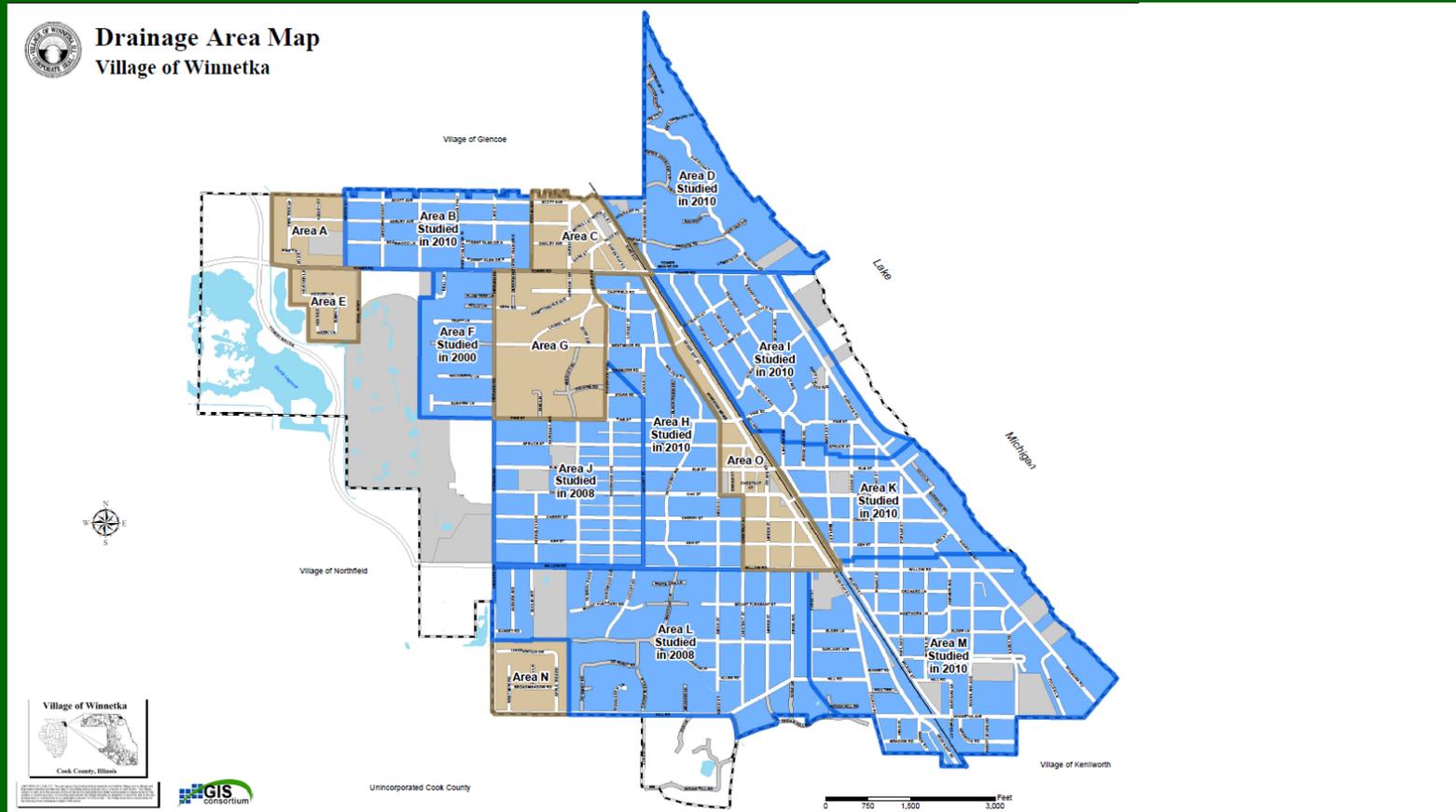


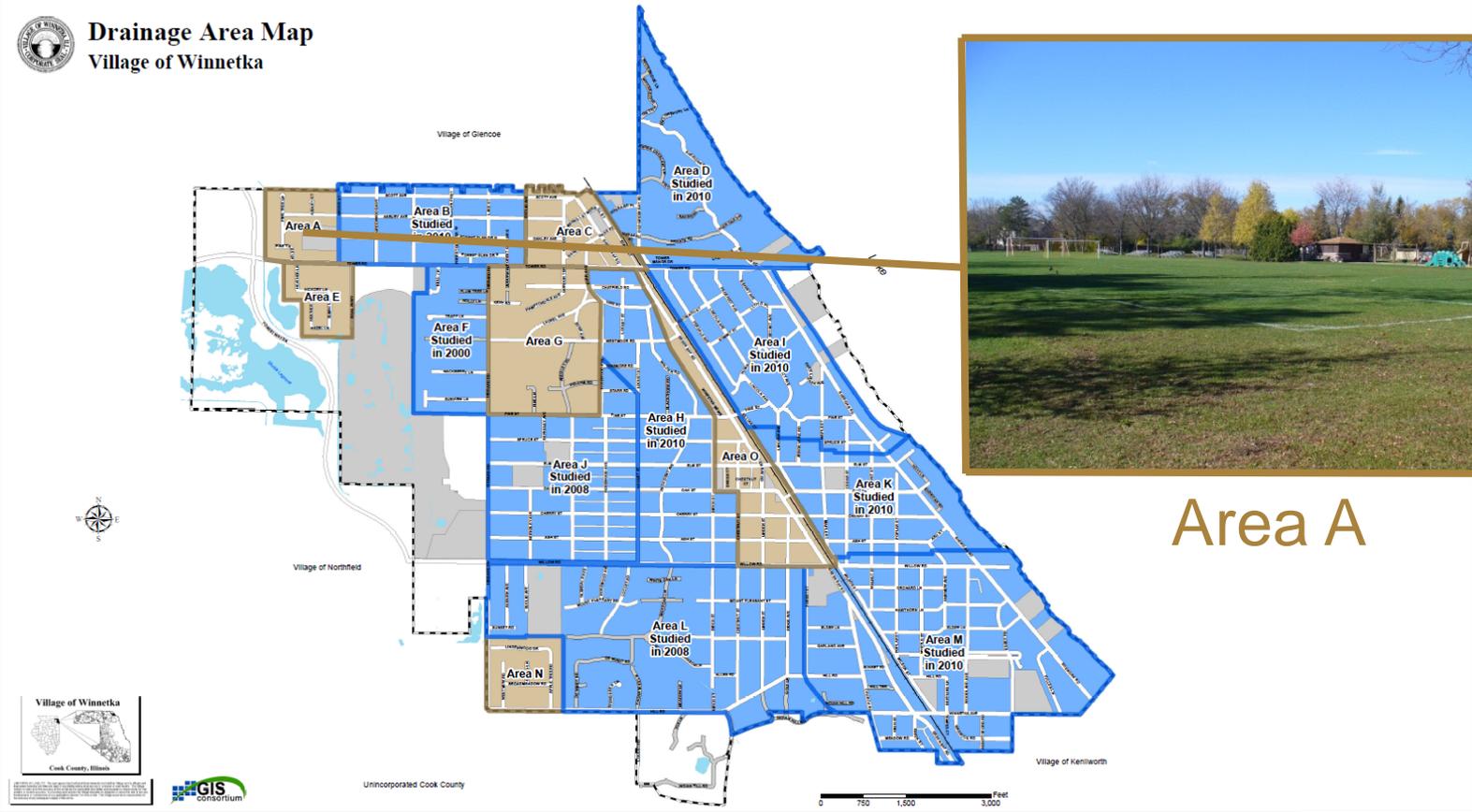


WINNETKA STORMWATER MASTER PLAN

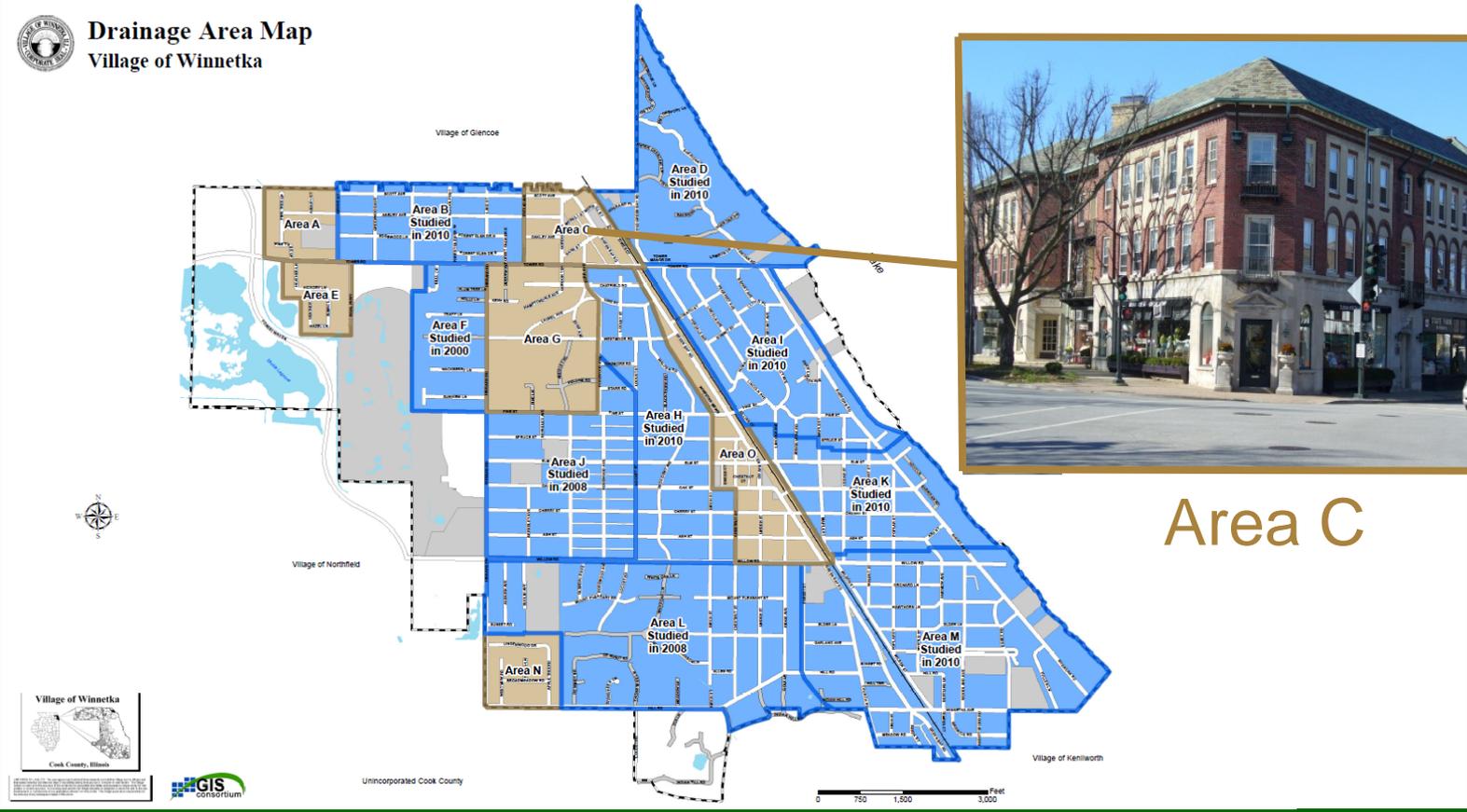
Flood Risk Reduction Assessment - Additional Study Areas



Additional Study Areas



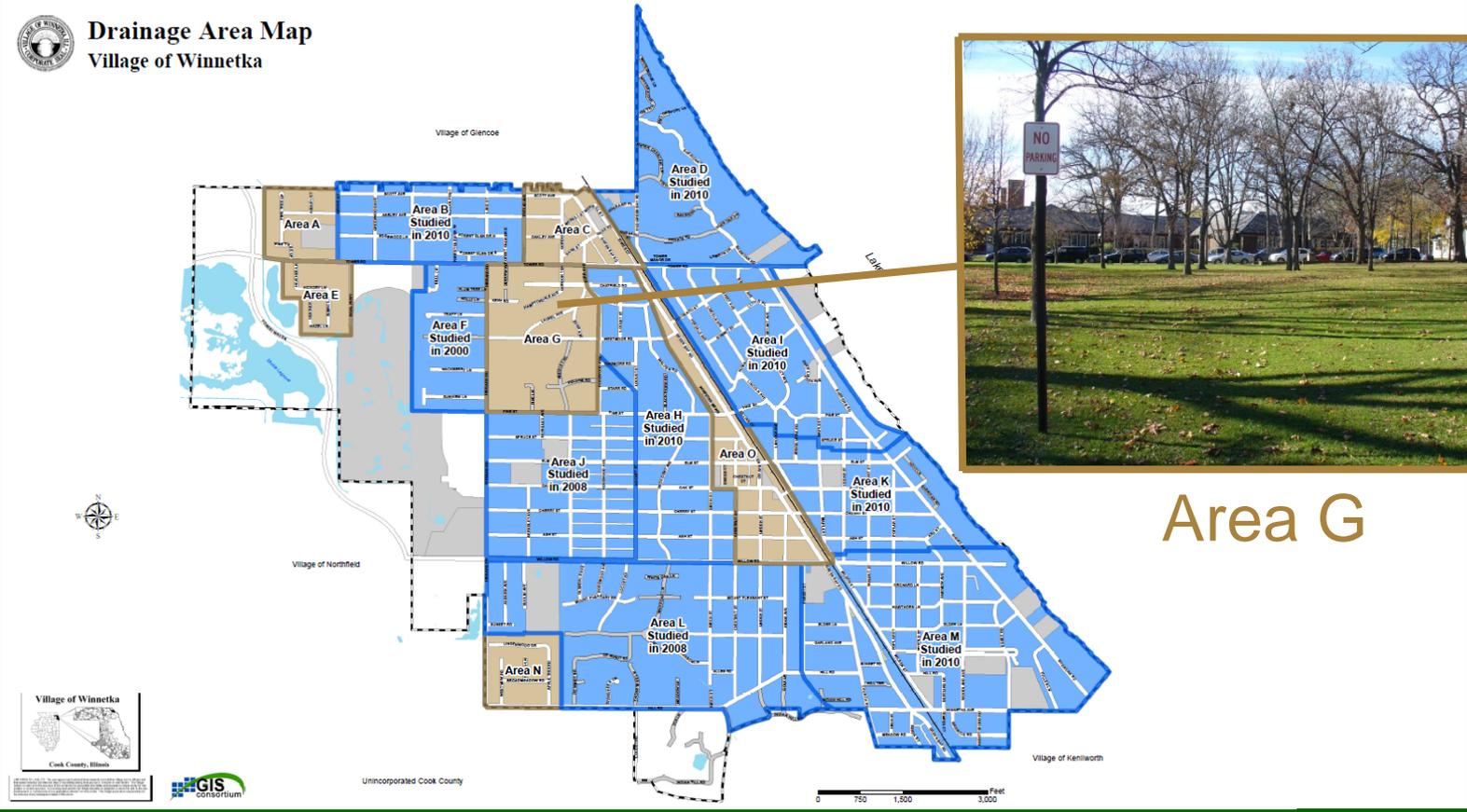
Additional Study Areas



Additional Study Areas



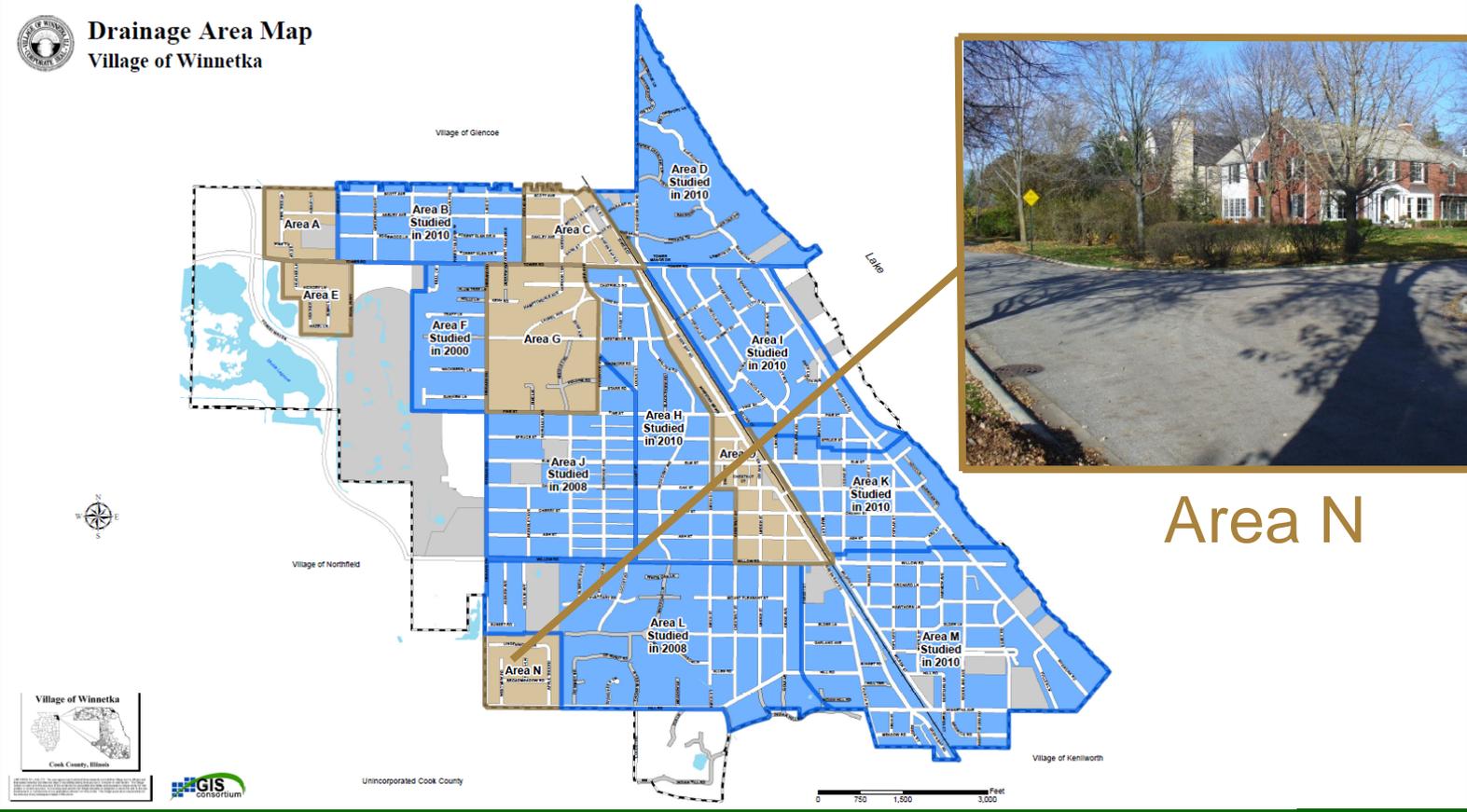
Additional Study Areas



Area G



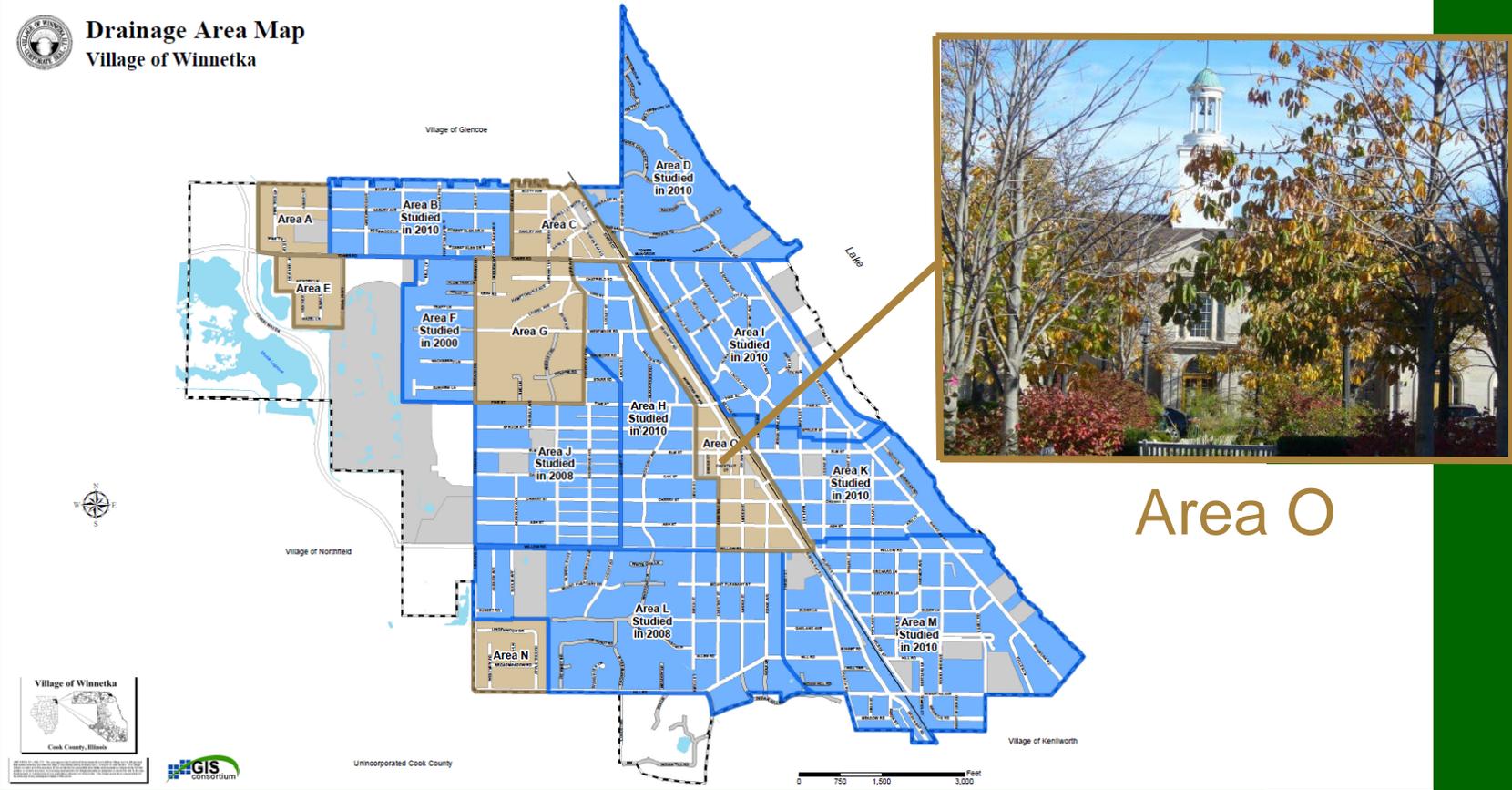
Additional Study Areas



Area N



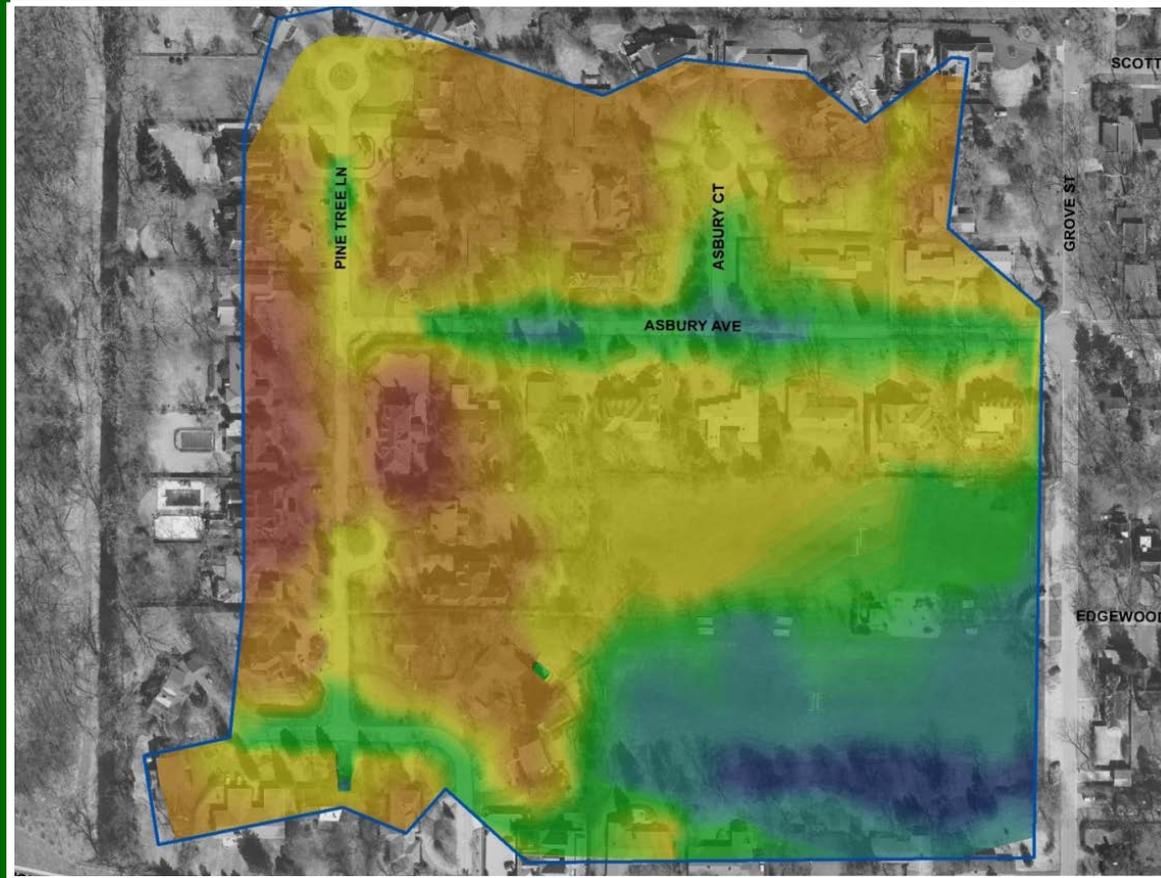
Additional Study Areas



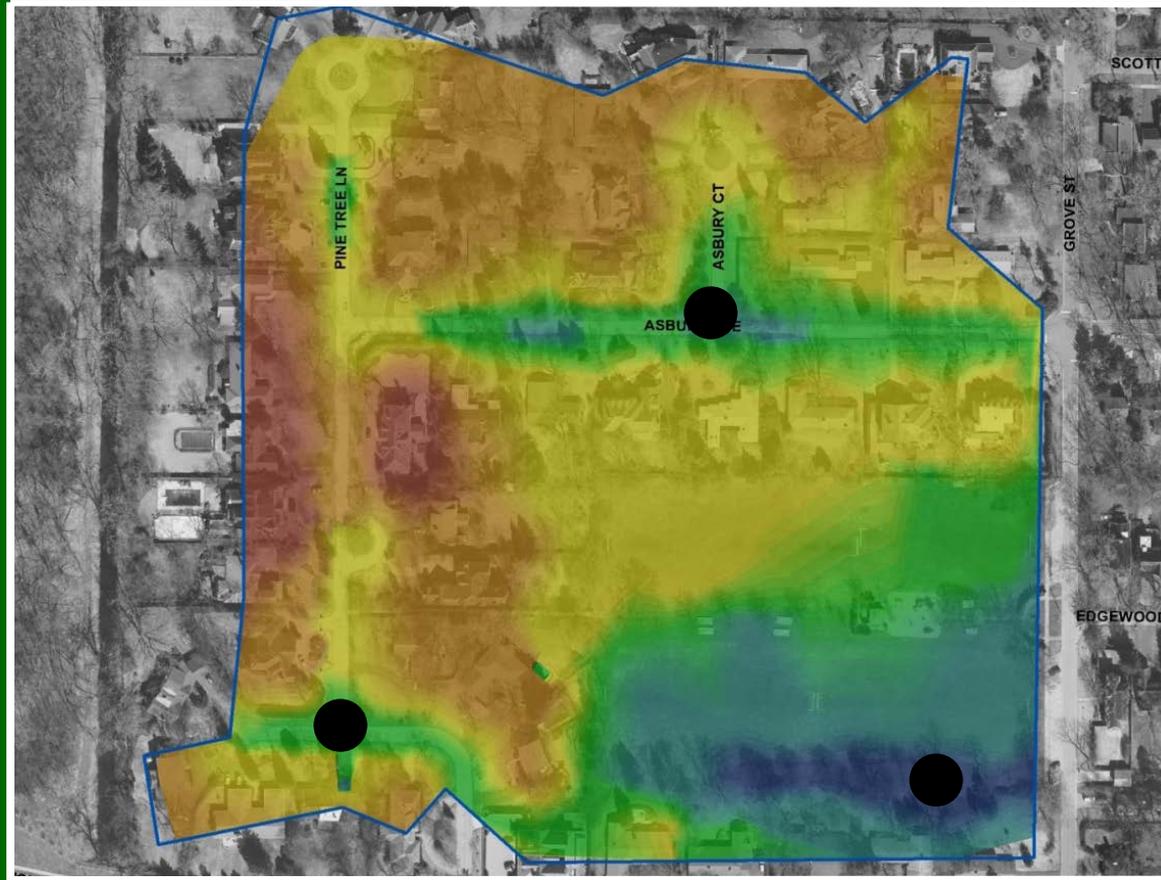
Area O



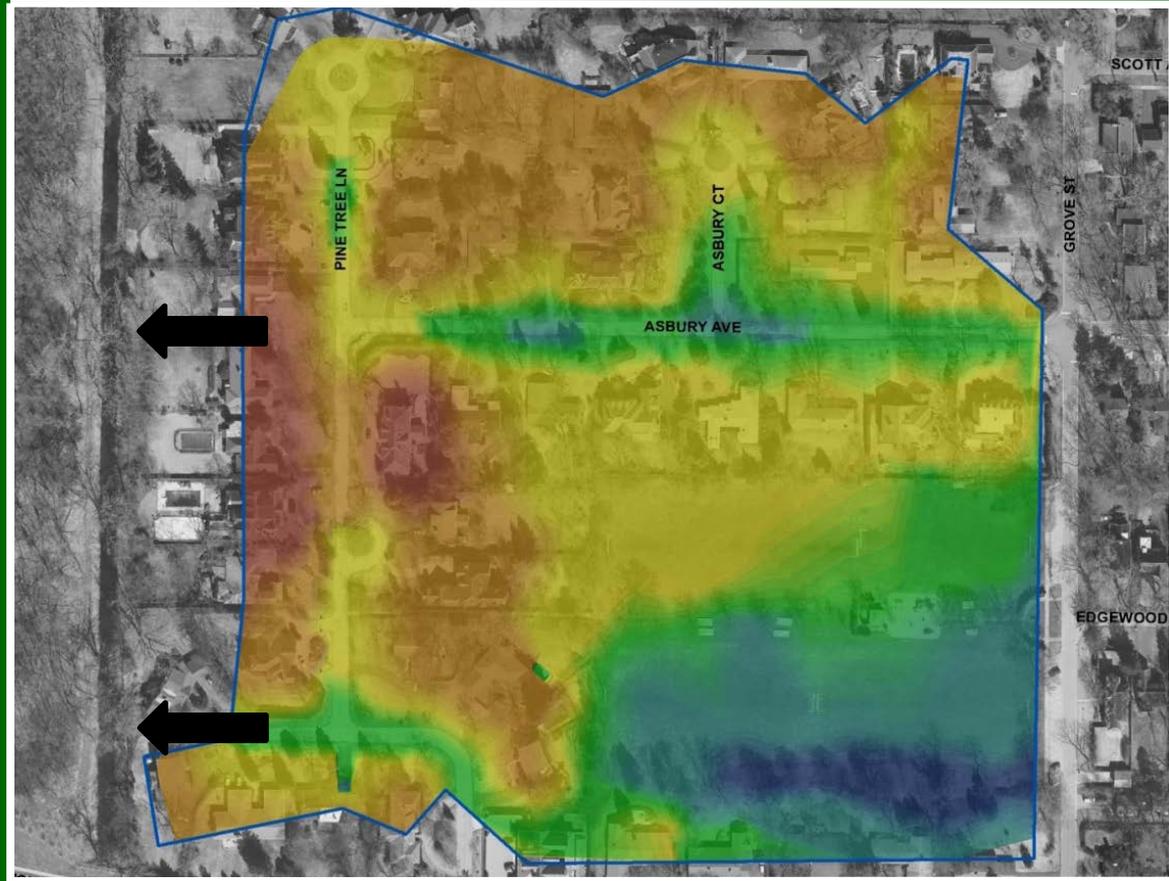
Study Area A



Study Area A



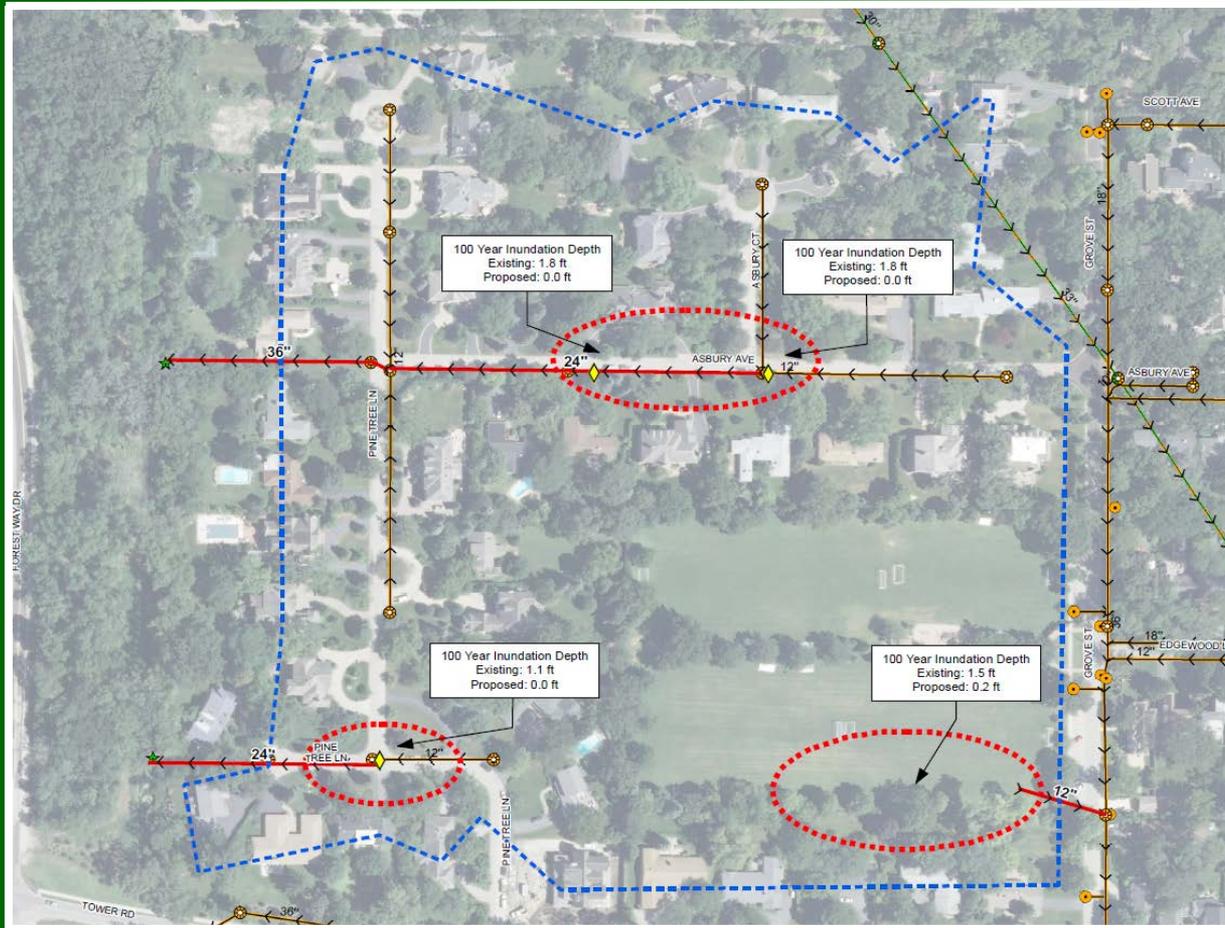
Study Area A



Study Area A



Study Area A



- Ex 12"-18" Sewers Replaced with
- Pr 24"-36" Storm Sewers
- Pr 12" Storm Sewer Draining Corwin Park



Study Area A

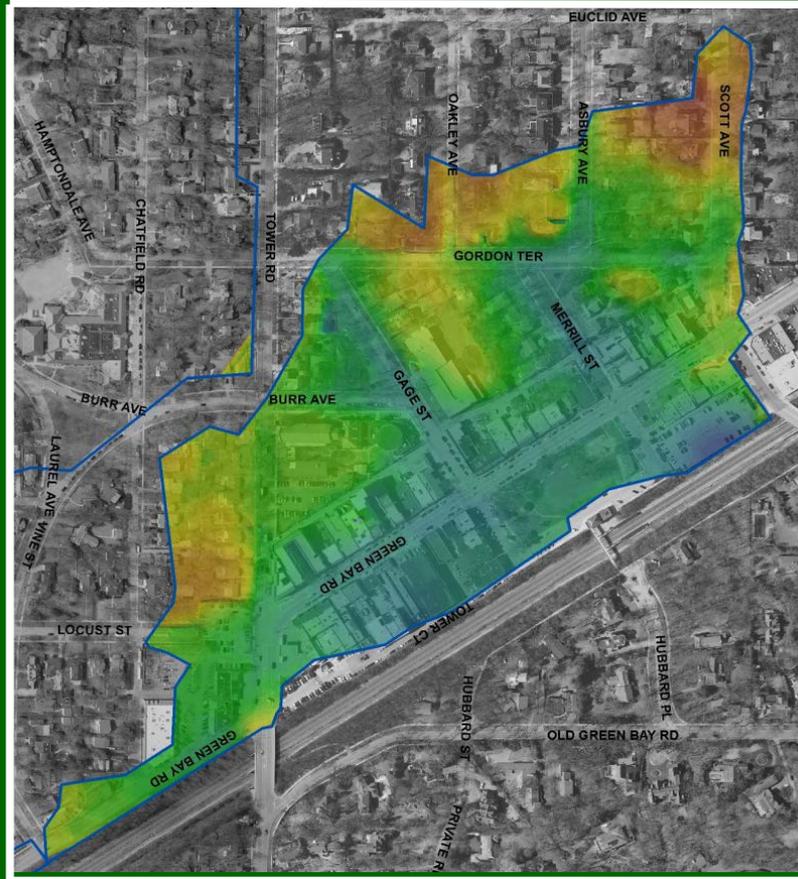


- Ex 12"-18" Sewers Replaced with
- Pr 24"-36" Storm Sewers
- Pr 12" Storm Sewer Draining Corwin Park

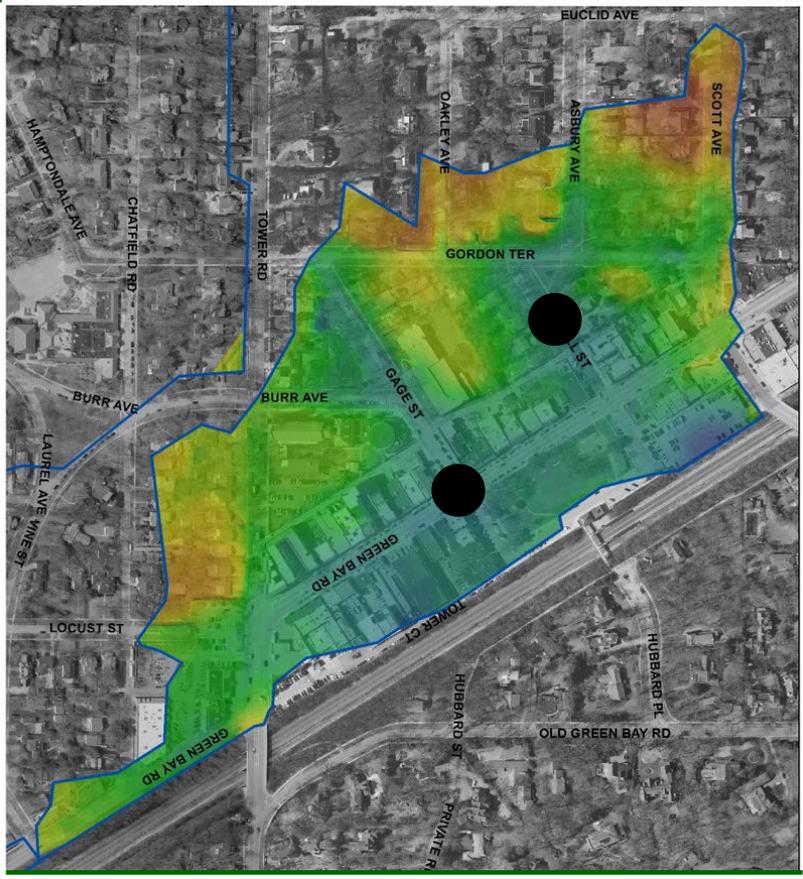
Probable Cost = \$493,408



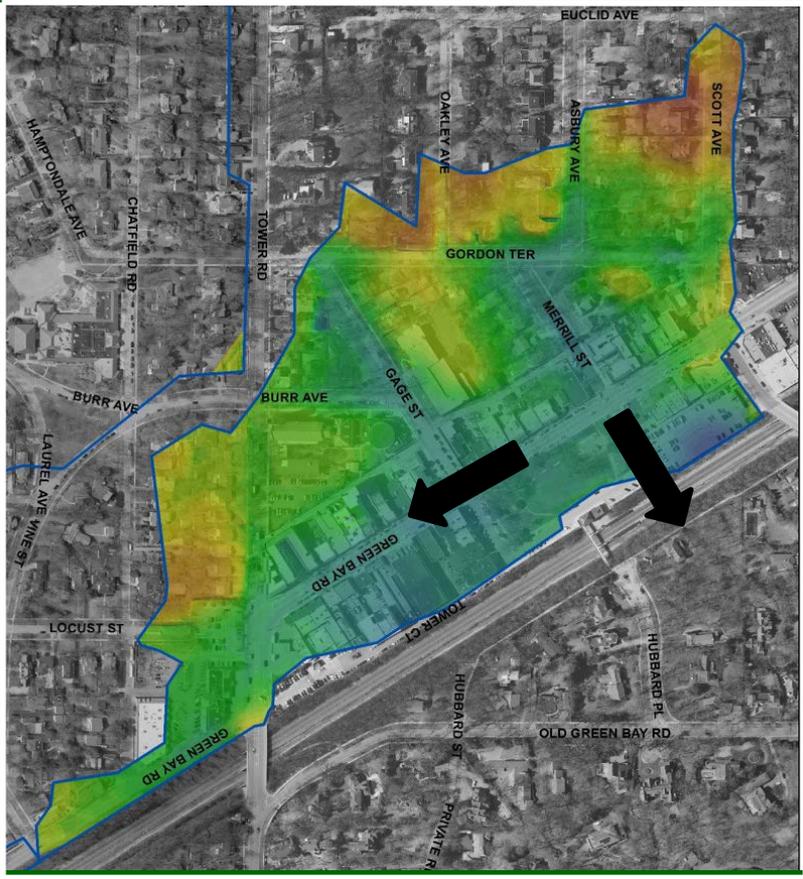
Study Area C



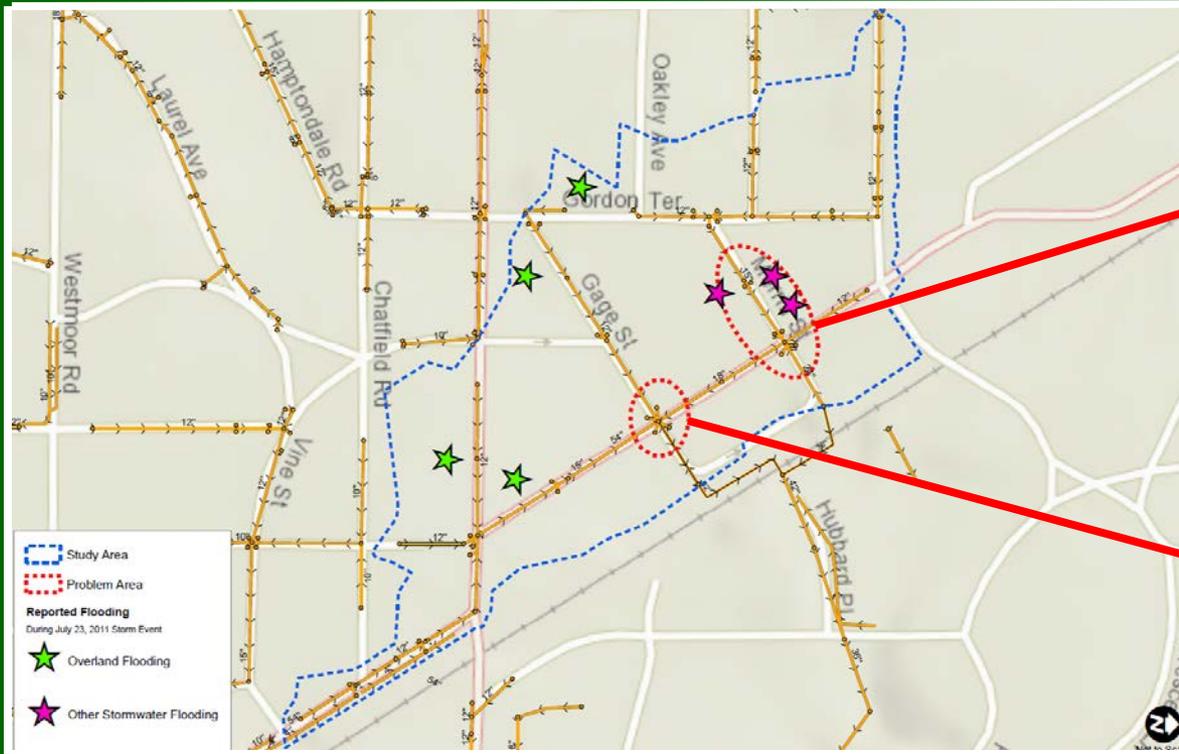
Study Area C



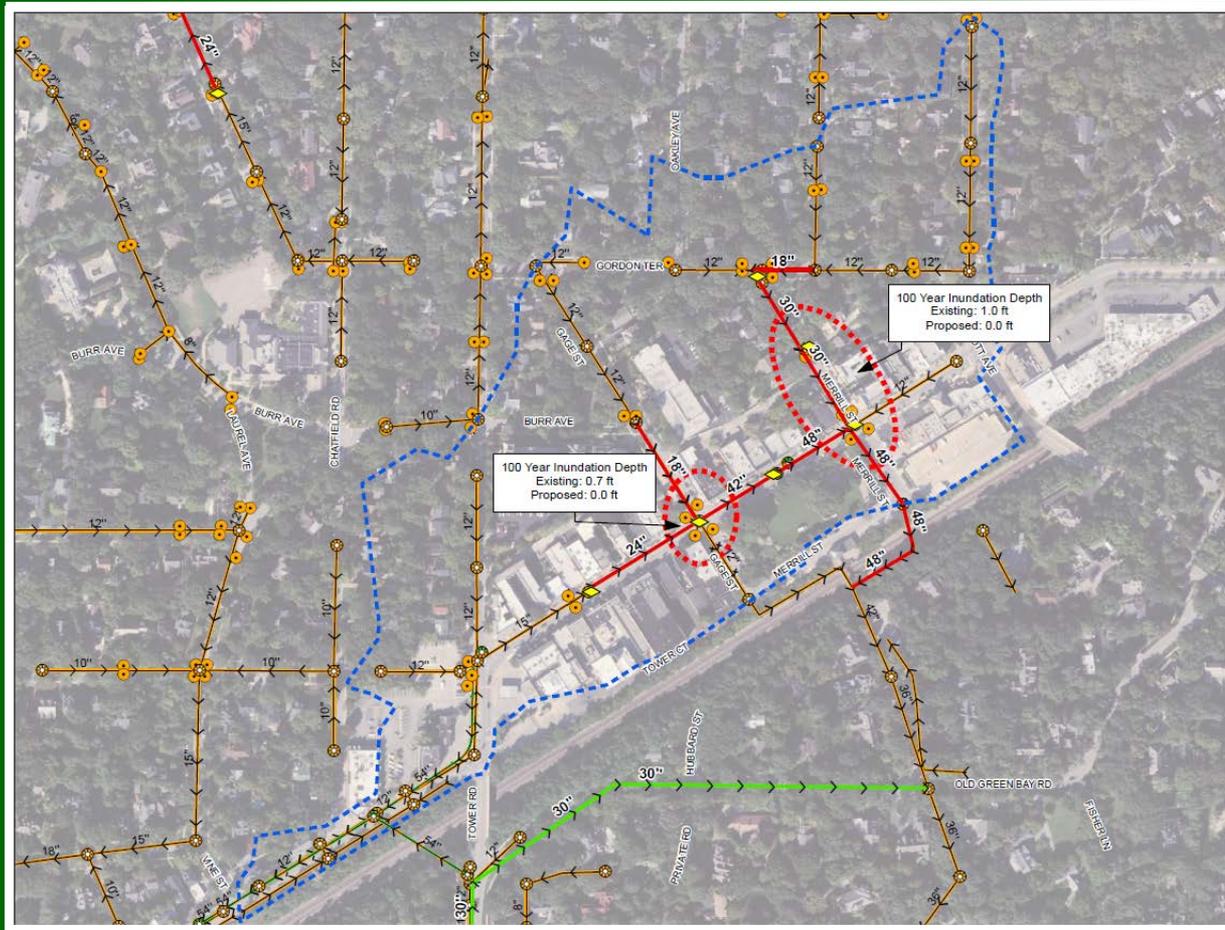
Study Area C



Study Area C



Study Area C

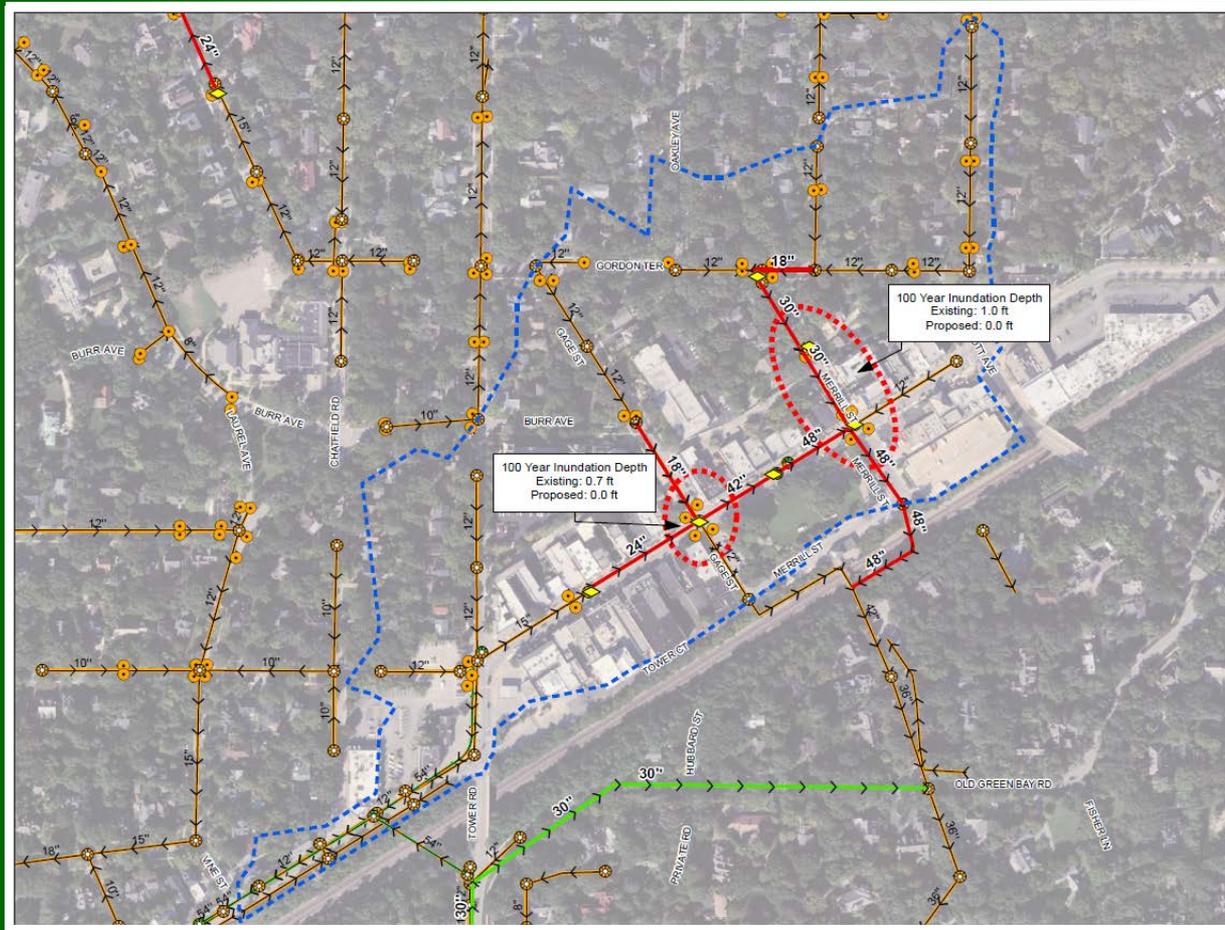


Alternate 1

- Disconnect from MWRD
- Ex 12"-36" Sewers Replaced with
- Pr 18"-48" Sewers



Study Area C



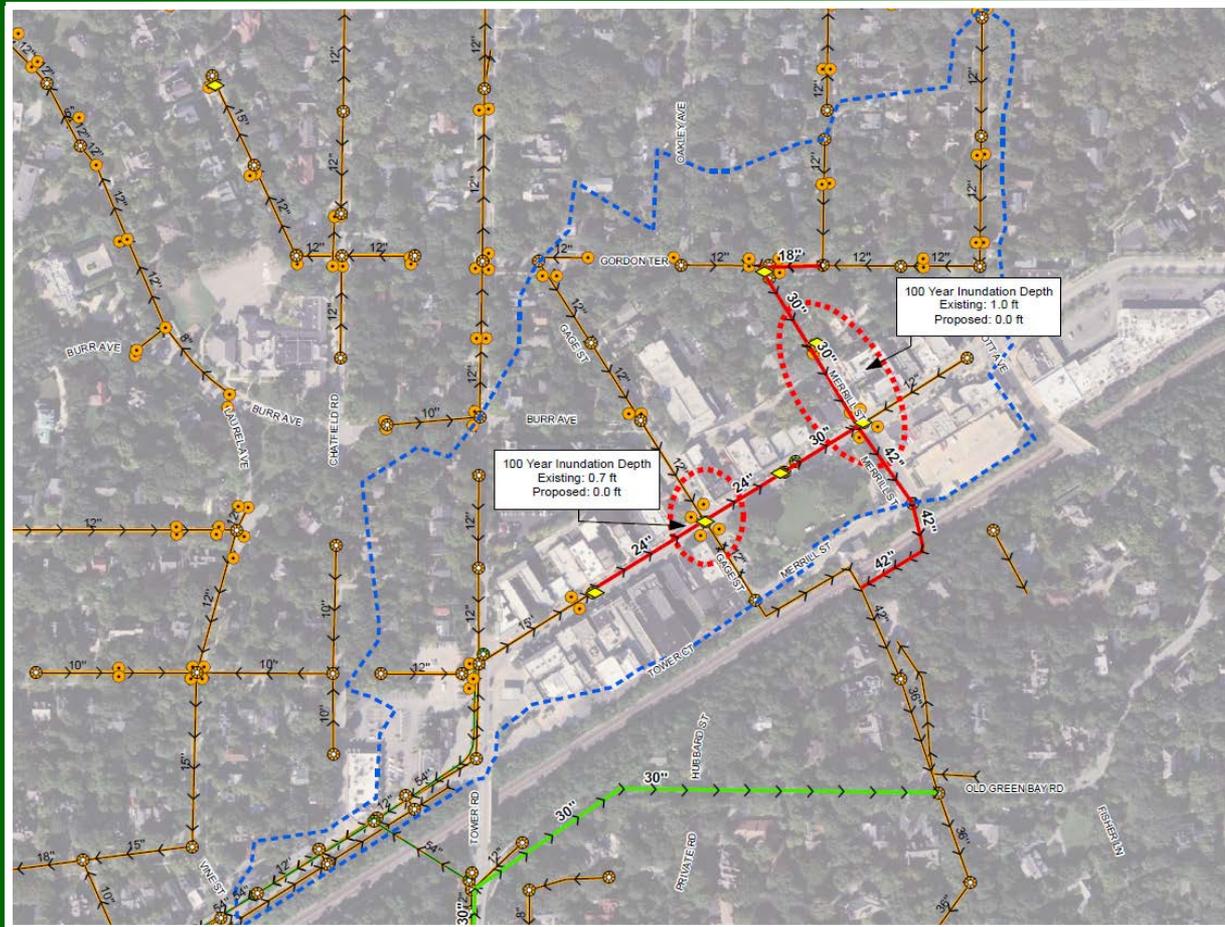
Alternate 1

- Disconnect from MWRD
- Ex 12"-36" Sewers Replaced with
- Pr 18"-48" Sewers

Probable Cost = \$1,913,278



Study Area C

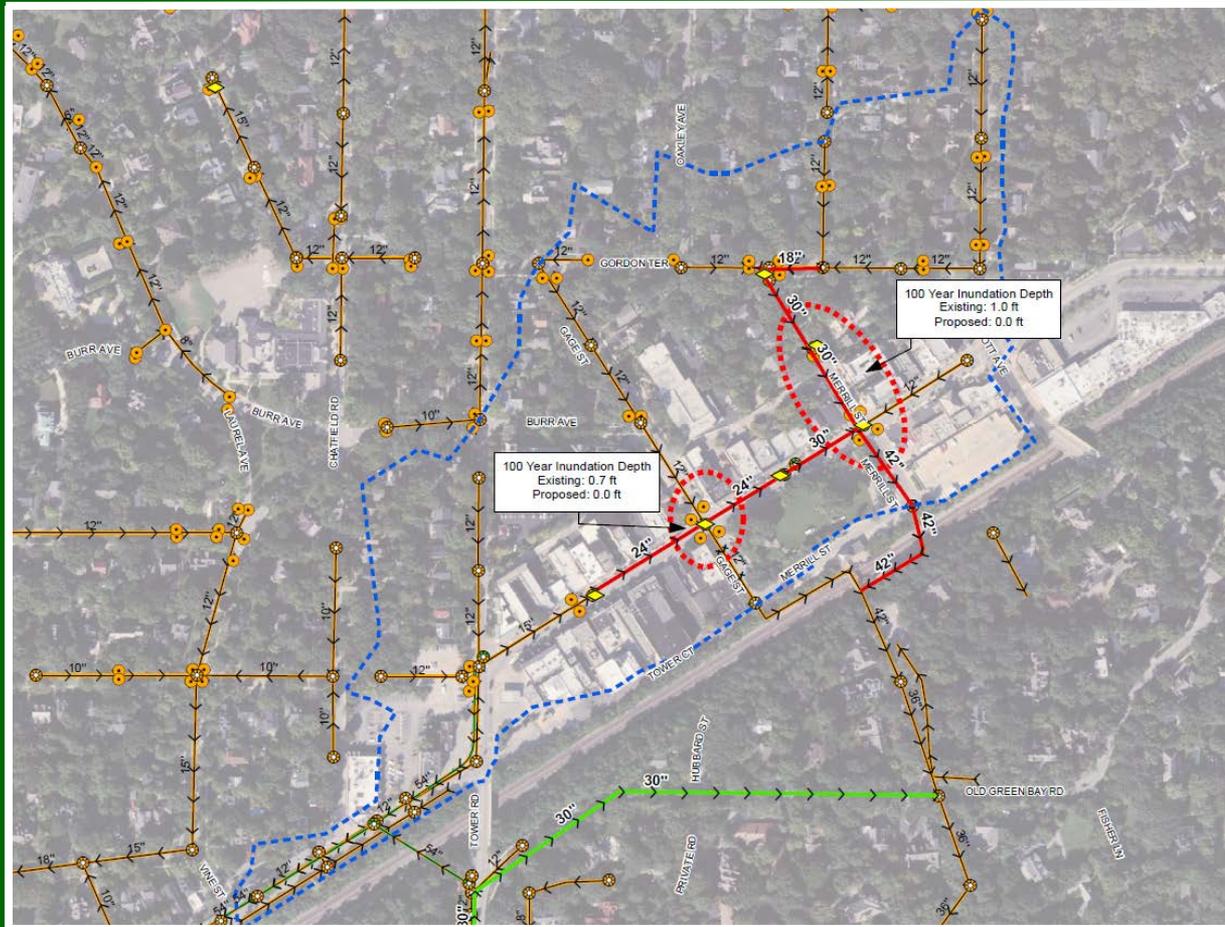


Alternate 2

- Maintain Connection to MWRD
- Ex 12"-36" Sewers Replaced with
- Pr 18"-42" Sewers



Study Area C



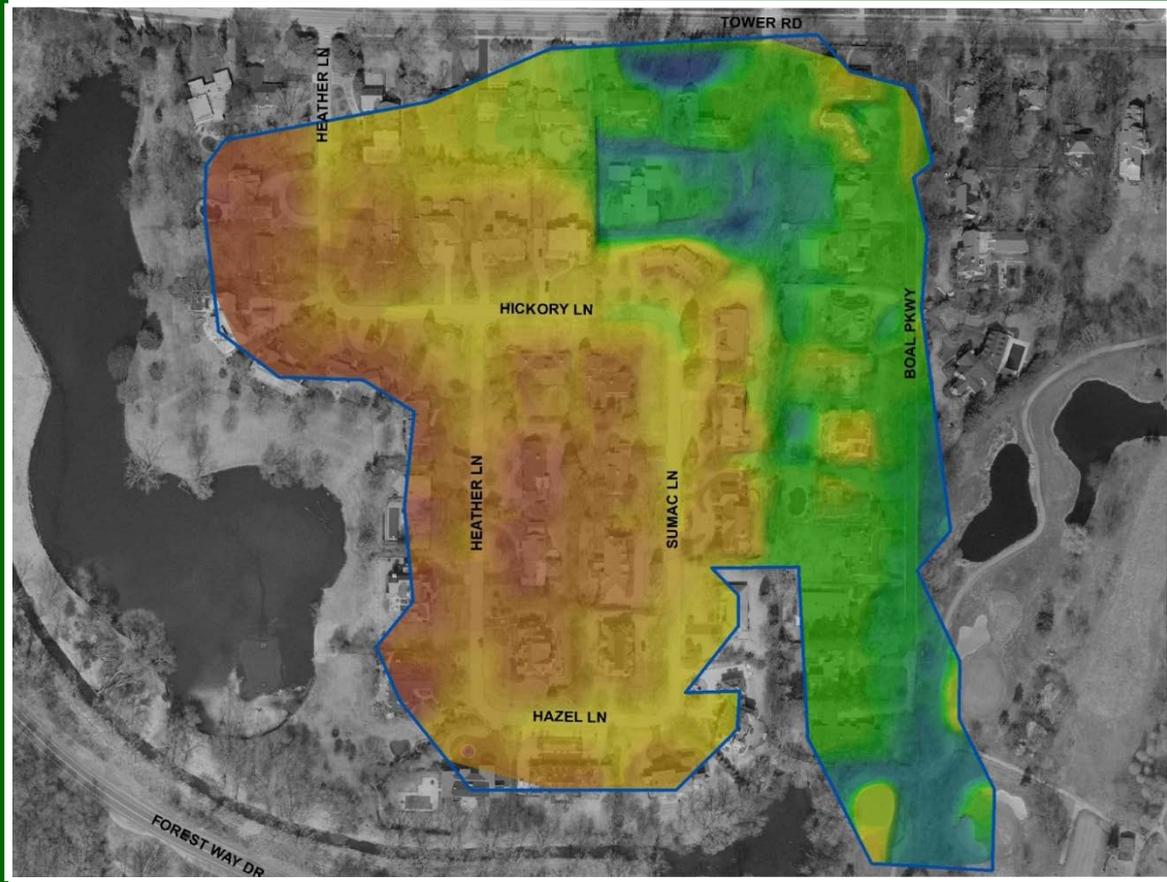
Alternate 2

- Maintain Connection to MWRD
- Ex 12"-36" Sewers Replaced with
- Pr 18"-42" Sewers

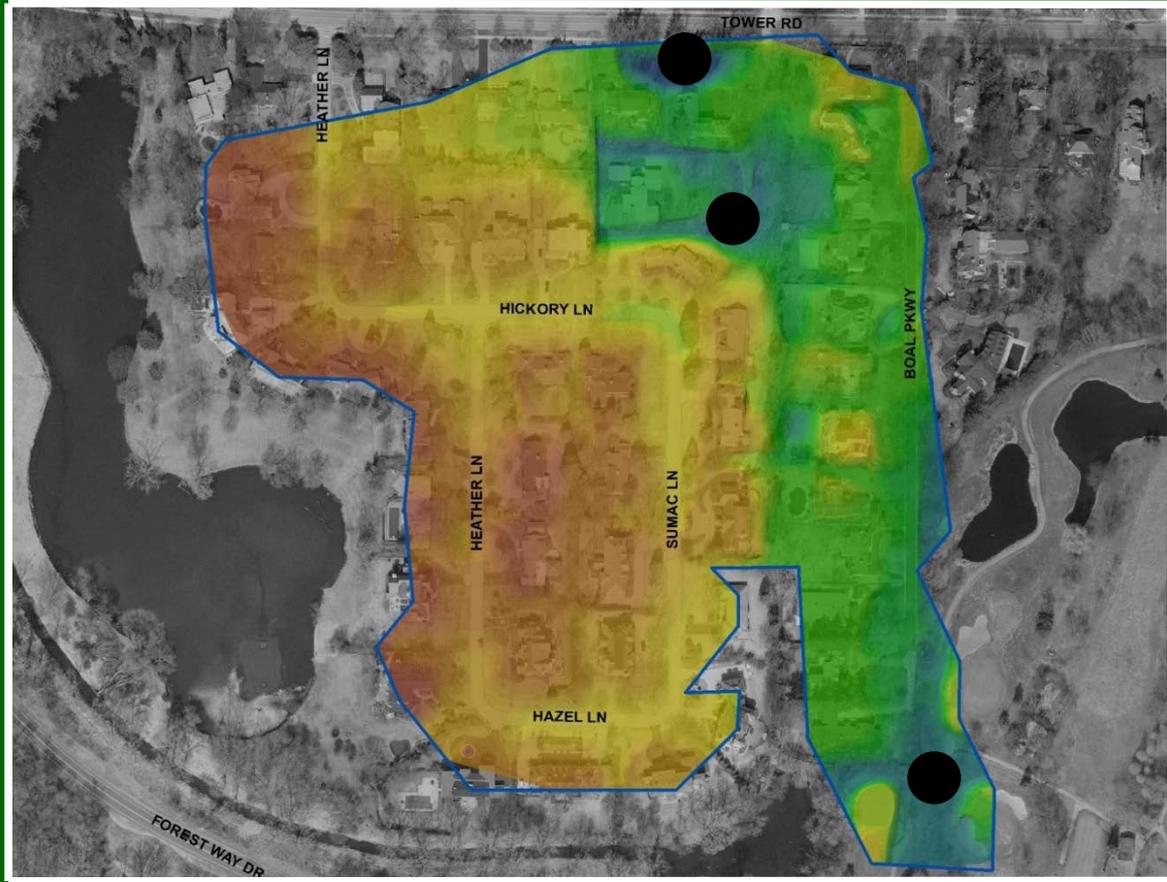
Probable Cost = \$1,668,341



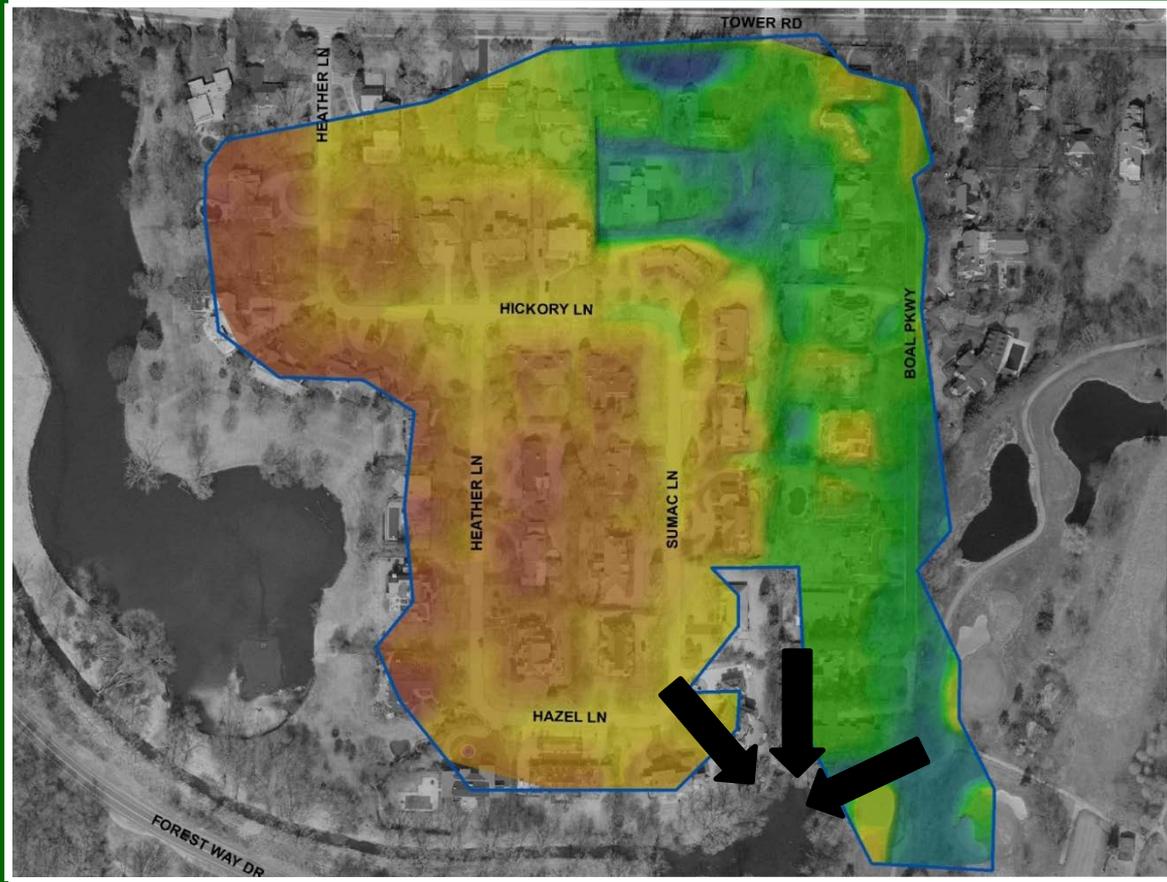
Study Area E



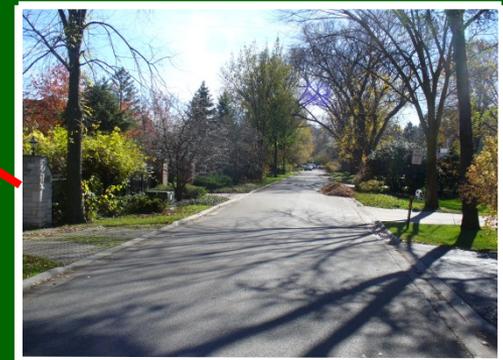
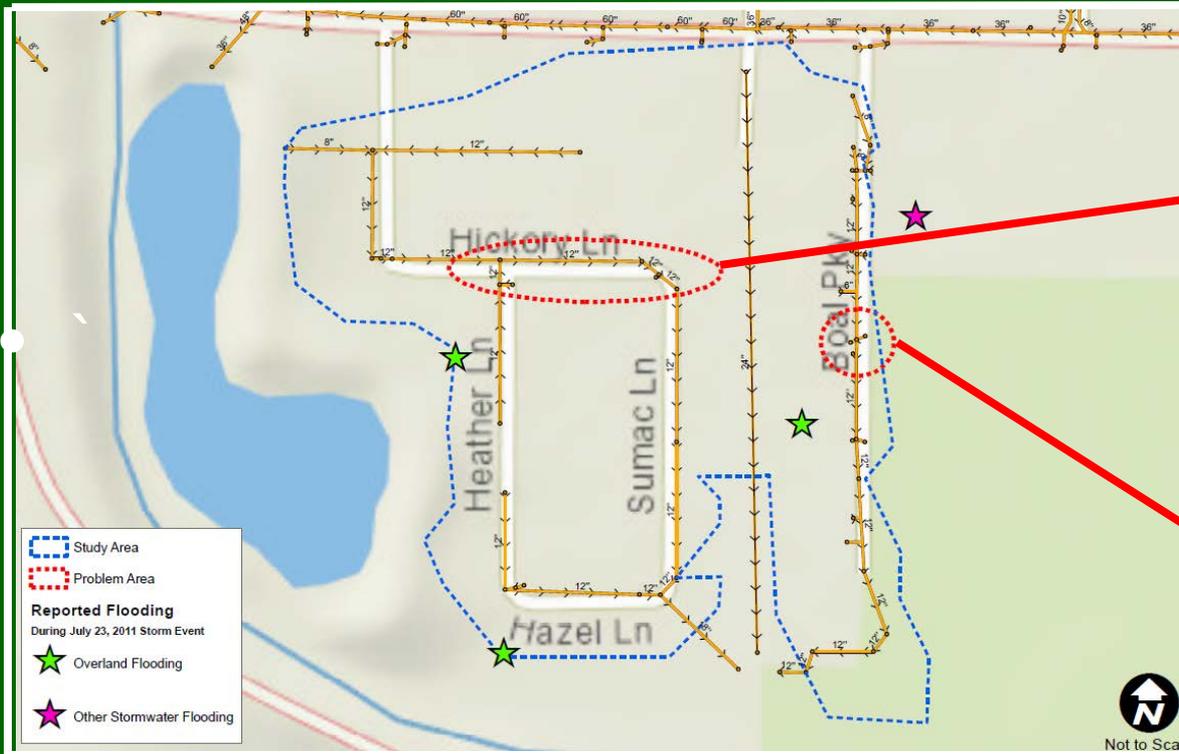
Study Area E



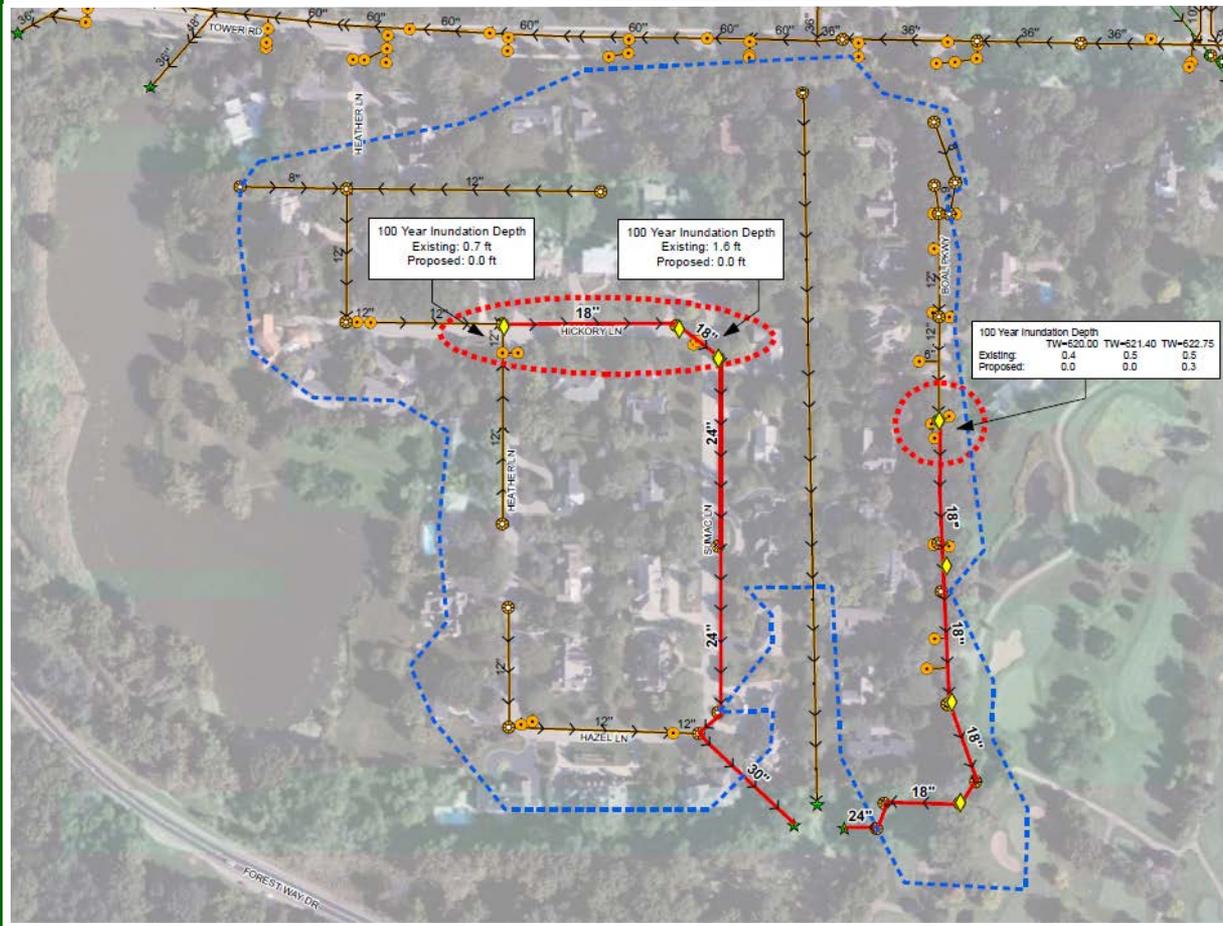
Study Area E



Study Area E



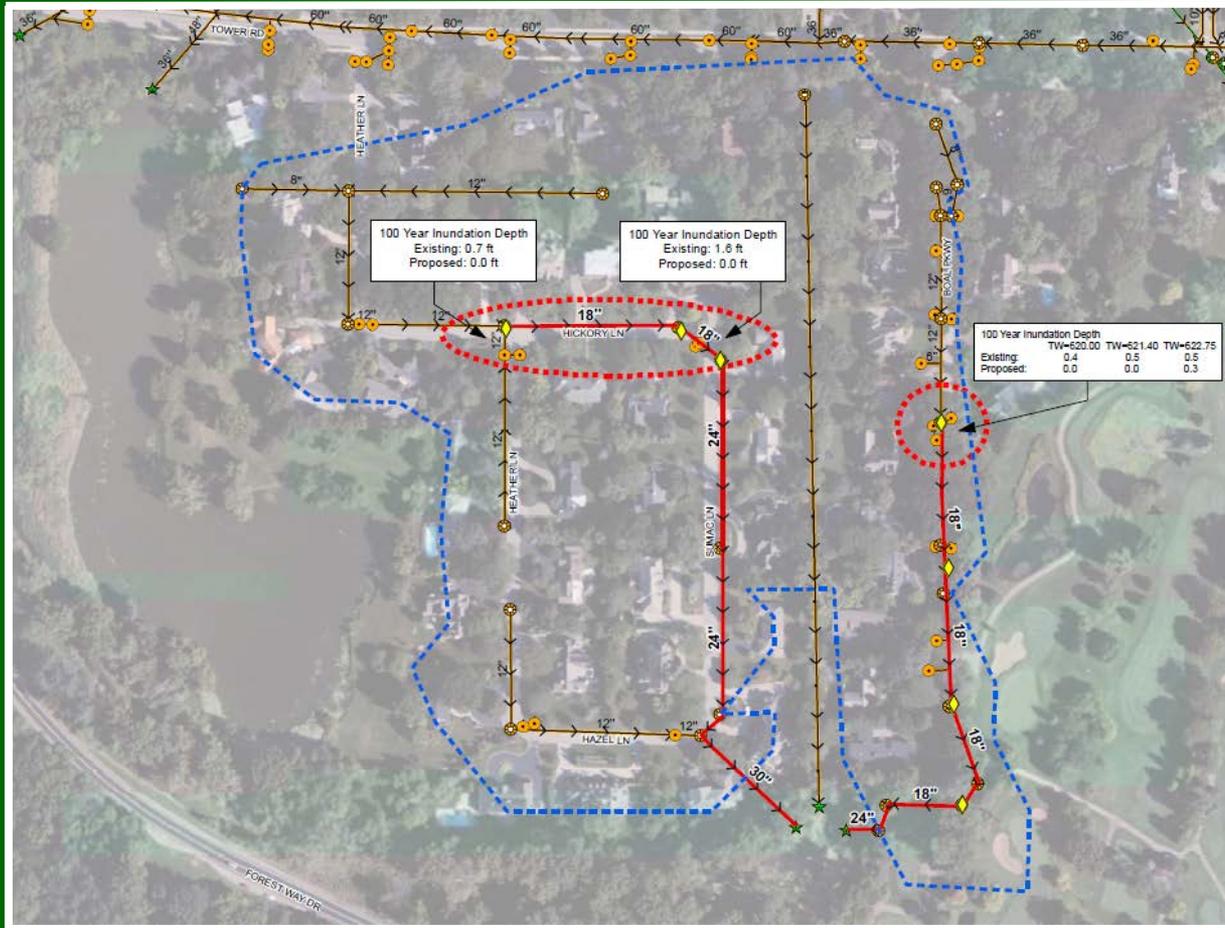
Study Area E



- Ex 12"-24" Sewers Replaced with
- Pr 18"-30" Sewers



Study Area E

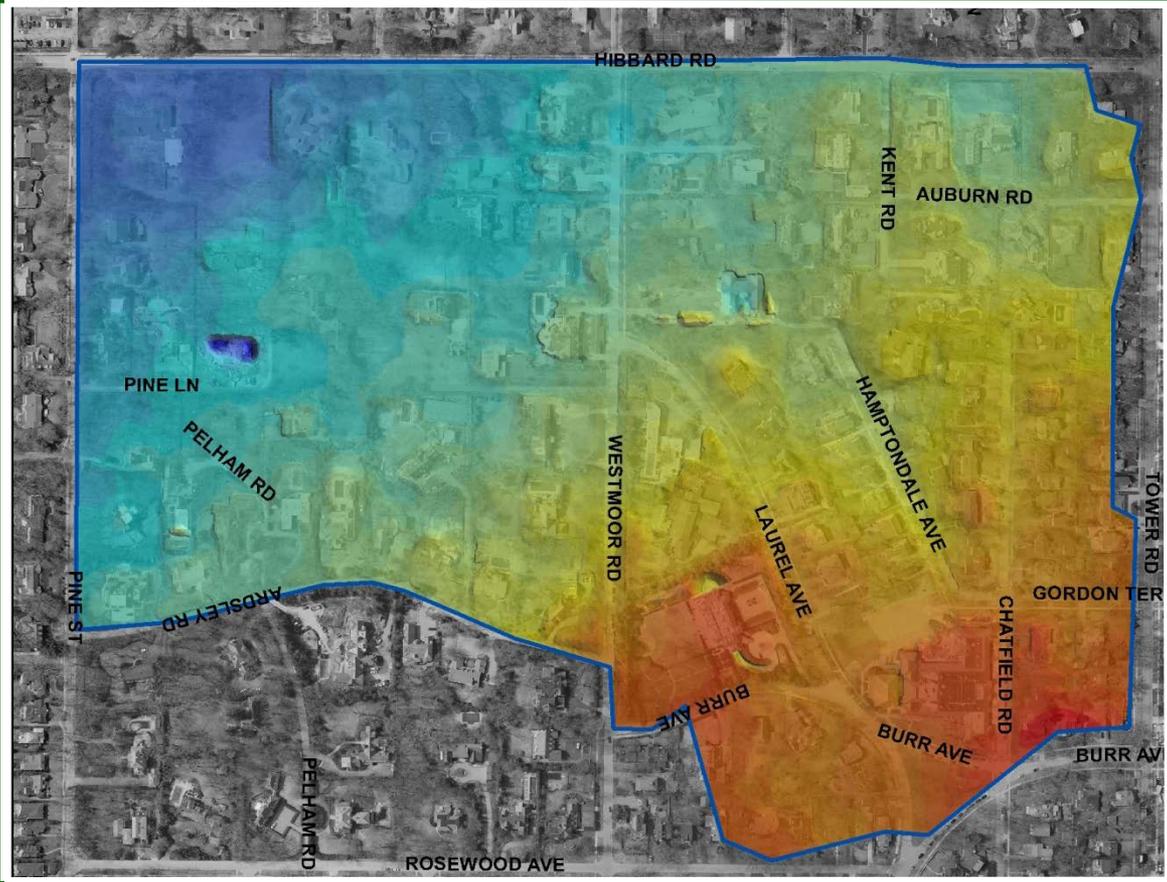


- Ex 12"-24" Sewers Replaced with
- Pr 18"-30" Sewers

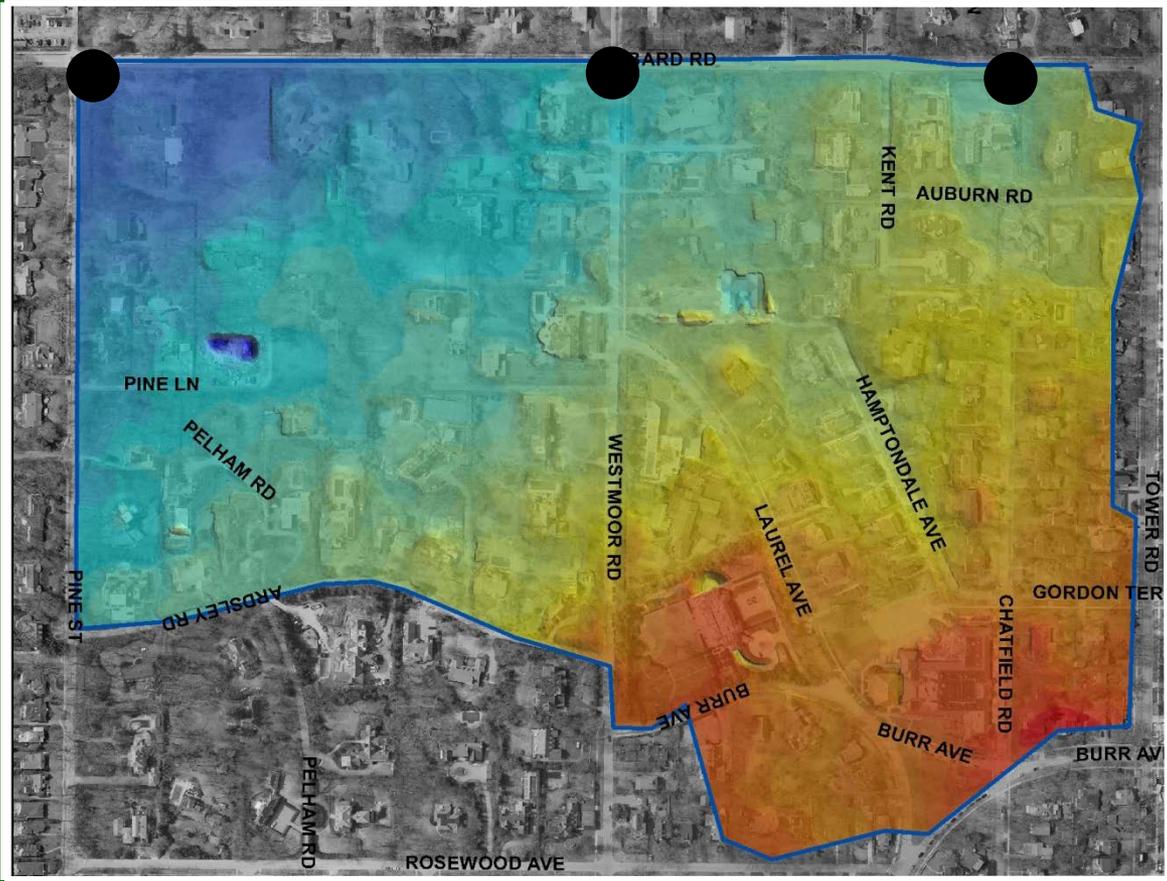
Probable Cost = \$862,755



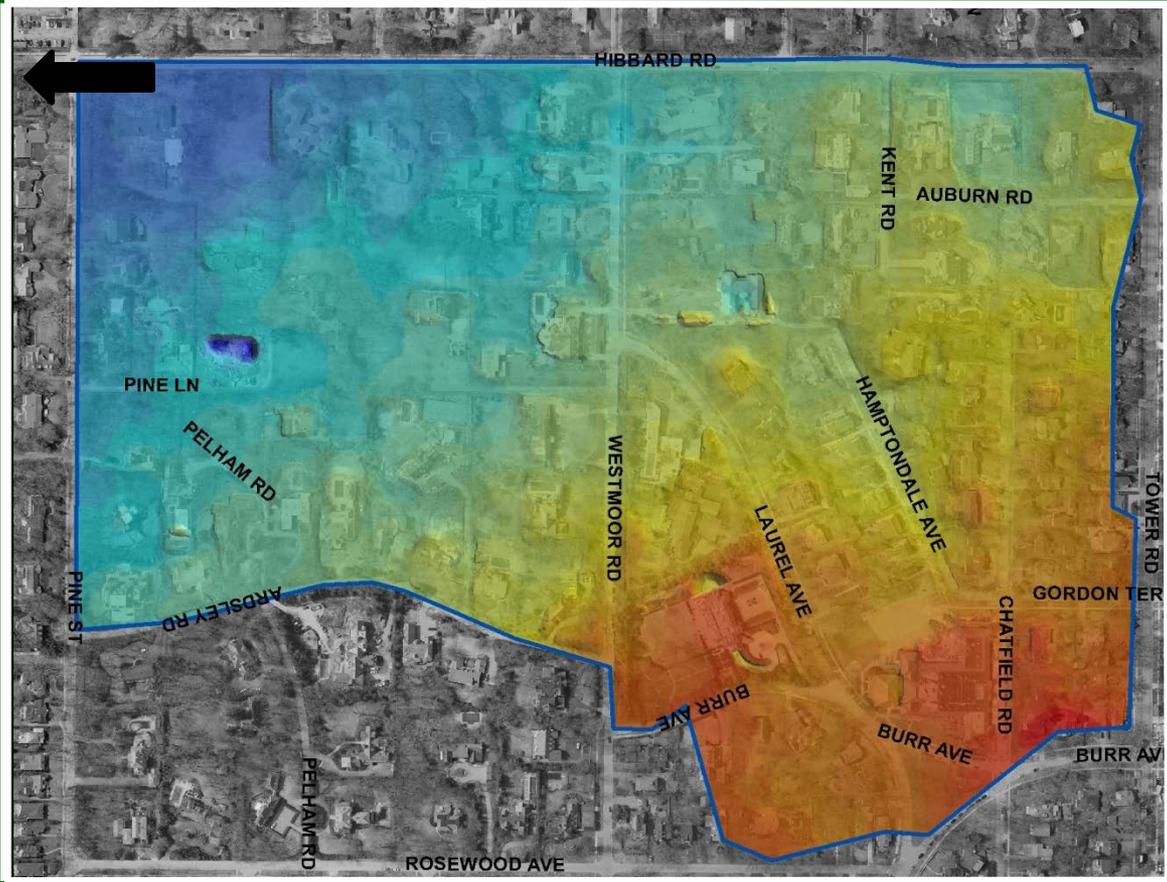
Study Area G



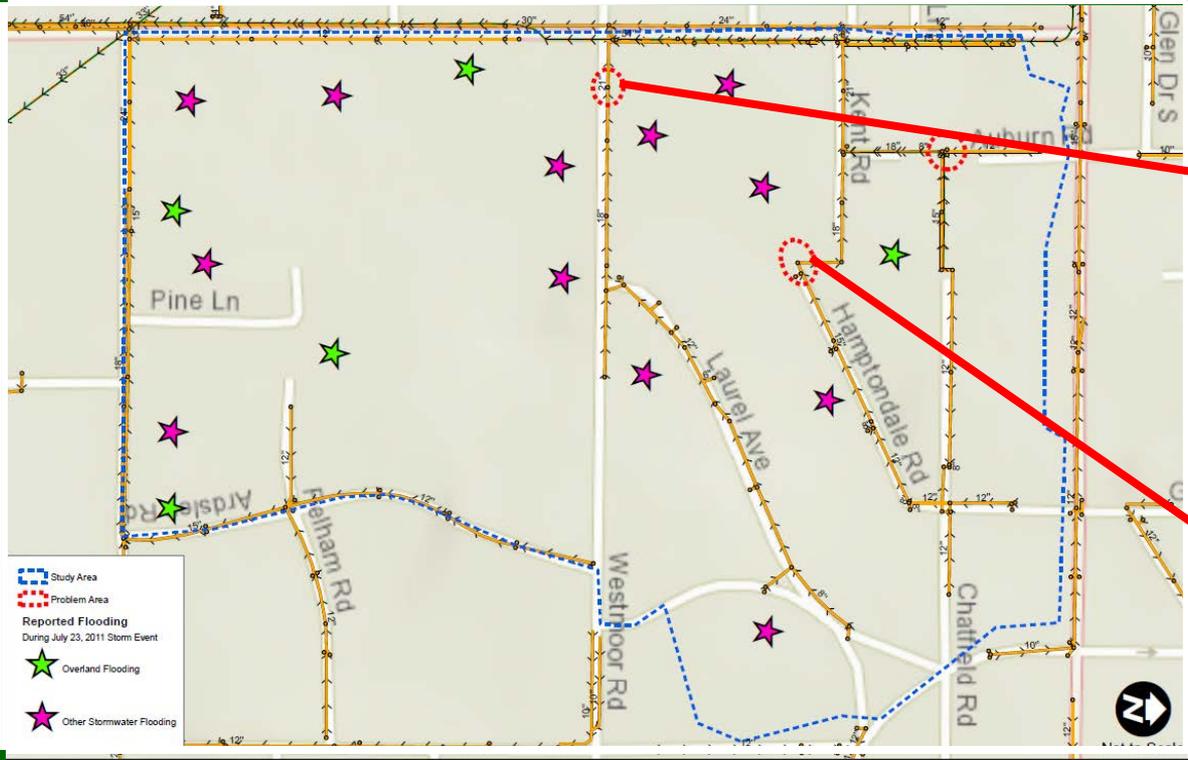
Study Area G



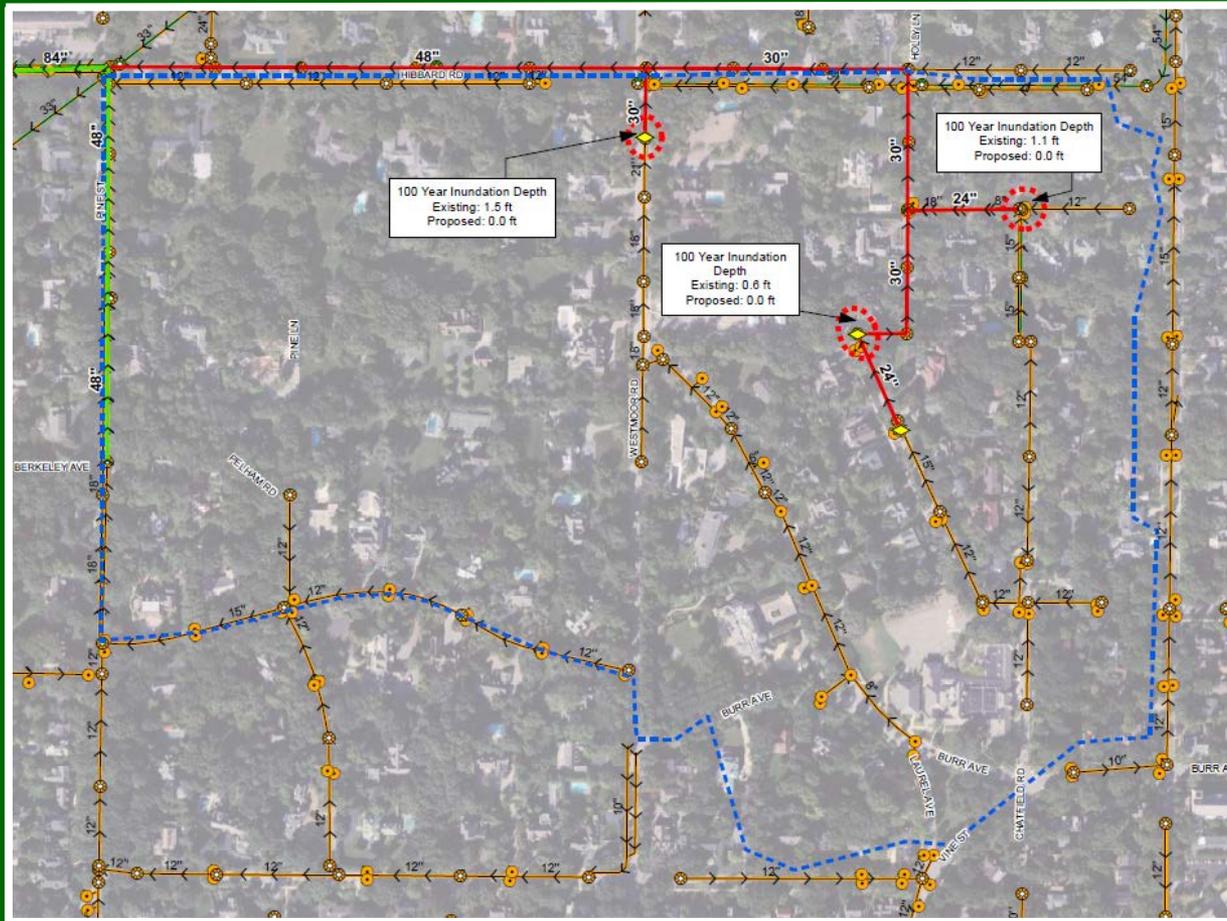
Study Area G



Study Area G



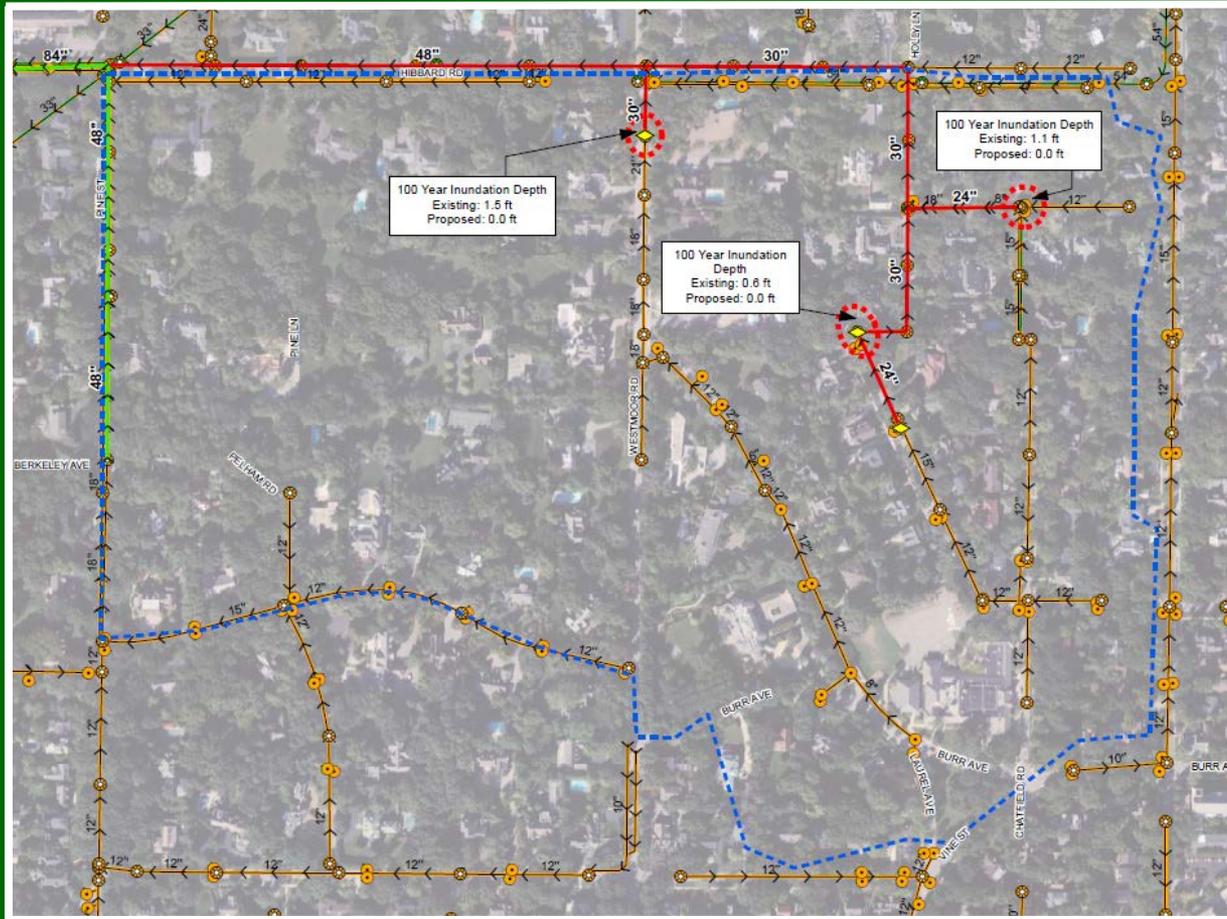
Study Area G



- Ex 15"-30" Sewers Replaced with
- Pr 24"-48" Sewers
- Connection to Planned 84" Sewer



Study Area G

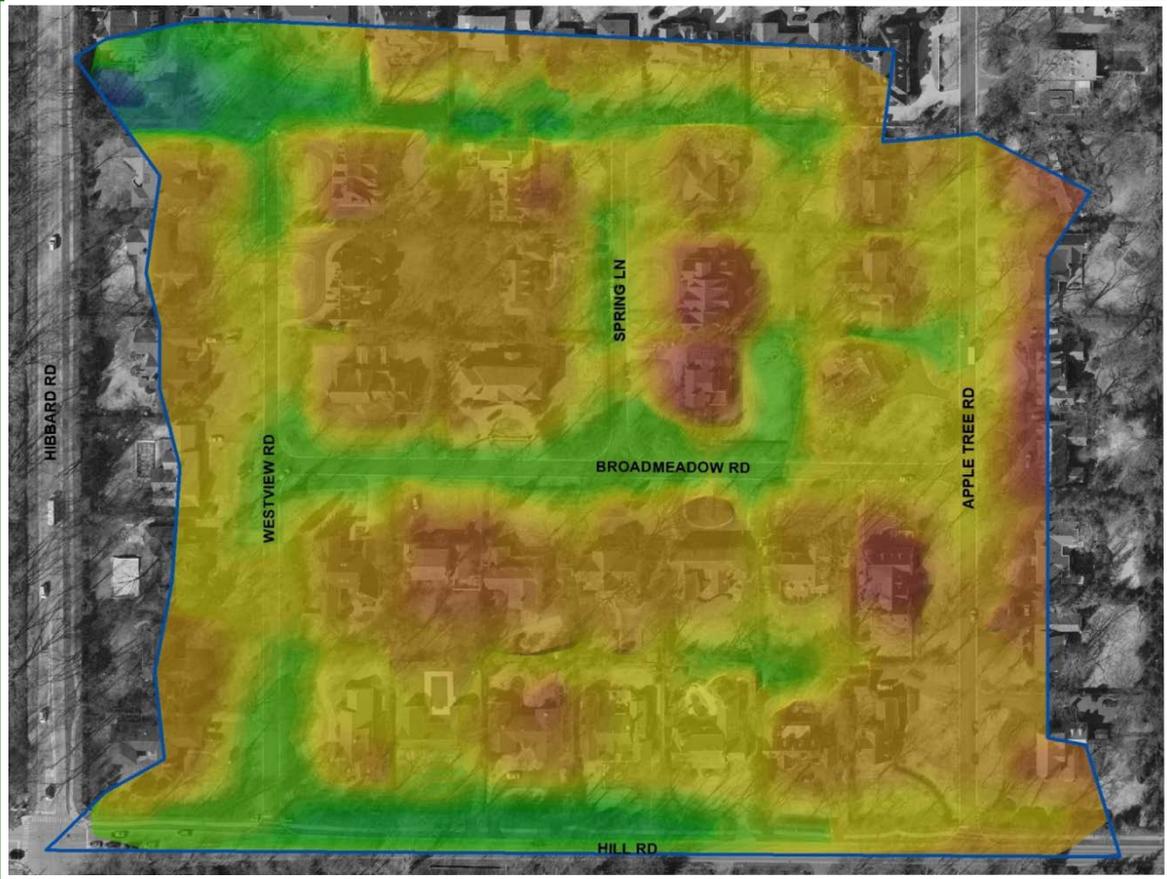


- Ex 15"-30" Sewers Replaced with
- Pr 24"-48" Sewers
- Connection to Planned 84" Sewer

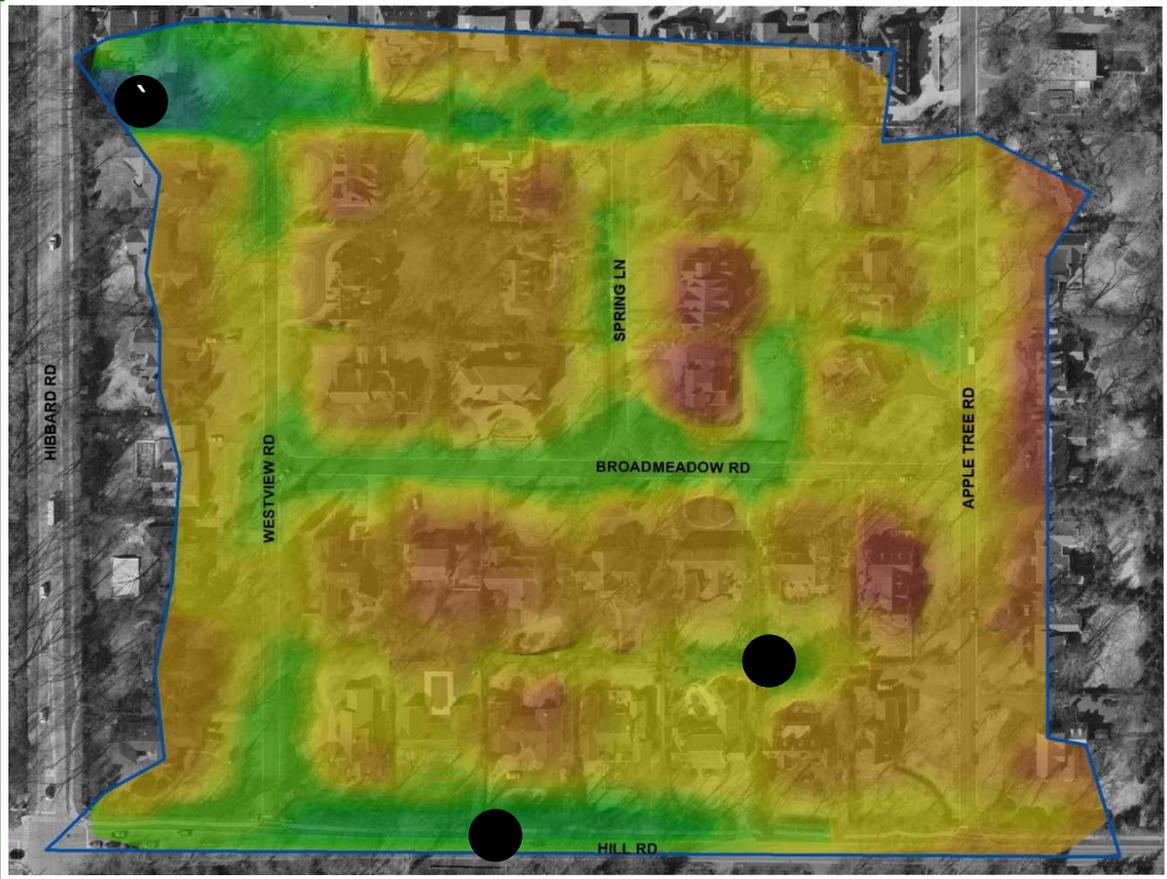
Probable Cost = \$1,961,270



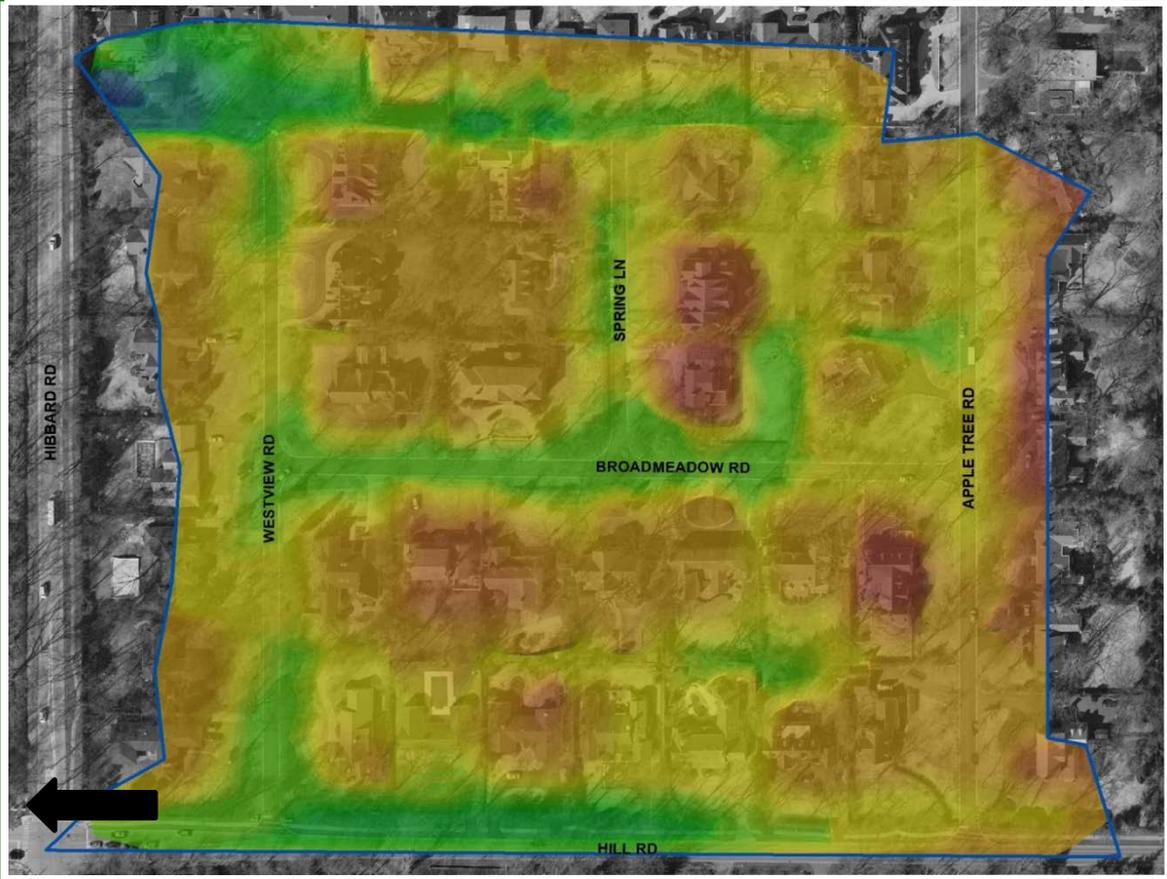
Study Area N



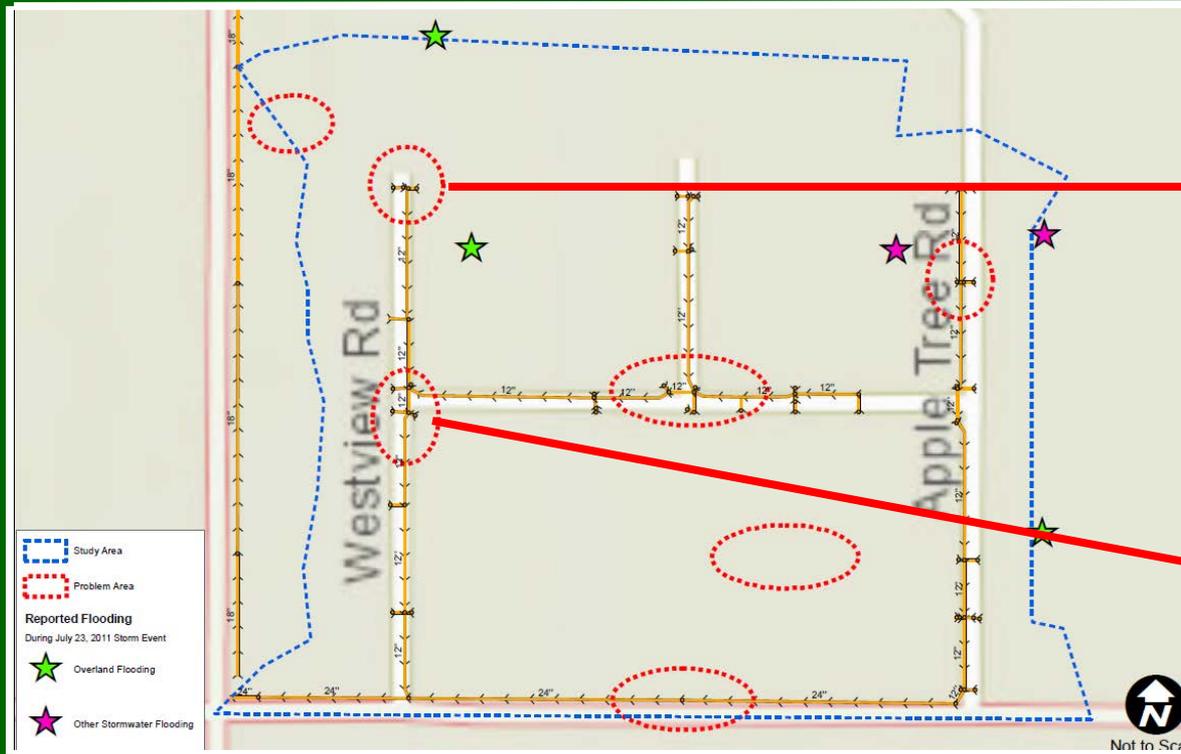
Study Area N



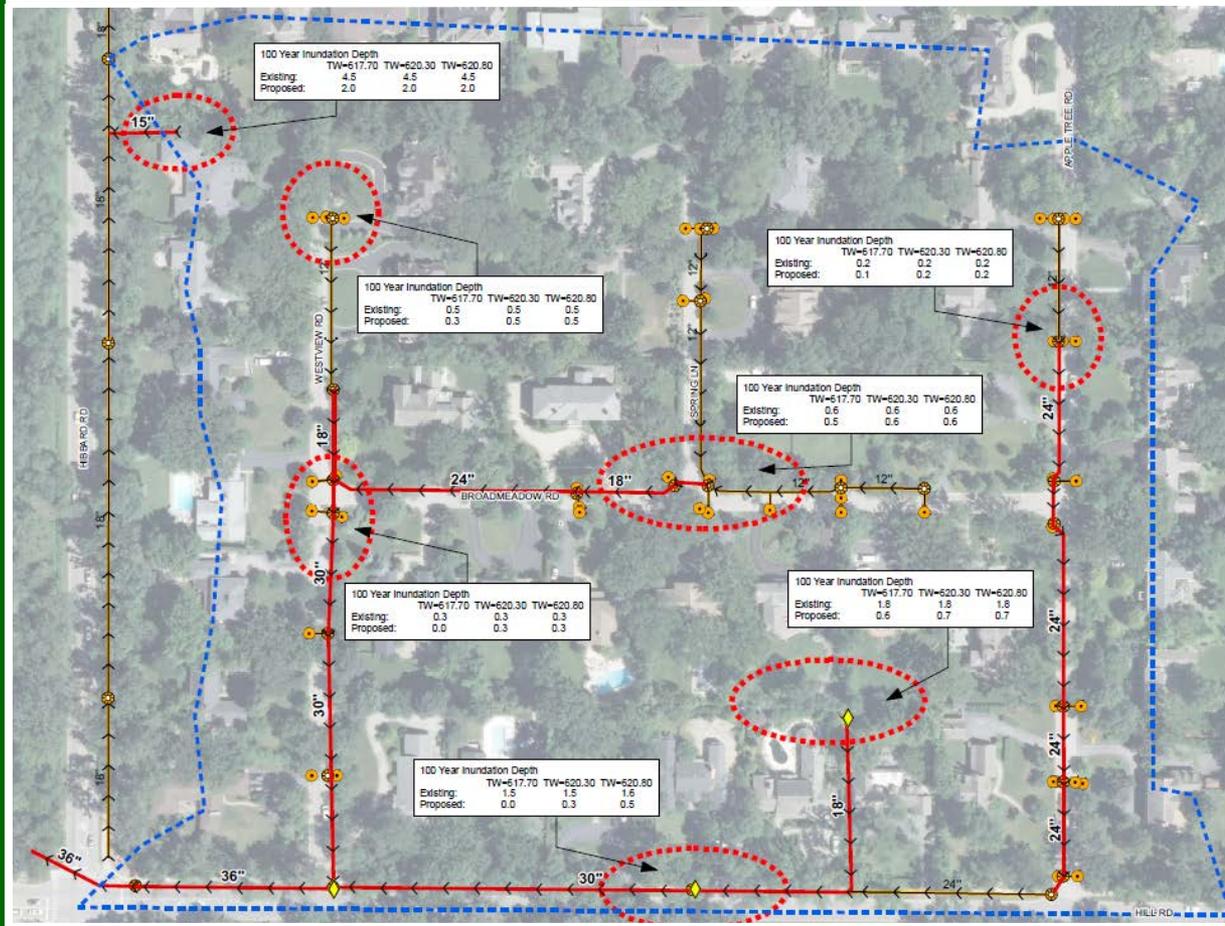
Study Area N



Study Area N



Study Area N



- Ex 12"-24" Sewers Replaced with
- Pr 18"-36" Storm Sewers
- Pr 15" and 18" Sewers Draining Depressions

Probable Cost = \$1,168,115



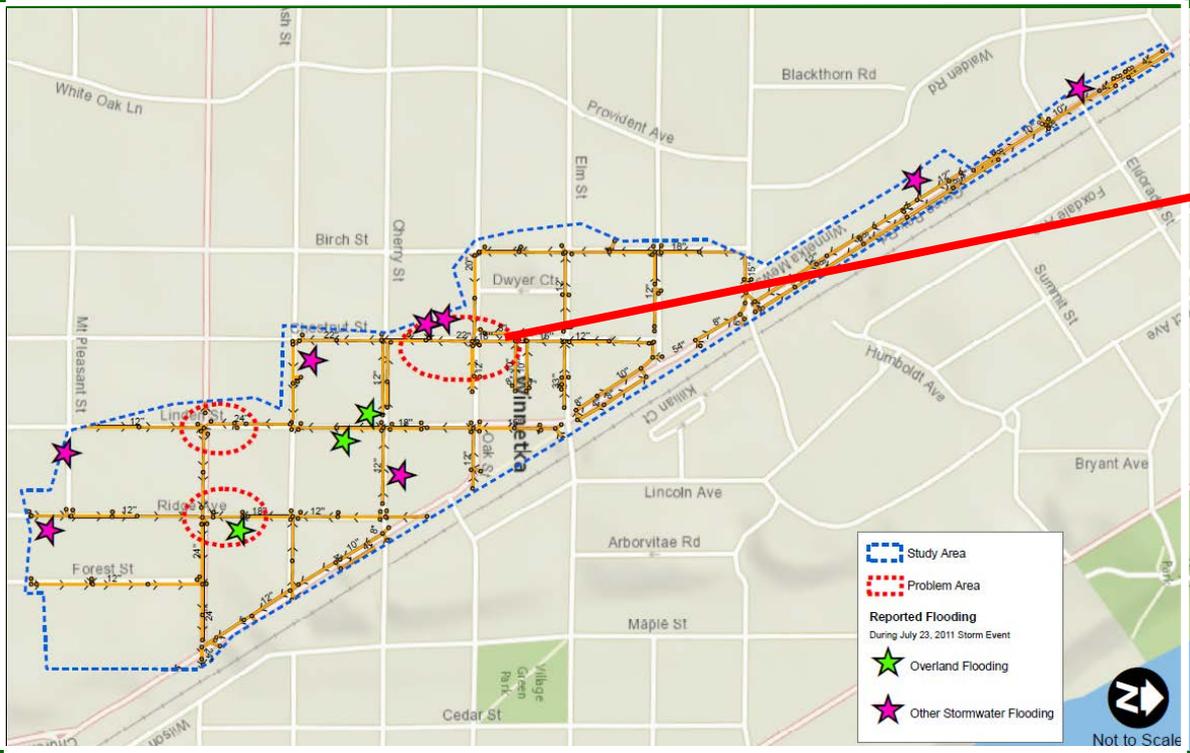
Study Area O



Study Area O



Study Area O



Study Area O



Alternate 1

- Disconnect from MWRD
- Ex 18"-24" Sewers Replaced with
- Pr 24"-48" Sewers
- Connection to Planned 48" and 96" Sewers



Study Area O



Alternate 1

- Disconnect from MWRD
- Ex 18"-24" Sewers Replaced with
- Pr 24"-48" Sewers
- Connection to Planned 48" and 96" Sewers

Probable Cost = \$2,303,475



Study Area O

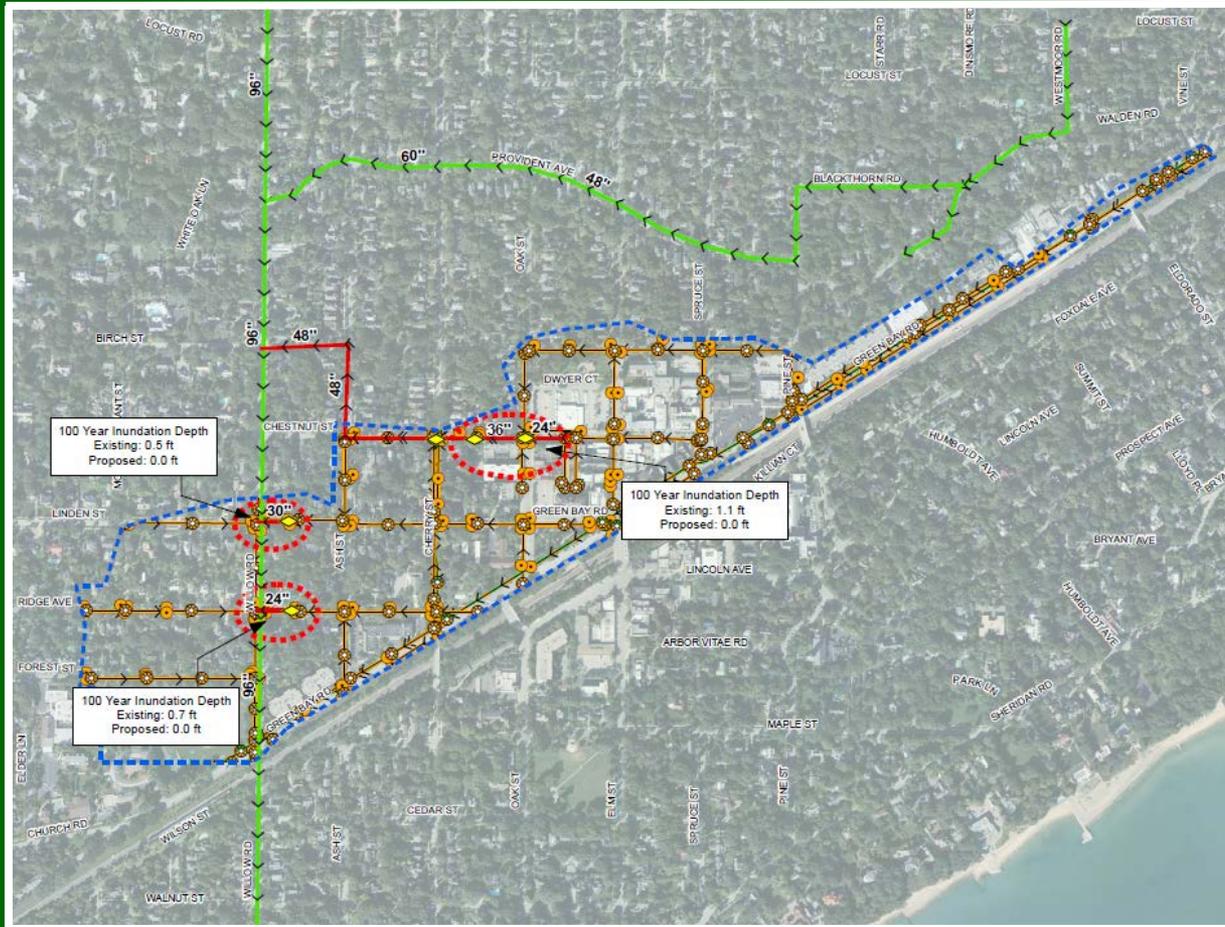


Alternate 2

- Maintain Connection to MWRD
- Ex 18"-24" Sewers Replaced with
- Pr 24"-48" Sewers
- Connection to Planned 96" Sewer



Study Area O



Alternate 2

- Maintain Connection to MWRD
- Ex 18"-24" Sewers Replaced with
- Pr 24"-48" Sewers
- Connection to Planned 96" Sewer

Probable Cost = \$1,767,074



Conclusions and Recommendations

Engineer's Estimate of Probable Cost (Millions)

Area A	\$0.5
Area C – Alternate 2	\$1.7
Area E	\$0.9
Area G	\$2.0
Area N	\$1.2
Area O – Alternate 2	<u>\$1.8</u>
Total =	\$8.1



Conclusions and Recommendations

Engineer's Estimate of Probable Cost (Millions)

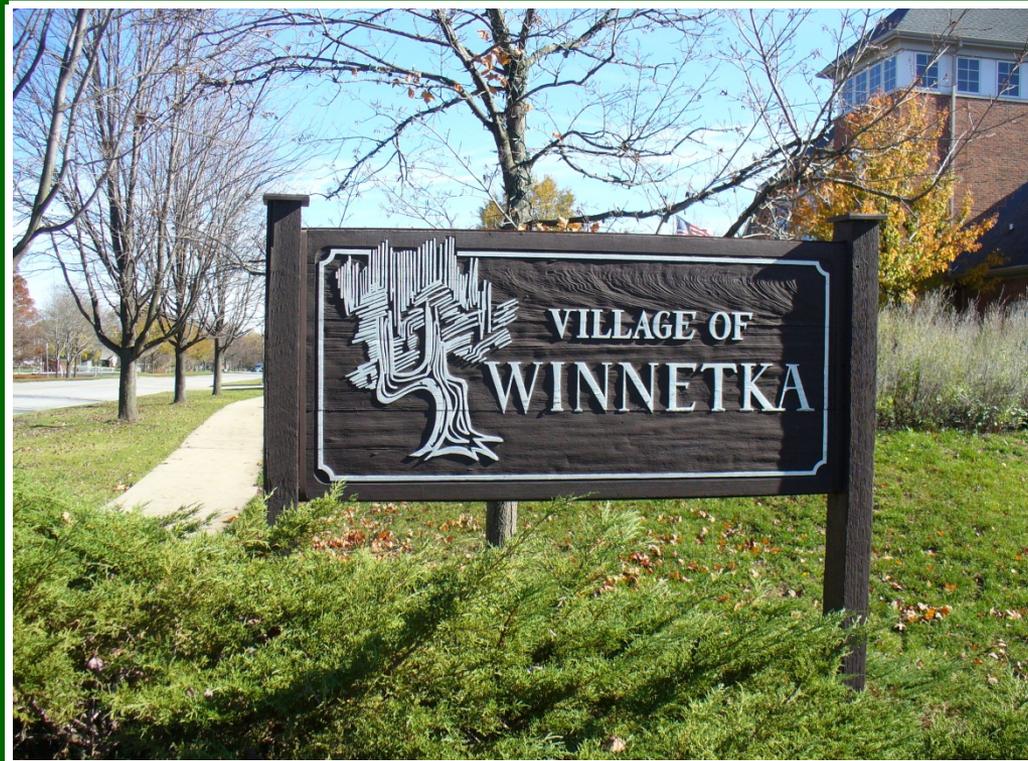
Area A	\$0.5
Area C – Alternate 2	\$1.7
Area E	\$0.9
Area G	\$2.0
Area N	\$1.2
Area O – Alternate 2	<u>\$1.8</u>
	Total = \$8.1



Conclusions and Recommendations

- Maintain connections to MWRD interceptor, if allowed.
- Delay improvements for Areas G, N, and O, which depend on other planned improvements.
- Make improvements to overland flow paths in Area N, rather than storm sewer improvements.





Questions?



WINNETKA STORMWATER MASTER PLAN





WINNETKA STORMWATER MASTER PLAN

Project Report

- Initial Tasks (July-Aug 2012)
 - Launch Project Website
 - Initiate Water Quality Sampling
- Additional Study Areas (Sept-Dec 2012)
- Draft Master Plan (Jan-July 2013)



www.winnetkastormwaterplan.com



WINNETKA STORMWATER MASTER PLAN



Stormwater Master Plan

- A vision for the Village's stormwater program with actionable goals and objectives
 - Comprehensive
 - Protects and enhances property values
 - Promotes a thriving and sustainable community



Stormwater Master Plan

- To improve its stormwater management system and the quality of its stormwater runoff, the Village will...



Stormwater Master Plan

- **Goal 1/Section 3:** The Village will reduce the risk of flooding with improvements to stormwater infrastructure.



Stormwater Master Plan

Village of Winnetka Stormwater Master Plan		Implementation Plan																					
		13	2014				2015				2016				2017				2018				2019
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	and Beyond
Stormwater Capital Improvements																							
1	Complete design of Winnetka PS, Lloyd Park Outlet, Tower/Foxdale, NW Winnetka/Forest Glen																						
1	Complete construction of Winnetka PS, Lloyd Park Outlet, Tower/Foxdale, NW Winnetka/Forest Glen																						
1	Complete design of Willow Road Tunnel																						
1	Complete construction of Willow Road Tunnel																						
2	Complete detailed topographic survey of Area N																						
3	Evaluate the the feasibility of additional capital improvements																						



Stormwater Master Plan

- **Goal 2/Section 4:** The Village will reduce basement back-ups and sanitary sewer overflows by reducing the amount of inflow and infiltration into the sanitary sewer system.



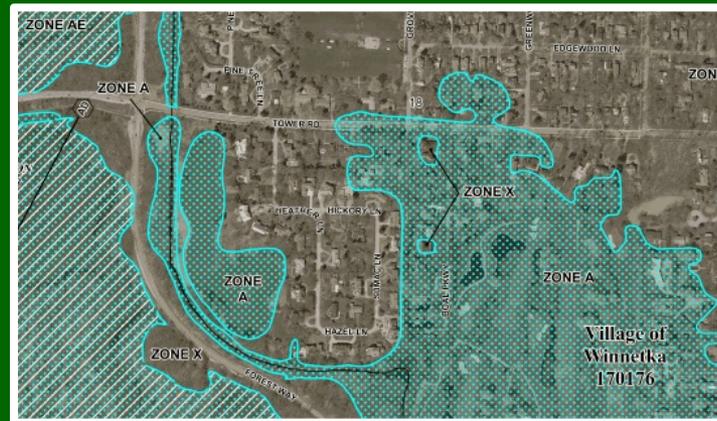
Stormwater Master Plan

Village of Winnetka Stormwater Master Plan		Implementation Plan																								
		2013				2014				2015				2016				2017				2018				2019
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	and Beyond			
Inflow and Infiltration																										
1	Complete SSES - Phase 1																									
1	Complete SSES - Phase 2																									
1	Complete SSES - Phase 3																									
2	Complete building-to-building canvassing																									
3	Smoke test streets prior to capital improvements																									
4	Implement a cost-sharing program for disconnection of sump pumps and foundation drains																									



Stormwater Master Plan

- **Goal 3/Section 5:** The Village will maintain participation and good standing in the National Flood Insurance Program and improve floodplain management practices to minimize flood damages and reduce flood insurance premiums for property owners.



Stormwater Master Plan

- **Goal 4/Section 6:** The Village will protect and enhance the quality of water in Lake Michigan and the Skokie River.

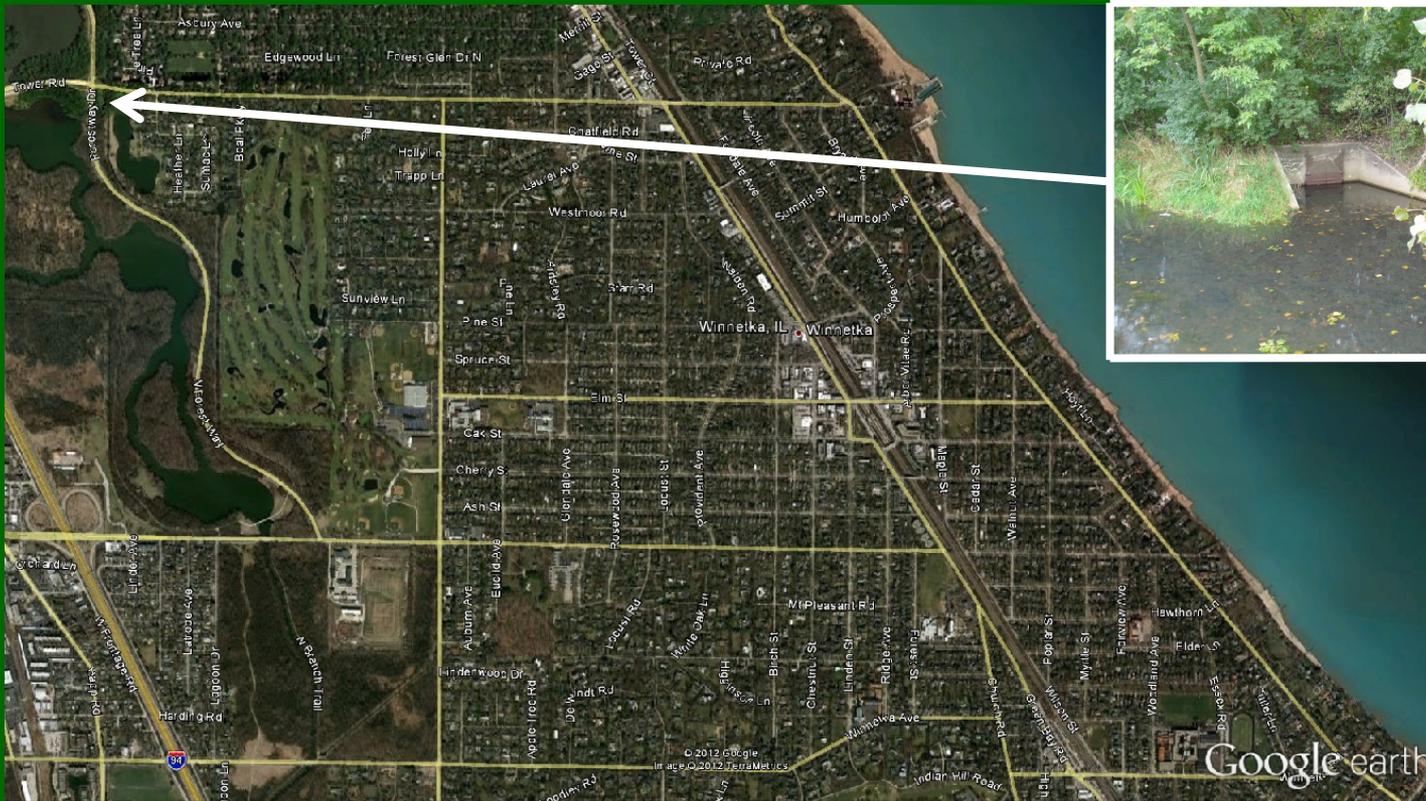


Water Quality Sampling

- 5 Sampling Points
- Wet and Dry Weather
- September-April
- Wide Range of Parameters



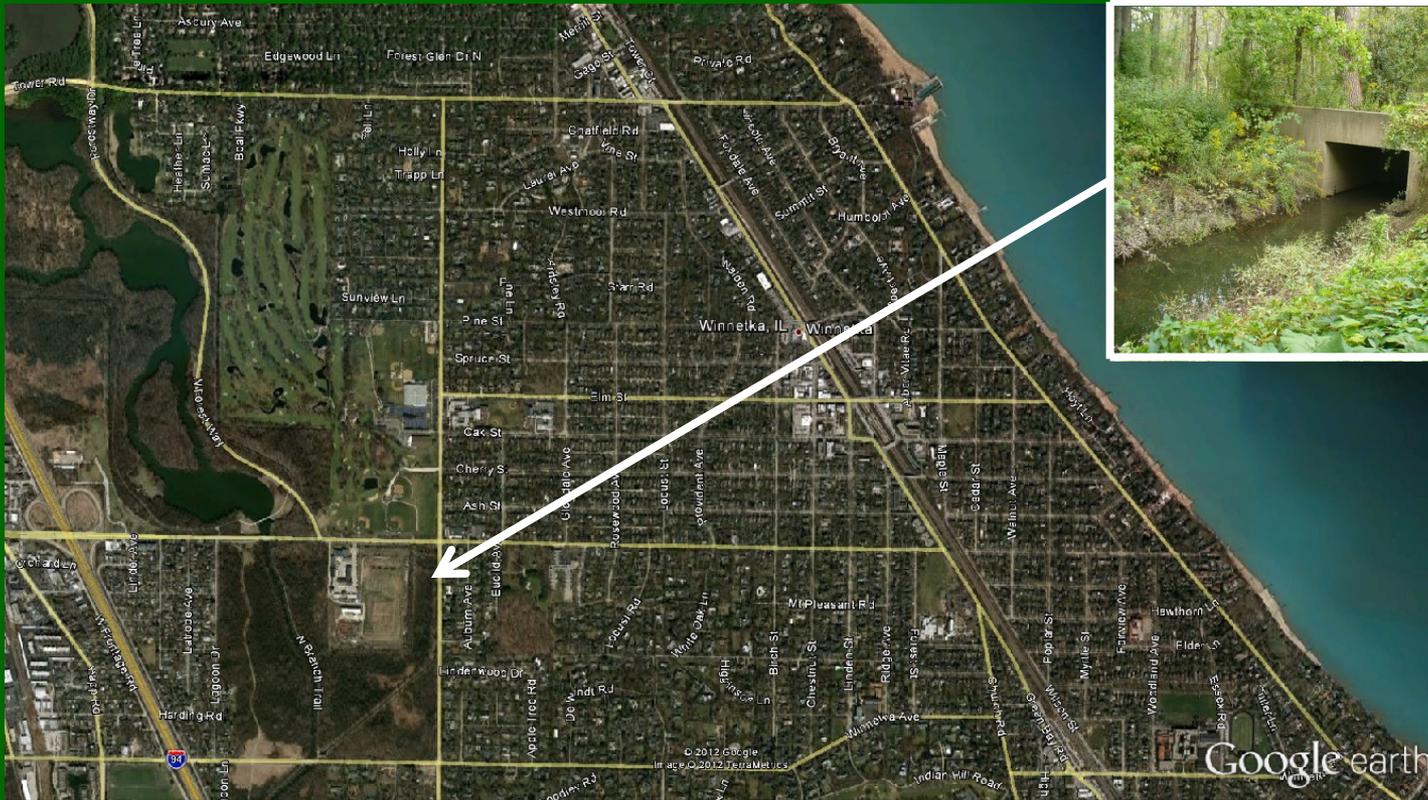
Water Quality Sampling



Location 1 – Tower Road and Forestway Drive



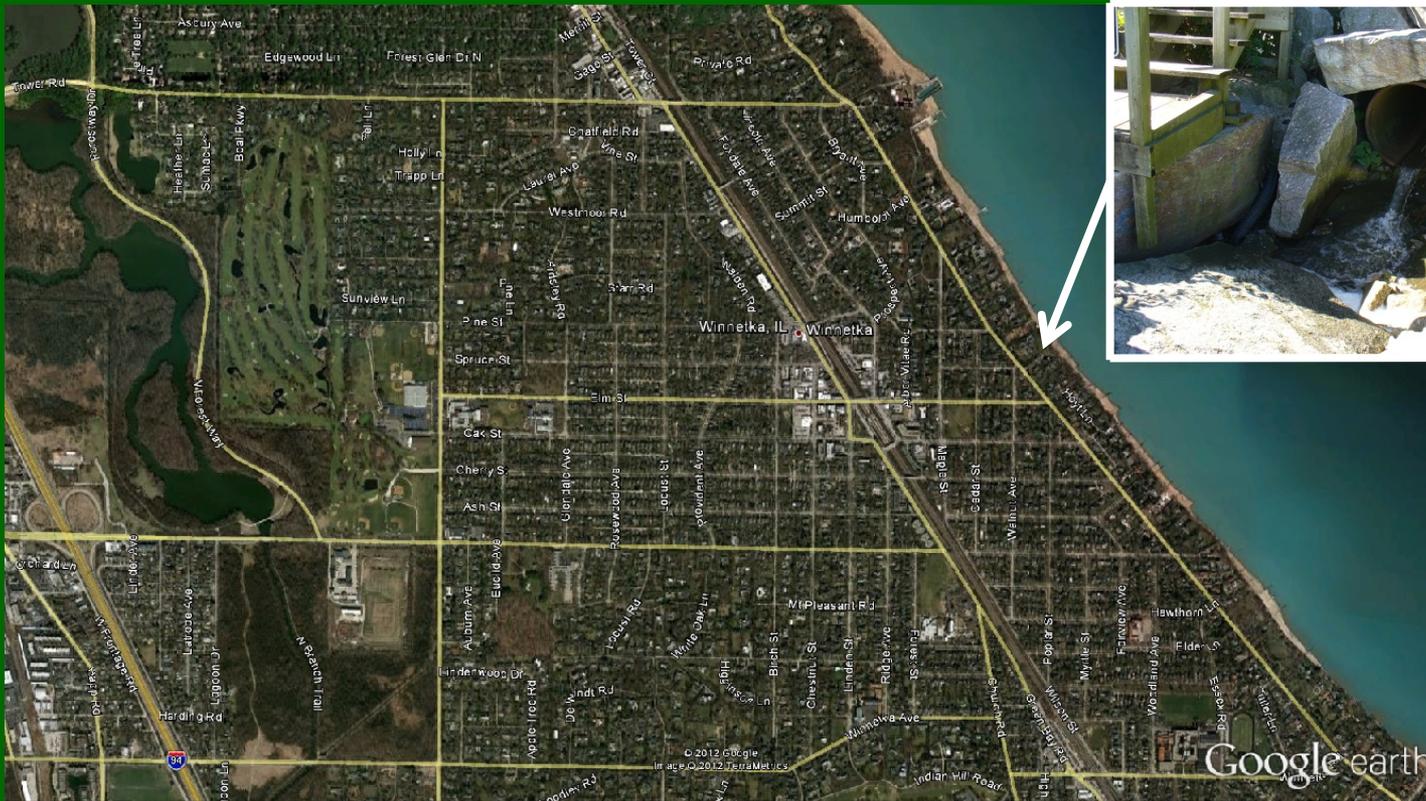
Water Quality Sampling



Location 2 – Willow Road and Hibbard Road



Water Quality Sampling



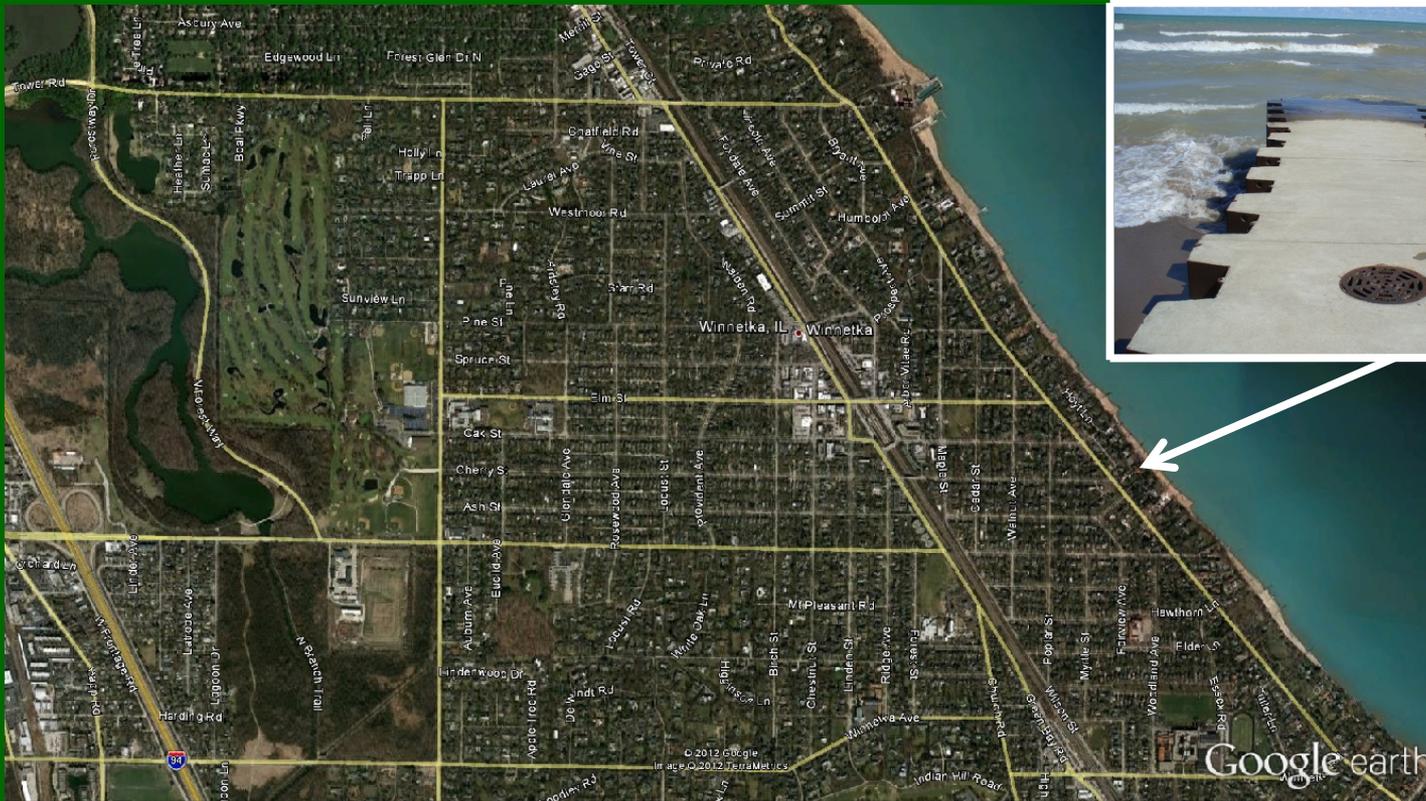
Location 3 – Spruce Street and Lake Michigan



WINNETKA STORMWATER MASTER PLAN



Water Quality Sampling



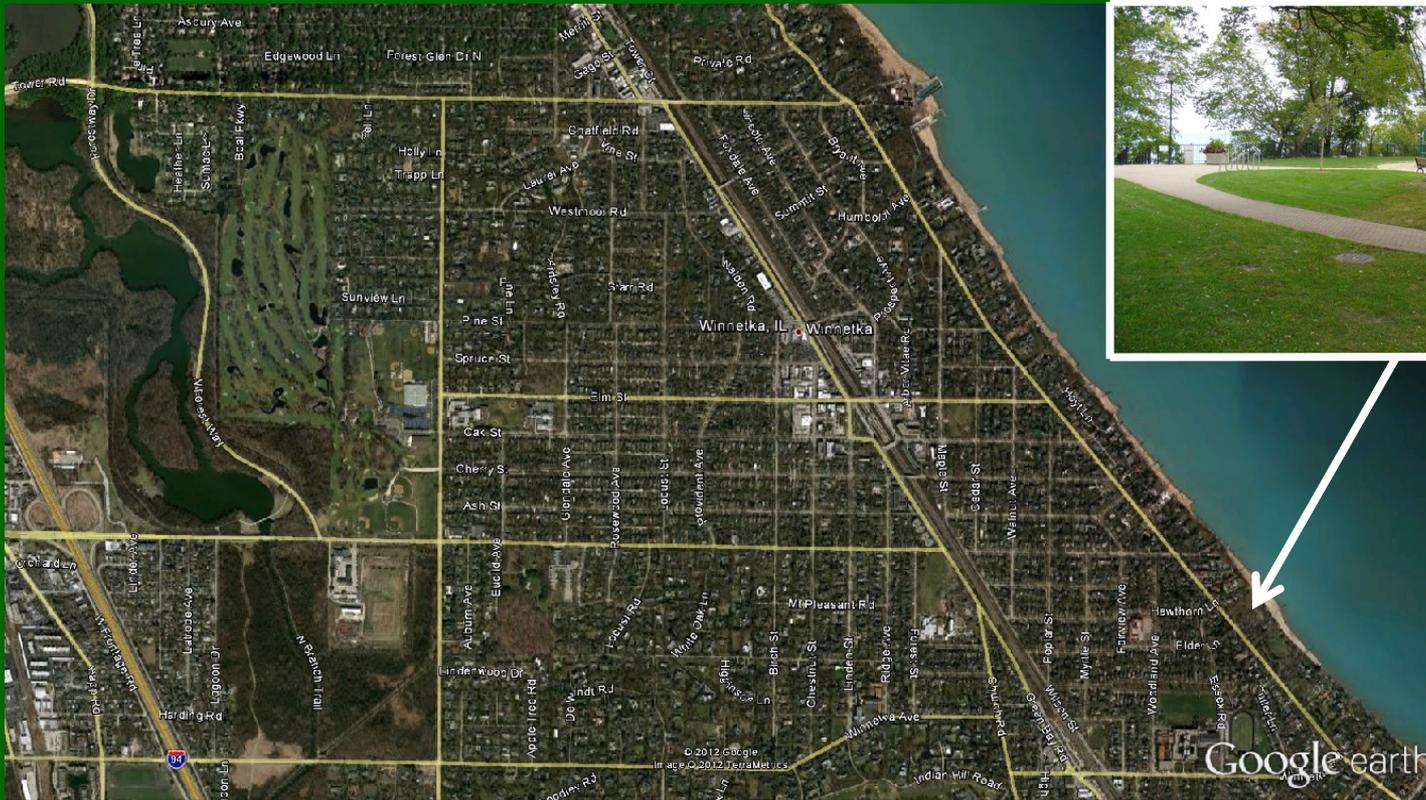
Location 4 – Cherry Street and Lake Michigan



WINNETKA STORMWATER MASTER PLAN



Water Quality Sampling



Location 5 – Elder Lane and Lake Michigan



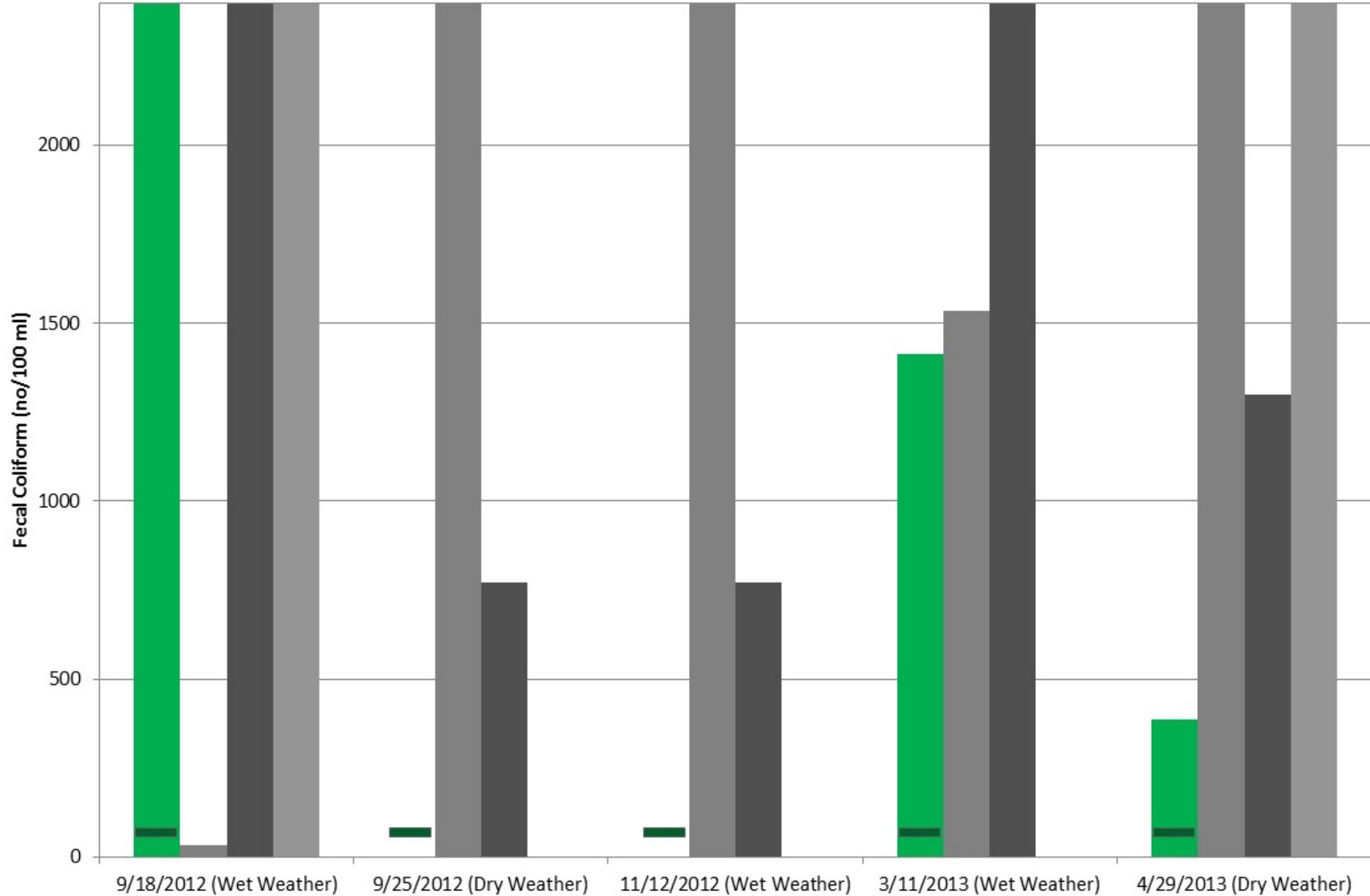
Water Quality Sampling

- Results Show Elevated Levels of:
 - Fecal Coliform
 - Nutrients (Nitrogen and Phosphorus)
 - Total Dissolved Solids
 - Total Suspended Solids
- Typical for Urban Stormwater Runoff



Fecal Coliform vs. Time

■ 2 ■ 3 ■ 4 ■ 5



Stormwater Master Plan

Village of Winnetka Stormwater Master Plan		Implementation Plan																								
		2013				2014				2015				2016				2017				2018				2019
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	and Beyond			
Water Quality																										
1	Continue to implement current NPDES Phase II program																									
2	Incorporate a stormwater pollution prevention webpage into the redesign of the Village's website																									
3	Develop a Stormwater Pollution Prevention Plan for the Public Works Facility and Village parks																									
4	Incorporate stormwater pollution prevention training into Public Works employee training																									
5	Implement a water quality monitoring program																									
6	Participate in the TMDL development process for the Lake Michigan and Skokie River watersheds																									



Stormwater Master Plan

- **Goal 5/Section 7:** The Village will encourage the use of stormwater best management practices to reduce runoff volumes and improve the quality of stormwater runoff.



Stormwater Master Plan

Village of Winnetka Stormwater Master Plan		Implementation Plan																					
		13	2014				2015				2016				2017				2018				2019
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	and Beyond
Stormwater BMPs																							
1	Implement an award or recognition program for BMPs installed on private property																						
2	Participate with the MWRDGC to distribute rain barrels to interested residents																						
3	Implement a formal process to incorporate stormwater BMPs in public improvements																						
4	Implement a stormwater fee credit program and a stormwater incentive program																						



Stormwater Master Plan

- **Goal 6/Section 8:** The Village will establish development regulations which are state of the art with regard to stormwater management.



Stormwater Master Plan

- **Goal 7/Section 9:** The Village will effectively maintain the storm and sanitary sewer systems to promote optimum performance.



Stormwater Master Plan

Village of Winnetka Stormwater Master Plan		Implementation Plan																					
		13	2014				2015				2016				2017				2018				2019
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	and Beyond
Operations and Maintenance																							
1	Clean and maintain 1/7 of the sanitary sewer system																						
2	Clean and maintain 1/7 of the storm sewer system																						
3	Inventory stormwater BMPs and develop a plan for regular BMP maintenance																						



Next Steps

- Refine Goals, Objectives, and Recommendations
- Open Houses (October-November)
 - Floodplain Management
 - Water Quality/Stormwater BMPs
 - Inflow and Infiltration
- Development Regulations Study Session



Next Steps

- Refine Goals, Objectives, and Recommendations
- Adopt Stormwater Master Plan (December)



Policy Direction

- Move forward with recommendation to conduct building-to-building canvassing?
- Move forward with recommendation for a cost-sharing program to disconnect sump pumps and foundation drains from sanitary sewer?



Policy Direction

- Move forward with recommendation to implement an award or recognition program for BMPs and a distribution program for rain barrels?
- Move forward with recommendation to implement a stormwater fee credit program and a stormwater incentive program (if a stormwater utility is adopted)?



Policy Direction

- Move forward with Open Houses?





Questions?



WINNETKA STORMWATER MASTER PLAN



Project Website

Winnetka Stormwater Master Plan

[HOME](#) [PROJECT OVERVIEW](#) [RESIDENTIAL FLOOD MITIGATION](#) [FREQUENTLY ASKED QUESTIONS](#) [CONTACT US](#)

 **WINNETKA STORMWATER MASTER PLAN**

Since 1994 the Village has completed a number of stormwater capacity Improvements. While these Improvements have provided much needed relief to flood prone areas, several recent extreme wet weather events have highlighted the need for additional Improvement. In response, the Village is developing a Stormwater Master Plan. This Plan will provide a comprehensive policy to guide the Village's efforts in flood management, stormwater drainage, stormwater quality, green Infrastructure, and wastewater over the next five to ten years.

Schedule
View the Stormwater Master Plan Schedule and a Public Information Calendar.
[SCHEDULE](#)

Videos
View meetings, informational videos, and powerpoints on the Stormwater Master Plan.
[VIEW OUR VIDEOS](#)

Photos
Visit our Photo Gallery to view Photos.
[VIEW OUR PHOTOS](#)

www.winnetkastormwaterplan.com



WINNETKA STORMWATER MASTER PLAN



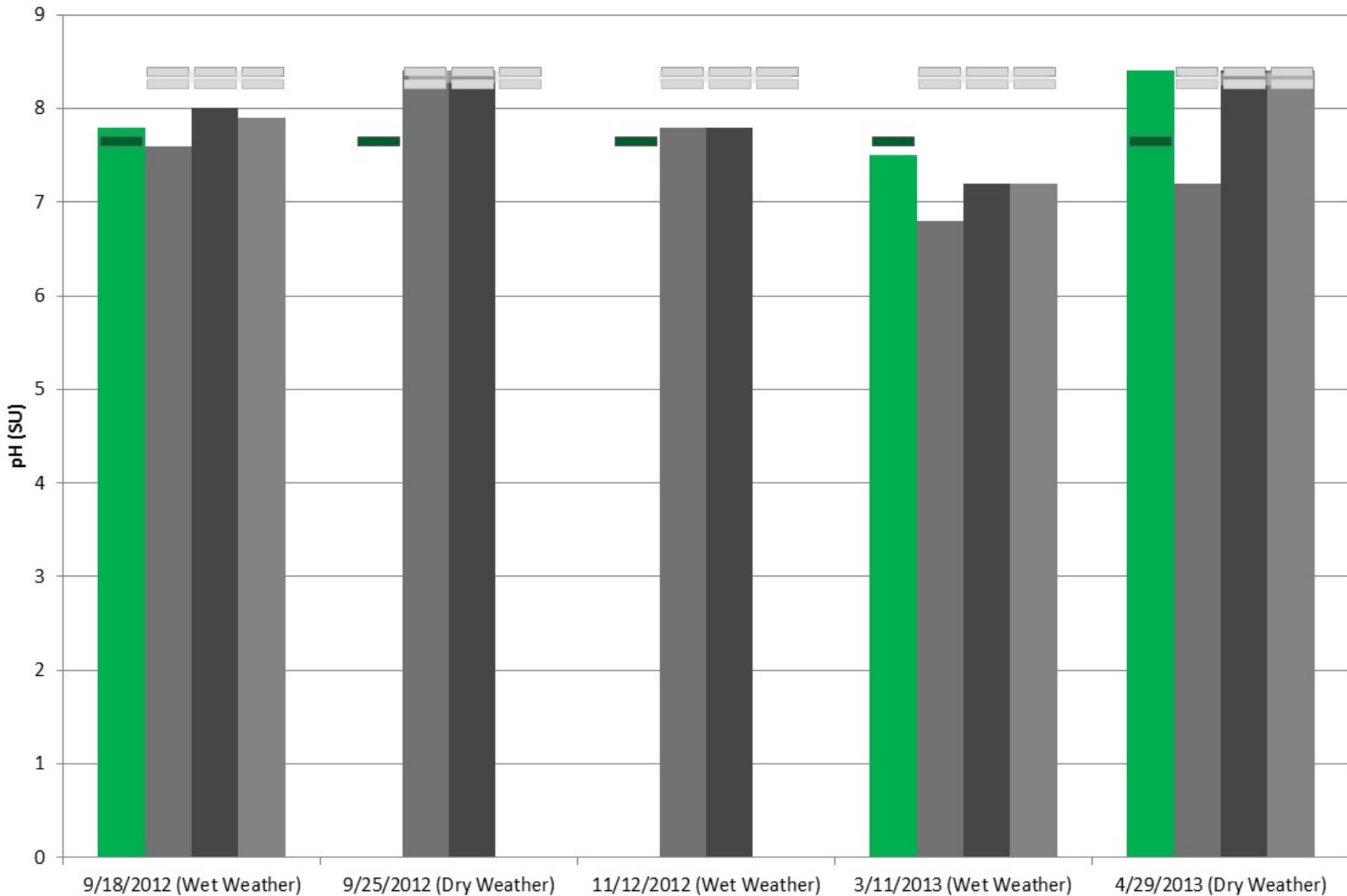
Private versus Public I/I Removal Comparison

<u>Public (Infiltration Removal)</u>		<u>Private (Inflow Removal)</u>	
COST		COST	
40,000	feet of public sewer main	30	Sump Pumps or Foundation Drain Connections
<u>\$40</u>	<u>per foot for sewer sealing and lining</u>	\$12,500	Average Cost for each Removal/Connect to Storm
\$1,600,000	main line sewer rehab cost	\$150,000	Public Contribution (\$5k max or 50/50)
		\$225,000	Private Contribution (remainder)
100	manholes		
<u>\$2,000</u>	<u>per manhole for sealing and lining</u>		
\$200,000	manhole rehab cost		
\$2,000,000	Total Project Cost (including eng & cont)	\$150,000	Total Project Cost (Village Contribution)
FLOW REDUCTION		FLOW REDUCTION	
6	gallons per minute (gpm) removed / sewer sections	35	gallons per minute (gpm) removed / home
100	sewer sections	30	homes
5	gallons per minute (gpm) removed / manhole	1050	Total gpm removed from public sewer system
100	manholes		
1100	Total gpm removed from public sewer system		



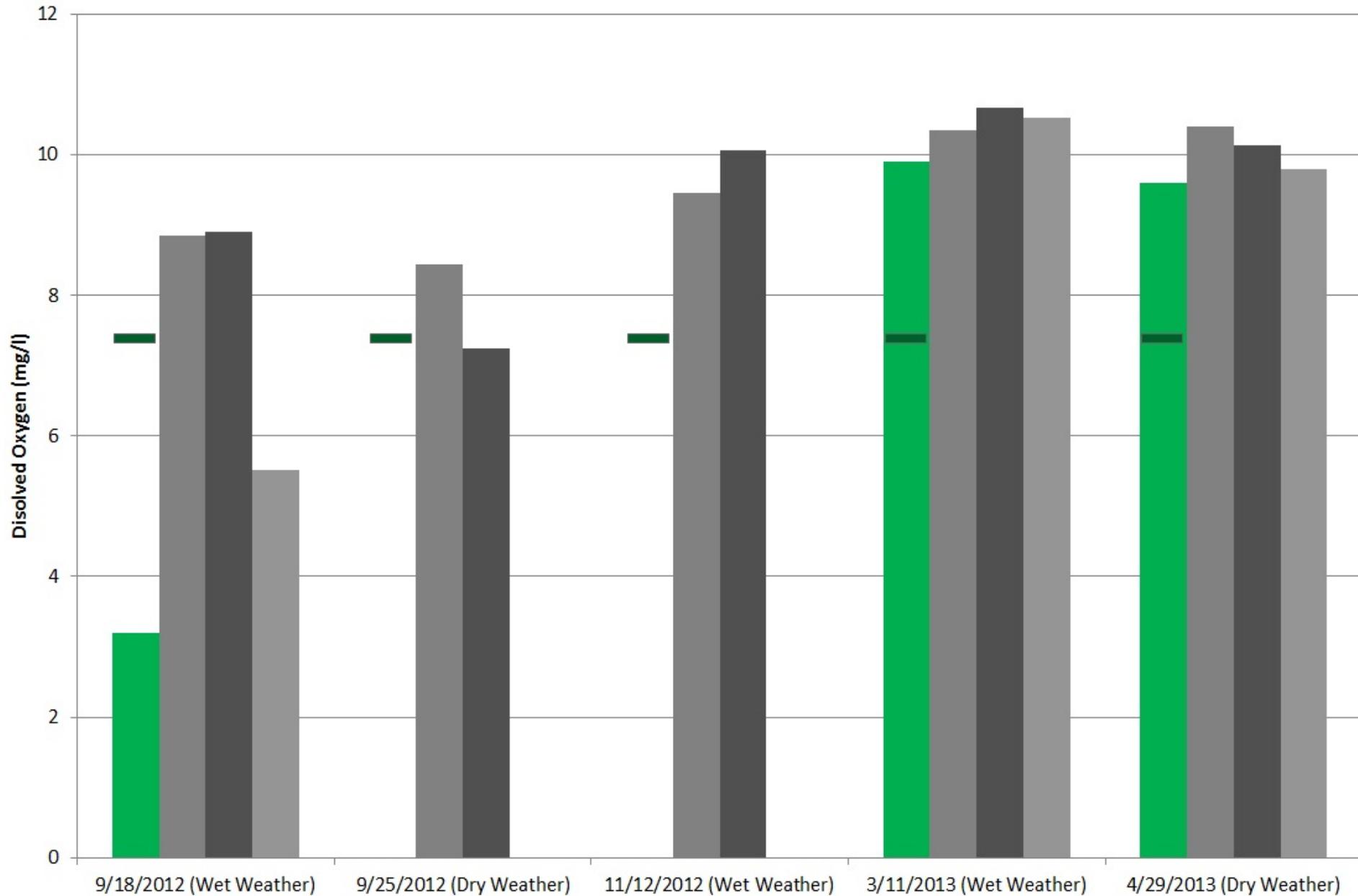
pH vs. Time

■ 2 ■ 3 ■ 4 ■ 5



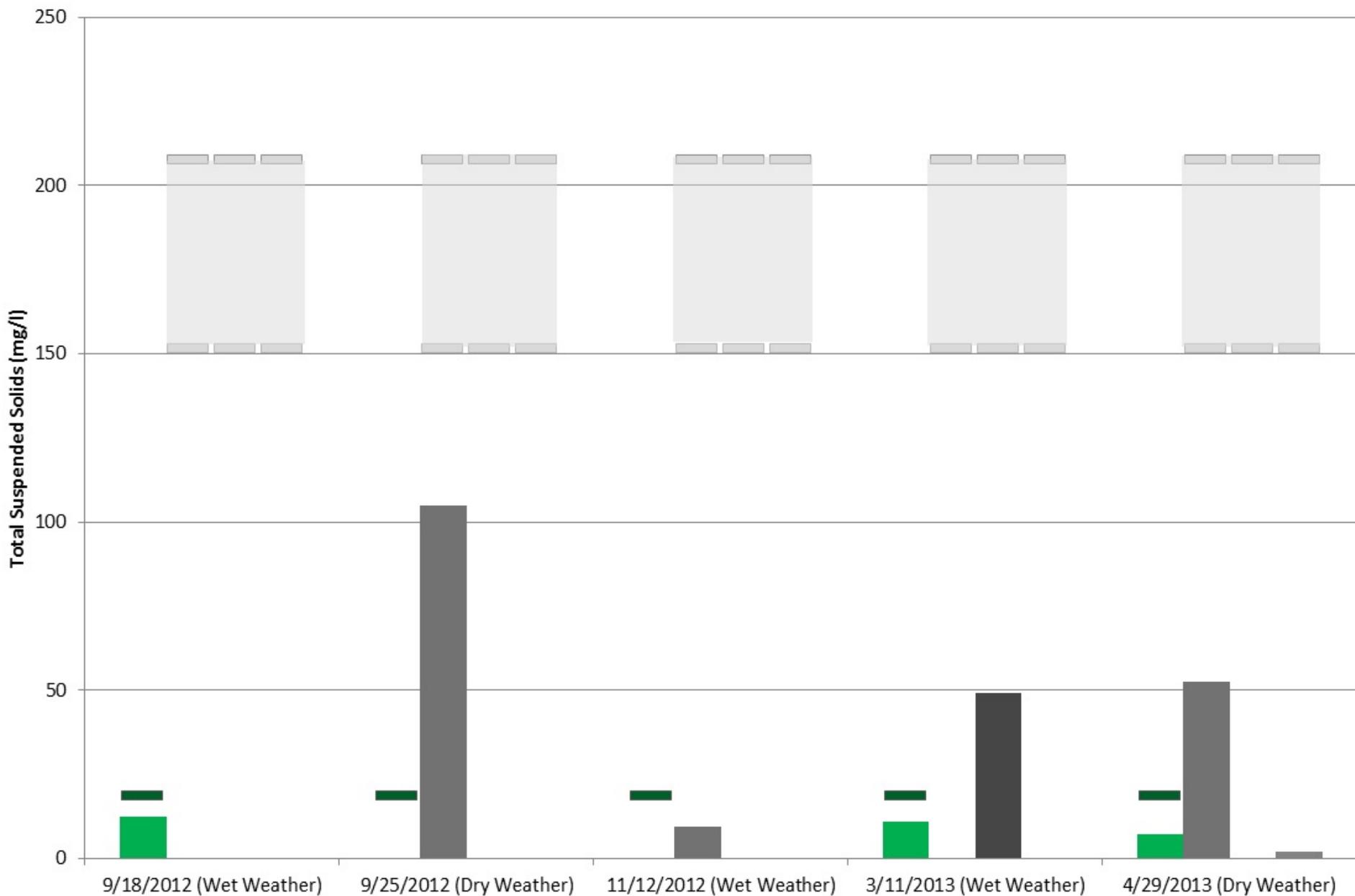
Dissolved Oxygen vs. Time

■ 2 ■ 3 ■ 4 ■ 5



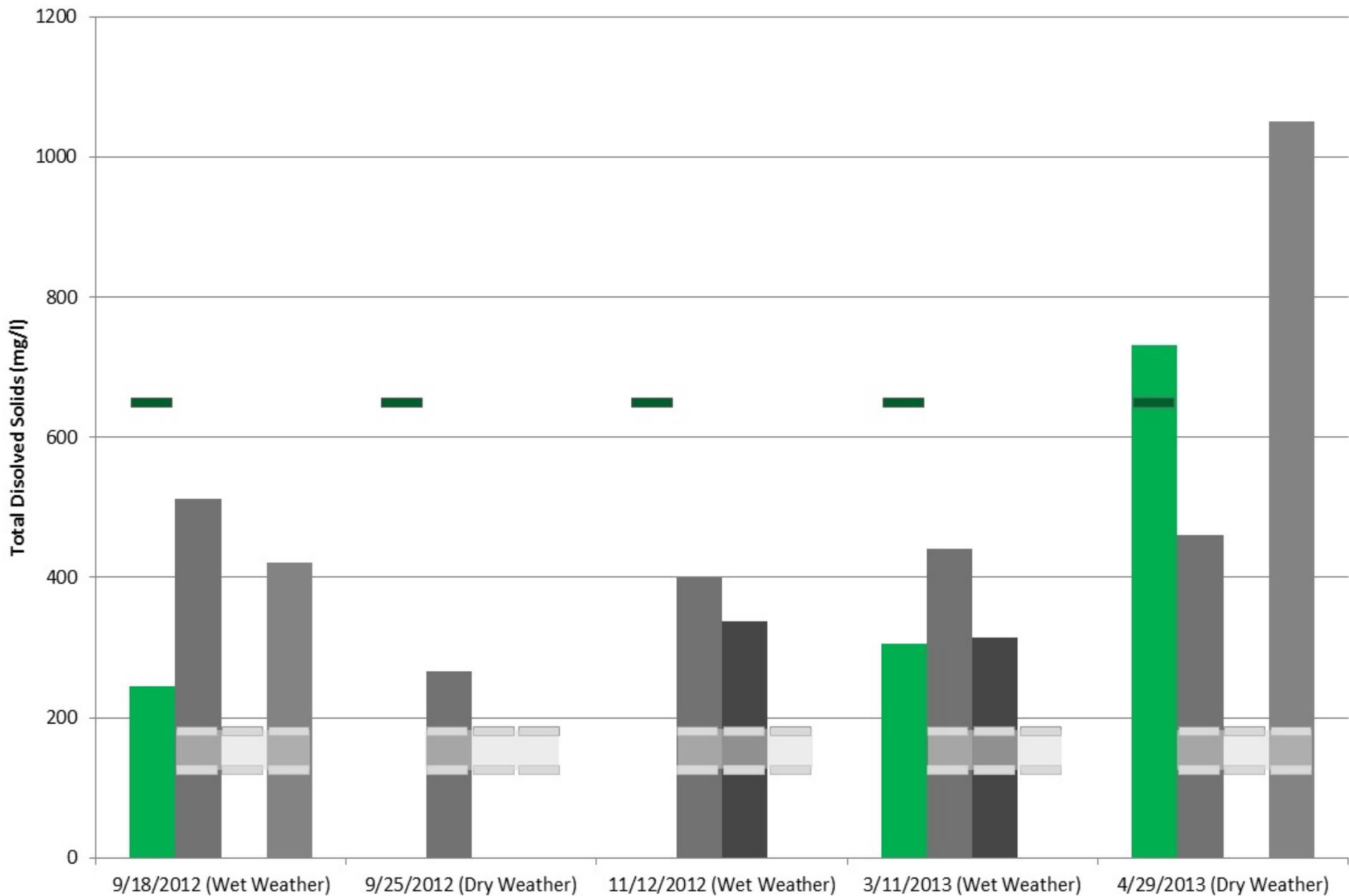
Total Suspended Solids vs. Time

■ 2 ■ 3 ■ 4 ■ 5



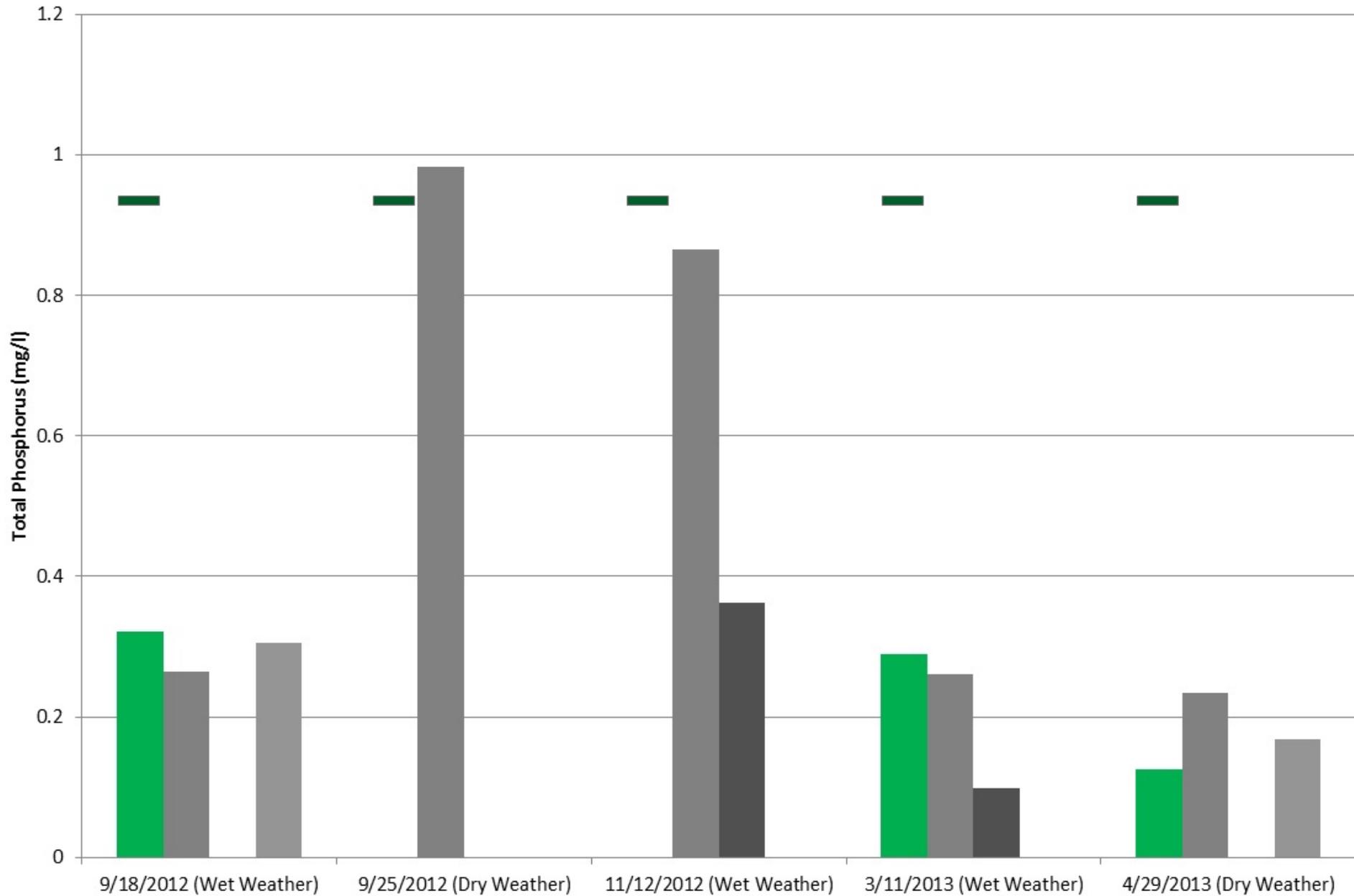
Total Dissolved Solids vs. Time

■ 2 ■ 3 ■ 4 ■ 5



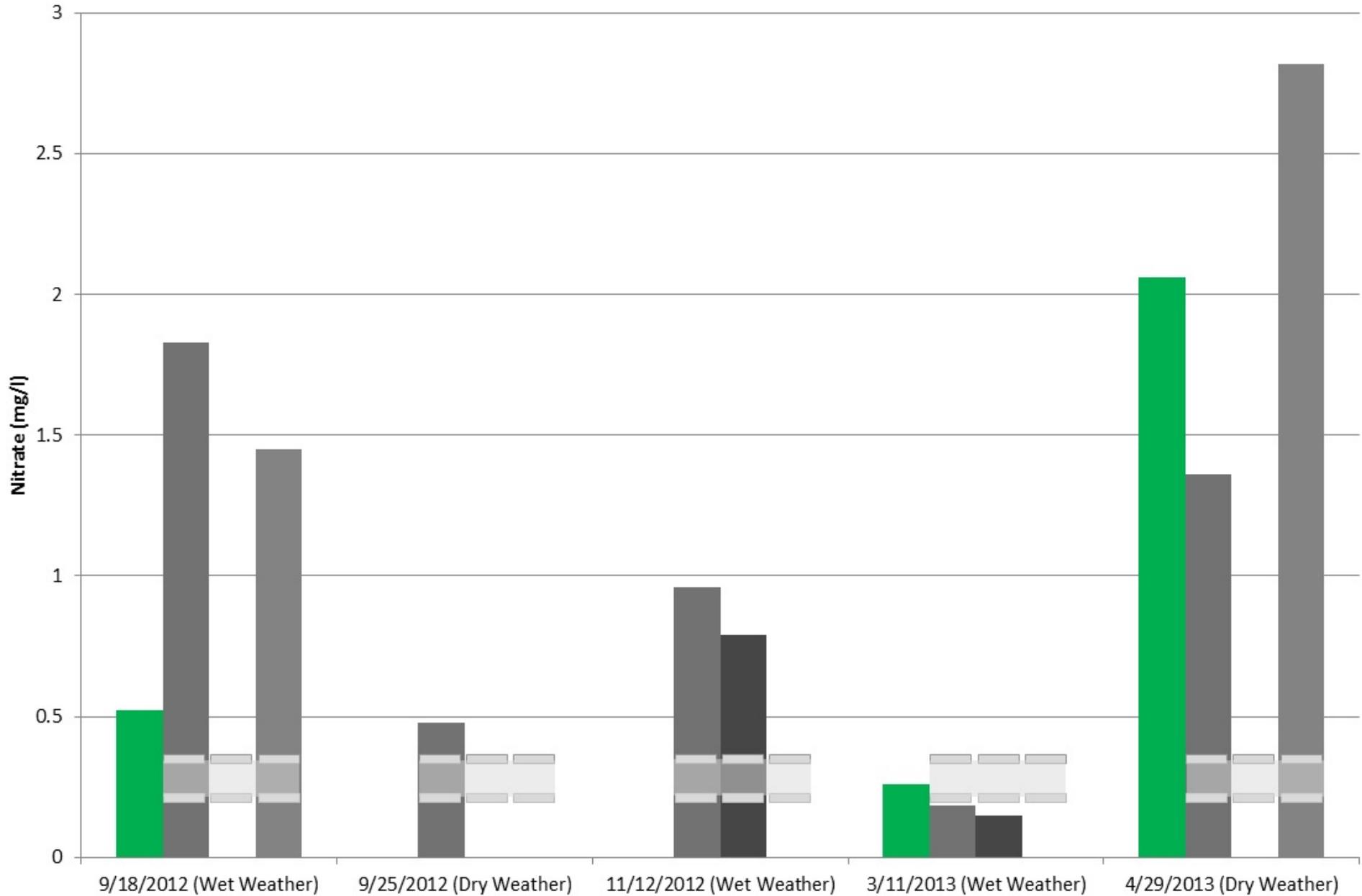
Total Phosphorus vs. Time

■ 2 ■ 3 ■ 4 ■ 5



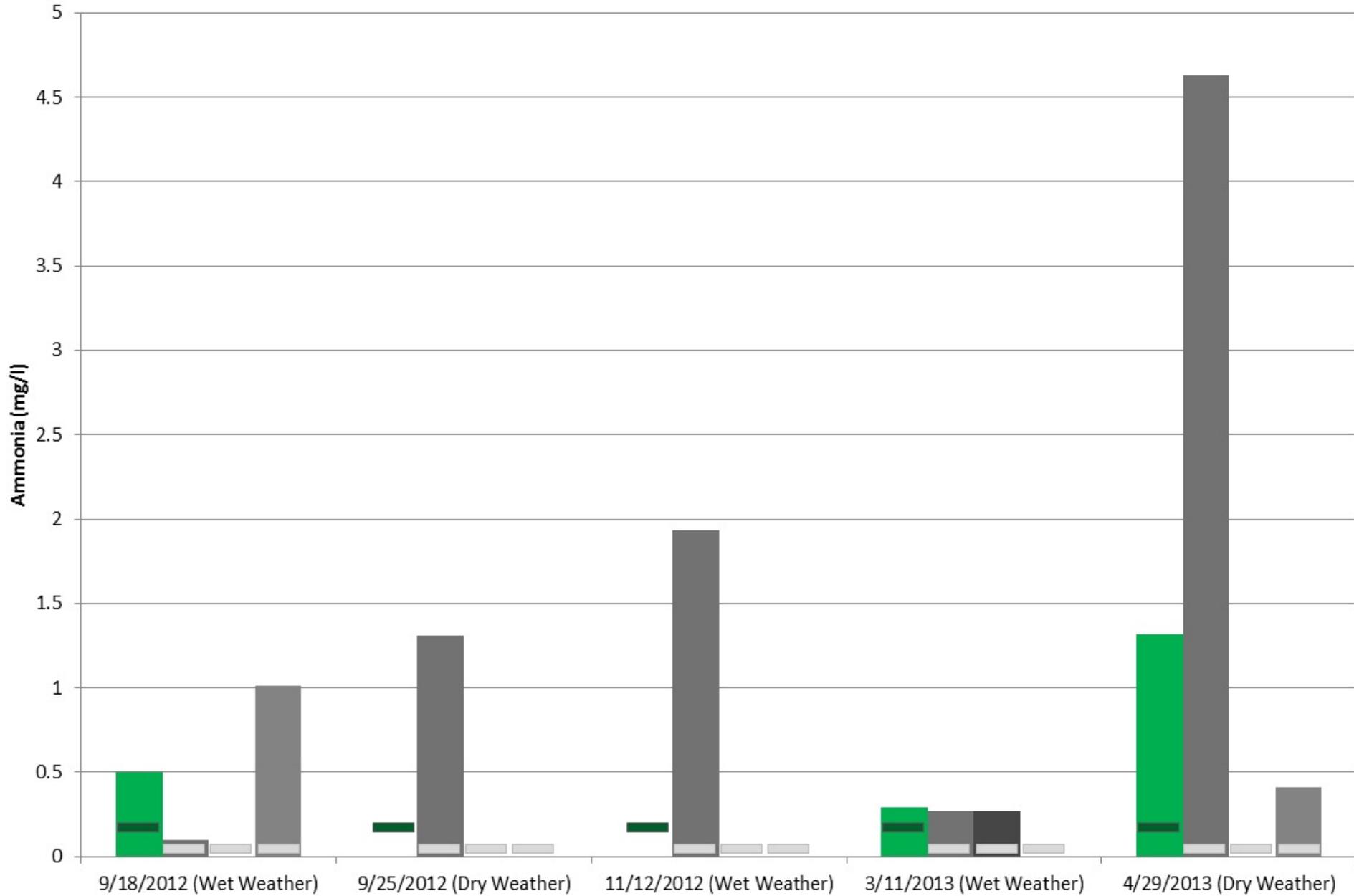
Nitrate vs. Time

■ 2 ■ 3 ■ 4 ■ 5



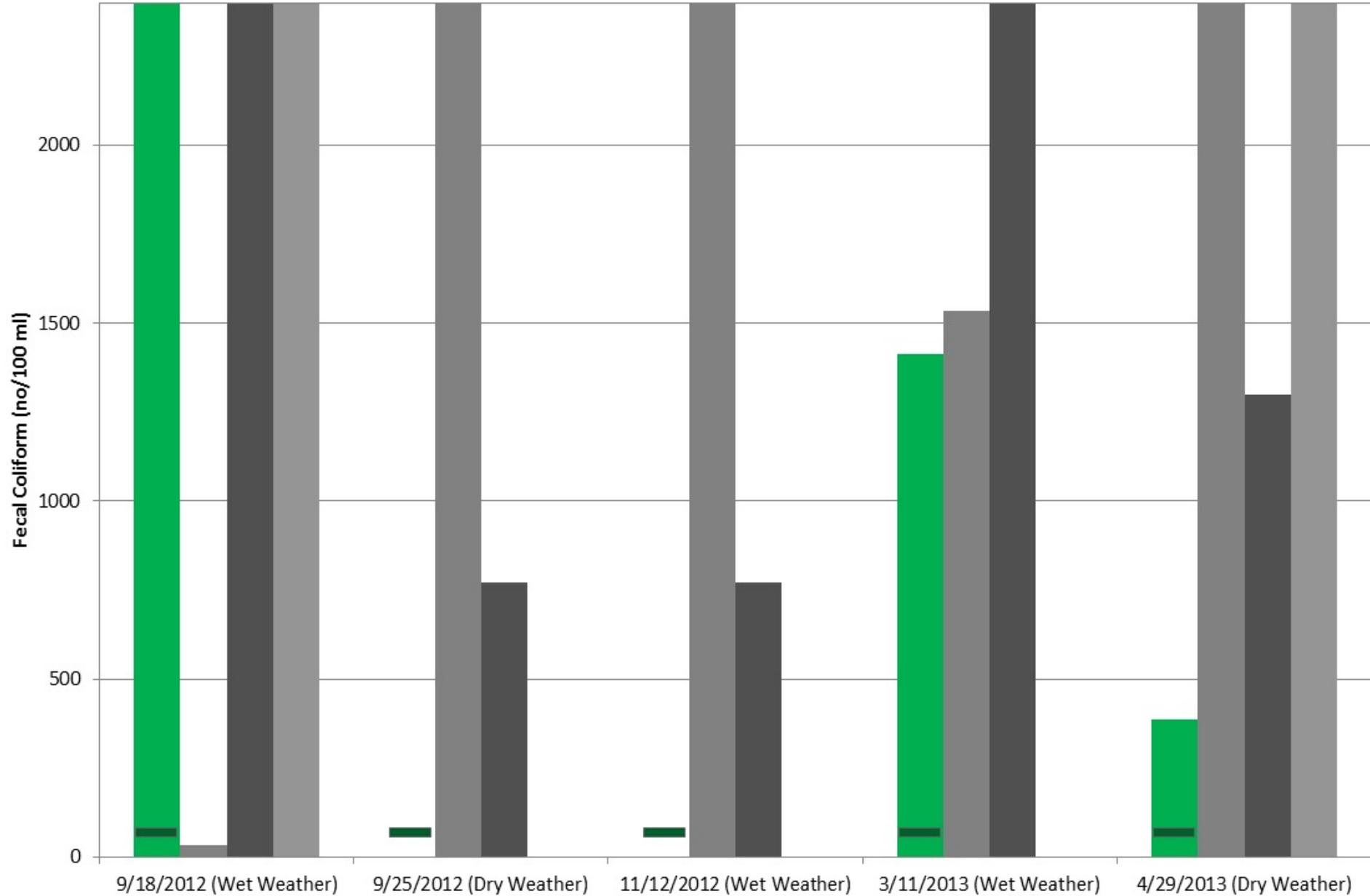
Ammonia vs. Time

■ 2 ■ 3 ■ 4 ■ 5



Fecal Coliform vs. Time

■ 2 ■ 3 ■ 4 ■ 5





The Village of Winnetka's Development Policies and Regulations

Stormwater Management Regulations

1. Runoff Requirements
2. Floodplain Requirements
3. Natural Area Requirements
4. Construction Site Requirements



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Village Regulations

1. Enforce Countywide regulations and Village regulations



Village Regulations

1. Enforce Countywide regulations and Village regulations
2. Enforce Countywide regulations



Village Regulations

1. Enforce Countywide regulations and Village regulations
2. Enforce Countywide regulations
3. Enforce Countywide regulations with updated Village regulations



Comparison of Ordinances

Scope of Regulations

1. Size of regulated development
2. Exempted projects
3. Permit term
4. Submittal requirements



Comparison of Ordinances

Currency of Regulations

1. Long-term maintenance of infrastructure
2. Water quality and volume reduction
3. Flood protection elevation
4. Wetlands and riparian areas



Comparison of Ordinances

Administration of Regulations

1. MWRD issued permits
2. MWRD audit
3. Variances



Recommendations

In Some Cases...

1. Maintain existing Village regulations



Recommendations

In Some Cases...

1. Maintain existing Village regulations
2. Match new Cook County Watershed Management Ordinance (WMO) regulations



Recommendations

In Some Cases...

1. Maintain existing Village regulations
2. Match new Cook County Watershed Management Ordinance (WMO) regulations
3. Do both





Stormwater Master Plan

Mark Phipps, P.E., CFM, CPESC
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