



Northeastern Illinois
Resilience Partnership

Bridging the Divide: Cook County, Illinois - National Disaster Resilience Competition

This proposal from Cook County is part of the Northeastern Illinois Resilience Partnership's (the Partnership) regional effort to build resilience. This multi-jurisdictional, bipartisan Partnership - led by Cook County, City of Chicago, DuPage County, and the State of Illinois – formed in response to the severe, repetitive, and chronic effects of flooding. The resilience of the country is dependent on the resilience of northeastern Illinois, a central hub for food, freight, and finance. Located between the Great Lakes and Mississippi River watersheds, the region is the steward of 84% of the country's freshwater. It is uniquely poised to bridge the divide across watersheds and lead a new water culture, starting with resilience-building within the many communities represented by the Partnership. While the region does not have well-known mega-storms, even small storms are a significant risk and result in flooding and polluted runoff draining into Lake Michigan and the Mississippi River. The resulting economic, environmental, and social toll stems from vulnerabilities across social, natural, and built systems.

To address these issues, the Partnership brings together a diverse network of public, non-profit, and private partners to: **1. Develop detailed resilience plans, one per applicant, for the region's most impacted and distressed communities.** These resilience plans will address the three types of flooding - overbank, overland, and urban/basement - experienced in northeastern Illinois. Each plan will be informed by community engagement designed to deeply understand

how flooding impacts residents and businesses; determine where underlying vulnerabilities lie; and identify priority interventions that build resilience at community scale. **2. Engage in a long-term, region-wide effort to institutionalize a regional resilience framework for action to reduce vulnerability and build resilience.** The Partnership will provide a platform for sharing knowledge across local and regional networks and will make transformative infrastructural and institutional changes that equip the region to be more resilient in the face of flooding and other natural hazards, stressors, and shocks. *This joint planning effort seeks to maintain and improve quality of life by building regional resilience by minimizing exposure, reducing sensitivity, and increasing adaptive capacity to current and future hazards, stressors, and shocks.*

Northeastern Illinois communities face the same risk of extreme precipitation, which leads to overbank, overland, and basement flooding. The impacts of flooding are not the same across the region because of local differences. Communities of color and low- and moderate-income households have less capacity to financially and administratively contend with disasters. The Partnership is applying an “All-Hazard” approach to resiliency by prioritizing actions that prepare the region for the widest-range of hazards, stressors, and shocks. Through a diversity of strategies, from infrastructural to institutional changes, this proposal will (1) minimize exposure; (2) reduce sensitivity; and (3) increase the adaptive capacity of the region’s built, natural, and social systems. The Partnership’s resilience-building strategies will be informed by the following **guiding principles:** to feature solutions that deliver multiple benefits and are innovative, cost-effective, and implementable; be data-driven; focus on vulnerable populations; engage local residents, businesses, and other stakeholders (including public agencies, civic organizations, philanthropic groups, and design professionals) in all phases; identify systemic solutions to solve problems; and create lasting benefits well beyond the competition timeline.

Through a series of specific pilots, the Partnership will demonstrate the effectiveness of innovative interventions, from on-the-ground projects to new finance mechanisms and policies. These pilot areas represent a cross section of the social, ecological, and built profiles found in Northeastern Illinois. Successful interventions will be transferred to communities across the region, and over time, the region will forge a new, healthy relationship with water.

Factor 1: Capacity

Factor 1a: General Management Capacity

The Cook County Department of Planning and Development (DPD), whose mission is to develop and sustain viable communities, can drive and implement resilience within the County and contribute to regionwide resilience efforts in a way that builds upon existing partnerships and enhances current planning and programming initiatives.

DPD effectively administers its Federal funds in a timely and compliant manner and has become a model HUD grantee in the region. DPD has historically managed over \$530 million in Federal funding from the U.S. Department of Housing and Urban Development (HUD) including annual entitlement CDBG, HOME, and ESG allocations as well as singular resources such as NSP, HPRP, Section 108 Loan Guarantee, and CDBG-R. Recently, DPD was awarded \$83.6 million in CDBG-DR funds to address impacts from 2013 flooding.

To guide its investments, DPD recently completed an innovative and collaborative strategic planning initiative, *Planning for Progress*,^{1,2} in partnership with the Chicago Metropolitan Agency for Planning (CMAP). Encompassing the City of Chicago, over 130 suburban municipalities, and unincorporated areas, this process incorporated an extensive and multi-faceted outreach and engagement strategy spanning 15 months. *Planning for Progress* resulted in a combined Consolidated Plan and Comprehensive Economic Development Strategy to guide

investments and partnerships in housing, community, and economic development. It promotes resilience, particularly for benefit to low- and moderate-income and vulnerable populations, and aligns County resources, including Federal funds, for expanded community impact.

Through *Planning for Progress* and continuing with this resilience effort, DPD has engaged County departments and agencies with relevant expertise to align efforts and foster new collaborations aimed at making the County more resilient. This application is led by DPD's Deputy Directors of Community Development and Housing, and *the application is written by DPD staff with support from other County agencies as well as public sector and nonprofit partners*. Based on its track record with HUD funding, DPD is well suited to administer CDBG-NDR funds on behalf of the County and has the legal authority and capacity to competitively procure vendors for program design and implementation.

A critical partner in this application is the Metropolitan Water Reclamation District (MWRD), the County's stormwater management agency, which regulates development through its regional watershed management ordinance. MWRD's mission is to "protect the health and safety of residents and the quality of the water supply source (Lake Michigan), improve the quality of water in watercourses, protect businesses and homes from flood damage, and manage water as a vital resource". Additional County partners include the Forest Preserve District, Departments of Public Health, Transportation and Highways, Environmental Control, and Homeland Security and Emergency Management, as well as affiliate agencies such as the Chicago Cook Workforce Partnership, Cook County and South Suburban Land Bank Authorities, and Housing Authority of Cook County. The Center for Neighborhood Technology (CNT) and Chicago District of the U.S. Army Corps of Engineers (USACE) are also providing support and offer additional expertise.

Factor 1b: Cross-Disciplinary Technical Capacity

The Partnership enables cross-disciplinary technical capacity across the region. Given the range of partners and their sector expertise, the capacity will still be retained if an individual partner reduces their participation.

Comprehensive Planning: The four regional applicants – Cook County, the City of Chicago, DuPage County and the State of Illinois (the Applicants) – have extensive experience developing and implementing comprehensive plans and complex programs. CMAP developed GO TO 2040, adopted in 2010 as the region’s comprehensive plan for land use, transportation, and economic development assistance to 280+ northeastern Illinois communities. Cook County’s *Planning for Progress* further demonstrates this capacity. The Cook County Department of Homeland Security and Emergency Management (DHSEM) also recently completed the first-ever Cook County Hazard Mitigation Plan (HMP) - the largest multi-jurisdictional all hazards mitigation plan in the nation - which benefits County residents by identifying cost-effective actions for risk reduction; focusing resources on the greatest risks and vulnerabilities; building partnerships; increasing education and awareness of hazards and risk; communicating priorities; and aligning risk reduction with community objectives. MWRD is piloting stormwater master plans in five Cook County communities that identify green and gray solutions to mitigate flooding and provide guidance on how communities can re-imagine urban drainage.

Data and Science-Based Analysis: Partners and leading research institutions in the region - Argonne National Laboratory, Illinois State Water Survey, and Midwestern Regional Climate Center - have experience collecting and analyzing climate data, including modeling and downscaling, and have conveyed the input of potential future conditions to the Partnership. CMAP, the repository for many regional datasets, facilitates access to science-based information. CNT has a nationally recognized data analysis team (responsible for developing HUD’s Location

Affordability Index) with the expertise to integrate transport and housing data with landscape permeability, remote sensors, and weather forecasting.

Community Development & Housing: DPD continues to strategically administer significant Federal funding in this arena. The Chicago Area Fair Housing Alliance (CAFHA) and CMAP analyzed regional disparities through a Fair Housing Equity Assessment for HUD. CNT brings knowledge of community-based flood resiliency through their RainReady initiative, helping communities upgrade properties and public rights-of-way to mitigate flooding.

Design, Engineering, and Maintenance: The Applicants all plan, design, and maintain components of the region's built environment, including buildings, streets, sewers, and green stormwater infrastructure. In coordination with private design and engineering consultants, the Partnership has the technical capacity to formulate and refine proposed physical interventions to reduce hazard exposure and build resilience. MWRD utilizes a traditional benefit-to-cost analysis (i.e. using USACE methodology and flood depth-damage curves) and also a cost per benefitting structure to assess project feasibility which would also be applied to CDBG-NDR projects. Design, engineering, and maintenance services would be procured by DPD as applicable. A design and engineering work group is also advising the Partnership, as described in Factor 3a.

Technology and Product Innovation: Cook County is a hub of creative technological and design innovation, such as Design for America, an award-winning nationwide network of interdisciplinary student teams and community members using design for local, social impact. UI Labs is a Chicago-based research and commercialization collaborative uniting universities, industry, and government to define problems, develop partnerships, and deliver scalable solutions. CNT is another innovation center, having designed tools funded and promoted

nationally by EPA, including Green Infrastructure Portfolio Standard, Value of Green Infrastructure Guide, and Green Values.

Environment: Several partners are focused on enhancing environmental quality, including land managers involved in active restoration and research, advocacy organizations devoted to making institutional and behavioral changes, and state and county regulators who safeguard natural resources. Forest Preserve Districts across the region manage over 180,000 acres of open space (a significant portion of which is within the regulatory floodplain along the streams and rivers of Cook County) that absorbs rainfall and cushions adjacent municipalities from overbank flooding. Chicago Wilderness, a 300+ member coalition, developed the Green Infrastructure Vision to identify priority landscape conservation areas and their resulting ecosystem services. The Natural Resources Defense Council (NRDC) are experts on public policies related to stormwater, water quality, and resilience. Locally, the Cook County Department of Environmental Control (DEC) is responsible for environmental regulatory functions and sustainability and has managed \$14.5 million in Federal funding related to air quality, pollution, asbestos, energy efficiency, solar energy, and brownfields programming. MWRD manages a Green Infrastructure Program, which facilitates projects that have the greatest potential to reduce flooding and/or basement backups. Potential projects are vetted based on the number of structures to benefit, cost per gallon infiltrated, visibility of the location, and the area's socioeconomic characteristics. The Calumet Stormwater Collaborative (CSC), which focuses on stormwater management in the Calumet watershed in south Cook County, has effectively engaged multi-jurisdictional resiliency stakeholders in integrating downscaled climate data into infrastructure design as well as implementing site-specific green infrastructure projects. DPD's south suburban pilot area

specifically builds on the work of the CSC, and the County has been an active CSC participant and wants to foster capacity-building initiatives like the CSC.

Civic and Philanthropic: The Metropolitan Planning Council (MPC), CNT, Delta Institute, and Foresight Design Initiative excel in coalition-building and community engagement; they convened consultation working groups and assisted Applicants' public outreach. The Chicago Community Trust, Grand Victoria Foundation, and other funders have provided feedback and resources on how to strategically advance the region's capacity to prepare for a range of hazards.

Factor 1c: Community Engagement Capacity

DPD effectively engaged stakeholders and the public through *Planning for Progress*, its strategic planning initiative spanning 15 months. An array of outreach methods were deployed including 20+ formal presentations, 3 interactive sub-regional workshops, web-based surveys, 30+ focus groups, and 4 open house events resulting in input from over 2,000 participants regarding local needs, resources, and opportunities for affordable housing, community, and economic development. Additionally, DPD regularly solicits input regarding program design and operations through annual strategic plans and performance reports. In relation to specific flood impacts and recovery needs, DPD solicited input from municipalities and social service providers in developing its CDBG-DR action plan. All DPD outreach efforts comply with the County's Citizen Participation Plan, adopted in 2012, and ensure sufficient advance notice via newspaper publication, website posting, and electronic email blast of public review/comment opportunities including public hearings. DPD regularly makes presentations and announces initiatives and related input opportunities to local stakeholder groups, subcommittees, boards, and commissions. Since DPD's programs largely target low- and moderate-income and other vulnerable populations, DPD coordinates with stakeholder agencies serving these groups.

Contingent on local needs, meeting notices, surveys, and summaries are made available in both English and Spanish. Additionally, individuals with disabilities or limited English proficiency are provided related guidance for requesting related accommodations. DPD's Economic Development Advisory Committee meets bi-monthly and offers opportunity for public comment.

Other Partners also have a strong track record for community engagement. DHSEM engaged 155 public and private partners and over 1,800 residents in developing the HMP. Through its pilot stormwater plans and other programs, MWRD focuses on education and outreach in target communities, engages neighborhood institutions and establishes public/private partnerships. CNT deploys a grassroots, community-based strategy that helps residents organize around flood resiliency issues and takes them through a structured process of awareness, education, involvement, and collaboration. Engagement methods include flyer distribution, resident training for rainfall measurement, walking tours of at-risk and opportunity areas, home upgrade block parties, storytelling, and public space rapid transformation pop-up events.

DPD and its partners are well-versed in best practices to effectively solicit and synthesize input from a wide array of stakeholders and members of the public, particularly when they represent competing interests. DPD is employing similar outreach and engagement modalities specific to resilience with an emphasis on households, institutions, and communities most affected by the 2013 flooding disaster, and most importantly, more likely to be impacted by and vulnerable to future threats and hazards including those resulting from climate change. The combination of outreach by County agencies, resident engagement and CNT's efforts is creating and empowering formal and informal leaders on stormwater management and broader resilience topics. Outreach has already begun under this application effort as detailed in Factor 3 and is being incorporated as DPD and its partners craft a conceptual strategy under Phase 1 and lay the

groundwork for continuing outreach that sustains awareness, involvement, and implementation of resiliency efforts through Phase 2.

Factor 1d: Regional or Multi-Governmental Capacity

Cook County has achieved national recognition for effective collaboration and coordination with public agencies regionally. President Toni Preckwinkle initiated and regularly convenes County leaders throughout the region to share information and resources. In concert with this regional leadership, DPD led a successful effort to apply to the Federal Economic Development Administration for an Investing in Manufacturing Communities Partnership designation.

The Northeastern Illinois Resilience Partnership will serve as the regional coordinator of resiliency activities. A regional approach is particularly appropriate for addressing shared threats and risks, such as flooding and climate change. If left uncoordinated, local actions to mitigate flooding can exacerbate downstream problems. Carrying out pilot and regional activities under the umbrella of the Partnership will lay a foundation for strategic implementation of resiliency planning across the region. The Partnership is a new collaboration that taps into the expertise and capacity of existing organizations, many of which have regional or multi-government capacity, to focus on resilience to flooding as the major issue facing the entire region. The Partnership will also expand the scope to encompass an “all-hazards” approach to resilience that addresses extreme heat, drought, economic competitiveness, and ecological and social vulnerability.

CMAP has extensive experience connecting local implementation to regional change, as well as building broad-based coalitions to tackle issues that cut across transportation, social, housing, economic, and environmental sectors, particularly through GO TO 2040. Implementing GO TO 2040’s recommendations, CMAP created a local technical assistance (LTA) program to provide planning support at no cost to local communities that aligns local decision-making with regional

priorities. Initially funded through a \$4.25 million HUD Sustainable Communities Regional Planning grant, LTA's effectiveness led it to become a permanent program. Cook County will be using its CDBG-DR funding to support a focus on stormwater management and resilience in the LTA program over the next several years. The relationships that CMAP has built with local and regional partners provide a tried-and-true model of broad-based engagement for the Partnership.

Like flooding, complex social vulnerabilities cross jurisdictional boundaries and are best addressed through regional coordination. Factors that contribute to social vulnerability – access to transportation, affordable housing, and/or economic opportunities, age, social isolation, and concentrated poverty - manifest differently in localities, but are regionally interconnected. The Partnership's framework allows Applicants to relate local vulnerabilities in their pilot areas to the larger economic, infrastructural, and ecological systems that support the entire region. For instance, local resiliency planning can provide project-specific workforce opportunities for the neighborhood, but those activities will be connected to regional efforts to develop workforce training programs and create market demand for green infrastructure, among other initiatives in the toolbox. This will allow solutions to benefit vulnerable populations including low-income, minority, disabled, senior, immigrant populations in the pilot areas and regionally. While DPD will be responsible for complying with HUD grant requirements and implementing pilot projects from the grant received, the Partnership will provide over-arching coordination between DPD's and the other Applicants' activities, as well as the broader range of crosscutting resilience activities that affect the region. The Partnership is exploring the opportunity to involve Rebuild by Design to advise on regional coordination to ensure that local resiliency activities are carried out in a concerted manner and scaled appropriately across the region.

Factor 2: Need

Unmet Recovery Need

Cook County is at the heart of the Chicago metropolitan region and makes up more than half of its population, jobs, and businesses. Despite its many assets, the County has a disproportionate share of vulnerabilities, both in comparison to the region and to other areas in the U.S. It leads the nation in disaster fatalities, with 1,158 deaths in the last 50 years—over twice that of the second highest jurisdiction, Orleans Parish, and more than those resulting from Superstorm Sandy. The County has experienced 19 hazard events since 1967 for which Federal disaster declarations were issued, with an additional 729 hazard events that caused monetary or human loss.¹ Its capacity to adapt and respond to hazards is restricted by an aging and insufficient infrastructure for current and future water management needs; a poverty rate that is nearly double that of its neighbors; and a lack of local government capacity and funding.

In May 2013, Cook County was the recipient of a Disaster Declaration due to flooding from severe storms (DR-4116). The entire County was determined by HUD to be most impacted and distressed. This series of storms, including one with 5 inches of rain in 24 hours, overwhelmed the County's stormwater system, resulting in widespread flooding and the inundation basements and below grade living areas. Unmet housing need totals affects many housing units. The disaster also led to infrastructure and property damages, as well as direct and indirect economic losses, environmental degradation impacting water quantity and quality, public health concerns including mold and respiratory problems, stress, and fatalities.

DR-4116 is characteristic of flooding in Cook County and not a one-time event. Since 1972, 13 presidential-declared flood events have caused \$628.5 million in property damage. Damage is caused by three types of flooding: overbank flooding of streams and creeks; localized overland flooding; and urban flooding, or basement backups due to undersized sewers. Over the past 20

years, urban flooding has become the principal cause of flood loss in the County. Nearly 8% of its land – containing \$22 billion of property – is located in 100-year floodplains, though damage increasingly affects other areas. From 2007 to 2011, flood-related claims were submitted across 97% of Cook County ZIP codes. ZIP codes with the highest concentration of payouts have no land area within floodplains.² Chronic flooding is a challenge and is expected to grow worse.

Comprehensive Risk Approach

Cook County's approach in establishing programs and selecting activities focuses on identifying proposals that: have a regional perspective and/or reach; have a long-term vision with a clear and convincing short-term ambition; and incorporate innovative approaches. To identify its pilot area, the County developed and employed a risk analysis approach.. A County-wide analysis began with a review of DHSEM's HMP. The HMP was used to identify occurrences of natural hazards within each jurisdiction, rank hazards using a risk rating score (probability X impact), identify at-risk physical infrastructure and property, and assess jurisdictions' institutional capacity.³ The HMP incorporates Illinois Climatologist Office models and emission scenarios to examine future precipitation changes through 2100 and to inform a qualitative assessment of the impact of climate change on hazard risks. Information from the HMP was supplemented with FEMA Household Assistance data from DR-4116 (dollar amount and number of claims) and overlaid with low- to moderate-income data. When mapped together, several areas within the County were highlighted as having both a large portion of claims and low income. To finalize the pilot area, an assessment of the social environment was completed, including unemployment rates, age and race distribution, and economic trends.

Using this science-based risk approach, Cook County identified a pilot area in the south suburbs containing the cities of Blue Island and Calumet City and the villages of Calumet Park, Dolton,

Riverdale, and Robbins, home to 110,000 residents. Spanning two watersheds, the area was filled with wetlands and shallow marshes before Chicago was settled. After railroads traversed the marshes, heavy industry moved in, and residential development followed. The area quickly became an industrial center and economic engine. By the 1980s, however, the industry faltered and, in the following decades, the area experienced significant economic decay.

In the HMP, severe weather is identified as the number one hazard for the pilot area. At particular risk are 965 acres located within 100-year floodplains and 265 critical facilities and infrastructure. Analysis finds that government capacity is limited – the area’s tax capacity is 25% below the median for the region – and maintenance of the aging stormwater infrastructure has not been performed, which exacerbates flooding and basement backups.⁴ DR-4116 impacted more than 10% of households in 3 of the communities, and 3,650 FEMA household assistance applications were submitted. FEMA verified loss totaled more than \$13 million. Compounding flood losses and other shocks, nearly 60% of the population has income below 80% of area median income, and vulnerabilities exist for persons over 65 living alone (9% of households), residents receiving social security income (27%) female-headed households with children (16% of households), and HAAC voucher holders. The area is predominately African American (72%).⁵ A fifth of residents have no health insurance, and the mortality rate in Robbins is more than double that in other areas in the County.⁶

The pilot area is representative of other areas within Cook County and the region, affected by both riverine and urban flooding, vulnerable to severe and repetitive flooding, and lacking the physical capacity, resident resources, and local government capacity to anticipate and effectively manage this issue. The proposed pilot program will create tools to be used throughout the County and regionally to build adaptive capacity and improve resiliency.

Regional Geographic Perspective

While the unmet needs from DR-4116 described above qualify Cook County for the CDBG-NDR Competition, aggregate losses from repetitive flooding in the region tell the fuller picture. Disasters in northeastern Illinois are typically not well-known mega-events but rather smaller-scale, repetitive events that cumulatively result in significant damages to health, housing, infrastructure, the economy, and ecosystems. Typical storms have led to major road, rail, and utility outages, severe erosion, sewer overflows and mold, closures of businesses, and deaths. Flooding stands as the primary hazard facing the region, accounting for 41% of disaster losses statewide and resulting in over \$195 million in FEMA NFIP payments to the region since 1978.⁹ The pilot areas serve as case studies of the three types of flooding impacting the region and are also representative of the spectrums of social, ecological, and built conditions and vulnerabilities found across the region. Together, they allow the region to learn from distinct but coordinated solutions that address different mixes of vulnerabilities.

The impacts of flooding are exacerbated by four regional factors. First, the severity and frequency of flooding will increase with climate change, as discussed in the following section. Second, CMAP and MWRD analyses of the region's infrastructure show that it is aging and not built to accommodate the frequency or intensity of rainfall events the region is experiencing.⁷ Third, based on a regional analysis of the National Land Cover Database, urbanizing development patterns are increasing imperviousness, resulting in increased runoff in Cook and DuPage Counties. Fourth, communities facing concentrated vulnerability in income level, age, race, educational attainment, English proficiency, medical condition, and transportation access are the ones hit hardest by flooding. Studies of equity indicate the geospatial distribution of vulnerable populations across the region.

Response to Questions

1. Threats, Hazards, and Vulnerabilities: Climate change in particular poses a growing risk to the region. Precipitation in the Midwest has increased 37% over the last 54 years, and the National Climate Assessment projects further increases in extreme rainfall events and flooding in the Midwest and risks to the Great Lakes.⁸ Most Midwest Regional Climate Center and Illinois State Climatologist models, which are more specific to northeastern Illinois, project that annual precipitation will increase by as much as 20% by the end of the century, with a significant portion from more frequent heavy rainfalls. Heavy downpours are occurring 35% more frequently since the 1980s.⁹ This is a particular challenge given that rainfall events of 2.5 inches or more in 24 hours already cause flooding in the region. Combined with exacerbated risks to the Great Lakes, which contains 84% of all fresh water in the Country and is the region's drinking water supply, northeastern Illinois is already experiencing substantial impacts from climate change. In addition to shared hazards, Cook County's pilot area experiences frequent overbank and urban flooding due to its relatively flat topography and a high level of urbanization. It also faces threats for other weather-related challenges like extreme heat, as well as vulnerabilities described earlier and in Question 3: deficiencies in infrastructure; socioeconomic challenges including an aging population and poverty; economic disinvestment; and limited local government capacity.

2. Data Utilized: Cook County relied on a number of data sources to assess County-wide factors and to select its pilot area. To understand the historical prevalence and future risk of flooding, the HMP was used to examine occurrences of natural hazards and climate change models. Seven MWRD and USACE Detailed Watershed Plans (DWPs) provided a summary of stormwater-related areas of concern (solicited from Watershed Planning Councils (WPCs), federal and state

agencies, and stakeholders) and a list of potential capital improvement projects. Hydrologic models generated for each watershed for 2-, 5-, 10-, 25-, 50-, 100-, and 500-year flood events and simulated water surface profiles, overlaid on a ground elevation model, helped to identify structures at risk of flooding and estimates of property damages. Data from CNT is based on surveys, interviews, and flood damage payouts. This information, along with FEMA, SBA, and NFIP data for DR-4116 and the data from resident surveys, municipal meetings, and community workshops held by Cook County, reveals that the impact of flooding is greatest in the south and west portions of the County. Finally, in order to assess other vulnerabilities – also found to be most pronounced in these areas – the County utilized Census and American Community Survey (ACS) data on demographic, socioeconomic, and housing conditions; health data from the Illinois Department of Public Health; and data from CMAP, Illinois Department of Revenue, and ACS on community and institutional capacity. The selected data is comprehensive, recent, and locally informed, making it the best available source to inform the proposed program.

3. *Primary Risks Faced:* Cook County identified the following risks faced by its communities.

Outmoded & Aging Infrastructure: The region’s infrastructure is designed based on historic precipitation and design standards. A 10-year storm is used for the design of stormwater systems, and a 100-year storm is used for the design of flood protection measures. However, the rare 100-year storm has been met or exceeded 3 times in the County since the 1980s.¹⁰ (Efforts are underway by IDNR to redefine the 100-year storm). Indeed, communities in the pilot area have high infiltration and inflow into sewer systems, contributing to sewer overflows and basement backups, but have limited to no resources to maintain infrastructure. Exacerbating the issue is an older housing stock with combined sewer systems, leading to health issues when they back up.

Strained Environment: Suburban Cook County's population may rise by 15 percent over the next 30 years, leading to a proliferation of impervious surfaces (already, 42% of land is impervious), increased stormwater runoff, and increased incidence of urban flooding due to limited capacity of drainage systems.^{11,12} These impacts are exacerbated by climate change. While the magnitude of population growth is unknown, environmental risk is high if not proactively addressed.

Segregation among Low-Income & Minority Populations: From 2000 to 2012, the poverty rate in the City of Chicago remained constant (around 20 percent) but increased in suburban Cook County (from 6 percent to 10 percent) -- a 'suburbanization of poverty'.¹³ Households in south and west Cook are far less affluent than the regional average. While the County has become more diverse, it has become more segregated by both income and race and ethnicity.¹⁴ The risk that growth perpetuates segregation is high and a challenge to creating resilience.

Disparity in Housing Markets: Suburban Cook County's almost one million housing units and the housing markets they comprise vary significantly. Much of the County's housing is older, with 75% built prior to 1980. Affordable housing remains a challenge; half of renters pay at least 30% of their income on rent, with concentrations of cost-burdened households in the west and south. Given anticipated population increases, additional housing units will be needed for households earning less than \$50,000. Seniors will comprise a majority of this increase.

Job Loss & Economic Disinvestment: Cook County lost 60,000 jobs, primarily in suburban Cook, while the region gained jobs between 2004 and 2013. Commercial and industrial taxpayers in Cook County often face higher taxes than they would in surrounding counties due to a weakened tax base, the tax structure, and the cost of maintaining special taxing districts.

Disinvestment is particularly evident in the pilot area. Nearly 7% of land is vacant, including 700

commercial parcels and 310 industrial parcels.¹⁵ In Robbins, almost a third of land is vacant.

Without investment in areas of need, there is a risk that economic decline will continue.

Limited Local Government Capacity: Several south suburban municipalities can no longer afford the basic government functions of police protection (with some police services now provided by the County), let alone provide maintenance for their collection systems. While sub-regional entities like the South Suburban Mayors and Managers Association (SSMMA) work to provide some shared services, especially around planning, fragmentation presents challenges. For example, each jurisdiction manages and maintains its stormwater and sanitary sewer systems.

4. Risk Due to Un-Insured and Under-Insured Property: Of claims related to DR-4116, 60% were for property covered by homeowner's insurance. Within the pilot area, there are 632 National Flood Insurance Program policyholders. Of these, 75% are subsidized which means there is barely enough funding to restore properties, much less add resilience measures.¹⁹

5. Addressing the Threats & Hazards from DR-4116: Addressing the vulnerabilities identified above will help to address unmet disaster recovery need associated with DR-4116 in housing, infrastructure, and economic revitalization, ensure that near-term recovery efforts are successful, reduce vulnerabilities, and revitalize communities. Investments in infrastructure and the natural environment will increase physical capacity and preparedness for hazard events that are increasingly more frequent and significant, as well as increase the quality of place. Improvement to the socioeconomic environment – addressing stressors among low-income and minority populations, particularly as related to job loss and economic disinvestment – will generate more household-level resources to address unmet recovery need and incorporate resiliency measures. Increased capacity and collaboration among local governments will support resident needs, increase resiliency through new investments in the built and natural environment, enhance

economic opportunity through site redevelopment, business creation and attraction, and job creation, and build stronger, healthier, and more vibrant communities.

6. *Disproportionate Effects on Vulnerable Population Groups:* In general, vulnerable populations – particularly households with low incomes and those reliant on social security or public assistance income – are more impacted by flooding. Cook County ZIP codes with the highest number of insurance damage payouts have median household incomes below the County average, as within the selected pilot area.¹⁷ The impact may be even more pronounced, as the ability to access private insurance is related to income, and many low-income households that suffer flood damage may not be covered. Other protected classes that have fewer housing choices are also affected, including older adults and racial and ethnic minorities, as they lack mobility. Significant, repetitive flooding has the long-term effect of reducing property values, as higher-income residents and businesses have moved to less hazardous areas.

7. *Existing Conditions which Exacerbate Vulnerability:* Within the pilot area, waste materials from years of manufacturing have dramatically altered land and water in the area. More than a quarter of Lake Calumet has been filled in with manufacturing waste, and contamination at nearby former industrial sites remains, including 6 brownfields, 46 leaking underground storage tanks, and 11 Illinois EPA Site Remediation Program (SRP) sites in Riverdale alone.¹⁸ Most of the region’s brownfield sites are in Cook County. From 1996 to 2007, more than 2,250 sites (74% of the region’s total) totaling more than 11,125 acres in the County were enrolled in SRP.¹⁹ Brownfields are both an environmental risk and lost economic opportunity. As discussed earlier, economic disinvestment and the accompanying lack of capacity and resources is an exacerbating issue for many of Cook County’s suburbs and is particularly evident in the pilot area.

8. Actions Taken & Barriers to Address Risks: Much of the efforts to address risks have been driven by an increasingly active citizenry. Analysis of ‘flooded basements’ on Google Correlate shows that Illinois ranked first among all states, indication of resident interest. Since 2011, CNT, aware of the need for coordinated action across private properties and in public rights of way, has participated in 200 events in the County, provided grants to thousands of homeowners, trained a network of volunteers, and established Resident Action Groups in several communities. CNT’s RainReady program is piloting a home upgrade service; a community planning service to improve public rights-of-way; and is currently working to design a flood warning system. The RainReady program is available in several Cook County suburbs, with an expansion planned to 30 communities, but additional funds are needed for a full County-wide expansion.

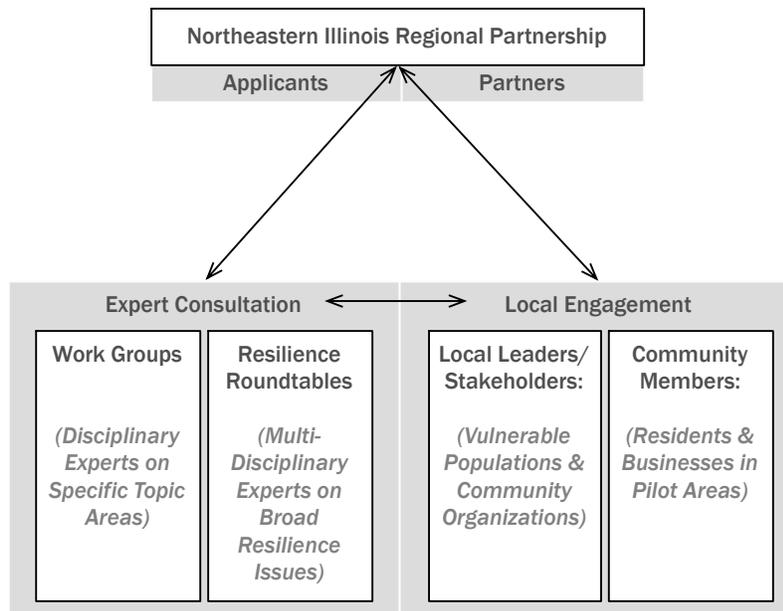
A number of planning and infrastructure improvements have been completed. WPCs for Little Calumet and Cal-Sag are developing a Stormwater Master Plan that overlaps with the County’s pilot area. This plan will incorporate resilient measures and is part of the Detailed Multi-Hazard Resiliency Plan, described in Factor 3b, Part 1. Even through MWRD’S work to maximize the use of public lands for stormwater storage, repurpose infrastructure, and floodplain restoration, there is still – and will be – a significant excess runoff. Though MWRD has constructed 35 regional storage reservoirs in the County and has permitted thousands of detention facilities, it is still challenged with addressing recent weather patterns through traditional infrastructure improvements. By leveraging additional Federal resources, MWRD can provide more widespread relief and resiliency. In early 2015, Cook County added a preference for resilient infrastructure proposals in its CDBG program. A final barrier to a complete solution is a lack of regional coordination limiting the effectiveness of locally-scaled solutions.

FACTOR 3: SOUNDNESS OF APPROACH

Factor 3a: Consultation

Factor 3a, Part 1: Outreach and Engagement Approach

The Partnership has convened over non-resident 275 stakeholders through 27 meetings held between November 2014 and March 2015 representing 41 units of government, 35 non-profit and community-based organizations, 15 research institutions, 8 foundations, and 61 businesses. In order to create meaningful, diverse, and efficient channels for outreach and consultation, the Partnership has employed a four-pronged approach to engagement: 1) Expert consultation; 2) Engagement of local leaders and stakeholders; 3) Community engagement meetings; and 4) Partnership coordination meetings. The Partnership’s expert consultation efforts have occurred in primarily two formats: 1) Work Groups and 2) Resilience Roundtables. Both have broadened the conversation with thought leaders across the public, private, non-profit, philanthropic, and academic sectors; and have clarified roles in collectively building regional resilience.



Five work groups were convened around specific content areas to garner input on and inform the region’s emerging resilience framework for action. Each work group is comprised of 10-20

representatives. Distilled from these work group discussions, over 60 recommended resilience-building actions covering specific policy changes, research and modeling needs, finance mechanisms, planning activities, infrastructure modifications, and approaches to build adaptive capacity at the individual, community, municipal, and regional scales informed this proposal and will be further explored in Phase 2.

1) Design & Engineering. Convened by the NRDC and engaging leaders from the design and engineering community, this group began to define key principles and recommendations for building more resilient infrastructure systems that provide a multitude of benefits. Into Phase 2, this work group will be instrumental in assisting the applicants formulate and refine proposed physical interventions to reduce hazard exposure and build resilience. 2) Financing the Future: Convened by Enterprise Community Partners, this work group engaged experts from the insurance, finance, economic development, and philanthropic sectors, and identified existing and emerging financial tools like State revolving loan funds, stormwater fees, and social impact bonds as potential mechanisms to fund interventions at the property, community, and regional scales. 3) Using Technology to Impact Behavior: Convened by CNT, this work group was comprised of leaders from the technology, innovation, research, and emergency management sectors and focused on the use of technology in helping communities understand risks through better data collection, predictive modeling, alert systems, and awareness campaigns, and assisting communities in acting on these risks with innovative tools to prepare, respond, and adapt to current and future disasters. 4) Economic Transformation & Opportunity: Convened by MPC, this work group of experts leading the region's workforce, community, and economic development efforts identified emerging jobs, services, markets, and industries tied to resilience-building, particularly around urban food security and green infrastructure. 5) Multiplying the

Benefits: Convened by the Delta Institute, this work group brought together ecologists, land conservationists, social scientists, public health, and social service experts and identified 25 priority vulnerabilities across the region's social and natural systems and recommended strategies for reducing them, including new approaches to increase recreational space, build social cohesion, coordinate resilience messaging, and build preparedness.

Resilience Roundtables, convened by MPC, are larger, monthly meetings that began in January 2015 and will continue monthly over the next two years. Open to the public, national experts are invited to present on specific resilience issues and facilitate discussion about best practices application. The first Roundtable, "Mega-Storms, Mega-Regions, Mega-Plans" held on January 27, featured speakers from two winning Rebuild By Design teams, Kobi Ruthenberg and David Waggonner, and explored what makes a compelling application. The second, on March 4, provided an opportunity for feedback on the proposals before their release for public comment. The third Roundtable, planned for April 14, will focus on the how to identify, measure, and intervene on social vulnerability; Jacqui Patterson of the NAACP Environmental and Climate Justice Program will be among the speakers. Future meetings will cover issues such as adapting management and decision-making approaches within local government, accounting for sub-regional climate variations in regional resilience planning, and leveraging citizen data collection to track progress.

The Partnership holds weekly coordination meetings that have laid the foundation for a collaborative effort to share information and strengthen institutional networks at the local and regional scales. Regular attendees have included multi-departmental representatives from Cook County, the City of Chicago, DuPage County, and the State of Illinois, as well as supporting nonprofit and regional planning organizations. These meetings are intended to: 1) build new

relationships between public agency representatives from across departments, including community and economic development, water and natural resource management, public health, and emergency management, among others; and 2) create a collective understanding of the recovery needs, risks, and vulnerabilities in communities across the region. In addition to regular meetings, the Partnership has met with representatives from the stormwater management and planning departments of the adjoining counties (Kane, Kendall, Lake, McHenry, and Will), as well as many of the regional planning councils across the state.

On behalf of the Partnership, the NRDC convened a meeting in Chicago with Rebuild by Design to learn more about the best practices of the winning teams in that competition. Other timely and relevant events organized by members of the Partnership have occurred during Phase 1, including the Symposium on Urban Flooding organized by the State of Illinois and CNT (February 10, 2015) as part of stakeholder engagement for the Urban Flooding Awareness Act, discussed in Section 4b, and monthly meetings of the Calumet Stormwater Collaborative convened by MPC (November 7, 2014; December 5, 2014; January 9, 2015; February 6, 2015). The Partnership has met with a group of the region's largest funders of environmental initiatives to generate support for Phase 2.

Cook County, as well as the other Applicants, led community engagement among residents, businesses, and neighborhood groups. Consistent materials, marketed as part of the Partnership, were used for related meetings. The objective of this engagement effort has been to better understand local past experiences with flooding, including: 1) how flooding has affected them personally; 2) how they responded to the flooding; and 3) what types of resources would be helpful to better respond to flooding.

Within the County's pilot area, DPD deployed a multi-faceted outreach and engagement campaign. DPD developed and distributed a survey instrument with regional and County-specific components, as well as a flyer detailing public meetings and input opportunities in hard copy handouts in local municipal halls and public libraries as well as electronically via website posting and repeated electronic email blast to 80+ stakeholder groups. Outreach targeted the general public, municipal leadership, local public housing authorities, social service providers, land banks, and Continuum of Care leadership. The survey collected feedback regarding flooding impacts and unmet needs as well as community assets and related resilience opportunities. DPD conducted an initial meeting with 25 representatives from the planning, public works, and storm water departments of the pilot municipalities which included a discussion of resilience concepts and an interactive mapping exercise to identify areas particularly impacted by flooding. This meeting was the kick-off of a joint resilience planning effort of Cook County and MWRD, supported by Arcadis. Resulting discussion highlighted the symbiotic nature of environmental and economic resilience as participants provided anecdotal accounts of flooding impacts more recently and historically on individual families, neighborhoods, and the broader community. Three local resident community meetings were held to gather additional information regarding unmet community needs and flooding impacts as well as to discuss social, environmental, and economic resilience in the face of natural disasters such as flooding through information sharing, a mapping exercise, and a framing discussion. These meetings, with 34 total attendees, were community-led conversations about how Cook County can reduce impacts, increase adaptability, create opportunities, and build regional resilience capacity over time. The draft proposal was also available for a 15 day public comment period which was advertised electronically via website

posting and e-blast distribution to a list of 2,000+ stakeholders. This outreach methodology is a replicable model for work in subsequent areas beyond the pilot.

Incorporating Consultation

Through the engagement of public agencies, community residents, local businesses, regional experts, and vulnerable populations, the Partnership has developed a thorough understanding of the regional and local 1) priority vulnerabilities across built, natural, and social systems (from aging infrastructure to loss of biodiversity to unemployment), specifically the compounding interactions between these vulnerabilities, including vulnerable transportation systems potentially exacerbating unemployment for residents reliant on them; 2) Unmet recovery needs, in light of DR-4116 as well as those as a result of chronic and repetitive hazards since; 3) Current and future hazards, both shocks and stresses including weather-related events.; 4) Direct and indirect risks and; 5) Existing and emerging tools and opportunities to build regional resilience.

Within Cook County, outreach conducted and feedback received through *Planning for Progress*, CDBG-DR strategy development, HMP, and other strategic plans developed by the Forest Preserves District and Department of Transportation and Highways have further informed DPD's approach to resilience. MWRD's open project call as well as their ongoing outreach efforts also contributed to local understanding of resilience needs and opportunities.

Influential insights from consultations include the need to: 1) Prioritize most vulnerable communities and meet them where they are with information, technology, and resources; 2) Reduce single-points of failure by creating redundancies through decentralized systems; 3) Leverage existing community engagement efforts by coordinating with public health, social services, and library systems; 4) Improve trust between residents and public agencies through two-way communication that ensures information sharing on risks, actions, and impacts; 5)

Balance efforts between preparations/recovery in time of disaster with long-term proactive actions/transformational change; 6) Consider flexible policies encouraging improvement through recovery, rather than return to previous states; 7) Plan to evolve resilience-building strategies with future forces of change (i.e., new technology, market demand, shifting hazards, etc.); 8) Strike a balance between gray and green infrastructure and consider them holistically. 9) Ensure that improvements in one area don't transfer to or magnify related issues in another area; and 10) Capitalize on high interest in the pilot area related to economic development and job creation.

Future activities – Phase 2 and Beyond (1 page)

The types of consultation described above will continue through Phase 2 and beyond. The Partnership is committed to continuing twice monthly meetings through October 2015 and monthly beyond in order to 1) coordinate on projects, policy making, communication efforts, and grant applications; 2) share best practices and lessons learned from pilot projects; 3) report on progress and impact; and 4) connect to and inform relevant efforts outside of the Partnership.

For Phase 2 of this proposal, the Partnership will solicit innovative ideas from designers by holding a design competition to develop site-level solutions within the pilot areas that improve resilience. This design competition is meant to attract public interest in resilience by creating interesting and striking design concepts that can be discussed at public events, and generate ideas that can be further developed and submitted as part of the Phase 2 proposal. The most innovative and effective ideas will be recognized at workshops and conferences around the region, and those that are feasible will also be considered for incorporation into the Phase 2 applications by the relevant Applicants. The Partnership is currently in conversations with Rebuild by Design to manage the competition. The demands of continued consultation are significant, and the Partnership is also seeking philanthropic funding to hire a project manager for this purpose.

Area leaders and stakeholders that include or serve vulnerable populations will be included in the localized planning activities in the pilot area. Since the pilot areas have been chosen in part because of their concentration of vulnerable populations and businesses, Phase 2 will include a engagement process that builds community resilience by increasing the knowledge and resources available to vulnerable households and communities in addressing flooding; strengthens long-term social networks and connections within/between communities and public agencies; and integrates local and technical understanding by providing opportunities for vulnerable populations to work with designers and decision-makers. DPD, in coordination with CNT and MWRD, will continue to gather information, deploy surveys, conduct outreach, and share information through in person meetings and forms of electronic distribution to hear directly from residents/businesses and consult with community-based organizations and local leaders to gain further insight into the diverse issues faced by vulnerable populations as well as build community trust and support. Quick install, high visibility demonstration and place-making projects will make the solutions tangible and provide a sense of momentum.

Factor 3b, Overall Approach

The Partnership seeks to build regional resilience to current and future hazards, stressors, and shocks by addressing each factor of vulnerability - physical exposure, population sensitivity, and adaptive capacity (as defined by the Intergovernmental Panel on Climate Change). Resilience to flooding will be a focus as all Applicants experience chronic flooding, particularly urban flooding associated with intense rainfalls that overwhelm existing stormwater infrastructure and expose vulnerabilities across our interacting built, natural, and social systems. Based on the philosophy that preparedness for *any* disaster builds capacity to respond to *every* disaster, the ideas and concepts proposed also improve resilience more broadly. They are meant to improve

the region's resilience to other threats such as extreme heat and drought, as well as chronic stresses like economic disinvestment or unemployment. Resilience will be approached at varying scales based upon local needs and can be divided into three categories of work: 1) Multi-Hazard Resilience Planning - designed and piloted plans in the Applicants' selected areas across the region. Each plan will include significant technical analysis, community engagement, and prioritization of solutions to maximize co-benefits. The process will be designed with replication and scalability in mind. 2) Cross-jurisdictional coordination and scaling of these Plans, with the goal of building a toolbox for the region. Coordination of the Plans will improve the innovation and quality of each, ensure that impacts are considered across jurisdictions, and ultimately develop a template for resilience planning that can be replicated. 3) Establishing a Regional Resilience Framework for focused implementation and replication by strengthening capacity in data and modeling, planning, capacity-building, work force development, financing mechanisms, and policy/institutional changes. The Partnership will carry this out by building on the structure of two existing resiliency initiatives, RainReady and the CSC.

Factor 3b, part 1: Detailed Multi-Hazard Resilience Plans

Cook County will design and test a model approach to disaster resiliency that can be rapidly taken to scale across the County. This planning process will be launched in the pilot area in the form of a Detailed Multi-Hazard Resilience Plan (Plan). This Plan will focus on addressing unmet needs described in Factor 2 as well as additional challenges identified through current and future engagement of the public. The Plan will result in recommendations for local capital investments and policy or institutional changes and will be prepared by a design team of contractors, including architects, landscape architects, engineers, urban planners, outreach specialists, and other technical experts in consultation with local residents and community

leaders. MWRD's Stormwater Master Plan pilot study for the Little Calumet River and Cal-Sag Channel will also be part of the pilot area's Detailed Multi-Hazard Resiliency Plan. The goal of this pilot study is to identify green and gray solutions to severe weather events like 100-year flooding of structures and basement backups.

In response to the unique conditions of the pilot area described in Factor 2, Cook County's approach will focus on: 1) improving the physical capacity to handle stormwater in innovative ways that will have co-benefits including job creation and increased recreational amenities, 2) increasing the capacity of residents and businesses to respond to flooding and other shocks and stressors, and 3) building the capacity of local governments to address their challenges. Additionally, the Plan will create unique partnerships to use scarce resources more productively.

While DPD will refine its approach through the planning process, the types of solutions that will be considered include: 1) Green infrastructure along public right of ways, existing institutional space and vacant properties - widespread deployment of projects that infiltrate, intercept, delay, and detain rainwater before it can reach stormwater drains and pipes; 2) Private property stormwater retrofits - achieved through RainReady with a property assessment, construction oversight, and funding. Improvements include downspout disconnection, re-grading, foundation crack sealing, porous paving, rain gardens, and backwater valves. 3) Floodplain buyouts for properties that have been repeatedly flooded, substantially flooded, or at-risk of damage as climate change affects precipitation patterns; 4) Enhancing natural functions through the restoration of wetlands, riparian corridors, and forests in areas where they can best alleviate current and future vulnerability to flooding and reverse the transformation of the region's landscape and hydrology over the past 150 years; 5) Gray infrastructure retrofits to resize built stormwater infrastructure to handle the storms currently experienced or those that

will be experienced in the future, and address “choke points” where an undersized component may join two more appropriately sized components, negating system capacity by inhibiting local stormwater flow; 6) Help communities reduce infiltration/inflow (I/I) by identifying, testing, and correcting I/I problems, where they contribute strongly to urban flooding; 7) Sewer-shed buyouts - for those areas identified as being impacted by relatively small rainfall events, or located in “choke points” where stormwater often backs up, examine the purchasing of properties to eliminate flood risk and create new spaces for green infrastructure, gray infrastructure and restoration of natural systems; 8) Restoring tree canopy and urban forestry - as much of the pilot area has little or no tree canopy, plant trees to enhance the capacity of urban soils to retain stormwater and decreasing the quantity of excess runoff through transpiration and evaporation; 9) Basement-to-Cistern conversions - for flood-prone properties that are bought out, remove the above grade structure and conduct an engineering analysis to determine if the pre-existing basement can be used for in-ground detention, retrofitting these formerly vulnerable basements into an integrated component of a functioning stormwater management system; 10) Investigate levee rehabilitation and realignment - for those areas where structural flood control strategies are already in use, investigate the rehabilitation of existing levees and also look at the realignment of those levees or related modifications to create additional floodplain and floodway conveyance; and 11) Use all forms of public infrastructure - prioritize solutions on the public right of way (as part of transportation infrastructure, primarily), to maximize the use of these assets, then within parks and other publicly-owned facilities, and then on vacant, publicly-owned land; privately-owned land is a lower priority, due to long-term maintenance responsibility concerns.

DPD will develop and implement a Plan driven by the following core principles: 1) Easy adoption and replication: Ensuring that any services and tools are developed in a way that makes

them easy to adopt and relevant to communities across the region. 2) Community-wide efforts: Ensuring that relief goes to whole neighborhoods and communities. 3) Evidence-based strategies: Prioritizing investment based on an analysis of the risks property owners and residents face. 4) Market-based approaches: Meeting the needs of individual property owners and leveraging local and private investment for wider public gain; 5) Inclusive and fair: vulnerable groups will be co-creators and collaborators in the design and implementation with the aim of furthering solutions that benefit all residents and businesses; 6) Leveraging for Multiple Benefits: Seeking opportunities to leverage infrastructure investments in transportation, housing, and energy that bring wider environment, social, and economic benefits; 7) No negative downstream impacts: Avoiding negative impacts on neighboring communities; 8) Nature-based solutions: Use of green infrastructure, since it brings broad benefits to communities; 9) Fiscal fairness and transparency: Engaging all stakeholders equitably in resiliency discussions, recommendations, and expenditures; and 10) Preventative measures: Promoting the adoption of zoning ordinances, permits, and incentives to encourage land use and development consistent with broader resiliency. As a result of the process, the Cook County and the Partnership will establish an innovative and lasting planning approach to tackling vulnerabilities that can be shared throughout the region. Equally important, the Plan will be designed to bring wider benefits to the communities including economic development, community cohesiveness, recreation, health, improved transportation, and natural resource protection.

Factor 3b, part 2: Regional Scaling and Replicability

Achieving regional benefits from the pilot studies described above plans will require collaboration of the full Partnership. While DPD will manage and administer the preparation of its own Plan, it will coordinate closely with the other members of the Partnership, recognizing

the benefit of scale and uniformity across jurisdictions. The County's design team will regularly communicate with the design teams contracted by the other applicants. This will regularly occur in small, focused settings, involving the applicants, design teams, and other groups by invitation. The applicants and the design teams will share findings, best practices, and lessons learned to help inform the results of other Plans. Expert advisers that formed the design and engineering work group will be brought in to meet with DPD and other partners to tour and discuss the pilot areas and potential approaches.

Each design team will also participate in regional educational and coordination efforts that involve researchers, climate scientists, groups who represent vulnerable populations, and many others. Planned Resilience Roundtables are one example of this regional coordination, and several of these will be focused on topics of interest to the design teams. The benefits of coordination include: 1) Peer review and feedback from regional experts on each Plan will inform design teams about the impacts on climate change, best practices involving vulnerable populations in service delivery and built environment, and similar topics. Involvement of multidisciplinary experts will help to highlight interdependencies between sectors such as housing or community development that may not be present on the design teams. 2) Water doesn't understand political boundaries. Regional coordination will provide a mechanism to examine the impact of each Plan on a broader geography, including adjacent areas. Cook County affects and is likewise affected by neighboring jurisdictions. Regional coordination will avoid problematic approaches, like making infrastructure investments that simply push flooding problems downstream. The "regional scaling" process provides an opportunity for other jurisdictions to be involved; the Applicants have already entered into an agreement to work together, and other adjacent units of government have expressed willingness to cooperate.

Ultimately, the pilot areas are meant to create a model for Detailed Multi-Hazard Resiliency Plans that can be used region-wide and state-wide. A toolbox approach allows resilience concepts to be applied beyond the timeframe of the CDBG-NDR grant, providing a lasting, long-term commitment to address resilience. This element of the proposal was inspired by Rebuild by Design, with further emphasis on regional collaboration between design teams. Its collaborative nature takes advantage of the region's existing institutional capacity.

At the local level, DPD will establish a toolbox approach to resiliency planning and implementation that can be rapidly taken to scale across the County. Replication and scalability requires an approach that is (a) simple and systematic enough that others can do it, (b) broadly adaptable to a wide range of settings, and (c) can leverage the resources needed to drive expansion. In addition to creating a model or prototype that can be easily taken to scale, replication requires a suite of activities including coordination and leadership, training, transparent communications, citizen engagement, and excellent feedback loops. These following processes will be in place to support scaling: 1) **Leadership development and training:** DPD will continue to contribute to the Resilience Roundtable series for a period of two years, covering different topics of interest, and reconvene the Expert work groups – particularly those focused on design and engineering, and financing – and other work groups as required.

2) Process documentation: DPD will establish an interagency team to independently evaluate meetings and processes (and provide feedback to meeting organizing), gather and document information (maps/photos/film). It will also set up customer management systems, quality control, and process planning. **3) Citizen engagement and communications:** Citizens are some of the most important champions of resiliency. The County has an active network of Resident Action Groups and will establish a Citizens Engagement Network to provide opportunities for

leaders of these Groups to meet and share experiences, helping them log and record their experiences (through film, story-telling, photographic displays, social media and events), and support resiliency planning in their own community. 4) **Monitoring and impact evaluation:** MWRD is currently working with CNT to implement a *Green Infrastructure Portfolio Standard*, a methodology for planning, prioritizing, implementing and recording progress in the installation of multiple green projects. The *Value of Green Infrastructure Guide* provides a tool for evaluating the additional economic benefits derived, such as water treatment costs and reduced air pollution. CNT is also developing a risk model for evaluating the impact of RainReady Home upgrades. These tools will be applied within the pilot communities. 5) **Replication roadmap:** Carrying out this work requires a roadmap i.e. a process for identifying priority communities, engaging with community leaders, and carrying out mapping and planning activities.

Factor 3b, part 3: Regional Resilience Framework

Many of the plans and policies in the Partnership's participating jurisdictions were developed based on incomplete assumptions of the current and future intensity and volumes of rainfall and stormwater. The Partnership will complete an analysis of relevant plans, policies, and practices that influence the risk of all types of flooding with the full input of stakeholders and members of the Partnership's various workgroups. In Phase 2, the Partnership will identify and prioritize the amendment and creation of new policies and guidance, where practicable. An initial scan of key policies, plans, and other institutional practices has identified the following opportunity areas.

Data, modeling, research: The Partnership proposes to integrate disconnected data sets, modeling efforts, and other decision-making support tools to build a comprehensive system for watershed and sewer shed management and infrastructure optimization. This integrated system will give multiple parties access to the same decision-making support tools, using the same data, with the

capability of assessing upstream and downstream impacts of a variety of stormwater management intervention decisions.

Planning: The Partnership proposes to integrate resilience into local plans and regulations, including comprehensive plans, zoning ordinances and development regulations, watershed plans, hazard mitigation plans, and capital improvement plans, allowing interdependent solutions to be explored. CMAP will also integrate resilience as a regular part of its planning efforts including the LTA program, using its 2013 Climate Adaptation Guidebook as an important starting point. MWRD will follow a similar approach in its planning initiatives. The Partnership also proposes to integrate two distinct types of watershed planning - those funded through the IEPA that covers stream quality and permits use of 319 funds, in line with the Clean Water Act, and those prepared by stormwater management agencies focused on flood reduction.

Policy and Regulatory Change: Several examples of policy and institutional changes are below; these will be further explored and prioritized by the Partnership during Phase 2. Specific resilience financing proposals are discussed in Factor 4b. Zoning ordinances and development regulations set requirements for lot coverage, use of permeable pavement, and tree diversity, among others; small changes to ordinances can have major impacts on the built environment. These changes can be accomplished through trainings of local staff or provision of direct technical assistance. Innovative and effective design practices generated from the pilot Plans can also be integrated into infrastructure design standards. For example, transportation agencies can incorporate green infrastructure design into roadway improvement projects, and can account for new flooding expectations due to climate change when designing transportation facilities. These design practice changes will be accomplished through trainings for staff in local transportation or public works departments. The State of Illinois also proposes to enact regulatory and policy

changes to enable certain aspects of resiliency planning and design. The Illinois Department of Natural Resources (IDNR) will implement recommendations of the ongoing Urban Flood Awareness Act, which covers areas outside of floodplains that receive chronic flooding due to basement backups and limited sewer capacity. The state plumbing code should also be amended to allow for the re-use of water.

Economic and Workforce Opportunities: Some of the most disadvantaged communities suffer from the greatest rates of flooding and can benefit from public investments in new green infrastructure projects. Public agencies, workforce development boards and intermediaries will train and connect the local workforce with on-the-ground projects (such as the construction, design, and maintenance of resilient green infrastructure). The region already boasts several examples of environmentally-focused workforce programs such as the Calumet Green Manufacturing Partnership, High Bridge, and Chicago's Green Corps program. The Partnership will support scaling up of these initiatives to create workforce programs aimed at vulnerable populations who have lost jobs or income due to disaster. Likewise, the Southland's unique rail infrastructure offers the opportunity to create a positive cycle of investment and reinvestment by bringing buildable industrial sites to the private sector in a way that also reduces flood risks and enhances recreational spaces. This work can be scaled up through a partnership between SSMMA, CNT and MWRD.

Capacity Building and Education: The Partnership will hold workshops through RainReady and MWRD's stormwater master plan that educate local residents and businesses about flooding resilience strategies, connect them to funding opportunities, and increase preparedness for a range of hazards. The Partnership will also organize local resiliency ambassadors to lead tours that showcase resiliency planning and design in action. Students will be particular targets of

engagement, and CMAP will devote one year of its nationally-recognized Future Leaders in Planning program, which educates high school students about planning and public policy, to the concept of resilience. Within the pilot area MWRD will also develop a locally-focused stormwater education program for grades K-2 at elementary schools to engage both students and their parents in learning about causes and solutions to urban flooding.

In order to integrate resilience into local decision-making, the Partnership will host trainings for elected leaders, municipal staff, and public works officials on (1) how to integrate future climate impacts into planning and update regulations, (2) adaptive management practices to leverage data and monitoring of interventions to inform future decisions, and (3) best practices for successful scaling and transferring effective interventions across communities. Capacity building for design professionals will ensure that resilient infrastructure designs can be replicated in public and private sector developments. These workshops will focus on designing infrastructure that can serve multiple functions and scaling individual property interventions across blocks or communities.

Factor 4: Leverage and Outcomes

Factor 4a: Outcomes

Each Detailed Multi-Hazard Resilience Plan (described in Factor 3b, Part 1) will evaluate alternative methods – such as green and gray infrastructure or use of innovative technology and design – that address flood mitigation while achieving additional co-benefits. Each alternative will be evaluated against a set of performance measures. Specific performance measures will vary between pilot areas, but will fall within categories that are shared across applicants. These categories, and the specific measures that Cook County will use, include: *1) Leadership Strategy*: Create a framework and tool that is transferable to at least three other Cook County

communities. **2) Health and Wellbeing:** reduce asthma by 10% and increase overall health and well-being. Increase access to recreation and open space by 20% within the pilot area; **3) Economy and Society:** Create 100 new jobs through new industry, number of companies relocating; number of companies working in the green infrastructure sector; and number of sites attractive to industries such as urban farming or small scale manufacturing. **4) Infrastructure and Environment:** Reduce basement flooding to less than 5% of homes during the 100 year storm Number of brownfield cleanups completed; number of acres of development available for green development or open space; Conserve water DPD will also explore feasibility of implementation and cost effectiveness related to project cost per benefitting structure for projects under design and those that have been completed. Additional consideration will be given for measures taken to reduce losses due to flooding; cost-effectiveness for these projects will be measured via reduced need for emergency funding, insurance rate reductions, and better use of a plentiful resource, water. Finally, solutions with positive impacts on neighboring jurisdictions and the ability to be applied in other parts of the region will be prioritized. This measure will be assessed qualitatively through the regional scaling up of the Plans (see Factor 3b, part 2).

These performance measures prioritize solutions that provide co-benefits. For example, a gray infrastructure solution may provide only flood reduction benefits, while a green infrastructure solution adds access to open space and recreational assets; environmental and ecosystem benefits, particularly when connected with broader networks of open space; and workforce and training opportunities for lower-skill workers in its maintenance.

Measurement of outcomes will occur quantitatively and qualitatively. Many benefits can be assessed using quantitative performance measures - like new acres of parkland created, or volume of runoff reduced. Others, like improved social cohesion created by an engaging and

responsive planning process, are more difficult to measure numerically. Therefore, stakeholders and experts will be involved, through the regional scaling up process (described in Factor 3b, part 2), to assess the performance of each alternative against these factors. The scaling up process will also be used to review and improve the measures through intensive peer review.

Local Measures of Success

Locally, success is measured by a reduction in basement flooding and clean-up of brownfields for water retention and economic activity, such as urban agriculture or smaller manufacturing and logistics areas to take advantage of the area's transportation system, as well as expanded open space and recreational space.

Regional and Statewide Measures of Success

Regional or statewide success metrics include: the number of government units that address resilience within their comprehensive plans, zoning ordinances, capital improvement plans, and similar documents; the number of stand-alone Detailed Multi-Hazard Resilience Plans adopted, and the percentage of the region's population that resides in areas with such a plan; the number of government units using optimization tools (such as stormwater models) to plan for infrastructure needs; and an increase in connectivity and inter-jurisdictional partnerships between Partnership members.

Factor 4b, Leverage

Through the "Financing the Future" workgroup, the Partnership is engaging a broad range of banks and insurance companies in the area to discuss how they may incentivize resilient practices from residences, business, and large landholders in the area. Participants in this group included representatives from private banks, community development financial institutions (CDFIs), land banks, and finance consultants. This group explored a range of options for new

revenues to fund resilience planning - with a particular focus on green infrastructure financing. In order to leverage existing housing and transportation resources for stormwater management, the group suggested leveraging Low Income Housing Tax Credits for resilient design and working with CDFIs to underwrite home improvements to be able to scale innovative designs across the region. These options underscore the need for performance-based investments that can demonstrate flood reduction, while also providing benefits to low-income households who have the least ability to finance retrofits. The group also identified new streams of revenue that could be established for resiliency planning activities, including stormwater fees, social impact bonds, and value-capture mechanisms similar to tax increment financing that can recover the private property value gains from public infrastructure investments. Opportunities to use transportation infrastructure investments for stormwater capture were also identified. Availability of these resources would reduce FEMA and private insurance payouts on flood damages, while also improving property value and furthering economic development.

The insurance industry has also been a key player in identifying long-term leverage for resilience. The 2014 Urban Flooding Awareness Act, IDNR has been undergoing a study of the cost and prevalence of urban flooding problems across Illinois. For this investigation, the IDNR's Office of Water Resources and Illinois Department of Insurance collected data from the FEMA National Flood Insurance Program (NFIP), as well as all private insurers in the state requesting insurance claim data for flood damage claims in Illinois from 2007-2014. Together, these claims data provide the most comprehensive picture of all types of flooding across the state, including basement back-ups and floods that occur outside of a floodplain. The insurance data shows the severity of chronic urban flooding in Illinois: 89% of all Illinois NFIP and private insurance claims were located within urban areas. The final study, which will be completed in

June 2015, is expected to identify potential revisions to flood insurance programs and update regulations to support innovative and cost-effective stormwater management strategies. These recommendations will provide a roadmap for FEMA, private insurance companies, and state and local governments to incentivize long-term changes that will enable better community flood preparedness.

Land protection in riparian areas will permanently reduce and limit insurable assets on flood-prone property, while also clearing any pending liens or title conflicts that would otherwise increase insurance liability.

Private and non-profit partners are committing their resources to leverage new public investments in resiliency. Openlands – one of the nation’s oldest metropolitan conservation organizations is mobilizing its professional staff and more than 2,000 volunteer members to assist with resiliency-building projects throughout the greater Chicago region. Openlands’ involvement will confer long-term cost savings by building residents’ capacity to care for green infrastructure on an ongoing basis. Openlands has deep institutional and grassroots ties within the target communities and supports long term community engagement through outreach and local decision making in green infrastructure planning, volunteer and community leadership training and development of neighborhood conservation plans in these areas.

Partners are aggressively seeking and being awarded funding for complimentary efforts that are focused on realizing project co-benefits. Recent funders of related projects include Chicago’s extensive network of charitable community foundations and federal agencies, including the National Oceanic & Atmospheric Administration (NOAA), the U.S. Fish & Wildlife Service (USFWS) and Natural Resources Conservation Service (NRCS).

Public-private partnerships are forming pursuant to the above efforts that are generating substantial co-funding opportunities. In partnerships such as Space to Grow, a collaborative effort to transform schoolyards into green learning spaces which also provide green infrastructure solutions, private partners like Openlands and the Healthy Schools Campaign engage community members, mobilize volunteer networks and accept donated services, lands and other project inputs. Public partners, such as Metropolitan Water Reclamation District and local schools, contribute pass-through funding and permitting assistance. The result is greener and cleaner schoolyards that provide both community open space AND significant stormwater recharge.

Cook County is also looking at a range of options for new revenues, reprioritizing existing resources, and leveraging other financial assets in order to secure necessary up-front capital for project development and the longer-term costs of operating and maintaining the various green and gray infrastructure improvements that will be constructed in the region. Cook County, in its partnership with MWRD has the ability to levy real estate taxes for the purposes of stormwater management. To date, MWRD's annual operating budget is little over \$1.2 billion dollars a year. In 2015, the operating budget for the MWRD's Stormwater Management Fund is \$47 million dollars. MWRD has set aside a special allocation of its most recent bond issue for voluntary acquisition of flood-prone property. In addition, they procured the services of Arcadis valued at \$600,000 for outreach and engineering for the Cook County pilot area which is serving as the County's required match for this application. The County also uses motor fuel taxes to fund infrastructure and roadway improvements. The County's Department of Transportation and Highways is looking to add resiliency features into all new projects and the University of Illinois

just received a \$3 million planning grant to look at resiliency planning in suburban Cook County's transportation system.

There is an opportunity to better direct the Clean Water State Revolving Fund to support resiliency-building green infrastructure projects. Administered by the Illinois EPA, the CWSRF provides market rate financing for a range of infrastructure projects. Legislation passed in 2014 expands eligibility to stormwater and green infrastructure, which were not previously supported. Many states use some of these funds to encourage green infrastructure through additional rate reductions, closing fees, and longer-term loans. New state legislation is pending that could create a revolving loan fund that would be aimed exclusively at projects for addressing urban flooding.

Factor 5: Regional Coordination and Long-Term Commitment

Regardless of the outcome of its Applications, both Cook County and the Partnership commit to an array of local and regional activities to enhance resilience in northeastern Illinois over the long term. These activities, as outlined below, will be implemented by early 2017 within and beyond the most impacted and distressed areas.

Local Commitments: Illinois has a Community Rating System but one shortcoming of the CRS system is that the only incentive for communities to participate is the financial discount property owners receive on insurance and the benefit of having made themselves less vulnerable to flooding. Communities themselves do not benefit from these efforts, and communities with more stringent standards are not rewarded.

Cook County and the Partnership will look at ways to promote enrollment in the Community Rating System (CRS). *Metric:* % of communities at CRS at a rating of 7 or higher and work with already-enrolled communities to move them up at least one level. *Baseline:* % of communities enrolled in CRS. Additionally, Cook County will adopt a cumulative substantial improvement

and substantial damage threshold, rather than a one-time event, per the State's model floodplain ordinance.¹ The NFIP's minimum standard is that a substantial improvement is any single improvement that increases a property's value by 50% or more. Substantial damage is any single incident of flood damage in excess of 50% of the property's value. A cumulative standard adds up all previous improvements or damage, or over a certain number of years. Once that threshold is met it is a requirement of the NFIP that the property be elevated. Cook County will look to incorporate resilience measures in all of its facilities including the hospitals, courts, and jails; infrastructure, roadway, and public facilities projects. Further, the County will consider resiliency measures in its day to day practices such as allowing employees better access to technology for remote work during hazard events. *Metric:* Number of facilities with incorporated resilience measures; Number of projects with incorporated resilience measures; Number of green infrastructure projects over the next three years; Value of investments in resiliency in County facilities and operations; Value of investments in resilience in funded external projects.

Regional Commitments: CMAP's role in developing a range of local plans, including comprehensive plans, zoning ordinance updates, capital improvement plans, and watershed plans, provide a natural platform for ensuring that local plans are updated according to latest climate and flooding information and aligned with regional resiliency goals. Currently, no local land use, infrastructure, or zoning plans developed through the LTA program account for a changing climate. CMAP firmly commits to incorporating climate considerations into the plans that it develops through the LTA program. This best practice will add two major elements to its existing planning process for the types of plans listed above. First, climate vulnerability assessments of infrastructure, facilities, and policies will be incorporated into the summary of existing community conditions. Second, plan recommendations will be based upon the latest

downscaled climate projections. Infrastructure, land use, economic development, and conservation, and natural resource management recommendations will be developed according to the most updated climate models provided rather than outmoded historical data that will not represent future conditions. The Midwest Regional Climate Center, Illinois State Water Survey, and Illinois State Climatologist, all members of the Partnership, will be the primary providers of best available climate data. *Metric:* The Partnership will measure regional outcomes by the number and total cost of initiated local plans that incorporate climate considerations, as well as the total population and total land area covered by such plans. *Baseline:* No CMAP plans currently consider climate change directly.

This year the Illinois EPA is expected to finalize regulations that will make low interest financing available through its Clean Water State Revolving Fund (CWSRF) for the first time ever for urban stormwater, green infrastructure, water efficiency and projects intended to make water infrastructure more resilient. Legislation enacted in 2014 expanded the list of eligible projects that could access the CWSRF. This new eligibility also comes at a time when Illinois EPA is contemplating expansion of CWSRF resources through the sale of bonds. *Metric:* Number of project applications to the CWSRF and dollars of loan funding awarded to projects for green infrastructure and urban stormwater. *Baseline:* Currently, no CWSRF financing can be used toward green infrastructure and urban stormwater projects, with the exception of projects for the abatement of combined sewer overflows.

State Structural Risk Assessment: To advance mitigation actions in flood prone Illinois communities, IDNR is committed to expand the implementation of a GIS database of flood hazard risk for every structure located within or near a designated floodplain to: prioritize federal, state and local mitigation assistance to advance mitigation within these communities;

estimate event related flood damages (based on flood forecasts) to determine anticipated emergency response needs to vulnerable populations; estimate event related flood damages recovery needs of vulnerable populations (based on post flood high water mark elevations); update community hazard plans, and evaluate the benefit/cost economics of potential structural flood risk reduction activities including acquisition and elimination of repetitive loss structures. Acquisition and elimination of repetitive loss structures, in high risk areas, provides the opportunity to increase the resiliency of a community to flooding. This holds the potential for additional public benefits including greenways, wetland areas, community gardens and parks. The database will provide an assessment of each floodplain structure based on known structure types, structure appraised values, and surveyed first floor/low entry information.

The IDNR, Office of Water Resources has completed structural flood damage assessments of structures in Alexander, Cook, and Lake counties. The assessment in Alexander County led to the acquisition and demolition of 143 structures in this distressed portion of the state. The State is partnering with the City of Rockford to assess and prioritize flood risk mitigation measures for all flood prone structures along all tributaries into and through the city. *Metrics:* Number of structures assessed and prioritized for mitigation action with a goal to complete the assessment of all 1000 structures by September 2016 and implement at least 10 appropriate mitigation actions in the most distressed portions of the watershed by December 2016 *Metrics:* Number of assessed structures throughout Illinois; number of homes directly acquired due to assessments.

ACRONYMS

ACS	American Community Survey
CAFHA	Chicago Area Fair Housing Alliance
CDBG	Community Development Block Grant

CDBG-DR	Community Development Block Grant – Disaster Recovery
CDBG-NDR	Community Development Block Grant – National Disaster Recovery Competition
CMAP	Chicago Metropolitan Agency for Planning
CNT	The Center for Neighborhood Technology
CRS	Community Rating System
CSC	Calumet Stormwater Collaborative
CWSRF	Clean Water State Revolving Fund
DEC	Cook County Department of Environmental Control
DHSEM	Cook County Department of Homeland Security and Emergency Management
DOTH	Cook County Department of Transportation and Highways
DPD	Cook County Department of Planning and Development
DWP	Detailed Watershed Plan
ESG	Emergency Solutions Grant
FEMA	Federal Emergency Management Agency
HMGP	FEMA Hazard Mitigation Grant Program
HMP	Cook County Hazard Mitigation Plan
HPRP	Homeless Prevention and Rapid Rehousing
IDNR	Illinois Department of Natural Resources
IEMA	Illinois Emergency Management Agency
IEPA	Illinois Environmental Protection Agency
LTA	Local Technical Assistance
MPC	Metropolitan Planning Council
MWRD	Metropolitan Water Reclamation District

NFIP	National Flood Insurance Program
NRDC	Natural Resources Defense Council
NSP	Neighborhood Stabilization Program
SRP	Site Remediation Program
SSMMA	South Suburban Mayors and Managers Association
USACE	Chicago District of the U.S. Army Corps of Engineers
WPC	Watershed Planning Council

CITATIONS

Factor 1: Capacity

1. Cook County Planning for Progress Information and Documents:

<http://blog.cookcountyil.gov/economicdevelopment/planning-for-progress/>

2. Chicago Metropolitan Agency for Planning Planning for Progress project page:

<http://www.cmap.illinois.gov/programs-and-resources/ita/cook-county>

3. Chicago Metropolitan Agency for Planning GO TO 2040

<http://www.cmap.illinois.gov/about/2040>

Factor 2: Need

1. The Spatial Hazard Events and Losses Database for the United States (SHELDUS), University of South Carolina.

2. Center for Neighborhood Technology. “The Prevalence and Cost of Urban Flooding.”

3. Cook County Multi-Jurisdictional Hazard Mitigation Plan. Volume 1 – Planning-Area-Wide Elements. September, 2014; revised, November, 2014. Accessible at

<http://www.cookcountyhomelandsecurity.org/hazard-mitigation-plan/>

4. Chicago Metropolitan Agency for Planning analysis of Illinois Department of Revenue data and U.S. Census Bureau 2008 – 2012 American Community Survey five-year estimates
5. 2010 U.S. Census
6. Illinois Department of Public Health, 2000 to 2008.
7. Chicago Metropolitan Agency for Planning. Infrastructure analysis.
8. 2014 National Climate Assessment Report. www.globalchange.gov
9. Walsh, Wuebbles, Hayhoe, et. al, 2014: Ch. 2: Our Changing Climate. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67.
10. *Climate Adaptation Guidebook for Municipalities in the Chicago Region, Appendix A*, Chicago Metropolitan Agency for Planning, p.17, 2013
11. Chicago Metropolitan Agency for Planning GO TO 2040 projections
12. “Estimating Impervious Surface Area: A Comparative Assessment of CITY green and NOAA’s Impervious Surface Analysis Tool (ISAT) Methodologies. December 2009.
13. “The Suburbanization of Poverty: Trends in Metropolitan America, 2000 to 2008.” Emily Garr and Elizabeth Kneebone. Brookings Institution Metropolitan Opportunity Series.
14. 2000 and 2010 U.S. Census
15. Chicago Metropolitan Agency for Planning Land Use survey, 2010.
16. NFIP data, as of 7/31/2013.
17. Center for Neighborhood Technology. “A RainReady Nation: Protecting American Homes and Businesses in a Changing Climate”. January 2015.
18. IEPA

19. Chicago Metropolitan Agency for Planning “Brownfields Redevelopment Strategy.” March, 2009.

20. Chicago Metropolitan Agency for Planning Land Use survey, 2010.

Factor 5

1. Model Floodplain Ordinance for Communities Within Northeastern Illinois, Secs. 1003.1.2 and 1003.1.3. Available at http://dnr.state.il.us/flood/PDF/NE_IL_Model_Ord.pdf.