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Strand Associates, Inc.®

Forest Preserve Mitigation Provides Backbone for Major Flood Mitigation Project

Ohio Stormwater Association Conference
May 10, 2019

Presented by: John Lyons, P.E.

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Village of Winnetka, IL

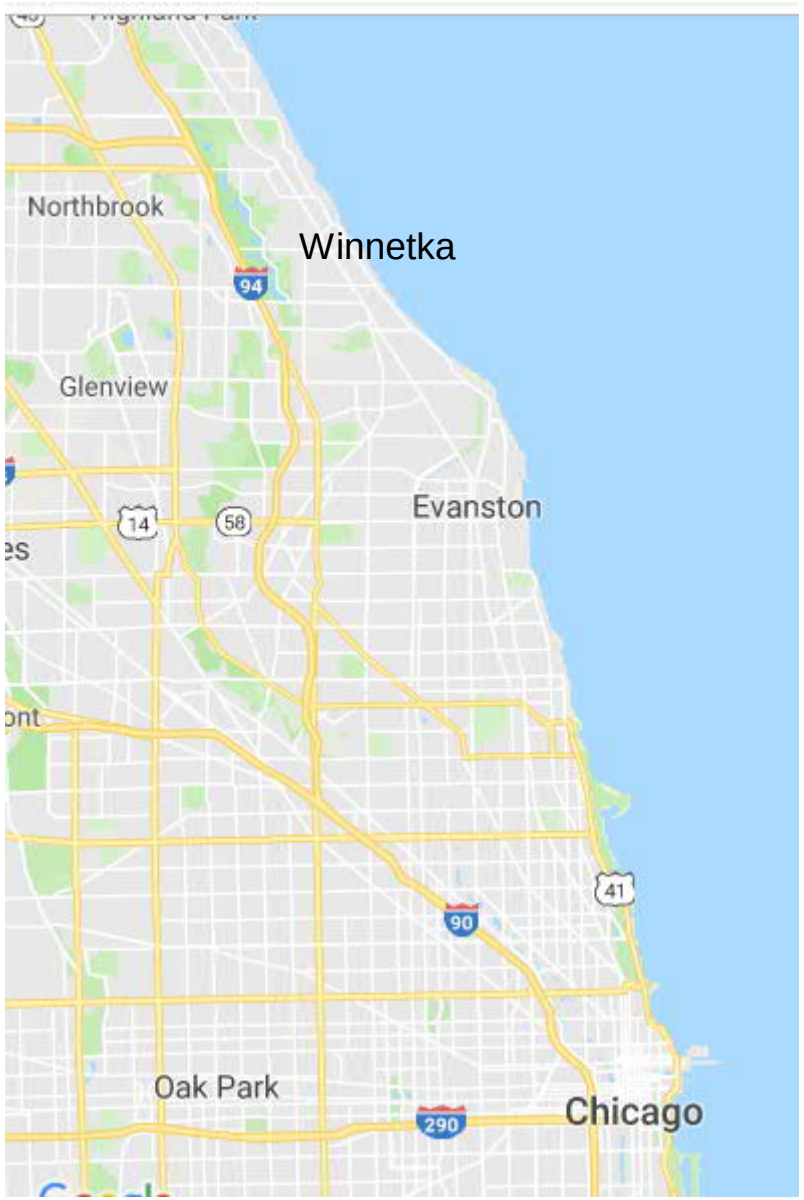

Image from Google Maps

"Winnetka is a village in Cook County, Illinois, United States, located 16 miles north of downtown Chicago. The population was 12,187 at the 2010 census. The village is one of the wealthiest places in the nation in terms of household income, and the richest in Illinois." *Wikipedia*

Winnetka, IL

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The Problem: Severe Flooding

12 block of Cherry - July 2011

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The Problem: Severe Flooding

Ash and Glendale - July 2011

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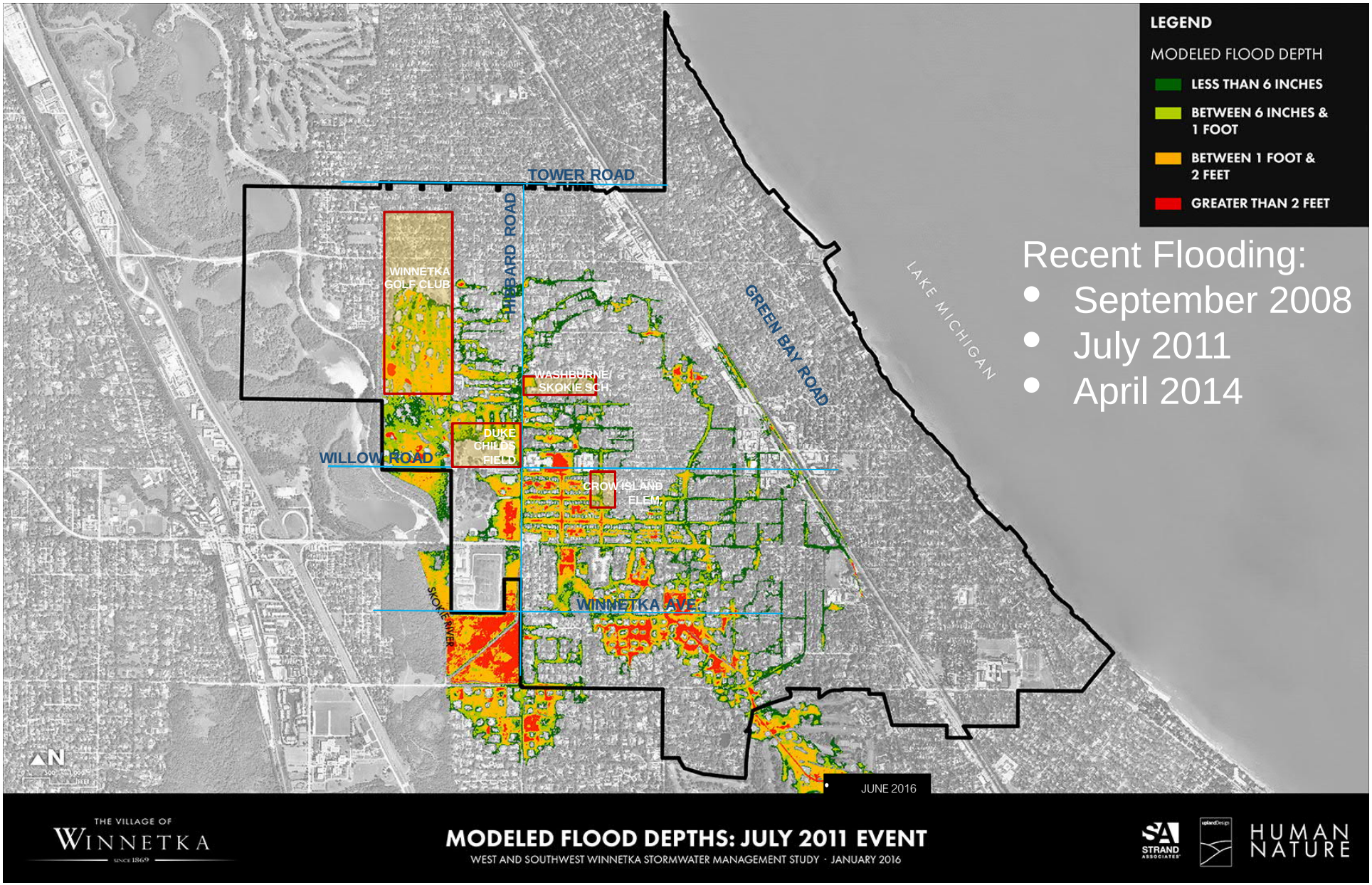
2-Dimensional Modeling of July 2011 Event



Recent Flooding:

- September 2008
- July 2011
- April 2014

Village Response

February 21st: Contract Awarded to Baird for Willow Rd. Tunnel Outfall Design

February 21st: Contract Awarded to Strand for Sanitary Sewer Evaluation

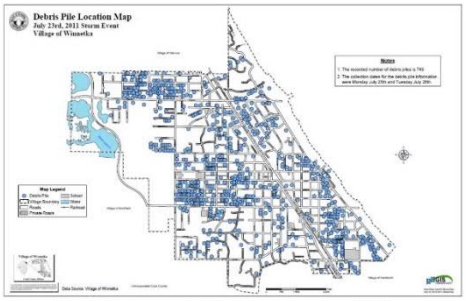
May 10th: Contract Awarded to AT Group Stormwater Manager

May 10th: Meeting with Regulators

June 12th: Contract Awarded to Baxter & Woodman for Stormwater MP

September 11th: Contract Awarded to Kenny Construction for Tunnel Project Costs

November 13th: Village Council Meet with MFSG to Develop Project Financial Plan



January 21st: Contract Awarded to MWH for Tunnel Design & Permitting

June 18th: MWH Submits Review Point #1 Summary

2011

July 22nd: Significant Storm

August 2nd: Tunnel Proposed as a Solution

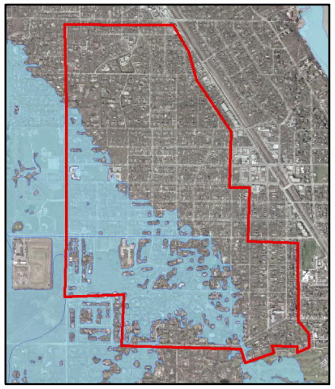
September 13th: Ammendment to Village Code - Sanitary Sewer Backflow Prevention

October 5th: Flood Risk Reduction Assessment

October 11th: Village Council Meeting - Continue Tunnel Exploration

November 15th: Contract Awarded to TSC for SUbsurface Investigation

2012



2013

March 15th: Sewer Back-Up Program Discontinued

July 31st: RFQ Published for Tunnel Project

October 23rd: RFP Published for Tunnel Project

2014

April 28th: MWH Submits Review Point #2 Summary

June 2nd: Contract Awarded to V3 Companies for Cost Evaluation and VE

June 2nd: Village Council Meeting- Proceed with Permit Applications but Not Design

2015

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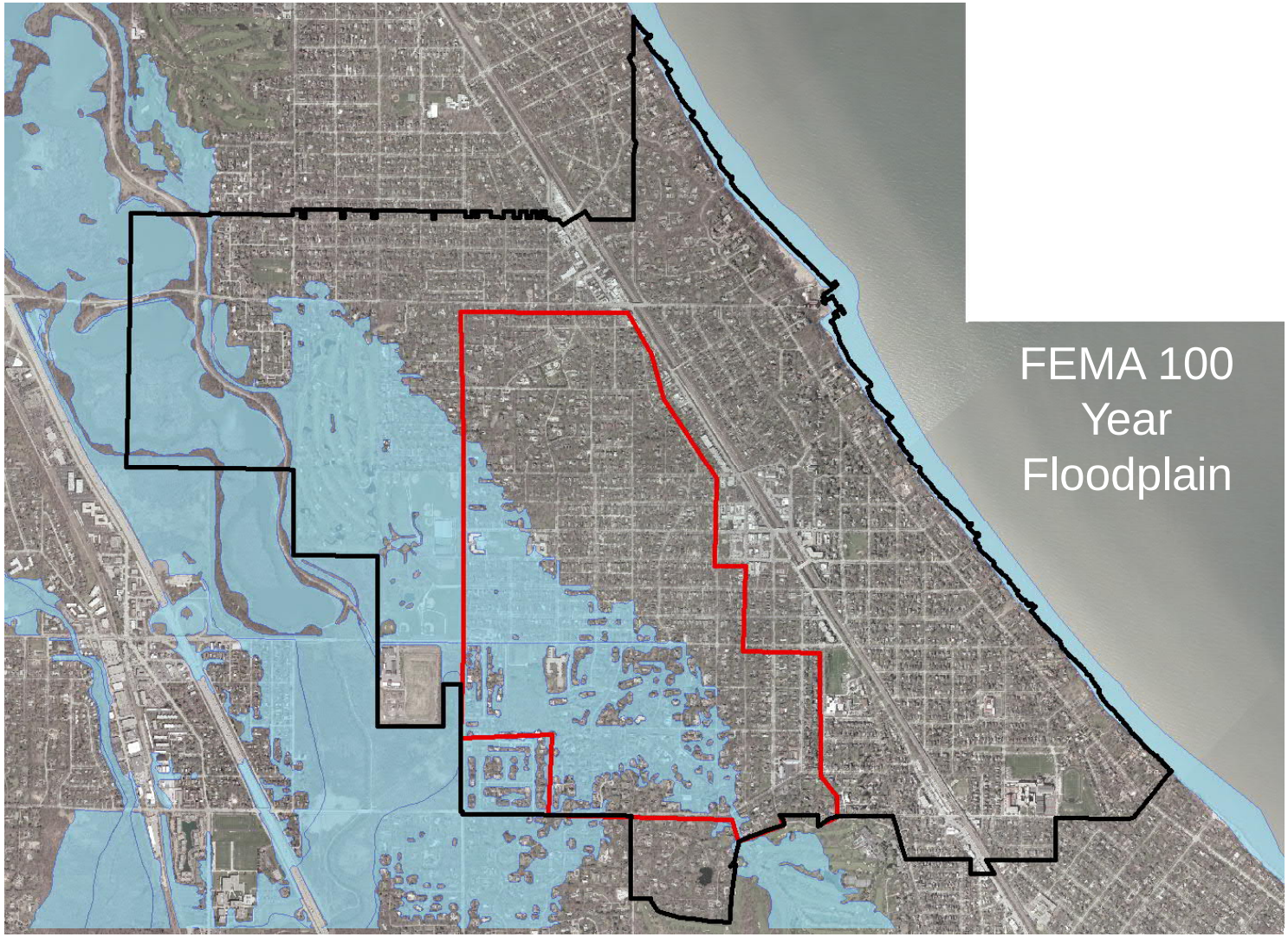
Back to the Basics



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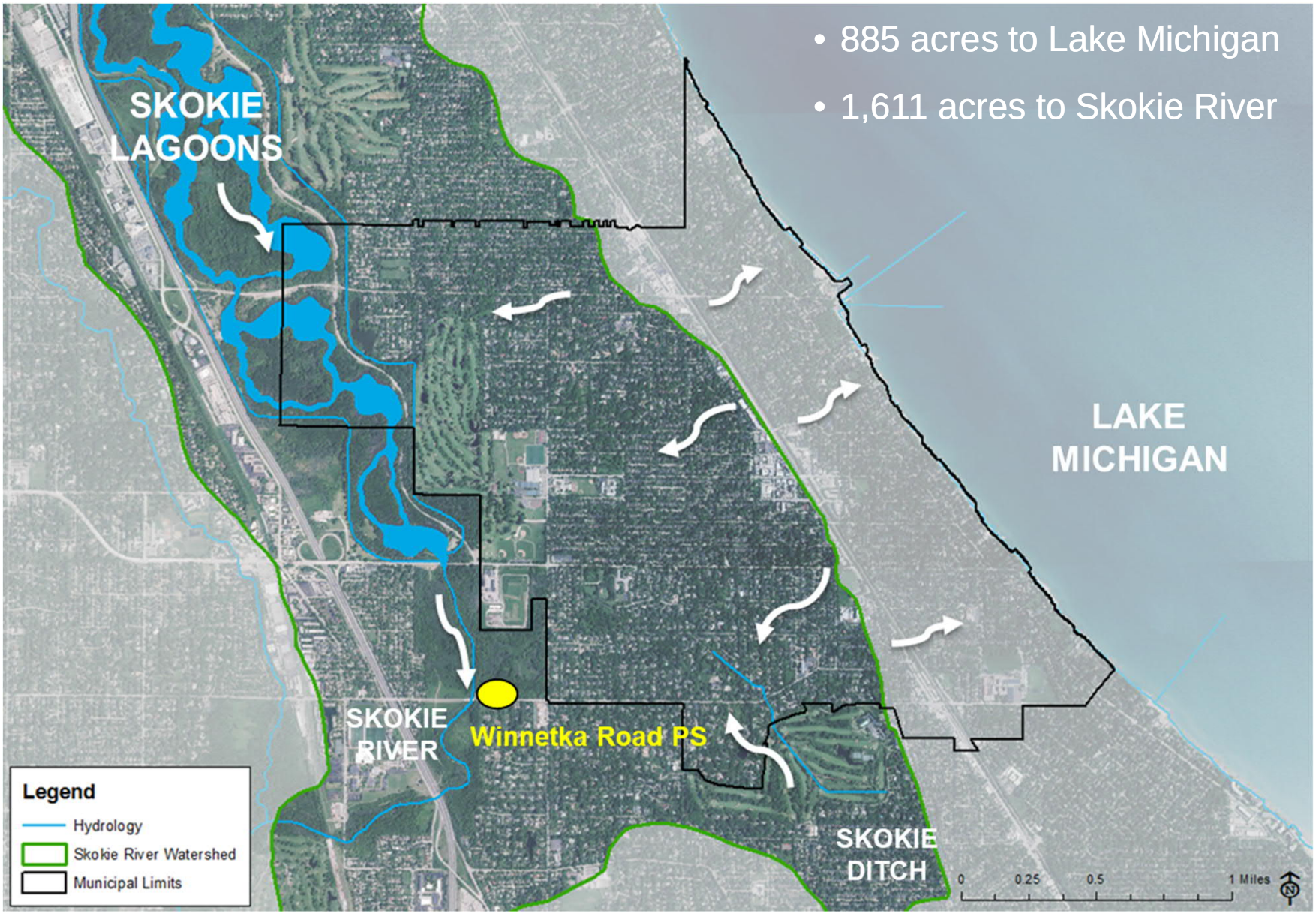
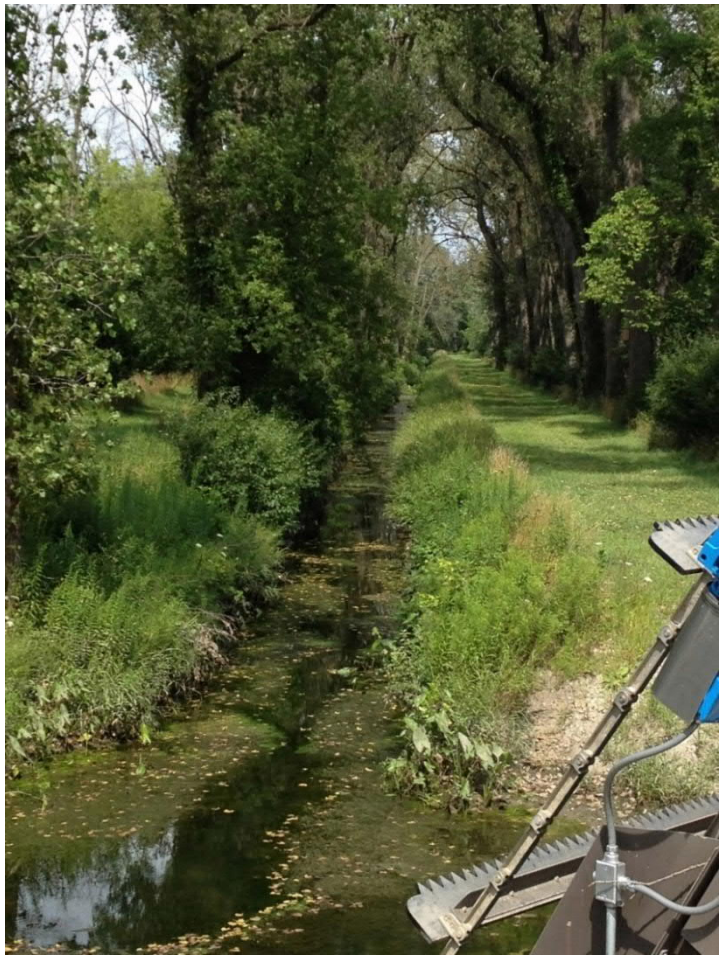
Understanding the Watershed



Understanding the Watershed



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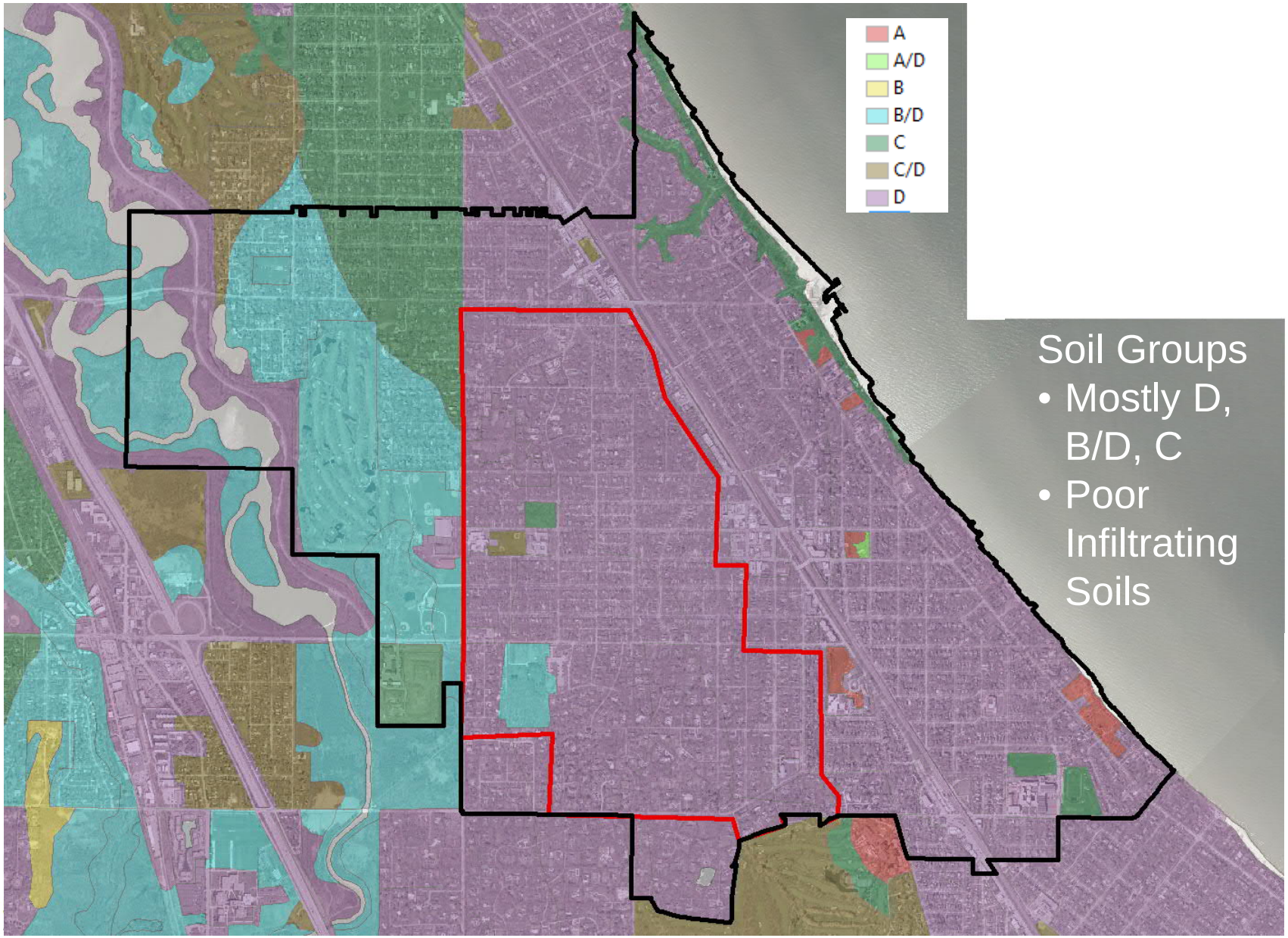
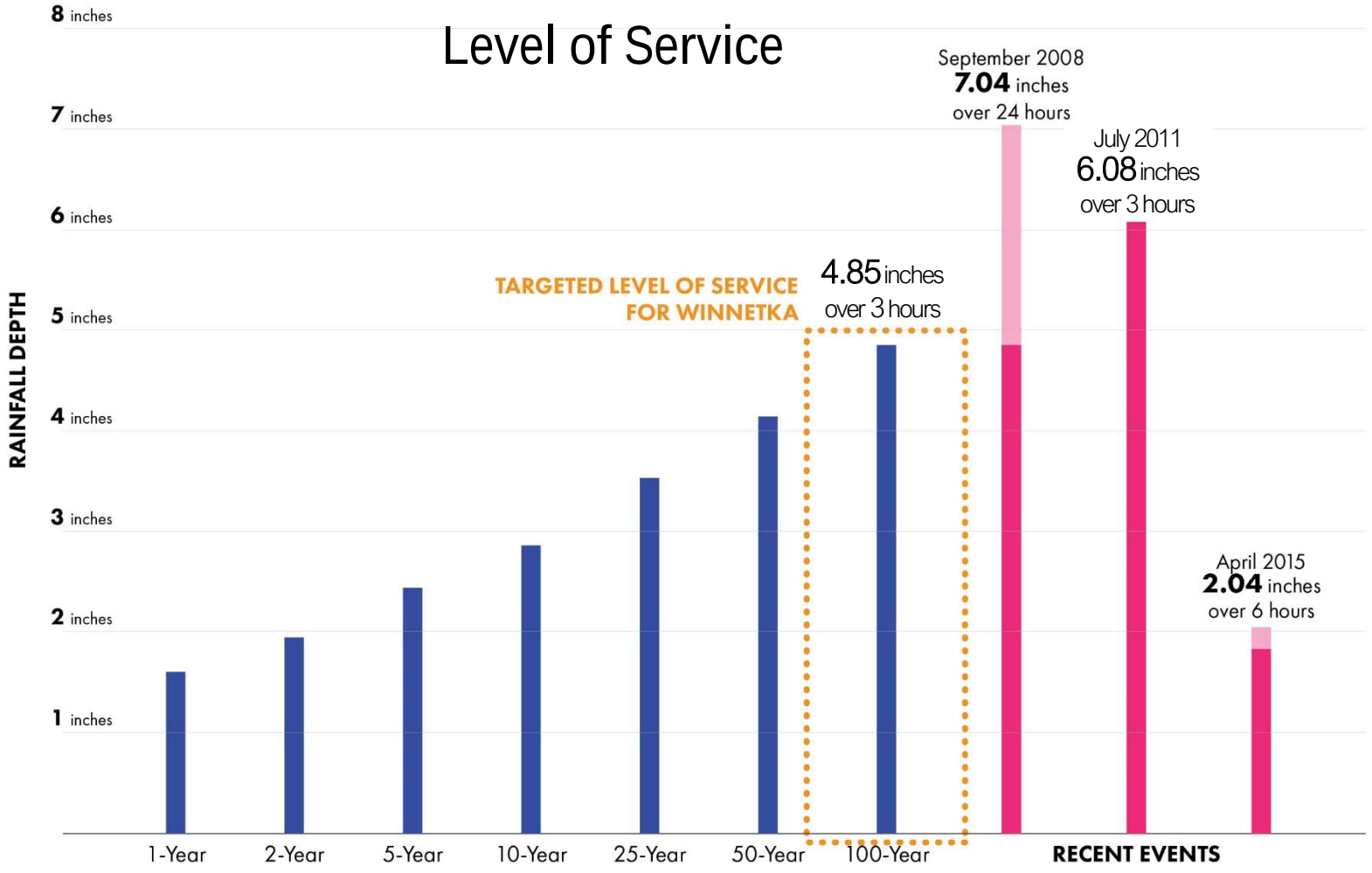
Understanding the Watershed



Establish the Target



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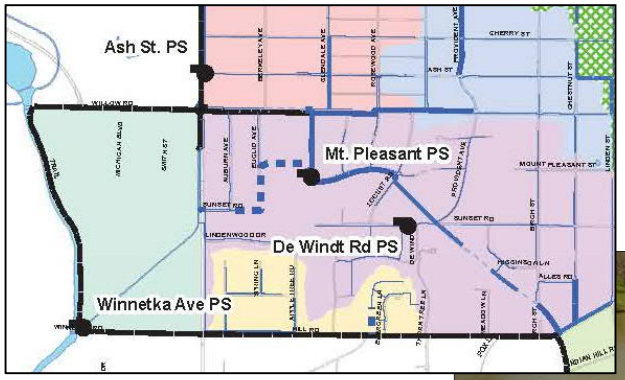
Consider the Alternatives

- Wet Detention/Retention
- Dry Detentions
- Underground Storage
- Pump/Lift Stations
- Surface/Roadway Storage
- Maximizing Existing Infrastructure
- Storm Sewer Upgrades
- Tunneling



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Compare the Options

No.	Map/ Text ID	Control Type	Opportunity	Pros	Cons	Lower Volume Range (Ac-Ft)	Higher Volume Range (Ac-Ft)	Land Acquisition	Reliance on Mechanical Facilities	Maintains Existing Drainage Patterns	Regulatory Authority Acceptance	Property Owner Acceptance	Overall Effectiveness	Relative Cost
1	1a	Private Property: Rain Barrels	Property owner participation with 2 barrels per property. Assumes 20-40% (600 to 1200 homes) participation in study area	- Opportunity for residents to participate in reducing the stormwater issues in the community - Potential to augment/reduce larger stormwater control features - Potential to create incentives by offering stormwater utility fee credits or rebates	- Due to the limited capacity of these techniques additional controls will still be required - Potential for increased cost and maintenance requirements for property owners - Barrels need to be empty prior to large storm event to achieve benefit	0.2	0.4	NA	+	+	+		+	+
2	1b	Private Property: Pervious Driveways	Property owner construction of pervious driveways. Assumes 3-8% (100 to 250 homes) participation in study area and a 1,200 SF driveway	- Opportunity for residents to participate in reducing the stormwater issues in the community - Potential to augment/reduce larger stormwater control features - Provides opportunity for water quality treatment - Potential to create incentives by offering stormwater utility fee credits or rebates	- Due to the limited capacity of these techniques and Winnetka's low permeability soils additional controls will still be required - Potential for increased cost and maintenance requirements for property owners - Limited storage volume: additional controls will still be required	2	5	NA	+	+	+			-
3	1c	Private Property: Rain Gardens	Property owner construction of rain garden on their property. Assumes 10-20% (310 to 610 homes) participation and a 500 SF rain garden	- Opportunity for residents to participate in reducing the stormwater issues in the community - Potential to augment/reduce larger stormwater control features - Provides opportunity for water quality treatment - Potential to create incentives by offering stormwater utility fee credits or rebates	- Due to the limited capacity of these techniques and Winnetka's low permeability soils additional controls will still be required - Potential for increased cost and maintenance requirements for property owners - Limited storage volume: additional controls will still be required	3	6	NA	+	+	+		+	+
4	1d	Street Curb Bump Outs	Village reconstruction of street intersections with curb bump outs. Assumes 210 SF bump out with 4 per intersection at 20-30% (50 to 70) of Village intersections	- Use of Village-owned right-of-way - Provides opportunity for water quality treatment - Opportunity to enhance aesthetics in the neighborhoods and community - Provides traffic calming benefits	- Will require disruption to road network and residents - Will require a period of "learning" for users - May require removal of parkway trees - Some increased cost and maintenance for Village - Winnetka's low permeability soils reduce effectiveness and require more soil engineering - Limited storage volume: additional controls will still be required	1.0	1.4	+	+	+	+		+	
5	1e	Street Intersection Bioretention Storage	Village closing and reconstructing street intersections with lager scale rain gardens. Assumes 1 intersection	- Use of Village-owned right-of-way - Provides opportunity for water quality treatment - Opportunity to enhance aesthetics and park lands in the neighborhoods and community - Less tree removal than other right-of-way improvements - Provides traffic calming benefits	- Will require permanent disruption to the current road network - Will require an extended period of "learning" for residents and users due to change in local traffic patterns - May be perceived to increase traffic on other streets in the neighborhood - Some increased cost and maintenance for Village - Winnetka's low permeability soils reduce effectiveness and require more soil engineering - Limited storage volume: additional controls will still be required	0.5	0.8	+	+	+	+		+	
6	1f	Parkway Bioretention Storage	Village construction of bioretention basins between sidewalk and curb. Assumes implementation along 20-30% of proposed storm sewer conveyance project length.	- Use of Village-owned right-of-way - Provides opportunity for water quality treatment - Implemented in conjunction with proposed storm sewer projects	- Will require disruption to local streets and residents - May require removal of parkway trees - Increased cost to Village for native plantings and long-term maintenance - Winnetka's low permeability soils reduce effectiveness and require more soil engineering - Limited storage volume: additional controls will still be required	3	5	+	+	+	+		+	+
7	1g	Induced Infiltration	Use of Passive-Induced Infiltration Structures	- Potential to reduce stormwater runoff volumes in watershed - Opportunity to recharge aquifers	- Presence of suitable conditions for infiltration measures (i.e. glacial deposits 20' thick or more within 50' of ground surface not available - Difficult to predict effectiveness and actual volume captured	NA	NA	+	+	+	+	+		+
8	1h	Infiltration Wells	Village construction of deep infiltration wells. Assumed to be installed at new Village rain gardens.	- Potential to reduce stormwater runoff volumes in watershed - Can be installed in fairly small footprint of area - Potential to recharge aquifers	- Wells need to extend to 80' deep or greater - May not be acceptable by Illinois Environmental Protection Agency and Illinois Department of Natural Resources. - Difficult to predict effectiveness and actual volume captured	NA	NA	+	+	+	-	+		

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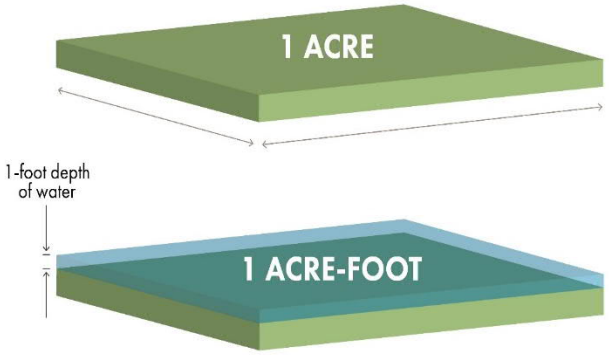
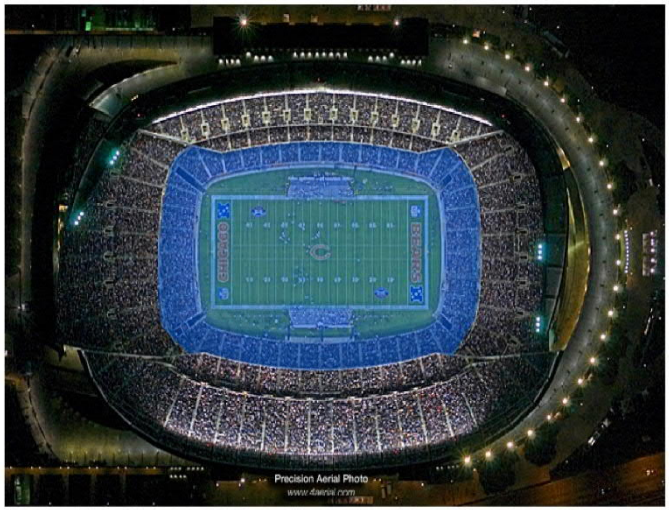
Establish the Perspective of the Need

Residential Parcels	Total Area (SF)	Impervious Area (SF)	2-Yr 3-Hr Storm (Gal)	10-Yr 3-Hr Storm (Gal)	50-Yr 3-Hr Storm (Gal)	100-Yr 3-Hr Storm (Gal)
Average Parcel	14,500	4,900	7,080	10,400	15,100	17,700



1 ACRE-FOOT = 325,851 gallons



Source: precision Aerial Photo (www.4aerial.com)

150 ACRE-FEET STORAGE NEEDED TO MEET THE TARGETED LEVEL OF SERVICE IN WINNETKA

35 FEET DEPTH OF WATER IN **SOLDIER FIELD** (ALL OF SECTION 100)

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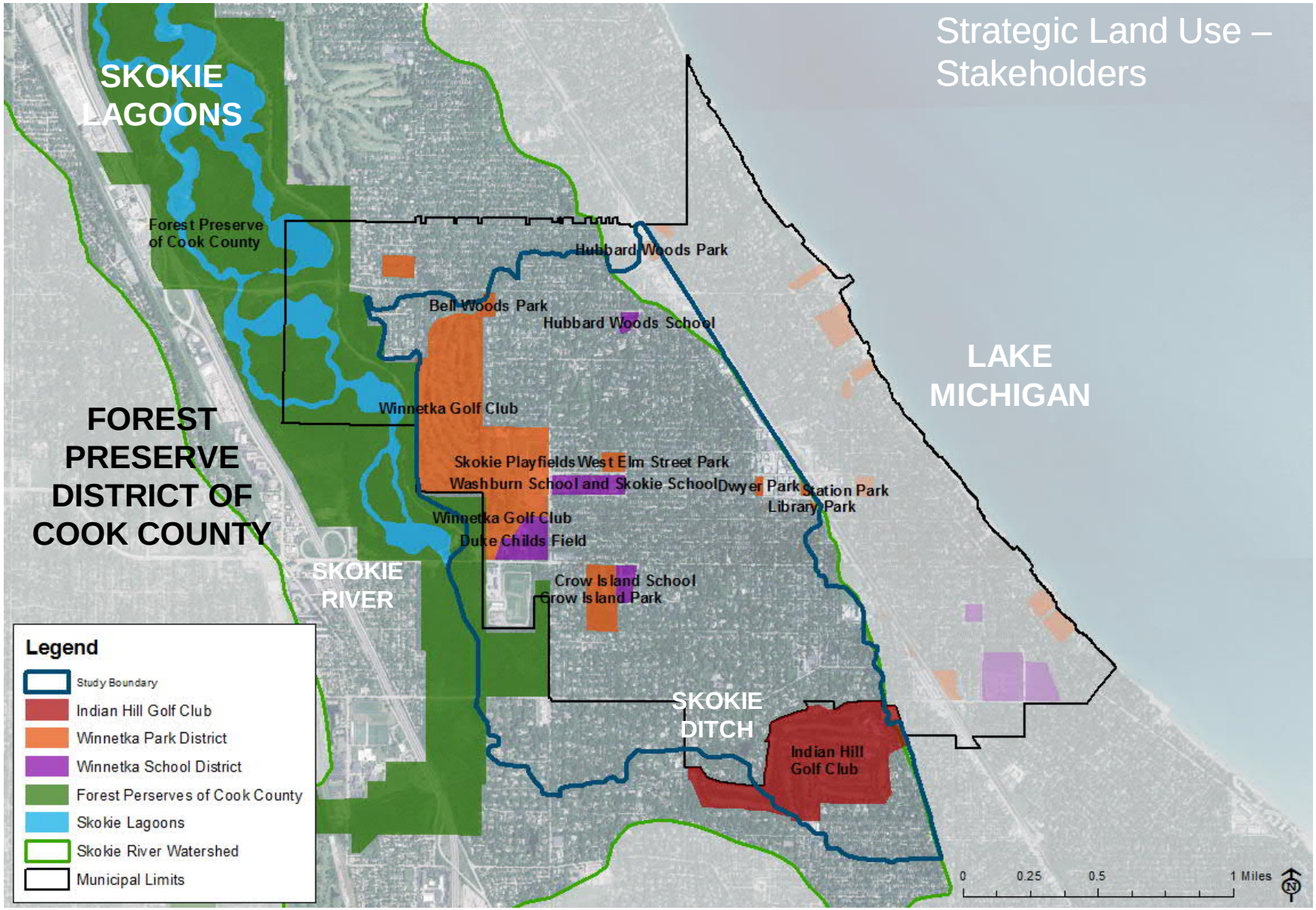
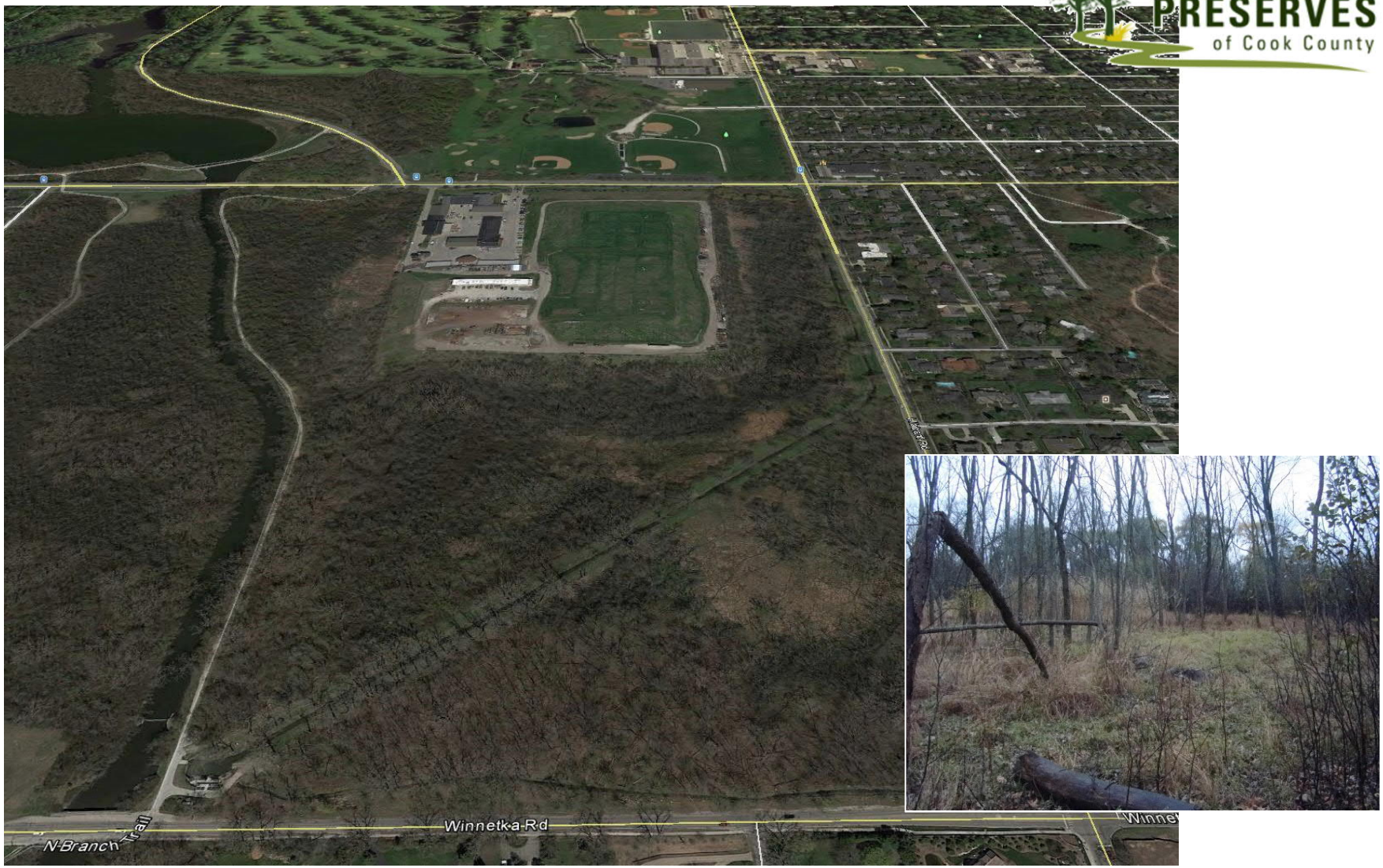
Identify the Opportunity: Public Land Options



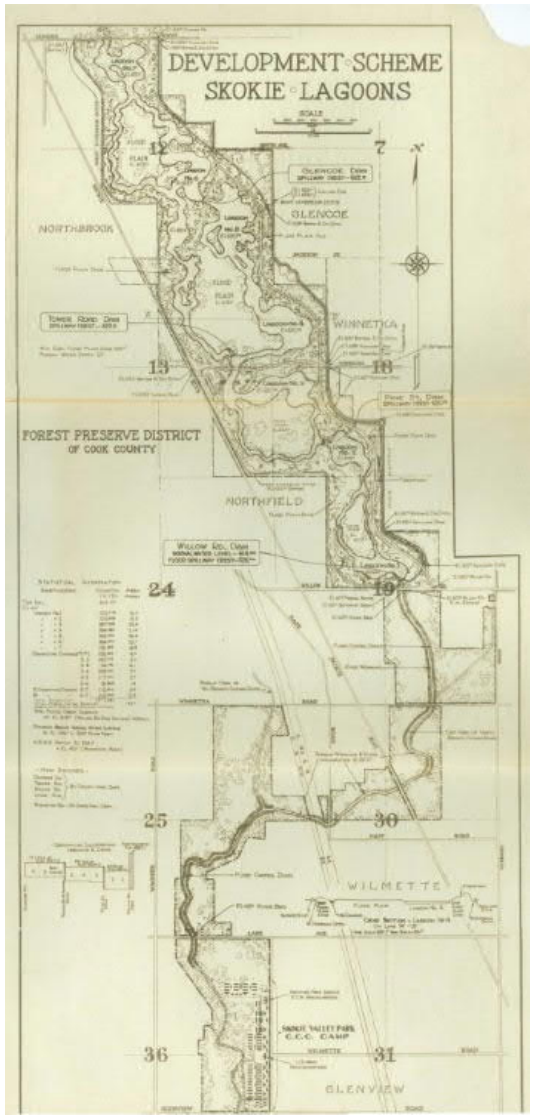
Identify the Opportunity: Public Land Options

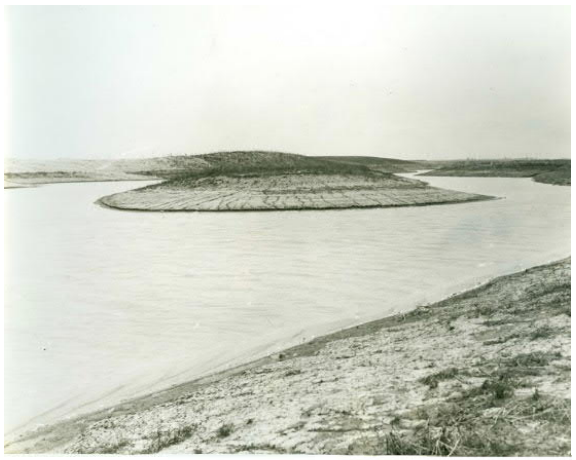
The Cook County Forest Preserve



Identify the Opportunity: Skokie River

Skokie River through Winnetka: Historical Context





SOURCE: http://skokielagoons.omeka.net

Identify the Opportunity: Skokie River

"The character of the marsh varied from season to season.

During the spring and summer, water levels in the marsh ranged from a few inches to several feet deep."

SOURCE: http://skokielagoons.omeka.net

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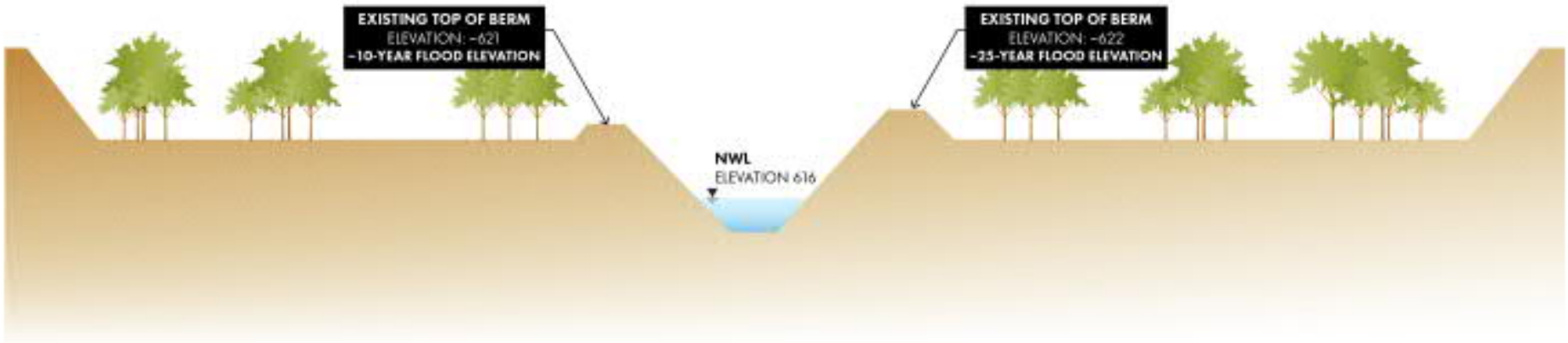
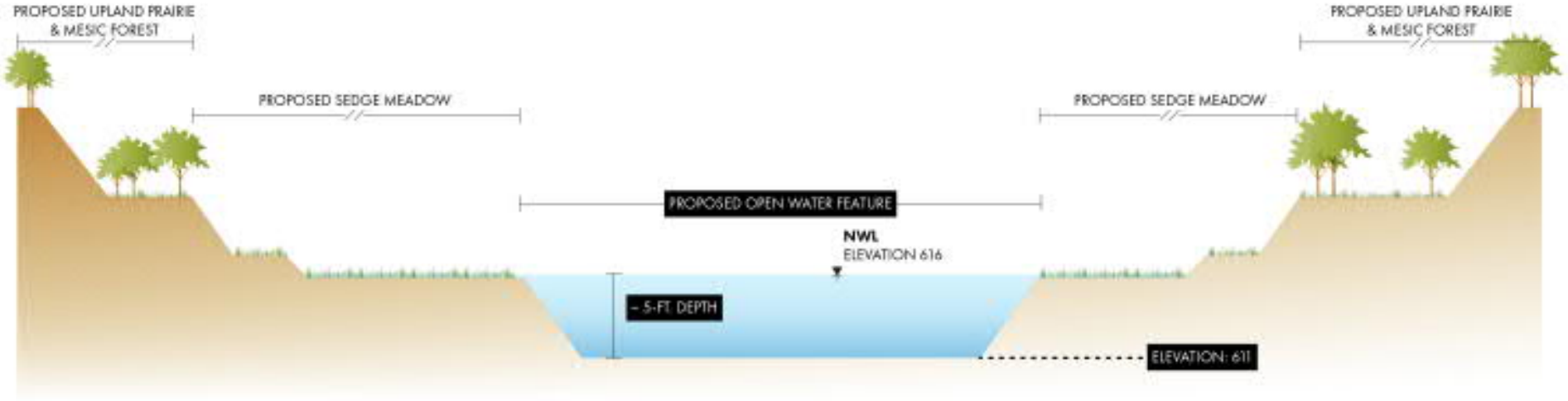
Forest Preserve – Hibbard Road



SKOKIE DITCH: EXISTING CONDITION (NOT TO SCALE; SCHEMATIC IS VERTICALLY & HORIZONTALLY EXAGGERATED)



SKOKIE DITCH: PROPOSED CONDITION (NOT TO SCALE; SCHEMATIC IS VERTICALLY & HORIZONTALLY EXAGGERATED)

THE VILLAGE OF WINNETKA

FOREST PRESERVES OF COOK COUNTY

ZONE D: CONCEPTUAL CROSS SECTION

WEST AND SOUTHWEST WINNETKA STORMWATER MANAGEMENT STUDY · DECEMBER 2015

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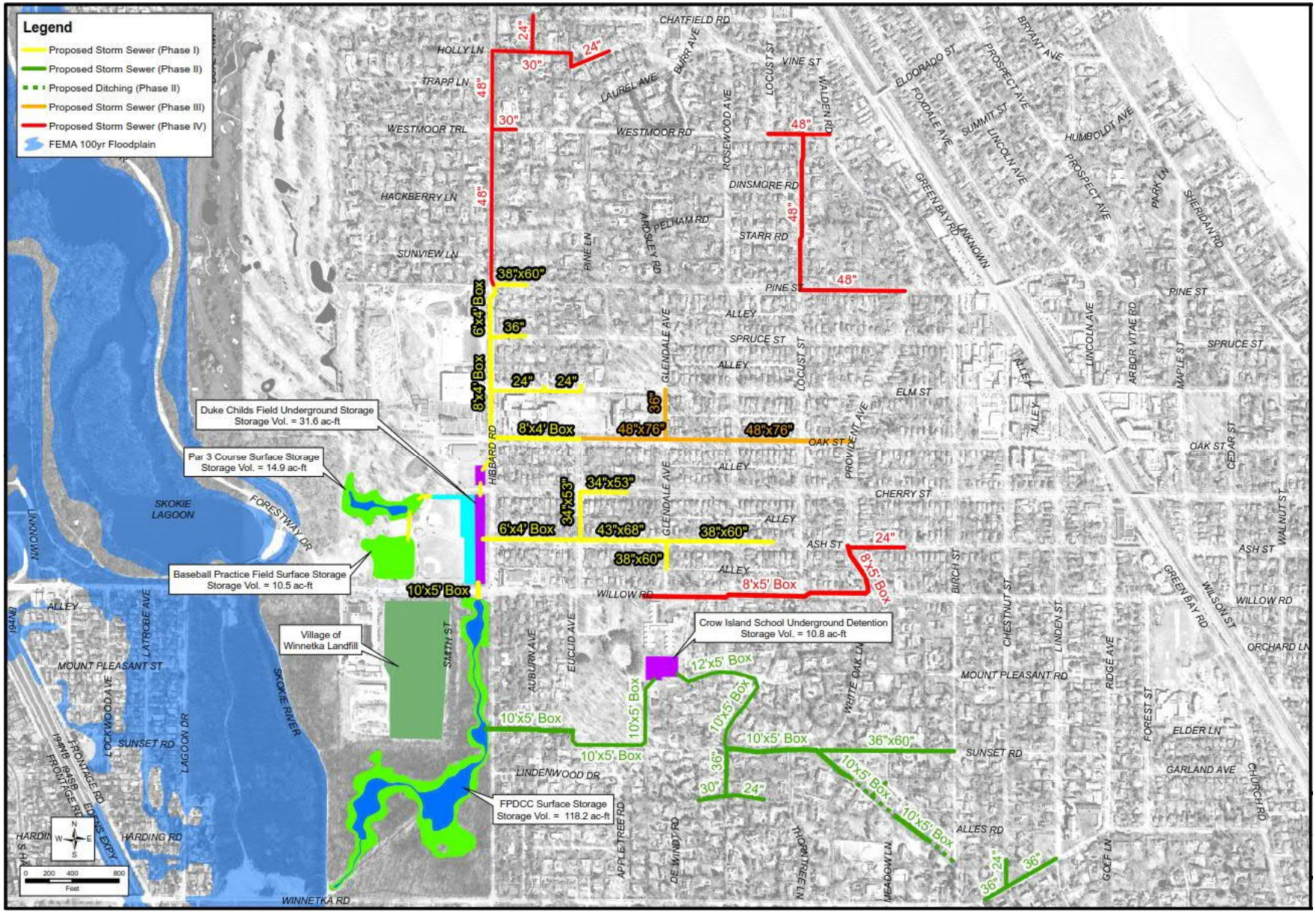
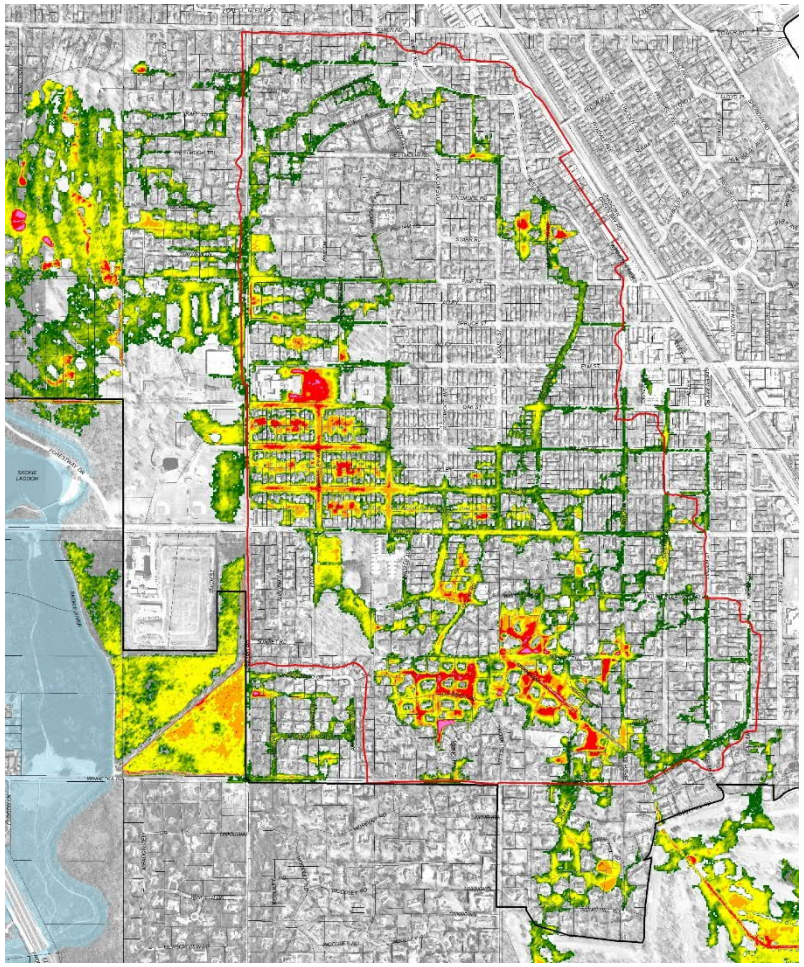
HUMAN NATURE

Overall Vision Today

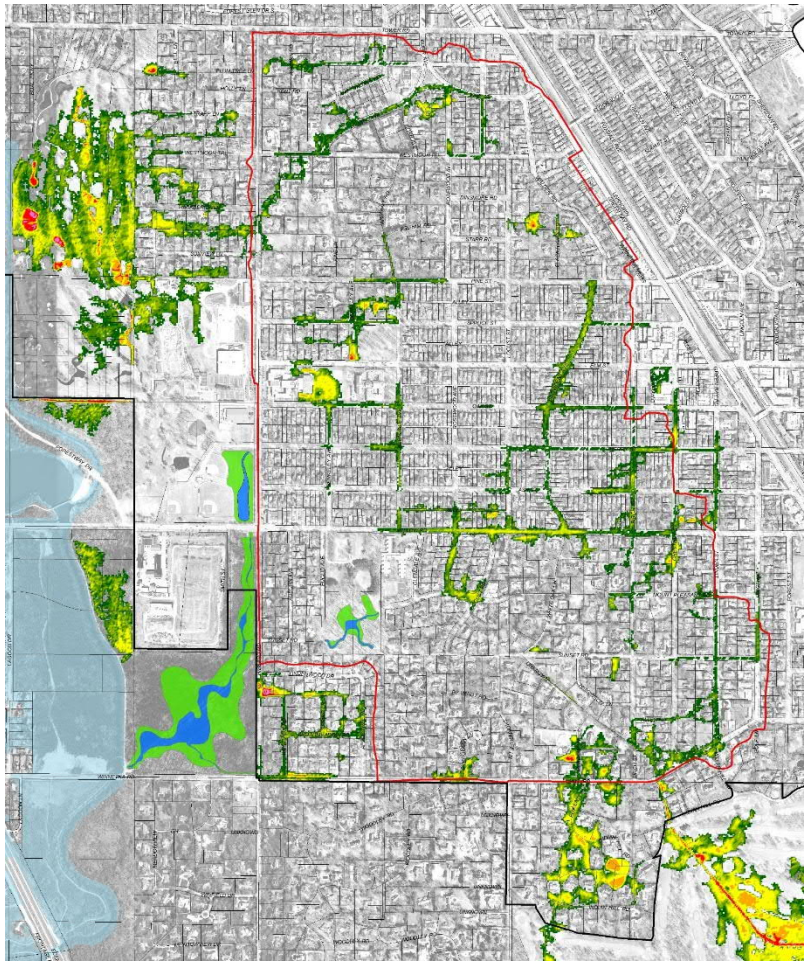


Existing vs. Proposed Conditions

EXISTING CONDITIONS, 100-YR, 3-HR



PROPOSED CONDITIONS, 100-YR, 3-HR



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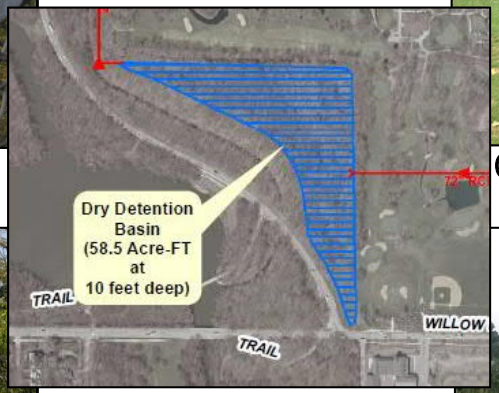
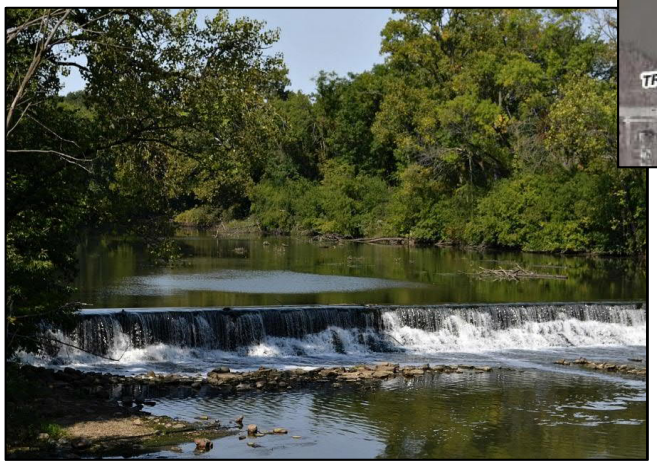
A Community Partnership Starts With Open Dialogue and Identification of “Win-Win” Opportunities

Duke Childs Field, Winnetka, IL

Crow Island School, Winnetka, IL





Skokie Lagoons, FPD Cook County

UW-Madison Arboretum, Madison, WI

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