STAR COMMUNITIES

SUSTAINABILITY
TOOLS FOR
ASSESSING &
RATING COMMUNITIES

Measuring Community Resilience
with the STAR Community Rating System

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STAR Communities is a nonprofit organization that works to evaluate, improve, and certify sustainable communities. We administer the STAR Community Rating System[TM] (STAR), the nation's leading framework and certification program for local sustainability. Cities and counties use STAR to measure their progress across social, economic, and environmental performance areas. Built by and for local governments, STAR is a catalyst for local action and is transforming the way that communities address sustainability progress.

One of the top reasons that U.S. cities and counties come to STAR Communities is because they are looking for ways to understand buzzwords like sustainability and resiliency. This document is designed for local government staff and planners and provides guidance on how to use the STAR Community Rating System to measure and improve local resiliency. For more information on STAR programs and services, please visit www.STARcommunities.org.

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Introduction

Resilience: it's a hot topic on the minds of local leaders these days. Whether it's a rust belt city dealing with economic shocks from changing industries, a west coast town battling droughts and wild fires, or a coastal county responding to rising sea levels, cities and counties across the United States are increasingly aware of the importance of preparing for and adapting to changing conditions. This is important not just to be able to bounce back quickly after a crisis, but to recover in a way that increases sustainability and quality of life for all residents.

STAR Communities is a nonprofit organization that works to evaluate, improve, and certify sustainable communities. We help cities and counties achieve a healthy environment, a strong economy, and well-being for their residents. We administer the STAR Community Rating System (STAR), the leading framework and certification program for local sustainability in the United States. Technical experts, sustainability leaders, and local government officials developed the rating system to provide a transparent and data-driven mechanism to improve local communities. Cities and counties use STAR certification to measure progress across social, economic, and environmental performance areas.

Recently city and county officials have asked how the STAR Community Rating System relates to resilience and whether STAR's metrics and best practices can be used to measure community-wide resilience. This guide is STAR Communities' second effort to provide guidance on a complex sustainability topic that covers multiple objectives across the STAR framework; the first was the STAR Climate Change Guide, released in 2017.

The intent of this document is not to introduce a new rating system for local resilience, but instead to identify how the existing STAR framework of sustainability metrics can be translated to a resilience perspective. STAR's framework of goals, objectives, outcomes, and actions enables a community to better understand baseline community conditions, set goals for improvement, identify best practices, and measure progress over time.

Similarly, this guide presents information, metrics, and case studies that communities can use to measure local resilience, recognize connected community systems, learn about best practices, and start setting a path towards becoming a more resilient and sustainable community.

Measuring Community Resilience

One-time shocks like hurricanes, flooding, or mass shootings put massive strain on community resources, while ongoing stressors such as development inequities, social divides, and aging infrastructure reduce the ability of existing systems to respond to emergency events. These challenges are ever made worse by a changing climate. In many cities and counties in the United States, community systems that could potentially help to mitigate the impacts of crises often have not been adequately maintained over time, resulting in buildings, infrastructure, social networks, and economic systems that lack sufficient capacity to absorb and recover quickly from negative shocks and stresses.

The first concepts of modern resilience emerged in the 1960s and 70s and recognized that uncertainties and unexpected hazards can shock communities, and so community leaders must take steps to ensure that they can recover when these shocks happen. Early measures of resilience therefore focused upon returning to the status quo after unexpected events. Today, resilience theory has evolved to recognize that complex systems relating to the planet and human society continually change over time, and that community systems must evolve alongside those changes. Both single events and long-term stresses must be addressed to build resilience.

Resilience, much like sustainability, is not a static state, but instead is a descriptor of the functionality of a given system. Acknowledging that both returning to an existing state and building towards a new, more adapted state are important elements of community resilience, STAR Communities has adopted the following definition from the U.S. Green Building Council:

> **Resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.**

An important step in operationalizing this definition of resilience in respect to both single events and long-term stresses is to establish a robust baseline of ongoing resilience efforts and the underlying social, natural, and economic functions of community systems. The STAR Community Rating System captures much of what is needed to be a resilient community, as the rating system was built and designed with resilience as a guiding principle.

Community resilience goals, much like sustainability goals, need to be tailored to the unique local context of the community. Assessing the unique strengths and vulnerabilities of existing community systems is a critical step towards developing a robust resiliency action plan. Only then can community stakeholders come together to develop shared goals and specific strategies for building a more resilient and sustainable community.

Each objective in STAR can be seen as one subsystem of a community; the measures within the objective are a way to measure the performance of the subsystem. While most STAR objectives do not directly measure community-wide resilience, the overall condition or functionality of individual systems point to strengths and weaknesses within the community that would strongly impact the community's ability to respond and recover from emergency events. As a result, STAR's metrics can provide a valuable picture of a community's resilience to both single events and long-term stresses.

Communities that are already tracking progress using the STAR Community Rating System can use this guide to further align their efforts with existing national and state-level emergency management assessment and reporting structures. This guide utilizes a resilience framework developed by the Federal Emergency Management Agency (FEMA) and the National Oceanic and Atmospheric Administration (NOAA). The Draft Interagency Concept for Community Resilience Indicators and National-Level Measures is a joint interagency effort to define how the federal government communicates the intended objectives and outcomes from their community resilience indicators, metrics, standards, and related resources.

FEMA's report identifies four key themes for community resilience, one of which is further divided into six subcategories:
- *Risk and Resilience Assessment;*
- *Community Resilience Capacity;*
  - *Housing Resilience*
  - *Health Resilience*
  - *Economic Resilience*
  - *Access and Functional Needs*
  - *Community Planning*
  - *Social Connectedness*
- *Infrastructure Systems Resilience;* and
- *Ecosystem and Natural Resource Resilience.*

In this guide, we will go through each of the FEMA community resilience themes, suggest the STAR objectives and evaluation measures that best align with the theme, and provide a case study of a certified STAR community that is leading the way. In addition to this narrative guide, we have also created a companion spreadsheet tool that lists out all the STAR evaluation measures that fall within the FEMA resilience categories.

About the STAR Community Rating System

The STAR framework integrates economic, environmental, and social aspects of sustainability and provides communities with a menu-based system to customize their approach based on local conditions and priorities. Sustainability means different things to different people, so STAR provides a customizable, data-driven approach to assessing communities' sustainability efforts.

STAR was developed for local governments by local governments. Released in October 2012, STAR represents a milestone in the national movement to create more livable communities for all. The rating system's evaluation measures collectively define community-scale sustainability and present a vision of how communities can become healthier, more inclusive, and prosperous across seven goal areas. STAR's framework can also provide a deeper, shared understanding of community resilience. Both sustainability and resiliency strive to improve and ensure community well-being, and both rely upon social, economic, and environmental systems.

The STAR Community Rating System is divided into the seven thematic sustainability goal areas below. An eighth category, *Innovation & Process*, supports the evolution of sustainability practice by recognizing best practices and processes, exemplary performance, innovation, and good governance. Each of the sustainability goal areas is divided into five to seven objectives, aimed at achieving community-level aspirations. These forty-five objectives each contain between eight and fifteen evaluation measures that can be used to benchmark and evaluate community progress.

Each STAR objective contains a mix of two types of evaluation measures: community-level outcomes and local actions. Community-level outcomes are measurable, condition-level performance indicators that demonstrate progress. Local actions are the things community stakeholders can do to move toward the community-level outcomes – the range of decisions, investments, programs, plans, and codes that a local government and partners put in place. Actions focus on interventions that move the needle toward desired outcomes, and can be done by the local government and other community groups, stakeholders, and partners.

Communities and technical experts agreed that it is important for the rating system to include both quantitative measures that demonstrate progress over time, as well as qualitative best practices that are the foundational steps and strategies for sustainability. This acknowledges that sustainability is a process, not a static state, and that it takes time to be able to show progress, especially in communities that do not have access to robust data sets and tracking systems. Communities are able to receive credit for the things that they are doing, as well as for being able to demonstrate the measurable results of these efforts.

To see a full list of the evaluation measures, download the free rating system from the STAR website. You can also learn more about the goals and objectives under the education section of our website.

Resilience in STAR

STAR's community-wide approach to sustainability mirrors FEMA's whole community approach to resilience, in which hazard and vulnerability identification and solution development must go beyond the local government to include residents, local community groups and organizations, non-profits, and private organizations.

Local efforts to measure and achieve the goals embedded in resilience should incorporate substantial community input, as resilience is complex, and concerns and vulnerabilities will vary widely from community to community. The metrics and information in this guide present a solid foundation from which to begin understanding and measuring community resilience, but should ultimately be tailored by community members to address local context. Low-income neighborhoods and communities of color are frequently the most vulnerable to shocks and stresses, and thus should be thoroughly engaged throughout the process.

To help communities get started with resilience, STAR Communities has identified the top objectives from the rating system that align with the FEMA resilience categories (*highlighted*, *image below*). The following sections of this guide present detailed information on the twelve priority objectives, including case studies and data from certified STAR communities. Each STAR evaluation measure that is relevant for the FEMA categories are included in a companion spreadsheet tool that can be easily filtered and used to align local efforts.

Built Environment	Climate & Energy	Economy & Jobs	Education, Arts & Community	Equity & Empowerment	Health & Safety	Natural Systems
Ambient Noise & Light	Climate Adaptation	Business Retention & Development	Arts & Culture	Civic Engagement	Active Living	Green Infrastructure
Community Water Systems	Greenhouse Gas Mitigation	Green Market Development	Community Cohesion	Civil & Human Rights	Community Health	Biodiversity & Invasive Species
Compact & Complete Communities	Greening the Energy Supply	Local Economy	Educational Opportunity & Attainment	Environmental Justice	Emergency Management & Response	Natural Resource Protection
Housing Affordability	Energy Efficiency	Quality Jobs & Living Wages	Historic Preservation	Equitable Services & Access	Food Access & Nutrition	Outdoor Air Quality
Infill & Redevelopment	Water Efficiency	Targeted Industry Development	Social & Cultural Diversity	Human Services	Health Systems	Water in the Environment
Public Parkland	Local Govt GHG & Resource Footprint	Workforce Readiness	Aging in the Community	Poverty Prevention & Alleviation	Hazard Mitigation	Working Lands
Transportation Choices	Waste Minimization				Safe Communities	

Risk and Resilience Assessment

When getting started on a resilience planning effort, the first questions that a community should answer are:

- "What are our community's unique risks and vulnerabilities?"
- "Which parts of our community are most vulnerable to these risks? Do we have representation from these neighborhoods?
- "Which systems are we discussing, and what do we hope to make them resilient to?"
- "Do we have the correct data and assessments needed to make informed plans and decisions?"

The first FEMA resilience category, *Risk and Resilience Assessment*, addresses efforts to reduce community-wide vulnerability to potential one-time shocks and disasters and to guarantee adequate capacity to respond when those events occur. Too often, communities only look at known risks, or use outdated models to predict future shocks and disasters.

Above: Community members from Goleta, CA attend a workshop to review STAR actions that could help the community address vulnerabilities due to wildfires and mudslides.

The STAR outcome measures that best align with this FEMA category ask that a community demonstrate a reduction in vulnerability or an increase in resilience to locally identified hazards. The STAR action measures address best practices for the mitigation of those hazards and for emergency management and preparedness efforts.

To get started, STAR Communities recommends looking at the *HS-6: Hazard Mitigation* and *HS-3: Emergency Management & Response* objectives within the *Health & Safety* goal area, as well as the *CE-1: Climate Adaptation* objective within the *Climate & Energy* goal area.

 HS-6: Hazard Mitigation directly measures resilience efforts relating to existing hazards, while *CE-1: Climate Adaptation* measures vulnerability reductions to future expected hazards. Measures from *HS-3: Emergency Management & Response* are also important to assessing risk and resilience, as they indicate the readiness and capacity of the community's fire, police, and emergency management systems to respond to emergency events and disasters.

Priority STAR Objective: Hazard Mitigation

The purpose of the *HS-6: Hazard Mitigation* objective is to reduce or eliminate long-term risks to life and property from existing or potential hazard events through an on-going process that occurs before, during, and after disasters. The objective contains two quantitative outcome measures and eight action measures that a community could consider enacting to reduce risk to locally defined hazards. The outcome measures for this objective require local data and will vary depending on specific local hazards:

Outcome 1—Location-Specific Hazards:
>   Part 1:
>> Option A: Reduce over time the number of homes below code standards that are located in designated high-risk areas
>> --OR--
>> Option B: Reduce over time the percentage of residents living in designated high-risk areas
>   --AND--
>   Part 2: Reduce over time the critical infrastructure below code standards that is located in designated high-risk areas

Outcome 2—Full Community Hazards:
>   Demonstrate a measurable reduction in vulnerability and/or increase in resiliency to community-wide hazard threats over time

The outcomes within this objective are tough to achieve, in part due to a lack of data from comprehensive risk and vulnerability assessments. Of the sixty-three communities certified under STAR Version 1, only a small percentage have made enough progress to achieve the points for the *HS-6: Hazard Mitigation* outcomes. 13% of certified communities received credit for HS-6 Outcome 1 by demonstrating measurable reductions in vulnerability of homes and infrastructure to location-specific hazards. This could be shown by providing the number of homes in a vulnerable area that were brought to a higher code standard or by moving key infrastructure out of a floodplain, for example. Only 21% of certified communities received credit for Outcome 2 by demonstrating increased resiliency or reduced vulnerability to hazards like hurricanes or drought.

While performance in the *HS-6: Hazard Mitigation* outcomes was low, most certified communities are actively taking steps towards reducing vulnerability, which can be seen in higher achievement of actions. Some of these action measures are required by state hazard mitigation planning programs and are more commonly accepted best practice. For example, 83% of certified communities have adopted hazard mitigation plans and 70% have taken steps to increase awareness of natural hazards through community education and outreach programs.

Case Study: Northampton, MA – Mitigating a $25 Million Problem

The City of Northampton, home to approximately thirty thousand residents, is located right in the middle of Massachusetts. The town consists of three distinct villages nestled in the valley between the Connecticut River and the glacial-formed hills to the west. Over the course of 2014, Northampton completed an update to their hazard mitigation plan, in conjunction with the Pioneer Valley Planning Commission. This update looked at vulnerabilities to a wide range of current and future risks.

The 2015 Multi-Hazard Mitigation Plan identified flooding as the community's highest risk, with up to $25 million of damage projected to occur in the event of a 100-year flood. To reduce the impact of potential flood events, the City has adopted a number of subdivision and zoning regulations, including:

- A requirement that stormwater management systems in all new developments be designed so that post-development peak discharge rates do not exceed pre-development rates;
- Adoption of a Special Conservancy district, which prevents new residential development and severely restricts commercial development in the 500-year flood plain; and
- Use of the City's existing Open Space Acquisition Program to purchase 0.5% of the jurisdiction's land area per year, either in fee or by agriculture and conservation restrictions. As a result, over 25% of the City's land area is now permanently protected open space.

To identify opportunities to reduce emergency management system failures during extreme weather, the City of Northampton also completed a resiliency study in cooperation with Sandia National Laboratory. Resiliency actions that Northampton is now considering include:

- Developing resilient microgrids in the areas with the greatest concentration of emergency operations centers and food supplies;
- Installing photovoltaics at emergency operations centers and shelters; and
- Reducing energy loads for operations centers and shelters that would have to be operated with emergency power during severe weather and power outages.

Photo: City of Northampton

Priority STAR Objective: Climate Adaptation

CE-1: Climate Adaptation, within the *Climate & Energy* goal area, is intended to strengthen the resilience of communities to climate change impacts on built, natural, economic, health, and social systems. This objective contains one outcome measure, which relies on local data, and ten action measures.

Outcome 1—Climate Resilience:
> Demonstrate a measurable reduction in vulnerability and/or increase in resiliency to 3 community-wide risks and 1 at-risk population group [Partial credit available]

Climate change remains a politicized issue in the U.S. and so this is a commonly low-scoring objective in STAR, indicating that there is much room for improvement. Some communities have opted to skip the objective completely, and those that do acknowledge the importance of adapting to a changing climate tend to be at the initial stages of identifying impacts and creating first plans.

Of the sixty-three communities certified under Version 1 of the STAR rating system, around half (54%) have taken steps to create or enhance programs and services that help address climate change threats, with many focused on predicted flooding or drought conditions. Only a limited portion of communities (19%) had made substantial enough progress to demonstrate a measurable reduction in climate vulnerability and receive credit for the outcome measure.

Case Study: Baltimore, MD – Adapting to Expected Changes

Created in 2013, Baltimore's Disaster Preparedness and Planning Project Plan (DP3) takes a unique approach to hazard mitigation and climate adaptation. The award-winning plan integrates projected climate impacts alongside traditional hazard mitigation efforts for existing threats like coastal storms, floods, and winter storms. Rather than being structured by hazard, the plan is organized into four categories—infrastructure, buildings, natural systems, and public services—for more efficient and effective implementation.

Resilience improvements in the community have included:

- Upgrading the Back River Waste Water Treatment Plant to maintain power in the event of a power outage;
- Encouraging development of green streets in flood-prone areas of the city;
- Passing a new zoning code, TRANSFORM, which includes more green space requirements in priority waterfront overlay zones;
- Developing the Green Network Plan Draft document, which identifies vacant area potential for conversion to permanent green space;
- Developing resilience hubs in vulnerable parts of the community; and
- Working with the Johns Hopkins Center for a Livable Future to release a Food System Resilience Assessment that details how the community's food supply could be affected by fourteen types of emergencies.

Community Resilience Capacity

The second FEMA resilience category, *Community Resilience Capacity*, looks at the condition of underlying community systems that may impact resilience. Within *Community Resilience Capacity*, six subcategories are presented that as a whole measure the social systems that most strongly influence resilience. The subcategories include:

- *Housing Resilience;*
- *Health Resilience;*
- *Economic Resilience;*
- *Access and Functional Needs;*
- *Community Planning;* and
- *Social Connectedness.*

To better understand strengths and weaknesses within crucial community social systems, local leaders should track and analyze metrics within the FEMA subcategories of *Housing Resilience, Health Resilience, Economic Resilience*, and *Social Connectedness*. These systems can either be a stressor or resource to the community in regard to resilience. For example, the local economic system could be a source of resilience in a community with a growing number of diverse, well paying jobs, or it could be a source of community-wide stress, such as in the case of a city that has recently lost a major industry.

The *Community Planning* and *Access and Functional Needs* subcategories from FEMA look across community systems rather than within them. Metrics for *Community Planning* should aim to determine whether all community members are engaged in decision-making and planning processes, which in turn guarantees that resilience decision-making and planning meets the needs of all community members. *Access and Functional Needs* metrics address the needs of the most vulnerable community members—those that would be most impacted by disasters and that may have the hardest time recovering.

It is of the utmost importance that equity be a guiding principle of any community resilience efforts. Low-income and historically disadvantaged populations are the most vulnerable to shocks and disasters as they lack the financial safety net to recover. Shocks can also compound preexisting inequalities, as vulnerable communities are often financially and geographically cut off from recovery efforts, accelerating urban decline and disinvestment. Effective resilience planning should ensure that post-disaster or shock, community systems cannot only bounce back, but bounce forward.

Housing Resilience

Stable housing is a fundamental human need. It contributes to the safety, health, and emotional well-being of the people within the community. When a city lacks stable and affordable housing, community members have to move frequently, resulting in stress and health issues and a weakened sense of community cohesion.

Stable housing allows residents to develop strong and supportive relationships with friends and neighbors, which contributes to resilience. In times of crisis, it is often neighbors who are the first to respond to those in need.

Additionally communities need to make sure that there is adequate affordable housing available in convenient and safe locations to access jobs and community assets like schools. Communities without affordable housing are often segregated by income and family background, contributing to growing inequality and destabilizing the community. Well-placed affordable housing can help to create a vibrant, diverse group of residents.

In terms of resilience, communities with stable housing and strong affordable housing programs are less susceptible to shocks. Residents in these communities are better able to stay in their homes and build strong community ties, which impacts social connectedness and social capital – vital resources for neighborhoods during disasters. Additionally, residents who have affordable housing tend to have greater financial flexibility, which helps to respond to disasters as they're occurring and provides greater capacity to rebuild or recuperate afterwards.

For communities looking to work on housing resilience, STAR suggests starting with the *BE-4: Housing Affordability* objective within the *Built Environment* goal area. Additional objectives to consider include *BE-3: Compact & Complete Communities* and *EAC-2: Community Cohesion*.

Priority STAR Objective: Housing Affordability

The purpose of *BE-4: Housing Affordability* is to construct, preserve, and maintain an adequate and diverse supply of location-efficient and affordable housing options for all residents. There are three outcomes and eight action measures that measure progress in this objective:

Outcome 1—Housing and Transportation Costs:
> Part 1: Demonstrate that there are at least 80% of Census block groups where a household earning the Area Median Income (AMI) would spend less than 45% on housing and transportation combined [Partial credit available]
> --AND--
> Part 2: Demonstrate that there are at least 60% of Census block groups where a household earning 80% AMI would spend less than 45% on housing and transportation combined [Partial credit available]

Outcome 2—Affordable Housing Production:
> Option A: Achieve targets for creation of new subsidized affordable housing identified in a locally adopted comprehensive housing strategy
> --OR--
> Option B: Demonstrate affordable housing is being produced at a rate of 5% annually

Outcome 3—Affordable Rental Housing Preservation:
> Option A: Demonstrate no loss of subsidized affordable housing units due to expiring subsidies in the past 3 years
> --OR--
> Option B: Demonstrate that any loss of subsidized affordable housing units is being replaced with new affordable housing production [Partial credit applies]

BE-4: Housing Affordability is one of the most challenging objectives in the STAR rating system. Only 11% of certified communities have achieved credit for meeting the thresholds for *Outcome 1—Housing and Transportation Costs*. More success has been seen in local housing programs, as 19% of communities have achieved targets for creating new subsidized affordable housing and 27% are successfully preserving subsidized affordable housing.

Many certified communities are taking substantial steps to promote and increase affordable housing. 46% of certified communities have a comprehensive housing strategy that guides housing programs, 68% have programs that help preserve and maintain existing affordable housing, and 83% partner with nonprofit or faith-based organizations to provide education, counseling, and financial assistance to homebuyers or renters.

Gentrification continues to be a challenge for certified communities. Only 11% analyze the likelihood and extent to which housing costs are anticipated to increase in response to new transit or major infrastructure investments in low- and moderate-income neighborhoods. This is especially important when local governments are considering infrastructure and other improvements to further resilience, so that all existing residents will reap the benefits of development and not be forced out of their homes by rising housing prices.

Case Study: Atlanta, GA - Preserving Housing Affordability Along a Major Transportation Corridor
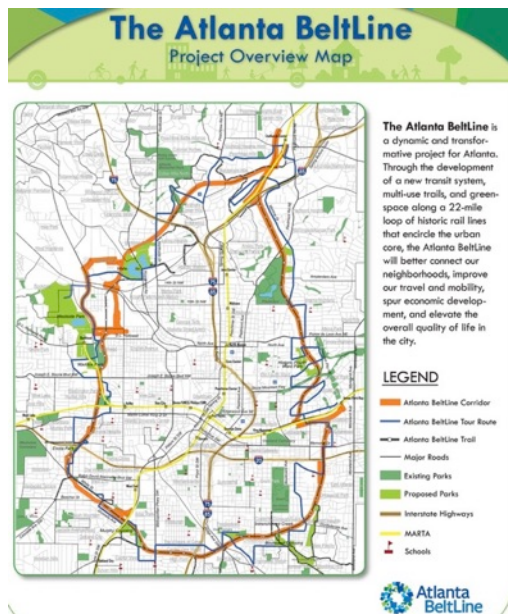
Proactive, substantial planning for affordable housing before major projects get underway is a vital component of an affordable housing program. A great example of this is the Atlanta BeltLine trail corridor – a sustainable redevelopment project to convert a 22-mile loop of railway into a vibrant system of new and improved transit, parks, trails, and affordable housing.

The BeltLine Project aims to make resulting economic growth accessible to all; a key part of the project is to provide sustained, high-quality affordable housing. To meet this goal, the Atlanta City Council established the BeltLine Affordable Housing Advisory Board (BAHAB) to make recommendations about the creation of affordable housing around the BeltLine.

To create sustained affordability, the BAHAB recommended that all new affordable housing rental projects be subject to a 15-year minimum affordability period. Projects that receive more than $30,000 of BeltLine Affordable Housing Trust Fund (BAHTF) subsidy per affordable unit should go further and have a 30-year restriction. The BAHTF should also support owner-occupied housing through "soft second" mortgages and down payment assistance programs, which help to render the purchase price affordable to the homebuyer.

Additional programs that support affordable housing around the BeltLine include:
- An Inclusionary Zoning policy that requires that developers building ten or more new residential rental units within the Atlanta BeltLine Overlay District set aside units for affordable housing;
- An effort to centralize information on tax exemptions for homeowners and affordable housing opportunities through ABI and Invest Atlanta partnerships;
- Homeowner education workshops to make sure existing homeowners in BeltLine neighborhoods are equipped to take advantage of available resources to stay in their homes or knowledgeably evaluate opportunities if selling; and
- Development of an Integrated Action Plan to guide the Beltline's ambitious economic development and housing goals.

As a result of these proactive planning efforts, the City of Atlanta created 2,565 affordable workforce units within walking distance of the Beltline between 2005 and 2017. These efforts around affordable housing have resulted in a more resilient workforce, economy, and transportation system for the community.

Health Resilience

Health is one of the foundational principles of community resilience; almost everything we do to prepare for disasters and increase resilience is for the sake of preserving human lives, health, and well-being. To build *Health Resilience*, communities should use their assets to strengthen existing public health and healthcare systems, in order to improve the community's physical, behavioral, and social health to withstand and recover from shocks and disasters.

The first component of *Health Resilience* is to enhance and improve the community's day-to-day health and well-being. Healthy individuals are less vulnerable to hazards and more able to participate in their community, which strengthens social bonds and builds the social capital that is invaluable during emergency events. Individuals with physical and mental health issues are often the most vulnerable to shocks and disasters and less able to get out of harm's way in the face of a natural disaster.

The strength and resilience of local healthcare systems make up the second component of *Health Resilience*. Healthcare systems, hospitals, health departments, and community health partners support individual health and well-being before a disaster and recovery efforts afterwards. Health systems should be affordable, accessible, and inclusive. If a community healthcare system is not meeting the needs of its community before disaster strikes, it is unlikely that the system will be able to adequately meet needs after a disaster. Finally, it is critical that healthcare centers and hospitals are physically secure and able to withstand hazards and disasters, as they are key institutions before, during, and after an event.

For communities working on *Health Resilience*, STAR Communities suggests starting with a combination of the *HS-2: Community Health* and *HS-5: Health Systems* objectives within the *Health & Safety* goal area. More substantial efforts should also include considerations of *HS-1: Active Living, HS-4: Food Access and Nutrition, HS-7: Safe Communities*, and the numerous social determinants of health, which can be found in the *Equity & Empowerment* goal area and *EJ-4: Living Wages & Quality Job*s.

Photo: Jordan Andrew

Priority STAR Objectives: Community Health and Health Systems

The purpose of *HS-2: Community Health* is to achieve positive health outcomes and minimize health risk factors associated with behaviors and poor indoor air quality in schools and homes. This objective measures community health through two outcomes and twelve action measures.

The outcomes use national data from the County Health Rankings program at the Centers for Disease Control and Prevention (CDC). The STAR measures look at county health outcome performance, including vital statistics data, sexually transmitted disease rates, and Behavioral Risk Factor Surveillance System (BRFSS) survey data. These are compiled and calculated annually by staff at the National Center for Health Statistics and other units of the CDC. Communities are able to look up results online.

Outcome 1—Health Outcomes:
> Demonstrate that the county is a Top U.S. Performer in regards to Length of Life and Quality of Life indicators [Partial credit available]

Outcome 2—Health Behaviors:
> Demonstrate that the county is a Top U.S. Performer in regards to key behaviors that impact health [Partial credit available]

The purpose of *HS-5: Health Systems* is to provide high quality local healthcare systems that are accessible and responsive to community needs. This objective contains three outcome measures and eight action measures. Outcome 1 is also derived from the CDC County Health Rankings program, while Outcomes 2 and 3 look at whether the local hospital system and health department are recognized through prestigious national accreditation programs.

Outcome 1—Clinical Care:
> Demonstrate that the county is a Top U.S. Performer in regards to quality of clinical care, including access to health care [Partial credit available]

Outcome 2—Quality of Local Hospital Systems:
> Part 1: Demonstrate that at least 1 hospital per 50,000 residents is accredited by the Joint Commission
> --AND--
> Part 2: Demonstrate that at least 1 hospital has been recognized as a top performer by the Joint Commission

Outcome 3—High Performing Health Department:
> Demonstrate that the local public health department is accredited by the Public Health Accreditation Board

In comparison to the previously featured objectives, most communities that pursue STAR certification are able to achieve some points for the outcome measures in *HS-2: Community Health* and *HS-5: Health Systems*. This is probably partially due to the fact that the data comes from national sources and doesn't have to be gathered at the local level.

70% of communities certified under Version 1 of the STAR Community Rating System have demonstrated at least partial achievement in health behaviors and clinical care availability in the community, with 48% showing some level of achievement in health outcomes. Most certified communities (86%) have at least one hospital that has been recognized as a top performer by the Joint Commission or benefit from a local public health department that has been accredited by the Public Health Accreditation Board.

Looking at the action measures in these objectives, many certified communities have conducted a comprehensive community health assessment (75%) and provide information to the public in regard to health issues and local health programs (68%). Over half (62%) have also developed a comprehensive community health improvement plan. Fewer have conducted health impact assessments on proposed infrastructure or development projects (19%) or have adopted a health in all policies statement or commitment (13%).

In Version 2 of the rating system, STAR Communities added a new measure that asks that local healthcare institutions make a strategic commitment to addressing equity in their services. 44% of communities certified under Version 2 received credit in this new measure, indicating a shift in many healthcare institutions to a focus on health equity.


Photo: Dane Deaner

Case Study: Cleveland, OH - Place Matters, Addressing Health Equity

Place Matters is a national initiative of the Joint Center for Political and Economic Studies Health Policy Institute. The initiative is intended to improve the health of participating communities by addressing social conditions that lead to poor health.

In the Cleveland metro area, the Cuyahoga Place Matters team has come together to place health implications and equity considerations at the forefront as policymakers and others make decisions that substantially impact the residents of Cuyahoga County and the neighborhoods in which county residents live. The initiative's team strives to:

- Support a broader definition of health;
- Inform, influence, and engage policy-makers and community members to develop policies, using an overarching health equity lens, that have long-term impacts, create conditions for optimal health, and reduce inequities; and
- Utilize place-based interventions to engage and empower residents in under-resourced communities to revitalize their communities.

To lay the groundwork for Place Matters Cuyahoga, in 2015, the Kirwan Institute for the Study of Race and Ethnicity at the Ohio State University prepared a report on the role of policy, race, and real estate in the geography of health equity and opportunity in Cuyahoga County.
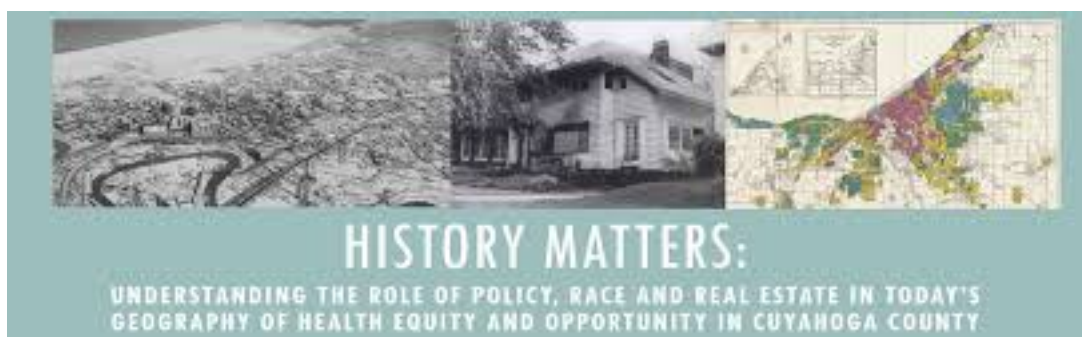
The City of Cleveland is now working in partnership with Cuyahoga County and other healthcare providers in the area to operationalize the Place Matters initiative. Since the release of the report and the formation of the Place Matters partnerships, the community is now:

- Assessing and acknowledging that there are health disparities in life expectancy of up to 10 years from urban to suburban areas across the County area;
- Establishing the Healthy Cleveland initiative, which aims to change the culture of health in the community and create more equitable health outcomes for residents across neighborhoods;
- Conducting health impact assessment trainings so that health and equity are included in all policies and decisions;
- Incorporating social determinants of health and the Place Matters framework into conversations with the County Board of Health, County Health and Human Services, County Department of Development, and Cleveland City Planning Commission; and
- Helping the Cleveland City Planning Commission to become more health-centric in its approach.

Economic Resilience

The [U.S. Economic Development Administration (EDA)](#) defines economic resilience as the ability of the local or regional economy to anticipate risks, evaluate how these risks might impact key economic assets, and to build a responsive capacity to respond to risks. The EDA suggests analyzing the risks associated with three types of shocks or disruptions:

- Downturns or other significant events in the national or international economy which impact demand for locally produced goods and consumer spending;
- Downturns in particular industries that constitute a critical component of the region's economic activity; and/or
- Other external shocks (a natural or man-made disaster, closure of a military base, exit of a major employer, the impacts of climate change, etc.).

To start understanding how these types of events might affect a community, it's important to understand the current strengths and weaknesses of the local and regional economy. Numerous elements of a community's economy impact resilience. A strong, diverse economy that is working for all community members is more resilient to disaster events.

For example, low unemployment levels and higher income levels may indicate that much of the community has access to a strong financial safety net. These individuals will need less recovery assistance from the government after a disaster and may have the resources needed to rebuild or pay medical bills on their own. Likewise, a community with a diversity of industries and job types, that is not dependent on one industry, is less likely to be impacted by broad international economic trends. On the other hand, a community with high levels of poverty and income inequality may be more susceptible to shocks and disruptors.

Economic development leaders should strive to diversify the local economy, strengthen job training and placement programs, build a resilient workforce that is able to adapt to changing economic needs, and promote business continuity in the face of risks and potential shocks.

To assess strengths and weaknesses in the local economic system, local leaders can use the evaluation measures from STAR's *Economy & Jobs* goal area, including: *EJ-1: Business Retention & Development, EJ-2: Green Market Development, EJ-3: Local Economy, EJ-4: Quality Jobs and Living Wages, EJ-5: Targeted Industry Development*, and *EJ-6: Workforce Readiness*. Going further, communities should also consider the metrics from *EE-6: Poverty Prevention & Alleviation* within the *Equity & Empowerment* goal area.

Priority STAR Objective: Local Economy

For communities looking to measure *Economic Resilience*, STAR Communities suggests starting with *EJ-3: Local Economy,* as a strong, diverse local economy can help resist shocks and stressors. The purpose of *EJ-3: Local Economy* is to create an increasingly self-reliant community through a robust local economy that strongly supports small independent businesses.

There are three outcomes and eight action measures in this objective. The outcomes use national data pulled from the U.S. Bureau of Labor Statistics (BLS), the Federal Deposit Insurance Corporation (FDIC), the National Credit Union Administration (NCUA), and the Census' Statistics of U.S. Businesses (SUSB).

Outcome 1—Community Self-Reliance:
> Option A: Demonstrate that 50% of import sectors have increasing location quotients over the past 3 years
> --OR--
> Option B: Demonstrate that the percentage of import sectors with increasing location quotients has increased over the past 3 years [Partial credit applies]

Outcome 2—Local Financial Institution Deposits:
> Increase the total funds deposited in locally owned and operated financial institutions over time

Outcome 3—Small Businesses:
> Option A: Demonstrate there are at least 20 small businesses per 1,000 residents for cities
> --OR--
> Option B: Demonstrate there are at least 31 small businesses per 1,000 residents for counties [Partial credit available]
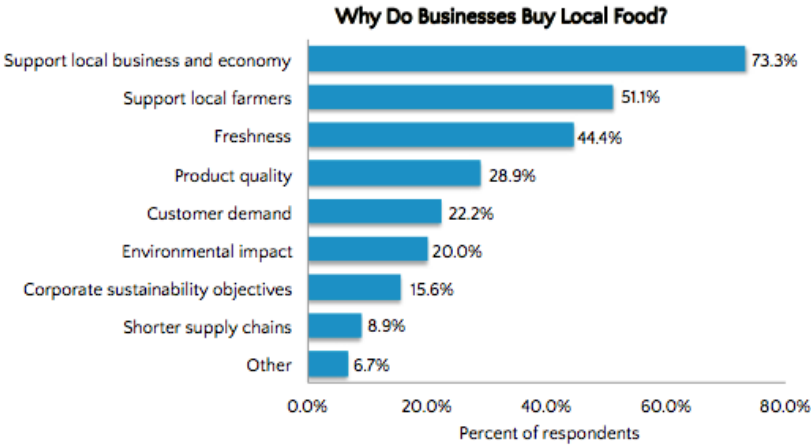
It can be challenging for communities to create a more self-reliant economic system that is focused on small, independent businesses. Much of this work tends to be done at the regional level. Only 29% of certified STAR communities were able to demonstrate community self-reliance through increasing import sector location quotients (a measurement of how clustered the local economy is). More communities (56%) were able to demonstrate an increase in funds deposited in local banks and credit unions. Funds deposited in local institutions are often used to finance local infrastructure and other development projects, strengthening local resiliency.

Many communities have a strong general business focus, but dedicate few resources to intentionally planning for, tracking, and building a focus on small, independent businesses and the local economy. Only 12% of certified communities have adopted an economic localization plan to increase local production for local consumption and export, and fewer than 10% provide incentives for businesses that use materials produced within the region. Communities have had more success in connecting entrepreneurs and business owners with lenders and investors (56%) and creating or supporting bank local, buy local, or buy from small/independent businesses campaigns (56%).

Case Study: Louisville, KY - Growing the Local Economy Through Food

A local economy that is built on diverse, independent businesses and supported by strong local financial institutions is increasingly self-reliant and more able to withstand shocks and stressors outside of its control. The City of Louisville seeks to build its local economy in part through a focus on local agriculture and foods.

An important first step in promoting local food was to complete an analysis of the regional food economy. Released in 2012, the Louisville Local Food Demand Analysis found that while local consumers and commercial buyers spend about $300 million annually on local food purchases, they were interested in buying more than double that amount. Residents spent $2 billion on food in 2011, so the opportunity for increasing the local economy through agriculture and food was substantial. Further, the report found that the key driver to purchasing local food was to support businesses and the economy, over freshness and environmental concerns (*image below*).

Why Do Businesses Buy Local Food?

Reason	Percent
Support local business and economy	73.3%
Support local farmers	51.1%
Freshness	44.4%
Product quality	28.9%
Customer demand	22.2%
Environmental impact	20.0%
Corporate sustainability objectives	15.6%
Shorter supply chains	8.9%
Other	6.7%

Percent of respondents

Efforts to grow the local food economy include:
- An annual Buy Local Louisville Fair and Local Business Expo.
- The Louisville Agribusiness Loan, a low-interest tool targeted at assisting businesses processing food grown by Kentucky farmers. The loan is targeted to contract packers or co-packers, food cooperatives, distilleries and wineries, dairy processors, distributers, and processed products manufacturers. To be eligible, businesses must locate in Louisville's Portland Neighborhood, provide employment opportunities for Portland residents, and demonstrate that major ingredients in their product come from Kentucky farmers.
- Louisville's Farm to Table Program, which provides individual assistance as well as workshops and programs designed to support Kentucky farmers who wish to sell their edible agricultural products regionally. The program includes brokering deals and relationships, hosting public forums to identify and overcome barriers in the local food system, and working directly with institutions such as Jefferson County Public Schools to support their local food purchasing goals.
- A partnership with a local waste management company that collects food waste from the wet-dry recycling program in the Central Business District. This food waste is delivered to a local composter, who converts the waste by-product into compost and sells it wholesale to big box retailers and area landscapers.

Social Connectedness

When looking at FEMA's *Community Resilience Capacity* category, the *Social Connectedness* section is a crucial aspect to resilience, yet it can be very difficult to define, quantify, and measure.

Social connectedness and social capital look at the strength of community bonds, and the ways that community members feel connected and responsible for each other. Those connections act as a valuable resource during times of crisis and help individuals to mitigate, withstand, and recover from disasters. During intense emergency events, neighbors, family, and friends are more likely to be the first to come to the aid of people in need. People across social networks support each other during emergency events and help each other get back on their feet after the event has passed.

Social connectedness is important not only for the health and resilience of the community, but also for individual health. Isolated individuals are more vulnerable during emergency events and are more susceptible to mental health problems, before, during, and after events.

In the STAR Community Rating System, social connectedness can be measured using *EAC-2: Community Cohesion* in the *Education, Arts & Community* goal area. In addition to direct measurements of social cohesion, foundational elements of a community like education, civil rights, and services for older adults promote strong social connections. These elements are measured in *EAC-3: Educational Opportunity & Attainment, EE-2: Civil & Human Rights, EAC-5: Social & Cultural Diversity*, and *EAC-6: Aging in the Community*.

Above: Community members in Dubuque, IA discuss equity and community cohesion.
(Photo: Inclusive Dubuque.)

Priority STAR Objective: Community Cohesion

For communities looking to measure *Social Connectedness*, STAR Communities suggests starting with *EAC-2: Community Cohesion*, which has the goal of promoting socially cohesive neighborhoods where residents are connected, have a sense of place, and feel committed to their community. *EAC-2: Community Cohesion* has three outcome measures and eleven action measures:

Outcome 1—Accessibility of Community Venues and Facilities:
>   Demonstrate that at least 75% of residents live within 1 mile of a community venue that is open to the public and offers free services and/or events for residents

Outcome 2—Volunteerism:
>   Option A: Demonstrate that at least 30% of residents in large jurisdictions or 35% of residents in small or mid-sized jurisdictions volunteered in the past year
>   --OR--
>   Option B: Demonstrate an increase in the percentage of residents who volunteered over the past 3 years [Partial credit applies]

Outcome 3—Cohesion and Connectedness:
>   Option A: Demonstrate that at least 80% of residents report positive levels of neighborhood cohesion through community surveys
>   --OR--
>   Option B: Demonstrate an increased percentage of residents reporting positive levels of neighborhood cohesion through community surveys [Partial credit applies]

Many STAR-certified communities performed well in Outcome 1. 73% achieve credit by mapping out publically accessible community venues in which community members can gather, meet, and socialize. Outcome 3 is much tougher to achieve, partly due to the cost and timing of community-wide surveys. Only 24% of certified communities demonstrated increasing or strong levels of neighborhood cohesion, as measured through community survey responses. It's vital that communities understand perceived or real barriers to community cohesion and identify priority areas in the community that may have limited social capital, as these areas may have fewer resources to activate during emergency events.

Certified communities performed better in the action measures. Nearly all communities provide youth development programs (84%) or direct funding and management of community and neighborhood venues (83%). A strong majority partner with neighborhood organizations to identify and address neighborhood-specific needs (68%) or have a department with staff assigned to work as liaisons with specific neighborhoods (63%). The most challenging action for communities involves having neighborhood plans in place for a majority of neighborhoods in the community (43%).

Case Study: Columbia, SC - Building Social Capital

Community cohesion, a critical building block of social capital, supports resilience by ensuring that community members know, trust, and support each other. These relationships are a key element of resilience during disasters; strong cohesion can be utilized to check on and assist neighbors in need, especially those vulnerable to hazards, such as seniors, during and after emergency events.

In Columbia, SC, the Columbia Council of Neighborhoods (CCN), a nonprofit umbrella organization that supports the 90+ neighborhood organizations in the City, contributes to a strong sense of community cohesion. While many communities schedule regular meeting times between elected officials and residents, the CCN is innovative in that it enables neighborhood organizations to self-define their own community boundaries, therefore increasing member buy-in.

The CCN provides an ongoing link between neighborhood groups and city officials, enhancing the process of identifying neighborhood problems and setting priorities for solutions. It also serves as a meeting place for diverse neighborhood groups, provides education and capacity building to community leaders, and helps address issues like drugs, crime, and toxic waste.

The efforts of the CCN run parallel to the Greater Columbia Community Relations Council (GCCRC), which promotes social progress, mutual respect and unity through dialogue, education programs, and collaborative efforts that validate the benefits of diversity and inclusion. GCCRC advocates, mediates, and educates on behalf of all of the many citizens of the area's diverse communities so that everyone is included in public policy making.

Examples of the GCCRC's programs include:
- PACE (Preparation, Arts, Civility and Education) – an elementary age, in-school character building and leadership program that helps students understand and appreciate cultural differences;
- FBI (Faith-Based Initiative) – a committee of local clergy from varying denominations that address and mediate neighborhood concerns and help groups resolve disputes and issues, and
- Coalition of Columbia Communities – an inclusive, diverse community leader task force that works together to support each other's right to respect, equality, and prosperity.

Access and Functional Needs

The FEMA subcategory on *Access and Functional Needs* looks at how community assets and services are distributed across the community and how well they are functioning to meet the community's needs, especially for those populations that are most vulnerable, historically disadvantaged, or that require extra assistance. Developing a solid security net of support services before a crisis occurs will help to build community resiliency, so that vulnerable populations are better equipped to cope when those events and shocks do happen.

Disasters and long-term stressors impact community members with lower socioeconomic status disproportionately, as these residents tend to have more preexisting health conditions, higher rates of past trauma, and fewer available financial resources to withstand or recover from emergencies. Proactively working to improve the health, well-being, and self-sufficiency of these communities can promote quicker and more efficient recoveries, as well as providing cost savings in the long run.

In addition, older adults and people with disabilities, or individuals experiencing mental health or substance abuse disorders, domestic violence, homelessness, or abuse and neglect have a range of specific conditions and needs that must be uniquely addressed prior to and during emergency events. People already experiencing these issues will likely have a harder time coping and recovering; for example, individuals experiencing mental health or substance abuse issues may relapse during times of extreme stress, such as an intense emergency event.

It is important that these services are easily accessible and equitably distributed across the community, and that there is a plan for maintaining these services during an emergency event. Having programs and services, such as accessible transportation, in place to service to those with disabilities will help ensure those resources can be called upon during disasters. Furthermore, large scale disasters will likely result in more people needing mental health or substance abuse support, as these traumatic events can cause long-term impacts in those that were affected.

Within STAR, programs and services for individuals experiencing mental health and substance abuse issues, homelessness, or abuse and neglect are measured through *EE-5: Human Services*. Meanwhile, *EAC-6: Aging in the Community* encourages active aging by optimizing opportunities for health, participation, and security in order to enhance quality of life as people age.

EE-4: Equitable Services & Access and *EE-3: Environmental Justice* are also important considerations for measuring *Access and Functional Needs*, as these objectives look across neighborhoods to see whether everyone has equal access to community goods and services and that no one neighborhood or area of the community is overburdened by pollution. These objectives ask local leaders to perform geospatial analysis of access to foundational community assets, as well as pollution issues in the community, to take a neighborhood-by-neighborhood approach to resiliency.

Priority STAR Objective: Human Services

While numerous objectives within STAR are important considerations of community access and functional needs, communities looking to prioritize key areas of effort should consider starting with *EE-5: Human Services*. Additional efforts could analyze proximity to environmental pollution (*EE-3: Environmental Justice*) and access to community assets (*EE-4: Equitable Services & Access*) that serve to help or hinder vulnerable community members during emergencies.

The intent of *EE-5: Human Services* is to ensure that essential human services are readily available for the most vulnerable community members. There are three outcomes and nine action measures in this objective, which all require data from local service providers.

Outcome 1—Homelessness Services:
> Demonstrate the homeless population within the community receives timely housing services or resources [Partial credit available]

Outcome 2—Mental Health & Substance Abuse Services:
> Option A: Demonstrate the timely provision of mental health and substance abuse treatment programs and services
> --OR--
> Option B: Demonstrate improvements in the timely provision of mental health and substance abuse treatment programs and services [Partial credit applies]

Outcome 3—Child and Adult/Elderly Abuse and Neglect Services:
> Demonstrate that all child and adult/elderly abuse and neglect complaints in the past 3 years have been investigated and redressed in a timely manner

Demonstrating achievement in human services is a challenge for most certified STAR communities; only approximately 5% have been able to demonstrate adequate services for individuals and families experiencing homelessness, mental health and substance abuse issues, or child/ adult/elderly abuse and neglect. This is likely due to difficulties in obtaining and tracking data for these services, which are often provided by a network of external service providers and partners across the broader community.

Certified communities have had more success advancing specific human services actions. 68% have developed public education campaigns to inform residents about available service programs, 49% work closely with non-governmental service providers, and 46% have an active advisory committee that provides consultation on the provision of priority human services. More innovative efforts, such as implementing information technology solutions to improve client support (33%) and equipping human services personnel with advanced skills and training needed to effectively improve the well-being of vulnerable populations (32%) have proven to be less widely adopted.

The low performance in these STAR evaluation measures indicates that many communities are far behind in understanding their vulnerable populations and that ensuring adequate services are in place for them, especially during disasters. In most communities, there is a need for centralized data on available services and providers, and for more standardized tracking and performance metrics.

## Case Study: Tacoma, WA - Building Resilience for Vulnerable Community Members

The Human Services Division for the City of Tacoma, WA guides service delivery through a five-year human services strategic plan. The plan's vision is "that all Tacoma residents have access to the opportunities and pathways that will lead them to well-being and prosperity." This vision is achieved through a robust and integrated system of culturally appropriate services that are equitable, easy to access and navigate, and available in locations where the needs exist.

The most recent strategic plan, covering 2015-2019, identifies four priorities:
• Preparing children and youth for success;
• Increasing employability, self-determination, and empowerment for adults;
• Meeting basic needs of Tacoma residents; and
• Enhancing mental health/substance use disorder services.

The City has taken a number of steps to address these priorities, including:
• Implementing a 0.1% increase in sales tax which must be used to address substance use disorders or mental health treatment;
• Conducting a Domestic Violence Needs and Gaps Assessment and Community Mental Health and Chemical Dependency Assessment to effectively plan for service needs;
• Implementing a Housing First model to provide housing quickly to those experiencing homelessness before providing other needed services; and
• Sponsoring a systems development initiative that connects homelessness, household stability, social wellness, and opportunity and achievement impact areas to develop common performance measures across similar programs.
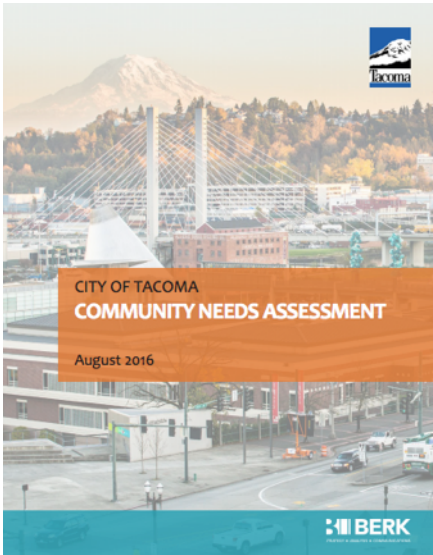
Proactively planning human services around this vision of equity, well-being, and prosperity for all Tacoma residents will help ensure everyone in the community has the foundation necessary to withstand and recover from disaster events. The systems development program should improve program tracking and link the success of various programs together, to provide a fuller picture of human services delivery and performance.

Community Planning

One of the primary ways that communities prepare for the future is through local community plans, and so it is important that communities begin to integrate the principles of resiliency and sustainability into their planning efforts. The *Community Planning* FEMA subcategory works hand-in-hand with the *Risk and Resilience Assessment* category to guarantee that resilience planning and decision-making includes all community members and all current and future hazards.

The *Risk and Resilience* category ensures that both current and future hazards are correctly identified and analyzed, and then included in resilience planning. It is not enough to rely solely on science and projections for resilience planning; rather it is crucial to engage all sectors of the community to provide input at multiple stages of assessment and plan development.

The identification of community-wide hazards and associated decisions on strategies or solutions must take everyone into account to make sure that the solutions are culturally appropriate and benefit all residents, especially those most vulnerable. Inclusive community engagement during planning should result in a more robust post-recovery plan so that after disaster strikes, all neighborhoods are able to build back stronger, smarter, and more resilient.

Communities with a strong culture of inclusive public engagement tend to have higher levels of trust and social capital. Within STAR, community engagement is measured through the *EE-1: Civic Engagement* objective in the *Equity & Empowerment* goal area, while several of the metrics in *EAC-5: Social & Cultural Diversity* are also applicable. Other best practices related to planning can be found within the *Innovation & Process* section of the rating system. Communities can look at *IP-1: Best Practices & Processes*, which includes outcomes for comprehensive planning, public engagement techniques, and innovative codes and ordinances.

STAR Communities suggests starting with *EE-1: Civic Engagement*, which aims to facilitate inclusive civic engagement through the empowerment of all community members to participate in local decision-making. Inclusive empowerment and engagement of all community members through electoral action and political voice is crucial to process equity, which guarantees that all community members have the opportunity to participate in local decision making processes. This is key to any *Community Planning* effort.

Above: Community members in West Palm Beach, FL at a STAR sustainable action planning workshop.

Priority STAR Objective: Civic Engagement

EE-1: Civic Engagement aims to facilitate inclusive civic engagement through the empowerment of all community members to participate in local decision-making. The objective has three outcomes and ten action measures. The outcomes rely on local data provided by the local board of elections, city clerk office, and the results of a community-wide survey.

Outcome 1—Voter Turnout Rate:

> Part 1: Demonstrate at least a 65% voter turnout rate in local elections during presidential election years or at least 50% during non-presidential election years
> --AND--
> Part 2: Option A: Demonstrate at least a 65% voter turnout rate by the community's 3 lowest performing wards or districts in the most recent local election during presidential election years or at least 50% during non-presidential election years
> --OR--
> Part 2, Option B: Increase the voter turnout rates for the community's 3 lowest performing wards or districts in local elections over time [Partial credit available]

Outcome 2—Sense of Empowerment:

> Option A: Demonstrate that 51% or more of residents believe they are able to have a positive impact on their community based on a local survey
> --OR--
> Option B: Increase over time the percentage of residents who believe they are able to have a positive impact on their community based on local surveys [Partial credit applies]

Outcome 3—Diverse Community Representation:

> Option A: Demonstrate that appointments to local advisory boards and commissions reflect the gender, racial, and ethnic diversity of the community
> --OR--
> Option B: Demonstrate incremental progress in appointing local advisory boards and commission members that reflect the gender, racial, and ethnic diversity of the community [Partial credit applies]

Only 20% of communities certified under STAR Version 1 were able to demonstrate increasing voter turnout rates over time, and 10% of communities have demonstrated a majority of their residents feel they are able to have a positive impact on their community through a local survey. The limited success in these outcomes indicates a lack of data in some cases, but also that room exists to expand civic engagement opportunities, especially for underrepresented groups.

A majority (58%) of certified communities conduct education campaigns about the electoral process or voter registration and 65% have regular, ongoing opportunities for residents to meet with elected officials or senior government staff in open information settings. Fewer communities provide training on effective public engagement guidelines or techniques (37%), have an adopted policy to encourage diversity in local government appointments to advisory boards and commissions (19%), or have adopted, inclusive public engagement guidelines for local government agencies and department (27%). These results indicate many communities have basic civic engagement operations in place, but need improvements in intentionally implementing inclusive public engagement for all community members.

Case Study: Dubuque, IA - Establishing Inclusive Community Engagement

Resilience planning must be inclusive so that mitigation and adaptation strategies are culturally appropriate, applicable to all community members, and have broad community buy-in. The City of Dubuque, IA guides inclusive civic engagement through its community engagement toolkit, which provides a framework for the City's community engagement practices based on current best practices of other cities, practitioners, and researchers in the field. The toolkit includes:

- Guiding principles for community engagement;
- A process flowchart that can be used to identify engagement needs (*image below*);
- Phase 1 toolkit: Pre-Planning;
- Phase II toolkit: Planning and Implementation;
- Example questions; and
- Appendices that cover impact evaluation, key discoveries, SMART Goals, and community engagement techniques by type.
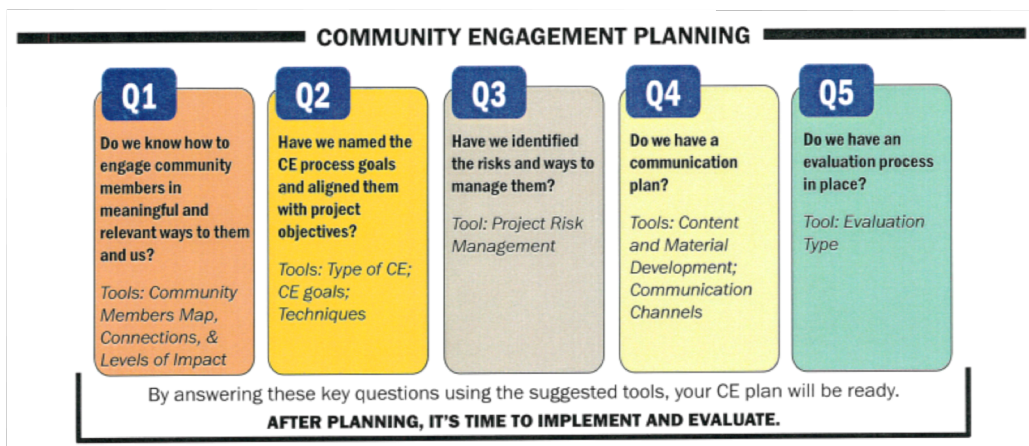
The City's *Racial Equity Toolkit* further supports civic engagement by offering guidance on how to intentionally include communities of color in outreach efforts and program planning. Racial equity tools are designed to help decision makers think through the ways in which racial equity might be advanced or hindered by particular policies, practices, programs, and budgets. The thought process and actions encouraged by the tool can help develop strategies and actions that reduce racial inequities and improve success for all groups.

When racial equity is not explicitly brought into operations and decision-making, racial inequities are likely to be perpetuated. To avoid this, Dubuque's toolkit asks: "How have communities been engaged?", "Are there opportunities to expand engagement?", and "What are the strategies for advancing racial equity?" to ensure engagement is representative and far-reaching.

Finally, the City further promotes diversity in civic engagement through a Diversity and Inclusion Resolution for appointments to boards and commissions. The resolution serves as a declaration of official intent to seek out and appoint individuals with the professional expertise, personal experience, multilingual abilities, and cultural backgrounds that can expand the board or commission's collective cultural awareness and support the board or commission in responding to the needs of the various communities represented in Dubuque.

Infrastructure Systems Resilience

The third FEMA category, *Infrastructure Systems Resilience*, addresses the condition of underlying infrastructure systems that impact resilience, such as water, energy, communications, and transportation systems. In the United States, many of these systems have not been adequately maintained to be resilient to current hazards, and are ill equipped to handle future hazards associated with climate change and increasing population growth.

High quality, well-maintained infrastructure systems are more able to withstand and absorb shocks and also provide services to mitigate the hazard's impact to other community systems. While the upfront cost of upgrading and maintaining these systems can be high, it is far cheaper than replacing entire systems and/or rebuilding when a system fails and causes additional issues, as was the case in New Orleans when the levee system failed during Hurricane Katrina in 2005, resulting in devastating flooding.

Within STAR, *BE-5: Infill & Redevelopment* directly measures the condition of the community's built infrastructure, while *NS-1: Green Infrastructure* measures the amount and proximity of natural and green infrastructure systems. Communities looking to do a comprehensive analysis of infrastructure conditions should also consider *BE-2: Community Water Systems, BE-7: Transportation Choices, CE-3: Greening the Energy Supply, CE-4: Energy Efficiency, CE-5: Water Efficiency,* and *CE-6: Local Government GHG & Resource Footprint*.

Assessing the condition of these built resources provides an idea of where built systems may be acting as a stressor or resource in terms of resilience. For example, energy and transportation systems that struggle to serve the community effectively during stable times are especially vulnerable during emergencies like extreme heat or cold events. Alternatively, communities with strong water efficiency efforts in place will be less susceptible to droughts that put pressure on water supplies, and communities with strong water quality systems may be able to supply neighboring jurisdictions with clean water during contamination incidents.

Priority STAR Objective: Community Water Systems

Communities looking to measure infrastructure systems resilience should consider starting with the STAR objectives *NS-1: Green Infrastructure* and *BE-2: Community Water Systems*.

The intent of *BE-2: Community Water Systems* is to provide a clean and secure water supply for all local users through the management of potable water, wastewater, stormwater, and other piped infrastructure. This objective contains four outcome measures and eleven action measures. The outcomes are tied to water quality standards and monitoring requirements set by the U.S. Environmental Protection Agency (EPA).

Outcome 1—Drinking Water Quality:
>   Demonstrate that the community is not in violation of EPA's drinking water rules for chemical and microbial contaminants in water pipes and turbidity

Outcome 2—Water Footprint:
>   Option A: Demonstrate that the ratio of water withdrawals for human use to the total renewable water resources is less than 0.2
>   --OR--
>   Option B: Demonstrate that the ratio of water withdrawals for human use to the total renewable, stored, and allocated water resources is less than 0.2 [Partial credit applies]

Outcome 3—Safe Wastewater Management:
>   Demonstrate that all NPDES permit holders, including publicly owned treatment works (POTWs), are in compliance with Clean Water Act effluent and reporting guidelines

Outcome 4—Safe Stormwater Management:
>   Comply with all NPDES permit requirements for MS4s, construction activities, and regulated industrial activities

BE-2: Community Water Systems tends to be a high scoring objective for STAR-certified communities. 84% have been able to demonstrate compliance with EPA drinking water rules and 71% are complying with the NPDES permit requirements for stormwater management in Outcome 4. Fewer communities have been able to demonstrate that all NPDES permit holders, including publically owned treatment works and industrial dischargers, are in compliance with Clear Water Act effluent and reporting guidelines, with only 29% achieving credit in Outcome 3. 36% are able to adequately demonstrate a secure water supply or sustainable water footprint.

Over half of certified communities have achieved a majority of the action measures for community water systems, such as developing and providing conservation programs to residents and businesses (67%), managing and upgrading infrastructure to reduce leaks and eliminate contaminants (67%), and enacting policies to ensure authority to enact water conservation measures during periods of drought (73%). Communities have struggled to demonstrate they have programs in place to guarantee the provision of water to low-income residents (38%).

Communities should regularly conduct assessments of the water management and delivery systems, to identify any problem areas that would be exacerbated during emergencies or that could act as an ongoing stressor. For example, water scarcity may be an ongoing stressor that negatively impacts the community's resilience both before and after a shock or disaster.

Case Study: Cedar Rapids, IA - Ensuring Resilience to Future Flooding

In 2008, the City of Cedar Rapids experienced catastrophic flooding when the Cedar River crested to its highest level in recorded history, 31.12 feet. The floodwaters penetrated 10 square miles or 14% of the city (*image at left, from City of Cedar Rapids*). The flood dislocated more than 18,000 residents and damaged 310 City facilities. Since then, the City has taken substantial steps to improve the health and function of the whole watershed, to increase water system resilience and better handle future floods.

To support watershed health, the Middle Cedar Partnership Project is a significant collaborative effort between downstream water users like the City of Cedar Rapids and upstream farmers, landowners, and conservation entities like Soil and Water Conservation Districts. This project seeks to vastly expand the use of best management practices (BMPs) like cover cropping, wetland creation, and nutrient management to improve water quality and help mitigate future flooding. The project includes watershed plan development to evaluate and optimize BMP placement, technical and financial assistance to implement BMPs, outreach activities to 435 landowners and producers to increase adoption, and tracking/evaluation of results through water monitoring, adoption rates, and locations of BMPs.

Within the City of Cedar Rapids itself, numerous post-flood improvements have been made to drinking water and wastewater systems. The Cedar Rapids public water system includes four geographically separated well fields that supply raw water to two of the City's water treatment plants. Water plants are out of the floodway but rely solely on raw water wells that are within the floodway. 98% of the City's wells have been raised or otherwise flood protected to a level of 34 feet, beyond the 2008 crest of 31 feet. To protect raw water wells, the City raised vertical wells and supporting electrical equipment, e.g. transformers, control panels, and other devices needed for operating individual wells. Horizontal collector wells were made more resilient to flooding primarily by raising transformers and communications and control equipment.

Following the 2008 flood, over $55 million was invested in the sanitary sewer collection system to replace or rehabilitate over 43 miles of sanitary sewer. The work done will make the sanitary sewers more resilient to future flood events as older pipes were replaced or lined with a cured-in-place liner effectively eliminating joints, making them less susceptible to flood damage.

Finally, the 2008 flood totally inundated the City's Water Pollution Control (WPC) and wastewater treatment systems, rendering them completely out of commission for twelve days. During that time, raw sewage was released in low elevation areas throughout the City. Following the flood, critical WPC equipment has been moved, protected, or mitigated in other ways to prevent a similar disaster. For example, in 2014, a permanent floodwall and pump station was completed that will protect the entire WPC site to a level three feet above the 2008 flood mark.

Priority STAR Objective: Green Infrastructure

The purpose of *NS-1: Green Infrastructure* is to design and maintain a network of green infrastructure features that integrate with the built environment to conserve ecosystem functions and provide associated benefits to human populations. The objective contains two outcome measures and nine action measures.

Outcome 1—Green Stormwater Infrastructure

Option A: Demonstrate that 35% of the jurisdiction's land area has designated green stormwater infrastructure providing bioretention and infiltration services
--OR--
Option B: Demonstrate that no more than 65% of the jurisdiction's land area contains impervious surfaces

Outcome 2—Green Infrastructure Distribution

Demonstrate that 85% of the population lives within a 1/3-mile distance from green infrastructure features that provide localized cooling through tree canopy cover or vegetative surfaces

Green infrastructure serves numerous important functions that complement other forms of grey infrastructure, including localized cooling through tree canopy cover, green roofs, or green walls; water management through wetlands, stream buffers, and permeable surfaces; and recreation through parks and greenways. Compared to some of the previous objectives, more certified communities have successfully reported on these outcomes. 37% of certified STAR communities have demonstrated at least 35% of their land area is covered by vegetated surfaces acting as green infrastructure, while 54% have shown at least 85% of their population benefits from green infrastructure by living within a half mile of those features.

A majority of certified communities (62%) have taken steps to upgrade public spaces and buildings with green infrastructure or by creating demonstration projects, and 67% work with community groups to ensure green infrastructure is used in appropriate settings. 32% of communities have a green infrastructure monitoring program to track and promote ongoing maintenance, 30% have a substantial, dedicated funding source for green infrastructure, and 37% have incentive programs to encourage the adoption of green infrastructure practices.

While many communities have taken important first steps toward incorporating green infrastructure into their stormwater management or general resilience strategies, there is substantial room to more systematically integrate these practices into more operations and policies, in turn increasing infrastructure system resilience.

Case Study: Cambridge, MA - Mitigating Heat Islands and Flooding

Located in the Boston metro area, Cambridge is a dense urban city situated alongside the Charles and Mystic Rivers in a coastal floodplain region. Due to both the physical location of the community and the development that surrounds it, Cambridge is susceptible to both flooding and heat island impacts.

To mitigate these challenges, the City of Cambridge has adopted the use of green infrastructure. The City is developing an urban forestry management plan and has a tree protection ordinance to protect and preserve existing natural resources that provide green infrastructure benefits. The tree ordinance states that if significant trees are to be removed for a development, the developer must either plant replacement trees on the lot or pay for the cost of replacement trees and accompanying maintenance to the City, deposited into a dedicated tree replacement fund.

Photo: City of Cambridge.

Cambridge has developed protections for the wetlands and associated stormwater management infrastructure that constitute the City's most essential green infrastructure. Cambridge enforces the state's stringent wetlands law, and the City's Conservation Commission aims to prevent any disturbance to wetlands during the development process and entirely prevent filling. Any project that impacts a wetland must receive a permit from the Conservation Commission and has to supply a maintenance plan that accounts for all factors and is in force in perpetuity.

The City is not only preserving existing green infrastructure features, but is also actively building new ones. To maintain regional watershed health, the Alewife Wetland and ten bioswales and rain gardens treat runoff and stormwater before they enter the Little River in the Alewife Brook Watershed. The Alewife project includes weekly monitoring during the growing season. Additionally the City actively promotes the use of porous pavement to reduce runoff—over 24,000 square feet was recently installed to treat roadway runoff across three projects. The City distributes educational materials for residents detailing the benefits of porous pavements and biobasins for specific projects.

As a result of these and other strategies, 38% of Cambridge's land area is protected by green infrastructure features including tree canopy and open spaces, and 100% of residents are in close proximity to those features.

Ecosystem and Natural Resource Resilience

The final FEMA resilience category is *Ecosystem and Natural Resource Resilience.* This category has been of growing interest and importance to communities that are looking to bolster physical resilience to wildfires, storms, and other natural disasters. As these types of events increase in frequency, often due to a changing climate, it is becoming clear that the development of our communities and corresponding destruction of ecosystems has reduced the ability of the natural environment to respond to disasters.

The condition of local ecosystems strongly impacts a community's resilience to natural hazards and climate change. Many communities are undergoing restoration efforts to bolster the capacity and functioning of natural systems specifically to protect human health and physical infrastructure. For example, in coastal communities, efforts to increase the area of wetlands and shorelines can reduce flooding peak flows and storm surges by absorbing or impeding floodwaters. Further inland, protecting forests can reduce soil erosion and landslide potential by keeping soil in place, and maintaining wildlife habitat quality helps ensure strong ecosystems and the economies that rely upon them.

Within the STAR Community Rating System, *NS-2: Biodiversity & Invasive Species, NS-3: Natural Resource Protection, NS-5: Water in the Environment*, and *NS-6: Working Lands* all measure elements of natural resource protection. *BE-6: Public Parkland* also informs this resilience category, as public parks provide many of the same resilience benefits that other open spaces do.

Above: STAR Leadership Communities learn about beach restoration efforts during a training event in Broward County, FL.

Priority STAR Objective: Natural Resource Protection

For communities looking to measure *Ecosystem and Natural Resource Resilience*, STAR suggests starting with *NS-3: Natural Resource Protection*. Communities with substantial water resources could also consider addressing *NS-5: Water in the Environment*, while agricultural communities might consider *NS-6: Working Lands*.

The purpose of *NS-3: Natural Resource Protection* is to protect, enhance, and restore natural ecosystems and cultural landscapes to confer resilience and support clean water and air, food supply, and public safety. There are four outcomes, which require local or regional data, and eight action measures in this objective:

Outcome 1—Natural Resource Areas:
> Option A: Maintain natural resource acreage at 20 acres per 1,000 residents or greater
> --OR--
> Option B: Maintain natural resource acreage at 11.5% or more of jurisdictional land area

Outcome 2—Wetlands, Streams, and Shoreline Buffers:
> Achieve no-net-loss of wetlands, streams, and shoreline buffers

Outcome 3—Connectivity:
> Increase the amount of natural or restored areas directly connected to regional natural systems in order to improve ecosystem services

Outcome 4—Restoration:
> Option A: Reduce the difference between the actual acreage restored and targeted acreage established in the natural systems plan or land conservation plan
> --OR--
> Option B: Restore degraded natural resource areas at a ratio greater than 1% of developed land area in the jurisdiction

NS-3: Natural Resource Protection tends to be a low scoring objective for certified STAR communities—less than one third have shown achievement in the outcomes. Only 19% demonstrated achievement of Outcome 1 for maintaining adequate natural resource acreage or achieving targets for land conservation. Similarly, 24% demonstrated no-net-loss of wetlands, streams, and shoreline buffers; 30% increased the amount of natural areas directly connected to regional natural systems; and 22% are on track to achieve local restoration targets. The most commonly adopted strategies for promoting natural resource protection have been partnering to advance land conservation (76%), sponsoring ecological literacy and education activities (75%), and developing plans to protect and restore natural resources (68%).

Some of the challenges with reporting in this objective seem to have to do with jurisdictional control. Many of these strategies are done at a state or regional level, depending on the scope of the natural resource being tracked. It is important for communities to partner with other jurisdictions and be sure that accurate assessments of priority systems are being conducted. Degraded natural resources can have a strong negative impact on the ability of a community to deal with hazards and disasters, so it is vital that a comprehensive resilience strategy include robust strategies like those found in STAR to acquire, protect, and restore natural systems.

Case Study: Fort Collins, CO - Acquiring Natural Areas for Conservation

The City of Fort Collins, CO is situated in Northern Colorado. Surrounded by mountains, lakes, and rivers, residents of Fort Collins enjoy being outdoors and value the recreational opportunities provided by the region's abundant natural resources. To maintain these resources indefinitely in the future, the City has seen significant success in protecting land through fee-simple acquisitions, donations, and conservation easements in strategic priority areas in and around the community.

Although funding for conservation efforts comes from a variety of sources including grants, donations, and park fees, a majority of funding in Fort Collins actually comes from citizen-initiated sales tax ballot measures. For example, in 2003 local residents voted for *Open Space, Yes!*, a 1/4 cent sales tax increase that provides for land conservation in local areas, community separators, and regional areas. 80% of the *Open Space, Yes!* revenue must be spent on land conservation and restoration, while the remaining 20% can be spent on management, education, enforcement, public improvements, maintenance, and operations.

The City's Natural Areas Department (NAD) actively manages 35,000 acres of important natural areas. NAD's primary mission is to restore, maintain, and monitor conserved natural lands. Once a property has been acquired by NAD, restoration opportunities are assessed and the property is placed into a queue for restoration. The property is typically restored to a native condition, especially if it was previously impacted by development, and restoration success is monitored on an on-ongoing basis and tracked in GIS.
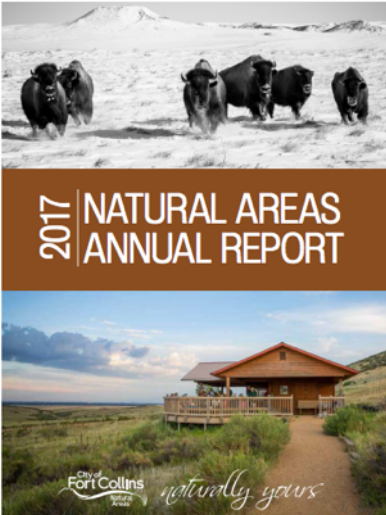
As a result of strong local funding mechanisms and substantial community support, the City has acquired nearly 40,000 acres for public use and conserved nearly 6,000 in conservation easements. Every year, the City releases a Natural Areas Annual Report reviewing local conditions and detailing progress towards goals and targets. In 2017 alone, the City acquired twelve parcels constituting 1,165 acres. Other notable efforts from 2017 included the restoration of 2,498 acres—from natural area stream banks being returned to previous conditions to non-native plants being replaced with native trees, shrubs, and grasses.