

# ONE

## OPPORTUNITY

Green infrastructure can be a community amenity and perform key ecological services. Buffalo's neighborhoods could be transformed by connecting people to their environment with urban installations of green infrastructure. This chapter presents Buffalo's stormwater and green infrastructure goals, places these goals in the planning and regional context and details the opportunities for green infrastructure in six of Buffalo's most critical CSO Basins.

### **12 Stormwater Goals**

### **18 City & Regional Context**

### **36 Priority CSO Basins**

- 42** CSO Basin 14
- 62** CSO Basin 26
- 82** CSO Basin 27
- 102** CSO Basin 28
- 122** CSO Basin 33
- 142** CSO Basin 53









## STORMWATER GOALS

# Building a Green Future

Buffalo, like many older cities, has a combined sewer system. As city neighborhoods were built, the combined sewer system was engineered to carry sewage and stormwater away as quickly as possible.

The system functions similarly today. Both stormwater—rainfall and snow melt—and sanitary sewage flow into the same pipe. In dry weather all sewage is conveyed to the wastewater treatment plant and treated before being released to the Niagara River. In wet weather, however, a combination of stormwater and sewage enter the sewer and the wastewater treatment plant cannot always handle all the wastewater. As a result, untreated wastewater can overflow into our creeks, rivers, and lakes, resulting in a combined sewer overflow (CSO). By diverting stormwater from the sewers, capturing it and retaining it on site, green infrastructure reduces the amount of stormwater entering the sewers and reduces the number of CSO events, protecting public health and the environment.

## Anticipating Climate Change

According to researchers at the nonprofit Climate Central, Buffalo's summers could resemble the summer weather in southern Florida by 2100. While warmer weather might not sound bad in the winter, it will threaten native habitat and cause strain on Buffalo's buildings and infrastructure. Green infrastructure projects help build a more resilient and sustainable city and Buffalo Sewer is a key partner in addressing climate change in the region. Green infrastructure mitigates climate change impacts by decreasing the urban heat island effect, preserving water resources, and mitigating extreme precipitation events. Green infrastructure helps preserve ecological communities and allows for greater adaptation to a wide range of conditions. Green infrastructure is an effective strategy and tool for sustainability planning and action.

## Buffalo's Nested Stormwater Strategies

### PREVENT



water from entering the system with green infrastructure



### MANAGE



water more effectively in the existing system with smart controls

### IMPROVE



the existing gray system for resiliency & large events

## Buffalo Stormwater Planning

Buffalo's stormwater planning has evolved from 2004 to the present. Buffalo, like other cities with combined sewer systems, has had to demonstrate to state and federal authorities that they have a plan to comply with the federal Clean Water Act requirements for safe, healthy water. Like other cities with combined sewer systems, Buffalo has prepared a Long-Term Control Plan (LTCP) (2014) that details the specific steps Buffalo Sewer will take to ensure compliance with the Clean Water Act.

Buffalo's LTCP was developed in consultation with community stakeholders. It contains plans for improving gray infrastructure, maximizing the use of existing sewer infrastructure with "smart" solutions that use real time control sensors, and the Rain Check program to maximize green infrastructure to reduce the amount of stormwater entering the sewer system. For more detail on the LTCP goals, refer to **Chapter Two**.

## The Rain Check Programs

Launched in 2015, Rain Check is Buffalo's program to protect and restore the health of Buffalo's waterways by addressing the stormwater challenge. Rain Check 1.0 described the first generation of green infrastructure in Buffalo. Rain Check 1.0 focused on tackling the parts of the built environment that create the most runoff from stormwater—streets, parking lots, and roofs. Projects included: **green streets** with planted areas to collect and infiltrate stormwater and improve pedestrian safety; **green parking lots** that collect and absorb stormwater; **demolitions and vacant lot restorations** that created neighborhood green spaces to absorb stormwater; and **rain barrels and downspout disconnections** that enable homeowners to keep stormwater out of the system.

Rain Check 2.0 outlines strategies to deliver the next generation of green infrastructure projects to reduce runoff to meet the LTCP goals. Since a significant percentage of Buffalo's impervious surfaces are on private property, Rain Check 2.0 proposes three areas of focus: **new developments must meet strict stormwater requirements, new investments in the public sector should consider green infrastructure, and targeted properties should be encouraged to add green infrastructure.**

Lastly, Rain Check 2.0 will apply a lens of equity considerations to both the Rain Check 1.0 and 2.0 work. Buffalo Sewer is building upon regional equity initiatives to best understand how green infrastructure strategies can be equitably implemented and benefit communities and those involved in their construction and maintenance.

## Establishing a Green Culture

It takes more than well-engineered systems to meet Buffalo's stormwater challenges. Organizations and individuals across the City need to have a shared commitment to implement change, resulting in shared benefits for all. Buffalo Sewer is committed to building a culture that supports green investment and builds new knowledge across the City.

Buffalo Sewer is adapting its internal processes to identify, evaluate, and adopt effective, economical, and equitable green infrastructure solutions. This involves ongoing discussions of how to best deliver projects and serve the needs of Buffalo Sewer's customers.

Buffalo Sewer is committed to working with partners and community stakeholders to find shared benefits and to making decisions and implementing projects that promote benefits in marginalized communities. Buffalo Sewer is prioritizing engagement, establishing relationships, and building trust with communities, especially those that have been historically underserved.

GOAL  
**569**

impervious  
acres  
managed

CSO53 298ac

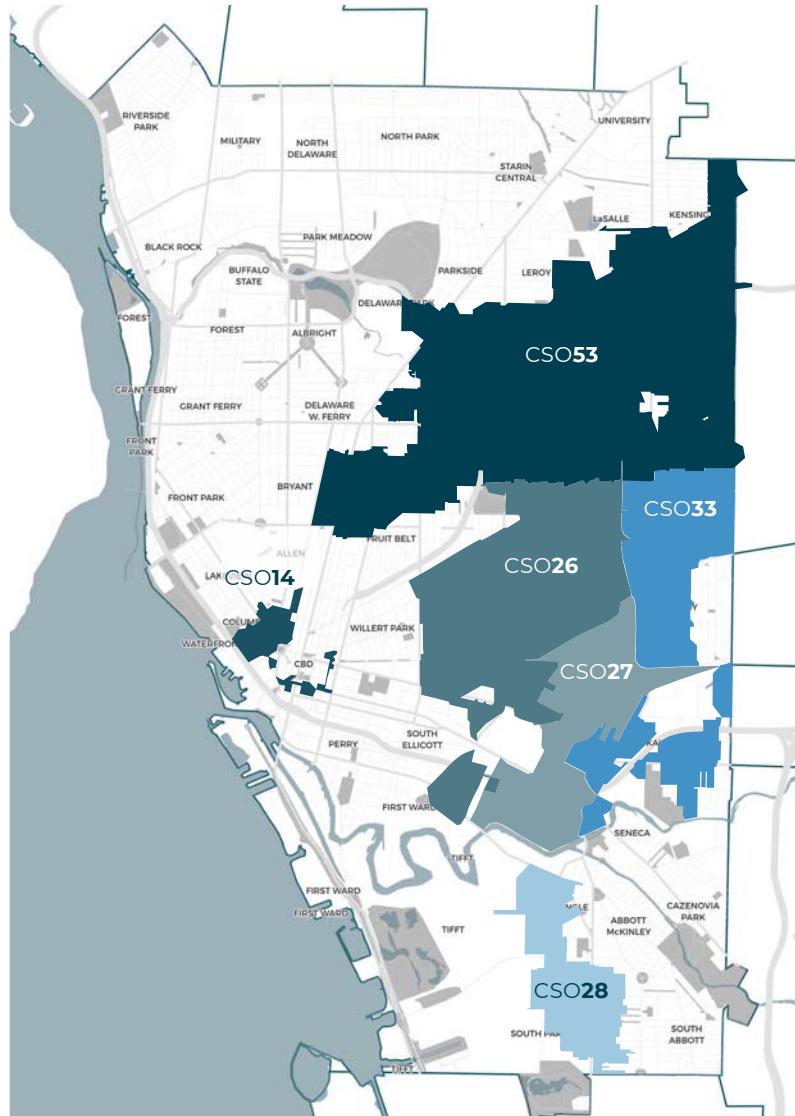
CSO33 94ac

CSO28 27ac

CSO27 73ac

CSO26 64ac

CSO14 13ac



**2006**

Buffalo Sewer tours green infrastructure in Toronto.

**2010**

Buffalo Sewer launches downspout disconnection pilot project.

**2011**

Buffalo Sewer supports a green infrastructure feasibility study. The study calls for a mix of gray and green infrastructure solutions and the creation of a citywide green infrastructure program.

**2013**

Buffalo Sewer prepares a **Green Infrastructure Master Plan** to accompany the Long Term Control Plan (LTCP).

The Long-Term Control Plan's goals are to dramatically reduce the number of CSO events and reduce the volume of CSO flows to local waterways.

By 2034, only 12 of the 52 permitted CSO discharge points are expected to activate. Forty discharge points will remain in place but not activate during a typical year.

By 2034, 11 of the permitted CSO discharge points will activate six or fewer times per typical year. Only CSO 55 will activate more often but water quality modeling shows that those activations do not prevent the attainment of Niagara River water quality objectives.

The volume of CSO flow to local waterways will be reduced by 73% and over 97% of all sanitary and stormwater flow will be captured and treated at the wastewater treatment facility.

The goal was set as a percentage of impervious area in the priority CSO basins where the number of CSOs exceeds what is permitted by the LTCP .

GOAL

**569**

impervious  
acres managed  
by green  
infrastructure

2014

Buffalo Sewer finalizes the LTCP and includes **first generation green infrastructure projects** with focus on green streets, green demolitions and vacant lots.

2015

**Rain Check is launched.** Buffalo Sewer partners with Community Foundation for Greater Buffalo to secure a national Partners for Places grant.

2016

Buffalo Common Council adopts Buffalo Green Code, an updated city zoning ordinance that includes on-site stormwater management requirements for all new development.

2018



Buffalo Sewer publishes Rain Check 1.0 Report. Together with the City, they partner with the Ralph C. Wilson, Jr. Foundation to explore opportunities with the private sector and start the next generation of green infrastructure in Buffalo.

2019



Buffalo Sewer publishes Rain Check 2.0 Report and begins work on the next phase of green infrastructure in Buffalo.

## STORMWATER GOALS

# Buffalo's Six Priority CSO Basins

Buffalo Sewer focused on 6 priority CSO basins that span neighborhoods across Buffalo's East Side, as well as areas in downtown Buffalo and South Buffalo. These basins encompass a quarter of the City's land area and almost half of its population. The 6 priority CSO basins were chosen to have the greatest impact on water quality and public health in Buffalo, to improve basins with high numbers of CSO events, to leverage other investments, and to decrease impervious cover where its percentage is highest. For each of these basins, Buffalo Sewer conducted an equity analysis, environmental analysis, and site analysis as discussed in the next sections.

**ERIE** **CSO Basin 14** is in the central business district and close to waterfront access. Green infrastructure in this CSO basin can build on recent and future private development in this area to help reduce storm runoff.

**CSO Basin 26** is the site of many environmental improvement projects. Buffalo Sewer contributes to these projects as an important part of demonstrating environmental leadership.

**CSO Basin 27** is anticipated to undergo significant investment in the near future in the East Side commercial corridors and revitalization. Buffalo Sewer wants to ensure that green infrastructure is part of these developments. This CSO basin has a very high percentage of impervious area, making work on green infrastructure here a priority.

**CSO Basin 28** has the highest number of annual CSO events. This CSO basin also has a very high percentage of impervious area. Very little green infrastructure work has occurred in this CSO basin to date.

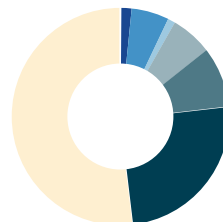
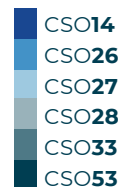
**CSO Basin 33** is also anticipated to receive significant investment in the near future as part of the East Side commercial corridors and revitalization. This CSO basin also has a very high percentage of impervious area.

**SCAJAQUADA** **CSO Basin 53**, where approximately one quarter of Buffalo lives, contributes to Scajaquada Creek. Recently, Scajaquada Creek has been dredged for contaminated sediment and habitat has been restored. CSO Basin 53 has a high number of annual CSO events and work in this basin can complement real time control projects that are part of Buffalo's Smart Sewer System and can augment anticipated future water quality projects by other organizations. Similar to other basins, there is anticipated investment in East Side commercial corridors and revitalization.

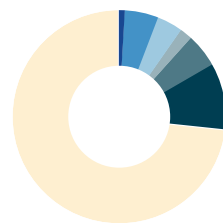
**ERIE BASIN** The **Erie Basin** is a popular recreation area and is part of Buffalo's iconic waterfront. CSO Basin 14 flows to the Erie Basin.

**BUFFALO RIVER** The **Buffalo River** is part of the industrial heart of Buffalo and is increasingly a focus of tourism and recreation. Buffalo Sewer's work in the 4 priority CSO basins contributing directly to the Buffalo River (CSO Basins 26, 27, 28, and 33) builds on work done by other agencies to improve water and habitat quality in the Buffalo River, including dredging of contaminated sediment and habitat restoration.

**SCAJAQUADA CREEK** **Scajaquada Creek** runs both above and below grade and receives surface runoff as well as CSO drainage. CSO Basin 53 flows to Scajaquada Creek.



**48%**  
of Buffalo's  
population  
lives in the six  
priority basins



**26%**  
of Buffalo's  
land area is  
within the six  
priority basins



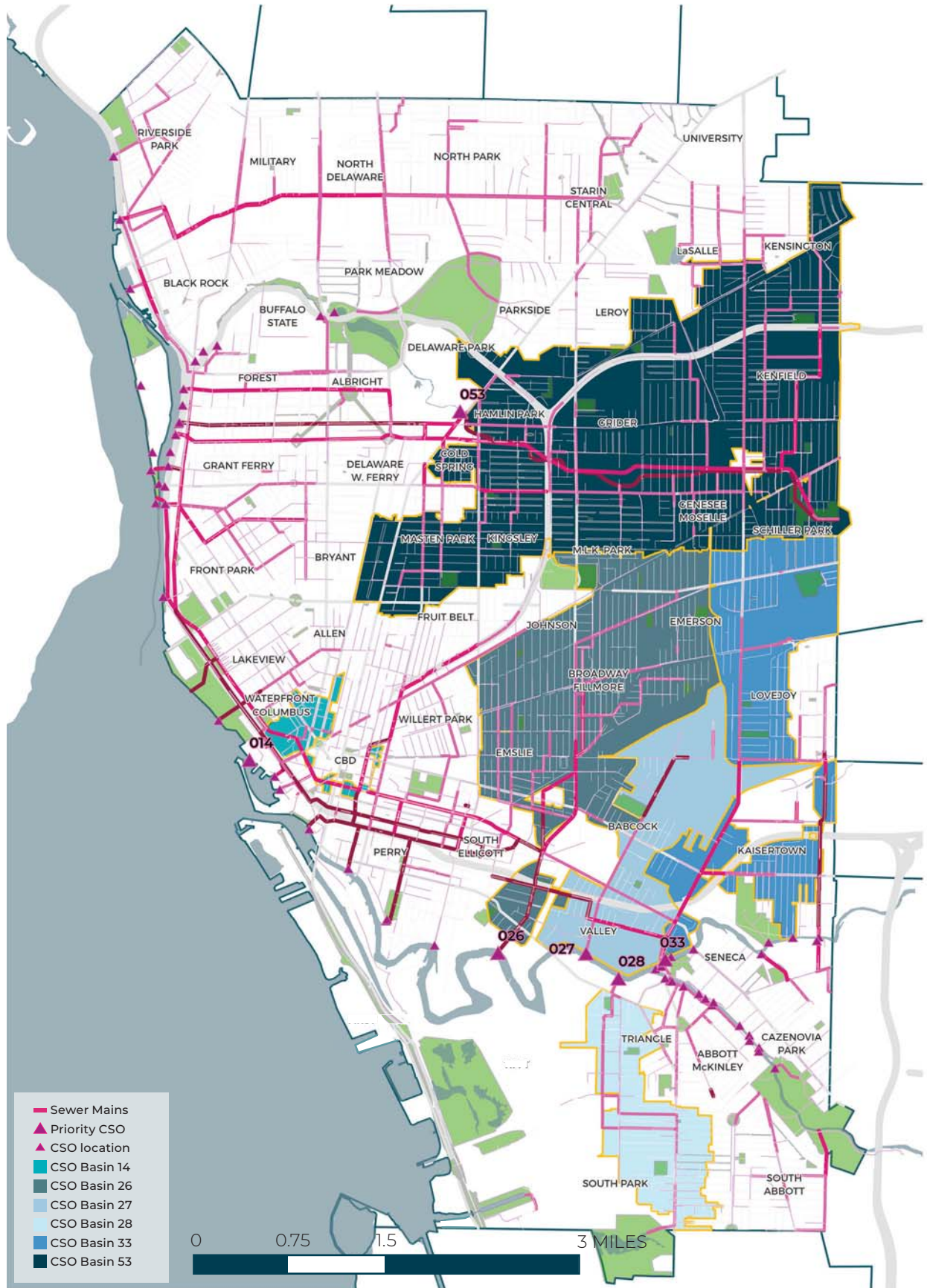


Figure 1.1: Map of Buffalo Sewer Network and Priority CSO Basins.



## Green Infrastructure & Existing Initiatives

There are many signs of a more sustainable, prosperous future across Buffalo, driven by strategic planning, collaborative partnerships, and community engagement. Buffalo Sewer will help advance shared goals by working collaboratively with other agencies and aligning with existing planning efforts.

### Revitalizing Buffalo's Waterfront

For years, many plans have focused on Buffalo's waterfront. These efforts strive to revitalize former industrial areas and waterfront neighborhoods, restore natural environments, and enhance waterfront access. Major efforts include the City's new development ordinance, the **Buffalo Green Code**, and the **Local Waterfront Revitalization Program (LWRP)**. The Green Code integrates shoreline protection and green infrastructure into standards for commercial waterfront zones that intersect sewer basins targeted by Rain Check 2.0 along the Buffalo River.

The LWRP calls for enhancing access to waterways and improving water quality through green infrastructure. Other initiatives, like the **Ralph C. Wilson Jr. Foundation's plan to transform LaSalle Park** which lies adjacent to the downtown area targeted by Rain Check 2.0, are more geographically specific but also call for substantial improvements and better connections to key waterfront assets. Efforts to revitalize Buffalo's waterfront, whether through commercial development or natural restoration, offer high-profile opportunities to incorporate green infrastructure on both public and private lands.

### Reinvesting in Commercial Corridors

Efforts are being made to revitalize neighborhood commercial areas across Buffalo. This is evident in City plans like the **Buffalo Green Code**, which prioritizes improving the visual character of commercial areas through form-based zoning codes to promote redevelopment. Commercial revitalization is also an economic development priority for New York State. Through the **Better Buffalo Fund** and the **East Side Corridor Economic Development Fund**, Empire State Development is partnering with the City of Buffalo to fund development and infrastructure projects along key corridors and neighborhood commercial districts. This includes a focus on Fillmore, Jefferson, Michigan, and Bailey—all of which overlap Rain Check 2.0's target areas. In downtown, public infrastructure investments are being guided by the **Public Realm Framework for Downtown Buffalo**, which promotes investment in strategic parts of downtown that also overlap Rain Check 2.0 priority areas. As these plans stimulate investment, they can create opportunities to add green infrastructure in commercial areas that tend to lack green space and are highly visible to residents.

### Waterfront Initiatives

- Remedial Action Plan Stage 2 Addendum: Niagara River Area of Concern (2012)
- Niagara River Habitat Conservation Strategy (2014)
- Buffalo Green Code: Land Use Plan and Unified Development Ordinance (2016)
- Buffalo River Corridor: Brownfield Opportunity Area (2017)
- Imagine LaSalle: A Community Vision for Buffalo's LaSalle Park (2018)

### Commercial Corridor Initiatives

- Michigan Street African American Heritage Corridor Draft Management Plan (2012)
- Buffalo Green Code: Land Use Plan and Unified Development Ordinance (2016)
- Buffalo River Corridor: Brownfield Opportunity Area (2017)
- Tonawanda Street Corridor: Brownfield Opportunity Area (2017)
- The Buffalo Billion II East Side Corridor Economic Development Fund (2018)

**Existing initiatives focus on six strategic areas:**

- Revitalizing Buffalo's Waterfront**
- Reinvesting in Commercial Corridors**
- Enhancing the Transportation Network**
- Promoting Environmental Sustainability**
- Strengthening City Neighborhoods**
- Boosting the Regional Economy**

Many recent plans and initiatives share common strategies with Buffalo Sewer's Rain Check program. Buffalo Sewer's investments can reinforce other plans and uplift community visions for parts of the City where relatively few plans are in place.



Figure 1.2: City of Buffalo, Buffalo Sewer and partners meet for press event during CSO Basin 60 green infrastructure pilot project.



Figure 1.3: Aligned corridor investment can support green infrastructure.



## Enhancing the Transportation Network

Across the City and region, plans are underway to enhance Buffalo's transportation network by promoting alternative transportation modes. These plans call for multi-modal facilities, like bike lanes, recreational trails, and complete streets, all of which can involve green infrastructure. The **Buffalo Bicycle Master Plan** proposes specific streets for bicycle routes—such as Jefferson Avenue and Utica Street. Meanwhile, in outlining general strategies to promote multiple modes of transportation in the region, **Moving Forward 2050** envisions ways to incorporate green infrastructure on local roadways.

The **Comprehensive Transit-Oriented Development Plan for Niagara Frontier Transportation Authority** recommends green space around the City's transit stations, several of which fall within Rain Check 2.0 target investment areas, including Utica and Summer/Best. Similarly, the **Public Realm Framework for Downtown Buffalo** calls for green waterfront connections and Complete Green Streets in CSO Basin 14, including projects on Main Street, Delaware Avenue, and Erie Street. These efforts, as well as other transportation projects, provide opportunities to add green infrastructure in public rights-of-way, and potentially on private development projects spurred by public investments.

## Promoting Environmental Sustainability

Making the City and region sustainable through smart growth and environmental preservation is the objective of several recent plans. This includes regional plans, like **One Region Forward**, that share similar goals with Rain Check 2.0, namely improving water quality, preserving natural spaces, and increasing public access to waterways. Regional plans offer Buffalo Sewer an opportunity to make progress on these broader goals while helping to promote similar work across the region through collaborative networks.

Plans specific to the City of Buffalo also point to the need to add green infrastructure to improve local water quality. This includes the **Green Code**, which requires on-site stormwater management for any new development project in the City greater than 1/4 acre. The Green Code also sets vegetative buffer requirements for shoreline properties in the commercial waterfront overlay district that overlaps investment areas targeted by Rain Check 2.0 along the Buffalo River. **Plans for public parks, including for Buffalo's Olmsted Park system**, which is currently being updated, also open opportunities for enhanced green space for stormwater management in and around many public lands.

### Transportation Initiatives

- Queen City Waterfront: Buffalo Waterfront Corridor Initiative: A Strategic Plan for Transportation Improvements (2007)
- Downtown Buffalo Infrastructure and Public Realm Framework (2015)
- Buffalo Bicycle Master Plan (2016)
- Niagara Street Now: A Community Vision to Guide the Streetscape Transformation (2016)
- Moving Forward 2050: A Regional Transportation Plan for Buffalo Niagara (2018)

### Sustainability Initiatives

- The Olmsted City: The Buffalo Olmsted Park System: Plan for the 21st Century (2007)
- Western New York Regional Sustainability Plan (2013)
- Niagara River Habitat Conservation Strategy (2014)
- One Region Forward: A New Way to Plan for Buffalo Niagara (2015)
- Buffalo River Corridor: Brownfield Opportunity Area (2017)

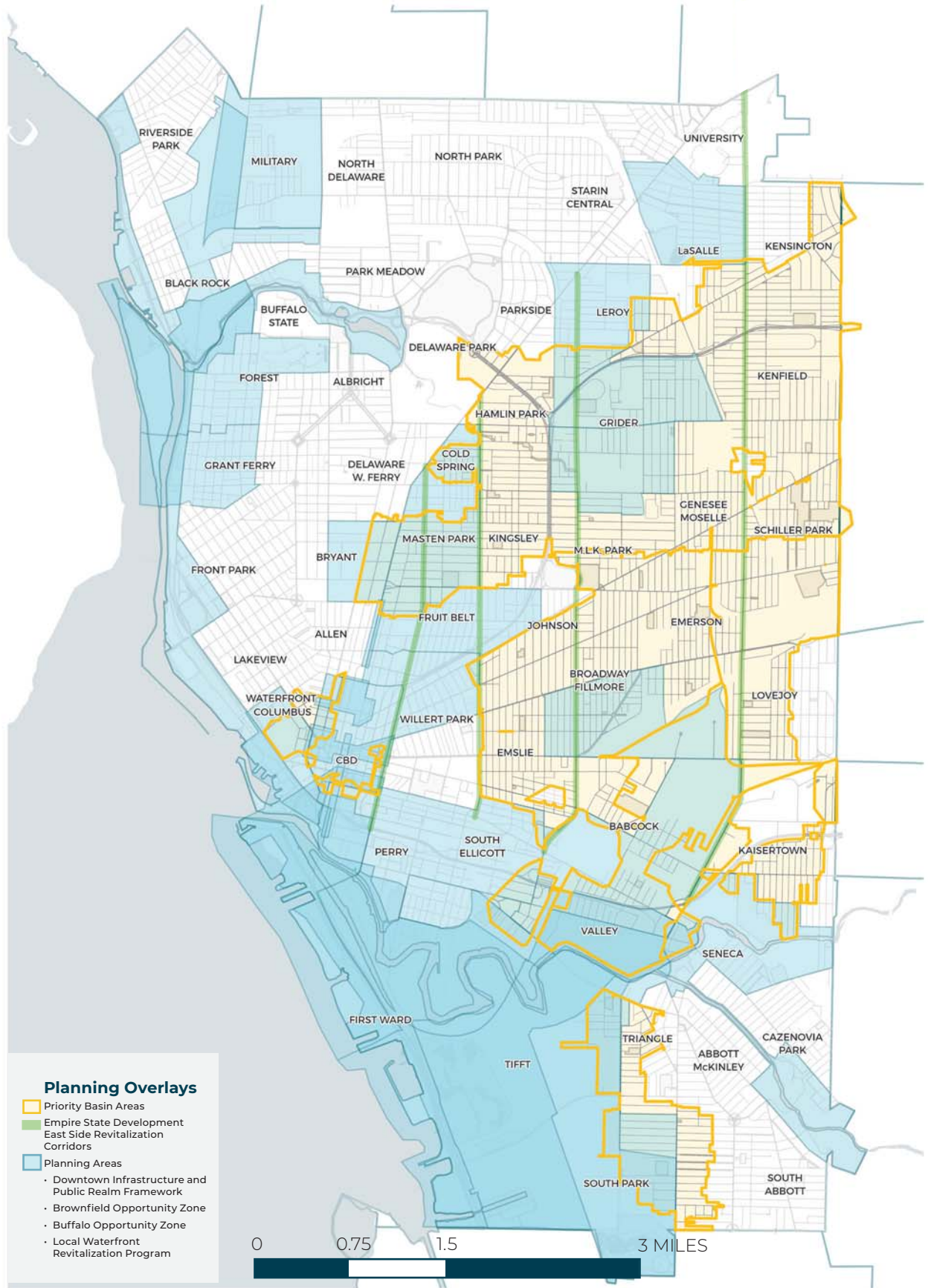


Figure 1.4: Map of Buffalo Planning Areas and Priority CSO Basins. The darker color indicates overlapping plans. More detailed planning maps for each priority basin can be found in each basin section.



## Strengthening City Neighborhoods

Many plans aim to revitalize communities throughout Buffalo. These include city-wide plans, like the **Queen City Comprehensive Plan**, as well as neighborhood plans by community groups. Key examples include the **Michigan Street African American Heritage Corridor plan**, which stresses the need for green space on public and private land in its vision. Additionally, a **master plan for the Bailey-Green neighborhood** within CSO Basin 53, proposes a greenway to enhance the pedestrian experience and create community gathering spaces. Empire State Development's **East Side Corridor Economic Development Fund** is aimed at revitalizing neighborhood commercial areas within Buffalo Sewer's targeted basins.

A regional plan—**Complete Communities for a Changing Region**—highlights possibilities for using green infrastructure on vacant land to improve aesthetics and add recreational assets in distressed neighborhoods. Federal initiatives, like the recently designated Opportunity Zones, could support these local plans through tax incentives aimed to spur investment in low income communities around Rain Check's sewer basins. The City's sharpening focus on equity in community development is also clear in local plans. The **Greater Buffalo Racial Equity Roundtable** calls for analyses of racial equity impacts in decision-making, while the **City's Opportunity Pledge** urges community members to commit to a culture of inclusion and equality. All these initiatives can guide Rain Check green infrastructure investments so that they support community visions and advance equity in city neighborhoods.

## Boosting the Regional Economy

The **WNY Regional Economic Development Council** and its **Buffalo Billion** initiative is supporting capital investments in strategic areas that can involve green infrastructure. The recently constructed **Northland Workforce Training Center** and **Tesla's Gigafactory 2**, both signature investments of the Buffalo Billion, integrate green infrastructure. Brownfield Opportunity Areas (BOAs), another NYS initiative, promote economic growth in former industrial areas. The **South Buffalo, Buffalo Harbor, and Buffalo River BOAs** overlap with Rain Check 2.0 investment areas. Along with promoting strategic investments, these initiatives promote water quality, waterfront access, community revitalization, and infrastructure enhancements.

Economic development plans include strategies to develop the local workforce that could help promote, install and maintain green infrastructure. Community organizations, such as **PUSH Buffalo**, are also involved in training efforts for the local green workforce. As the regional economy evolves, opportunities for green infrastructure will grow, along with the ability of the workforce to install and maintain these investments.

## Neighborhood Initiatives

- Queen City Hub: A Strategic Regional Action Plan for Downtown Buffalo (2007)
- Michigan Street African American Heritage Corridor Draft Management Plan (2012)
- PUSH Buffalo-BNSC: Building for the Future: Community Development Plan for the Massachusetts Avenue Corridor Green Development Zone (2012)
- The Racial Equity Dividend: Buffalo's Great Opportunity (2016)
- The Buffalo Billion II East Side Corridor Economic Development Fund (2018)

## Regional Economy Initiatives

- Queen City for the 21st Century: Buffalo's Comprehensive Plan (2006)
- WNY Regional Economic Development Strategic Plan: A Strategy for Prosperity in WNY (2011)
- Erie County Industrial Development Agency Comprehensive Economic Development Strategy (2017)
- Buffalo Billion: Buffalo Niagara's Strategic Plan for Prosperity (2017)
- WNY Regional Economic Development Council, A Strategy for Prosperity Progress Report (2018)



Figure 1.5: Enhancing the transportation network. Buffalo Niagara Medical Campus Streetscape, Design and Photo from SCAPE Studio.

Figure 1.6: Image of Buffalo's waterfront from The Racial Equity Dividend.

Figure 1.7 Niagara Street Corridor.



## Equity Considerations

Beneath the headlines around waterfront revitalization and startup hubs in Buffalo lies the reality of inequities by race, ethnicity, and neighborhood in the City and region. Progress is happening on multiple fronts and Rain Check is part of the solution to creating a more equitable city.

### Toward a More Equitable Future for Buffalo

Buffalo Sewer's green infrastructure initiative supports ongoing efforts to build greater equity in the region. Thousands of individuals, organizations, and businesses have signed the City of Buffalo's **Opportunity Pledge** to help build a culture of equity and inclusion across the City. The Greater Buffalo Racial Equity Roundtable, comprised of more than 30 community leaders from major public, non-profit, private, and faith institutions, has been meeting to develop innovative approaches to racial equity work that is data-driven, identifies and promotes promising practices, and promotes racial equity impact analysis. Furthermore, a range of stakeholders across Buffalo is developing more equitable and inclusive approaches to workforce training, business development, land use planning, neighborhood revitalization, and community engagement and leadership. Examples include the Northland Workforce Training Center and Beverly Gray Business Exchange Center.

### Integrating Equity into Rain Check 2.0

PolicyLink, a national nonprofit research and advocacy organization, provides a useful definition of equity: "Just and fair inclusion into a society in which all can participate, prosper, and reach their full potential."

Equity is different from the formal legal equality conferred by landmark laws such as the Civil Rights Act. Equality gives everyone the right to ride on the bus, in any seat they choose. Equity ensures there are bus lines where people need them so they can get to school or the doctor or work. It means policies and investments that grow good jobs and expand entrepreneurship opportunities for low-income people and people of color. It means policies that build human capabilities by upgrading the education and skill of the nation's diverse workforce. It means policies that dismantle destructive barriers to economic inclusion and civic participation, and build healthy communities of opportunity for all.

Source: "Equity Is..." PolicyLink, October 5, 2016.

### GI Equity Commitment

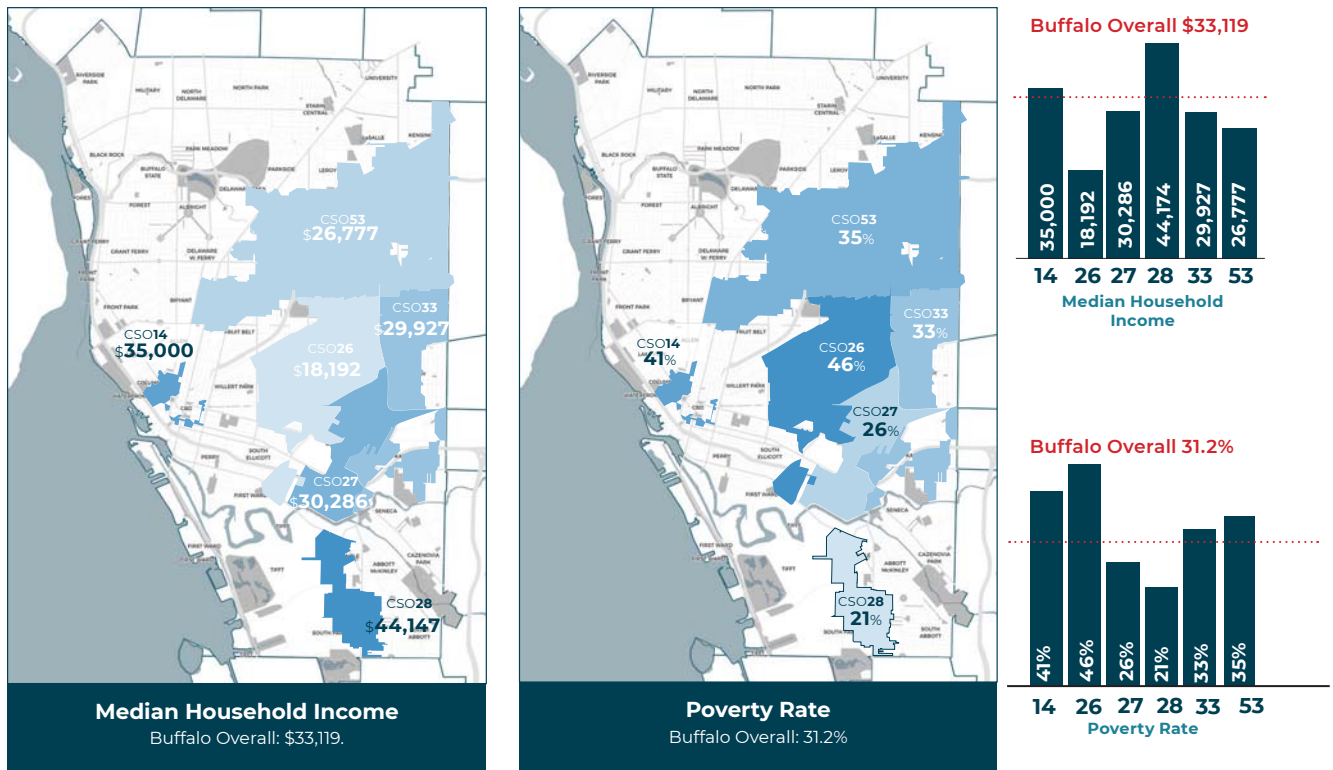
Buffalo Sewer will examine the following principles to maximize equitable investments:

- Embed equity into Rain Check mission
- Meet people where they are
- Identify and cultivate community champions
- Develop and communicate clear criteria for project selection
- Invest in social capital alongside physical capital
- Recognize that building trust takes time

Through Rain Check, Buffalo Sewer can advance equity by creating opportunities for communities to share in the economic, social, and environmental benefits of green infrastructure and have a role in stormwater management in their communities. Many forms of green infrastructure such as rain gardens, bioswales, and planters are above-ground, vegetated practices that can be found in a wide range of urban spaces—from school playgrounds to sidewalks and rooftops. These practices may not be recognized as a form of water infrastructure by the general public, but they can help alleviate stresses to Buffalo’s sewer system and improve water quality. National conversations around water challenges and equitable water management can inform local strategies around green infrastructure in Buffalo.

Green infrastructure investments can also support educational programs, local employment and career pathways, business development and contracting opportunities, and neighborhood improvements. Buffalo Sewer can maximize outcomes by partnering with educational institutions, workforce trainers, community-based organizations and other stakeholders across Buffalo.

### Green Infrastructure Equity Analyses and Index



Source for maps and graphs: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

Buffalo Sewer is committed to evaluating how its decisions and projects can reduce inequities across Buffalo. Site selection for green infrastructure is often driven by engineering and technical concerns. An equity analysis layers environmental, economic, and social factors onto the engineering approach when evaluating opportunities for green infrastructure. Several new planning tools use indexes and other need-based approaches to account for a wider range of potential program impacts. Buffalo Sewer has developed a Green Infrastructure Equity Index (GI Equity Index) that incorporates elements of existing green infrastructure indexes and racial equity analysis tools to conduct a preliminary analysis of various equity considerations. These in-depth analyses help form a guiding framework for Buffalo Sewer to build equity through the implementation of Rain Check 2.0 projects and the GI Equity Index allows comparison of measures of equity metrics across Buffalo. The GI Equity Index includes 17 variables related to disadvantage and vulnerability (socioeconomic factors), and environmental factors related to exposure to environmental risk and access to environmental amenities (built environment measures). To learn how the Equity Index was developed and the data sources used, reference **Appendix A** to this report.

## Equity in Green Infrastructure

According to the U.S. Water Alliance, water equity “occurs when all communities have access to safe, clean, affordable drinking water and wastewater services; are resilient in the face of floods, drought, and other climate risks; have a role in decision-making processes related to water management in their communities; and share in the economic, social, and environmental benefits of water systems.”

Source: U.S. Water Alliance, *An Equitable Water Future: A National Briefing Paper* (2017).

**Equitable development** considers the individuals, entities, activities and materials involved in the design, installation, and maintenance of green infrastructure projects. For example, issues of where materials are sourced, who gets contracts, and who makes up the local green infrastructure workforce could fall under equitable development considerations. Green infrastructure could create more access to opportunities for existing local, small, minority-, and women-owned businesses and workers from disadvantaged communities and provide opportunities for new businesses and workers to enter the field.

**Equitable decision-making** considers how the community members and government agencies make decisions and how they are engaged. Equitable decision-making considers broader community, economic, and environmental goals and tries to build partnerships and align green infrastructure development to advance shared goals. Issues of engagement are critical considerations for equitable decision-making, which aims to provide those potentially impacted by investments with opportunities to meaningfully engage throughout different phases and types of green infrastructure projects.

## GI Equity Index Factors

Buffalo Sewer is examining how the following factors influence the decision-making process:

### Socio-economic factors:

- Race and ethnicity
- Income
- Education attainment
- Young children
- Older adults
- Owner occupancy
- Limited English speakers
- Unemployment and labor force participation

### Built environment factors:

- Traffic proximity
- Ozone levels
- Particulate matter
- Access to public open space
- Tree canopy cover
- Impervious surface cover
- Vacant land
- Residential vacancy rates
- Commercial vacancy rates



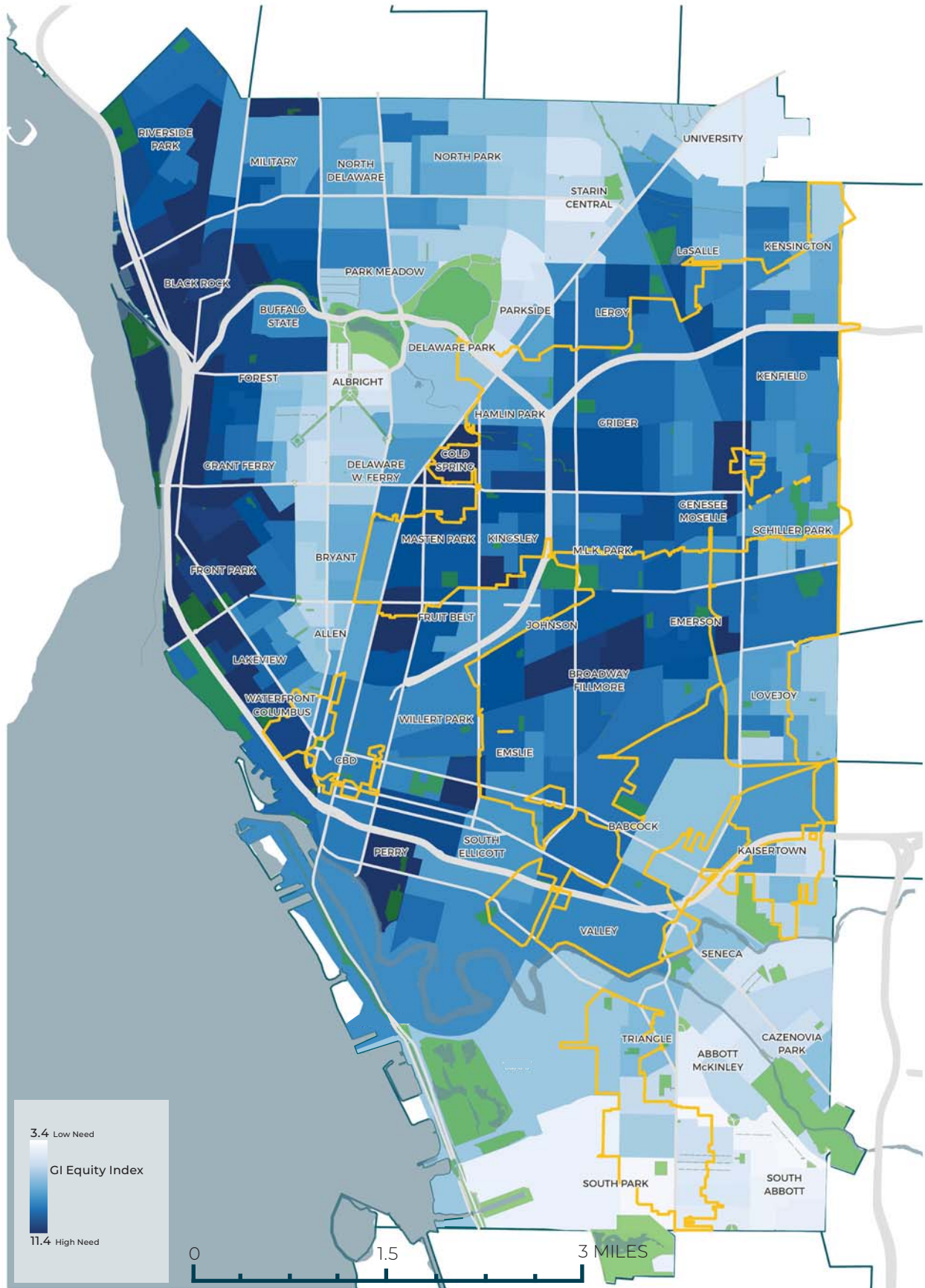
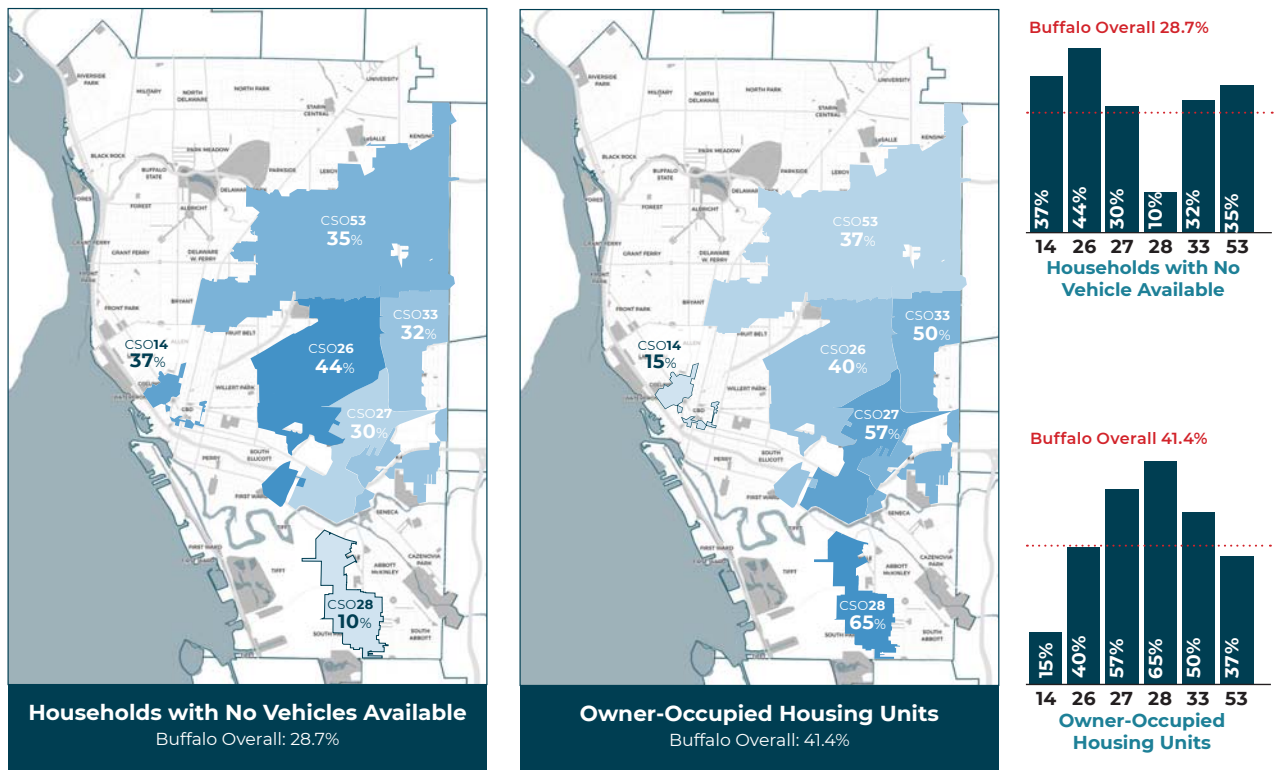


Figure 1.8: Map of Buffalo block groups with GI Equity Index Scores.

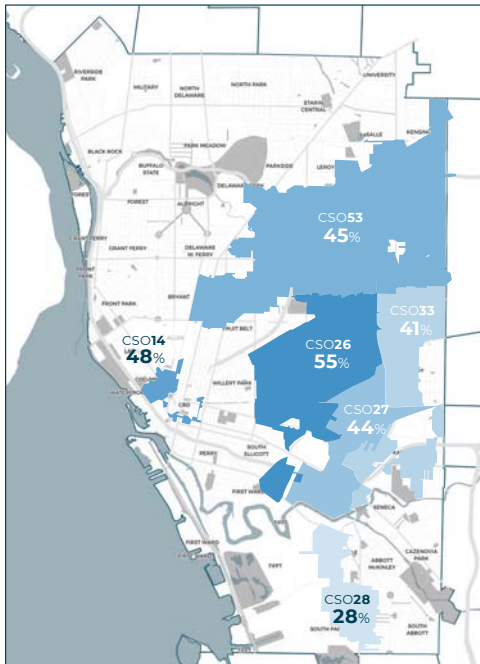
## Existing Equity Challenges

In recent years, Buffalo has taken great strides to attract population, jobs, and investment to the City. However, the City still faces deeply entrenched challenges around population loss, concentrated poverty, and racial segregation. Across various indicators of economic well-being, the City of Buffalo performs worse than the Buffalo-Niagara region and the United States as a whole. Furthermore, across nearly every indicator—including income, education, employment, housing, health and environmental justice—there are significant and persistent disparities by race, ethnicity, and neighborhood.

Despite overall population loss in the City, communities of color, especially immigrant communities of color, are growing. The City's population is mainly people of color (55.4%), with significant shares of Black (41.8%) and Latino residents (10.9%) and a rapidly growing Asian population (U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates). Communities of color are located throughout Buffalo, but are more concentrated in the northeastern and eastern neighborhoods of the City. Income inequality, as measured by the Gini coefficient, a summary measure of income inequality, is increasing and higher in Buffalo (0.51) than in the United

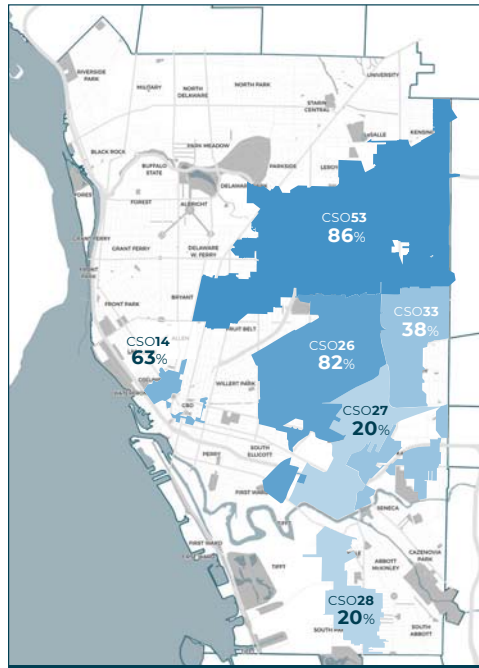


Source for maps and graphs: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.



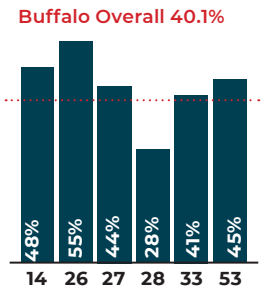
**Working-age Population, Not Employed, (16-64) including those unemployed or out of the labor force**  
Buffalo Overall: 40.1%

Source for map and graph: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

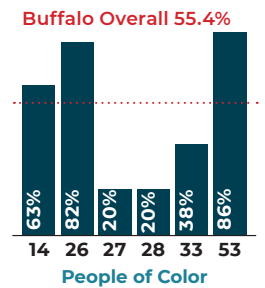


**People of Color**  
Buffalo Overall: 55.4%

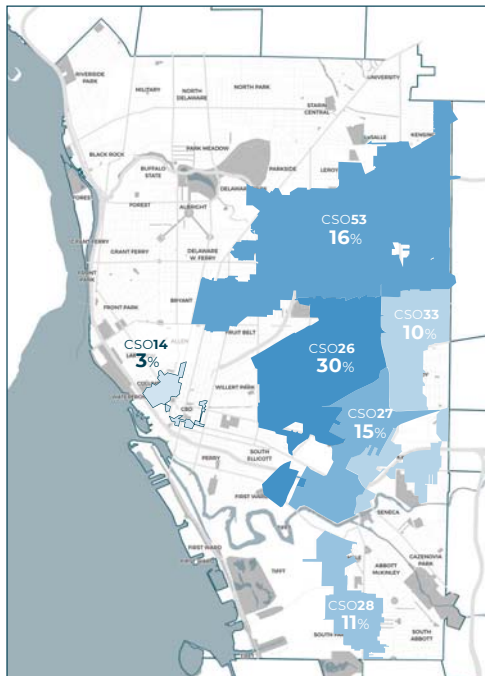
Source for map and graph: U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.



**Working-age Population Not Employed (16-64)**  
including those unemployed or out of the labor force

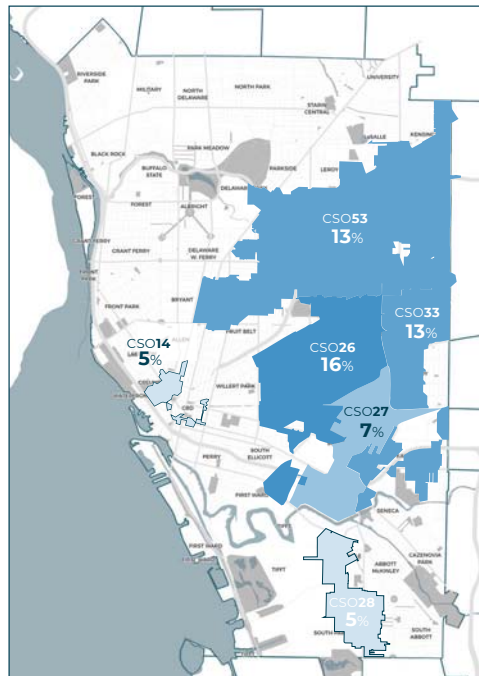


**People of Color**



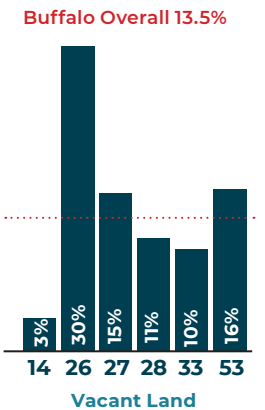
**Vacant Land**  
Buffalo Overall: 13.5%

Source: UBRI analysis of parcel data from the Erie County Department of Environment and Planning, 2016.

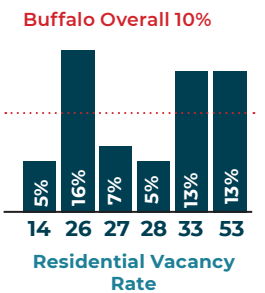


**Residential Vacancy Rate**  
Buffalo Overall: 10%

Source: HUD-USPS data on address vacancies, June 2018.



**Vacant Land**



**Residential Vacancy Rate**



States overall (0.48), for the period from 1979-2014. (U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates; PolicyLink and USC Program for Environmental and Regional Equity, “Advancing Health Equity and Inclusive Growth in Buffalo,” (Oakland, CA: PolicyLink, 2017). Buffalo has higher rates of poverty and unemployment, and lower levels of educational attainment and car access, than the broader region and country as a whole. While rates of poverty and unemployment are relatively high overall, they vary by neighborhood and by race and ethnicity. For example, unemployment rates are higher on the east side of the City, where several neighborhoods have an unemployment rate that exceeds 21%. (PolicyLink and USC Program for Environmental and Regional Equity, “Advancing Health Equity and Inclusive Growth in Buffalo,” (Oakland, CA: PolicyLink, 2017). Rates of unemployment in the City are highest for Black (15.2%) and Latino residents (12.3%). (U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates).

There are also challenges around work readiness, housing affordability, and car access that are unevenly distributed across the City. The education levels of the City’s population are not keeping up with employers’ educational demands. The non-profit organization, PolicyLink, estimates that by 2020, 51% of jobs in New York State will require at least an associate’s degree. Only 24% of Black residents and 20% of Latino residents in Buffalo have that level of education today. (PolicyLink and USC Program for Environmental and Regional Equity, “Advancing Health Equity and Inclusive Growth in Buffalo,” (Oakland, CA: PolicyLink, 2017). Although the share of affordable rental housing is higher in Buffalo than in the region and country overall, the majority of renter households are cost burdened (spending more than 30% of income on rent) and those on the east side of the City are particularly affected. Furthermore, Black households are more likely than White households to be cost burdened, regardless of whether they rent or own. Finally, car access is a serious issue in the City and varies significantly by neighborhood. There are several neighborhoods in the City where 43% of households or more do not have a vehicle and likely rely on public transit. (PolicyLink and USC Program for Environmental and Regional Equity, “Advancing Health Equity and Inclusive Growth in Buffalo,” (Oakland, CA: PolicyLink, 2017).

### Equity Considerations for Rain Check 2.0

The equity analysis prepared for Rain Check 2.0 provides context for understanding a wide range of inequities across the City overall, and in the target CSO basins. Buffalo Sewer has identified several equity considerations that it can influence through its own work or in partnership with others.

### GI Equity Priorities

To leverage positive equity impacts of green infrastructure investment, Buffalo Sewer will focus on:

- Workforce Development
- Contracting and Procurement
- Neighborhood Revitalization
- Inclusive Outreach and Public Engagement



Figure 1.9: Buffalo Sewer lending a hand at Waterworx Pop-Up Park event.

**WORKFORCE DEVELOPMENT**

Skilled workers are needed to design, build, and maintain green infrastructure systems. By intentionally expanding opportunities for more diverse populations to enter the green infrastructure workforce, Buffalo Sewer and partners can encourage local industries to be more reflective of the communities they serve. Green infrastructure could be a unique opportunity for Buffalo Sewer, educational institutions, workforce trainers, and community-based organizations to come together to prepare the next generation of green infrastructure workers. Partnership will be critical to the success of diverse and inclusive workforce development programs.

**CONTRACTING AND PROCUREMENT**

Public investment in green infrastructure is an opportunity to generate economic benefits for local, small, minority-, and women-owned businesses in professional service and construction contracts. While there may be existing programs and standards for inclusion, Buffalo Sewer will likely encounter challenges that hinder successful participation in green infrastructure projects. Investments in contracting, consulting, and procurement can provide direct opportunities for local small businesses and disadvantaged firms and help expand their contacts, clients, skills, and experience. There may also be opportunities to partner on business accelerators and development programs that support the growth of new firms and build the capacity of existing firms.

**NEIGHBORHOOD REVITALIZATION**

Green infrastructure projects can be a tool for neighborhood transformation by creating green space, adding vegetation, and upgrading aging infrastructure. Green infrastructure can leverage public dollars to provide multiple benefits to historically disinvested neighborhoods, especially when coordinated with investments in transportation, education, clean energy, and public space. These investments can contribute to building complete communities that offer residents spaces to live, work, and move in healthier and safer ways. At the same time, by spurring new economic development or expanding green space in disinvested places, these investments have the potential to contribute to increasing rents and property taxes, as well as other neighborhood changes that may not be desirable by existing residents.

**INCLUSIVE OUTREACH AND PUBLIC ENGAGEMENT**

Public green infrastructure planning and projects can create venues for residents, community-based organizations, and other stakeholders to connect to and shape local decision-making processes. Robust outreach and engagement can provide mutual benefits to both Buffalo Sewer and community members by deepening understanding of community priorities; increasing legitimacy and support for public plans and projects; cultivating resident and community stewardship of projects; and improving government/community relations. Additionally, green infrastructure projects can initiate and facilitate community visioning in disinvested neighborhoods to help distribute these benefits to parts of the City that need it most.

Evaluate what is **possible** by inventorying the opportunities and identifying partners, issues, and concerns.

Analyze what is **probable** based on factors related to partner capacity, development momentum, need, or other criteria.

Identify what is **preferred** by soliciting community preferences, aligning with other plans, and considering other benefits.

## Environmental Systems & Regional Context

Buffalo’s stormwater performance is closely linked to environmental systems including waterways and tree canopy.

Buffalo is located on the eastern shore of the Niagara River and Lake Erie, between Lake Erie and Lake Ontario – a key gateway between the United States and Canada. It is located in the Erie-Ontario Lake Plain province, with a topography typical of an abandoned lake bed – gently rolling and flat. The bedrock is Onondaga Limestone formation with a glacial till soil above this bedrock, which allows stormwater to infiltrate. High bedrock can be found just below the surface in some places and most soil types in the City are anthropogenic and the result of urban development.

Buffalo’s climate is a humid continental type climate influenced by the Great Lakes. Buffalo experiences cold, snowy winters due to the lakes. The ground is typically covered with snow from December through early March. Buffalo’s average annual precipitation between 2000 and 2018 was 40.3 inches. These patterns are likely to change, with an increase of snow, an extended growing season, and a temperature increase of between 3-5 degrees by mid-Century.

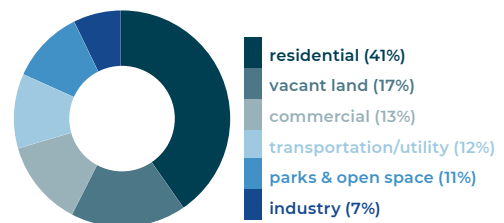
The Western New York region is characterized by hardwood forests. The most common forest communities include beech-maple forests, elm-ash forests, maple-basswood, hemlock-northern hardwood forests, oak openings and pitch pine areas. Common mammals include the cottontail rabbit, eastern chipmunk, woodchuck, raccoon, striped skunk and white-tailed deer. Characteristic birds include the American kestrel, mourning dove, downy woodpecker, red-eyed vireo, common yellow-throat, song sparrow and norther oriole. Common reptiles and amphibians include the American toad, leopard frog, painted turtle, and garter snake. Green infrastructure can support plant and animal communities by using native plants and avoiding invasive plants.

### Waterways

Buffalo has a special place in the Great Lakes system. All water that drains into the western Great Lakes flows past Buffalo and into the Niagara River before flowing over Niagara Falls, into Lake Ontario, and into the Saint Lawrence River. This makes the City of Buffalo a steward for all water in the Great Lakes—about one-fifth of the world’s freshwater.

The creeks and streams that run through the City of Buffalo also drain into the Great Lakes system. While the health of local waterways depends on the health of this broader system, steps taken to care for local waterways can also have big impacts on water quality throughout the Great Lakes. For example, algal blooms result from land-based runoff. The water quality in the Great Lakes can affect the environment, public health, and economy of all communities across the basin.

### Buffalo’s land use informed the priorities for Rain Check 1.0 and Rain Check 2.0.



Land Use Distribution Within the City of Buffalo



The priority CSO Basins discharge to the **Buffalo River** (CSO Basins 26, 27, 28 & 33), the **Erie Basin** (CSO Basin 14) and **Scajaquada Creek** (CSO Basin 53). The Buffalo River discharges into Lake Erie at the Buffalo Waterfront. All of Buffalo's stormwater eventually flows into the **Niagara River**.

The fast-flowing **Niagara River** is the distinctive waterway of the Buffalo Niagara region. The 37-mile river feeds the world famous Niagara Falls, connects Lake Erie to Lake Ontario and forms part of the border between the U.S. and Canada. Today, the Niagara River is widely used by residents and tourists for fishing, boating, sight-seeing and other recreation.

Historically, industry took root near the **Buffalo River**. It still serves that purpose today in a reduced role. The river is increasingly being used for recreation and tourism. Water quality in the Buffalo River is impaired due to a history of industrial pollution and runoff from many sources throughout the watershed, but has benefited from recent dredging and riparian restoration projects. As the Buffalo River becomes more important as a recreation and tourism amenity, cleaning up the river is a priority. Tributaries to the Buffalo River include Buffalo Creek, Cayuga Creek, and Cazenovia Creek. The river winds through South Buffalo before draining into Lake Erie at the City's Inner Harbor.

The New York Department of Environmental Conservation identified the Buffalo River as an Area of Concern in 1987. This designation resulted in restrictions on fish and wildlife consumption and dredging activities.

**Lake Erie**, the smallest Great Lake in terms of overall volume, links Buffalo with major shipping channels and has a substantial impact on the local climate. The Great Lakes to the west, and tributary streams south of the city, feed into Lake Erie, which is the source of all of Buffalo's water supply.

**Scajaquada Creek**, a tributary of the Niagara River, begins in the Town of Lancaster and flows west through Cheektowaga where it enters an underground channel before resurfacing at Forest Lawn Cemetery in Buffalo. From there, the creek travels through the cemetery and Delaware Park, feeding Hoyt Lake in the park before ultimately flowing into the **Black Rock Canal**.

The **Black Rock Canal** is formed by a break wall that reroutes the Niagara River waters between Unity Island and the City's shoreline. This channel was constructed so ships could travel from Buffalo more safely by avoiding the rapid current of the Niagara River. Today, the Black Rock Canal is a destination for boating, fishing, and for taking in waterfront scenery.

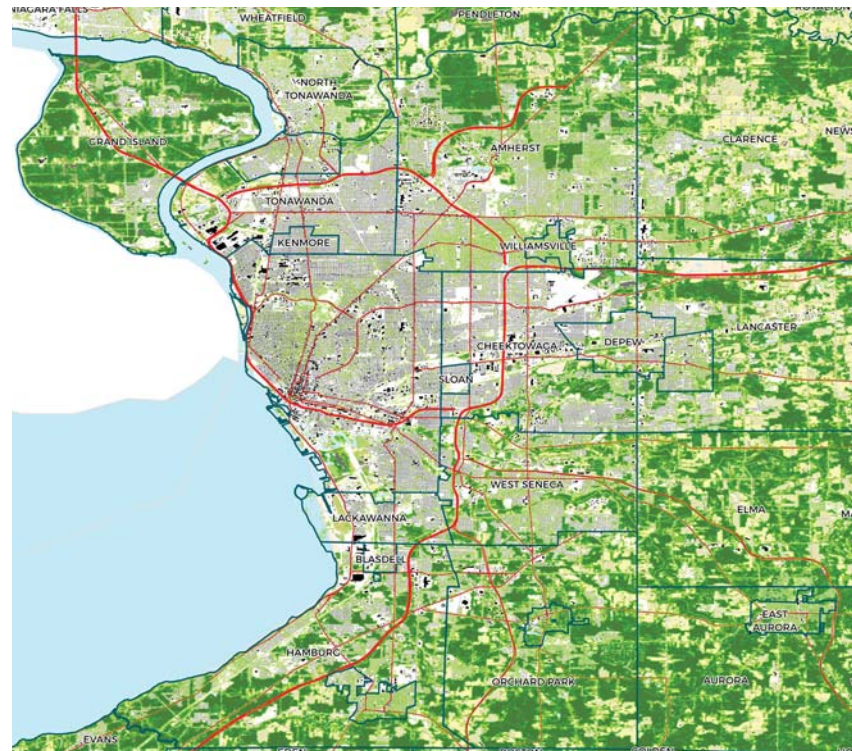


Figure 1.10 Buffalo's regional land cover from USGS national land cover dataset.

A tributary of the Buffalo River, **Cazenovia Creek** forms in southern Erie County, traveling through various towns before entering the City of Buffalo. It flows through South Buffalo neighborhoods and forms the prime water feature of Cazenovia Park, part of the City's Olmsted Park system. The creek can overflow and create flooding issues for nearby residents during significant wet weather events.

Buffalo has already taken a number of steps to address water quality concerns in the region. The **Buffalo River Ecological Restoration Master Plan** provides a framework for addressing habitat related impairments in the lower Buffalo River watershed. The **Great Lakes Legacy Act Sediment Action Plan** addresses many concerns around the Buffalo River Area of Concern. The draft **Local Waterfront Revitalization Program** proposes waterfront improvement projects, and establishes a program for managing, revitalizing and protecting resources along Lake Erie, the Niagara River, the Buffalo River, Scajaquada Creek, and Cazenovia Creek. Buffalo Sewer's Long-Term Control Plan is part of this region-wide effort to improve water quality and habitat.

### Tree Canopy Cover

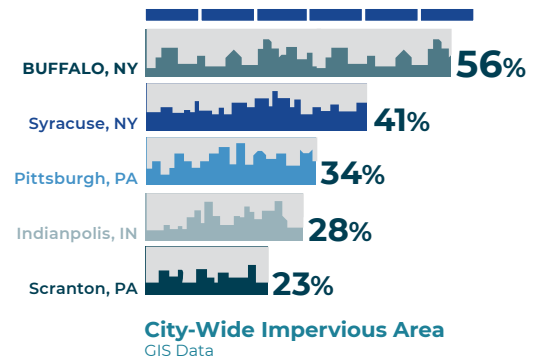
Trees intercept, absorb and filter stormwater. Increasing the tree canopy in Buffalo can help to reduce the amount of stormwater reaching the combined sewer and improve the quality of local waterways.

In addition to stormwater benefits, trees provide other benefits relating to equity goals and quality of life, including reducing urban heat island effect, improving walkability, increasing access to green space, and traffic calming. These many benefits of trees were also considered in the analysis of green infrastructure opportunities in Buffalo.

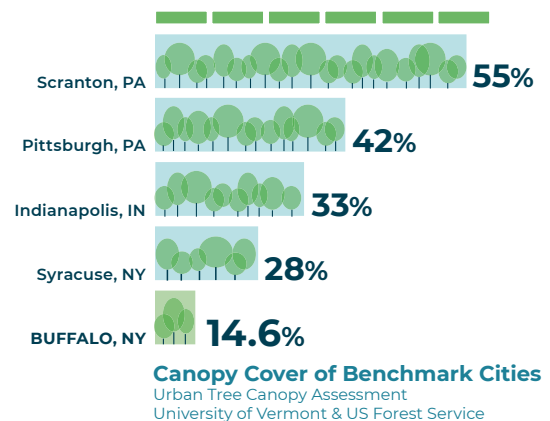
Buffalo's existing tree canopy in each priority CSO basin was analyzed to determine the amount of canopy within the public right of way and the amount of canopy on private land. The overall canopy cover for Buffalo is 14.6% or 3,836 acres of canopy. Most of the priority CSO basins have canopy cover on par with the city average. CSO Basins 27 & 33 are well below the city average. The city overall has more than 45,000 vacant acceptable street tree spaces. Increasing the canopy cover within the City and particularly within the priority CSO Basins would assist in meeting Buffalo Sewers stormwater goals.

To increase the tree canopy in the City, Buffalo Sewer is developing a system to account for the benefits of urban trees of different types and is examining programs to support tree planting. See Chapter Two for more information on what Buffalo Sewer is doing to understand the existing tree canopy and identify opportunities for urban forest expansion.

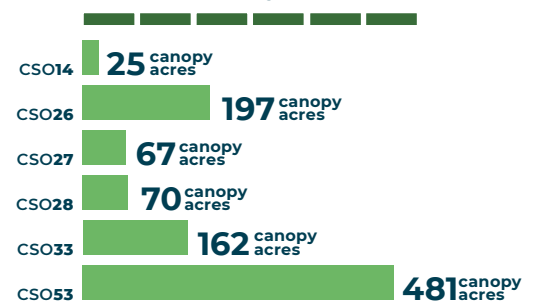
### Impervious surfaces depend on a city's density, topography, & land use.



### A city's urban tree canopy assists with stormwater control and makes neighborhoods more livable.



### Tree canopy area





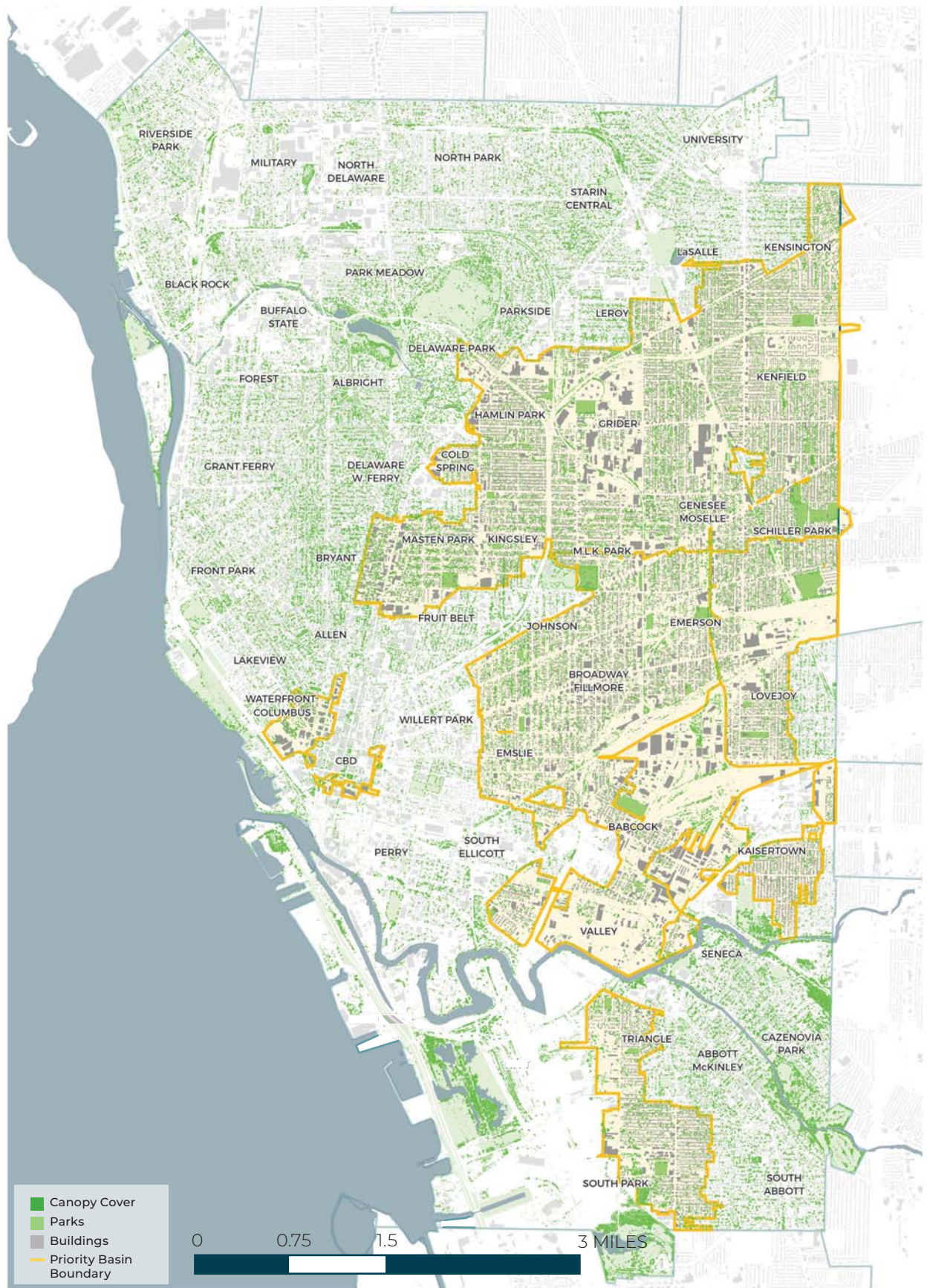


Figure 1.11: Map of Buffalo Canopy Cover and Priority CSO Basins.