wireless sub-metering which allows building operators, property management, or engineers to measure resource consumption on a sub-building scale or on individual pieces of equipment. Sub-metering will allow the consumers to better understand and individually control their energy consumption in commercial buildings and multi-family residential properties.
- 7) According to the Natural Resources Defense Council, Virginia has one of the nation's fastest growing renewable energy economies. However, the state offers few incentives for solar installation. Roanoke will explore ways to incentivize the use of solar or other renewable energy (i.e. wind, geothermal, etc.) to increase the use of renewable and alternative forms of energy in order to meet the City's growing energy demands, while improving sustainability and its economy.
- 8) Pursuant to the City's 2014 Legislative Program, the City of Roanoke applauds the Governor and the General Assembly for the historic enactment of the 2013 Transportation legislation which made possible the extension of passenger rail service to Roanoke. Roanoke City Council will continue its collaborative efforts with the Virginia Department of Rail and Public Transportation, Norfolk Southern Railway Corporation, and AMTRAK to develop, finance, and construct the essential infrastructure improvements to make passenger rail service operational in Roanoke as soon as practical. The City of Roanoke strongly supports further extensions of passenger rail service to localities south and west of Roanoke.
- 9) The City will continue to support the adoption of legislation that will enable the City to charge and collect a fee for the use of plastic shopping bags provided by retailers to its customers. The goal of such legislation is to provide the City with a revenue source to fund clean-up actions associated with persistent littering. These clean-up activities will assist the City in meeting its mandated MS4 stormwater permit requirements and enhance the livability and attractiveness of the Star City.
- 10) Roanoke will work to integrate more specific sustainability strategies into the City's Comprehensive Plan, *Vision 2001-2020* and other planning documents of the MPO.
- 11) Roanoke desires to improve the walkability of the community through increased bike lanes, appropriate signage, further greenway connectivity, and additional park and greenway amenities.
- 12) Roanoke will increase its capacity to regularly produce and collect reliable, standardized data on local energy efficiency processes and projects.
- 13) Roanoke will more effectively integrate environmental sustainability into long-term decision making.

- 14) Roanoke will promote environmental sustainability as a component in its internal capital plan funding decisions.
- 15) Roanoke will consider forming an internal energy audit team with team members responsible for the self-auditing of City facilities. Information gathered from the audit will be utilized to introduce energy conservation measures or appropriate energy-saving technologies and retrofits. This effort will assist the City in identifying cost-saving opportunities that will result in increased energy and water efficiencies.
- 16) Roanoke will explore innovative procurement practices and consider adopting a Green Procurement Policy for internal use.
- 17) Roanoke will expand the City's water conservation efforts through the utilization of rain water catchment in municipal operations.
- 18) Roanoke will actively explore the use of wind energy systems for municipal operations and the feasibility of installing wind turbines on public property.
- 19) Roanoke will aid in the restoration or "daylighting" of urban water streams by improving the riparian environment of those streams previously diverted into culverts, pipes, or drainage systems.

*A special thanks to all City Council members and city staff that made this Climate Action Plan possible.*