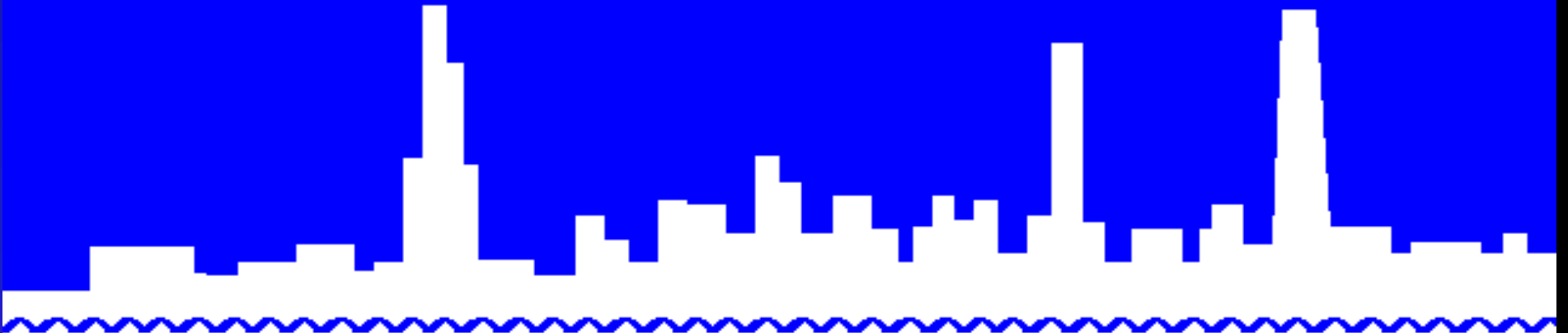


*Protecting Our Water Environment*



**Metropolitan Water Reclamation District of Greater Chicago**

**STORMWATER MANAGEMENT PROGRAM UPDATE**

**February 27, 2009**

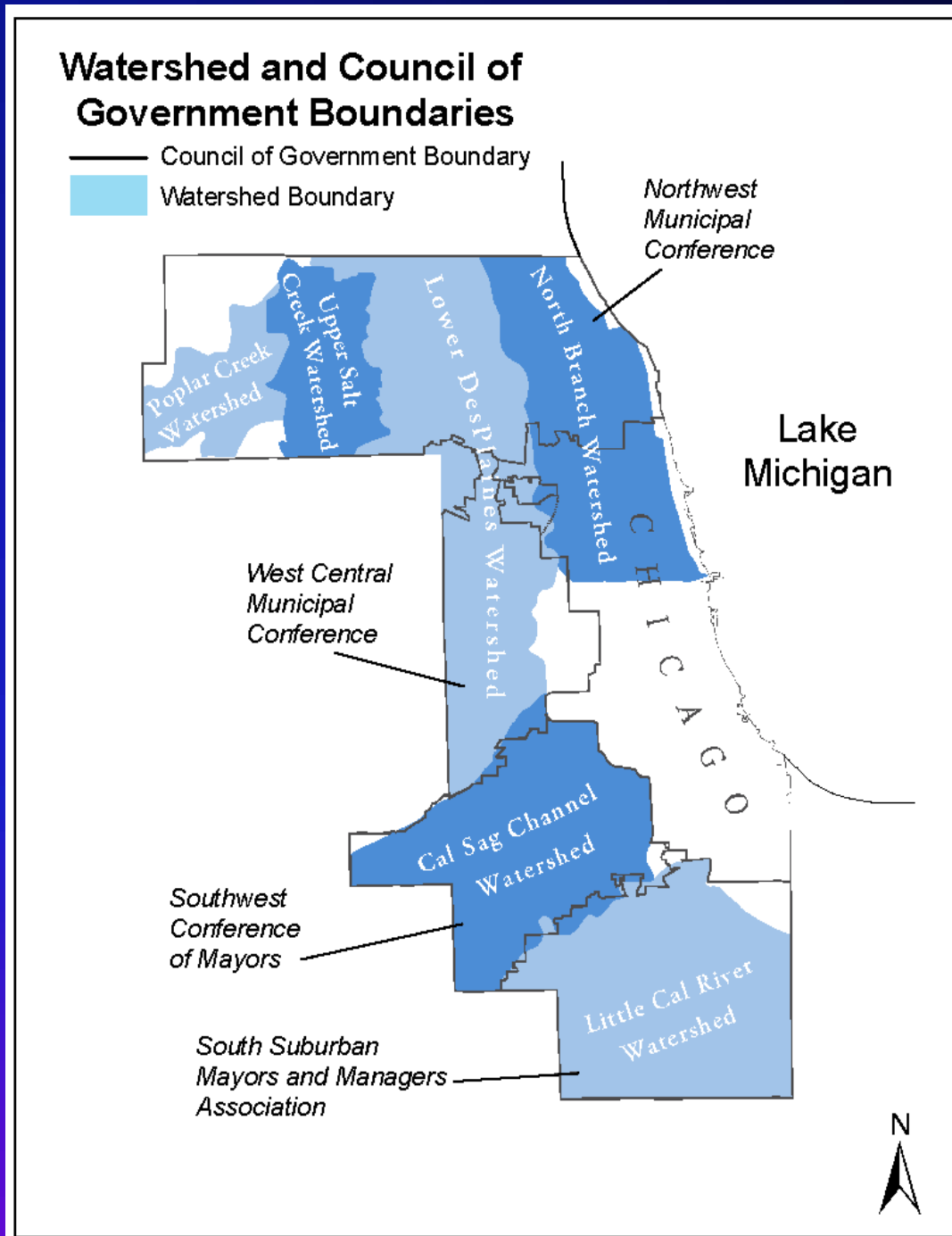
## ***PRESENTATION OVERVIEW***

- ***Statutory background***
- ***Cook County Stormwater Management Plan***
- ***Current District stormwater management initiatives***
- ***Detailed Watershed Plans (DWPs)***

## **STATUTORY BACKGROUND**

- ***Public Act 93-1049 (Act)***
  - ***Granted authority to the District to assume responsibilities of stormwater management for Cook County and provided a funding mechanism***
- ***Requires the District to prepare and adopt by ordinance a countywide stormwater management plan***
- ***The countywide plan may incorporate six or more separate watershed plans***
- ***Names six major watersheds in Cook County for which detailed watershed plans shall be developed***
- ***Created Watershed Planning Councils to act as advisory bodies to the MWRD***
- ***Requires benefit cost analysis in evaluating project prioritizations between watersheds***
- ***The District may prescribe by ordinance reasonable rules and regulations for floodplain and stormwater management***

# WATERSHEDS AND COUNCILS OF GOVERNMENT



# **COOK COUNTY STORMWATER MANAGEMENT PLAN**

- *Required under the Act*
- *The District may plan, implement, finance and operate regional stormwater management projects in accordance with the adopted stormwater management plan*
- *CCSMP was developed in 2006 and adopted by the Board of Commissioners in February 2007*
- *CCSMP is a high level, organizational plan establishing an overall framework for the program.*

# **COOK COUNTY STORMWATER MANAGEMENT PLAN**

- *Not a regulatory ordinance*
- *States mission, goals, minimum requirements for funding capital improvement projects*
- *Provides basic overview of program elements:*
  - *Detailed Watershed Plan Development*
  - *Watershed Management Ordinance*
  - *Maintenance*

# ***CURRENT STORMWATER MANAGEMENT INITIATIVES***

## ***■ Small Streams Maintenance Program (SSMP)***

- Started in 2006***
- Goal is to reduce flooding by removing obstructions and debris in the waterways that impede the natural drainage of small streams and rivers***
- Requests can be made via the District website***

07.18.2006 20:33

# ***CURRENT STORMWATER MANAGEMENT INITIATIVES***

## **■ *Rain Barrel Program***

- *The District sells rain barrels at a discounted price of \$40 each***
- *Individuals can purchase up to two rain barrels***
- *Municipalities can purchase 40 rain barrels for distribution to their residents***



***CURRENT STORMWATER MANAGEMENT  
INITIATIVES:  
JOINT FUNDING AGREEMENTS WITH USGS***

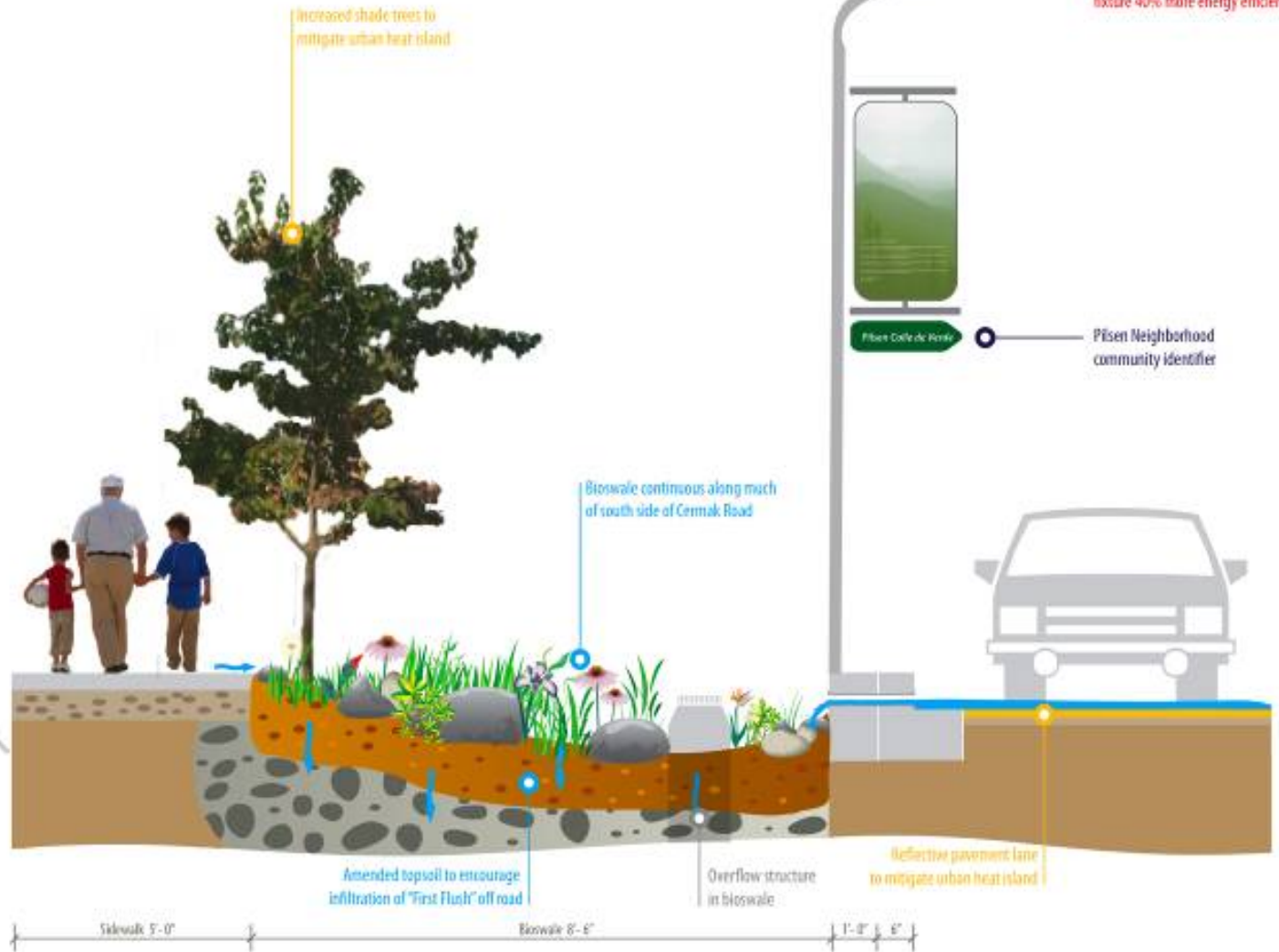
- ***Operation and maintenance of eight USGS stream gauges and one rain gauge in Cook County***
- ***Study of the location and extent of areas with hydrologic characteristics amenable to passive recharge of stormwater***
  - ***Identification of sites suitable for locating stormwater best management practices (BMPs) to reduce surface runoff***

# ***CURRENT STORMWATER MANAGEMENT INITIATIVES: JOINT FUNDING AGREEMENTS WITH USGS***

- ***City of Chicago Department of Transportation Sustainable Streetscape Project***
  - ***Monitoring and Research Department will monitor effectiveness of BMPs incorporated into an urban streetscape project being designed by CDOT (anticipated construction start Summer 2009)***
  - ***USGS is gathering sewer flow data and performing shallow groundwater monitoring to determine pre-construction wet-weather flows in the existing collection system***
  - ***Study will assess how best management practices contribute to combined sewer overflow abatement and overall flow and pollutant loading reduction to treatment plants***

## LEGEND

- **Recycled content**  
 Divert 50% of Construction Waste from Landfill; Specify new materials with a minimum 20% Recycled Content
- **Energy conservation**  
 Meet an energy reduction baseline below the streetscape baseline; select optimal street lights for energy efficiency; use reflective surface on sidewalks/roadways to improve lighting; use renewable energy on designated fixture
- **Storm-water management**  
 Divert 100% of Two year storm event from city storm system through the use of pervious pavements, bioswales and recharge of Chicago River through existing outfall
- **Urban heat island mitigation**  
 Reduce ambient summer temperatures on streets and sidewalks through use of reflective pavements on roadways; light colored materials on sidewalks and use of trees for shading
- **Public transportation**  
 Improve bus stops with signage, shelters where possible, and lighting; facilitate use of bikes with lanes along Blue Island, and strategically located bike racks
- **Water efficiency**  
 Limit or eliminate use of potable water sources for irrigation; Specify Native or Climate-adapted, drought tolerant plants for all plantings
- **Education**  
 Provide public outreach materials/ self-guided tour brochure to highlight innovative, sustainable design features of streetscape
- **Monitoring**  
 CDOT is partnering with MWRD (Metropolitan Water Reclamation District)



## BIOSWALE AT CERMAK ROAD

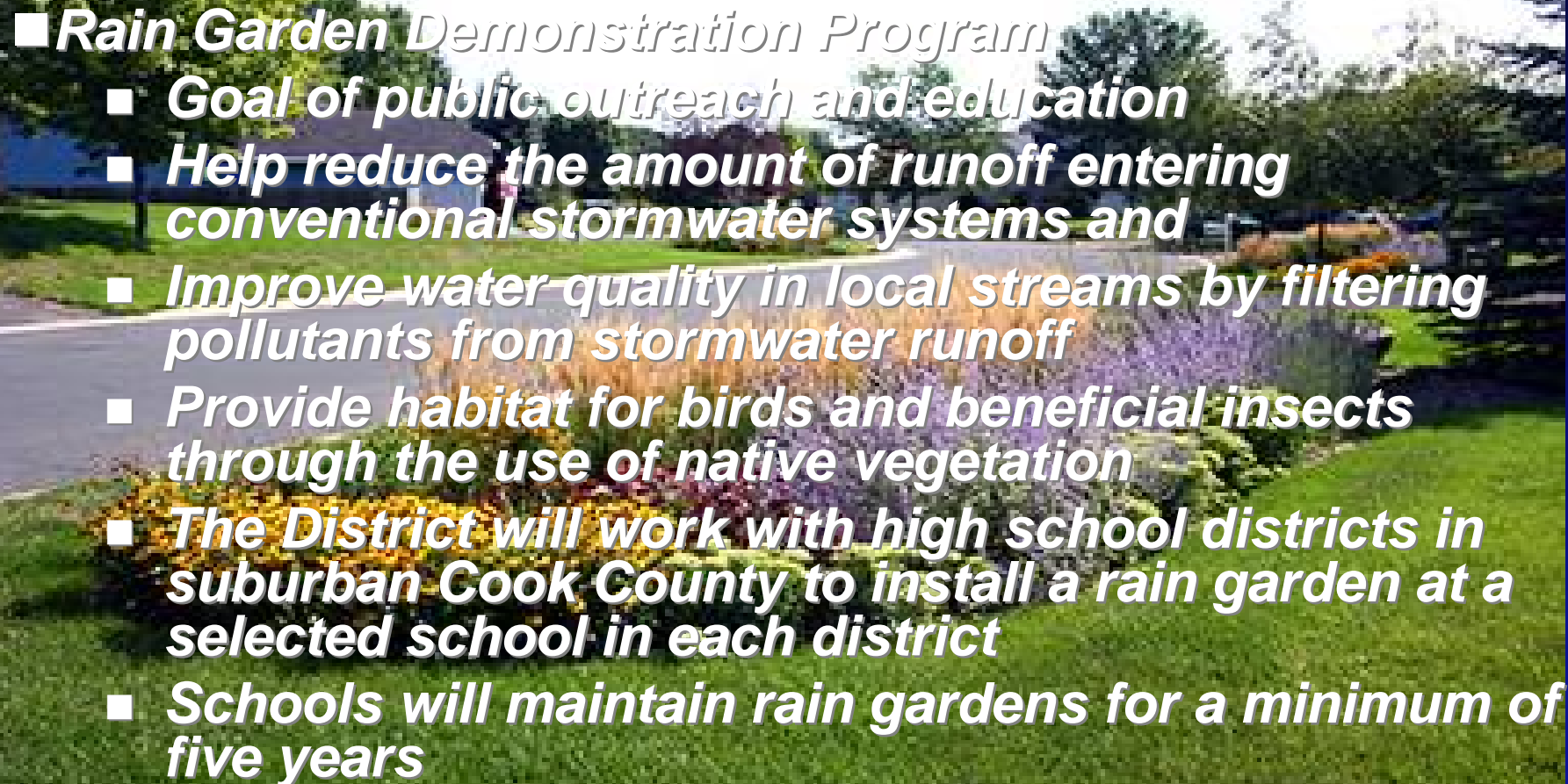


Wight & Company  
Soodan & Associates, INC.

Phoenix Architects  
Mactec

Image courtesy of CDOT

# ***CURRENT STORMWATER MANAGEMENT INITIATIVES***

- 
- ***Rain Garden Demonstration Program***
    - ***Goal of public outreach and education***
    - ***Help reduce the amount of runoff entering conventional stormwater systems and***
    - ***Improve water quality in local streams by filtering pollutants from stormwater runoff***
    - ***Provide habitat for birds and beneficial insects through the use of native vegetation***
    - ***The District will work with high school districts in suburban Cook County to install a rain garden at a selected school in each district***
    - ***Schools will maintain rain gardens for a minimum of five years***

# ***CURRENT STORMWATER MANAGEMENT INITIATIVES***

- ***Permeable Pavement Pilot Study***
  - ***Will give first-hand insight with respect to the use of permeable pavement systems as a stormwater BMP***
  - ***Will provide a basis for recommending alternative paving materials for use on District facilities***
  - ***Comparing performance of pervious concrete, porous asphalt and porous unit paving to conventional asphalt***

# ***CURRENT STORMWATER MANAGEMENT INITIATIVES***

■ ***M&R Department will oversee monitoring of pavement's effects on quality and quantity of stormwater runoff***

■ ***Anticipated monitoring startup – Spring 2009***





# ***CURRENT STORMWATER MANAGEMENT INITIATIVES: WATERSHED MANAGEMENT ORDINANCE***

- *Framework discussed in Chapter 7 of CCSMP*
- *Work began in 2007*
- *Comprehensive ordinance to establish uniform, minimum countywide stormwater management regulations*
- *Components include:*
  - *Drainage and detention*
  - *Wetlands (including isolated wetlands not currently protected)*
  - *Floodplain management*
  - *Water Quality*
  - *Riparian environment*
  - *Soil erosion and sediment control*



# ***CURRENT STORMWATER MANAGEMENT INITIATIVES: WATERSHED MANAGEMENT ORDINANCE***

- ***WMO Development***
  - ***Advisory Committees (TAC and PPOAC)***
  - ***White papers***
  - ***Draft Language***
- ***Draft version for public review in 2009***

# **MWRDGC STORMWATER MANAGEMENT**

## ***DETAILED WATERSHED PLAN DEVELOPMENT***

### **■ *Purpose***

- *Identify the stormwater related problems in a watershed***
- *Develop alternative solutions to those problems***
- *Evaluate the alternatives to determine those that are most effective in addressing the watershed's needs***
- *Completed DWP will contain a summary of the watershed's areas of concern, and a listing of proposed regional capital improvement projects***

## ***DETAILED WATERSHED PLAN DEVELOPMENT***

- ***Chapter 6 of the CCSMP provides guidance for detailed watershed plan development***
- ***District has enlisted the assistance of consulting firms with experience in watershed planning on similar scale and/or within the region***
- ***District led information-gathering effort, contacting all municipalities and townships within respective watersheds, state and federal agencies, and other stakeholders, requesting information on problem areas and on any existing data that may support our DWPs***

# ***DETAILED WATERSHED PLAN DEVELOPMENT***

## ***General Steps – Phase A:***

- ***Gather existing information on current watershed conditions & past studies***
- ***Analyze the suitability of existing information***
- ***Determine what additional information is necessary and outlining procedures for obtaining this information***

# ***DETAILED WATERSHED PLAN DEVELOPMENT***

## ***General Steps – Phase B:***

- ***Obtain the required new data***
- ***Develop hydraulic and hydrologic (H&H) models of the watershed, using or updating existing models when possible***
- ***Identify potential projects to address stormwater related issues***
- ***Quantify benefits and estimate costs of potential projects, and determine other non-economic factors to allow evaluation of alternative projects***

# ***DETAILED WATERSHED PLAN DEVELOPMENT***

## ***Cook County GIS Data Available to the District***

- ***Orthophotography (2003), resolution of 6 inches***
- ***LiDAR points (2003) – used to develop digital elevation models, horizontal accuracy of 2.2 feet and vertical accuracy of 0.6 feet***
- ***Cadastral (parcel) and Planimetric data (2006)***
- ***Hydrolines shapefile (1998) - updated as part of DWPs***
- ***Assessed values of parcels (2006)***

# ***DETAILED WATERSHED PLAN DEVELOPMENT***

## ***Stormwater Management Database***

- ***Based upon a similar database developed by CH2M Hill for project in another city***
- ***Facilitates tracking problem information, project photos, and alternatives***
- ***Automates damage calculations based upon model output and parcel data***
- ***Contains conceptual cost estimating feature***
- ***Produces standardized reports***
- ***Hosted on District server, but accessed by all DWP consultants***

# ***DWP TASKS: FIELD RECONNAISSANCE***

- ***Survey stream cross sections***
- ***Visit structures including bridges and culverts survey/measure as required***
- ***Measure damage elevations and high water marks/first floor entry points where other data sources are not available or usable***
- ***Inspect waterways to determine Manning's n***





# DWP TASKS: FIELD RECONNAISSANCE



# ***DETAILED WATERSHED PLANNING TASKS: H&H MODELING***

- *Decision to use HEC-HMS for hydrologic models and HEC-RAS for hydraulic models*
- *Programs are widely used in engineering community, recognized by FEMA, and likely be to supported for the foreseeable future*
- *HEC-geoHMS was used to produce model input from GIS data sources and HEC-geoRAS was used to process output from HEC-RAS*
- *Model output to be in GIS format*
- *Hydrologic modeling decisions*
  - *Maximum subbasin size of one square mile*
  - *Rainfall data from ISWS Bulletin 70*
  - *Use 2001 Land Use Data from CMAP; NRCS digital soils data*

# ***DETAILED WATERSHED PLANNING TASKS: H&H MODELING***

- ***Calibration of models using USGS stream gauge data, rain gauge data, radar-derived rainfall data where appropriate, IDNR-OWR stage data and high water elevations; sensitivity analysis of hydrologic parameters***
- ***Evaluation of existing, baseline, future and alternative conditions at 2-, 5-, 10-, 25-, 50, 100-, and 500-year storm events, for critical storm duration***
- ***Preparation of maps and hydraulic profiles showing existing conditions inundation areas during the 100-year storm event***
- ***Technical review of models by outside firm***

# ***DETAILED WATERSHED PLANNING TASKS: ECONOMIC ANALYSIS***

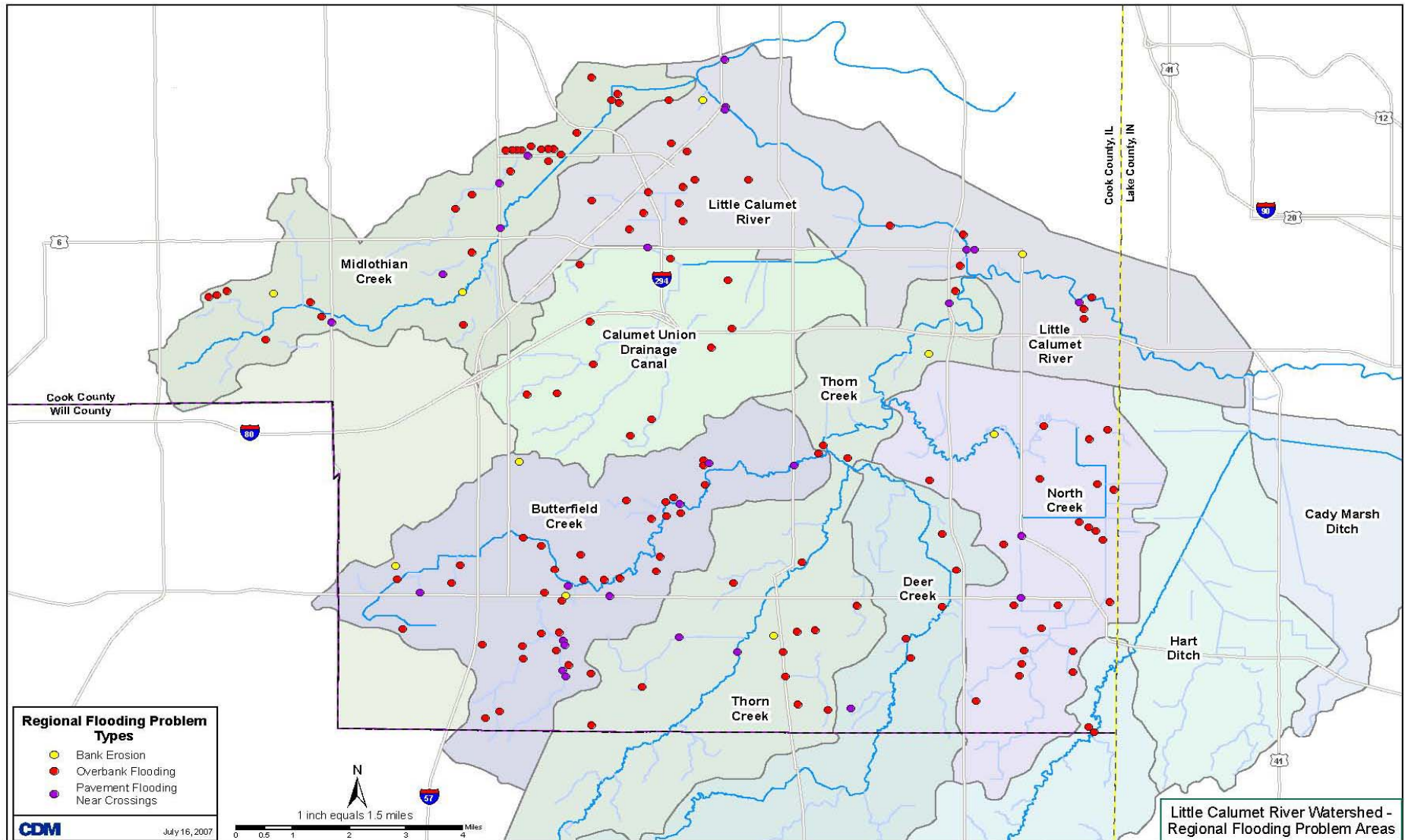
- *Economic damages are calculated by summing property damage from flooding, streambank erosion damage, transportation damage, and recreation damage*
- *Structure location and first floor entry elevation are determined by use of aerial photography, approximations based upon topographic data, and field surveying as needed*
- *Assessed value of assets is derived from Cook County's tax parcel assessment data*

# ***DETAILED WATERSHED PLANNING TASKS: PROBLEM ASSESSMENT***

- *Evaluate problems reported during outreach effort, problems identified using DFIRMS, and problems revealed during modeling*
- *Categorize specific problems as regional or local*
- *Regional problems may be grouped based upon location and cause of the problems*
- *A stormwater management measure or combination of measures comprise an alternative that addresses regional problems*

# DETAILED WATERSHED PLANS

## Little Calumet River Watershed: Regional Flood Problem Areas



# ***DETAILED WATERSHED PLANNING TASKS: ALTERNATIVE DEVELOPMENT***

- *Chapter 1 of CCSMP lists minimum criteria for capital improvement projects, therefore alternatives must meet these criteria*
- *Chapter 6 of CCSMP lists several possible technologies that can be applied to a problem or grouping of problems*
- *Examples: detention/retention facilities, culvert/bridge replacement, channel improvements, levees/floodwalls, streambank stabilization and erosion control*
- *Where opportunities exist, capital projects will incorporate multiple objectives such as best management practices or habitat restoration*
- *Existing documentation of wetland and riparian areas will be reviewed, in order to assess wetland/riparian impacts and enhancement opportunities*
- *Alternatives will be developed for each regional problem; alternatives are subject to revision based upon input of the Watershed Planning Council*

# ***DETAILED WATERSHED PLANNING TASKS: ALTERNATIVE ANALYSIS***

- *Perform H&H analysis of alternatives at range of recurrence interval events*
- *Check how well alternative solves known problems and impacts to other alternatives in the watershed*
- *Modeling shall determine the flood damage reduction benefits for each alternative*
- *Benefits can include added value of recreation facilities, wetlands and riparian areas*
- *Conceptual cost estimates shall be determined for each alternative, using Stormwater Management Database.*
- *Costs estimates to include study, design, land acquisition, construction and O&M (when appropriate)*
- *Benefit-to-cost ratio determined for each alternative*



# DETAILED WATERSHED PLANNING TASKS: ALTERNATIVE ANALYSIS

- *The District is required to consider BC ratio when selecting projects for implementation*
- *Non-economic criteria will also be considered*

**Metropolitan Water Reclamation District of Greater Chicago  
Example Prioritization Matrix**

|                  | B/C Ratio | Total Benefits (\$) | Total Project Cost (\$) | Total Cost To MWRDGC (\$) | Relative Damage Averted (%) |     |     |      | Area Removed from Floodplain (ac) | Wetland or Riparian Area Protected (ac) | Number of Structures Protected | Possibility of Funding Provided by Outside Agencies | Implementation Time (months) | Water Quality Benefit | Communities Involved   |
|------------------|-----------|---------------------|-------------------------|---------------------------|-----------------------------|-----|-----|------|-----------------------------------|---|--------------------------------|---|------------------------------|-----------------------|--|
|                  |           |                     |                         |                           | 25%                         | 50% | 75% | 100% |                                   |   |                                |   |                              |                       |  |
| <b>Project A</b> | 1.25      | 5.0 M               | 4.0 M                   | 3.2 M                     |                             |     |     |      | 5.0                               | 40                                      | 6                              | Very Likely   | 6                            | Positive              | Oak Park<br>Berwyn<br>Cicero   |
| <b>Project B</b> | 2.5       | 7.5 M               | 3.0 M                   | 3.0 M                     |                             |     |     |      | 2.6                               | 8                                       | 10                             | Not Likely  | 28                           | Slightly Positive     | Park Ridge<br>Des Plaines<br>Mount Prospect                                    |
| <b>Project C</b> | 1.2       | 12.0 M              | 10.0 M                  | 7.8 M                     |                             |     |     |      | 13.0                              | 0                                       | 50                             | Somewhat Likely                                     | 3                            | No Impact             | Oak Lawn<br>Chicago Ridge  |
| <b>Project D</b> | 1.0       | 15.0 M              | 15.0 M                  | 14.0 M                    |                             |     |     |      | 3.9                               | 15                                      | 25                             | Not Likely  | 24                           | Slightly Positive     | Buffalo Grove<br>Wheeling<br>Des Plaines<br>Mount Prospect<br>Prospect Heights |

Property Damage

Erosion

Transportation

Recreation

## ***PUBLIC PARTICIPATION***

- ***MWRD updates Watershed Planning Councils on status of watershed plans at quarterly meetings***
- ***MWRD conducts a series of workshops with technical and planning staff of municipalities and townships on the Watershed Planning Council, to solicit feedback on DWP development***
- ***Workshop sessions are generally held for each tributary***

# ***PUBLIC PARTICIPATION***

- ***Workshop #1***
  - ***Present local/regional classification of reported problems***
  - ***Present draft inundation maps***
  - ***Discuss availability of open space for use as project sites***
- ***Workshop #2***
  - ***Present preliminary alternatives***
- ***Workshop #3***
  - ***Present finalized alternatives***
- ***By necessity, public review process starts well before DWP report is written***

## ***DETAILED WATERSHED PLANS TO CAPITAL IMPROVEMENT PROJECTS***

- ***As part of DWPs, recommended alternatives will be identified in an Implementation Plan***
- ***Draft watershed plan report will be provided for District and Watershed Planning Council review***
- ***Recommended capital improvement projects from each DWP will be reviewed on a countywide basis by the District's Board of Commissioners***
- ***Priority by which projects will be implemented will be determined by the Board of Commissioners***
- ***The District will enlist the assistance of consultants to develop detailed design documents for projects to be implemented***

# STATUS OF DETAILED WATERSHED PLANS

## *Calumet-Sag Channel Watershed*

- *Contract scope and duration were extended to allow for calibration of H&H models to the September 2008 rain event*
- *Final stages of revising alternatives and writing report*
- *Draft DWP due in March*



# **STATUS OF DETAILED WATERSHED PLANS**

## **Upper Salt Creek Watershed**

- **Recalibration of H&H models to September 2008 storm event in progress**
- **Draft report expected in May**
- **Final report expected Summer 2009**



# **STATUS OF DETAILED WATERSHED PLANS**

## ***Little Calumet River Watershed***

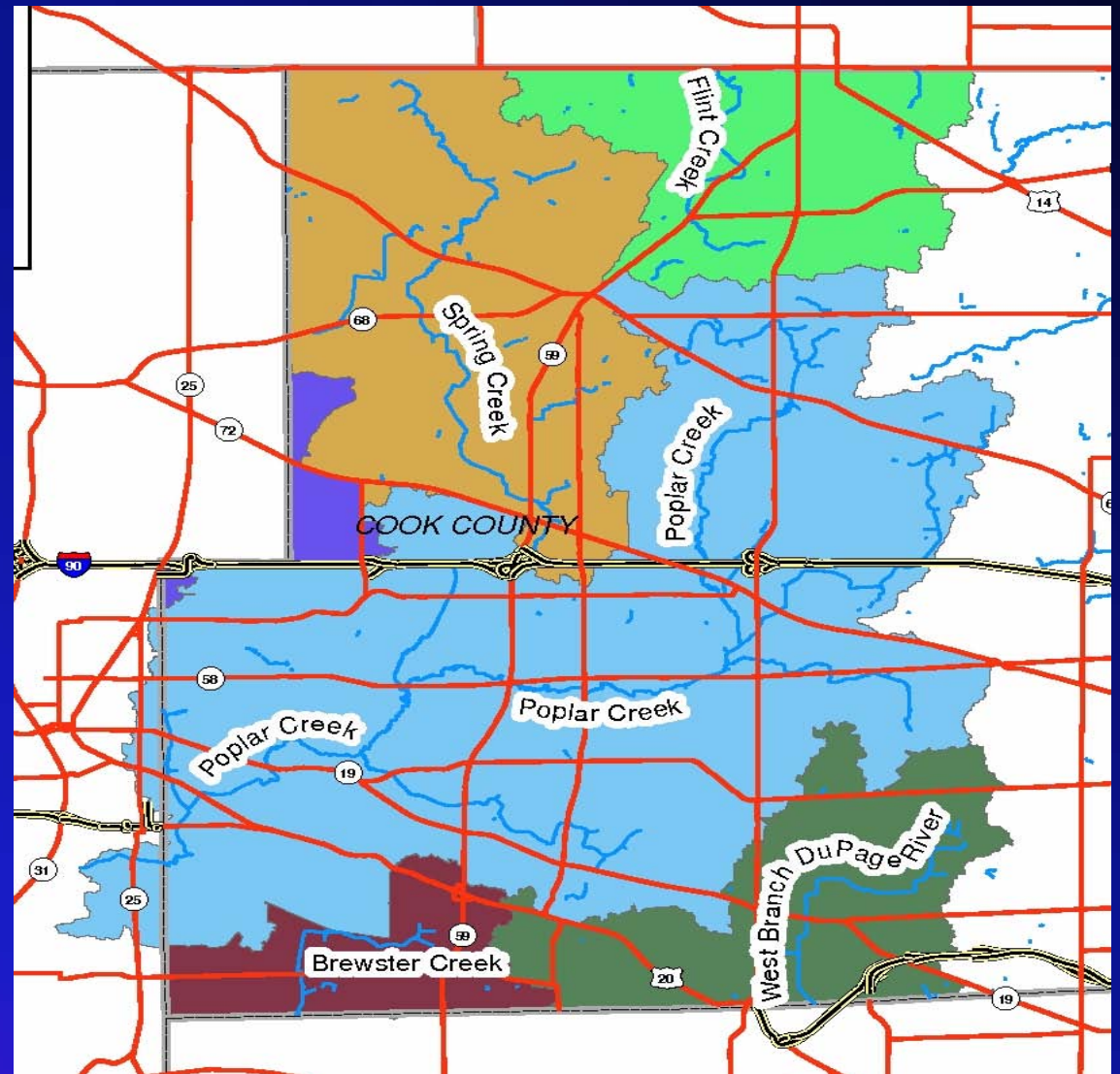
- ***Technical review of H&H models recently completed***
- ***Alternative development in progress***
- ***Final plan completion anticipated in Summer 2009***



# STATUS OF DETAILED WATERSHED PLANS

## *Poplar Creek Watershed*

- *Survey work in progress*
- *Coordination/data request meetings held with municipalities*
- *H&H model development underway*
- *Final report expected in Spring 2010*





# ***STATUS OF DETAILED WATERSHED PLANS***

## ***North Branch of the Chicago River Watershed***

- ***Survey work in progress***
- ***H&H model development underway***
- ***Final report expected in Spring 2010***



# ***STATUS OF DETAILED WATERSHED PLANS***

## ***Lower Des Plaines River Watershed***

- ***Survey work in progress***
- ***Evaluation of problem area data submitted by stakeholders***
- ***H&H model development underway***
- ***Final report expected in Fall 2010***

# ***CHARACTERISTICS OF A SUCCESSFUL DETAILED WATERSHED PLAN***

- ***Identifies all current regional stormwater problems***
- ***Recommends solutions to those problems that can be permitted, constructed and accepted by the communities in which they are located***
- ***Sets the stage for equitable and technically sound installation of measures that reduce flood damages***

**QUESTIONS?**