New Decision Making Tools for Communities & Residents: the RainReady Approach

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The Problem: Urban Flooding

Overbank

Basement Backup

Seepage

Overland
The Prevalence and Cost of Urban Flooding
A Case Study of Cook County, IL
Phase One (May 2013)
Select Recommendations for Local Governments

- Communities should **investigate existing property evaluation programs** to help homeowners.
- Communities should improve stormwater management in redeveloping areas by adopting stormwater ordinances that **incentivize reduction of imperviousness and updating storm water systems**, especially in known flood problem areas.
- Within a reasonable timeframe, communities should **update their storm sewer atlas** with storm sewer location, infrastructure sizes and design data to allow for evaluation of the effect of changing rainfall patterns on system capacity to more accurately identify areas at risk for urban flooding, and to better inform stormwater management planning.
- Non-CRS municipalities should consider **using CRS principles** in stormwater management to make their communities more resilient.
U.S. Army Corps of Engineers
Planning Assistance to States (PAS)

• Authorized by: Section 22 of WRDA, as amended
• Partner with Tribes and other non-Federal entities
  – %50 Federal /%50 non-Federal cost share
  – Work-in-kind or cash
• Preparation of comprehensive plans for the development, use, and conservation of water and related land resources
• Needed planning assistance is determined by non-Federal partners
• Initiated upon request and approval
• Studies conducted at planning-level of detail only
  – No feasibility-level studies or detailed design
Typical Planning Assistance Studies

The program can encompass many types of studies dealing with water resources issues.

Examples include:
- Flood damage reduction assessments
- Flood inundation mapping
- Dam safety and failure modeling
- Water supply and demand analysis
- Water quality assessments
- Environmental restoration concepts
- Wetlands delineation and biological assessments
- Coastal Zone Management/ Protection
PAS Case Study
RainReady, Heart of the Calumet

• **Non-Federal Sponsor:**
  Cook County Bureau of Economic Development

• **Work-in-kind:**
  Funding for Center for Neighborhood Technology (CNT)

• **Agreement initiated:**
  September 30, 2015

• **Study Description:**
  To develop a shared plan, with specific actions for each of the six high flood risk communities within the Watersheds of the Little Calumet River and the Cal Sag Channel in the south suburbs of Cook County, Illinois, and find solutions to mitigate risks of future flooding and build broader community resiliency.
Planning Objectives

• Establish shared understanding of flood risks and opportunities
  — Public Outreach
  — Planning-level Engineering
  — Hydrologic & Hydraulic Modeling

• Achieve consensus on priorities
• Provide municipalities with roadmap for implementation
• Empower residents to own the plan
• Prepare community to create sustainable financing mechanisms
Resiliency Process

Plan
- Problem Definition + Scoping
- Data Collection
- Risk + Opportunity Assessment
- Stakeholder Analysis
- GIS Mapping
- Collaborative + Iterative Solution Design
- Scenario + Alternatives Analysis
- Cost-Benefit Analysis
- Project Prioritization + Program Design
- Plan Development

Implement
- Solution Design
- Community Outreach + Education
- RainReady Alert
- Performance Monitoring
- On-going Community Organization Support
- RainReady Home + Neighbors
- Grant Writing + Management
- Funding + Finance + Implementation Strategy

Monitor
- Program Evaluation
- Stakeholder Coordination
- Performance Monitoring
- On-going Community Organization Support
- RainReady Alert

Assess
- Community Outreach + Education
- RainReady Alert
- Performance Monitoring
- On-going Community Organization Support
- RainReady Alert
THE RAINREADY PLANNING PROCESS

- RISK & OPPORTUNITY ASSESSMENT
  - SUMMER 2016

- SOLUTION MAPPING
  - FALL 2016

- PLAN DEVELOPMENT
  - WINTER 2016

- IMPLEMENTATION & MONITORING
  - 2017 →
New Decision-Making Tools for Communities and Homeowners

For Homeowners
My RainReady

For Communities/Planners
Flooding Solutions Tool
Map Risk: **Problem Points**

- **Phase 1**
  - Identified through prior risk assessments (e.g. NDRC, MWRD, Millennium Reserve) and stakeholder meetings
  - CMAP Stormwater Analysis Tool Output
  - RRC Survey Results

- **Problem Areas**
- **Problem Catchments**
- **Problem Points**
Map Resilience Opportunities: Assets

Phase 1

- Engaged / Concerned Residents
- Schools
- Parks
- Well-Equipped City Hall
- Possible Garden L...
Community Flood Solutions
Scenario Planning Tool

RainReady Community Risk Tool

Catchment: 420
Area: 962,156 sqft
FLOOD RISK SCORE: 5
OPPORTUNITY SCORE: 2

AVERAGE ANNUAL RAINFALL
Annual Rainfall (in): 26.77
Design Storm Rainfall (in): 2.44
Design Storm Time (hrs): 6.0

REDUCTION GOAL
Precipitation Depth Capture (in): 0.5
Goal Reached: 49.1%
Volume Needed to Capture: 40,090cuft (299,894 gallons)
Total Cost: $533K

GREEN IMPROVEMENTS

Roof Water Capture:
- Green Roof: $0, 0%

Roof Water Redirection:
- Planter Boxes: $0, 0%
- Rain Garden: $533K, 49.1%
  Coverage: 32808 Sq. Ft.
  (13%) of 259,942 Sq. Ft.

show advanced options

Map Layers: Community Areas
Enter an Address or Catchment ID

Upstream → Selected Catchment → Downstream

FLOOD RISK
low 1 2 3 4 5 High

GREEN IMPROVEMENT CO-BENEFITS
Green improvements contributing to 1% of the rainfall capture goal also contribute towards these co-benefits:

- Runoff Reduction
- Other Metric
- Other Metric
Collaboratively Design / Advance Resilience Pro

Conceptual Case Study
Calumet Memoria Green Infrastructure Project

Resilience Project/Program
**objective:** reduce risk of basement flooding in homes through coordinated action on private property

**strategies:**

- Promote Home Retrofit Programs
  - maintain lateral lines
  - check for inflow issues
  - install backwater valves / overhead sewers
  - green infrastructure
  - seal foundation cracks

- Short-Term Solutions
  - floodproofing garage
  - directing water
  - DIY
  - RainReady Alert
My RainReady
Virtual Home Flood Risk Assessment

Your Home
What year was your home built?
1950

Tip: All homes require regular maintenance in order to prevent water from entering the building. Problems can be hidden from view. For example, if you have a finished basement, wall cracks or other issues can develop behind the drywall. You can reduce your risk of flooding and water damage through preventative maintenance.

Survey Summary
2121 W North Ave, Chicago, IL 60647, USA

Your Location
• Located in a flood zone: no
• Home is at lower elevation
• Served by old sewer system
• Flooding in streets

Your Home
• Year Built: Not available (older building)
• Lot: 81% impervious (high risk)
• Backyard ponding / erosion
• Yard or concrete slopes towards building
• More than one year since rodding home’s sewer line
• Connected downsputs
• Inadequate downspout discharge
• Foundation damage (efflorescence, mold, spalling or water stains)

Your Flood History
• None reported

Has it been more than 1 year since last rodding and televising your home’s sewer line?

- Yes
- No
- I don’t know

Tip: Homes are connected to the municipal sewer system through a home sewer pipe ("sewer line"). The sewer pipe may become clogged by fats, oils or grease; leaves or litter; or tree roots. It can also crack or collapse over time.

Are your drains or catch basin always full, look collapsed, or have a sheen inside or nearby?

- Yes
- No
- I don’t know

MyRainReady.org
My RainReady

Virtual Home Flood Risk Assessment

My RainReady Recommendations

Based on the conditions you reported, here are some suggestions to look into. Plumbing, electrical, and other such construction work should be performed by a licensed professional, and may be subject to building permit and other requirements.

Add nature-based solutions to your yard

Recommended because you indicated:

- Your property has a high percentage of surfaces that are impervious to rain
- Your backyard has ponding or erosion
- Your home has areas that show efflorescence, mold, spalling or water stains or damage

Your yard offers many opportunities to manage flooding. Many of these solutions are do-it-yourself and cost-effective. Others should be done by an experienced landscape contractor.

- Let rain soak into a rain garden or bioswale that uses porous soil and water-loving plants. Rain gardens are boulvard-shaped: bioswales are line-shaped.
- Capture and store rain in a rain barrel, cistern or dry well. Rain barrels and cisterns sit above ground; dry wells are an underground chamber.
- Reduce stormwater runoff by replacing concrete or asphalt with permeable paving.

Nature-based solutions work best when they capture the rain water from your roof. You can do this by disconnecting your downspout and directing it into the rain garden or bioswale. If you use a rain barrel or cistern, be sure to empty it before heavy rains. Some homes use multiple rain barrels to increase the amount of rain that can be stored. Stored rain can be used to water your yard.

See our factsheets, “Making Your Yard RainReady (PDF)” and “Options for Flood Prevention (PDF)” to learn more about nature-based solutions. Check out our videos of homeowners using nature-based solutions to address seepage and yard ponding.

Typical costs (Chicago, IL):
- Rain garden or Bioswale: $500 to $4,000, depending on size and if you want to do-it-yourself
- Dry well: $2,500

Rake sewer grates to clear out any leaves and litter

Recommended because you indicated:

- Your neighborhood streets flood when it rains

Maintain your foundation walls with tuckpointing, crack repair and/or waterproofing

Recommended because you indicated:

- Your home has areas that show efflorescence, mold, spalling or water stains or damage

It’s important to regularly maintain your foundation walls. A regular maintenance schedule, including tuckpointing and repairing cracks, may help prevent seepage. Focus on horizontal cracks and cracks near L-shaped sections of your walls, not hairline fractures. If your home’s foundation drain is in good condition, a moisture-proof fabric can be applied against the walls, allowing seepage to be directed into the foundation drain.

Foundations are typically made of stone, brick or concrete. These materials are designed to "breathe" and allow moisture to move in and out. In some cases, it might not be possible to have an entirely dry basement. If you have an unfinished basement, consider leaving it unfinished. If you decide to finish your basement, be sure to use moisture-resistant construction materials and building practices. Damage from seepage is not typically covered by home insurance, sewer backup riders, or NFIP.

Read our factsheet, “Options for Flood Prevention (PDF),” for more information about addressing seepage.

Typical Cost (Chicago, IL):
- Foundation crack repair (epoxy injection): $500 to $800

Install foundation drain with sump pump and sump pit

Recommended because you indicated:

- Your home has areas that show efflorescence, mold, spalling or water stains or damage

A foundation drain is an underground pipe that runs along the bottom of a home’s foundation and helps keep the basement free of excess moisture from groundwater. Homes are built with a foundation drain, but the pipe may become clogged or collapsed. A sump pump and pit collects water, typically groundwater, from the basement floor or foundation drain and pump it outside the home.

Typical Cost (Chicago, IL):
- Sump pump and pit (attach to existing foundation drain): $800 to $1,200

Repair or repour concrete, or regrade soil, to drain away from the building (“positive drainage”)
Questions?