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Smart Tools for MS4:

Integrating Ecological Restoration and GIS Platforms



March 14, 2019

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Dan Peloquin, P.E., Village of Mokena, IL



Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand East
P.O. Box 19276
Springfield, Illinois 62794-9276

General MS4 Permit-IL

- Approximately 651 MS4 communities in IL
- In 2014, IEPA drafted MS4 permitting requirements consistent to USEPA rulemaking
- On March 01, 2016, the final MS4 permit went into effect.

Issue Date: February 10, 2016

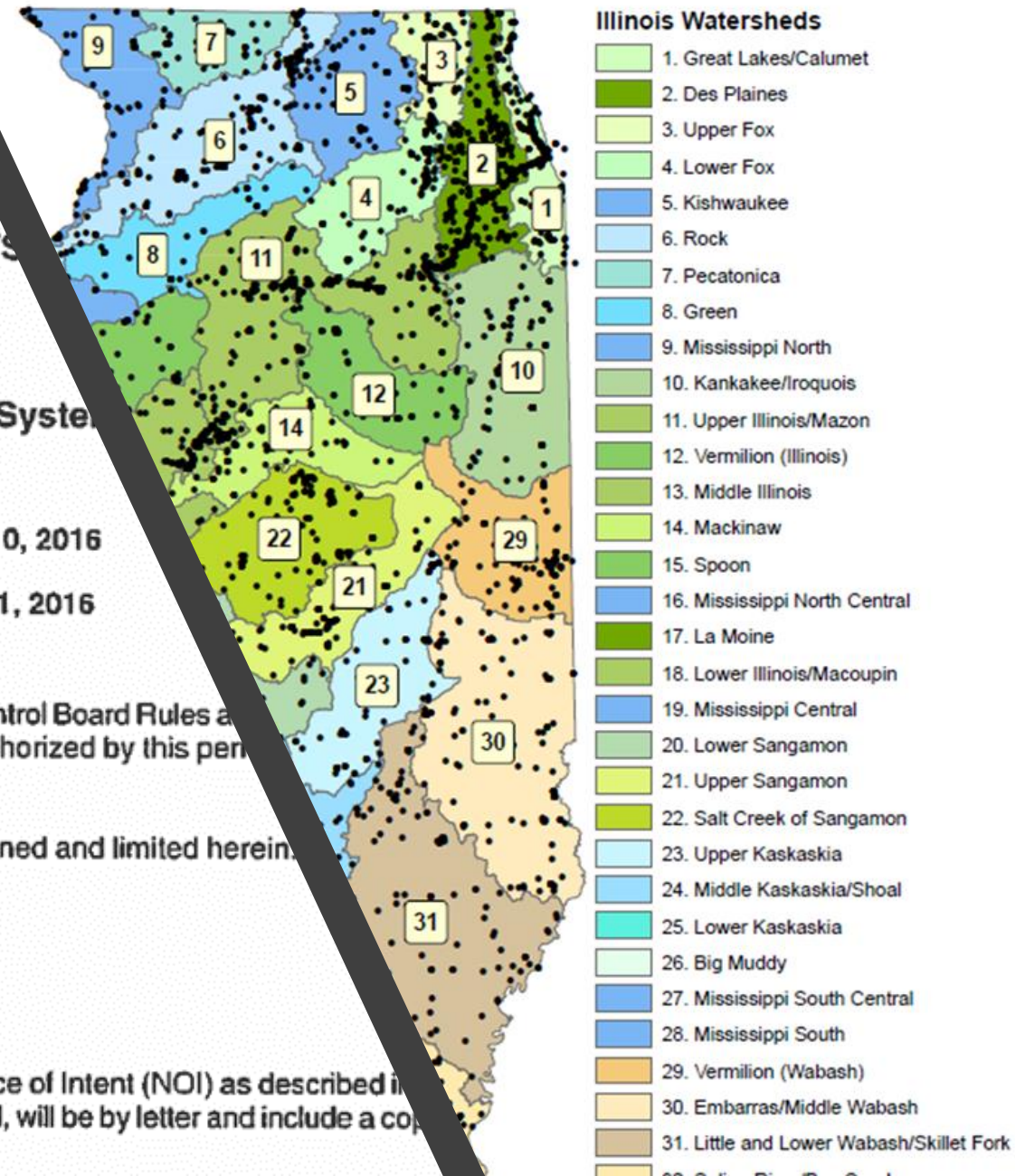
Effective Date: March 1, 2016

Discharges of only storm water from small municipal separate storm sewer systems (MS4s), as defined and limited herein, means storm water runoff, snow melt runoff, and surface runoff and drainage.

Receiving waters: Discharges may be authorized to any surface water of the State.

To receive authorization to discharge under this general permit, a facility operator must submit a Notice of Intent (NOI) as described in this permit to the Illinois Environmental Protection Agency (Illinois EPA). Authorization, if granted, will be by letter and include a copy of this permit.

NPDES Facilities in Illinois



General MS4 Permit-IL

Requirements:

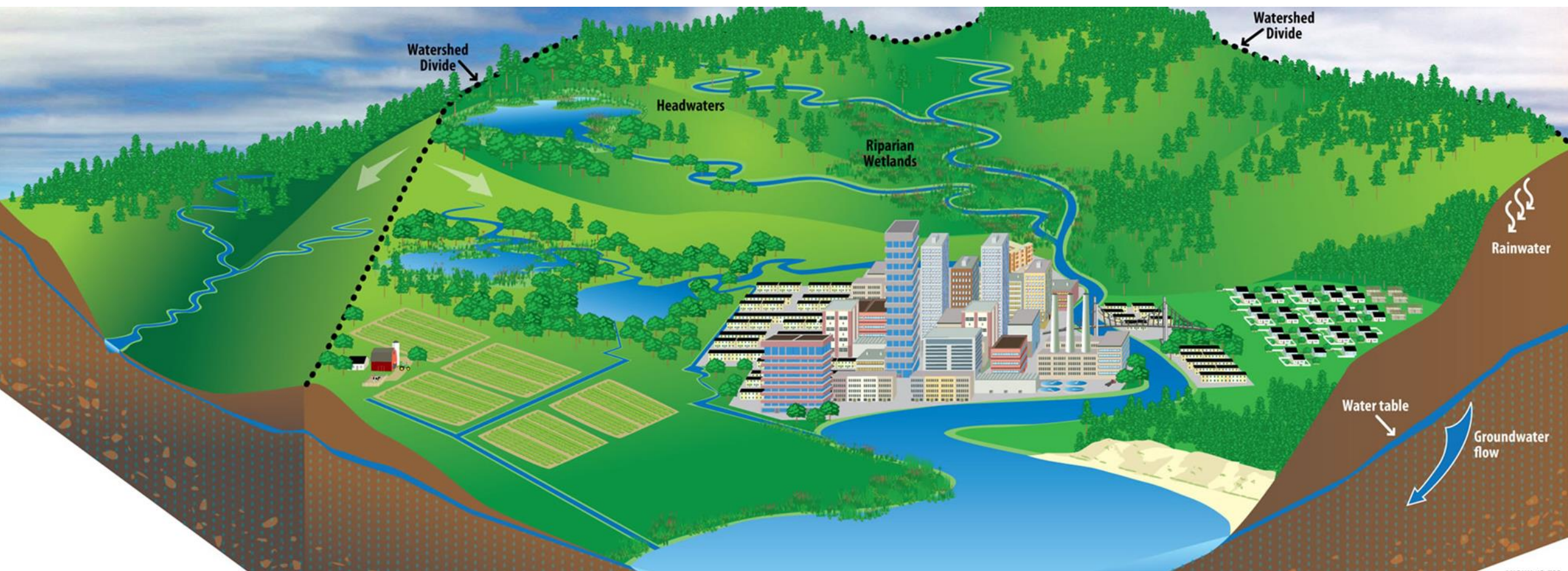
- Submit Notice of Intent (NOI)
- Prepare Storm Water Management Plan (SWMP)
- Develop a storm water management program and measurable goals for the six (6) minimum control measures
 1. Public education and outreach on storm water impacts
 2. Public involvement and participation
 3. Illicit discharge detection and elimination
 4. Construction site storm water runoff control
 5. Post construction storm water management in new development and redevelopment
 6. Pollution prevention/good housekeeping for municipal operations
- Submit Annual Reports (June 1st of every year)



General MS4 Permit-IL

Special Conditions (III-C)

- If a TMDL or watershed plan is approved for any water body into which you discharge, you must review your storm water management program to determine whether the TMDL or watershed management plan includes requirements for control of storm water discharges.



Watershed Planning & Management

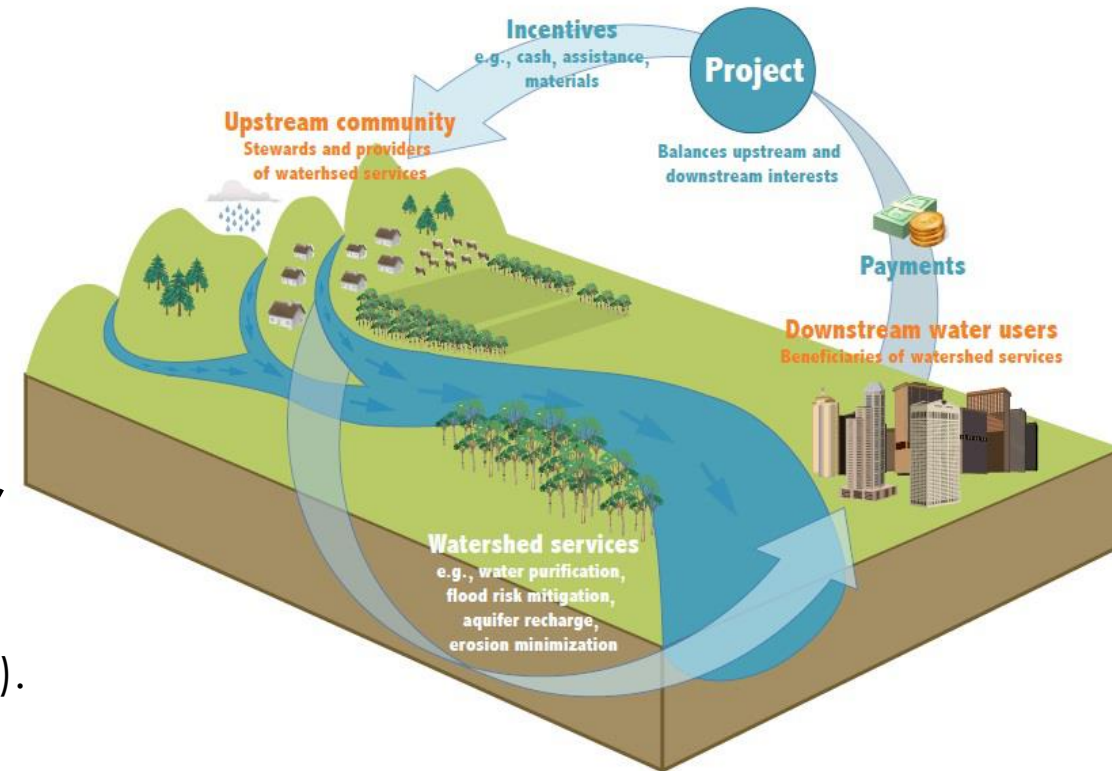
“watershed planning is often too complex and too expensive for one person or organization to tackle alone” (US EPA)

Watershed Groups

- “groups of individuals and organizations, who represent the interest of the community and the environment with a mission, goals, and plan for implementing water quality improvement projects, enhancing habitat, developing recreational activities and informing their neighbors of the importance of natural resource protection” (WVDEP).

Watershed Management Plan

- defines and addresses existing or future water quality problems from both point source and non-point sources of pollutants.

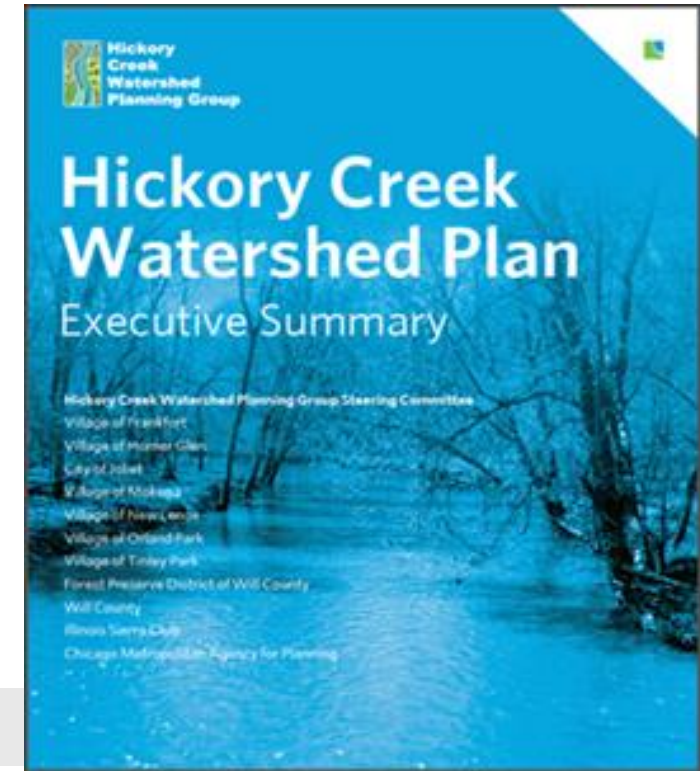


Ecosystem Services to Watershed Planning
(retrieved from: http://s3.amazonaws.com/mongabay-images/13/0128.foresttrends_watershed_large.jpg)

In 2011, a watershed management plan was developed based on the nine elements and approved by the Illinois EPA



Hickory Creek Watershed



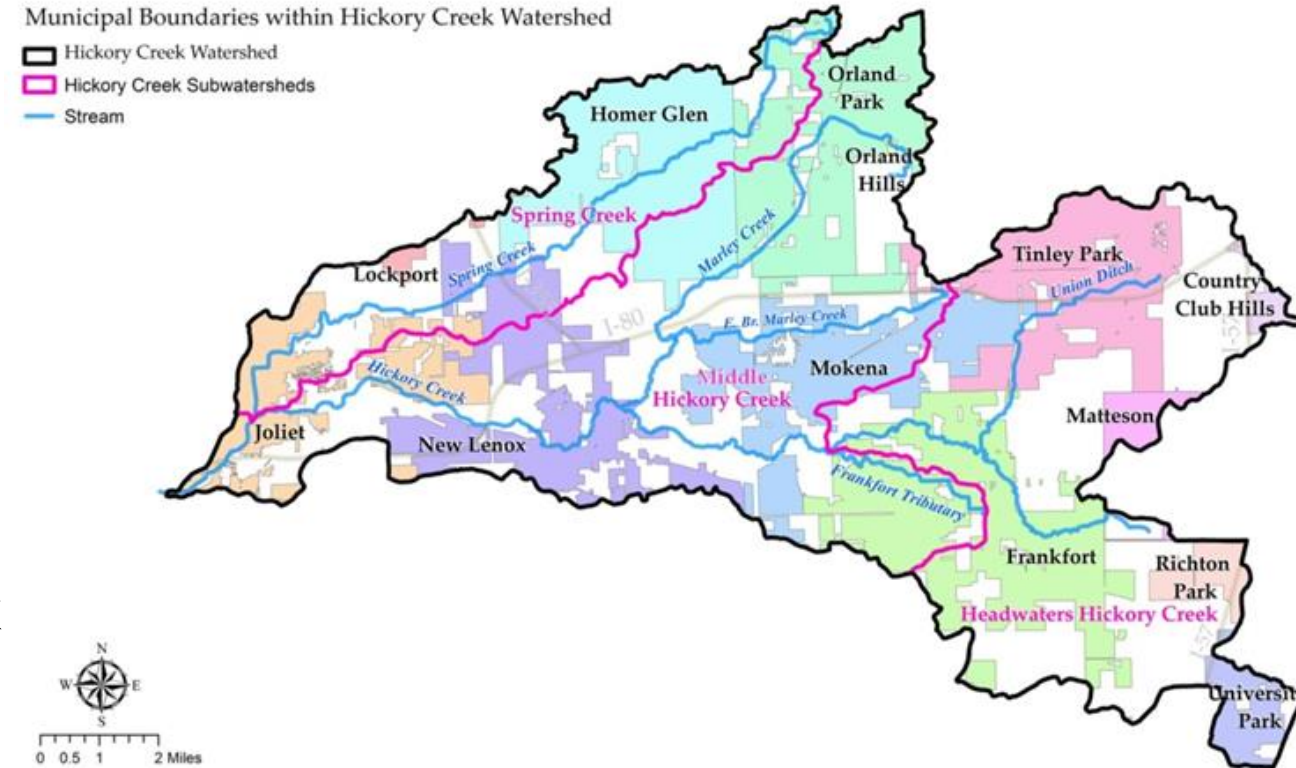
Watershed Management/Storm Water Opportunities

Watershed Plan Identified Environmental Goals

- Reduce nonpoint source pollutant loads
- Manage storm water runoff
- Improve water quality and habitat

Watershed Group Prioritized Projects

- Identified three stream bank stabilization projects within the watershed, with the goal of these becoming demonstration projects
 - Including East Branch of Marley Creek Streambank Restoration, Mokena, IL (HUC 12: 0712000406) project
 - Applied and received Section 319 grant funding in 2016
- Green Infrastructure and Storm Water Management Projects



Village of Mokena, POTW Parking Lot

Existing Conditions

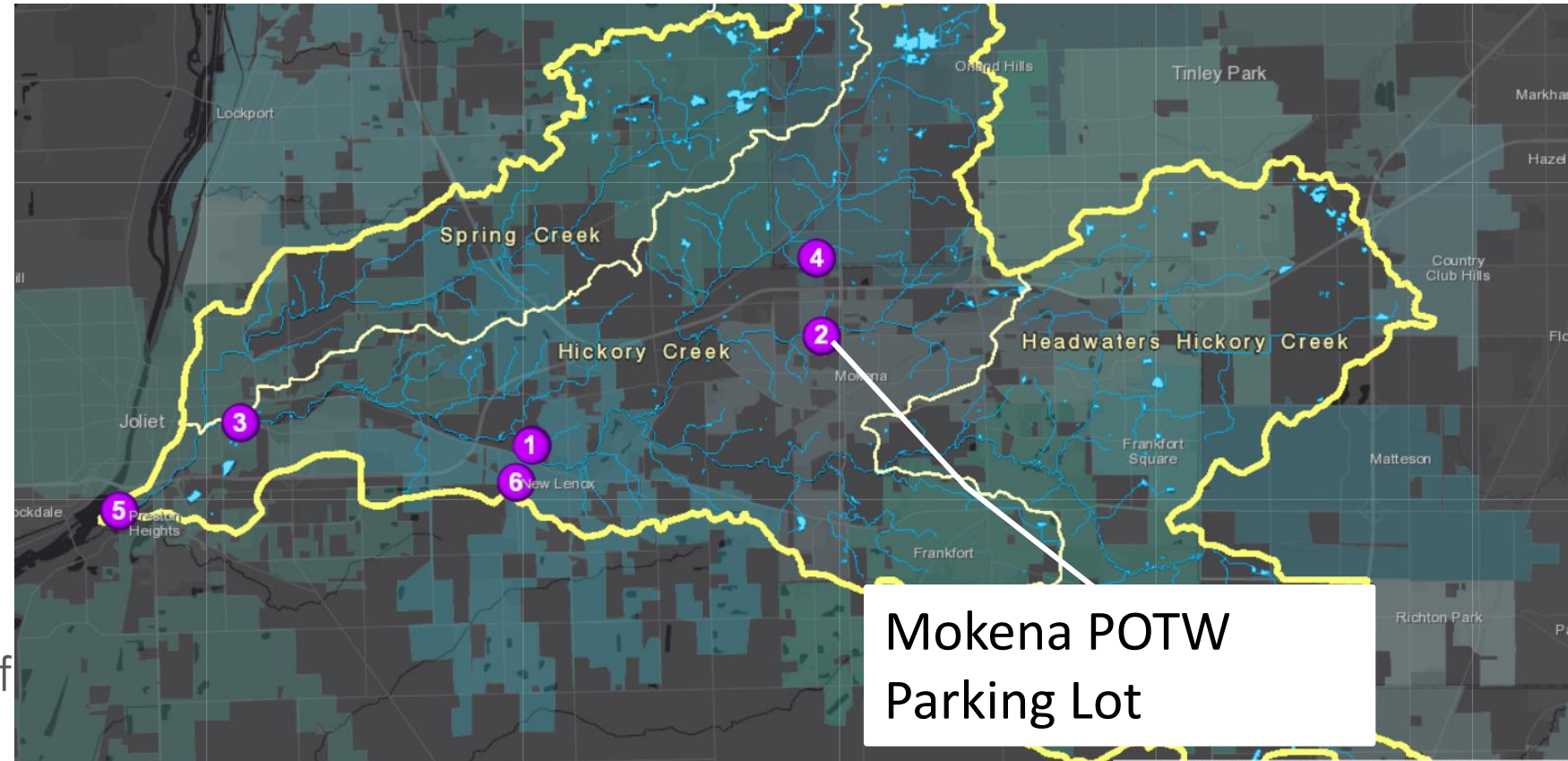
- Increase stormwater runoff from new parking lot
- Eroded pervious area

Challenges

- Cost
- Rapid Deployment
- Maintenance

Watershed Goals

- Manage storm water runoff
- Storm water education opportunity



Mokena POTW
Parking Lot



Village of Mokena POTW Parking Lot: Site Conditions



Village of Mokena: Rain Garden (Construction)



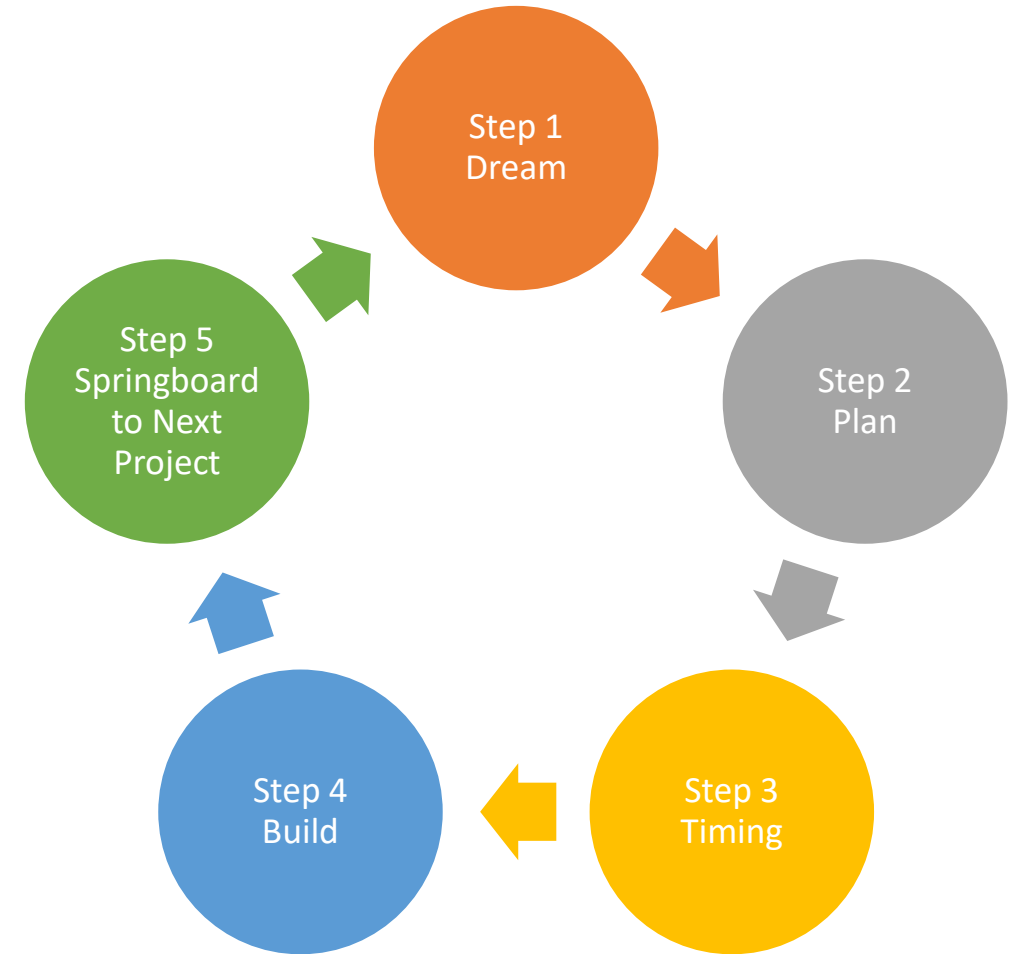
Village of Mokena: Rain Garden



Municipality's Viewpoint

Linking Partnerships & Leveraging Resources

- Mokena was happy with rain garden
 - Fulfilled NPDES MS4 requirements
 - Received local storm water grant
 - Under budget (leverage local department resources)
 - Short time frame from design to construction
 - Generated buzz within the Village
- Mokena was ready to dream bigger!
 - Streambank Stabilization and Ecological Restoration
 - Secured an IEPA 319 grant funds



East Branch of Marley Creek, Mokena, IL

Existing Conditions

- High levels of erosion
- Degraded stream banks

Challenges

- Grant deadlines
- High visibility (recreational and residential areas)
- Integrating with existing natural prairie

Watershed Goals

- Reduce suspended solids,
- Improve habitat and aquatic community diversity,
- Educate the community on green infrastructure and native vegetation



Pre-construction streambank conditions, facing upstream

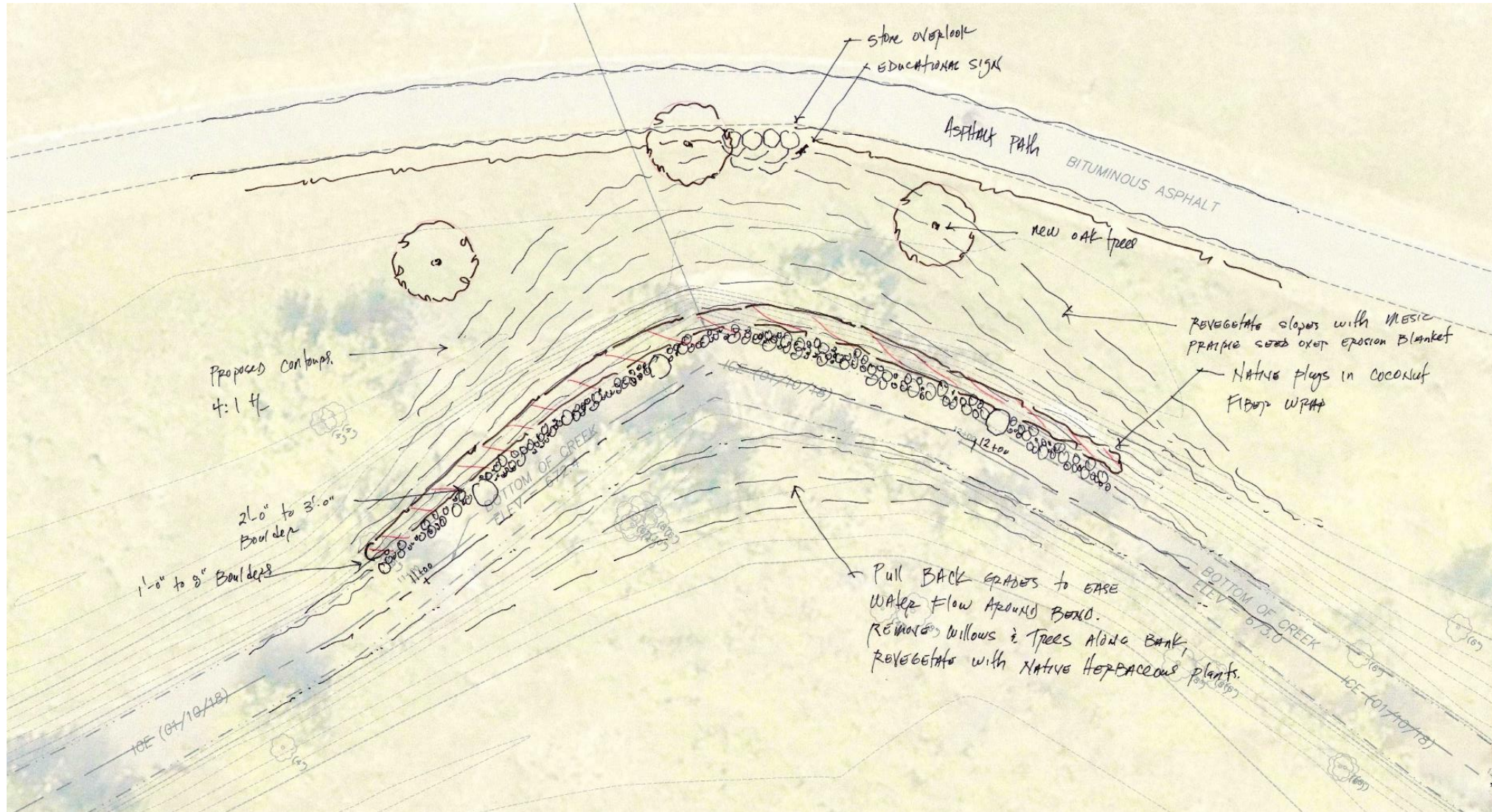


Pre-construction streambank conditions, looking upstream

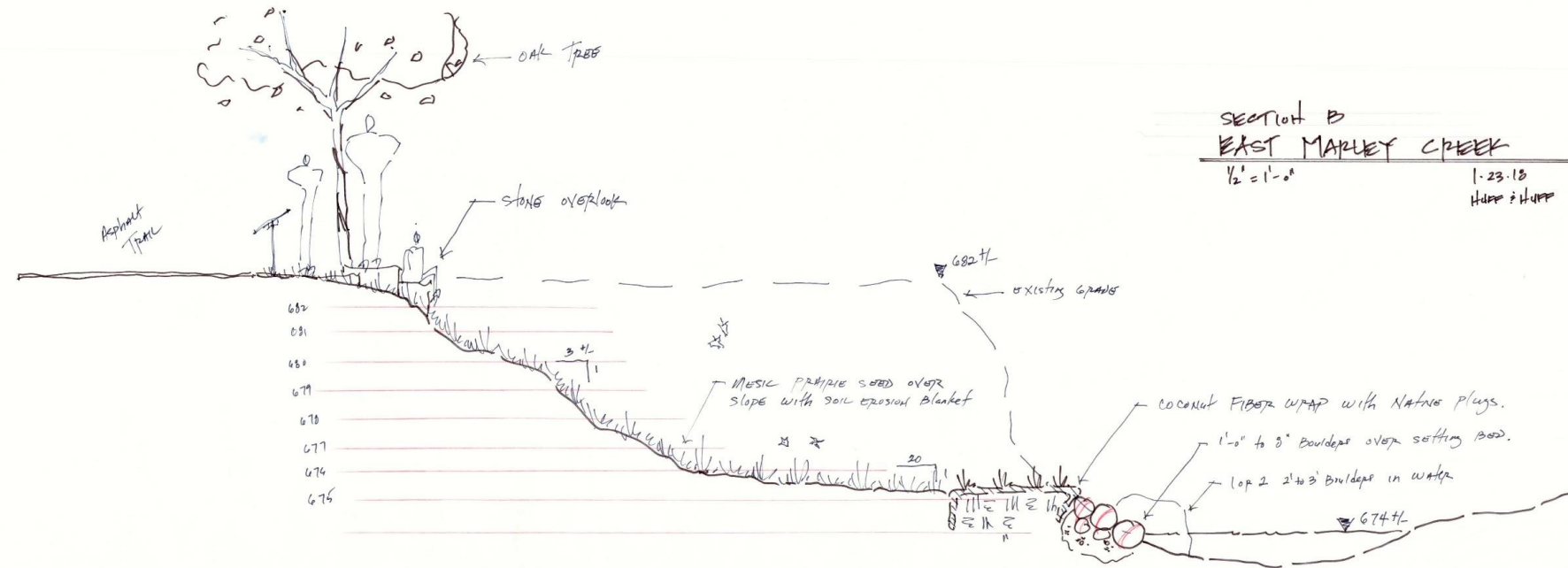
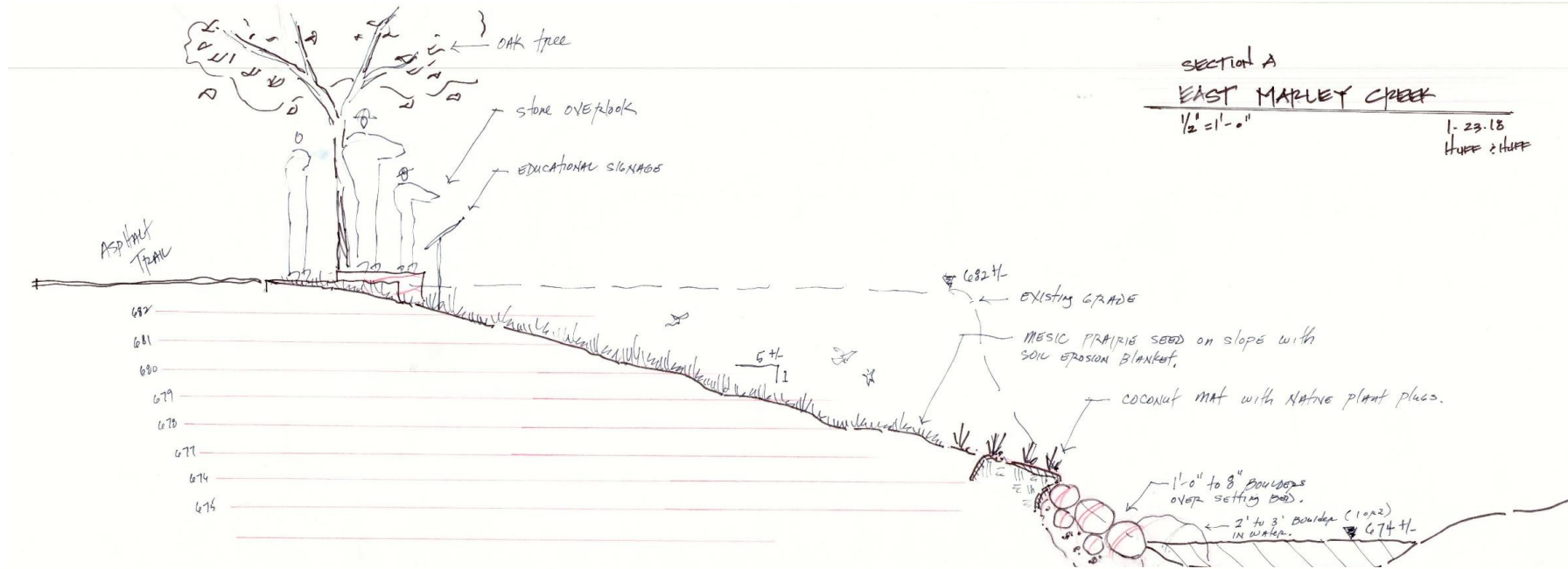


Pre-construction streambank conditions, facing west

East Branch of Marley Creek, Mokena, IL



That's odd, this looks like it was drawn by hand...



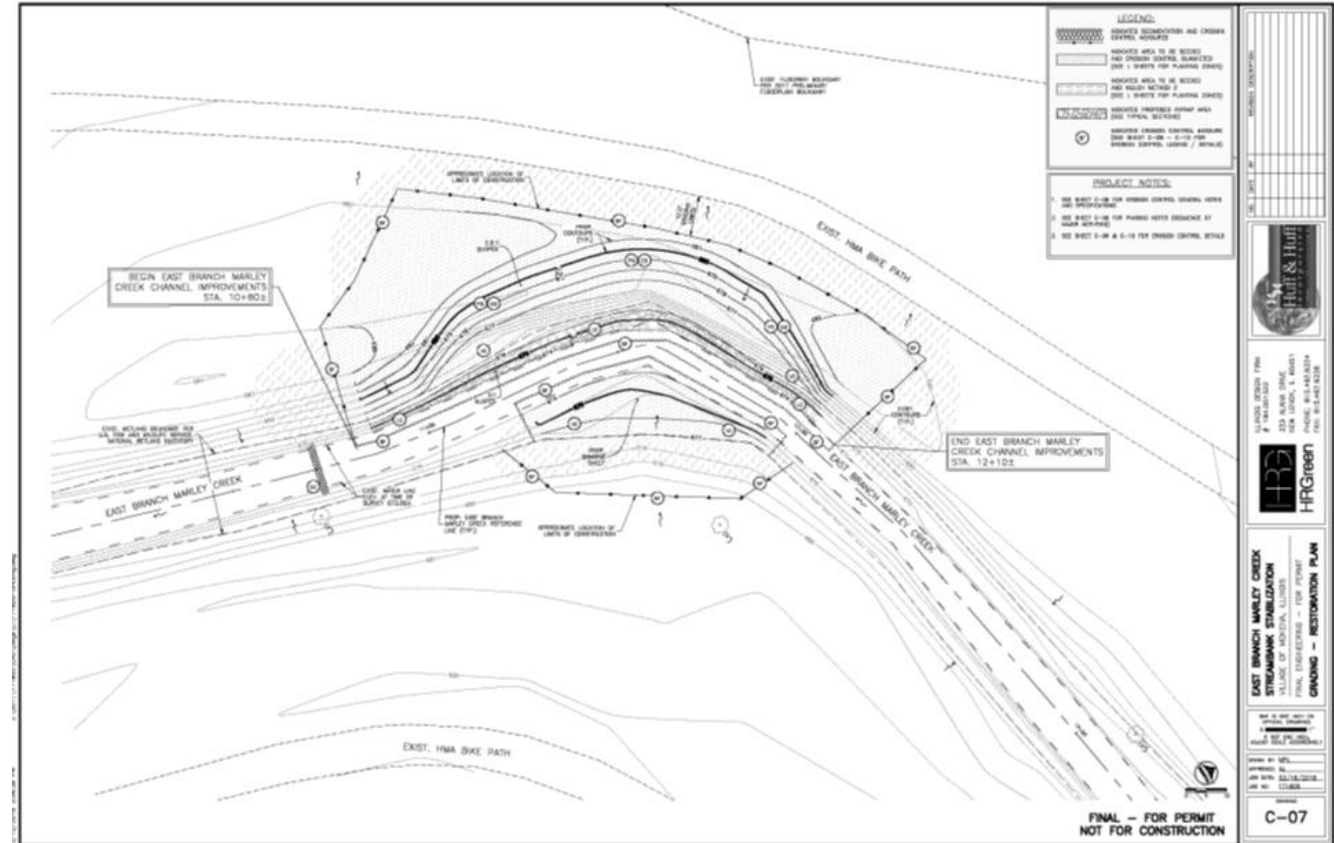
East Branch of Marley Creek Streambank Stabilization

Schedule:

- Concept plans developed – Dec. 2017
- Construction document development – Jan. 2017
- Competitive bid opening – May 30, 2018
- Award contract to lowest bidder – April 2018
- Permits obtained – April 2018
- Begin construction – August 2018
- Completes construction – September 2018

Maintenance Schedule:

- Begin 10-year operations and maintenance period – Sept.2018
- Contractor 3-year maintenance period ends – Sep. 2021
- 10-year O&M ends September 2028





During construction, facing west



During construction, upstream



Post construction, facing downstream



Planting phase, facing east

East Branch of Marley Creek, Mokena, IL

Streambank Stabilization

- Approximately 0.2 acres of invasive brush and vegetation clearing
- 0.2 acres of native prairie and wetland seeding
- 228 native plugs planted on a newly graded floodplain bench
- 54 square yards of stone riprap stabilization
- Total of over 130 linear feet of stabilized streambank

Water Quality Improvements (modeled):

- TP Reduction = 24 lb / yr
- TN Reduction = 48 lb / yr
- Sediment Load Reduction = 24 tons / yr

Aquatic Life Improvements:

- Benthic (mIBI) improved from fair to good (upstream versus downstream)



East Branch of Marley Creek Streambank Stabilization

Operation & Maintenance (O&M)

- The Village of Mokena is committed to a 10-year O&M agreement (Two Phase Approach)
 - Phase 1: More intensive management, through routine site inspections, to control weedy invasive plants
 - Phase 2: Annual long-term maintenance, past year one, to maintain native vegetation



Glove wick and hand-held wick application. Photo Credit: H. Chavez



A Subsidiary of GZA

Proactive by Design.
Our Company Commitment.



Operation and Maintenance Plan Crystal Creek Streambank Stabilization Village of Mokena, Will County, Illinois

November 20, 2018
File No. 81.0220501.02



PREPARED FOR:
Village of Mokena
11004 Carpenter Street
Mokena, Illinois 60448

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Municipal Viewpoint:

Get administration/officials/public buy in, that these types of projects are worthwhile in our community.

- Sometimes the best way to win over support and get started is with a partial funding approved project.
- It hard to say no to grant money.

Sustain momentum in MS4 projects

- Try and have follow up projects no matter how small to avoid one and done mentality

Community has to see/use it, otherwise it can be forgotten on site and in the budget.

- Don't be a lone voice, build a choir

Maintenance is key component at the front end

- If maintenance staff believes it will be an undue burden they will fight the whole way and little help guide things toward failure (looking their worst instead of their best)
- Spend the money for planting inspection or you will be trying to catch up with maintenance for several cycles



A watershed-wide public program that pairs volunteers with trained biologist to sample for macroinvertebrates



Hickory Creek Watershed Bio-Blitz



Public Outreach



Education



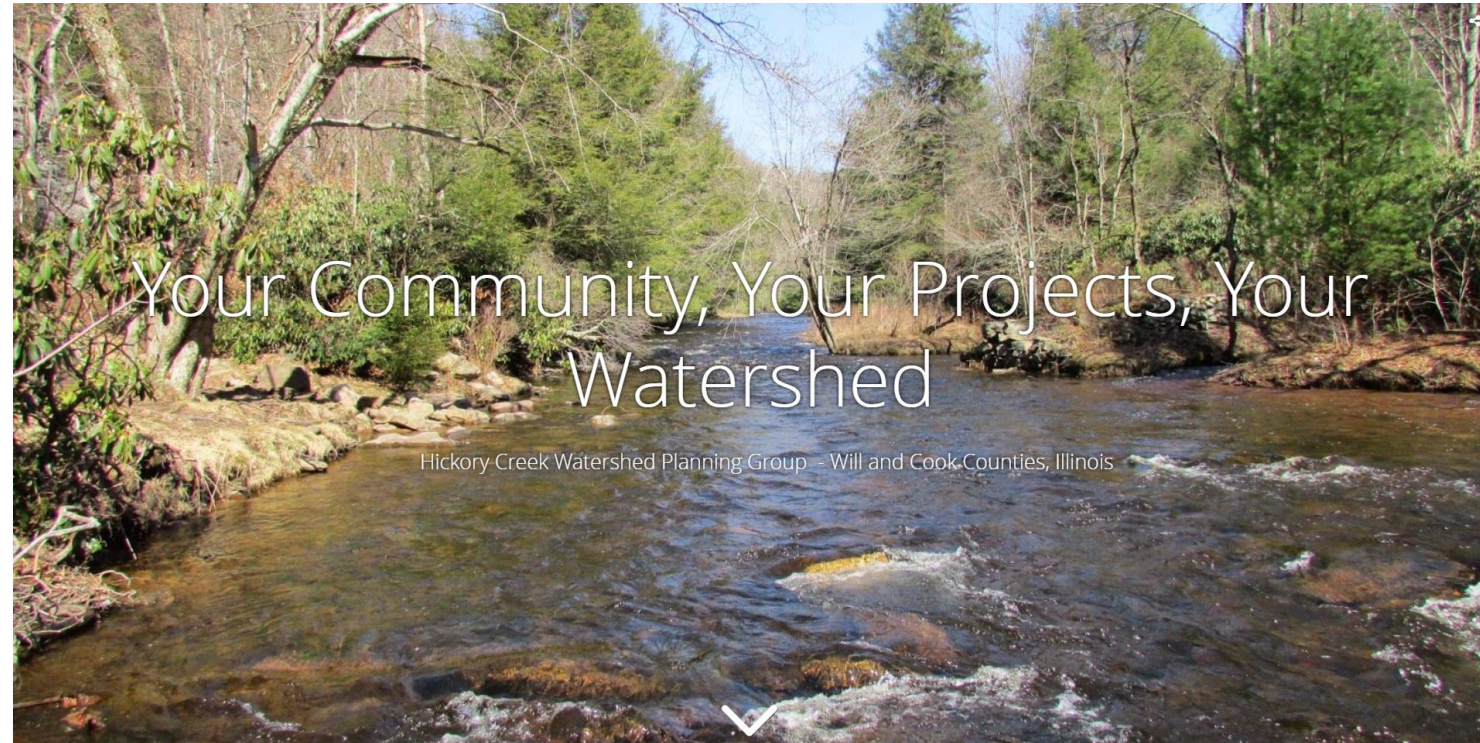
Assessment

Sustaining Citizen Engagement

A platform for supporting public outreach and meeting regulatory requirements

Challenges:

- Need to be able to access historic Bio-Blitz results
- Finding a solution to expand to a wider audience
 - Online presence
 - Meeting Environmental Justice requirements
- Tracking trends in stream health in a geographic context
- Meeting Regulatory Requirements
 - NPDES MS4 permit
 - NPDES wastewater permit



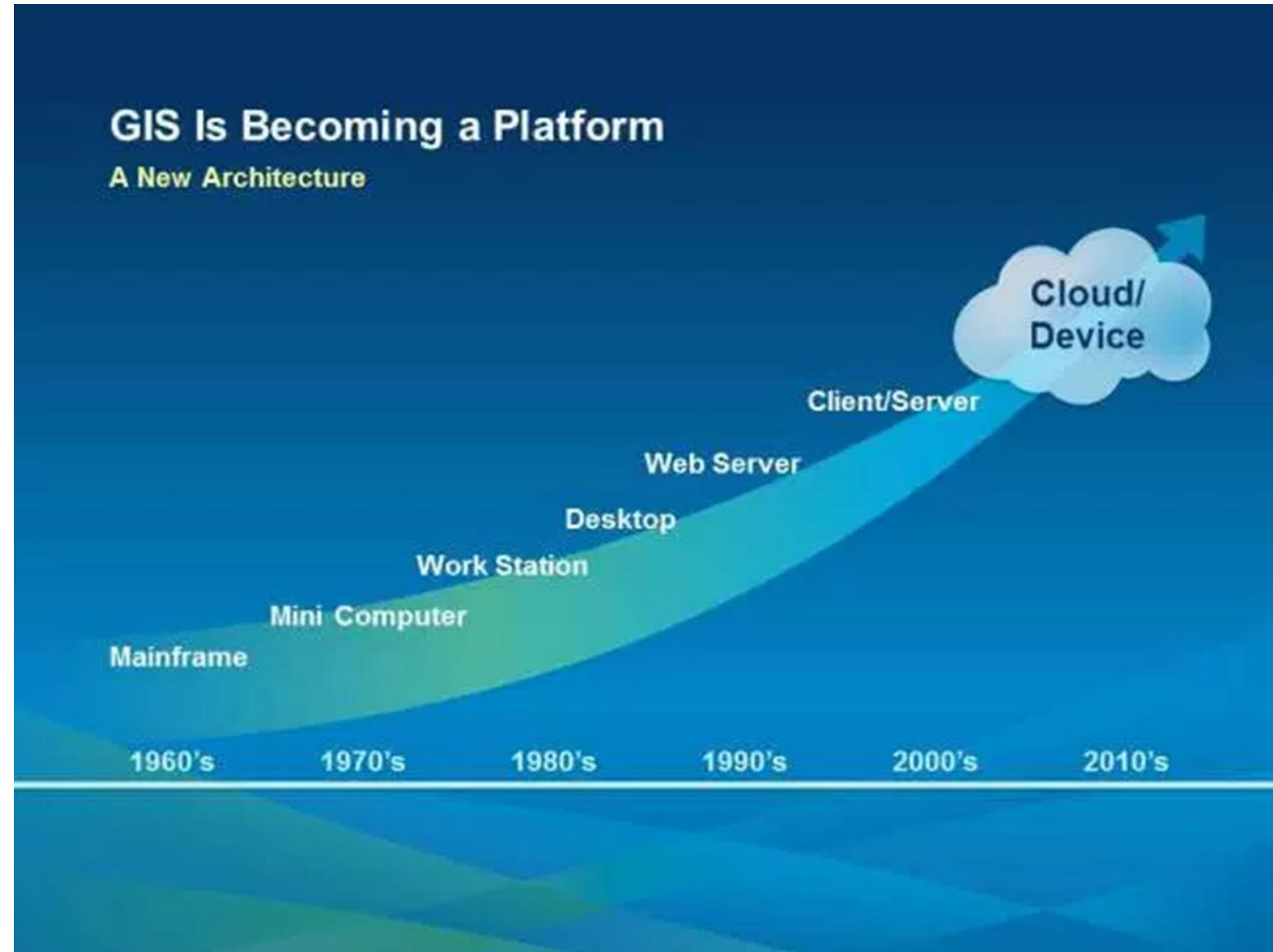
Smart Tools for Stormwater Management: Geospatial Technology

Web GIS Pattern Opportunities

- Migration from file-based data storage to Cloud services
- Desktop application capability extended to Software as a Service (SaaS)
- Data shared through web services
- Device agnostic

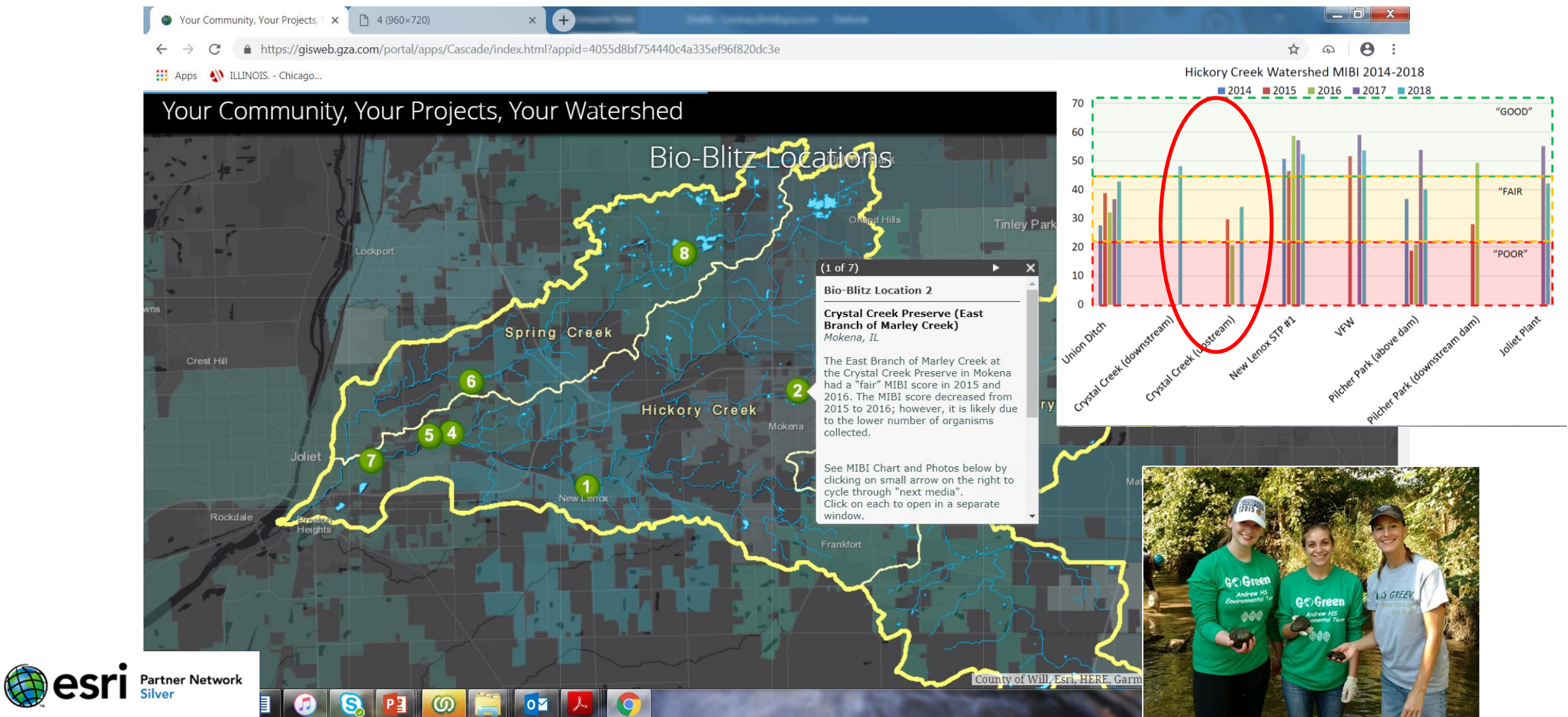
Key Benefits

- Cost
- Scalability
- Flexibility
- Rapid Deployment



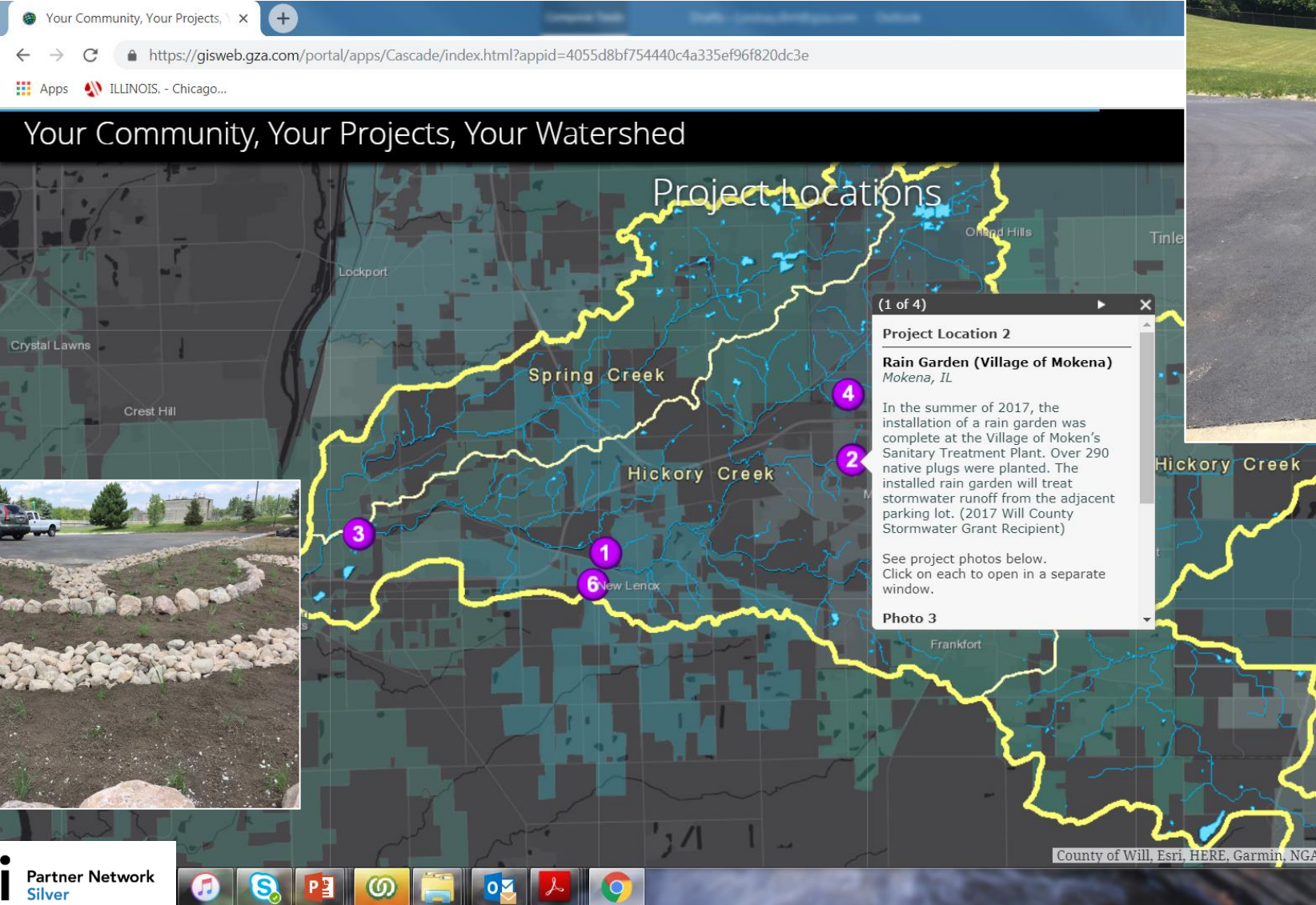
Geospatial Tools That Support Citizen Engagement

...with web GIS and Esri Story Maps for Bio-Blitz



Geospatial Tools That Support Stormwater Management

...by highlighting projects within the watershed

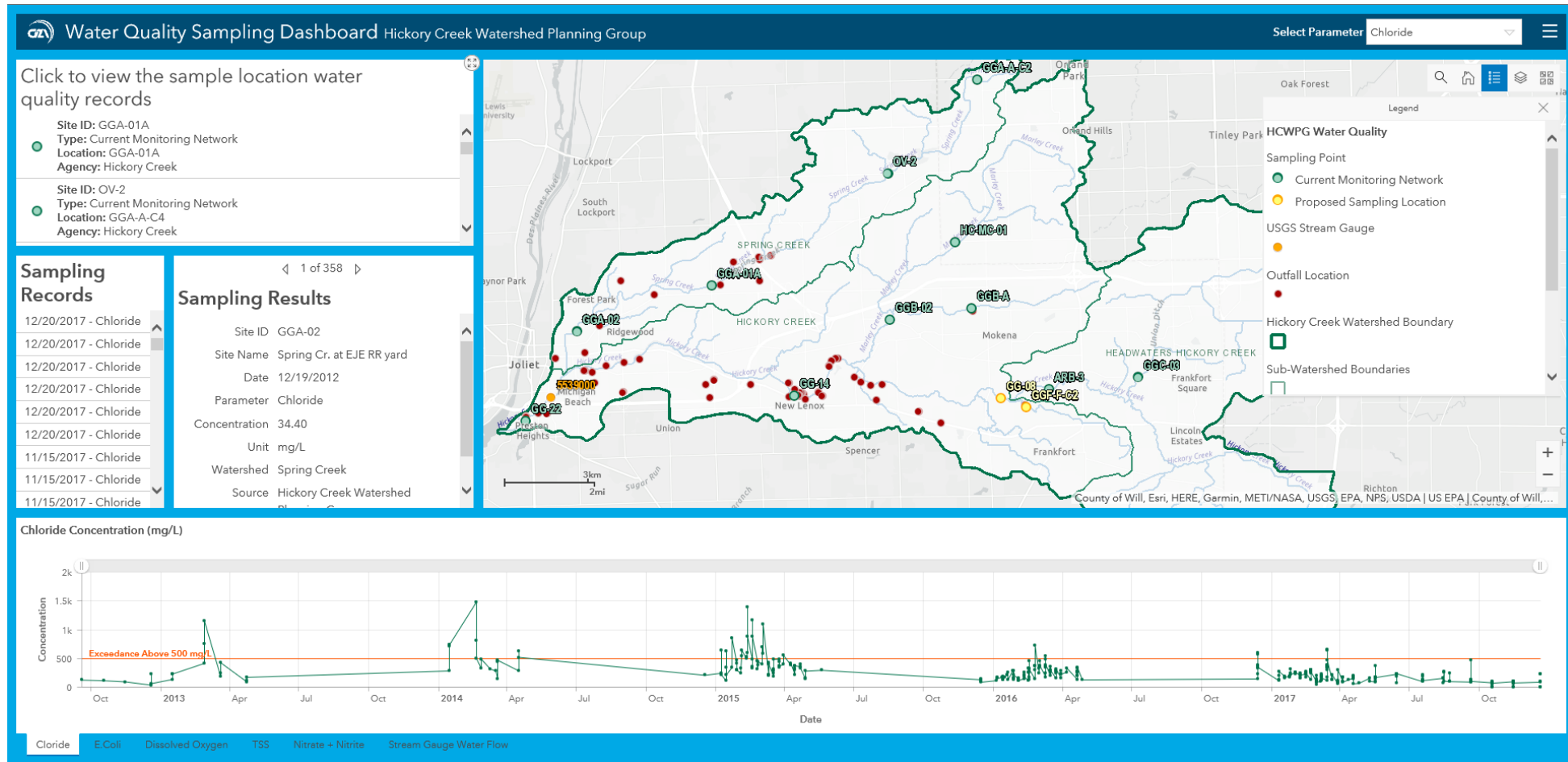


Geospatial Tools That Support Stormwater Management- Information Dashboards

Hickory Creek Watershed Planning Group

Operations Dashboard

- Manage events in real-time.
- Visualize performance indicators.
- Configurable widgets.
- Interactive map.
- Actions on features.



Key Takeaways



Building a collaborative design team and linking with multiple partners



Achieving regulatory requirement through a watershed approach



Moving beyond static maps to dynamic map management



Improving data transparency and enhance decision making with GIS



Story telling with maps cast a broader public outreach net

Thank You!



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