

# Application of Innovative Stormwater Management Approaches to Develop the Calumet-Sag Channel Detailed Watershed Plan



Illinois Association for Stormwater and  
Floodplain Management  
2009 Annual Conference, Champaign, IL

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# District's Board of Commissioners Adopted CCSMP to establish "Protocol" for Watershed Planning

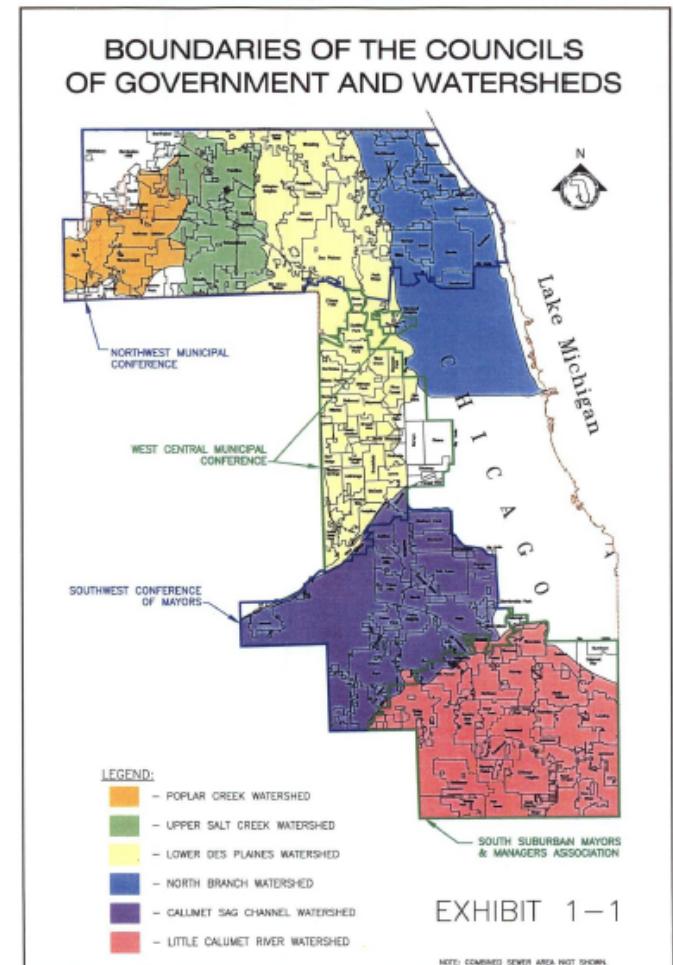






# Six Detailed Watershed Plans (DWPs) Initiated by the District to Develop Capital Improvement Program

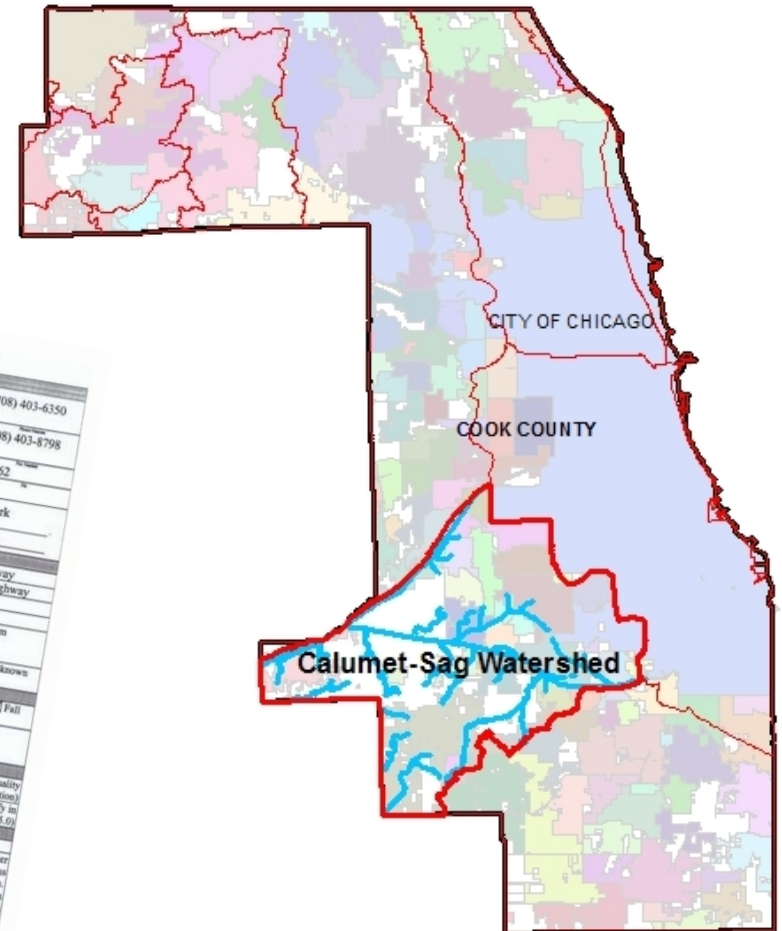
- 3 are near completion
  - Calumet-Sag Channel, Upper Salt Creek and Little Calumet River Watersheds
- 3 are underway for 2010 completion
  - Poplar Creek, Lower Des Plaines River, North Branch of the Chicago River Watersheds





# Phase A Calumet-Sag Channel DWP Optimizes Use of Existing Data

- DWPs completed in phases to leverage existing data
  - Phase A: Data Collection and Evaluation
  - Phase B: DWP Completion



**FORM A: Supporting Information from Municipalities for Detailed Watershed Plan**

Directions: Please let us know about the types of detailed watershed plan for watershed(s) in your city or town. We will review the type of information you have, but do not need, at a later time. Attach additional pages to this form as needed.

MUNICIPALITY/TOWNSHIP: Village of Orland Park

NAME AND TITLE OF PERSON (print): Pete Casey

CONTACT INFORMATION OF PERSON C: 15655 Ravinia Avenue, Orland Park, IL 60462

**FORM B: Specific Stormwater Problem Information**

1.0 Information Provider

Pete Casey, Director of Public Works, (708) 403-6350

Village of Orland Park, 15655 Ravinia Avenue, (708) 403-6350

Orland Park, IL 60462

pcasey@orland-park.il.us

I certify that I am authorized to submit this information on behalf of Orland Park, dated 12/20/06.

2.0 Location of Problem

2.1 Nearest Major Intersection: 115<sup>th</sup> Street & 88<sup>th</sup> Avenue

2.2 Location Description: SSPA 2 - Parkway Estates

2.3 Nearest Watercourse: Mill Creek

2.4 Watershed: Calumet-Sag Channel

2.5 Municipalities/Townships Affected: Orland Park

2.6 Is any part of this problem located in a Floodplain? ☒ Yes ☐ No ☐ Unknown

3.0 Time Period of Problem

3.1 Time of Year Problem Identified: ☒ Winter ☒ Spring ☒ Summer ☒ Fall

3.2 First Known Occurrence: 1996

3.3 Last Known Occurrence: 10/06

3.4 Frequency of Occurrence (# of times a Year): 2

4.0 Type of Problem (Check all that Apply)

☒ Overbank Flooding ☒ Basement Flooding ☐ Ponding ☐ Water Quality (Pollution)

☐ Storm Sewer Flow Restriction ☐ Bank Erosion & Sedimentation ☐ Wetland/Riparian Areas at Risk ☐ Other (Identify in 5.0)

5.0 Detailed Description of Problem

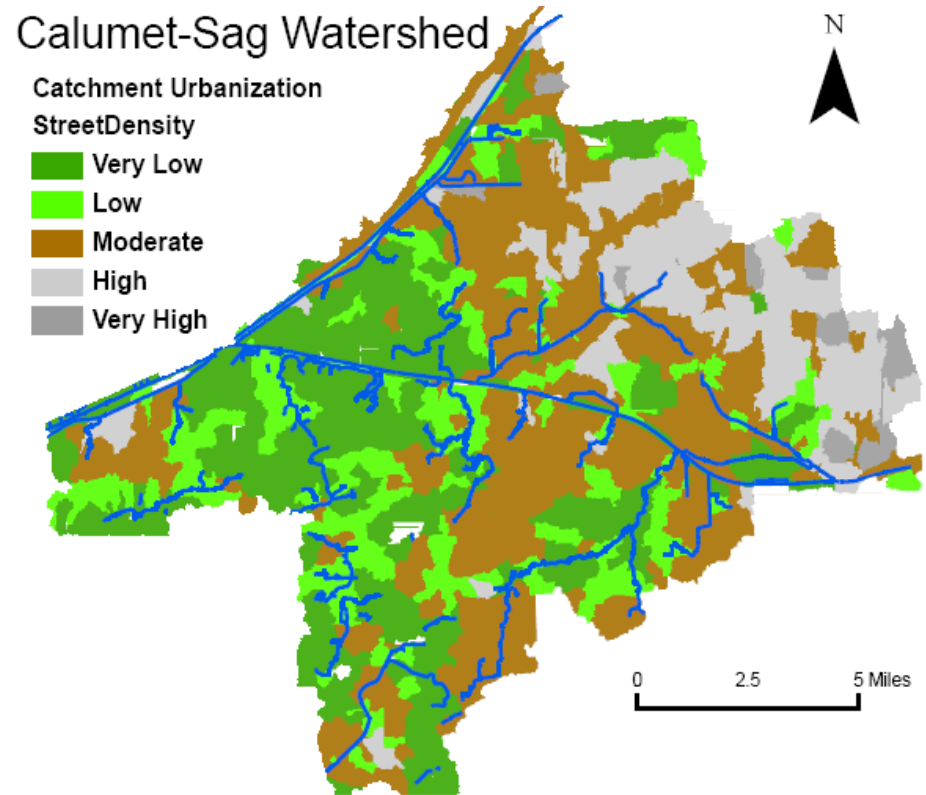
5.1 Provide a detailed narrative of the problem situation below:

Parkview Estates, specifically the homes located along Strawberry Lane, are being subjected to approximately 90 acres of off-site flow that the storm sewer and local conveyance systems are unable to accommodate resulting in significant home flooding. The area was studied following the 1996 flood and a relief storm sewer was constructed, but is unable to handle the off-site flow. The off-site flow is not within the Village, which further complicates possible solutions. The area is also subjected to substantial sanitary surcharging due to the off-site flow infiltrating the sanitary system.



# Complex Calumet-Sag Channel Watershed Required Utilization of Innovative Techniques for DWP Development

- ~150 mi<sup>2</sup> watershed
- Significant flooding and erosion problems
- 27 Communities
- 22 Major tribes
  - ~0.5-14 mi<sup>2</sup>
  - hilly topography in south
  - flat in the north
  - older communities in north

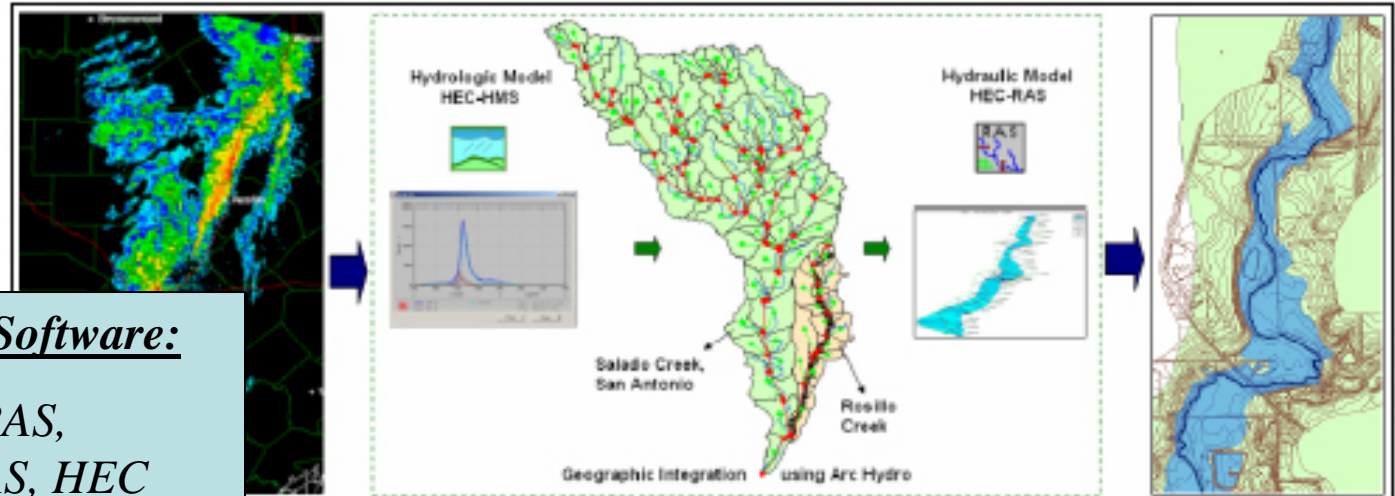




# Hydrologic and Hydraulic (H&H) Modeling Completed to Understand Problems and Evaluate Solutions

## H&H Software:

*HEC RAS,  
GeoRAS, HEC  
HMS, GeoHMS*



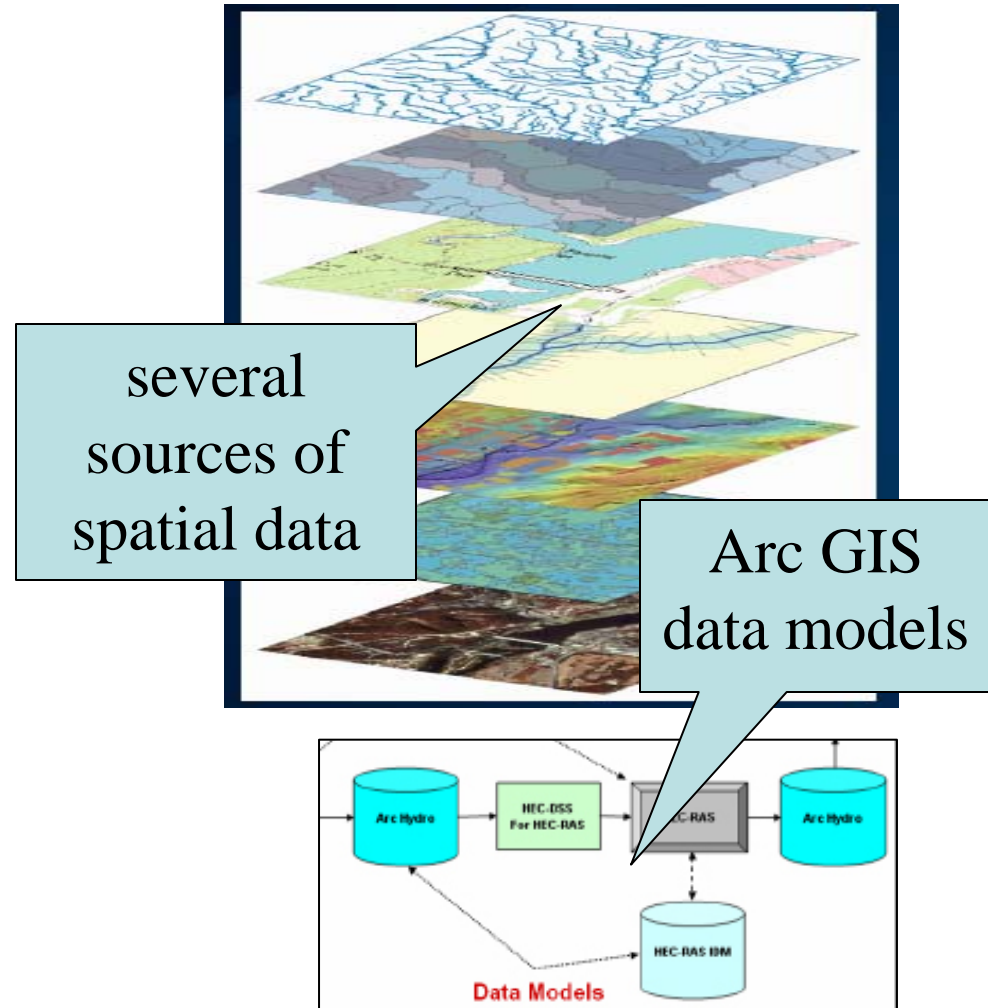
- Models developed using existing and newly collected data
- Models calibrated to observed storm events
- Design events evaluated for inundation mapping
- Alternatives evaluated to identify problem solutions





# GIS and Data Management Tools Utilized Extensively to Improve Efficiency and Quality

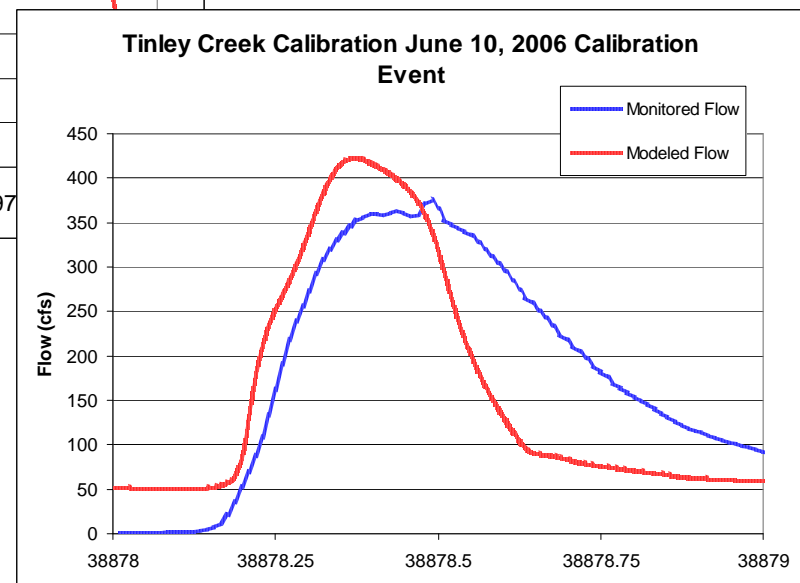
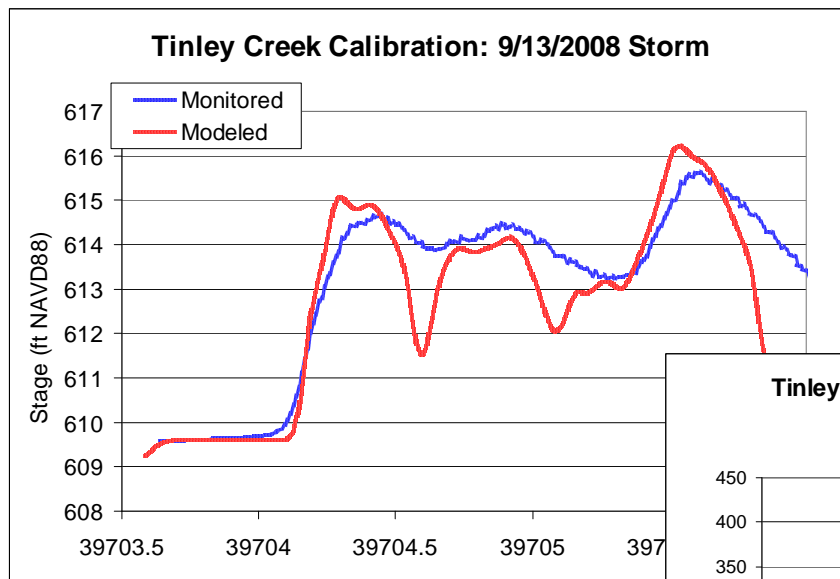
- GIS data used extensively for Calumet-Sag Channel DWP
- Many model development tasks are repeated
- Custom GIS tools created to support model development
  - Automate repeatable tasks
  - Ensure repeatability
  - Support quality control





# Models Calibrated Using Data from USGS Gages and High Water Elevations

- Model calibrated using USGS gage data and high water elevations
- Used range of recent storm data

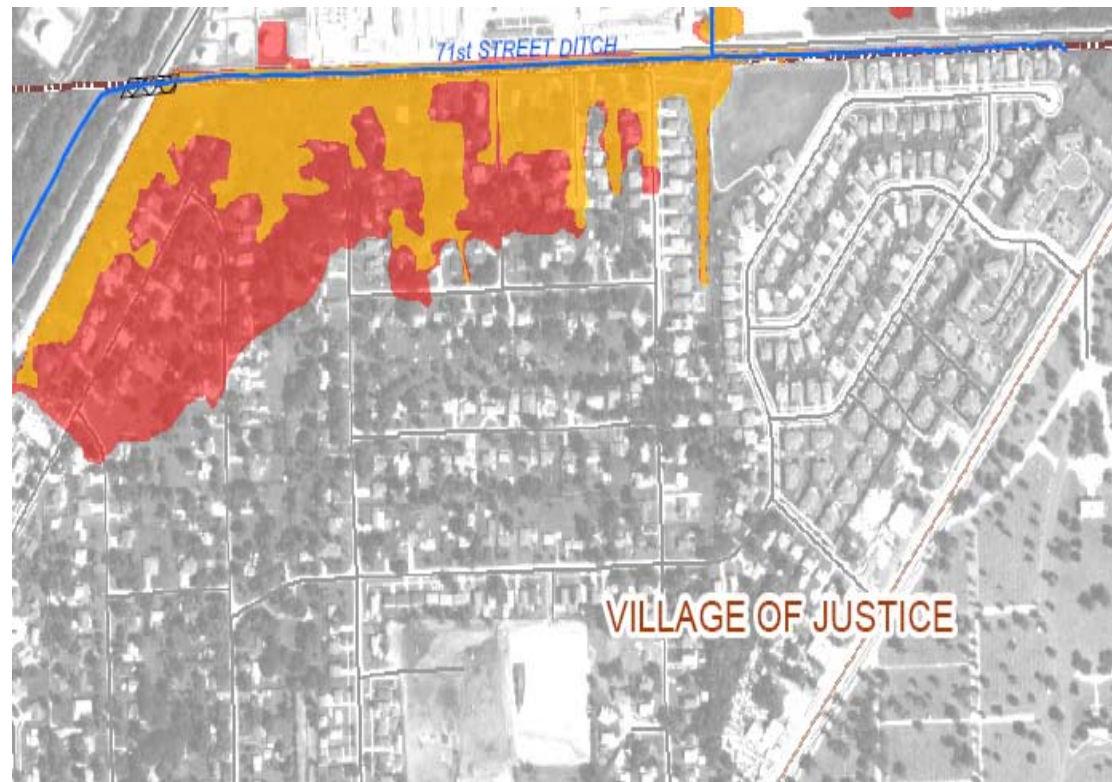






# Inundation Mapping Developed to Estimate Flood Damages for Alternative Development

- Inundation mapping used for B/C ratio development
- Show pre- and post improvement conditions









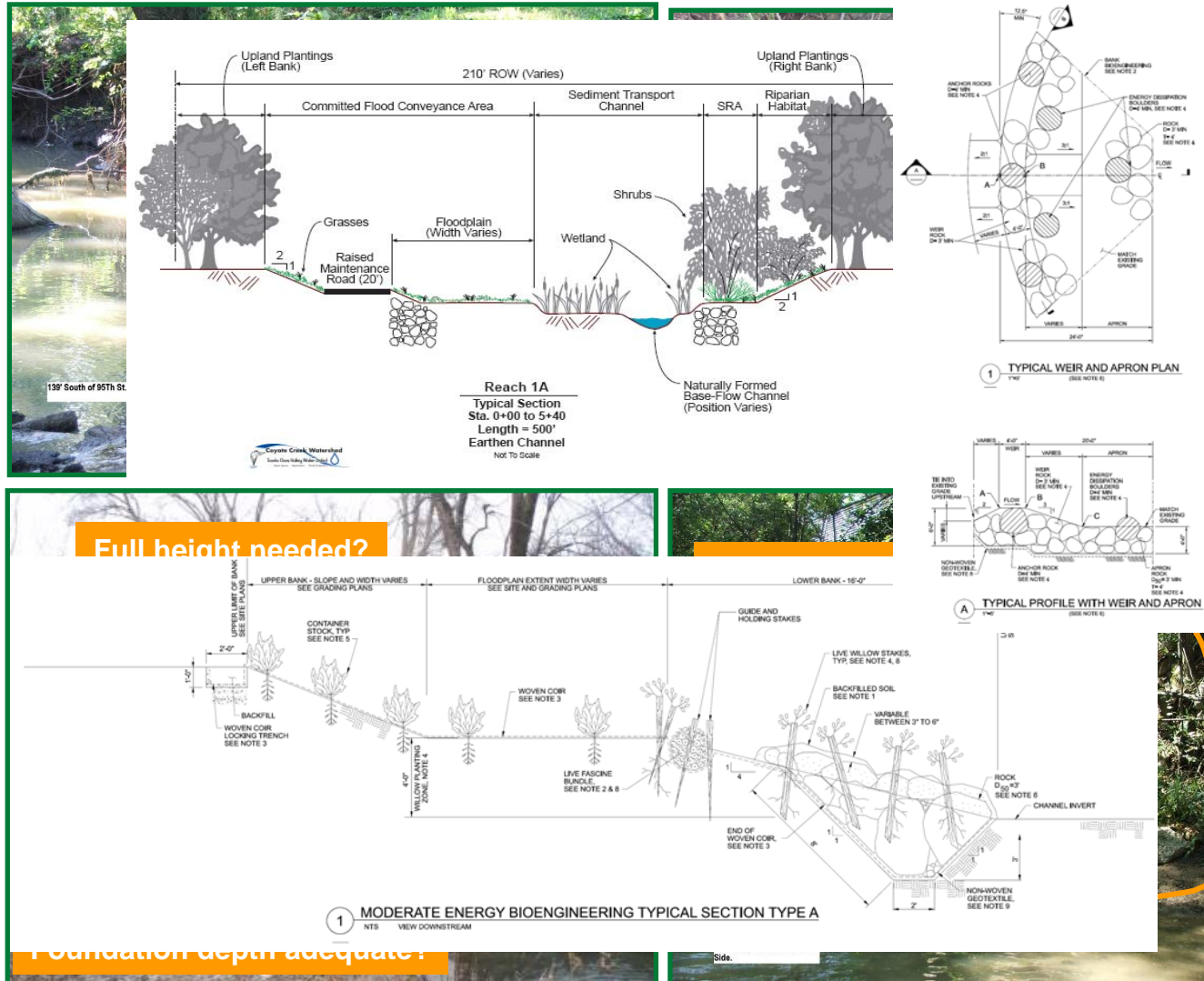
- 
- # Wolfe Wildlife Refuge
- Expand Wolf Wildlife Refuge by 29 ac-ft
- Oak Lawn
- Expand Wolf Wildlife Refuge by 58 ac-ft
- W 100TH ST





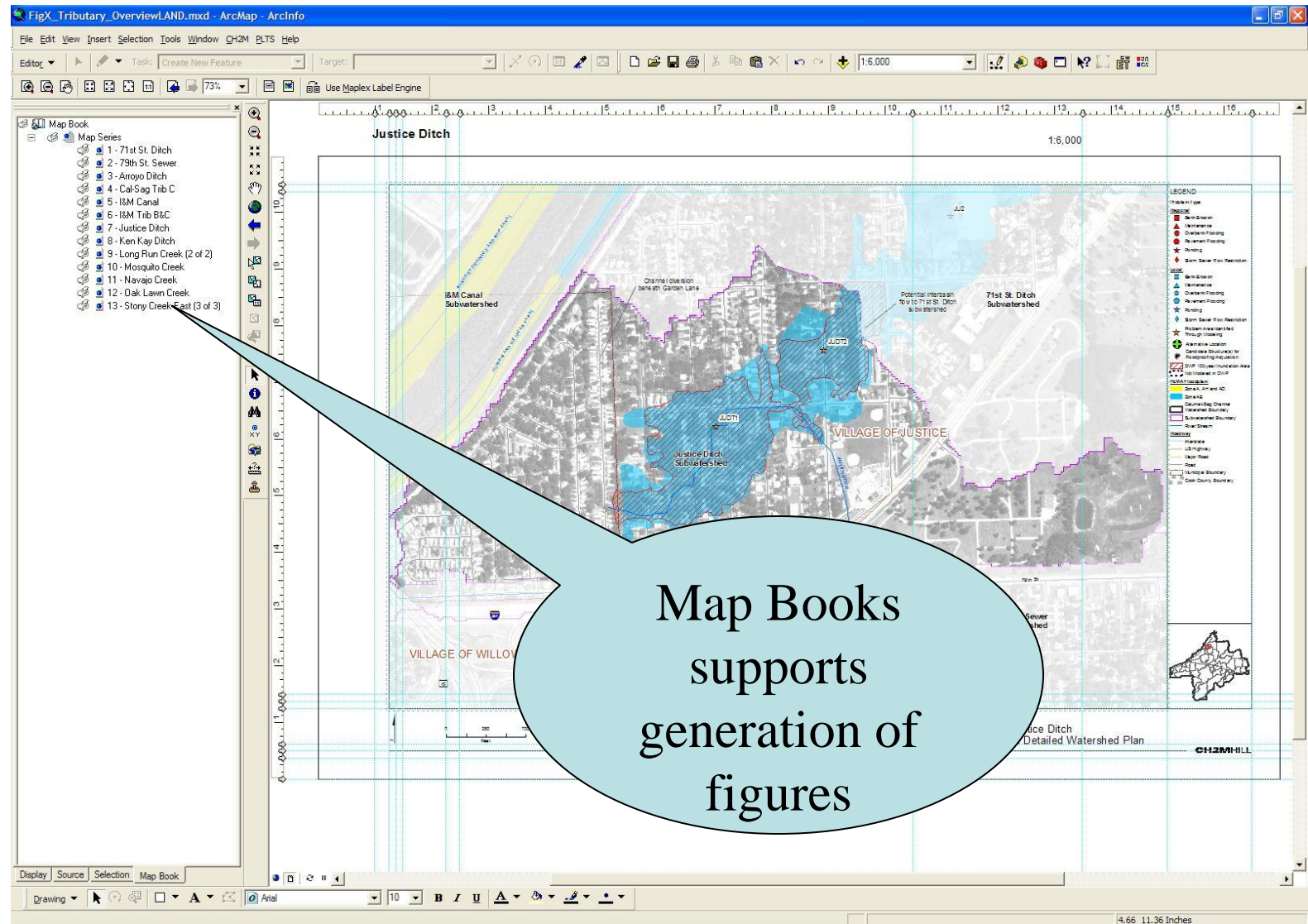


# Draft DWP Recommends Improvements to Address Erosion Problems





# GIS Tools Utilized Extensively to Support DWP Documentation





# Stormwater Database Application Provides Framework for Alternative Development and Documentation

MWRDGC Watershed Planning Tool - Microsoft Internet Explorer

Address: http://ismwrd/

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Address: http://ismwrd/watershed/CostBenefitAlternatives.aspx

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Address: http://ismwrd/watershed/ReportViewer.aspx?title=FloodProblemDetail.rpt&ReachAll=False&ExistCond=True

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Go Google Settings

Protecting Our Water Environment

Metropolitan Water Reclamation District of St. Louis

Watershed: Cal Sag

Reach: Tinley Creek

Home Problem Definition Damage Assessment Alternative Development Cost Benefit Analysis Reports

Table X-X Flood Problem Details

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	Recurrence Interval	Water Surface Elevation	Flooding Depth	Structure Damage	Contents Damage
<b>Stony Creek</b>					
PIN: 23114070310000, Estimated Value: \$224,224.50					
First Floor Elevation: 593.78, Structure Type Key: 2					
	50 yr			Expected Damage	\$11,803
	50 yr			Expected Damage	\$8,518
	50	592.79	-0.99	\$31,257	\$22,687
	100	593.00	-0.78	\$33,140	\$23,535
PIN: 23114070320000, Estimated Value: \$205,383.50					
First Floor Elevation: 594.32, Structure Type Key: 2					
	50 yr			Expected Damage	\$2,429
	50 yr			Expected Damage	\$1,825
	100	593.00	-1.32	\$26,117	\$19,626
PIN: 23114070330000, Estimated Value: \$106,323.00					
First Floor Elevation: 594.32, Structure Type Key: 1					
	50 yr			Expected Damage	\$1,774
	50 yr			Expected Damage	\$1,236
	100	593.06	-1.26	\$19,079	\$13,288
PIN: 23114070350000, Estimated Value: \$187,403.62					
First Floor Elevation: 593.83, Structure Type Key: 2					
	50 yr			Expected Damage	\$9,785
	50 yr			Expected Damage	\$7,083
	50	592.80	-1.03	\$25,841	\$18,832
	100	593.03	-0.78	\$27,698	\$19,670
PIN: 23114070360000, Estimated Value: \$230,501.37					
First Floor Elevation: 592.76, Structure Type Key: 2					
	50 yr			Expected Damage	\$41,424
	50 yr			Expected Damage	\$28,525
	25	592.03	-0.73	\$34,529	\$24,401
	50	592.80	0.04	\$41,665	\$27,605
	100	593.05	0.29	\$44,201	\$28,700
PIN: 23114070420000, Estimated Value: \$246,095.00					
First Floor Elevation: 593.87, Structure Type Key: 5					
	50 yr			Expected Damage	\$888
	50 yr			Expected Damage	\$357
	100	593.01	-0.86	\$9,553	\$3,839
PIN: 23114070450000, Estimated Value: \$179,788.37					
First Floor Elevation: 593.03, Structure Type Key: 6					
	50 yr			Expected Damage	\$4,738
	50 yr			Expected Damage	\$1,871
	50	592.81	-0.22	\$12,628	\$4,937
	100	593.06	0.03	\$13,063	\$5,311
PIN: 23114080070000, Estimated Value: \$22,969.15					
First Floor Elevation: 592.88, Structure Type Key: 8					
	50 yr			Expected Damage	\$123
	50 yr			Expected Damage	\$357
	25	592.08	-0.80	\$31	\$114
	50	592.82	-0.06	\$146	\$534
	100	593.10	0.22	\$637	\$1,330
PIN: 23114080130000, Estimated Value: \$298,371.89					
First Floor Elevation: 593.58, Structure Type Key: 8					
	50 yr			Expected Damage	\$246
	50 yr			Expected Damage	\$900
	50	592.83	-0.75	\$505	\$1,846
	100	593.14	-0.44	\$1,130	\$4,136
PIN: 23114080150000, Estimated Value: \$193,172.12					
	50 yr			Expected Damage	

Done

Done

Trusted sites





# Damages Calculated by the Stormwater Database Application are Consistent County-wide

- Property damages are based on the Cook County Assessor data using a normalization factor developed by the District to provide a consistent, realistic value for property values
- Transportation damages are generally calculated to be 15% of property values, but more detailed calculations of transportation damages could be used where appropriate
- Erosion damages determined outside of the database on a case-by-case basis



# District to Begin Implementation of Improvements in 2009

- District will enlist the assistance of engineering consultant firms to develop detailed design for capital improvement projects
- The Calumet-Sag Channel DWP is anticipated to be delivered by the end of April this year
- Once the plan has been finalized, the projects in the Calumet-Sag DWP and those recommended in other DWPs will be prioritized by our Board of Commissioners for implementation on a countywide basis



# Questions?