



# RESILIENT VIRGINIA

# INTEGRATING RESILIENCY LANGUAGE INTO EXISTING PLANS

A look at Plans in Blacksburg, VA; Roanoke, VA; Norfolk, VA; Virginia Beach, VA; Central Shenandoah Planning District (VA); and Nashua, NH

## Contributors

### Resilient Virginia:

Annette Osso  
Tracy Garland  
Trish Porter

### UVA J-Term Interns:

Jessica Durand  
Sara Moreno  
Elizabeth Van Metre

June 2022

# TABLE OF CONTENTS

---

**01**

**Introduction**

**02**

**Planning for a Resilient Future**

**03**

**Ecosystem Services**

**04**

**Economic Activities**

**05**

**Community Action**

**06**

**Infrastructure and Buildings**

**07**

**Glossary**

**08**

**Resources**

# INTRODUCTION

Climate change mitigation is absolutely critical for mankind's survival. If we continue to emit greenhouse gasses at the rate we are today, we are going to get past a point of no return and the planet is going to be uninhabitable. Mitigating the impacts of greenhouse gas emissions is imperative, however it cannot be the only thing we focus on.

Climate change has already had a huge impact on our planet - to the extent that we cannot go back to the way things were before. This is where adaptation comes in - we need to adapt to the changes we are already seeing, such as the increase in extreme weather events and the change in seasonal temperatures. These are affecting our communities in ways we may or may not see and ignoring these changes will have detrimental effects. A resilient community is one that has assessed their risks and developed a plan to adapt to the changes they are seeing.

Our mission at Resilient Virginia is to help communities accelerate resiliency planning so they can remain a vibrant place to live for years to come. To this effort, we partnered with University of Virginia's Environmental Resilience Institute in January 2022 to host a group of student interns during their J-Term. These students identified resiliency language integrated in existing Comprehensive Plans, Hazard Mitigation Plans, and Master Plans from communities across Virginia and one in New Hampshire. Communities they looked at were Blacksburg, VA; Roanoke, VA; Norfolk, VA; Virginia Beach, VA; Central Shenandoah Planning District (VA); and Nashua, NH. It is our hope that these examples can help your community begin the process of adding resiliency language into your own plans.

# 2

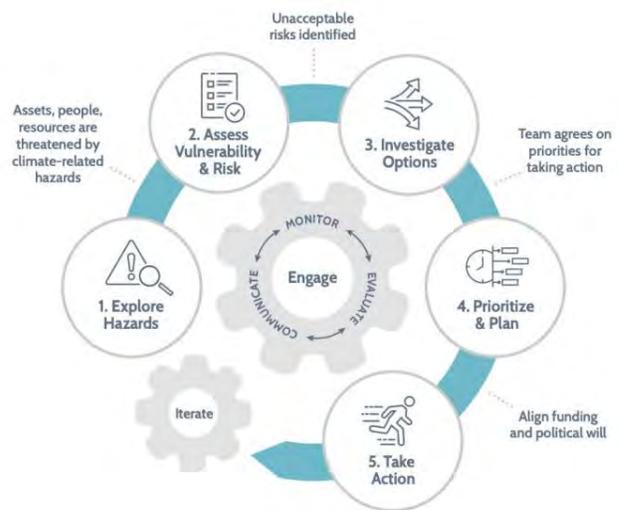
## PLANNING FOR A RESILIENT FUTURE

Communities face increasing challenges from extreme weather events and unpredictable climate patterns. Meanwhile, economic, environmental, health, and other social stresses continue to impact communities on an on-going basis. New ways of bringing together climate information, socio-economic trends, and natural resource impacts are needed. This can be done through a Resiliency Plan. Resiliency plans can provide a roadmap for localities to strengthen physical and societal infrastructure so they can continue to function and thrive as centers of production, sources of essential services, and equitable communities despite short and long-term challenges.

There is no “one size fits all” solution. Resiliency planning involves analyzing a community’s strengths and identifying gaps in how well it can deal with natural and man-made disasters, public health challenges, and socio-economic stressors.

The ideal approach to resiliency planning is for a community to perform a risk assessment and then publish a Resiliency Plan that addresses the community’s specific risks and needs. As you can see in the graphic on the right from NOAA’s Steps to Resilience, this process involves:

1. Exploring the community's unique and specific hazards;
2. Assessing the community's vulnerability and risk to these hazards;
3. Investigating how the community can respond to these vulnerabilities;
4. Prioritizing and planning their actions; and
5. Taking action - preferably through the publication of a Resiliency Plan.



[toolkit.climate.gov/#steps](https://toolkit.climate.gov/#steps)

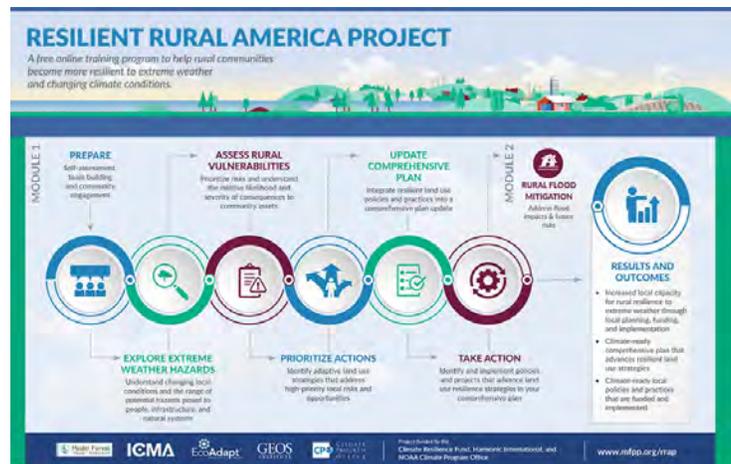
## 2 PLANNING FOR A RESILIENT FUTURE



The problem is that many communities lack the resources and capacity to develop their own plan. It is time consuming, expensive, requires additional personnel and cross-department collaborations, and requires more resource than a community may have.

One strategy that communities have started to use to address this complicated problem is to add resiliency language directly into their existing plans, such as their Comprehensive Plan or Hazard Mitigation Plan. Through integrating resiliency language and initiatives into their existing plans, these communities have started to address climate-related risks without the heavy burden of publishing a Resiliency Plan.

There are many tools available for communities to use in this process. One example is the Model Forest Policy Program's Resilient Rural America Project. You will notice that this process starts off with the same steps as NOAA's Steps to Resilience – you explore, assess, and prioritize – but after prioritizing your actions, in this process you integrate your policies and practices into the existing comprehensive plan instead of publishing a new resiliency plan.



It is important to recognize that neither process skips exploration, assessment, and prioritization. These steps are necessary because every community is unique, with its own unique hazards, risks, vulnerabilities, potential actions, timeline, and resources so every community's plan will look different.

This report focuses on specific communities that have successfully added language into existing plans and are looking at ways to adapt to their future needs.

## 2 PLANNING FOR A RESILIENT FUTURE

# WHAT MAKES A COMMUNITY RESILIENT?

Resilience can be defined as "The capacity of a community to prevent, withstand, respond to, and recover from a disruption." This can be a natural disruption, such as a flood or drought. This can also be a man-made disruption, such as a large employer shutting down, or disease, as we've seen with COVID and how it impacted so many different areas within our communities.

A resilient community is one that has identified its risks and built the capacity to respond to and recover from disruptions.



Resilient Virginia has identified 4 key areas communities must address to build resilience: Ecosystem Services, Economic Activities, Community Action, and Infrastructure & Buildings. Depending on the regional location - coastal, urban, or rural - as well as local socio-economics and other community factors, local governments will need to identify and prioritize which of the sub-categories from these four main resiliency components will help them formulate resiliency solutions. At the same time, it is important for communities to address these four components as a whole to build resilience.

For this report, we have identified language in each of these 4 key areas that communities have used in their existing plans.

# 3

## ECOSYSTEM SERVICES

---



To address Ecosystem Services, communities need to protect their natural resources, preserve farm and forest land, plan their land use for mitigation, and utilize green infrastructure. Following are examples of how the communities we studied addressed these topics in their existing plans.

### 3 ECOSYSTEM SERVICES

Topic(s)	Phrase	Plan
Protect Natural Resources	<p>"Encourage the use of native species, for sustainability and drought resistance purposes, wherever possible."</p> <p>"Encourage developers to preserve, to the greatest extent possible, existing, non-invasive trees, especially larger ones."</p> <p>"Identify and control invasive species that threaten natural ecosystems."</p>	<p>→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 6 Page 14</p>
Protect Natural Resources	<p>"The approach Roanoke takes in caring for its natural resources is vital to the quality of life for current residents and the marketability of the area for attracting new residents and businesses."</p>	<p>→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Page 56</p>
Protect Natural Resources	<p>"Sustainability Goal Be a community that places a high value on environmental stewardship, advances the well-being of residents, and fosters economic resilience in order to provide a high quality of life for current residents as well as future generations."</p>	<p>→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 17</p>
Protect Natural Resources & Plan Land Use for Mitigation	<p>"Recognize and retain the multiple values provided by land resources, ecosystem services, open spaces, and water resources while responsibly mitigating the hazards posed by natural geologic features, topography, natural disasters, major storms, and climate change."</p>	<p>→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 26</p>
Protect Natural Resources & Plan Land Use for Mitigation	<p>"Improving connections between Nashua’s green spaces will not only improve the recreational experience for all visitors but also serve as a mitigation feature for climate resilience and improve animal habitat and migration."</p>	<p>→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 134</p>

### 3 ECOSYSTEM SERVICES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Preserve Farm and Forest Land	"Climate change poses a new challenge to local agricultural production and food systems. In order to remain resilient, Blacksburg's local agricultural economy and food systems will need to adjust to the changes that are anticipated for our region: hotter summers, warmer winters, and changes to seasonal precipitation patterns."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 37
Preserve Farm and Forest Land	"Conserve, protect and manage networks and corridors of natural vegetation, forested areas, wildlife habitat, and undeveloped steep slopes." "As part of the development review process, seek opportunities to preserve and improve open spaces, outdoor recreational amenities, agricultural viability, biodiversity and native habitat for threatened and endangered species. "	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 50
Preserve Farm and Forest Land	"Support regional efforts to advance retention of farmland and economic viability of farming including small start-up agricultural operations, agritourism, access to local foods, small start-up farms, and innovative forms of agriculture."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 53
Preserve Farm and Forest Land	"Conduct proactive planning focused on developing mitigation strategies and projects that focus on wildfire mitigation at the landscape scale in wildland areas across communities or at a regional level; to address vulnerabilities of the Wildland Urban Interface in the Region."	→ <a href="#">Central Shenandoah Hazard Mitigation Plan 2020 Update</a> Page V:6

### 3 ECOSYSTEM SERVICES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Plan Land Use for Mitigation	"Promote land use forms that reduce greenhouse gas emissions. Promote land use management programs that increase carbon sequestration."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 25
Plan Land Use for Mitigation & Protect Natural Resources	"Support land use policies and programs that contribute to a sustainable community and the wellbeing of residents by fostering smart growth and lower-impact development practices, reducing cardependency, planning for future climate resiliency and adaptation, addressing the housing, transportation, and services needs of low-income and traditionally marginalized populations, and protecting natural resources and ecosystem services.	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 192
Plan Land Use for Mitigation & Utilize Green Infrastructure	"Impervious surface contributes to high temperatures, increased water runoff, and pollution. Reducing the amount of impervious surface within the City improves stormwater management by allowing for more vegetation which in turn adds aesthetic benefits and temperature regulation. The city's policies and standards for development and infrastructure should be updated to reflect our desired results."	→ <a href="#">City Plan 2040 – City of Roanoke's Comprehensive Plan</a> Page 62
Plan Land Use for Mitigation	"The priorities for land use are to adopt policies that will support development of complete neighborhoods, design for permanence, and purposeful land use."	→ <a href="#">City Plan 2040 – City of Roanoke's Comprehensive Plan</a> Page 104

### 3 ECOSYSTEM SERVICES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Utilize Green Infrastructure	"Implement A Green Infrastructure Plan for Norfolk: Building Resilient Communities (Green Infrastructure Plan) by exploring an expansion of the Stormwater Utility Fee Mitigation to include trees as an approved BMP."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 6 Page 12
Utilize Green Infrastructure	"In order to maximize the ecosystem services provided by trees, such as temperature regulation, 40% coverage needs to be met per block. Much of the City's tree canopy is concentrated in natural areas like Mill Mountain . In order to experience lasting benefits, tree canopy needs to be increased and with targeted dispersion throughout the city."	→ <a href="#">City Plan 2040 – City of Roanoke's Comprehensive Plan</a> Page 63
Utilize Green Infrastructure	"In order to offset these threats [disease, harmful insects, aging trees, and the unnecessary removal of trees] and to reverse the tree canopy decline, the City strives to diversify tree species, replace aging trees, incentivize the planting of new trees and conservation of existing trees, and enforce regulations that protect trees."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 6 Page 2
Utilize Green Infrastructure	"Increase the quantity, density, and diversity of trees to achieve a goal of 30% tree canopy cover through a combination of regulatory actions and City- provided trees."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 6 Page 13
Utilize Green Infrastructure	"Minimize heat island effect and determine areas throughout the city that were identified as high priority in CHAP such as the French Hill neighborhood for green infrastructure."	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 141

# 4

## ECONOMIC ACTIVITIES

---



To address Economic Activities, communities need to diversify their economy, develop a business case for resiliency, establish new resiliency businesses, look for innovative financing opportunities, and establish more farm-to-table initiatives. Following are examples of how the communities we studied addressed these topics in their existing plans.

## 4 ECONOMIC ACTIVITIES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Diversify Economy	"Research and continually assess the market to identify diverse industries."	→ <a href="#"><u>City Plan 2040 – City of Roanoke’s Comprehensive Plan</u></a> Page 95
Diversify Economy	"The ideal is a model of economic diversity and innovation, where the benefits of local value-creation are realized locally, where jobs and goods and services are in, or near, our neighborhoods where they can use the infrastructure already in place."	→ <a href="#"><u>City Plan 2040 – City of Roanoke’s Comprehensive Plan</u></a> Page 93
Diversify Economy	"Continue to evaluate economic opportunities, including Strategic Economic Development areas, utilizing Vision 2100 and other applicable plans and studies."	→ <a href="#"><u>PlaNorfolk2030 – Norfolk’s General Plan</u></a> Chapter 5 Page 6
Diversify Economy	"Creating jobs in multiple sectors is one goal of local economic development, but building an inclusive and resilient economy also includes tourism, the arts, placemaking, and strong partnerships. This approach should plan for and create an environment that welcomes and supports businesses, research, and industries that generate local job opportunities. "	→ <a href="#"><u>Blacksburg Comprehensive Plan - 2021</u></a> Page 118
Diversify Economy	"We believe our future growth will depend on the City's ability to focus on greater diversification of its economy, such as a focus on the biomedical, cybersecurity, and healthcare fields, while growing and retaining our existing tourism industry, as well as our hallmark employers and our base of Small, Women and Minority-Owned (SWaM) businesses."	→ <a href="#"><u>City of Virginia Beach Comprehensive Plan</u></a> Chapter 2 Page 80

## 4 ECONOMIC ACTIVITIES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Develop Business Case for Resiliency	"Based on existing conditions and trends, the following are the key issues involving Norfolk's economy: 1. Reinvesting, reusing, or redeveloping properties to enable economic development since Norfolk is a mature, developed city. 2. Supporting or enhancing existing assets and competitive advantages, such as the military, port, university facilities, and the "renewable" labor force they represent, in order to maximize economic development potential. 3. Investing in lifelong learning to promote economic vitality. 4. Improving and expanding regional transportation linkages, including highway, bridge, and tunnel infrastructure, as well as multi-modal connections"	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 5 Page 3
Develop Business Case for Resiliency	"Norfolk is the business, cultural, educational, and medical center of the Hampton Roads region. To continue this role, Norfolk seeks reinvestment, reuse, and redevelopment of existing properties and supports education and lifelong learning opportunities."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 1 Page 4
Develop Business Case for Resiliency	"National demographic trends are constantly shifting and specific recent trends will be detailed through the data gathered with the completion of the 2020 U.S. Census. The local economy needs to remain nimble and address shifting demographic trends to remain healthy and resilient. "	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 118

## 4 ECONOMIC ACTIVITIES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Establish New Resiliency Businesses	"Support the recruitment and expansion of "Green" businesses and manufacturers"	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 5 Page 8
Establish New Resiliency Businesses	"State and federal initiatives aimed at creating offshore wind-energy sites off the coast of Virginia present supply chain opportunities for Norfolk and other municipalities."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 5 Page 8
Establish New Resiliency Businesses	"Retain and recruit environmentally-conscious businesses/industries that support Blacksburg's sustainability goal."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 131
Establish Farm-to-Table Initiatives	"Support local agricultural viability through community engagement that increases demand for locally-grown food and other agricultural products."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 53
Establish Farm-to-Table Initiatives & Diversify Economy	"Blacksburg's vision of sustainability is about ensuring options for community members in how they choose to live their lives while providing for the well-being of future generations. More explicitly, that means that Blacksburg seeks to: <ul style="list-style-type: none"> <li>• Support economic diversity and resilience</li> <li>• Foster resilient local and regional food systems"</li> </ul>	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 14
Establish Farm-to-Table Initiatives	"Farming and food production is a valuable economic industry for the region. Bridging the gap between local food producers and consumers will strengthen the local economy, while improving access to healthy food for residents."	→ <a href="#">City Plan 2040 – City of Roanoke's Comprehensive Plan</a> Page 54

## 4 ECONOMIC ACTIVITIES

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Look for Innovative Financing Opportunities	"Identify areas for tourism, such as the Downtown Roanoke Tourism Zone, to provide incentives that attract investments and private companies in these areas"	→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Page 97
Look for Innovative Financing Opportunities	"Structure real estate tax rates to emphasize the taxation of the land rather than buildings to encourage maintenance and quality construction, decrease land speculation, and incentivize development"	→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Page 99
Look for Innovative Financing Opportunities	"Expand the tax base to ensure a diversified revenue stream over time, and promote the creation of a range of jobs in the City’s core and emerging sectors."	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 129
Look for Innovative Financing Opportunities	"Explore development incentives and invest in infrastructure along commercial corridors such as Amherst and Daniel Webster Highway to position limited key land areas for future office/mixed-use commercial development including research and development and appropriate life science opportunities."	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 128
Look for Innovative Financing Opportunities	"Explore creative financing resources, such as Tax Increment Financing and Business Improvement Districts, for economic development activities."	→ <a href="#">PlaNorfolk2030 - Norfolk’s General Plan</a> Chapter 5 Page 5

# 5

## COMMUNITY ACTION

---



To develop resilience, communities must take action through seeking diverse community input, addressing health and equity, developing effective leadership practices, addressing emergency management, and developing a resiliency plan. Following are examples of how the communities we studied addressed these topics in their existing plans.

## 5 COMMUNITY ACTION

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Seek Diverse Community Input	"Employ a design review process based on the themes of the Nashua Master Plan, which incorporates community vision and local feedback in a predictable manner."	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 162
Seek Diverse Community Input	"Meaningful community engagement is also key to the Town's ethic of governance. To foster an inclusive planning process, the Town should ensure that all community members feel welcome and empowered to participate. This can be achieved by providing a wide range of convenient opportunities, providing transparent and responsive communication, and applying innovative engagement methods"	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 13
Seek Diverse Community Input	"Expand opportunities for community engagement and leadership through Town programs such as the Citizens Institute or regional programs such as the Chamber of Commerce's NRV Leadership program."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 132
Seek Diverse Community Input	"Hold periodic programming including open houses, neighborhood meetings, online forums, status updates to create opportunity for the public to engage, learn about, and stay updated with city land use policy and development."	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 163
Seek Diverse Community Input	"Varying outreach methods were used to contact all communities within Roanoke in an effort to reach diverse participants... Specific meetings were held to address equity and hard-to-reach areas."	→ <a href="#">City Plan 2040 – City of Roanoke's Comprehensive Plan</a> Page 18

## 5 COMMUNITY ACTION

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Address Health and Equity	"We see inequity in patterns of life expectancy and disease rates among different neighborhoods, and this is where issues of health and equity intersect. Equitable health outcomes should be the ultimate goal. All policy and action should be oriented to reducing these inequities."	→ <a href="#"><u>City Plan 2040 – City of Roanoke’s Comprehensive Plan</u></a> Page 47
Address Health and Equity	"Locate new city facilities on sites that are accessible to the population being served and on sites that can increase efficiency by accommodating multiple public uses, while also serving as community and neighborhood focal points"	→ <a href="#"><u>PlaNorfolk2030 - Norfolk's General Plan</u></a> Chapter 9 Page 7
Address Health and Equity	"Ensure Blacksburg is a community that centers equity in its planning processes, development of policies, and implementation of projects and programs. Ensure that environmental, social, and economic burdens are not disproportionately borne by any one group and that community amenities, benefits, and opportunities are equitably available to all. Advance programs and policies that improve the health and wellbeing of the whole community while addressing the specific needs and priorities of traditionally marginalized and underserved populations."	→ <a href="#"><u>Blacksburg Comprehensive Plan - 2021</u></a> Page 103
Address Health and Equity	"Review park and natural area inventory to determine how accessible park and natural areas are for all residents. Seek funding and build neighborhood parks in areas of the City that are park deficient."	→ <a href="#"><u>Imagine Nashua - Comprehensive Master Plan</u></a> Page 138

## 5 COMMUNITY ACTION

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Develop Effective Leadership Practices	"Improve local government operations, planning, zoning, land use regulations, and code enforcement to reduce the impact of natural and manmade hazards and disasters."	→ <a href="#">Central Shenandoah Hazard Mitigation Plan 2020 Update</a> Page V:3
Develop Effective Leadership Practices	"Establish and maintain regular communication opportunities between regional governments so issues of regional importance and responsibility are considered."	→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Page 90
Develop Effective Leadership Practices	"Improve existing relationships and establish new relationships between governing bodies of the New River Valley and the Roanoke Valley to improve understanding and support regional development. Improve existing relationships and establish new relationships with local organizations to improve understanding of and support the needs of the whole community."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 101
Develop Effective Leadership Practices	"Continue to work with all jurisdictions in Hampton Roads to strengthen major regional assets, including the military, ports, medical institutions, colleges and universities, and tourist destinations."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 12 Page 4
Develop Effective Leadership Practices	"By monitoring progress our progress, and holding both City officials and the public accountable for partnering on its implementation, we can be informed and make necessary mid-course corrections in order to stay focused on achieving our city’s long-range range for 2040."	→ <a href="#">City of Virginia Beach Comprehensive Plan</a> Chapter 3 Page 2

## 5 COMMUNITY ACTION

Topic(s)	Phrase	Plan
Address Emergency Management & Address Health and Equity	"Assist with emergency planning, preparedness education, and hazard mitigation to individuals with access and functional needs and service providers."	→ <a href="#">Central Shenandoah Hazard Mitigation Plan 2020</a> Page V:7
Address Emergency Management	"The City has also developed the Sea Level Wise Adaptation Strategy, which consists of four complimentary themes, each with a specific approach to flood risk management. The layers are designed to support each other, integrating structural and non-structural measures to ensure comprehensive flood protection across a range of environmental conditions."	→ <a href="#">City of Virginia Beach Comprehensive Plan</a> Chapter 2 Page 72
Address Emergency Management	"Enhance the Town's all-hazards disaster preparedness, mitigation and response by completing the Town's Comprehensive Emergency Management Strategic Plan, which focuses on improving communications, providing training opportunities, and working regionally."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 75
Develop a Resiliency Plan	"Expand upon the community-wide Climate Vulnerability Assessment and develop a Climate Adaptation and Resiliency Plan."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 25
Develop a Resiliency Plan	"Refine and Implement a robust climate action and resilience plan for Nashua"	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 141

# 6

## INFRASTRUCTURE & BUILDINGS

---



To address infrastructure and buildings, communities need to design their buildings for resilience, adapt their water management practices, improve communications systems, adapt transportation methods and offer resilient transportation opportunities, and provide clean and reliable energy options. Below are examples of how the communities we studied addressed these topics in their existing plans.

## 6 INFRASTRUCTURE AND BUILDINGS

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Design Buildings for Resilience	"New facilities should demonstrate environmentally friendly design practices with respect to sustainable sites, indoor environmental quality, energy efficiency, and the efficient use of materials"	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 77
Design Buildings for Resilience	"All new construction and building renovations and upgrades should be designed and maintained for resource efficiency and GHG reduction"	→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 172
Design Buildings for Resilience	"Orient development codes, tax policy, and programs to support green building and sustainable site design for new development"	→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Page 60
Design Buildings for Resilience	"Develop a long term strategy for the replacement of aging city facilities, including as part of that strategy consideration of the feasibility of consolidation and the co-location of multiple facilities on one site."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 9 Page 8
Design Buildings for Resilience	"Pursue a minimum certification of Silver through the U.S. Green Building Council LEED green building rating program for new construction and major renovations"	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 65
Design Buildings for Resilience	"Adopt programs to incentivize construction that meets sustainability standards such as EarthCraft and U.S. Green Building Council’s LEED."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 221
Design Buildings for Resilience	"In addition to actions that protect and enhance the environment, actions are needed to conserve resources and reduce the overall impact of the built environment on the natural environment."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 9 Page 3

## 6 INFRASTRUCTURE AND BUILDINGS

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Adapt Water Management Practices	"As a part of local or regional climate vulnerability and resiliency planning, assess the capacity of stormwater infrastructure to manage anticipated increases in intensity or frequency of precipitation events. Ensure future infrastructure design and upgrades are built with anticipated climate models as a guide."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 95
Adapt Water Management Practices	"Storm frequency and intensity is expected to increase as a result of climate change. The City needs to reduce its contribution to climate change and also adapt to these expected increases through innovative, sustainable methods."	→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Page 65
Adapt Water Management Practices	"Continue to implement cost-effective capital improvements that add resilience by improving stormwater management and controlling flooding, using Vision 2100 for guidance."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 9 Page 14
Adapt Water Management Practices	"Provide a resilient, sustainable and cost-effective public wastewater service that is in conformance with all state and federal regulations."	→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 90
Adapt Water Management Practices	"Incorporate bio-retention facilities, such as rain gardens, in municipal landscaping for passive treatment of stormwater using native plant species."	→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 9 Page 7
Adapt Water Management Practices	"Enhance stormwater management by exploring alternatives to conventional stormwater management facilities (SWMFs), such as Low Impact Development (LID) approaches that are applicable to the coastal plain."	→ <a href="#">City of Virginia Beach Comprehensive Plan</a> Chapter 2 Page 59

## 6 INFRASTRUCTURE AND BUILDINGS

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Improve Communications Systems	<p>“Expand utility services to provide the same level of service throughout the community.</p> <p>Increase access to broadband.</p> <p>Adequate wireless service throughout the City consistent with the Wireless Telecommunications Policy.”</p>	<p>→ <a href="#">City Plan 2040 – City of Roanoke’s Comprehensive Plan</a> Pages 85-86</p>
Improve Communications Systems	<p>“Fitting the dynamic nature of technology into the traditional infrastructure planning process is a challenge. Community expectations are changing and a significantly higher level of service for technology is essential for residents and businesses alike. In particular, broadband and wireless technology infrastructure are vital utilities in the same way as water or electrical service.”</p>	<p>→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 88</p>
Improve Communications Systems	<p>“Create a digital map platform and way-finding app, and printed map materials to provide residents and visitors information on how to access the City’s park and natural area system.”</p>	<p>→ <a href="#">Imagine Nashua - Comprehensive Master Plan</a> Page 139</p>
Improve Communications Systems	<p>“Continue to coordinate upgrades and replacement of non-City provided utilities, including electricity, natural gas and communication networks.”</p>	<p>→ <a href="#">PlaNorfolk2030 - Norfolk's General Plan</a> Chapter 9 Page 14</p>
Improve Communications Systems	<p>“Continue the transition toward paperless communications for all Town of Blacksburg processes, including website upgrades to implement the latest technology advances for on-line registration, payment and tracking of applications for all Town services and programs.”</p>	<p>→ <a href="#">Blacksburg Comprehensive Plan - 2021</a> Page 93</p>

## 6 INFRASTRUCTURE AND BUILDINGS

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Adapt Transportation Methods and Offer Resilient Transportation Opportunities	"Ensure access to a range of transportation options that meet the current and future mobility needs of residents, workers, and visitors of all ages, incomes and abilities."	→ <a href="#"><u>Imagine Nashua - Comprehensive Master Plan</u></a> Page 8
Adapt Transportation Methods and Offer Resilient Transportation Opportunities	"Create a connected multimodal network of complete streets that balances the needs of all users. Good pedestrian and bicycle facilities support good placemaking and can improve public health and reduce the use of trips completed by automobile, reducing congestion."	→ <a href="#"><u>City Plan 2040 - City of Roanoke's Comprehensive Plan</u></a> Page 132
Adapt Transportation Methods and Offer Resilient Transportation Opportunities	"Develop metrics/guidelines that can be used to assess the resilience of existing transportation infrastructure and inform the planning of investments in transportation infrastructure."	→ <a href="#"><u>Imagine Nashua - Comprehensive Master Plan</u></a> Page 165
Adapt Transportation Methods and Offer Resilient Transportation Opportunities	"With the expansion on regional rail, encourage transit oriented development by permitting new development in close proximity to the train station."	→ <a href="#"><u>Imagine Nashua - Comprehensive Master Plan</u></a> Page 173
Adapt Transportation Methods and Offer Resilient Transportation Opportunities	"Continue acquisition of electric buses to convert the Blacksburg Transit fleet to all-electric."	→ <a href="#"><u>Blacksburg Comprehensive Plan - 2021</u></a> Page 193
Adapt Transportation Methods and Offer Resilient Transportation Opportunities	"Align Transportation Improvements and Services with affordable, accessible housing and community services"	→ <a href="#"><u>City of Virginia Beach Comprehensive Plan</u></a> Chapter 2 Page 22

## 6 INFRASTRUCTURE AND BUILDINGS

<u>Topic(s)</u>	<u>Phrase</u>	<u>Plan</u>
Provide Clean and Reliable Energy Options	"Phase out fossil fuel systems for heating and appliances and encourage the retrofit of full electrification for existing buildings."	→ <a href="#"><u>Imagine Nashua - Comprehensive Master Plan</u></a> Page 172
Provide Clean and Reliable Energy Options	"Support programs for public and private entities to become more energy efficient and utilize renewable energy sources such as solar, wind, or other decentralized technologies."	→ <a href="#"><u>Blacksburg Comprehensive Plan - 2021</u></a> Page 92
Provide Clean and Reliable Energy Options	"Partner with local utilities and other private partners to use renewable energy and provide it to local customers"	→ <a href="#"><u>City Plan 2040 – City of Roanoke’s Comprehensive Plan</u></a> Page 68
Provide Clean and Reliable Energy Options	"Allowing for a wider range of energy sources, specifically renewable energy sources, creates a resilient city by improving environmental quality and energy sustainability."	→ <a href="#"><u>City Plan 2040 – City of Roanoke’s Comprehensive Plan</u></a> Page 68
Provide Clean and Reliable Energy Options	"Support a reliable, affordable, efficient, and environmentally sound electrical infrastructure. Urge energy utilities to accelerate their transition to carbon-neutral energy sources. Urge energy utilities to integrate climate adaptation into their future infrastructure plans."	→ <a href="#"><u>Blacksburg Comprehensive Plan - 2021</u></a> Page 92
Provide Clean and Reliable Energy Options	"The City of Virginia Beach recognizes that local leadership and commitment to energy efficiency are keys to having a large influence over energy use in our community."	→ <a href="#"><u>City of Virginia Beach Comprehensive Plan</u></a> Chapter 2 Page 60

# 7

## GLOSSARY

---

<u>Term</u>	<u>Definition</u>
Adaptation	The process of adjusting to new (climate) conditions in order to reduce risks to valued assets.
Adaptative Capacity	The ability of a person, asset, or system to adjust to a hazard, take advantage of new opportunities, or cope with change.
Assets	People, resources, ecosystems, infrastructure, and the services they provide. Assets are the tangible and intangible things people or communities value.
Climate Stressor	A condition, event, or trend related to climate variability and change that can exacerbate hazards.
Consequence	A subsequent result (usually negative) that follows from damage to or loss of an asset. Quantifying potential consequences is an important part of determining risk.
Ecosystem Services	Benefits that humans receive from natural systems.
Exposure	The presence of people, assets, and ecosystems in places where they could be adversely affected by hazards.
Hazard	An event or condition that may cause injury, illness, or death to people or damage to assets.
Impacts	Effects on natural and human systems that result from hazards. Evaluating potential impacts is a critical step in assessing vulnerability.
Mitigation	Processes that can reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing them from the atmosphere.

## 7 GLOSSARY

<u>Term</u>	<u>Definition</u>
Non-Climate Stressor	A change or trend unrelated to climate that can exacerbate hazards.
Probability	The likelihood of hazard events occurring. Probabilities have traditionally been determined from the historic frequency of events. With changing climate and the introduction of non-climate stressors, the probability of hazard events also changes.
Projections	Potential future climate conditions calculated by computer-based models of the Earth system. Projections are based on sets of assumptions about the future (scenarios) that may or may not be realized.
Resilience	The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.
Risk	The potential for negative consequences where something of value is at stake. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard. Risk can be assessed by multiplying the probability of a hazard by the magnitude of the negative consequence or loss.
Sensitivity	The degree to which a system, population, or resource is or might be affected by hazards.
Uncertainty	A state of incomplete knowledge. Uncertainty about future climate arises from the complexity of the climate system and the ability of models to represent it, as well as the inability to predict the decisions that society will make.
Vulnerability	The propensity or predisposition of assets to be adversely affected by hazards. Vulnerability encompasses exposure, sensitivity, potential impacts, and adaptive capacity.

Glossary from U.S. Climate Resilience Toolkit: [toolkit.climate.gov](http://toolkit.climate.gov)

# 8

## RESOURCES

---

- Blacksburg Comprehensive Plan - 2021  
<https://www.blacksburg.gov/departments/departments-l-z/planning-and-building/comprehensive-plan>
- Central Shenandoah Hazard Mitigation Plan 2020 Update  
[https://www.cspdc.org/wp-content/uploads/2021/03/CSHMP\\_2020\\_Final-compressed.pdf](https://www.cspdc.org/wp-content/uploads/2021/03/CSHMP_2020_Final-compressed.pdf)
- City of Virginia Beach Comprehensive Plan  
<https://www.vbgov.com/government/departments/planning/2016ComprehensivePlan/Pages/Comprehensive%20Planning.aspx>
- City Plan 2040 – City of Roanoke’s Comprehensive Plan  
<https://planroanoke.org/city-plan-2040/>
- Imagine Nashua - Comprehensive Master Plan  
<https://imagine.nashuanh.gov/>
- PlaNorfolk2030 - Norfolk's General Plan  
<https://www.norfolk.gov/1376/plaNorfolk2030>
- U.S. Climate Resilience Toolkit  
<https://toolkit.climate.gov/>
- Model Forest Policy Program - Resilient Rural America Project  
<https://www.mfpp.org/rrap/>