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Integrating equity into **flood resilience investments**



Chicago Metropolitan
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KEY DEFINITIONS

Capacity building – Training, technical assistance, and on-the-ground support offered to local governments and community-based organizations.

Co-benefits – Social and environmental benefits that a flood resilience investment can provide in addition to flood mitigation.

Community-based organization (CBO) – Including but not limited to local non-profit organizations, environmental groups, and neighborhood associations.

Disadvantaged communities – Current term used by the federal government to describe communities that are marginalized, underserved, and overburdened by pollution as part of the Justice40 Initiative. The White House Council of Environmental Quality developed the Climate and Economic Justice Screening Tool to identify disadvantaged communities for federal funding opportunities.

Environmental justice – Defined by the U.S. Environmental Protection Agency (USEPA) as “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.”¹

Environmental justice communities – Communities that are disproportionately affected by environmental hazards and social inequities, including pollution and a lack of basic infrastructure and investment. USEPA refers to environmental justice communities as “overburdened communities.”

Equity – The concept that everyone is provided what they need to succeed through increased access, resources, and opportunities, especially for those who are underrepresented and have been historically disadvantaged. The federal government defines equity as, “the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities

that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.”²

Flood resilience – The ability of our region and its communities to prepare for and recover from the shocks and chronic stresses of flooding by transforming our infrastructure, natural systems, and social structures to be more responsive and adaptable.

Municipal capacity – The ability of a municipality to ensure services are provided on a sustained basis in pursuit of local and regional objectives. Capacity factors that can affect a municipality's ability to sustain these services include staff and elected official expertise, financial conditions, tax base and policy, and the ability and expertise to prioritize investments.

Systemic racism – Includes both institutional and structural racism. Institutional racism refers to unjust policies, practices, and procedures that work better for white people than for people of color, whether intentional or not. Structural racism refers to a history and current reality of institutional racism across all institutions, which combine to create a system that negatively impacts communities of color.³

INTRODUCTION

Flood resilience is a community's ability to prevent, withstand, and recover from flooding. The Chicago Metropolitan Agency for Planning (CMAP) produced this guide with the goal of strengthening the flood resilience of northeastern Illinois, a key goal identified in ON TO 2050, the region's comprehensive plan.⁴ A more resilient region will require future investments. This guide explains why such investments must be made in an equitable manner, outlines key principles and strategies for stakeholders to consider when integrating equity into their decision-making process, and highlights regional and national examples of success. The guide also provides strategies for applying an equity lens to all aspects of flood resilience work, including planning, design, maintenance, and funding. It is written for engineers, planners, and decision makers working in the areas of flood mitigation, stormwater management, and climate resilience, including government staff and private consultants working for municipalities and counties, as well as state and federal agencies.

Flooding impacts nearly every community in northeastern Illinois and climate change is expected to increase the frequency and intensity of extreme storms in the future. Yet flooding does not affect all people or communities equally. Historically disinvested, marginalized, and underserved communities are disproportionately impacted by flooding. Systemic racism has forced these communities into areas with high flood risk, concentrations of hazardous industries, a lack of tree canopy and park space, and high impervious cover, while depriving them of adequate resources for flood mitigation and recovery. Current land use and development practices also perpetuate and exacerbate these disparities, which lead to inequities in public health, infrastructure, housing, and local economies.

While current government leaders and staff did not initiate these inequities, their duty to serve all constituents equally requires acknowledging and addressing disparities with equitable solutions. During the COVID-19 pandemic, the murders of George Floyd and other Black lives reignited a movement for

racial justice.⁵ Voices throughout the region continue to call for both the disruption of existing patterns of exclusion and an end to systemic racism. Meeting this challenge will require meaningful policy change centered on equitable outcomes for all people.

Implementing the strategies and practices in this guide will require organizations to build capacity. Integrating equity into investment decisions demands a significant and necessary shift away from the historical practices and approaches that have led to inequitable outcomes. While this work requires time, expertise, and funding, the case studies highlighted herein demonstrate that collaborative success is achievable. A critical component is action to build an equitable and inclusive organizational culture that embraces positive change.

Now is the time to act. Governments across the region as well as the federal government are increasingly working to integrate equity into their decision-making processes. Through the Justice40 initiative,⁶ the Federal Emergency Management Agency (FEMA), U.S. Army Corps of Engineers (USACE), USEPA, and other federal agencies are required to ensure that 40 percent of the benefits of certain federal programs flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.

This guide was developed through collaboration with five regional CBOs: Austin Coming Together; Cicero Community Farm; Clean Power Lake County; OAI, Inc. (OAI); and the Southeast Environmental Task Force. These community partners provided their expertise on public health, economic and workforce development, housing, and environmental justice to CMAP, and ground this work in the needs of the communities they represent.

SECTION 1

WHAT IS EQUITY IN FLOOD RESILIENCE?



The federal government defines equity as, “The consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.”⁷

Equity in flood resilience refers to programs, policies, and investments aimed at reducing the disproportionate impact of flooding on underserved communities. As governments in northeastern Illinois invest in flood resilience, prioritizing communities facing disproportionate impacts will be crucial to ensure that all residents have access to the resources they need to thrive.

Where are we today?

While flooding regularly impacts communities across northeastern Illinois, research has shown that flooding disproportionately burdens historically disinvested communities, which are characterized as having a relatively low average income and a majority population of people of color. A 2019 report by The Center for Neighborhood Technology found 87 percent of flood damage insurance claims paid in Chicago between 2007 and 2016 were in zip codes with a majority of people of color. Thirteen zip codes represent almost 75 percent of all flood insurance claims and within those zip codes, 93 percent are households headed by a person of color.⁸

Analysis by the Environmental Law and Policy Center found that areas of disproportionate flood and erosion risk along Illinois’ Lake Michigan shoreline have a majority population of people of color and a significant number of residents living below the poverty line.⁹ Additional analyses across the country demonstrate strong relationships between poverty and flood vulnerability.¹⁰

While many of these outcomes are the result of historical policies, CBOs consulted during this work emphasized that current decisions about project planning, land use, public engagement, and funding allocation continue to reinforce past harms.

“Money comes into environmental justice communities but goes to governments that have a history of systemically excluding voices.”

- Eileen Shanley-Roberts, Clean Power Lake County

Regional flash floods highlight need to mitigate urban flooding

A severe rainstorm on July 2, 2023, inundated Cook County, with nearly nine inches falling in Berwyn, Cicero, and Chicago’s Austin neighborhood, causing significant flooding.¹¹ The resulting rainfall in certain areas ranged between 100-year (1 percent chance of happening) and 500-year (0.2 percent chance) flood levels. Research shows that significant rainfall events are increasing across the state due to climate change.¹² A storm of this magnitude is likely to cause flooding anywhere in northeastern Illinois; for these majority Black and Latino working-class communities, the impacts are devastating.

Conversations with Cicero Community Farm representatives and Cicero residents highlight how the 2023 flood negatively impacted their finances, physical and mental health, and housing conditions. Residents maxed out credit cards to replace lost furnaces, boilers, hot water heaters, washers, and dryers, and yet were left trying to figure out how to make costly improvements to protect them from the next flood. Contaminated floodwater can expose individuals to a wide range of impacts including raw sewage, industrial contaminants, asbestos, lead, mold, and other pollutants.¹³

“Every time it rains, you get filled with anxiety. Every time you see dark clouds, your body freezes up.”

- Ankur Singh, Cicero resident

“We need emergency housing — a large percentage of people who lost their basement apartments are being forced to live in mold-infested properties. I know people who are disabled, lost their mobility equipment, and are still living in basements with mold.”

- Shapearl Wells, Cicero resident

Mold in basements exacerbated respiratory issues, and the fear of future flooding is a source of anxiety. Renters were particularly vulnerable as many lived in flood prone basement apartments, did not have renter’s insurance, and may not have known how to get assistance. Undocumented residents were in a worse situation as they are ineligible for government assistance altogether.

On August 15, 2023, President Joe Biden issued a major disaster declaration for the region, thus making FEMA funding available to eligible individuals in Cook and surrounding counties. In response, local, county, and municipal governments worked to sign community members up for assistance. Simultaneously, residents advocated on behalf of their undocumented neighbors, as well as for significant investments to be directed to majority Black and Brown communities to mitigate future flooding events.

“It affects people with low incomes the most. I’ve heard a lot of people talking about losing everything.”

- Anonymous Cicero resident

How did we get here?

Past policy decisions have laid the foundation for the disproportionate flood impacts that persist today. Historically, systemic racism has pervaded government policies, programs, and decision-making — either explicitly or implicitly. While the effects of systemic racism in government are expansive and interrelated, they have impacted the flood resilience of communities today in terms of their location, access to resources, and municipal government capacity.

Location

Historical governmental policies and practices served to create and/or reinforce geographic boundaries in which certain groups could (and could not) live. For example, a Federal Housing Administration policy in the early 20th century known as redlining¹⁴ created areas in which homeownership opportunities were both expanded for white populations and restricted for Black communities. Redlining was implemented in conjunction with other racially prejudiced policies, such as racial covenants in mortgages, exclusionary zoning, and urban renewal initiatives, all of which sought to proscribe where people of color could not live. Through displacement and exclusion, communities of color were increasingly pushed to inhabit areas considered undesirable: low-lying and at risk of flooding, or located near polluting land uses such as industrial, manufacturing, and waste processing facilities. Because of these policies, communities of color are exposed to additional flooding and public health risks.¹⁵

Access to resources

Discriminatory practices have also prevented historically marginalized communities from accessing key drivers of economic growth and wealth creation, such as homeownership, employment, and private investment like loans and credit. Governments have prioritized transportation investments and development decisions that, in the aggregate, have disconnected historically marginalized communities from employment, education, and other options to access economic mobility. As a result, systemic poverty, disinvestment, displacement, and insufficient economic opportunities are disproportionately concentrated within communities of color.¹⁶

These conditions mean that residents in historically marginalized communities are less likely to have the personal financial resources required to repair damage caused by reoccurring flood events. Making matters worse, low-income communities of color are also less likely to have flood insurance coverage.¹⁷ With each flood, repairs can deplete limited household resources forcing some property owners to forego repairs. Renters are particularly vulnerable because they cannot obtain flood insurance for damage caused to the building and often pay for increased property management costs through higher rents. With numerous barriers to homeownership, today's communities of color have more people renting than owning their homes.¹⁸

Flood incidents can impact an individual's ability to go to work and manage family issues which, in turn, create barriers to employment and financial stressors. Individuals without savings and access to credit are pervasive in communities facing poverty and are challenged to respond to flood damage. Unaddressed flood damage can expose residents to health hazards like mold, mildew, sewage, poor air quality, and unsafe living conditions from structural damage. The cumulative impact of flooding on finances, housing, health, and employment can lead families to spiral into crisis.

"I have seasonal allergies that have worsened from the flood — it's very aggravating with a cough and headaches — I can't sleep."

- Anonymous Cicero resident

Municipal capacity

Municipal financial challenges have also impaired flood resilience. Prolonged disinvestment has stifled the ability of some municipalities to generate sufficient revenue to sustainably fund essential services like flood mitigation planning and implementation. Low resource municipalities may lack the staff to even apply for grants or low-cost loans.

Funding opportunities often require costly pre-award work to even apply — such as preliminary engineering, long-term maintenance plans — and require the applicant to share significant costs (such as local match requirements). As such, many municipal governments face immense challenges when competing for the resources necessary to implement flood infrastructure improvements.



SECTION 2

INTEGRATING EQUITY INTO INVESTMENT DECISIONS



Local governments, engineers, and planners can advance equity in flood resilience programs, projects, and policies by adopting the following principles and strategies. Each strategy includes best practices that local governments can implement based on their local context.

Key principles for equitable investments



Centering community voices

Grassroots community organizations and leaders, residents and business owners, and other members have deep knowledge of their community and a vested interest in its future. Centering community voices means that grassroots organizations and residents have a permanent seat at the table and that their voices receive equal time and consideration as others, and greater consideration in matters pertaining to their communities.



Holistic solutions

Flooding solutions help communities advance other goals, such as public health, housing, education, recreation, and economic development, resulting in greater benefits and community buy-in.



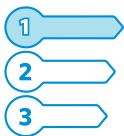
Long-term planning

Long-term funding, maintenance, and interagency coordination needs must be incorporated into the planning process at the onset to develop viable solutions to ensure investments are feasible and can serve communities over their entire service life.



Intentional trust building

Governments actively work to gain the trust of grassroots organizations that represent communities disproportionately impacted by flooding. Taking actions that acknowledge past harms and demonstrate accountability and transparency is key to building trust.



Prioritized investments

Governments direct investments in infrastructure and people to areas that are disproportionately impacted by flooding and have been underserved by past investments. Doing so helps recognize past harms, regardless of the cause of those harms.

Strategy 1

Use equity-related data to inform investments

Directing investments to communities disproportionately impacted by flooding is essential to mitigate damages and improve quality of life. When engineers, planners, and emergency managers use equity-related data, resilience investments can be tailored to improve the lives of their most vulnerable residents. The best practices presented below can help engineers and planners both identify those disproportionately impacted by flooding and incorporate appropriate considerations into flood resilience studies, plans, and investment decisions. A full list of data currently available for use when making equitable flood mitigation investments is provided in Section 3.

Key principles



Centering community voices



Intentional trust building



Prioritized investments

Benefits

- ✓ Identifies communities and populations impacted by flooding
- ✓ Identifies communities and populations to engage
- ✓ Considers how flooding disproportionately impacts some populations and neighborhoods
- ✓ Provides measurable and objective information that can inform investment decisions

Best practices

1A. Use equity-related data to identify communities most vulnerable to flooding

Overlaying spatial equity-related data with data on flood risk helps identify communities that are disproportionately impacted by flooding. There are several equity-related data types, including socioeconomic, demographic, health, environmental, and infrastructure inequities. Data layers can be used individually, however, overlaying more than one layer at a time helps frame the cumulative impacts of multiple stressors that communities face.

This data can help answer questions like:

- Which communities can least afford to recover from a flood?
- Which communities will need translation services to participate in flood mitigation planning and emergency response?
- Which communities may have difficulties evacuating from a flood?
- Which communities may experience increased health risks from flooding?

Planners and engineers should also leverage publicly available flood risk data. Using reliable and standardized data based on engineering assessments or verified observations across a study area or community makes it easier to compare and prioritize areas for investment.

Currently, more and more public data on flood risk is available, including from counties, stormwater agencies, planning agencies, and non-profits. More information on equity-related and flood risk data, as well as publicly available screening tools for government use, is available in Section 4.

Equity-related data

- Low income
- Race and ethnicity
- Linguistic isolation
- Disability
- Age (children and older adults)
- Renting population
- Populations without health insurance
- Proximity to brownfields and hazardous sites
- Lack of green space
- Tax base per capita

Case study: Mapping flood risk and impacted communities

The Chicago and Cook County Greenprint¹⁹ helps identify where investments in green stormwater infrastructure can address flooding challenges in communities that have experienced disinvestment and injustices. The mapping tool overlays CMAP's urban flood susceptibility index with six variables from the Centers for Disease Control and Prevention's (CDC) Social Vulnerability Index. Census tracts mapped as high flood risk areas have the highest flood susceptibility and contain populations that may be disproportionately impacted by repeated or intense flooding.

Cook County, the Metropolitan Water Reclamation District (MWRD), municipalities, and other organizations can use this tool to identify locations to target green stormwater infrastructure and other flood resilience investments. By overlaying data on vacant land use, planners and engineers can identify opportunities for community parks to provide recreation, habitat, and stormwater storage.

1B. Collaborate with local community groups to collect and validate data

Data gaps on flooding — including location, depth, duration, and impacted populations — are common. Collaborating with CBOs, community development corporations, and other local partners help planners and engineers obtain and verify community-specific data. Information collected through interviews, focus group discussions, and public meetings can supplement missing or incomplete information and document both flooding locations and the individual experiences of impacted communities. The knowledge and expertise of a diverse group of community members are essential to supplement and validate the flood risk and equity-related data used in the analysis. See Strategy 2 for more information.

Case study: Community data collection

The Urban Flood Baseline²⁰ is an online mapping tool for the Calumet region of Cook County that raises awareness of communitywide flooding impacts and supports community advocacy, municipal action, and regional stormwater planning to reduce flooding. The project seeks to answer three main questions: Where is it flooding? Why is it flooding? And what are the impacts?

A key element of the urban baseline tool is the use of both quantitative and qualitative data. To secure high-quality, localized qualitative data, the project team trained and paid 15 residents to take photos of flooding following rain events during a 15-month period from spring 2021 to summer 2022. This data allowed the project team to both verify previously reported flood locations and reduce the impacts of known racial and economic disparities found in those datasets.

1C. Assess the distribution of previous investments

Data gaps on flooding — including location, depth, Infrastructure disparities have been perpetuated and exacerbated by the widespread use of traditional project selection processes that rely heavily on property valuations to determine project costs and benefits. Known as benefit-cost analysis, this decision-making approach relies upon property valuation which differs widely between highly resourced and historically disinvested areas. Consequently, using property values to estimate the costs and benefits of projects has inherently favored infrastructure investment in areas with already high property values.

Counties and municipalities can determine the level to which investments are reaching disproportionately impacted communities. They can overlay past investment data with equity-related data to ask and evaluate questions like, have fewer investments been made in flood-prone low- and moderate-income communities of color? If so, do these communities lack the necessary infrastructure to mitigate flooding? Further, should these communities be prioritized for investments in capital improvements, community engagement, and technical assistance? Such an analysis begins to correct disparities and disinvestment.

1D. Use equity-related data as a factor in project evaluation and selection

There are different ways to improve the process by which governmental investment decisions are made. Governments should develop and publish equity criteria for project selection to prioritize investments that benefit disproportionately impacted communities and foster faith, accountability, and transparency in the project evaluation and selection process. Adopting a policy that establishes equity as a goal is an important first step to demonstrate the organization's commitment to pursuing equitable outcomes for all communities in their service area and to establish the policy foundation to use equity considerations in investment decisions.

Adding equity as a project evaluation criterion could award points to projects that are located within or benefit disproportionately impacted communities. Defining such communities will depend on local context but could benefit from the inclusion of data on low income, linguistic isolation, proximity to brownfields and hazardous sites, and lack of green space. Equity-related points could be weighted in a way to direct investments to such locations. Funders can also ask applicants to make the case for how disproportionately impacted communities will benefit from the proposed project.

Recognizing some of the strategies discussed throughout this guide, applications could require meaningful community engagement be reflected in project narratives or, at the very least, award points to projects that incorporate community engagement practices that are traditionally excluded from planning and decision-making. More information on engagement best practices is provided in Strategy 2.

Case study: Considering impacts on people

In 2019, the Harris County Flood Control District in Texas used equity criteria to prioritize flood control projects for bond funding.²¹ The county took a “worst first” approach that focused on the impacts to people as opposed to the more traditional property impacts. The framework was used to score six project types: traditional infrastructure projects to reduce flooding; floodplain preservation and right-of-way acquisition; subdivision drainage improvements; channel capacity; flood warning system; and floodplain mapping updates. Projects received a score from 0 to 10 for eight criteria. The district used the CDC's Social Vulnerability Index as its equity criterion. The framework also assigned points to projects that minimize environmental impacts and provide multiple benefits. The criteria were weighted based on a holistic view of the district's priorities. A full list of the criteria and weights is provided in Table 1.

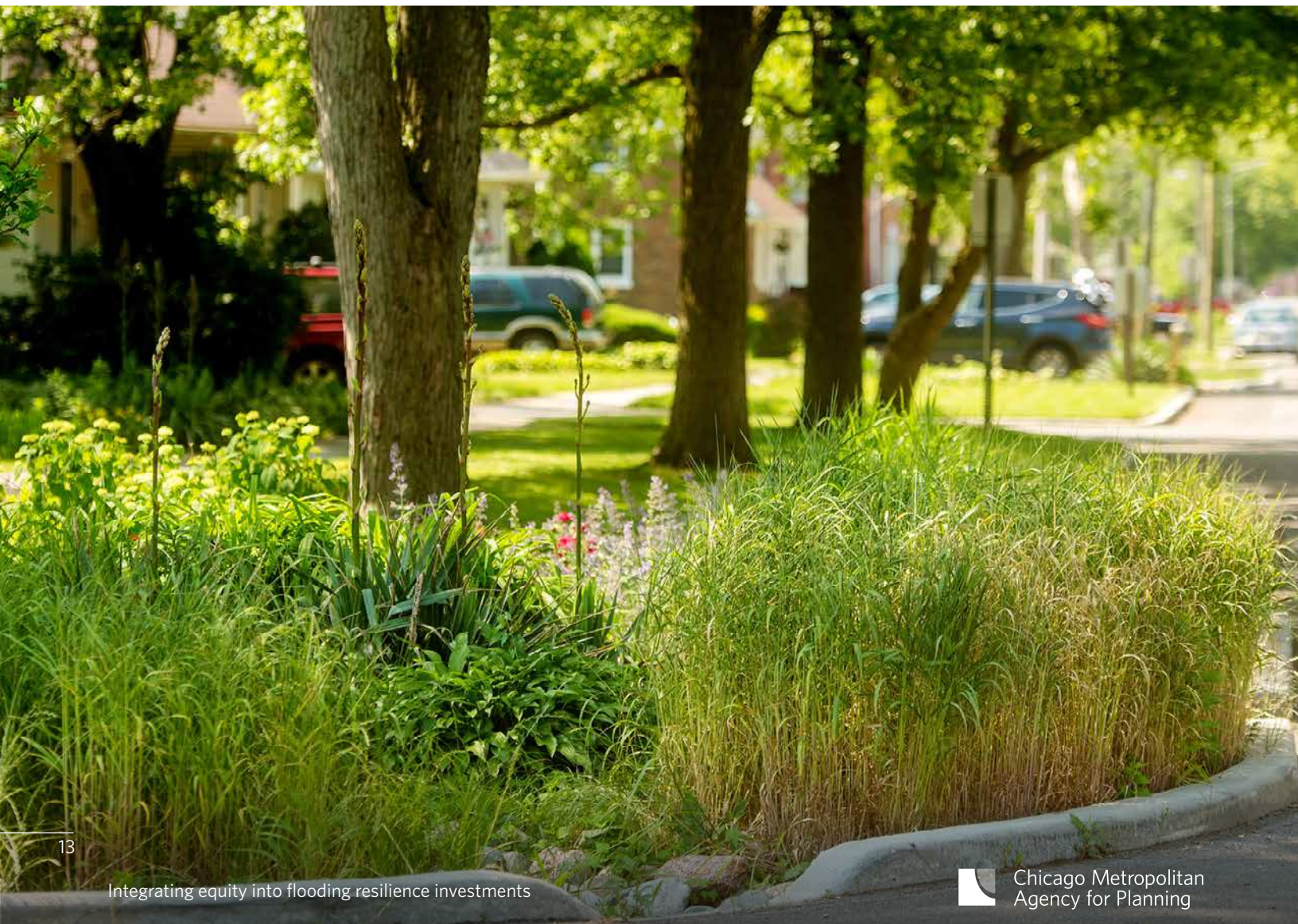
Table 1. Prioritization criteria and weighting factors

Criteria	Weighting factor
Flood risk reduction	25%
Existing conditions drainage level of service	20%
Social Vulnerability Index	20%
Project efficiency	10%
Partnership funding	10%
Long-term maintenance costs	5%
Minimizes environmental impacts	5%
Potential for multiple benefits	5%

Source: Harris County Flood Control District, 2019.

1E. Track the progress of achieving an equitable distribution of investments

Developing equity metrics helps implementers track progress in directing investments to disproportionately impacted communities. Municipalities and counties can use data on race, low income, linguistic isolation, proximity to brownfield and hazardous sites, lack of green space, and other relevant indicators to identify and track the number and percent of flood resilience projects located in disproportionately impacted communities. Governments should share data and progress with the public to increase transparency and accountability.



Strategy 2

Collaborate with local community groups to understand on-the-ground conditions

Meaningful engagement gives CBOs and community members a seat at the table and allows community needs to drive the process. The current state of practice is that flood resilience projects are often planned and designed with limited input from members of the community that the project aims to serve. When community members are not made aware of a project until it is well underway, their input is largely symbolic or an exercise to “check the community engagement box.” Beyond proactive engagement on individual projects, maintaining consistent and open lines of communication with CBOs can inform government understanding of problems that exist, where problems occur most frequently, and the solutions or projects sought by community members to remediate recurring flooding.

Key principles



Centering community voices



Intentional trust building



Holistic solutions

Benefits

- ✓ Builds trust with communities
- ✓ Reduces barriers to community participation
- ✓ Promotes community-led decision-making
- ✓ Ensures investments advance community goals
- ✓ Corroborates engineering studies with first-hand information on the type and extent of flooding
- ✓ Promotes government accountability and transparency

Best practices

2A. Partner with local community groups to co-define goals, identify problem areas and desired solutions, and verify data assumptions

Flood resilience solutions and powerful data analysis are most useful when they're combined with on-the-ground information from communities in affected areas. Broadly defining community to include local non-profit organizations, environmental groups, and neighborhood associations could increase the coalition of residents in support of infrastructure improvements. Flooding-related decision-making bodies, such as project steering committees, should strive to reflect the diversity of the communities they represent and encourage ongoing public participation. Before initiating engagement, it's important to understand and acknowledge the work that has already been done by groups to identify community needs and priorities.

Case study: Community-based technical assistance providers

In April 2023, Blacks in Green, in collaboration with five other community-based and community-serving organizations, received \$10 million to establish technical assistance centers across EPA Region 5. The centers will provide technical assistance, training, and support to communities with environmental justice concerns. Assistance will focus on program development and administration, clean-energy workforce development, assistance in navigating federal grant applications and identifying alternative funding sources, as well as cultivation of Sustainable Square Mile systems in their communities.²²

“Equity won’t happen while agencies continue to give grants to municipalities that don’t allow community members to participate. We need voices of the community to be heard.”

- Delia Barajas, Voces Fieles Comunitarias Contra la Opresión

2B. Center community needs in project planning and design

Successful flood resilience planning includes community members at the earliest opportunity and provides a two-way flow of information between implementers and residents. Early engagement activities to co-define community goals can reveal community priorities and needs. Engineers and planners should consider the totality of community input when planning flood resilience investments. By taking a holistic approach to the underlying problem, co-benefits can be achieved (see Strategy 3).

Design teams should develop and present different design scenarios for community input through a steering committee or public meetings. Flood resilience improvements often must balance project goals with available funds, maintenance capacity, and other constraints. While these constraints exist, providing different design alternatives can allow project planners and engineers to talk through the tradeoffs of each scenario and get meaningful input from grassroots organizations and community members on what they value most.

Case study: A community led process

The Chicago Department of Public Health (CDPH) conducted a cumulative impact assessment of multiple environmental, health, and social stressors across the city. The city convened a group of environmental justice leaders to establish the Environmental Equity Working Group (EEWG). The EEWG guided how the assessment should be conducted and served to hold the city accountable throughout the assessment process. In addition to the EEWG, the city established three working groups comprised of community representatives and CDPH staff: Data and Methods, Communications and Engagement, and Policy.

Collectively, the groups co-designed assessment methods, conducted the assessment, and made public a baseline report with recommendations. The final report was released in late 2023, with key findings identified from listening sessions, making it easy for community members to stay informed.²³

2C. Produce materials that are easy to read, understand, and share

Public engagement generally fails to both educate the audience on the underlying topic and present the material in a way that is accessible to a non-technical audience. Traditional outreach initiatives, such as open houses and public hearings, are most accessible to people who have free time to dedicate to civic engagement and/or can adjust their schedules to attend meetings. Virtual meetings can make it easier for some people to attend, but require internet access, which may be a challenge for others and may not create an inviting space for community members to participate. As such, people who are impacted by the project or plan may not have their voices heard due to work schedules and other commitments. Inconvenient outreach could create a sense that the project is only for those who can attend and not the entire community.

A meaningful engagement process establishes clear pathways for the community to inform project outcomes and recommendations while providing a range of accessible engagement opportunities for stakeholders with different schedules and communication styles. Meeting location, timing, duration, format, translation services, and the availability of on-site childcare are key considerations when planning an engagement event. Another best practice is to meet people where they are, such as attending a regularly scheduled community meeting or community-led events.

2D. Monitor the effectiveness of engagement and identify gaps in participation

Collect participation data (e.g., age, gender, race, and disability) to reveal if certain groups are being omitted from the process. This information, as well as comments on the engagement itself, can be collected through an event feedback survey.²⁴ It is also important that the project discuss successes, areas for improvement, and lessons learned. A post-project reflection worksheet can help teams reflect on their experience and what they would change when conducting meaningful engagement in future projects.²⁵

2E. Compensate community groups for their time and expertise

County, municipal, and private contractor staff are compensated for their time spent planning, designing, and constructing projects. Community groups with deep local expertise provide an invaluable service to project teams and should likewise receive compensation. Honorariums demonstrate government commitment to supporting local knowledge and provide material support for attending meetings, reviewing materials, or auditing engagement plans. Providing compensation can also help foster and strengthen relationships between community groups and government organizations.

Case study: Funding community group participation

CMAP's Community Alliance for Regional Equity²⁶ is a multiyear investment to ensure that the agency's engagement is more equitable and inclusive of communities that are traditionally excluded from the planning process. The collaborative, made up of 12 CBOs, is working with CMAP to make our investment processes more equitable and strengthen community collaboration. To compensate them for their time and expertise, each member organization received a \$10,000 honorarium to participate for one year with the potential for multiyear participation. CMAP hired a third-party organization to execute concise memorandums of understanding with each member organization and distribute the checks. Working with a knowledgeable third-party organization allowed CMAP to both fund honorariums using U.S. Department of Transportation funds and gain administrative efficiencies.

STRATEGY 3

Maximize project benefits and reduce unintended consequences

Flood resilience improvements should take a holistic approach and move beyond single-purpose infrastructure to advance multiple community goals. While flood resilience may be the most apparent need, it is important to understand related deficiencies in public health, housing, education, recreation, transportation service and infrastructure, and economic development. It is also important to anticipate unintended consequences from improvements such as increased downstream flood risk, increased housing costs, or reductions in affordable housing stock due to flood buyouts or other investments. Implementers can maximize both the benefits of resilience investments and community buy-in by identifying project co-benefits that advance community goals, collaborating with non-stormwater entities, and employing measures to reduce unintended consequences.

Key principles



Centering community voices



Intentional trust building



Holistic solutions



Long-term planning

Benefits

- ✓ Promotes collaboration with non-stormwater organizations
- ✓ Ensures investments advance multiple goals and maximize community co-benefits
- ✓ Builds trust with communities and promotes accountability and transparency by reducing unintended consequences
- ✓ Reduces implementation costs by leveraging alternative funding sources

Best practices

3A. Identify potential co-benefits from flood resilience investments

Co-benefits are community benefits *in addition* to flood mitigation and stormwater management. Some examples include parks, open space, recreation, and community space or venues used for arts and cultural activities; neighborhood beautification; improved transit, walkability, accessibility, and safety; affordable housing; and economic revitalization. Investments can also be designed to maximize indirect benefits such as improved public health through air and water quality improvements; increased shade from trees; education and environmental stewardship among community members who assist with maintenance; and community sustainability, climate resilience, and decarbonization.

Using the information collected in early engagement activities, engineers and planners should identify ways for flood resilience investments to achieve co-benefits in alignment with community goals. Collaborating with experts in parks and recreation, transportation, housing, community and economic development, climate and sustainability, and public health can help the team understand community priorities and needs and identify opportunities to leverage efforts from other agencies such as coordinating with other public infrastructure investments. These types of partnerships can also unlock new sources of local, state, and federal funding to help bring multipurpose projects to reality.

“It feels like stormwater and flooding issues are described as having more to do with costs to homeowners, but what about the cost to our health? This is especially true for renters.”

- Olga Bautista, Southeast Environmental Task Force

Case study: Robbins Stormwater Park

The Robbins Stormwater Park and Midlothian Creek Restoration Project²⁷ is a two-part project intended to reduce flooding on 140 acres of land and provide new open space and recreation amenities in a community with a history of disinvestment. The project will restore a riparian corridor along Midlothian Creek, create a new stormwater detention pond with surrounding park space, and establish a stormwater pond overflow channel to the Cal-Sag Channel. This work is being led by MWRD, in coordination with the Village of Robbins, and several public and private organizations.

To be successful, this project needed to address local needs beyond stormwater management. By meeting with local stakeholders early in the process and recognizing the importance of centering their needs as priorities, MWRD and their partners were able to develop a truly innovative approach that not only reduces flooding but also provides much-needed park space. The project was further supported by the Robbins Transit Oriented Development and Industrial Areas Plan,²⁸ created through a partnership with CMAP, which establishes a vision to expand affordable housing options and support long-term economic development.

3B. Collaborate with organizations to mitigate displacement and loss of affordable housing stock

Flooding and mitigation solutions have a direct nexus to the need to provide safe, affordable, and adequate housing for residents of all income levels. While resilience investments are specifically designed to reduce flooding of homes or structures, they could create unintended negative consequences in historically disinvested communities.

Effort to purchase and demolish flood prone properties are one of many resilience investments a government can make. However, the practice can negatively impact a community by reducing affordable housing stock (rental or otherwise). Because flood-prone homes are valued less, homeowners pursuing a property buyout may not receive enough money to stay in the community or buy somewhere else. Property buyouts can also lead to property devaluation and community destabilization, especially in areas with a history of disinvestment.²⁹ The historical and systemic placement of people of color in flood-prone areas means that attempts to limit development in those spaces can disproportionately impact people of color with low to moderate incomes.

On the other hand, flood resilience investments such as green schoolyards and stormwater parks can increase property values which, in turn, can displace residents who cannot afford higher property taxes or rents. In these cases, flood resilience investments — as well as other investments in infrastructure — can negatively affect the people they were designed to help. When displacement occurs, residents may be forced to leave their community and lose out on the benefits of the investment they worked hard to achieve.

Anti-displacement strategies should be considered for areas where displacement is a real or perceived concern. These strategies include providing renter protections, stabilizing rents, and preserving or expanding affordable housing. The 606-Pilsen

Demolition Permit Surcharge Ordinance³⁰ demonstrates a way to preserve original affordable housing and prevent community displacement associated with public investments in multi-use trails and recreation amenities.

Collaborating with the Illinois Housing Development Authority (IHDA), local housing organizations, county land trusts, community development agencies, and other organizations can help define and mitigate these unintended consequences. IHDA provides several programs and resources, including free technical assistance, to help communities address housing issues similar to those discussed above.³¹

Case study: Preventing displacement in flood buyout projects

Like many communities, flooding is a key challenge for the Village of Ford Heights. Seven percent of the village is located within the 100-year floodplain of Deer Creek, including a significant portion of the community's housing stock. Over the last several years, the village has worked with MWRD, Cook County, and other agencies to determine the feasibility of large-scale flood-prone property acquisition which would remove 121 residential properties from the floodplain.

Acknowledging the unintended impact that this project could have on the town's housing supply, Ford Heights began working with CMAP through its NEXT Program. CMAP convened an expert panel with IHDA representatives to identify strategies to increase the housing supply in Ford Heights and prevent the displacement of residents within the project study area. The panel developed four recommendations for the village:

- Address vacant and abandoned residential properties, outside of the project study area, through the State of Illinois' Strong Communities Program³²
- Apply for the State of Illinois' Home Repair and Accessibility Program³³ to improve the condition of owner-occupied housing units

- Leverage proactive planning services offered through the State of Illinois' Community Revitalization Program³⁴ to prepare for affordable housing development
- Connect residents with local housing counseling services and down payment assistance programs

Equipped with these recommendations, Ford Heights can work with IHDA and local housing organizations as well as MWRD, Cook County, USACE, and other agencies to develop a buyout project that mitigates flooding and ensures that residents can find safe and affordable homes within the community.

3C. Ensure that communities downstream of a flood solution are not at increased risk of flooding

While regulations have helped to prevent downstream flood impacts resulting from an improvement, the project design may not take the full watershed or sewershed into account. Increasing the size of a pipe in one location could negatively affect a community downstream by increasing the rate and volume of water flowing through the pipe to a neighboring community. Use data on income, race and ethnicity, linguistic isolation, disability, age, renting population, and municipal capacity to understand who could be at risk. Verifying the impacts of a project, both positive and negative, and clearly communicating the impacts to potentially affected communities can also help build trust and mitigate potential suspicions that the project could cause harm.



STRATEGY 4

Provide equitable maintenance and operations of infrastructure

While significant funds are devoted to the design and construction of capital improvements, their community value hinges on sustained maintenance. Failing stormwater infrastructure can cause flooding and associated financial, housing, health, and employment impacts, and costly emergency repairs or maintenance. Maintenance of such improvements is, generally, the local jurisdiction's responsibility — typically the municipality. Municipalities that receive funding to design and construct improvements are also, ultimately, responsible for maintaining the infrastructure over its intended lifespan.

Both green and gray infrastructure require routine maintenance. However, green stormwater infrastructure (GSI) requires more intensive maintenance in the first two years following installation and is more noticeable than gray infrastructure when neglected. As more investments are directed to disproportionately impacted communities, municipalities, counties, and other organizations must ensure the investment serves the community over the long term.

Key principles



Centering community voices



Intentional trust building



Prioritized investments



Long-term planning that includes a sustainable maintenance plan

Benefits

- ✓ Builds trust with communities
- ✓ Promotes accountability and transparency
- ✓ Ensures investment continues to function and benefit the community
- ✓ Promotes collaboration among organizations
- ✓ Supports lower-capacity municipalities
- ✓ Creates new local job opportunities

Best practices

4A. Understand operations and maintenance needs for existing infrastructure and eliminate disparities

Stormwater management and flood mitigation systems should provide a high level of service to all communities. The first step to understanding a community's existing infrastructure's need for maintenance, repair, and replacement is to develop an asset inventory and database to understand where existing assets are located and document the condition and whether flooding has occurred. For assets that have flooded, it is important to determine the root cause of the flooding. Is it due to poor maintenance — for example, are the drains clogged or have pipes collapsed? Or is the flooding due to undersized infrastructure? In many cases, the problem could stem from both insufficient maintenance and infrastructure capacity.

Next, analyze the inventory of asset location and conditions against data on race, ethnicity, and income to identify potential inequities in infrastructure service and response time. For example, are complaints in higher-income neighborhoods prioritized over complaints in lower-income neighborhoods? Are complaints underreported in lower-income neighborhoods or in majority communities of color?

Asset managers, including municipal public works departments, can take the information learned from the assessment and prioritize communities that are underserved and underreported. The City of Oakland's paving plan illustrates how repairs can be prioritized based on the asset's condition and benefit to communities defined as underserved based on race and ethnicity, income, disability, rent burden, linguistic isolation, and age (youth/seniors).³⁵

Municipalities and counties can also put mechanisms in place for staff and CBOs to easily share feedback

which can help build trust that the local government will address their needs. Community engagement and other efforts to build relationships with CBOs and community members will help to illuminate issues in service as they come up as well.

4B. Develop asset management plans for existing and new assets

Municipalities should develop asset management plans for existing green and gray infrastructure to ensure a proactive (as opposed to reactive) approach to maintenance. For new projects, counties and municipalities should work with design and engineering teams to develop an asset management plan and a budget for maintenance early in the design phase to ensure that future needs are identified and can be met.

An asset management plan should answer questions such as:³⁶

- Who is available to provide inspection and maintenance?
- What needs to be done and when?
- What special equipment is needed?
- How will maintenance be funded (e.g., local revenues, community volunteers, etc.)?
- Infrastructure sustainability — is there an opportunity to advance workforce development training for green infrastructure maintenance?
- What is the process for community members to report maintenance needs and issues?

If maintenance capacity is a concern, design teams should work with the municipal government and the community to explore the potential for low-maintenance solutions, such as planting lower-maintenance, drought-tolerant plants and trees and incorporating river rock and other cover types. This includes understanding the tradeoffs between lower maintenance and less vegetation for both the municipal government and the community.

4C. Consider affordability when exploring revenue options to support drainage infrastructure

Municipal stormwater and sewer utility fees can provide a sustainable stream of funding for maintenance. However, establishing or raising fees in historically disinvested communities can have a disproportionate impact on those who can least afford it. Local governments should consider affordability when exploring options for raising local revenue. For example, providing options to support residents' different financial circumstances, such as discounts, rebates, and forgiveness, while still raising revenue to help maintain community improvements.³⁷

The Northeast Ohio Regional Sewer District offers cost-saving programs for qualifying customers based on age, disability status, and income. The affordability program offers a 40 percent reduction in the sewer and stormwater bill for customers at or below 250 percent of the poverty level, including for renters responsible for paying the bill.³⁸

“Green infrastructure should be a source of community pride, but that’s not the case when it’s not well maintained. The financial investment is lost, as well as the time and energy invested by volunteers.”

- Kara Riggio

4D. Collaborate and explore creative solutions to meet maintenance needs

Partnerships can help municipalities reduce the funds, staffing, and equipment required for green and gray infrastructure maintenance. Many municipalities do not have enough funds for maintenance. For towns with just a few green infrastructure installations, the maintenance needs may not warrant hiring or training a team of maintenance contractors.

Partnerships with forest preserve districts, conservation districts, local colleges, or non-governmental organizations such as OAI can help a municipality maintain one or more green stormwater infrastructure installations. Coordinating volunteer days with community groups can be an effective strategy to remove trash and debris which can obstruct outlets and cause nuisance ponding. Volunteer days are also a way for community members to get involved, build community bonds, and grow pride in one’s community.

Several approaches to intergovernmental coordination, including joint procurement and shared service contracts between multiple municipalities, can help pool and deploy resources more efficiently for both green and gray infrastructure maintenance. Efforts such as the Suburban Purchasing Cooperative³⁹ and McHenry County Municipal Partnering Initiative⁴⁰ have successfully coordinated joint purchasing and contract bids, typically for public works and transportation-related goods and services, securing lower prices and offering a platform for coordination.

Shared service contracts, where multiple local governments enter a single contract with a service provider, can also increase efficiency and cost-effectiveness. However, there are challenges that must be overcome. OAI is currently working with several municipalities in the Calumet region to pilot a shared services approach to GSI maintenance. In the process, the participating organizations hope

to identify solutions to common challenges, such as changes in municipal leadership and public works staff, execution of access agreements and contracts, as well as fairly sharing time and resources across partner communities. Having a third-party organization like OAI overseeing a shared services contract allows an independent third party to manage the budget and make maintenance decisions based on the needs of a given site, which may differ from year to year.

4E. Develop a local workforce to provide maintenance, especially for green stormwater infrastructure installations

Investments in green stormwater infrastructure can create new business and workforce opportunities in historically disinvested communities. However, labor shortages and a lack of local contractors make it difficult to hire locally. Efforts are needed to define career paths for entry-level workers and identify training needs to help them advance. Entities such as OAI, Openlands, MWRD, Current, Greencorps Chicago, and several sister agencies at the City of Chicago are working together to outline areas of focus for GSI workforce development.

Developing standard operating procedures for maintenance inspections and activities is also important to help educate less experienced maintenance staff, especially for municipalities with high staff turnover.

“We need to have a concrete and long-term strategy for maintenance. Who pays, and who is responsible for paying? We can’t continue this cycle.”

- Kara Riggio

Case study: Exploring a coordinated approach to GSI maintenance in Chicago

The Space to Grow partners — Healthy School Campaign and Openlands — are working with the City of Chicago’s Office of Climate Equity and Environmental Justice to convene a working group to develop a comprehensive maintenance plan for publicly-owned GSI projects within Chicago. This multiagency effort brings together a steering committee and four topical subcommittees with representatives from nine public agencies and several nonprofit partners focusing on mapping and data inventory, workforce development and training, standards and guidance, and policy and funding.

The working group has identified short-term needs that include an inventory of all publicly owned GSI in Chicago, as well as detailed recommendations and cost estimates for maintaining the city’s GSI, with a focus on workforce training, design and construction standards, and policy and funding.

This project is particularly noteworthy for its comprehensive approach. While resources such as GSI inventories and strategy lists are helpful, more resources are needed to address the challenge. And so, this project goes further by not only exploring recommendations for developing the workforce needed to sustain GSI long-term but also building partnerships with funders and implementers to begin designing and organizing training even before the final plan is released.

STRATEGY 5

Reduce barriers for municipalities to access funds

State and federal funds play a key role in the development and maintenance of stormwater infrastructure projects. These funds are particularly important for projects located in communities that lack the ability to independently fund large capital projects. There are, however, key barriers that prevent these funds from reaching the communities that need them the most. This section highlights key challenges facing community groups and municipalities seeking external government funding and presents several actionable strategies that county and other funding agencies can implement to improve access to grants, loans, and other programs in historically disinvested areas.

Key principles



Centering community voices



Intentional trust building



Prioritized investments



Long-term planning that includes a sustainable maintenance plan

Benefits

- ✓ **Builds relationships among funders and municipalities**
- ✓ **Facilitates more funding applications from low-capacity municipalities**
- ✓ **Prioritizes investments to disproportionately impacted communities**
- ✓ **Strengthens municipal capacity to seek and manage funds**
- ✓ **Prepares for long-term needs**

Best practices

5A. Provide technical assistance for planning and project development

Flood studies and long-range plans are essential tools to identify and develop flood mitigation projects for external funding. However, most funding for flood mitigation is dedicated for shovel ready projects, meaning that municipalities must rely on internal funding sources to complete the pre-design work required to make a project eligible for funding. This can be a significant barrier for under-resourced municipalities that may lack the financial or staff capacity to proactively develop well-formulated projects to submit for grant funding.

Technical assistance is targeted support to governments and CBOs. Providing technical assistance for planning, baseline flood studies, and preliminary design work can give municipalities the information needed to prepare a competitive grant application. Successful grant applications demonstrate how the requested services or project can help the community reach its goals for flood resilience and other co-benefits. This type of assistance can also enhance the municipality's ability to attract private investment through redevelopment.

MWRD provides two types of technical assistance. Their Stormwater Partnership Program,⁴¹ which was developed to support shovel-ready projects, sets aside funds to help municipalities with lower capacity develop project concept plans. These plans provide the preliminary design work needed to identify stormwater and flood mitigation solutions and develop order-of-magnitude cost estimates for final design and construction. MWRD also provides data and planning assistance to help municipalities perform baseline flood studies in one or more communities. These studies and plans inform grant or partnership applications by helping a community understand where and why it floods and begin to identify potential solutions aligned with broader community goals.

5B. Strengthen relationships between funders and municipalities

Changes in leadership often result in a loss of institutional knowledge, a re-ordering of priorities, and a reduced emphasis on implementing plans created by the previous administration. When county and other funders conduct regular outreach to municipal partners, such as city/village administrators, public works directors, or engineers, it reduces the impact that elected official and staff turnover can have on a community's ability to access funding. While staff may come and go, building relationships with multiple staff members at a municipality can help sustain the relationship over time.

The most successful funders do this by including ongoing municipal outreach as a key work plan element for one or more employees. This allows the funding agency to both develop meaningful, long-term relationships with municipal staff and build an understanding of internal processes. Assigning staff to conduct periodic, non-project-specific outreach also reduces the funding agency's reliance on mass emails, which are generally not a successful way of engaging municipal governments with limited staff capacity.

Case study: Connecting municipalities with funding opportunities

The Cook County Department of Emergency Management and Regional Security has created a knowledge management system to house participating municipality hazard identification information, thereby allowing the county (and region) to access a list of prioritized flood mitigation projects identified and championed by relevant jurisdictions. When funding is available, the county can scan through a list of projects and work directly with eligible municipalities to create a funding application.

5C. Streamline the application process

Many funders report a desire to support projects in historically disinvested communities but struggle to attract applications. One of the common reasons cited by communities for their failure to apply is the complexity of the application process itself.

Lengthy and complex applications require time and expertise to complete, which may be a barrier to municipalities with limited staff availability. When developing application processes, funders should think critically about what information is truly necessary to make an award decision. Requirements such as financial studies, concept plans, and preliminary engineering can strain municipal resources with no guarantee of receiving funds. When these elements are necessary, funders can help reduce barriers through preliminary technical assistance.

Creating a clear and understandable timeline for grant submission, review, awarding, and receiving is another key need highlighted by communities. Applicants should be provided with status updates throughout the review process, and any changes to the timeline should be clearly communicated well in advance. Funders should also seek to reduce barriers by using plain language⁴² in all application and pre-application materials, consistent with guidance from the federal government.

The Cook County Department of Environment and Sustainability demonstrates many of these best practices in their application process for Climate Resiliency Planning⁴³ grants. All application materials, requirements, and preferences are clearly communicated on the department's website, as well as a timeline for application review and approval. The county also sought to create a concise, user-friendly application process. This avoided time-intensive requirements, such as detailed budgets and work plans, in favor of more targeted questions about municipal capacity and past work experience.

5D. Allow for flexible match requirements based on municipal capacity

Many funding programs require a local match or are reimbursement programs, meaning that municipalities must pay for services upfront, invoice the funding entity, and wait for invoice processing and payment, which can take months. These requirements are appropriate in many contexts but can present a barrier to participation in historically disinvested communities. To ease this burden, some funders have reduced or eliminated local match ratios for high-need municipalities.

CMAP determines the level of local capacity and technical assistance needed for communities in the region using the Community Cohort Evaluation Tool.⁴⁴ This tool assigns community cohorts throughout northeastern Illinois based on four factors: population, income, tax base per capita, and percent of population located in an economically disconnected or disinvested area.⁴⁵ Program contributions paid by communities receiving technical assistance are based on a community's cohort, with cohort 1 providing the largest contributions, and cohort 4 communities paying the least.⁴⁶ When reviewing applications, preference is given to projects in cohort 3 and 4 communities, though projects located in cohort 1 and 2 communities that directly benefit disadvantaged communities also receive preference. Cohort 4 communities are also given a greater degree of flexibility for scheduling contribution payments.

5E. Provide technical assistance for grant application and management

Applying for grants and overseeing the acceptance and expenditure of grant funds requires a level of attention and expertise that may challenge some municipalities. Receiving funds, processing and documenting invoices, budgeting hours, and recording expenditures all require institutional know-how.

Funders can address this challenge by providing capacity building assistance in addition to financial support for projects. Generally, capacity building work focuses on three areas:⁴⁷

- Building expertise through training for elected and appointed officials as well as staff to increase internal technical expertise;
- Building networks by creating accessible information and trusting relationships to enable discussions about challenges and shared needs; and
- Building capacity by providing tools, fiscal resources, and staff (even if from other agencies/entities) to plan and implement studies and projects.

FEMA's Building Resilient Infrastructure and Communities⁴⁸ program does this by allocating funds for Capability and Capacity Building projects. This program funds a variety of different project types, with most focusing on updating building codes, creating and sustaining partnerships, or hazard mitigation planning.

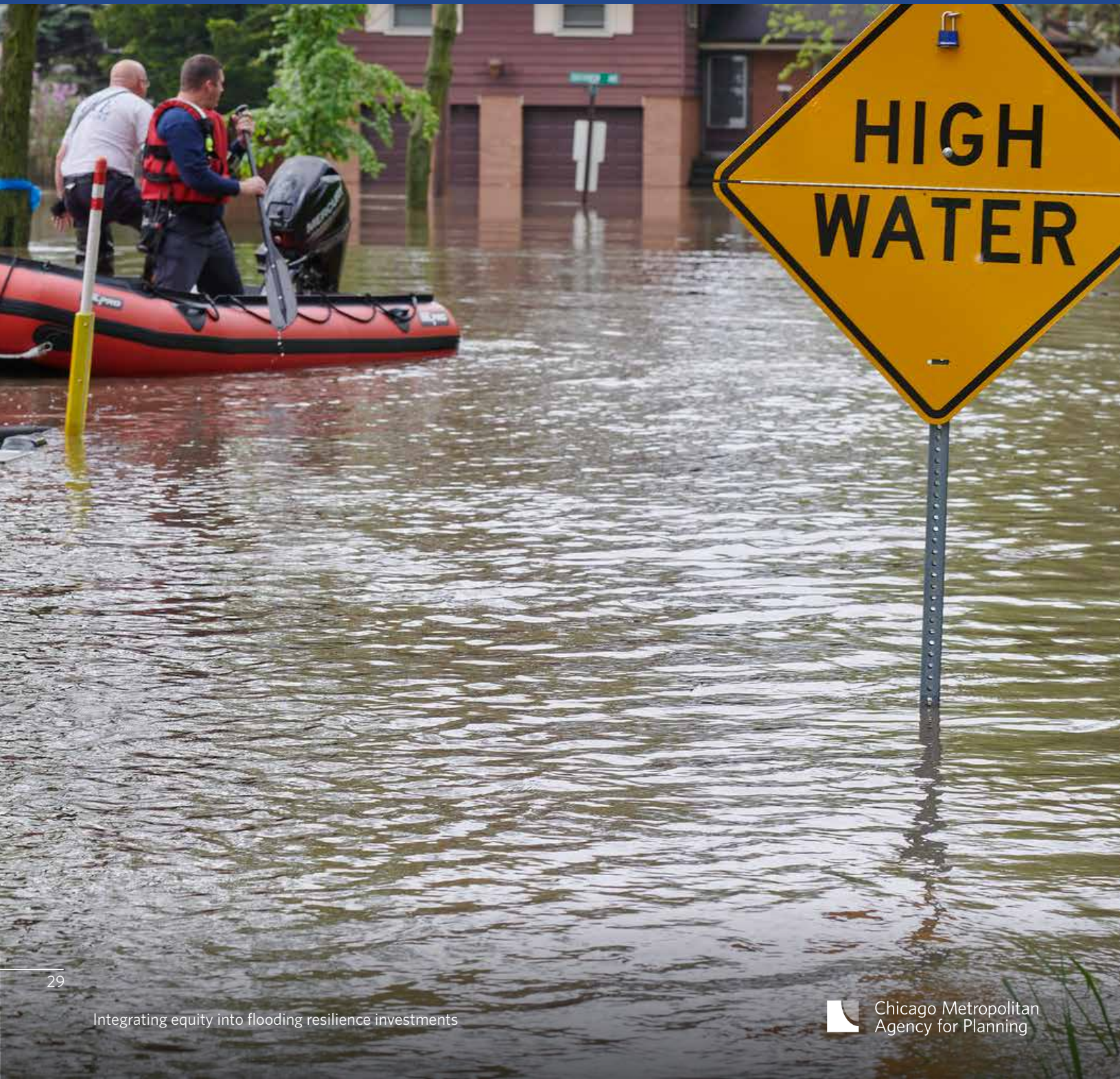
Case study: Hands-on assistance

CMAP has partnered with municipal and county governments to support planning projects through its technical assistance program since 2011. Historically, the program provided CMAP staff or consultant assistance to complete planning projects, but in recent years, has also provided resources and training to municipal staff and officials that help build capacity for accessing and managing county, state, and federal grants. This assistance is now offered through the annual call for projects, alongside more traditional planning efforts, such as corridor studies and transportation safety action plans.

Each grant readiness project is tailored to the needs of a specific community, but generally focuses on municipal procedures and tools to identify capital projects, apply for grants, and manage the appropriate application of grant awards to community improvement projects. CMAP typically works with the municipality to understand existing roles and processes, then establish with the partners a workflow of procedures that identifies specific positions — rather than individuals — who are responsible for overseeing every step of a grant life cycle, beginning with project identification and ending with successful project closeout. These processes often incorporate a series of user-friendly Excel-based tools developed by CMAP and customized for the community that allow for the tracking of applications and grant-funded projects.

SECTION 3

TAKING ACTION



Implementing the best practices highlighted in this guide can improve the health and resilience of communities, with a special focus on assisting those most in need. Engineers and planners should collaborate with local stakeholders to identify which practices make the most sense in their context. For new projects, it is important to consider equity at the earliest stages to ensure best practices (or innovations) are incorporated into the project scope, vetted with local community groups, and properly budgeted. Piloting best practices within individual projects can help garner organizational support to scale up to the program level and thus multiply the impact.

Engineers, planners, and others seeking to advance equity in flood resilience should be flexible in their approach. This involves continually measuring the progress and impact that projects and programs have toward advancing equitable outcomes, obtaining feedback from local community groups, discussing lessons learned from implementing equity-centered practices, and making adjustments to improve the process or outcomes.

Regional analysis and policy development

CMAP is committed to advance equity in flood resilience investments through regional analysis and policy development. CMAP is in the process of updating the regional flood susceptibility indexes (FSIs).⁴⁹ Developed in 2017, the urban and riverine FSIs identify areas across the seven-county region that may experience a higher risk of flooding due to various factors. Locations with higher FSI scores exhibit characteristics that may make them more susceptible to riverine or urban flooding than other parts of the region. Streets and properties highlighted in these locations could be more prone to overbank flooding, concentrated overland flow, ponding due to surface flow or sewer backups, water seepage, and basement backups. These indexes were not intended to replace more localized or technical modeling efforts; instead, they were designed to identify larger-scale priority areas where the region can focus its stormwater mitigation and resilience planning efforts.

Once the update is complete, CMAP will analyze the FSIs with the equity-related data provided in Table 2 to identify communities that are disproportionately impacted by flooding in northeastern Illinois. This analysis will help CMAP uncover potential inequities and identify trends that can help inform regional and local policy improvements and investment decisions, informed by the key principles and strategies of this guide. CMAP anticipates publishing and communicating the results in early 2024.

Data resources

Interested in learning more about equity- and flood-related data? Consider exploring the following resources.

Equity-related data

Table 2 provides the recommended list of equity-related data referenced in this guide, including a description, source, and questions that the data can help answer. Table 3 highlights the data layers that are relevant to each best practice outlined in Section 3. CMAP has compiled the equity-related data and made it available for download on the [CMAP Data Hub](#).

Most of the equity-related data is available to view in screening tools maintained by the federal government as noted in Table 2. These tools include:

- Climate and Economic Justice Screening Tool (CEJST) was developed by the White House's Council on Environmental Quality in 2022 to identify disadvantaged communities under the Justice40 Initiative. CEJST should be used when evaluating eligibility and competitiveness for certain federal funding opportunities, <https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5>.
- EJ Screen was developed by USEPA to screen communities for potential environmental justice concerns, <https://www.epa.gov/ejscreen>.

- Environmental Justice Index (EJI) was developed by the CDC to rank the cumulative impact of environmental injustice on health, <https://www.atsdr.cdc.gov/placeandhealth/eji/index.html>.
- Social Vulnerability Index (SVI) was developed by the CDC/Agency for Toxic Substances and Disease Registry Geospatial Research, Analysis, and Services Program to identify communities that will likely need support as a result of a hazardous event, https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html.

Flood-related data

Equity-related data is most useful to flood resilience efforts when paired with data on flood risk or exposure. More and more public data on flood risk is being made available, including from counties, stormwater agencies, planning agencies, and non-profit organizations. Below is a list of known sources of public data for northeastern Illinois.

Regional/state

- Building footprints, Illinois State Water Survey, <https://www.illinoisfloodmaps.org/building-footprints.aspx>.
- FEMA Flood Insurance Rate Maps, studies, and database products by county, Illinois State Water Survey, <https://www.illinoisfloodmaps.org/resources-county.aspx>.
- Flood Susceptibility Indexes, CMAP, <https://data-hub.cmap.illinois.gov/documents/0e4ddb54f1fd4d05963d9e604c31617b/about>.
- Topographic Wetness Index, Illinois State Water Survey, <https://www.illinoisfloodmaps.org/topo-wetness-index.aspx>.

County/municipal

Chicago

- 311 Service Requests (water in basement complaint, water on street complaint), <https://data.cityofchicago.org/Service-Requests/311-Service-Requests/v6vf-nfxy>.

Cook County

- 1 ft. elevation contours, <https://hub-cookcountyil.opendata.arcgis.com/documents/dc5795b953ea4e-a1bbf47e737fb24126/about>.
- Digital elevation model, <https://hub-cook-countyil.opendata.arcgis.com/datasets/5ff0bf2707854717a3fe7a57f368ab4c/explore>.
- Lakes, https://hub-cookcountyil.opendata.arcgis.com/datasets/078a8acf872548eb9c91d-68658f2895a_8/explore.
- Streams, https://hub-cookcountyil.opendata.arcgis.com/datasets/caa697dac1944713bf5f9f7e17fd-c0c5_6/explore.

DuPage County

- Rivers and streams, <https://gisdata-dupage.opendata.arcgis.com/datasets/rivers-and-streams-1/explore>.
- Watersheds, <https://gisdata-dupage.opendata.arcgis.com/datasets/DuPage::watersheds/about>.
- Wetlands, <https://gisdata-dupage.opendata.arcgis.com/maps/f585762ad192415c88e4ee48a63d103a/about>.

Kane County

- Floodplain maps and resources, <https://www.county-ofkane.org/FDER/Pages/environmentalResources/waterResources/floodplain.aspx>.
- KaneGIS4 Viewer (includes FEMA flood zones and stormwater layers), https://gistech.countyofkane.org/gisims/kanemap/kanegis4_agox.html.

Kendall County

- GIS Map Viewer (includes repetitive loss properties), <https://maps.co.kendall.il.us/mapviewer/>.

Lake County

- Lake County, Illinois Maps Online (includes drainage, National Flood Hazard Layer, soils, topography, and water data), <https://maps.lakecountyil.gov/mapsonline/>.
- Stormwater Capital Improvement Program, <https://lakecountyil.maps.arcgis.com/apps/MapSeries/index.html?appid=eb3712b9d1884e7d-b7ade7842878566f>.

McHenry County

- Athena - Public Property Search Viewer (includes FEMA flood zones, soils, topography, wetlands, and watersheds), <https://www.mchenrycountygis.org/athena/>.
- PlanDev Viewer (includes land use, FEMA flood zones, soils, topography, wetlands, and watersheds), <https://www.mchenrycountygis.org/planning/>.

MWRD

- MWRD inundation areas, <https://geohub.mwrdd.org/maps/b23f10c6901b4a1bb4ddde702ff4327f/about>.
- MWRD, Stormwater Inundation Mapping Application, <https://gispub.mwrdd.org/swima/>.

Will County

- Open Geo-Spatial Data portal (includes access to aerial, topography, and vector data such as FEMA flood zones, hydrology, soils, and watersheds) <https://www.willcountyillinois.com/County-Offices/Administration/GIS-Division/Data>.

Flood- and equity-related screening tools or map products for Cook County

- Chicago and Cook County Greenprint, The Nature Conservancy, <https://conservation-greenprinting-in-illinois-tnc.hub.arcgis.com/>.
- Natural Solutions Tool, Friends of the Chicago River and Trust for Public Lands, https://web.tplgis.org/chicago_nst/.⁵⁰
- Urban Flooding Baseline Inventory (for the Calumet region), Center for Neighborhood Technology, <https://ufb.cnt.org/>.

Table 2. Recommended list of equity-related data to inform flood resilience investments

Low income	Description	What questions can this data help answer? ⁵¹
	<p>People with low incomes may live in locations with higher flood risk and have fewer financial resources to prevent and recover from flooding. Lower-income residents are also at higher risk of being displaced by flood resilience investments.</p> <p>Definitions Households below 200% of the federal poverty level.</p> <p>Source U.S. Census, ACS, 2015-2019</p> <p>Screening tool(s)⁵³ CEJST, EJ Screen, EJI, SVI</p>	<ul style="list-style-type: none"> • Which communities can least afford to recover from a flood? (1a) • Have previous investments benefitted people with low incomes? (1c) • Does the current project selection and evaluation process prioritize projects that benefit people with low incomes? (1d) • Have recent investments benefitted people with low incomes? (1e) • What investments can increase flood resilience and housing affordability for people with low incomes? (3a, 3b) • Could people with low incomes experience ‘downstream’ impacts? (3c) • Are operational service and maintenance consistent and directed towards communities with low incomes? (4a, 4c)

<p>Race and ethnicity</p>	<p>Description Systemic racism has discriminated against people of color, causing racial and ethnic inequities in wealth generation, health conditions, and community investment.</p> <p>Communities of color include those identifying as majority Black, Indigenous, Hispanic or Latino, and Asian American and Pacific Islander.</p> <p>Definitions Individuals who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino.</p> <p>Source U.S. Census, ACS, 2017-2021</p> <p>Screening tool(s)⁵² EJ Screen, EJI, SVI</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which communities have experienced racial inequities and may have more difficulty recovering from a flood? (1a) ▪ Have people of color affected by a project been consulted? (1b, 2a) ▪ Have previous investments benefitted people of color? (1c) ▪ Have recent investments benefitted people of color? (1e) ▪ Could people of color experience 'downstream' impacts? (3c) ▪ Are we consistent in operational service and maintenance in communities of color? (4a)
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<p>Linguistic isolation</p>	<p>Description Not all governments provide materials in languages other than English. As such, people with limited English-speaking abilities face greater barriers to accessing resources that can assist with flood prevention and recovery.</p> <p>Definitions Households where no one over age 14 speaks English very well. These populations are also referred to as having LEP.</p> <p>Source U.S. Census, ACS, 2015-2019</p> <p>Screening tool(s)⁵² CEJST, EJ Screen, EJI, SVI</p>	<p>What questions can this data help answer?⁵²</p> <ul style="list-style-type: none"> ▪ Which communities will need translation services to participate in community planning and emergency response? (1a, 2c) ▪ Have Low English Proficiency (LEP) households affected by a project been consulted? (1b, 2a) ▪ Does the current project selection and evaluation process prioritize projects that benefit LEP households? (1d) ▪ Have recent investments benefitted LEP households? (1e) ▪ Could LEP households experience 'downstream' impacts? (3c) ▪ Are we consistent in operational service and maintenance for LEP households? (4a)
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Disability	<p>Description People with disabilities may face mobility and financial challenges that limit their ability to evacuate or recover from flood damage.</p> <p>Disabilities include hearing, vision, cognition, walking, self-care, and independent living.</p> <p>Definitions Civilian non-institutionalized population with a disability.</p> <p>Source U.S. Census, ACS, 2015-2019</p> <p>Screening tool(s)⁵² EJ Screen, EJI, SVI</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which communities and locations may have difficulties evacuating from a flood? (1a, 2c) ▪ Which communities may have difficulties repairing flood damage? (1a) ▪ Have people with disabilities affected by a project been consulted? (1b, 2a) ▪ What investments can facilitate evacuation and rescue of people with disabilities (i.e., accessible fire escapes, evacuation vans, etc.)? (3a) ▪ What investments can increase housing affordability for people with disabilities (3b) ▪ Could people with disabilities experience 'downstream' impacts? (3c)
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Age	<p>Description Children and older adults are more vulnerable to airborne pollutants like mold and respiratory issues. They could also have cognitive, visual, hearing, or mobility challenges that limit their ability to evacuate or recover from flood damage.</p> <p>Definitions Children are ages 10 and under. Older adults are ages 65 and older.</p> <p>Source U.S. Census, ACS, 2015-2019</p> <p>Screening tool(s)⁵² CEJST, EJ Screen, EJI, SVI</p>	<p>What questions can this data help answer?⁵²</p> <ul style="list-style-type: none"> ▪ Which communities may experience increased health risks from flooding, due to age? (1a) ▪ Which communities may have difficulties evacuating from a flood? (1a, 2c) ▪ Have youth and older adults affected by a project been consulted? (1b, 2a) ▪ What investments can facilitate the evacuation of children and older adults? (3a) ▪ What investments can increase housing affordability for older adults? (3b) ▪ Could older adults experience 'downstream' impacts? (3c)
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<p>Renting population</p>	<p>Description Renters face unique burdens and are underrepresented in planning activities. People who rent have less access to flood insurance and assistance programs, require the participation of their landlords to make repairs, and may avoid reporting flooding problems for fear of rent hikes and displacement.</p> <p>Definitions Total population in renter-occupied housing units.</p> <p>Source U.S. Census, ACS, 2015-2019</p> <p>Screening tool(s)⁵² EJI</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which communities may have difficulties repairing flood damage? (1a) ▪ Have renters affected by a project been consulted? (1b, 2a) ▪ What investments can increase flood resilience and housing affordability for renters? (3a, 3b) ▪ Could renters experience 'downstream' impacts? (3c)
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<p>Populations without health insurance</p>	<p>Description According to the CDC, health insurance is a key indicator of whether someone has access to necessary health services and preventative care. People without health insurance are more likely to be affected by the health-related impacts of flooding such as mold and poor air quality. When evaluated alongside socioeconomic conditions like low income, lack of health insurance is often associated with poor health status and chronic disease that can make flooding impacts worse.</p> <p>Definitions Civilian non-institutionalized populations who have no health insurance.</p> <p>Source U.S. Census, ACS, 2015-2019</p> <p>Screening tool(s)⁵² CEJST, EJ Screen, EJI, SVI</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which communities may experience increased health risks and costs as a result of flooding? (1a)
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<p>Proximity to brownfields and hazardous sites</p>	<p>Description Brownfields and toxic sites are abandoned or underused properties with potentially hazardous materials and contamination, making it difficult for them to be redeveloped, reused, or expanded. Proximity to such sites can pose significant health threats to nearby communities and the environment in the event of flooding. Floodwaters can transport hazardous materials and contamination into nearby communities, homes, and waterways. This is an even greater concern for sites that are in or near flood zones.</p> <p>Definitions Census tracts in proximity⁵³ to hazardous waste facilities, Risk Management Plan facilities, Superfund or National Priorities List sites, underground storage tanks and releases, abandoned mine land, and formerly used defense sites.</p> <p>Source Various⁵³</p> <p>Screening tool(s)⁵² CEJST, EJ Screen, EJI</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which communities may experience increased health risks from flooding? (1a) ▪ Does the current project selection and evaluation process prioritize projects that benefit communities near brownfields and hazardous sites? (1d) ▪ Have recent investments benefitted communities near brownfields and hazardous sites? (1e) ▪ What investments can increase flood resilience and health conditions of communities near brownfields and hazardous sites? (3a, 3b, 3c)
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<p>Lack of green space</p>	<p>Description Access to green space can be an indicator of a community’s quality of life. Parks and open spaces promote recreation, improve mental health, and have the potential to reduce stormwater runoff. Parks covered in grass and other vegetation allow rainfall to absorb into the ground, reducing the amount of runoff generated from hard surfaces.</p> <p>Definitions Share of land with developed surfaces covered with artificial materials like concrete or pavement, excluding crop land used for agricultural purposes.</p> <p>Source National Land Cover Database 2019 Percent Developed Imperviousness</p> <p>Screening tool(s)⁵² CEJST, EJ Screen, EJI</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which communities can most benefit from additional green space to decrease the risk of flooding? (1a) ▪ Does the current project selection and evaluation process prioritize projects that benefit communities lacking green space? (1d) ▪ Have recent investments benefitted communities lacking green space? (1e) ▪ What investments can increase open space, parks, and recreation in communities lacking green space? (3a, 3b)
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<p>Tax base per capita</p>	<p>Description Tax base per capita can help to measure municipal capacity. It compares a municipality’s population to its total tax base, which is equivalent to the total equalized assessed value (EAV) and total retail sales. A community with a history of a low tax base per capita may have insufficient funds to invest in flood resilience.</p> <p>Definitions Total tax base, which includes total equalized assessed value (EAV) and total retail sales, relative to a community’s population.</p> <p>Source CMAP, Community Cohort Evaluation Tool, 2022</p> <p>Screening tool(s)⁵² None</p>	<p>What questions can this data help answer?⁵¹</p> <ul style="list-style-type: none"> ▪ Which municipalities can least afford to invest in flood resilience? (1a) ▪ Have previous investments benefitted municipalities with low capacity? (1c) ▪ Does the current project selection and evaluation process prioritize projects that benefit municipalities with low capacity? (1d) ▪ Have recent investments benefitted municipalities with low capacity? (1e) ▪ Could municipalities with low capacity experience ‘downstream’ impacts? (3c) ▪ Which municipalities could benefit from technical assistance, capacity building, and maintenance support? (4a-e, 5a-5d)
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Table 3. Recommended list of equity-related data by best practice

Best practice	Equity-related data									
	Low income	Race and ethnicity	Linguistic isolation	Disability	Age	Renting population	Population without health insurance	Proximity to brownfields and hazardous sites	Lack of green space	Tax base per capita
Strategy 1 - Use equity-related data to inform investments										
1A. Identify vulnerable communities										
1B. Collect and validate data										
1C. Assess distribution of investments										
1D. Evaluate and select projects										
1E. Track progress										
Strategy 2 - Collaborate with community groups to understand on-the-ground conditions										
2A. Partner with community groups										
2B. Center community needs										
2C. Produce accessible materials										
2D. Monitor engagement effectiveness										
2E. Compensate community groups										
Strategy 3 - Maximize project benefits and reduce unintended consequences										
3A. Identify co-benefits										
3B. Collaborate to address housing needs										
3C. Ensure no downstream impacts										
Strategy 4 - Provide equitable operations and maintenance (O&M) of infrastructure										
4A. Understand O&M needs and disparities										
4B. Develop asset management plans										
4C. Consider affordability of revenue options										
4D. Explore creative maintenance solutions										
4E. Develop local maintenance workforce										
Strategy 5 - Reduce barriers for municipalities to access funds										
5A. Provide technical assistance for planning										
5B. Strengthen relationships with municipalities										
5C. Streamline application process										
5D. Allow for flexible match requirements										
5E. Provide technical assistances for grants										

Additional resources

Interested in learning more about best practices for integrating equity into flood resilience investments? Consider exploring the following resources:

A Fairer Funding Stream: How Reforming the Clean Water State Revolving Fund Can Equitably Improve Water Infrastructure Across the Country, 2022 report with recommendations for the Clean Water State Revolving Fund to achieve more equitable outcomes, <https://www.nrdc.org/resources/fairer-funding-stream-how-reforming-clean-water-state-revolving-fund-can-equitably>.

Centering Racial Justice in Urban Flood Adaptation: Planning and Evaluation Tools for Great Lakes Cities, 2021 guide on centering racial justice in climate adaptation planning and policy, <https://graham.umich.edu/media/pubs/Catalyst-Report-Centering-Racial-Justice-in-Urban-Flood-Adaptation-48491.pdf>.

Equity Guide for Green Stormwater Infrastructure Practitioners, 2022 guide to help green infrastructure program managers center equity in their work, <https://www.greenprintpartners.com/equity>.

Guide to Equitable, Community-Driven Climate Preparedness Planning, 2017 guide for local governments that outlines a framework for designing and implementing a community-driven, equitable climate preparedness planning process, <https://www.adaptationclearinghouse.org/resources/guide-to-equitable-community-driven-climate-preparedness-planning.html>.

Racial Equity Toolkit (Government Alliance on Race and Equity), 2016 step-by-step guide to integrate explicit consideration of racial and social equity in projects, programs, and proposals, <https://www.racialequityalliance.org/resources/racial-equity-toolkit-opportunity-operationalize-equity/>.

Racial Equity Toolkit (U.S. Water Alliance), 2022 four-phased approach for water utilities to improve their racial equity practices and outcomes both internally and externally, <https://uswateralliance.org/initiatives/water-equity/racial-equity-toolkit>.

Water Rising: Equitable Approaches to Urban Flooding, 2020 report detailing five priority actions, https://uswateralliance.org/sites/uswateralliance.org/files/publications/Final_USWA_Water%20Rising_0.pdf.



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- 17** Hughes, Sara et al., “Centering Racial Justice in Urban Flood Adaptation: Planning and Evaluation Tools for Great Lakes Cities,” University of Michigan, <https://graham.umich.edu/media/pubs/Catalyst-Report-Centering-Racial-Justice-in-Urban-Flood-Adaptation-48491.pdf>.
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- 19** “Chicago and Cook County Greenprint: High Flood Risk Areas,” The Nature Conservancy, 2023, <https://conservation-greenprinting-in-illinois-tnc.hub.arcgis.com/pages/flood-risk-data>.
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- 24** “Event Feedback Survey” (Metropolitan Area Planning Council, 2023), <https://www.mapc.org/wp-content/uploads/2023/02/Post-Event-Feedback-Survey.pdf>.

- 25** "Post-Project Reflection Template" (Metropolitan Area Planning Council, 2023), <https://www.mapc.org/wp-content/uploads/2023/02/Project-Reflection-Guide.pdf>.
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- 51** Corresponding best practices included in section 3 of this guide are noted in bold.
- 52** Equity-related data can vary across screening tools, including their definition and date range of the source. For each data layer listed in Table 2, tools in bold use the same definition and data source presented in the table. Other tools listed use the data, but the definition and date range vary. See each screening tool’s technical documentation for more information.

53 Proximity varies across site types. Proximity for hazardous waste facilities, Risk Management Plan facilities, and Superfund or National Priorities List sites is defined as the count of facilities within 5 kilometers (km) (or nearest one beyond 5km), each divided by distance in km. For underground storage tanks (USTs), proximity is based on the density of leaking USTs and the number of all active USTs within 1,500 ft of the census tract boundaries. Abandoned mine land is based on the presence of an abandoned mine left by legacy coal mining operations within a census tract. Formerly used defense sites are based on the presence of at least one property within a census tract that was owned, leased, or possessed by the U.S. under the jurisdiction of the Secretary of Defense prior to October 1986.

54 Abandoned mine land data is sourced from the Department of the Interior abandoned mine land inventory system (e-AMLIS), 2017. Formerly used dense sites data is sourced from U.S. Army Corps of Engineer Formerly Used Defense Sites, 2019. All other brownfields and hazardous sites data is sourced from EPA from 2020-2021 as compiled by EJ Screen. See CEJST methodology for more information: <https://screeningtool.geoplatform.gov/en/methodology>.

The Chicago Metropolitan Agency for Planning (CMAP) is the region's comprehensive planning organization. The agency and its partners developed and are now implementing ON TO 2050, a long-range plan to help the seven counties and 284 communities of northeastern Illinois implement strategies that address transportation, housing, economic development, open space, the environment, and other quality-of-life issues.

See cmap.illinois.gov for more information.

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