WEST AND SOUTHWEST WINNETKA STORMWATER MANAGEMENT STUDY

VILLAGE COUNCIL PRESENTATION • JUNE 2016

THE VILLAGE OF
WINNETKA
SINCE 1869

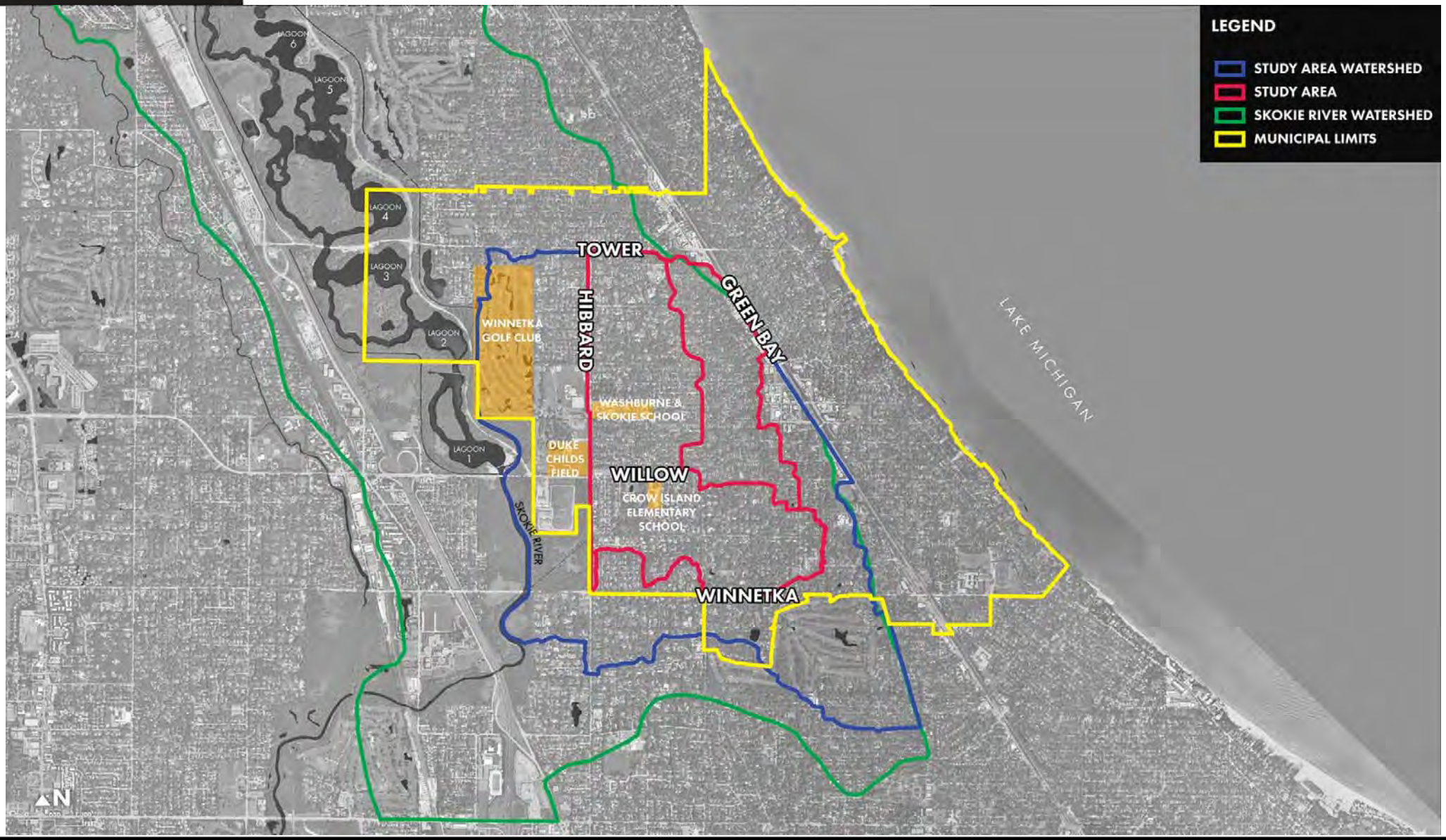
STRAND ASSOCIATES®

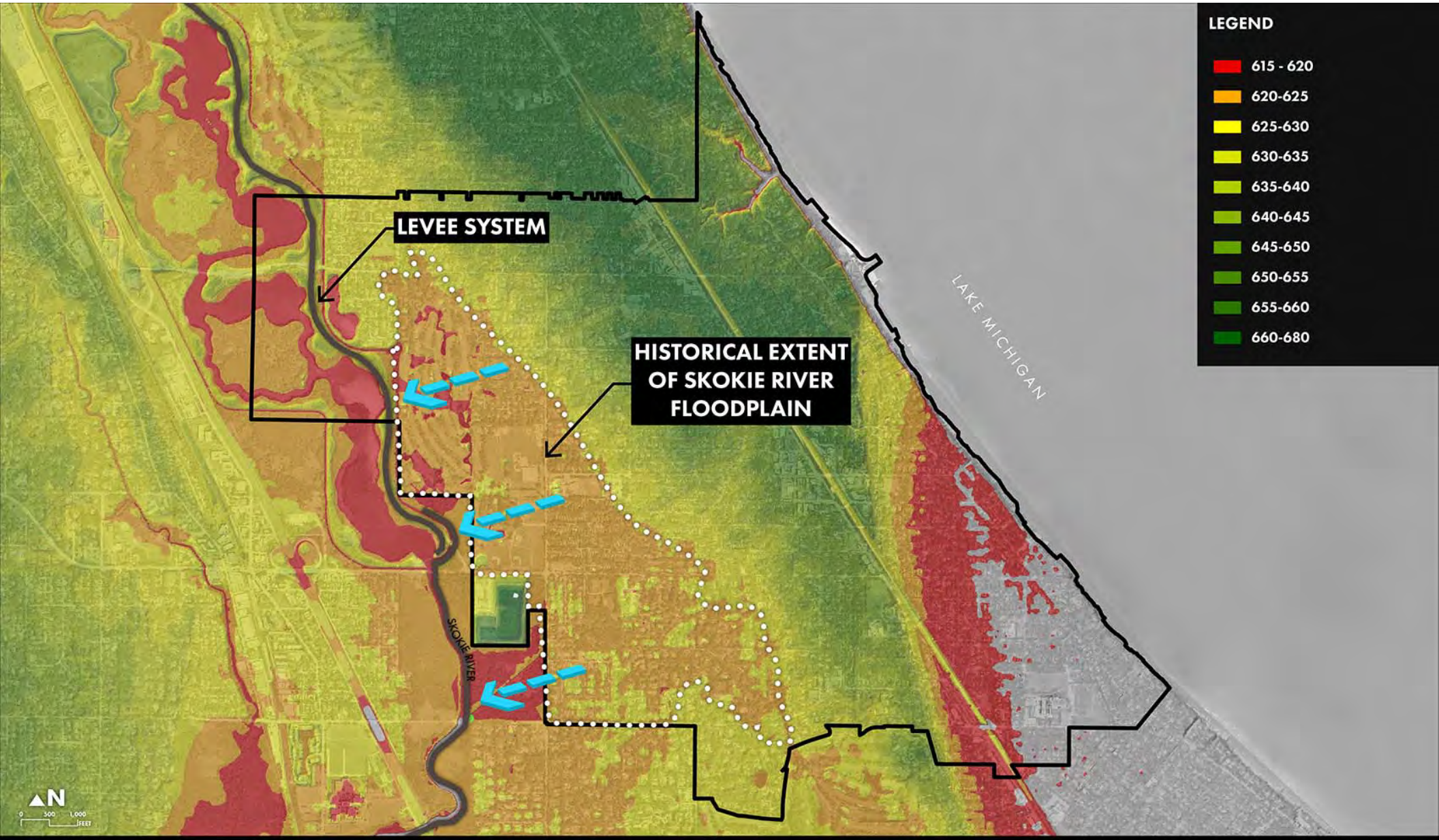
HUMAN NATURE

uplandDesign

THE VILLAGE OF WINNETKA SINCE 1869

Study Area Boundary





THE VILLAGE OF WINNETKA SINCE 1869

ELEVATION RANGES

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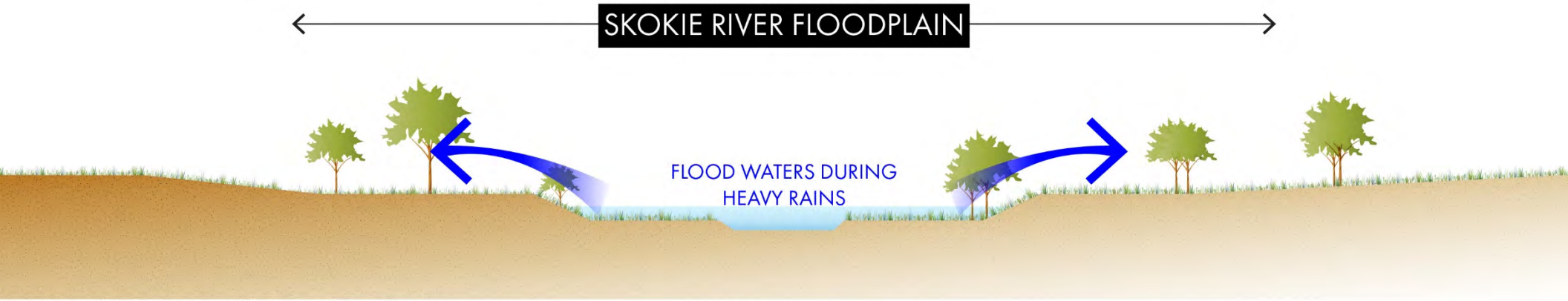
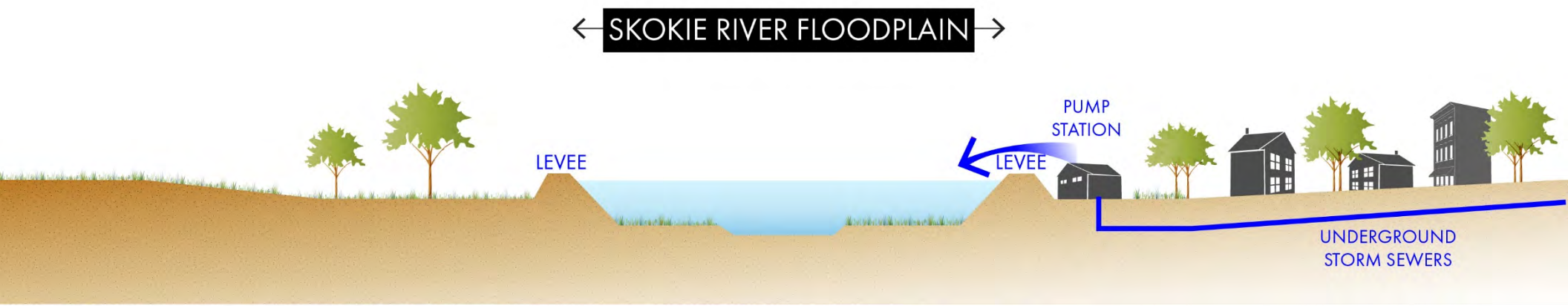
THE VILLAGE OF WINNETKA



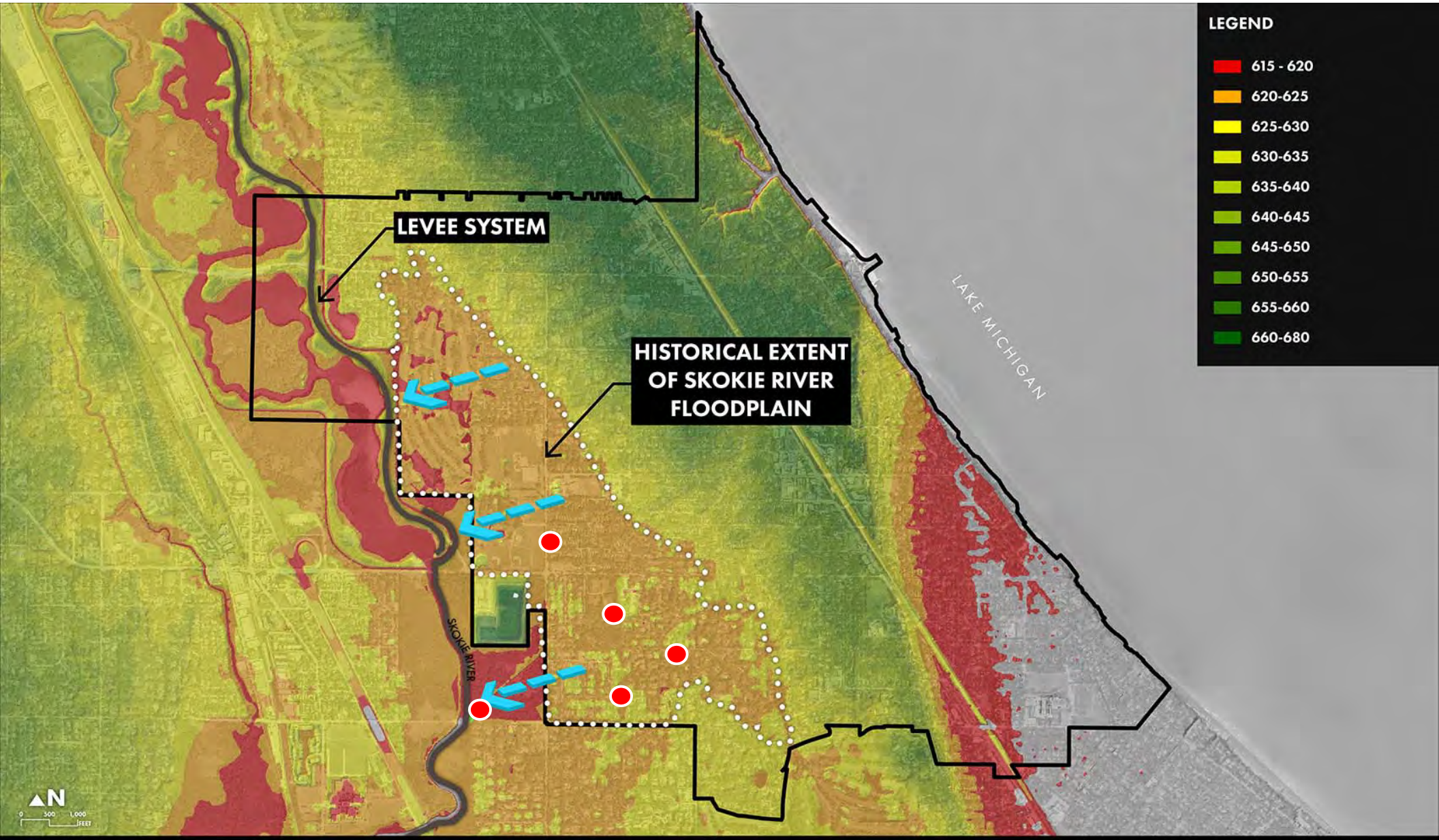
HISTORICAL CONDITION

CONCEPTUAL GRAPHIC - NOT TO SCALE



CURRENT CONDITION

CONCEPTUAL GRAPHIC - NOT TO SCALE



THE VILLAGE OF WINNETKA SINCE 1869

ELEVATION RANGES

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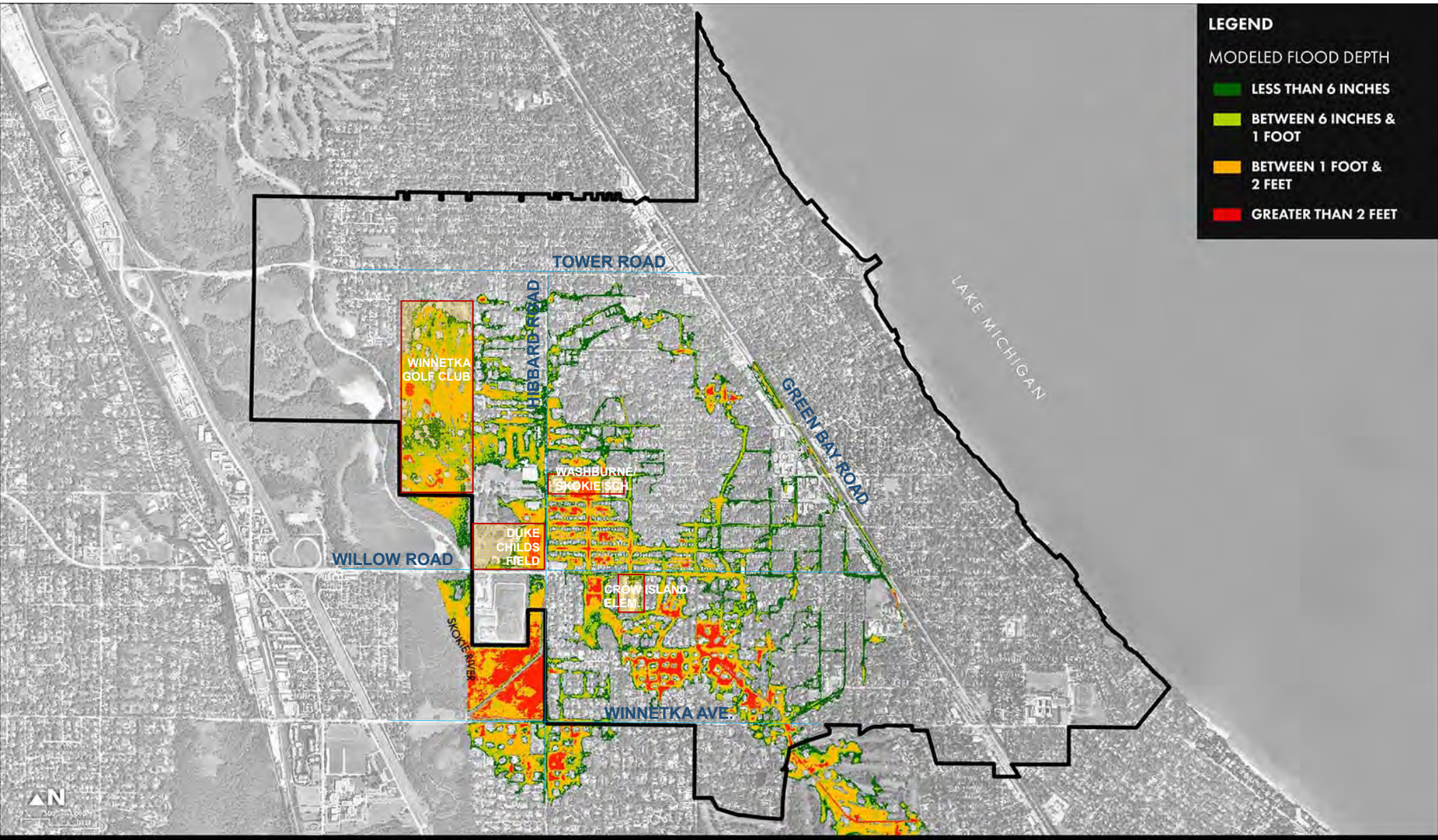

THE VILLAGE OF WINNETKA SINCE 1869

MODELED FLOOD DEPTHS: JULY 2011 EVENT

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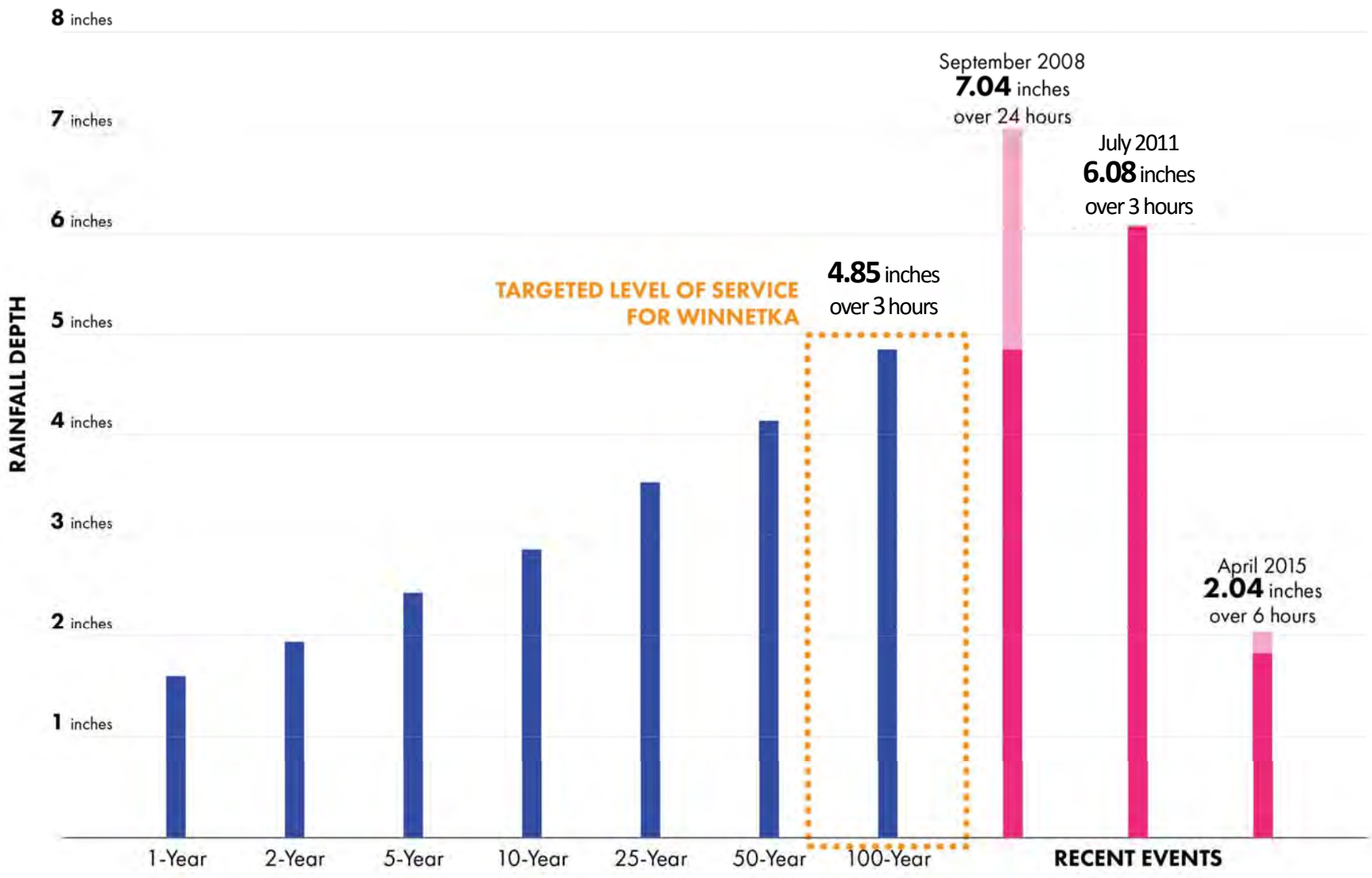
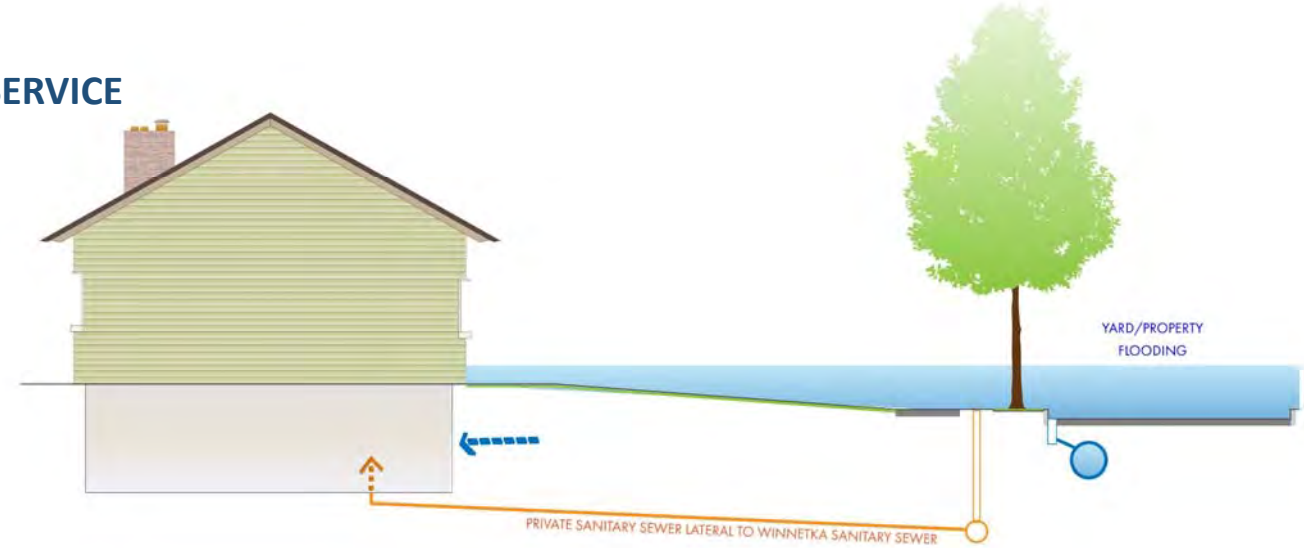
Target Level of Service - Storm

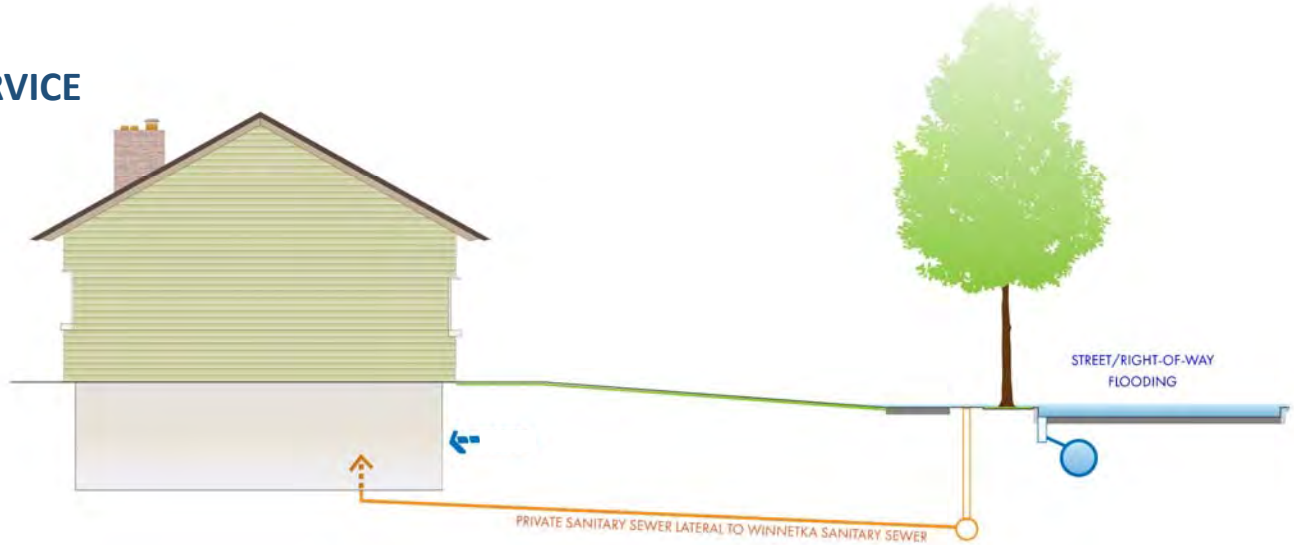


Target Level of Service - Protection

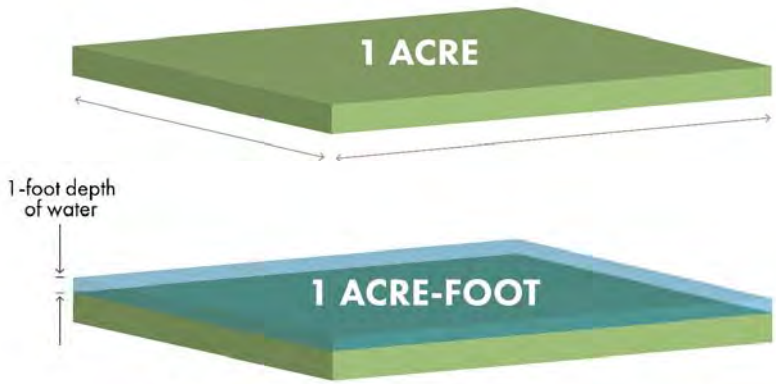
CURRENT LEVEL OF SERVICE



TARGET LEVEL OF SERVICE



Target Level of Service



1 ACRE-FOOT = 325,851 gallons

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

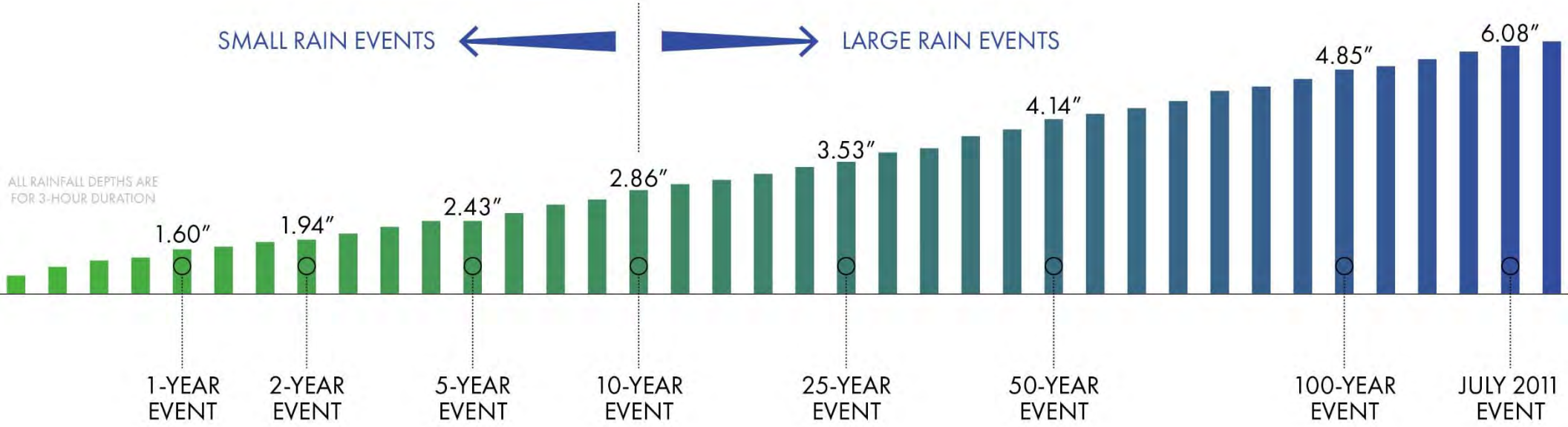
150 ACRE-FEET — STORAGE NEEDED TO MEET THE TARGETED LEVEL OF SERVICE IN WINNETKA

→

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

THE VILLAGE OF WINNETKA

Stormwater Management Opportunities



HOMEOWNER-LEVEL
INFRASTRUCTURE

NEIGHBORHOOD-LEVEL
INFRASTRUCTURE

WATERSHED-LEVEL
INFRASTRUCTURE

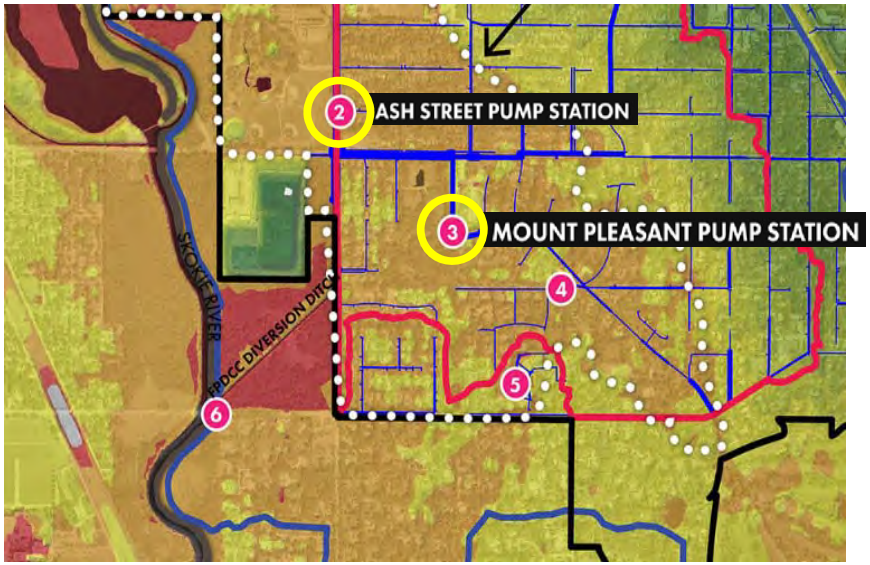
THE VILLAGE OF WINNETKA since 1869

Opportunity Matrix

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	+	+	+	-	+		

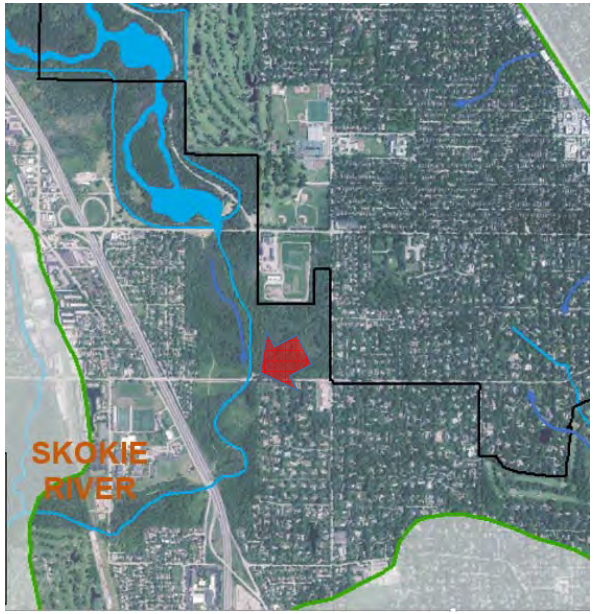
Opportunities Evaluation – Increased Pumping

- Increase the Capacity of the Ash St. and Mt. Pleasant St. PS to provide Target LOS
  - Current Ash St. PS capacity = 8 cfs
  - Required PS capacity = 125 cfs (15.6x)
  - Current Mt. Pleasant St. PS capacity = 22 cfs
  - Required PS capacity = 319 cfs (14.5x)
- Still requires gravity conveyance to deliver stormwater to the pumping stations
- Still requires land to build it
- Requires pumping to someplace
- Relies on mechanical systems



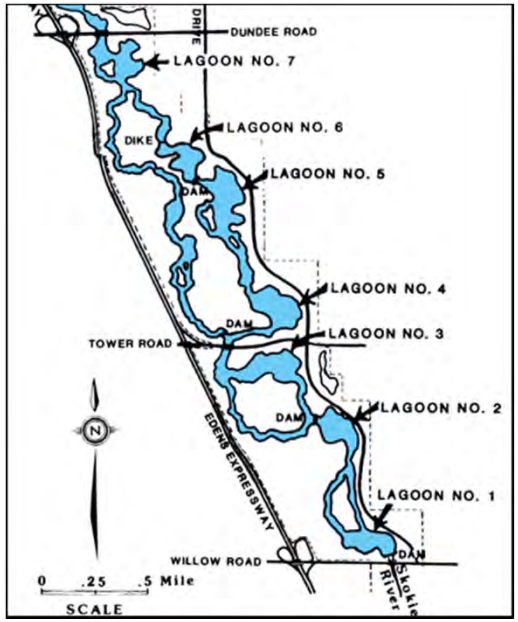
Opportunities Evaluation – Increased Pumping at Winnetka Avenue Pump Station

- Increase the capacity of the Winnetka Ave. PS to offset the need for providing flood storage
  - Current PS capacity = 134 cfs
  - Required PS capacity = 525 cfs (4x)
- Significant increases in peak flows could have adverse impacts to receiving flood prone waterways (Skokie River & N. Branch Chicago River)
- Likely not permitted by IDNR
- Increases reliance on mechanical systems



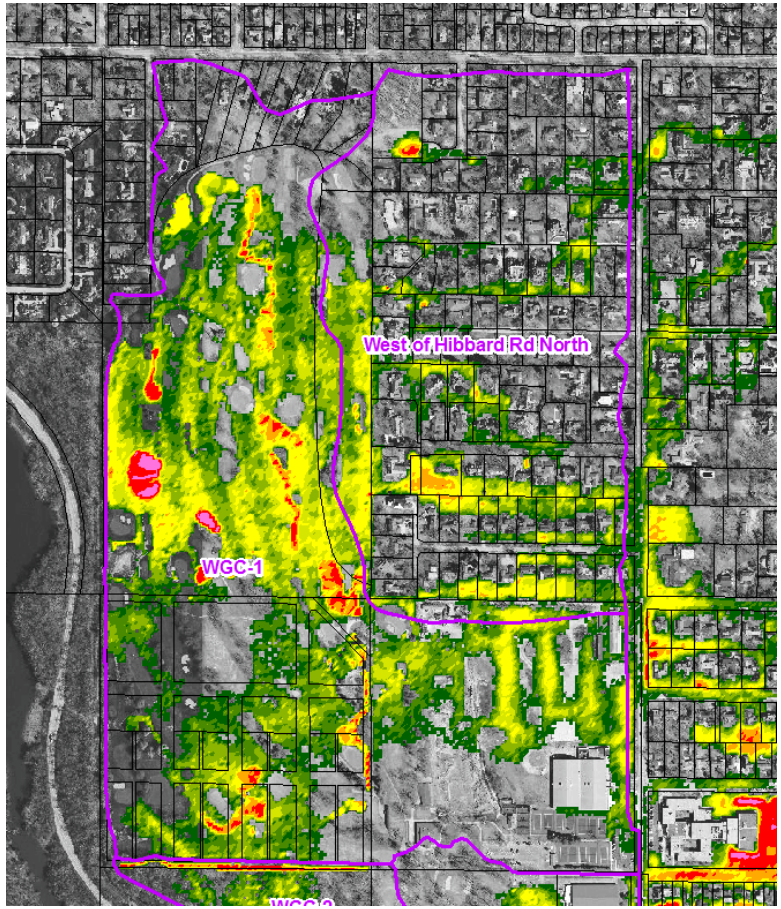
Opportunities Evaluation – Storage in Skokie Lagoons

- Potential to provide flood storage in lagoons
- Conveyance to the lagoons would require pumped systems
- Drainage from Study Watershed is not currently tributary to the Skokie Lagoons
- FPDCC indicated clearly that modifications to the lagoons would not be acceptable



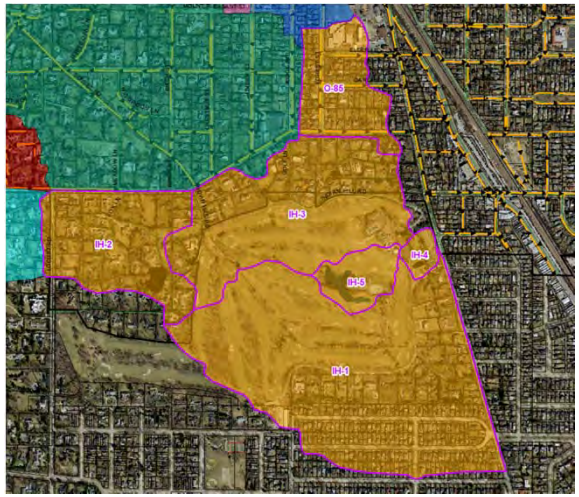
Opportunities Evaluation – Storage in Winnetka Park District 18-Hole Golf Course

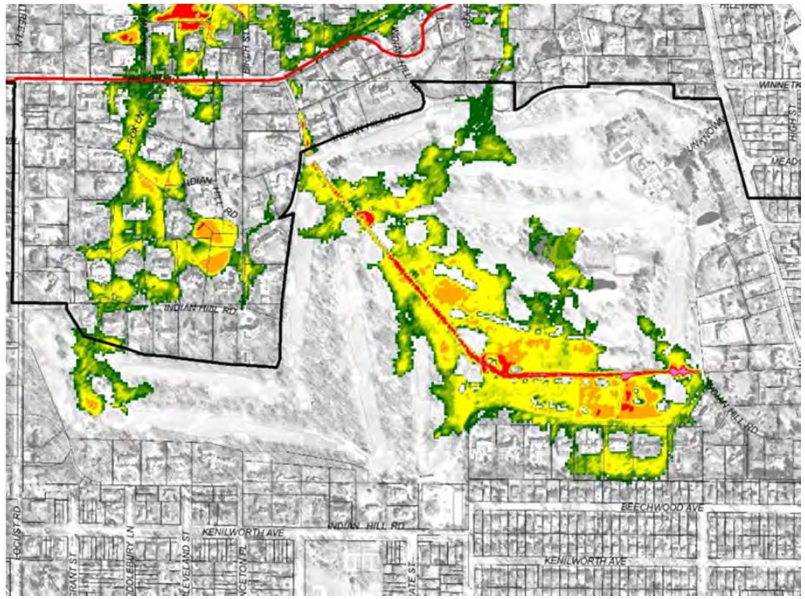
- WPD has indicated that the 18-hole course needs to remain playable
- Golf course currently experiences significant flooding impacts
- Little of the study watershed is tributary here
- Separated from flooding neighborhoods so gravity conveyance is difficult, pumped conveyance likely required
- Results in limited actual storage volume creation opportunities



Opportunities Evaluation –Storage at Indian Hill Country Club

- Relative contribution of stormwater runoff into the Village from 282 acre watershed limited by restrictive culverts
- Primary discharge is to the east into Kenilworth storm conveyance system
- Significant flood storage and lowering of peak flows currently occurs at the golf course (estimated 100-year storage volume ~37 ac-ft)
- Ability to divert or redirect stormwater to the golf course unlikely – private property located outside the Village



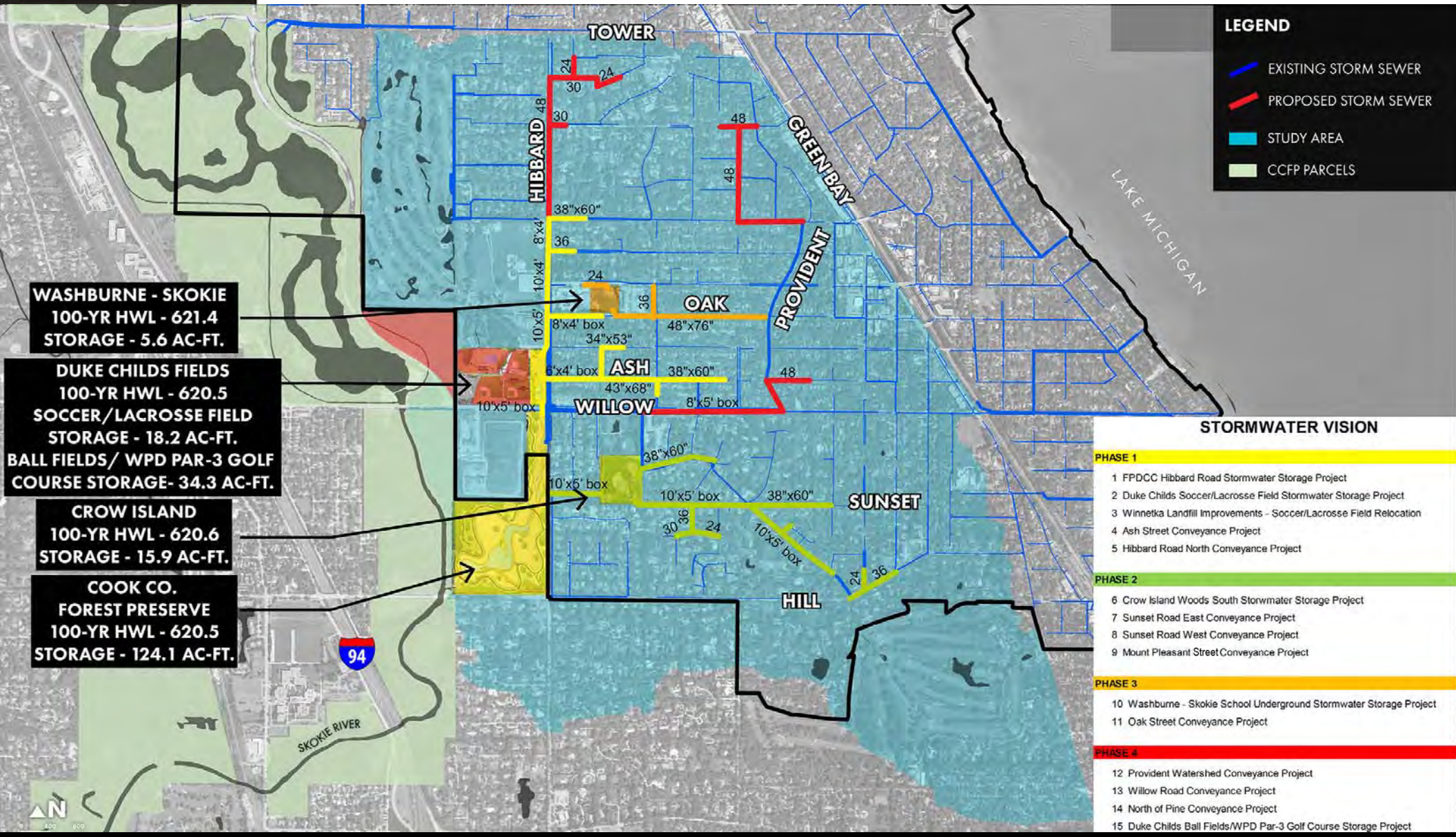


Opportunities Evaluation –Storage on Vacant Parcels or Flood Buyouts

- Three available vacant lots were identified in currently flood prone neighborhoods (ranging between 1 and 2 acres)
- Average listings = $1.3 million per acre
- 4 acres of land (similar to Duke Childs Field) ~ $5.2 M prior to actually making improvements.
- Often not contiguous to flood areas limiting conveyance ability
- Property acquisition and flood buyouts are cost prohibitive and minimally effective

THE VILLAGE OF WINNETKA

Overall Vision



STORMWATER VISION

PHASE 1

1 FPDCC Hibbard Road Stormwater Storage Project
2 Duke Childs Soccer/Lacrosse Field Stormwater Storage Project
3 Winnetka Landfill Improvements - Soccer/Lacrosse Field Relocation
4 Ash Street Conveyance Project
5 Hibbard Road North Conveyance Project

PHASE 2

6 Crow Island Woods South Stormwater Storage Project
7 Sunset Road East Conveyance Project
8 Sunset Road West Conveyance Project
9 Mount Pleasant Street Conveyance Project

PHASE 3

10 Washburne - Skokie School Underground Stormwater Storage Project
11 Oak Street Conveyance Project

PHASE 4

12 Provident Watershed Conveyance Project
13 Willow Road Conveyance Project
14 North of Pine Conveyance Project
15 Duke Childs Ball Fields/WPD Par-3 Golf Course Storage Project

Homeowner Level Green Infrastructure

Incentivize Implementation Through Storm Water Program

Typical Household:

- 2 Rain Barrels @ 50 gallons per barrel = 100 gallons
- 1 Rain Garden @ 12” deep and 20 feet by 20 feet (400 sq. ft.)

Totals 3,100 gallons = 0.01 ac-ft.

100 households could provide 1 ac-ft. of storage volume

A typical household produces 7,000 gallons from a 1.60” rainfall (2-year storm)

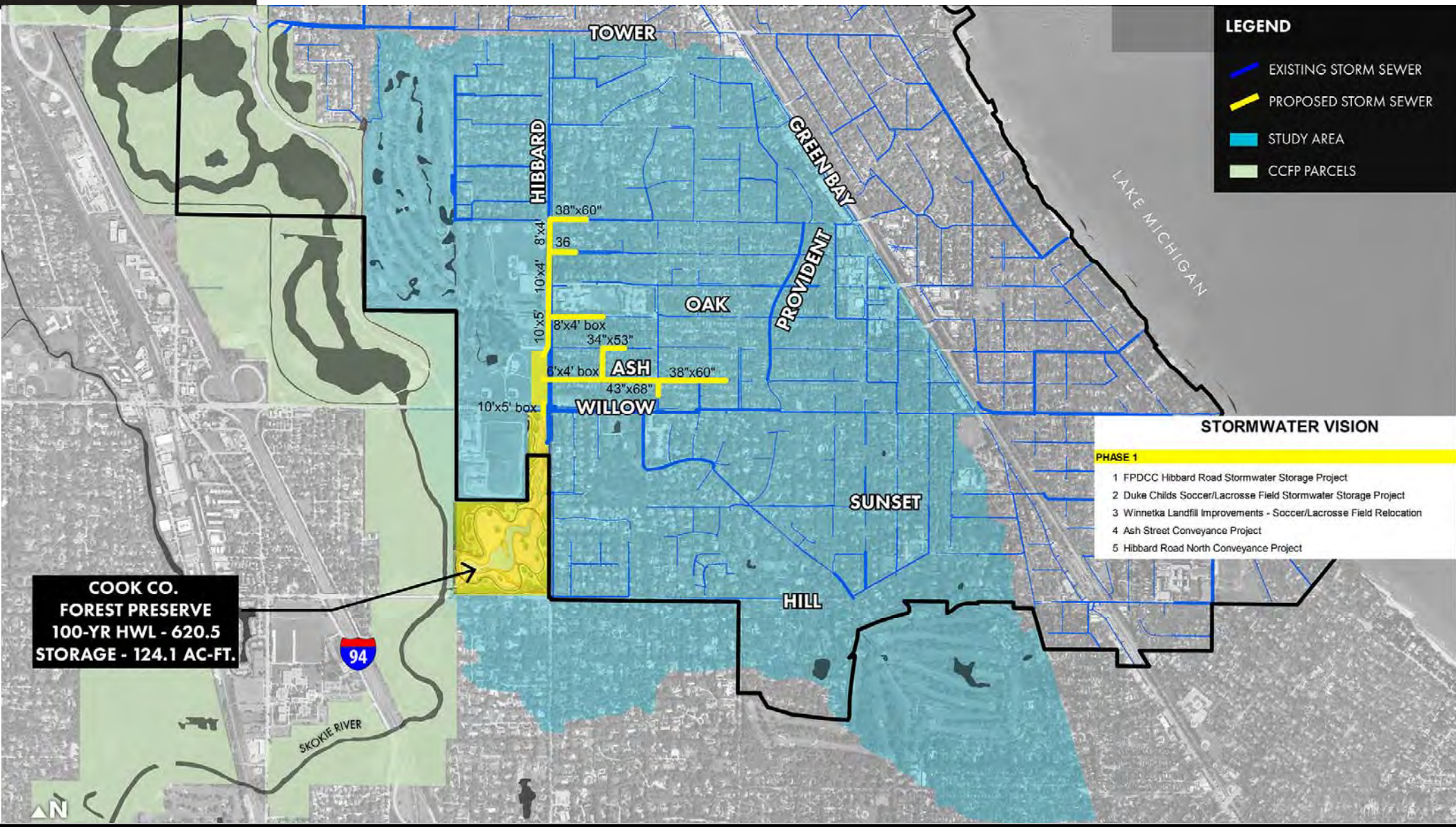
Neighborhood Level Green Infrastructure

- Anticipate 15 to 20 intersections
- Anticipate 12 to 15 parkways (without tree removal)
- To be constructed along with other conveyance improvements

Provides 4 to 5 ac-ft. of storage volume
Provides valuable water quality improvements

THE VILLAGE OF WINNETKA

Phase 1 Projects



THE VILLAGE OF WINNETKA SINCE 1869

FOREST PRESERVE

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SINCE 1869

DUKE CHILDS LACROSSE FIELDS

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WINNETKA
since 1869

DUKE CHILDS FIELDS

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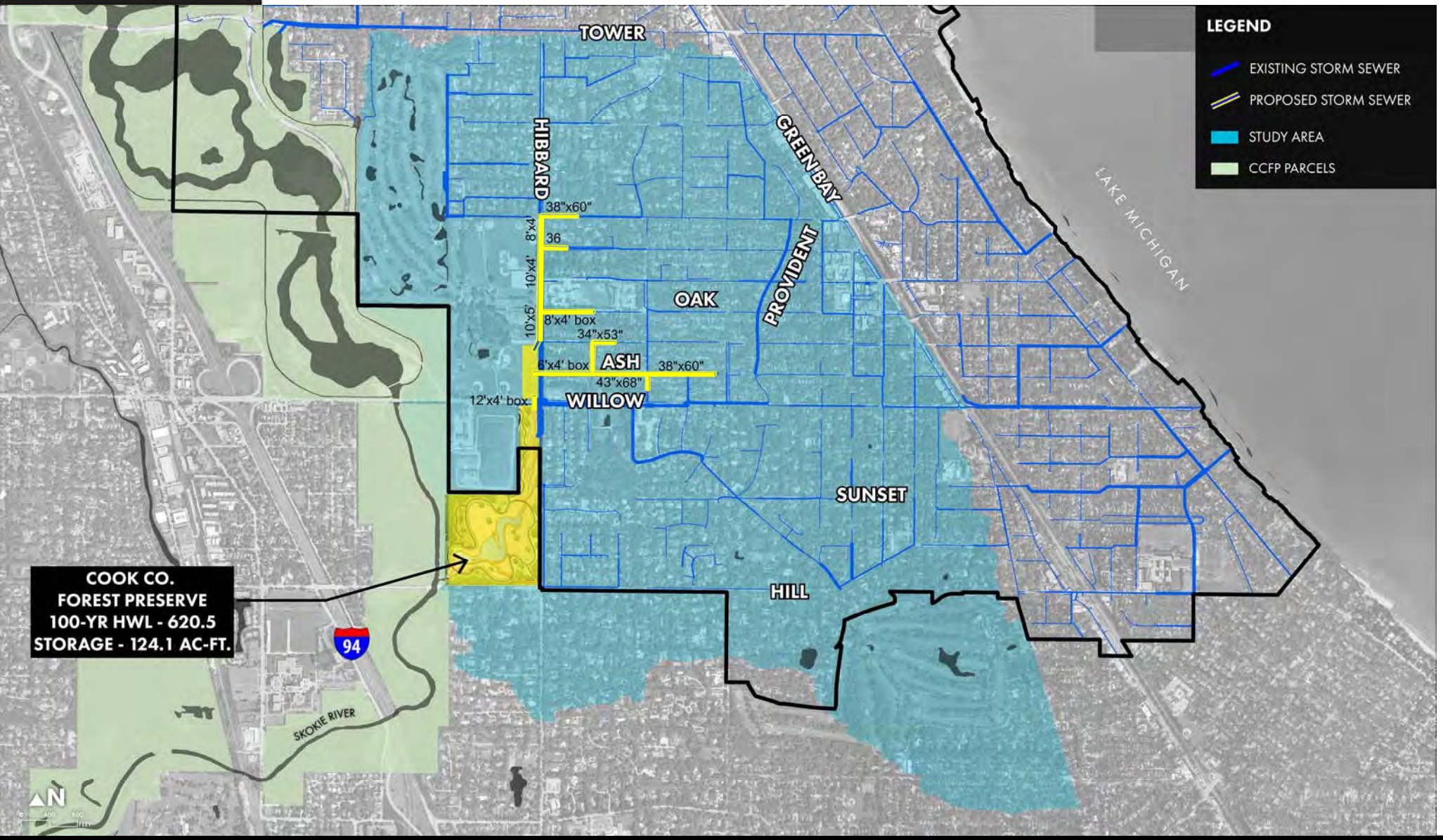
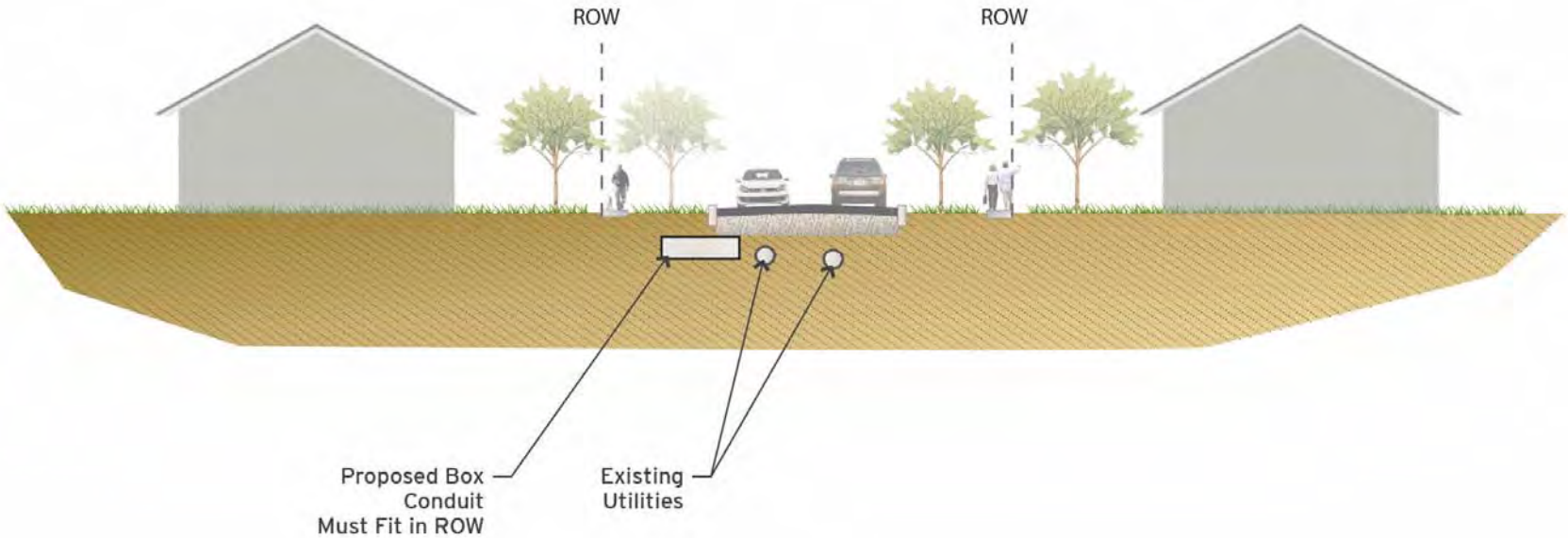
Phase 1 Projects - Conveyance



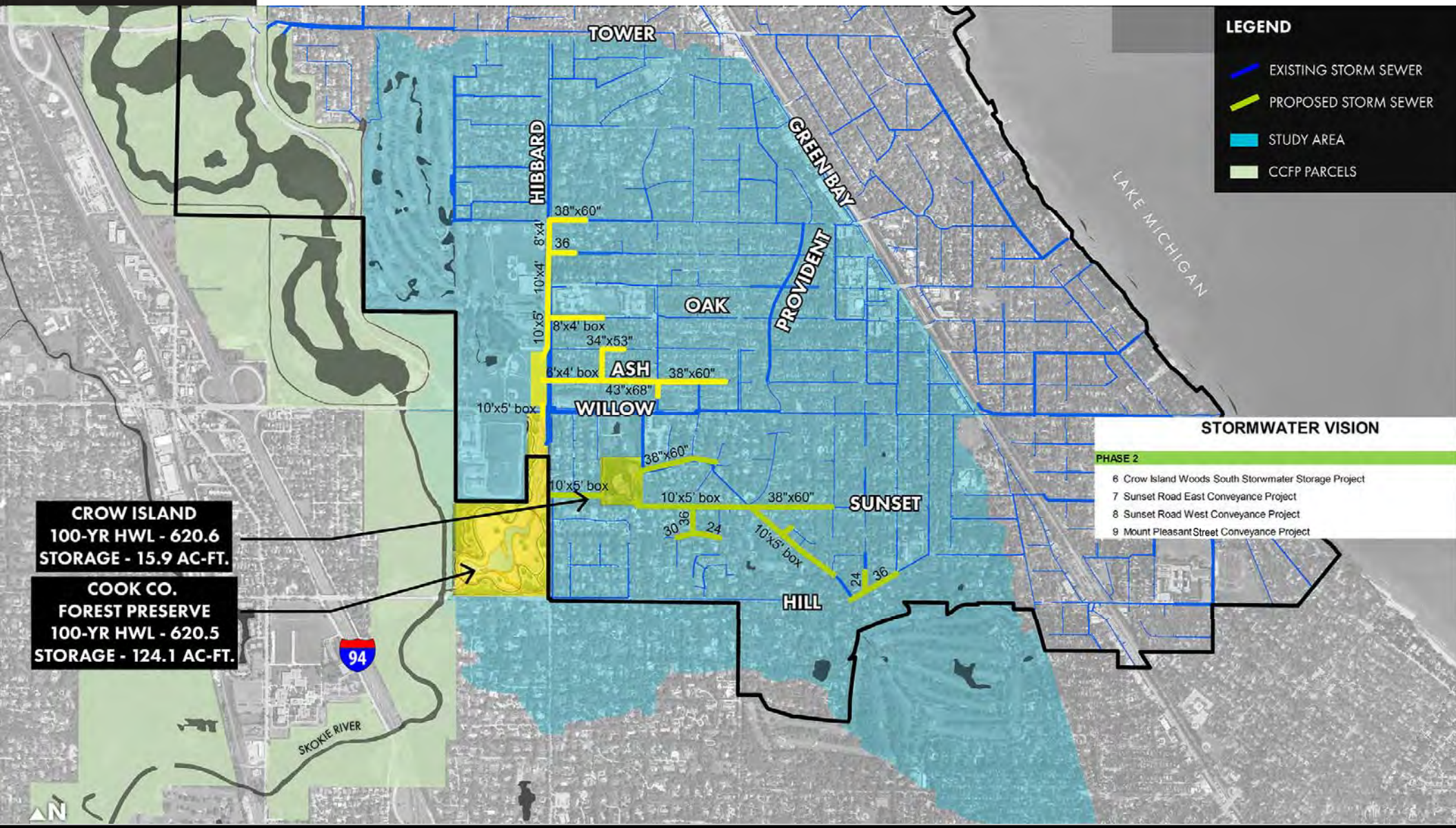
Conveyance



PROPOSED STORMWATER CONVEYANCE - ALONG STREETS

THE VILLAGE OF WINNETKA

Phase 2 Projects



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CROW ISLAND WOODS

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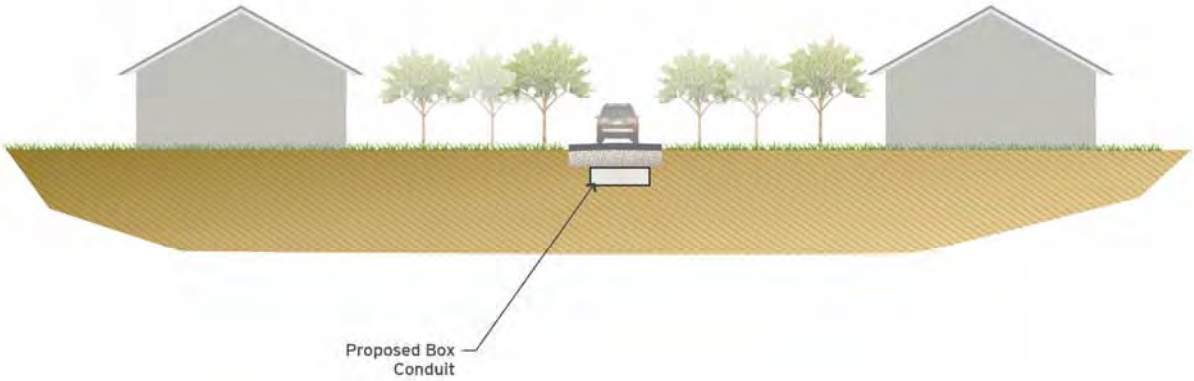
Phase 2 - Conveyance



Sunset Road

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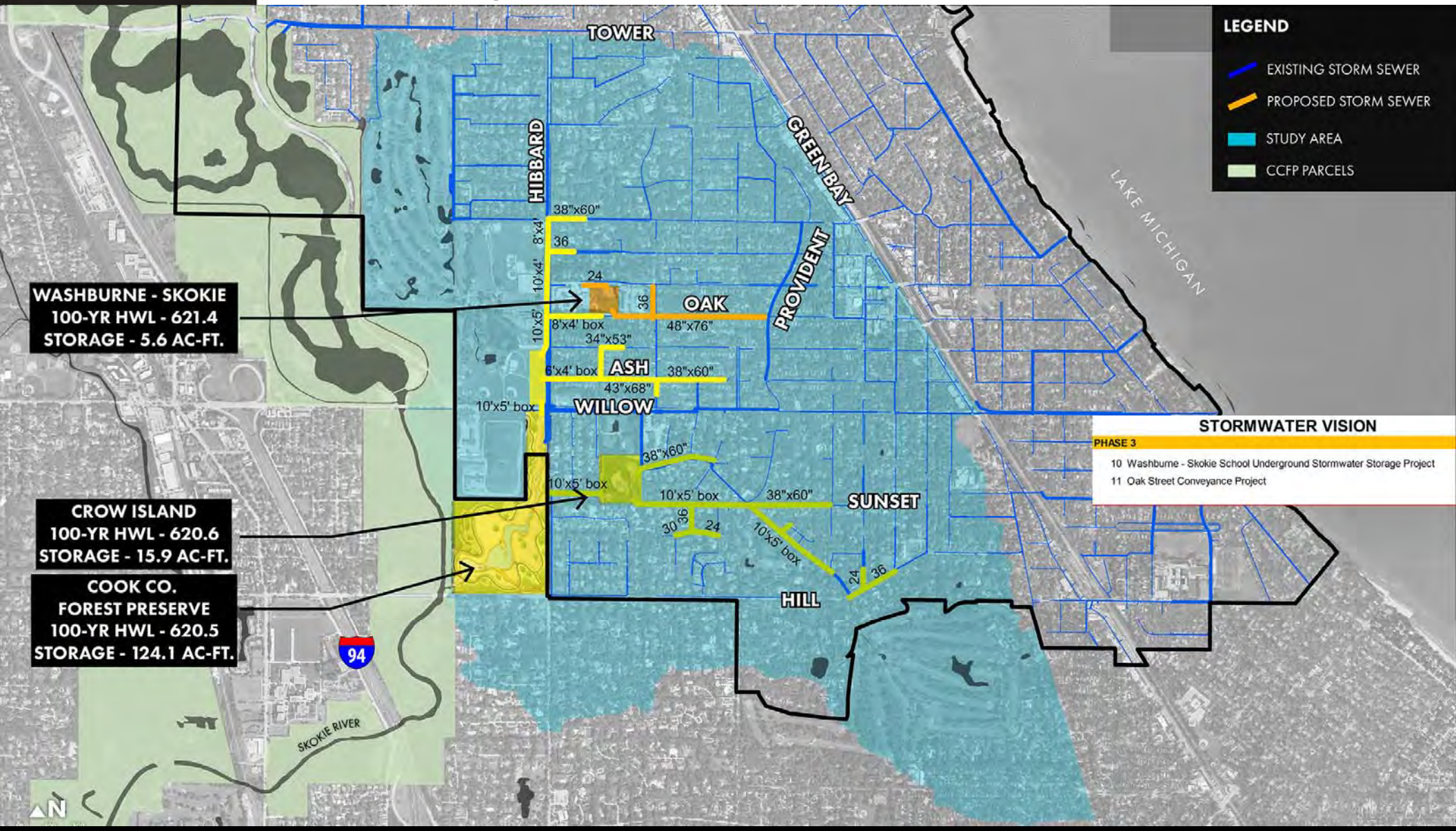
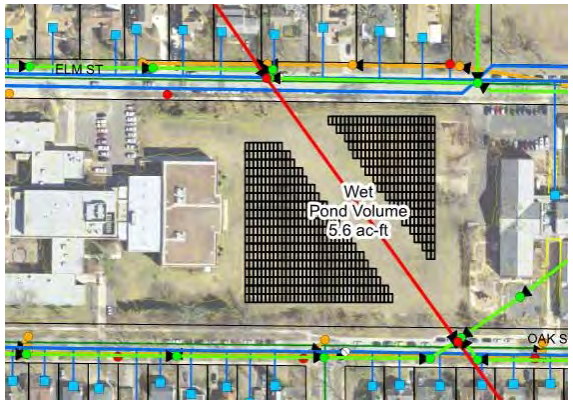
Phase 3 Projects



Skokie-Washburne Storage Project

Underground Storage with Playfields Rebuilt on Top



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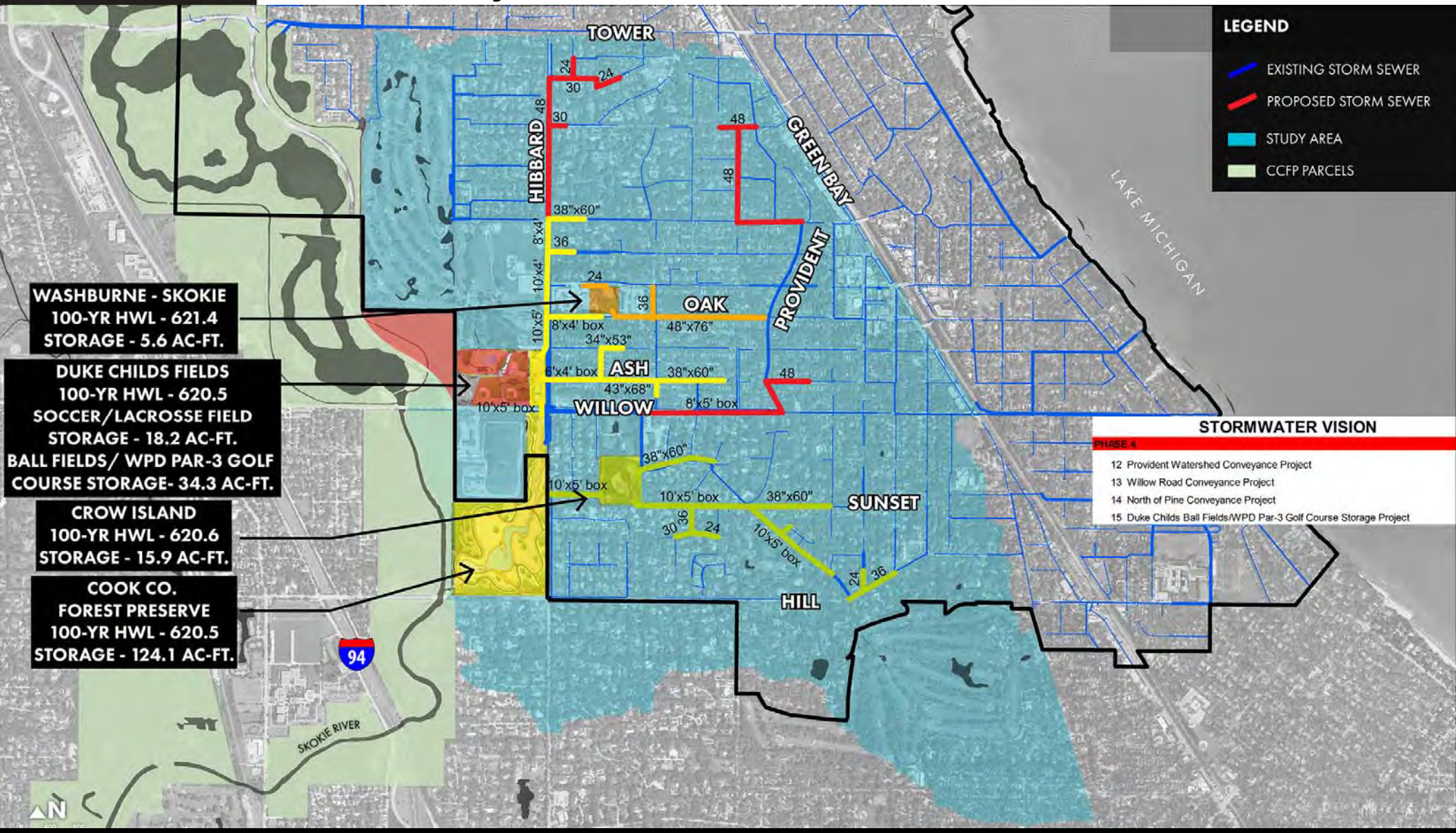
Phase 4 Projects

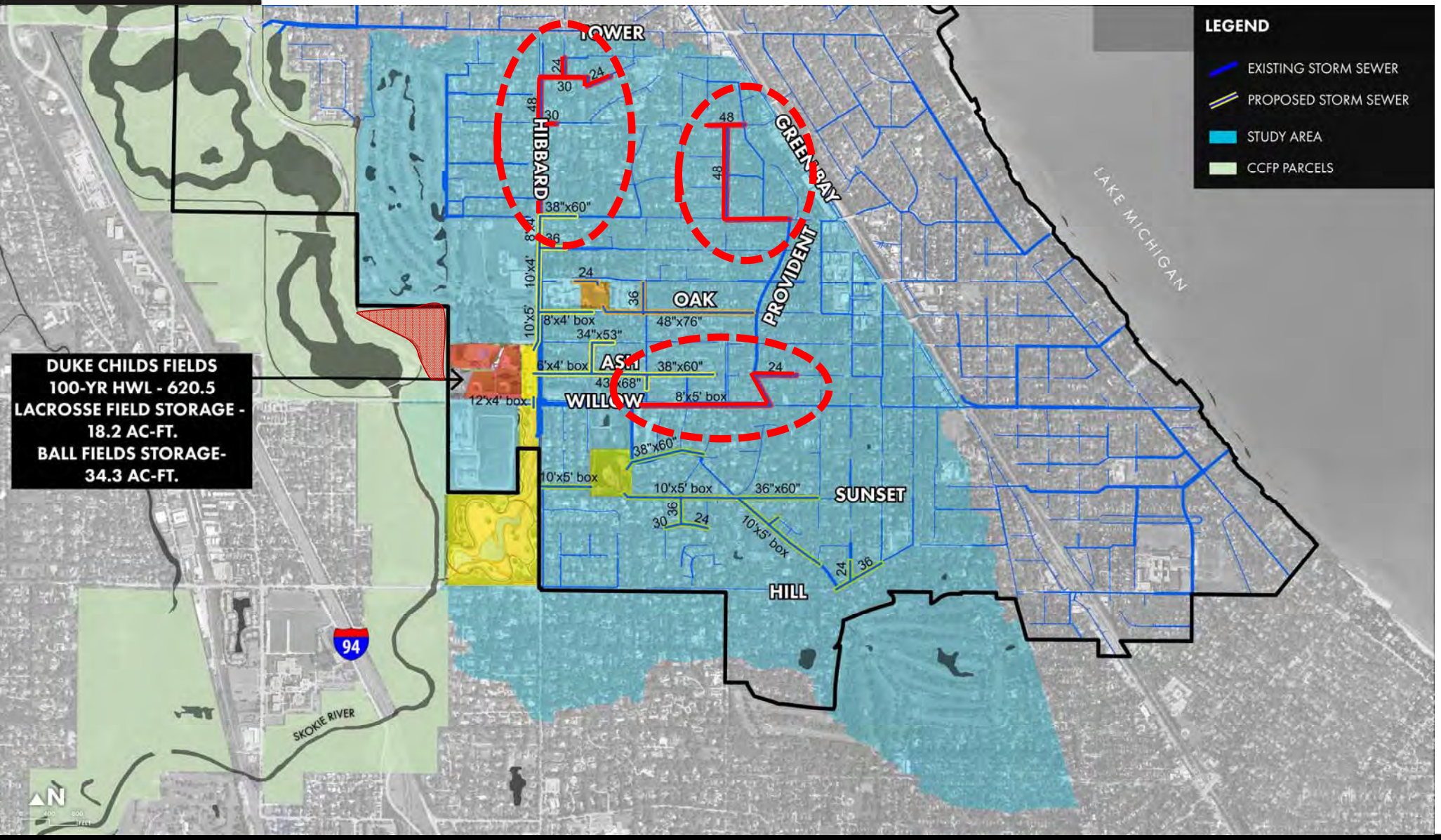


THE VILLAGE OF WINNETKA

Phase 4 Projects - Storage

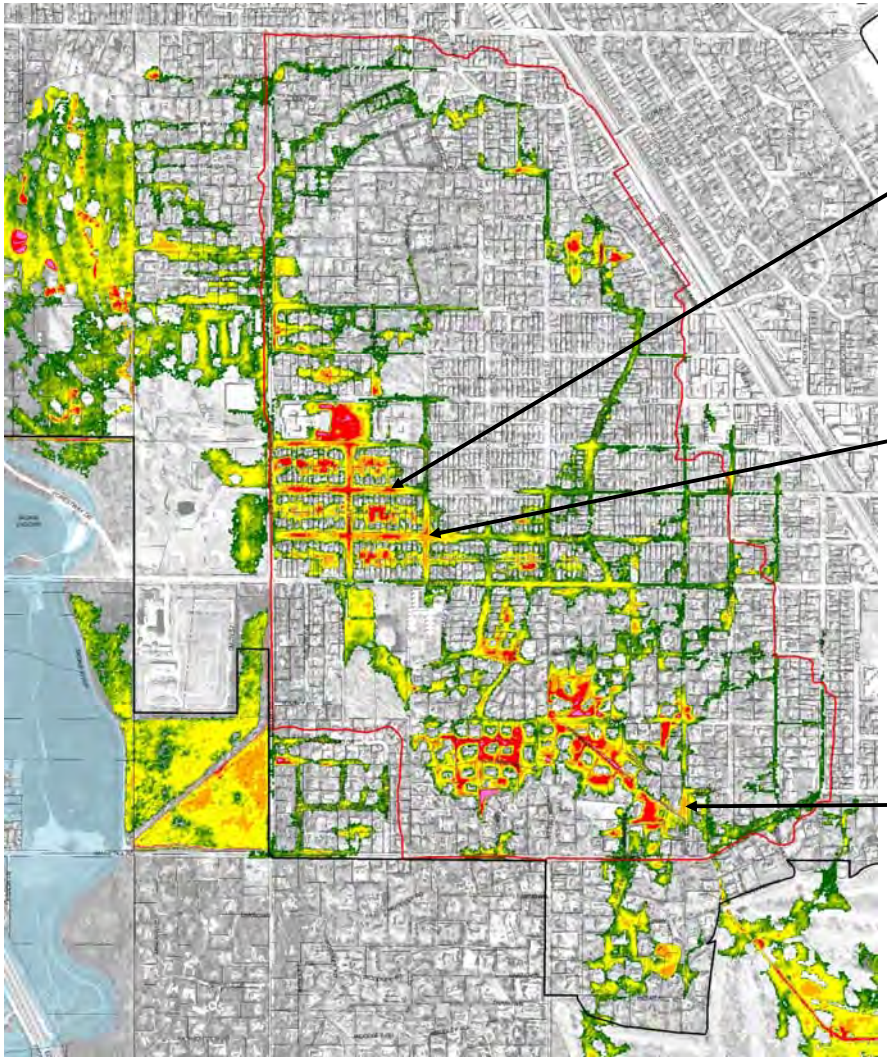
THE VILLAGE OF WINNETKA

Phase 4 Projects - Conveyance



Overall Vision

EXISTING CONDITIONS, 100-YR, 3-HR EVENT



July 2011 – 1200 Block of Cherry

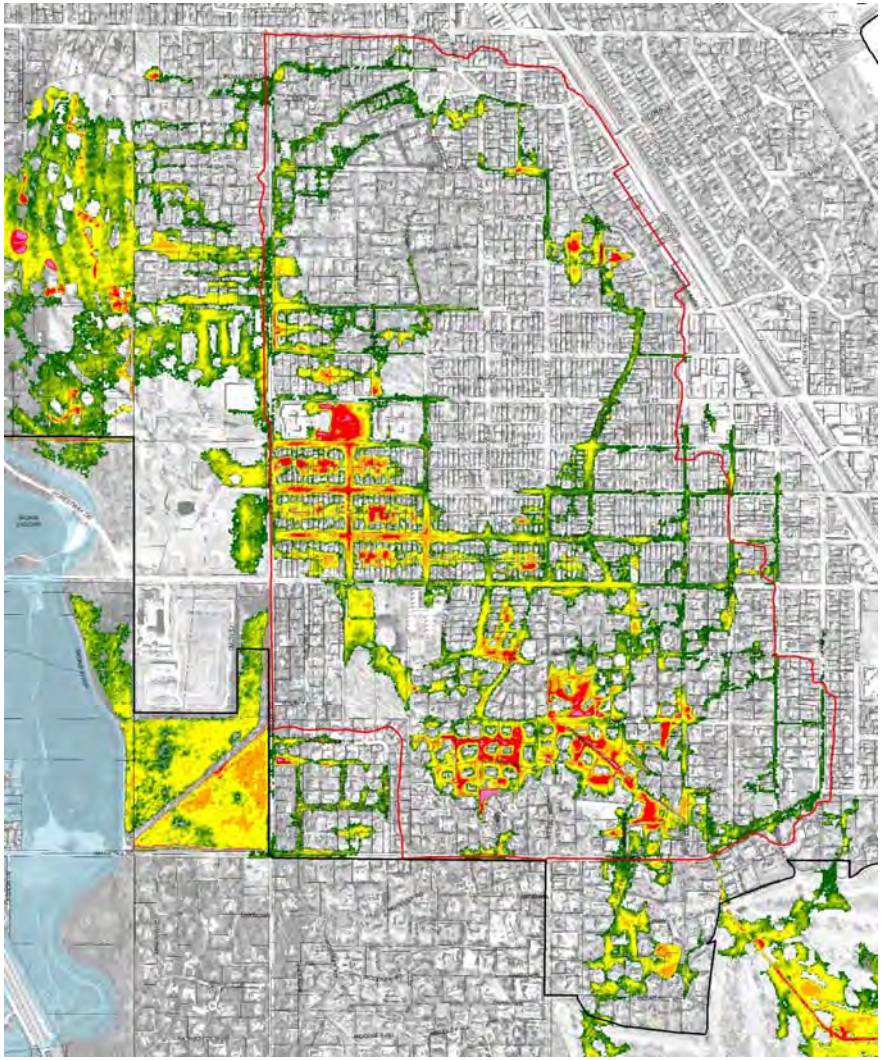
July 2011 – Ash and Glendale

April 2013 – Birch and Alles

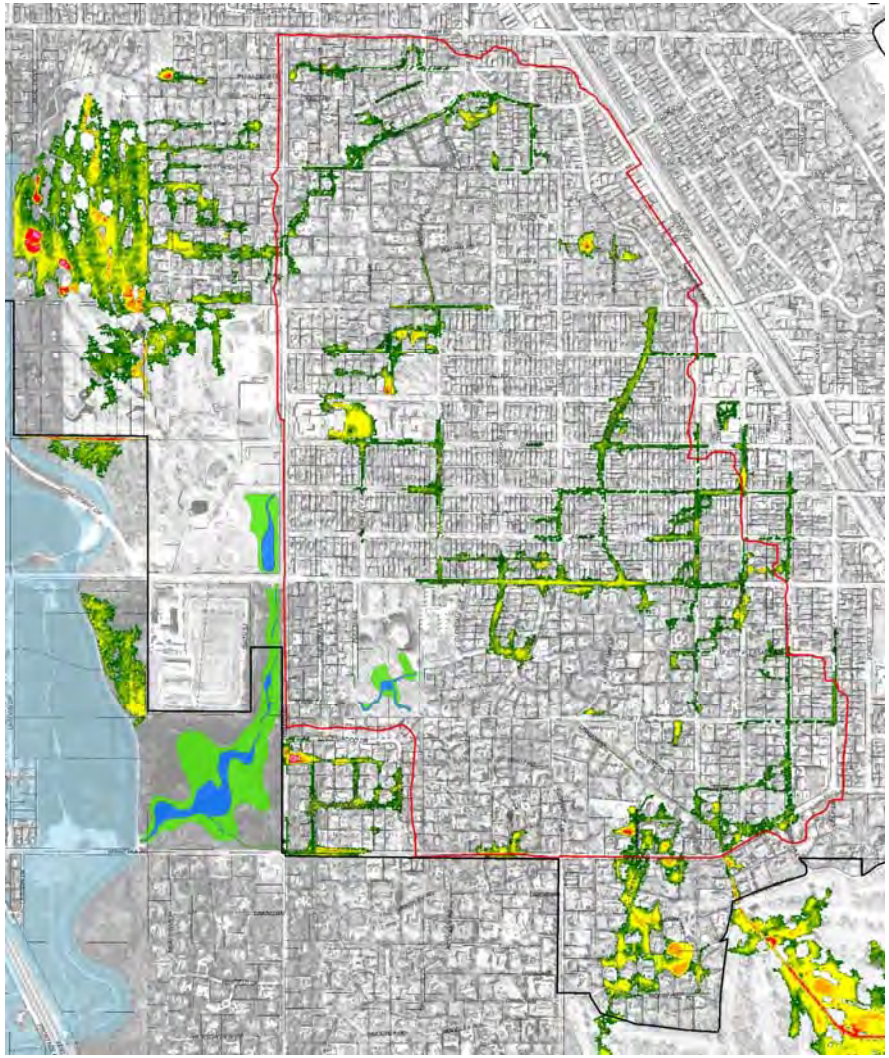
THE VILLAGE OF WINNETKA

Overall Vision

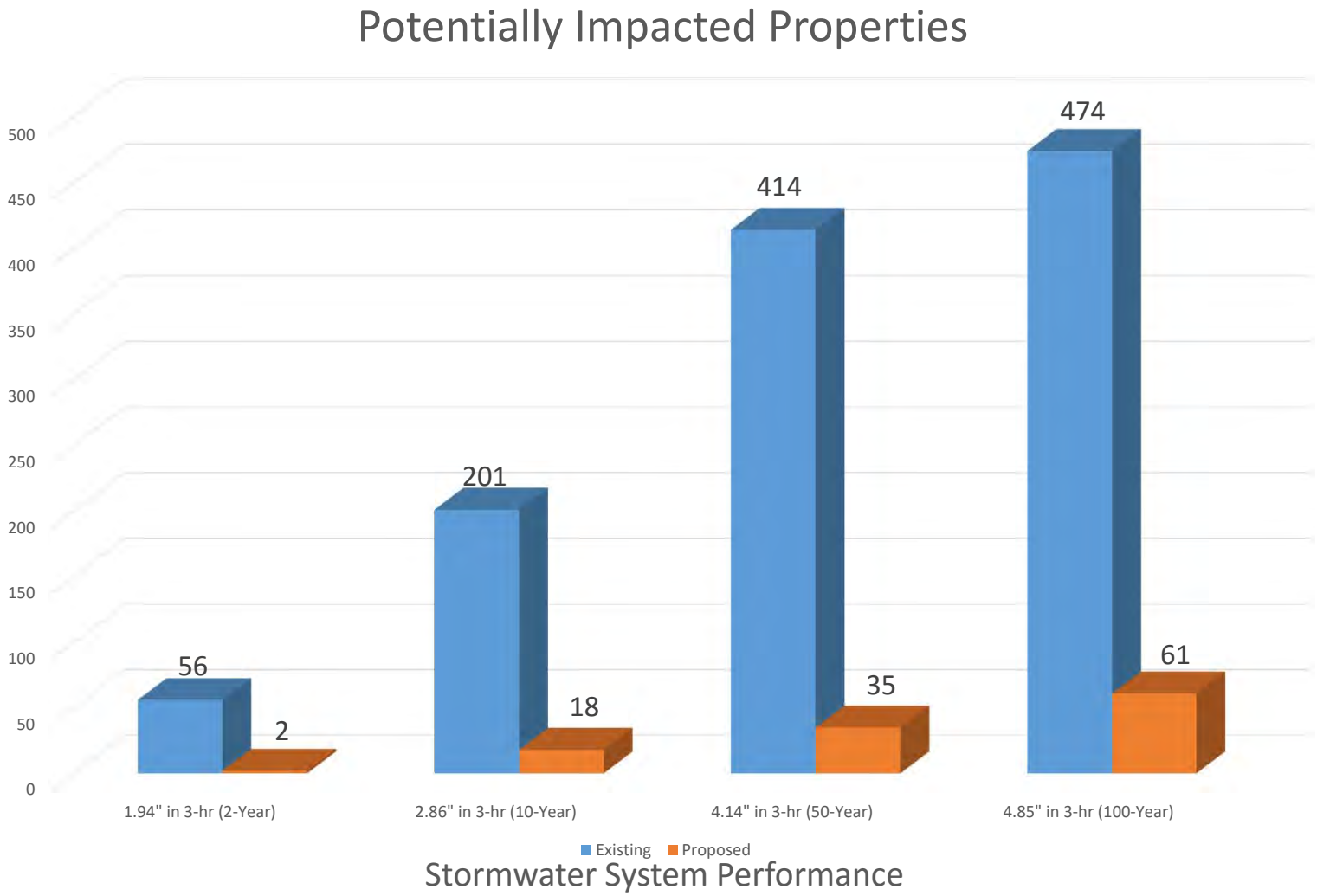
EXISTING CONDITIONS, 100-YR, 3-HR EVENT



PROPOSED CONDITIONS, 100-YR, 3-HR EVENT



Overall Vision



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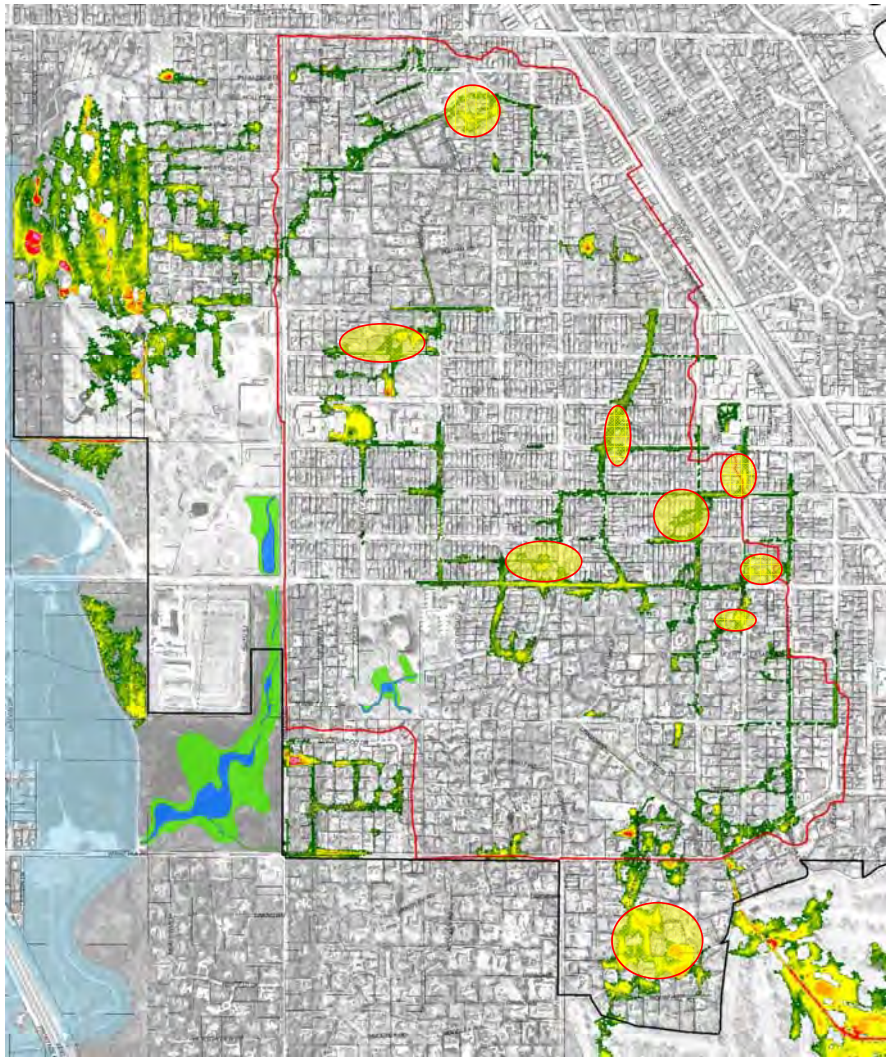
Mitigation Zones



THE VILLAGE OF WINNETKA

Preliminary Conceptual Cost Projection

• Phase 1		Cost
o FPDCC Hibbard Road Stormwater Storage Project	$	8,582,000
o Duke Childs Soccer/Lacrosse Field Stormwater Storage Project	$	1,005,000
o Winnetka Landfill Improvements - Soccer/Lacrosse Field Relocation	$	2,331,000
o Ash Street Conveyance Project	$	5,107,000
o Hibbard Road North Conveyance Project	$	6,553,000
Phase 1 Total	**$**	**23,578,000**
• Phase 2		**Cost**
o Crow Island Woods South Stormwater Storage Project	$	1,841,000
o Sunset Road East Conveyance Project	$	10,356,000
o Sunset Road West Conveyance Project	$	2,821,000
o Mount Pleasant Road Conveyance Project	$	1,362,000
Phase 2 Total	**$**	**16,380,000**
• Phase 3		**Cost**
o Washburne-Skokie School Underground Stormwater Storage Project	$	1,381,000
o Oak Street Conveyance Project	$	3,294,000
Phase 3 Total	**$**	**4,675,000**
• Phase 4		**Cost**
o Provident Watershed Conveyance Project	$	2,930,000
o Willow Road Conveyance Project	$	5,284,000
o North of Pine Conveyance Project	$	2,408,000
o Duke Childs Ball Fields/WPD Par-3 Golf Course Storage Project	$	2,461,000
Phase 4 Total	**$**	**13,084,000**
Stormwater Vision Total	**$**	**57,717,000**

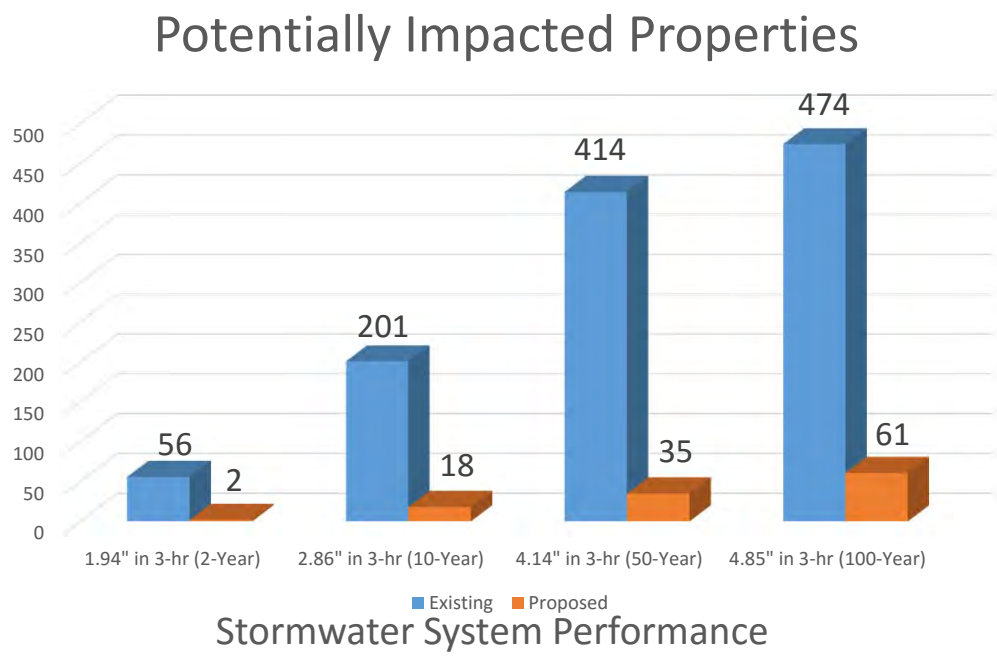
Preliminary Conceptual Cost Projection

- Total Project Cost (in 2016 Dollars) = $57.7 million
  - Conveyance Projects = $40.1 million
  - Storage Projects = $17.6 million
    - Green Infrastructure Aspects = $4.0 million (7%)
    - Design Contingencies
      - **30% for Conveyance Projects**
      - **20% for Storage Projects**
      - **15% Design & Construction Engineering**
      - **Wetland Mitigation Costs (FPDCC Project) = $2.3 million**
  - Basis of Conceptual Cost
    - Bid Tabulation Review of Past Village and other Similar Projects
    - Review of V3/HMM 2015 Cost Evaluation (Conveyance Primarily)
    - Detailed Quantity Takeoffs Well Beyond Typical Planning Level Studies
    - Utility Conflict Resolution Considered
    - Re-use of Excess Soil Results in Significant Cost Savings

Cost Considerations

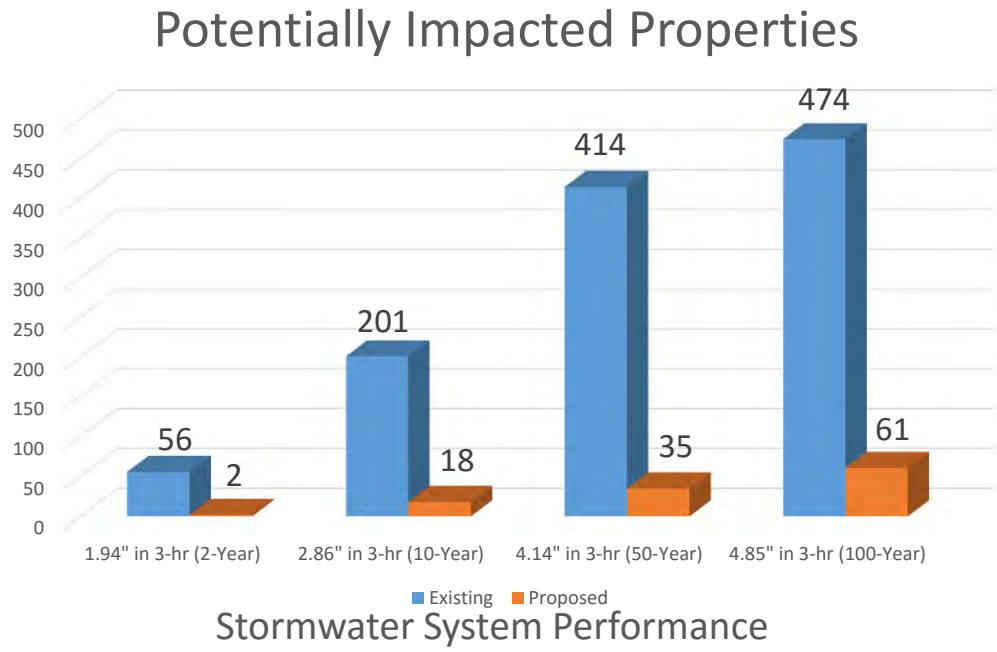
- 54 homes are protected from damage every 2 years
- An additional 145 homes are protected from damage every 10-years
- And so on…

- **Benefit-Cost Assessment (BCA):**
  - Comparison of future benefits to estimated overall cost
  - FEMA flood damage calculator for structure and contents only
  - Based on 2,000 sf structure (Impacted structure average is 4,000 sf)
  - Based on depth of flooding from model



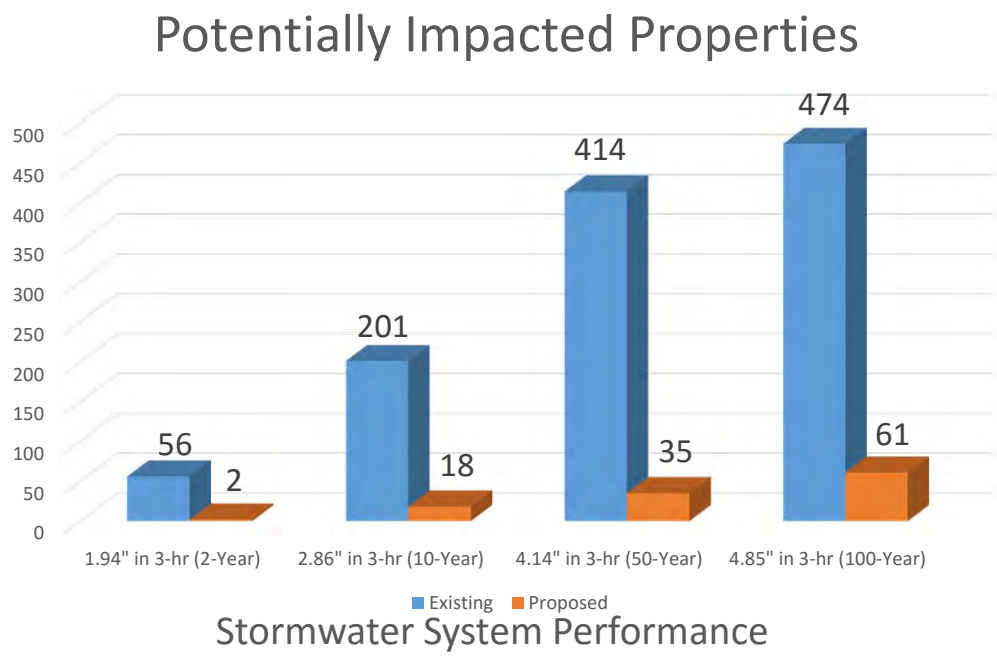
Cost Considerations

- **Benefit-Cost Assessment (BCA):**
  - FEMA calculator for a 2-Year storm = $39,150 per damaged home
  - 2-Year storm has 50% chance annually
  - Annualized cost = $19,575 per damaged home
  - 56 homes damaged = $1,096,200 annually
  - 2 homes damaged = $39,150 annually
  - Difference is $1,057,046 annual benefit
  - Applied for all events the annual benefit of damage reduction is $1,990,624
  - Standard BCA uses a 50-year project life
  - Damage reduction benefit = $99,531,221
  - Vision Conceptual Cost = $57,717,000
  - **Benefit-Cost Ratio (BCR) = 1.72**



Benefit Considerations

- The Benefit reflects properties protected from surface flooding, it does not reflect:
  - Homes relieved from foundation seepage
  - Relief to the sanitary sewer system
  - Increased accessibility during storm events
  - Reduced flood duration
  - Other reduced property damages (auto, landscaping, pavement, etc.)
  - Public works and clean up costs
- Does not reflect:
  - Ancillary utility and roadway improvements
  - Community stormwater quality and habitat improvements
  - Improved property values and sales
  - Eliminate the stigma of a community prone to flooding



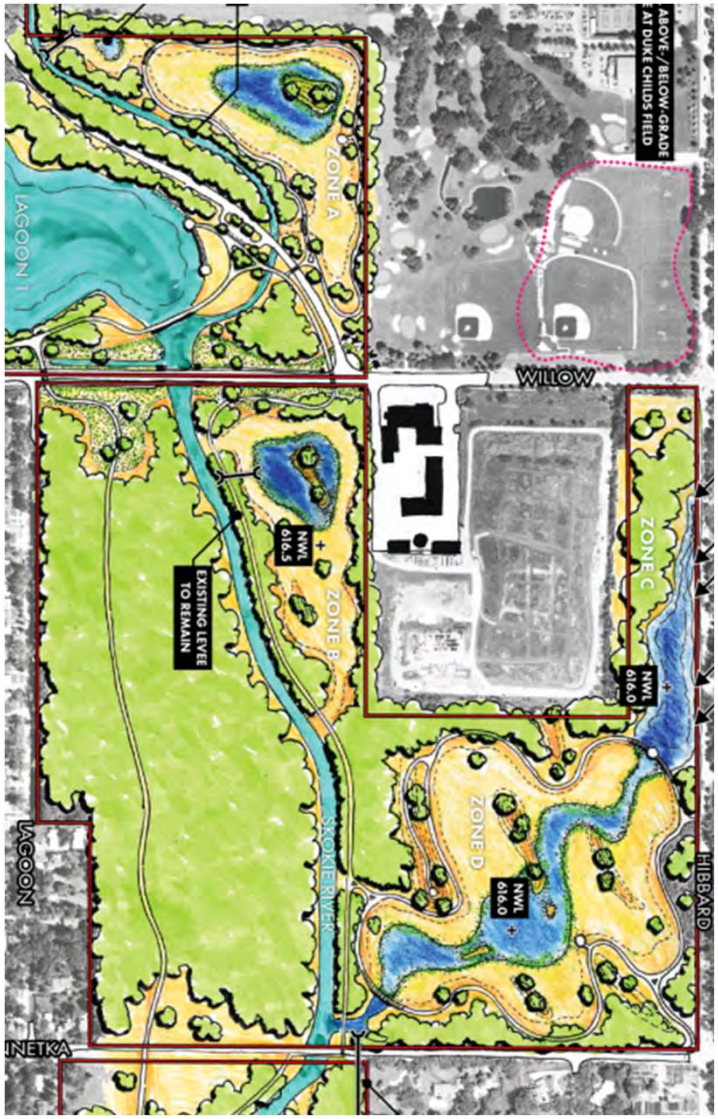
THE VILLAGE OF WINNETKA

Next Steps – Interdependency

Next Steps – Forest Preserve District of Cook County

Question/Concerns:

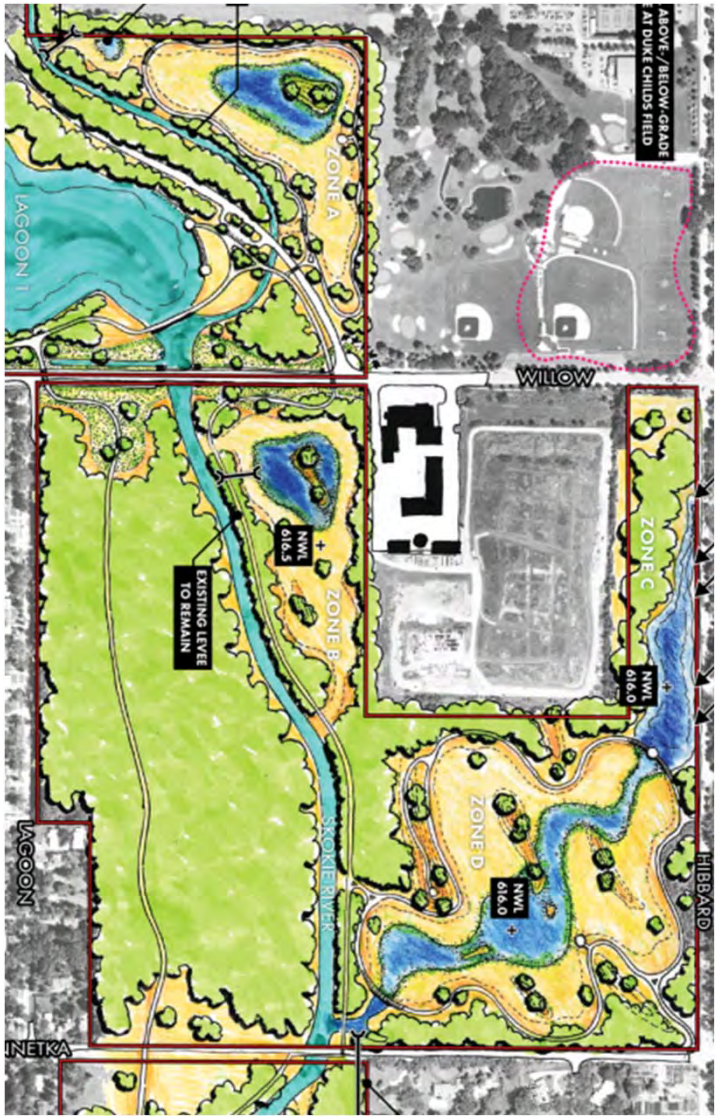
- Exhaust other opportunities for stormwater quantity and quality outside of FPDCC property
- Confirm project funding, implementation, and long-term maintenance
- Meet certain design and restoration expectations
- Confirm that no changes are proposed relative to the Skokie Lagoons



Next Steps – Forest Preserve District of Cook County

Additional Investigations:

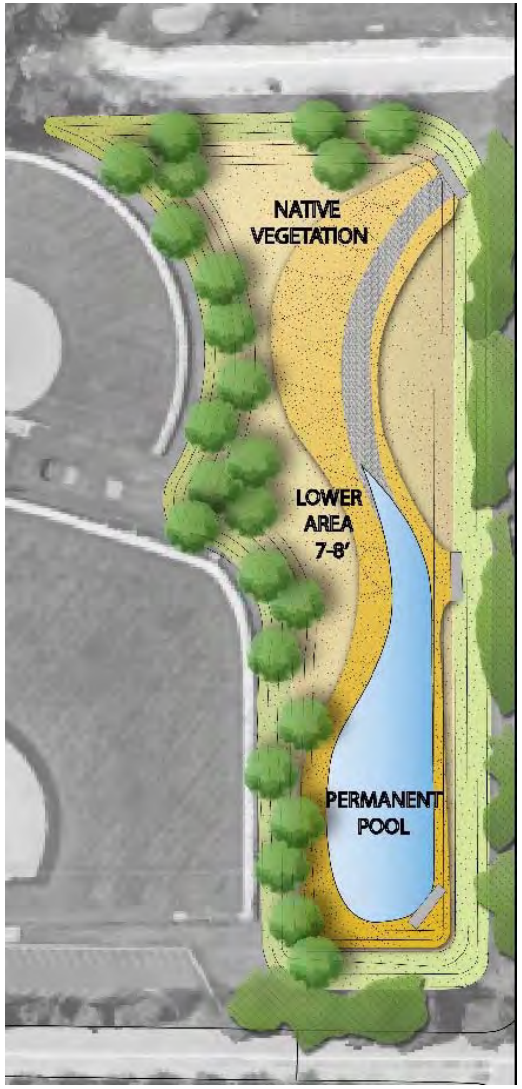
- Establish an understanding of the process and milestones for gaining official FPDCC approval
- Determine with FPDCC the scope of improvements and relationship to other Vision projects
- Perform a tree inventory, wetland delineation, and floristic quality assessment
- Begin discussions with USACE
- Continue open communication with local FPD Commissioner
- Engage stakeholder groups
- Develop more advanced concept engineering plans for FPDCC site
- Advance engineering for landfill redevelopment plan



Next Steps – New Trier High School District

Question/Concerns:

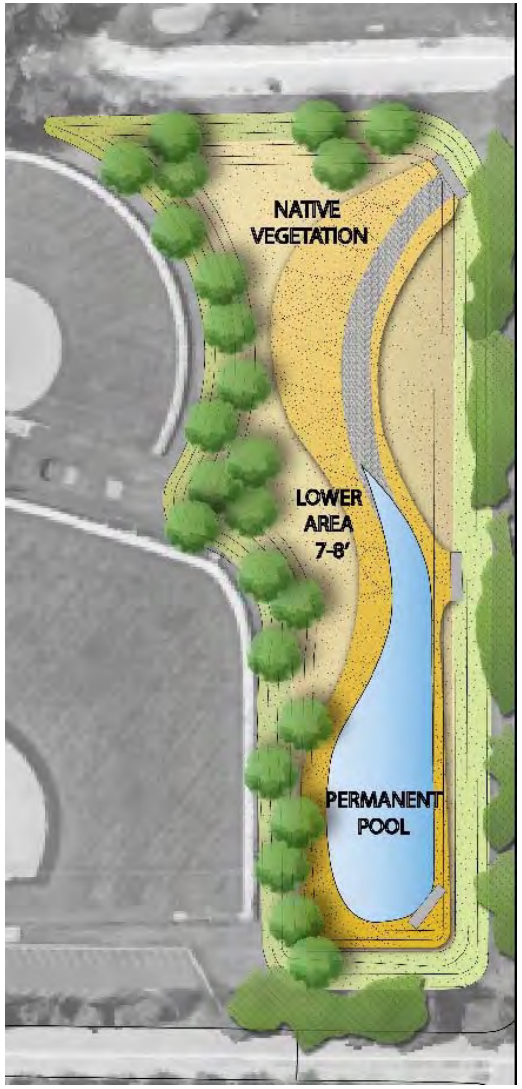
- Improvements on High School property must come at no expense to the NTHSD
- Improvements must result in no loss of current High School athletics use and programming
- Confirm the viability of the landfill redevelopment
- Concern with athletic operations divided between Duke Childs Field and the landfill fields
- Consider underground detention at Duke Childs Field soccer and lacrosse fields



Next Steps – New Trier High School District

Additional Investigations:

- Establish the expectations and position of the NTHSD Board and Administration relative to the Vision opportunities
- Develop more advanced concept engineering for the landfill redevelopment
- Explore alternatives to provide underground storage under the soccer and lacrosse fields
- Revise hydraulic modeling to reflect changes to the current Vision concepts
- Discuss changes to the Vision with FPDCC



Next Steps – Winnetka Park District

Question/Concerns – Crow Island Woods:

- Safety concerns with deeper water pools in proximity to school and neighborhoods
- Water quality concerns from urban stormwater runoff conveyed to the property
- Increased mosquito population in wet environment
- Impact and loss of high quality, mature trees and other natural areas
- Loss of screening between residential parcels and the public park
- Loss of trail system for park users and children walking to and from school

Next Steps – Winnetka Park District

Additional Investigations – Crow Island Woods:

- Perform a tree inventory and floristic quality assessment to determine actual condition of the site
- Perform a wetland delineation of the site
- Develop more advanced concept engineering for the current Vision within the context of maintaining as much of the existing quality features as possible
- Revise hydraulic modeling to reflect changes to the current Vision concepts
- With the Park District, conduct a site walking tour for the public to become more familiar with the current site and proposed improvements
- Meet with Park District staff and Board to discuss intentions for moving forward with the Vision
- Discuss changes to the Vision with FPDCC

Next Steps – School District 36

Additional Investigations:

- While no concerns or questions have been raised, members of the School District Board and Administration should be further engaged to confirm their support of the proposed Vision for underground storage at Washburne and Skokie school play yard.

Next Steps – Sunset Road and Alternative Conveyance

Questions/Concerns:

- Conveyance of stormwater out of the South of Willow watershed will require work on private roadways that are narrow and winding in mature neighborhoods
- Concerns with impact to private property, accessibility during construction, and final restoration

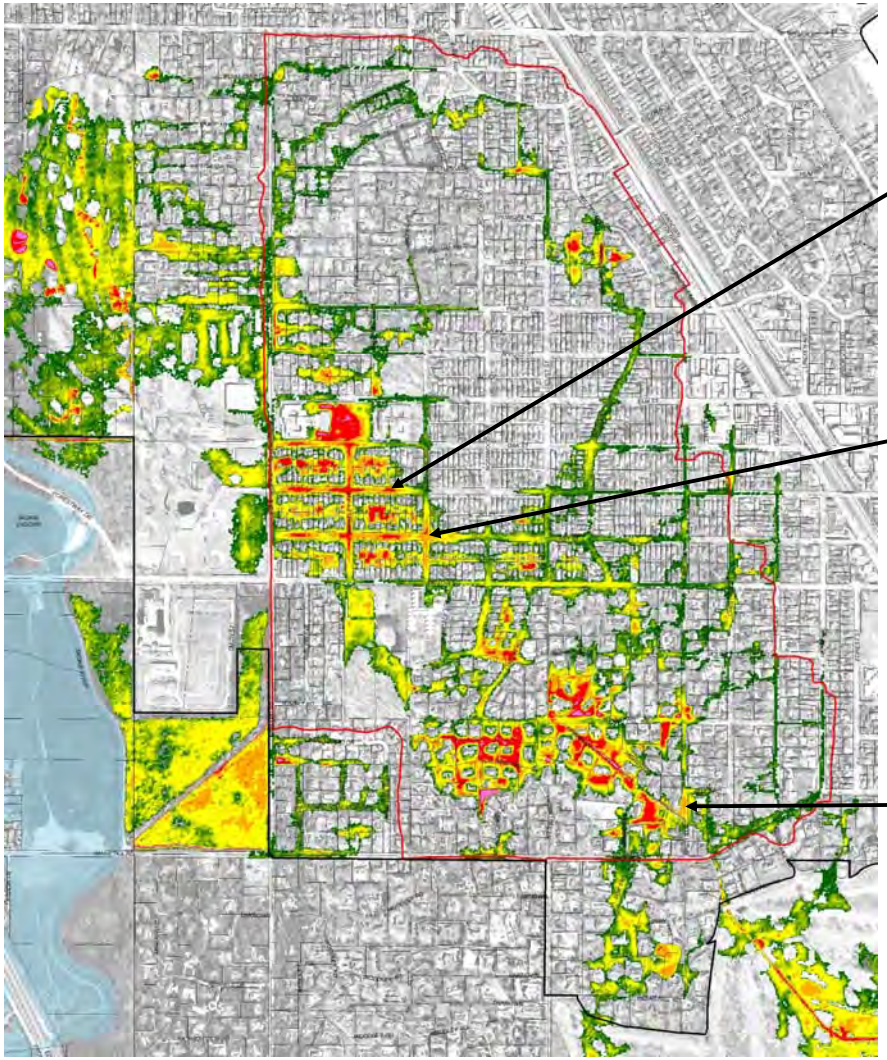
Additional Investigations:

- Develop more advanced engineering concepts along the proposed Sunset Road corridor
- Develop more advanced engineering concepts for alternative routes on Locust and Mt. Pleasant
- Continue engagement with affected property owners along the corridor to gain approvals
- Revise hydraulic modeling to reflect changes to the current Vision

Sunset Road

Problem

EXISTING CONDITIONS, 100-YR, 3-HR EVENT



July 2011 – 1200 Block of Cherry

July 2011 – Ash and Glendale

April 2013 – Birch and Alles

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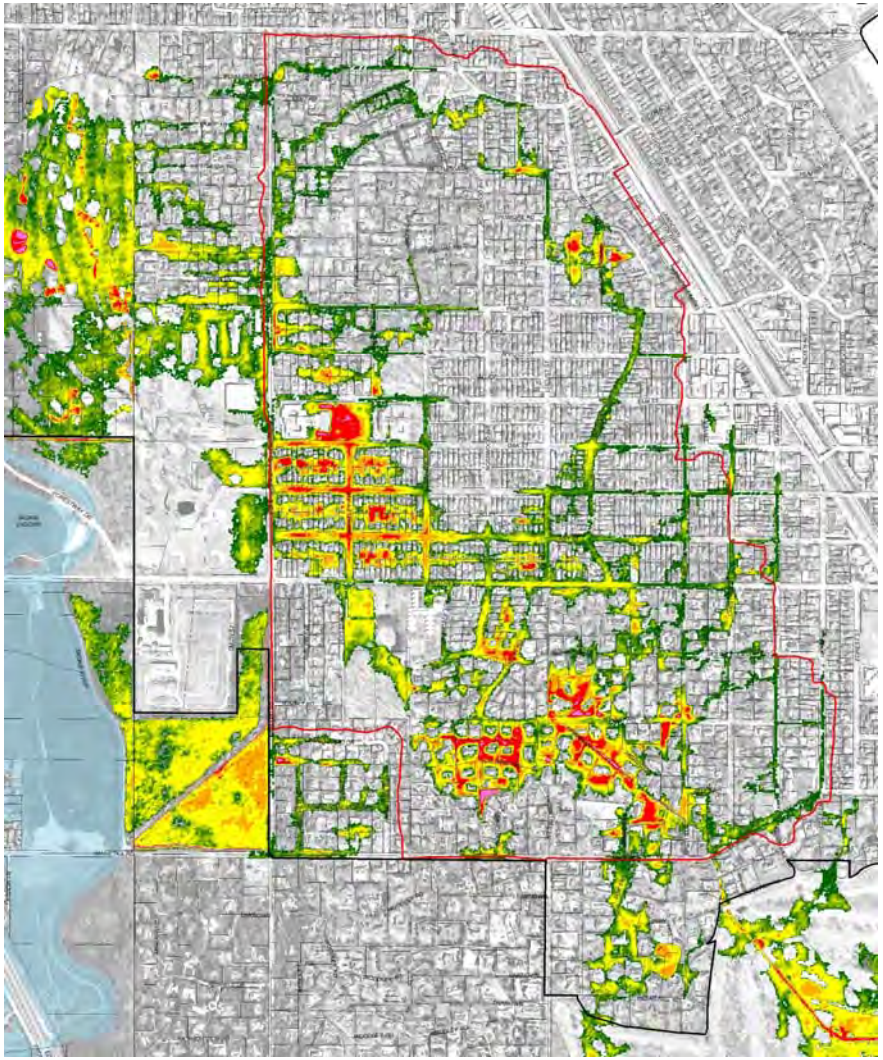
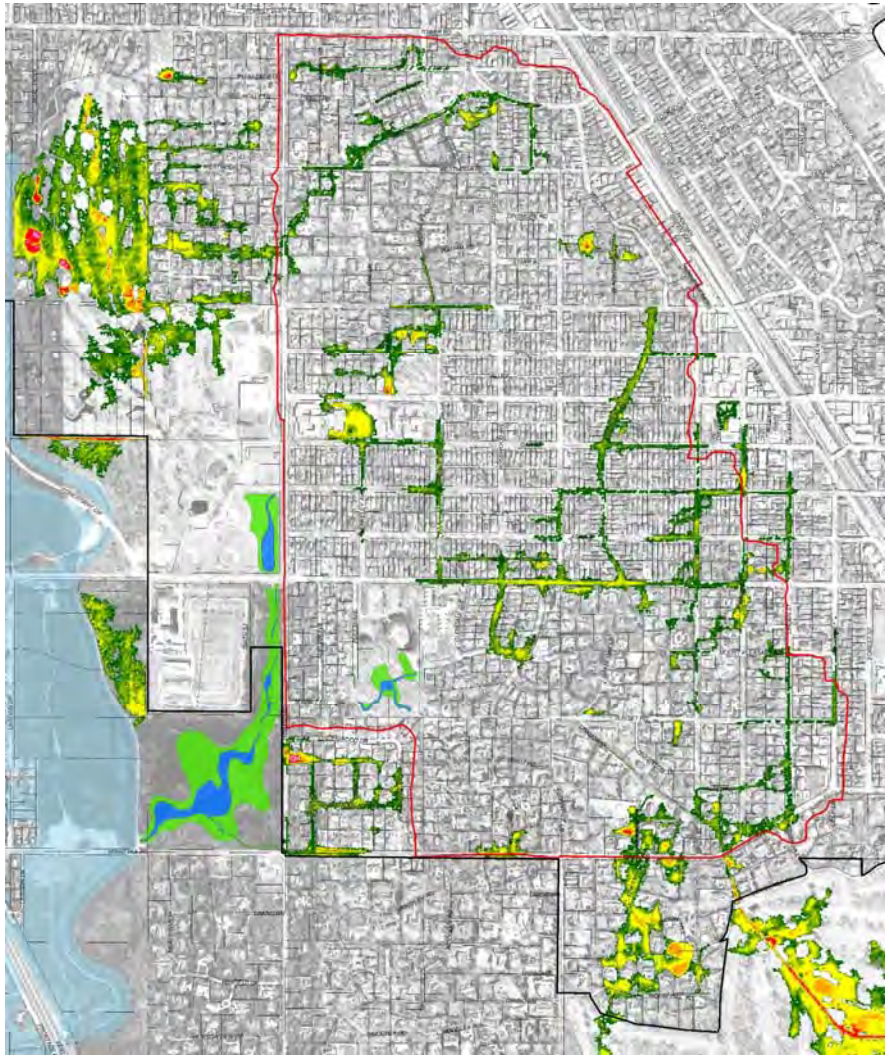
Solution

EXISTING CONDITIONS, 100-YR, 3-HR EVENT

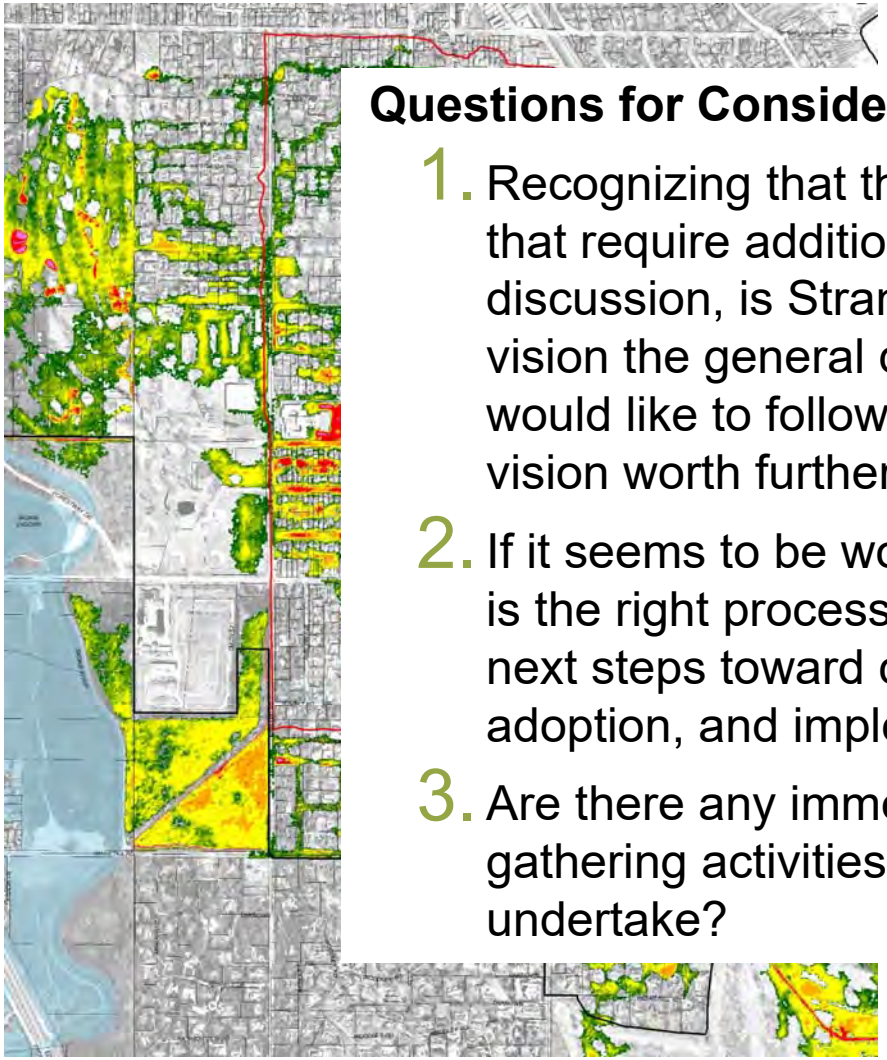


PROPOSED CONDITIONS, 100-YR, 3-HR EVENT

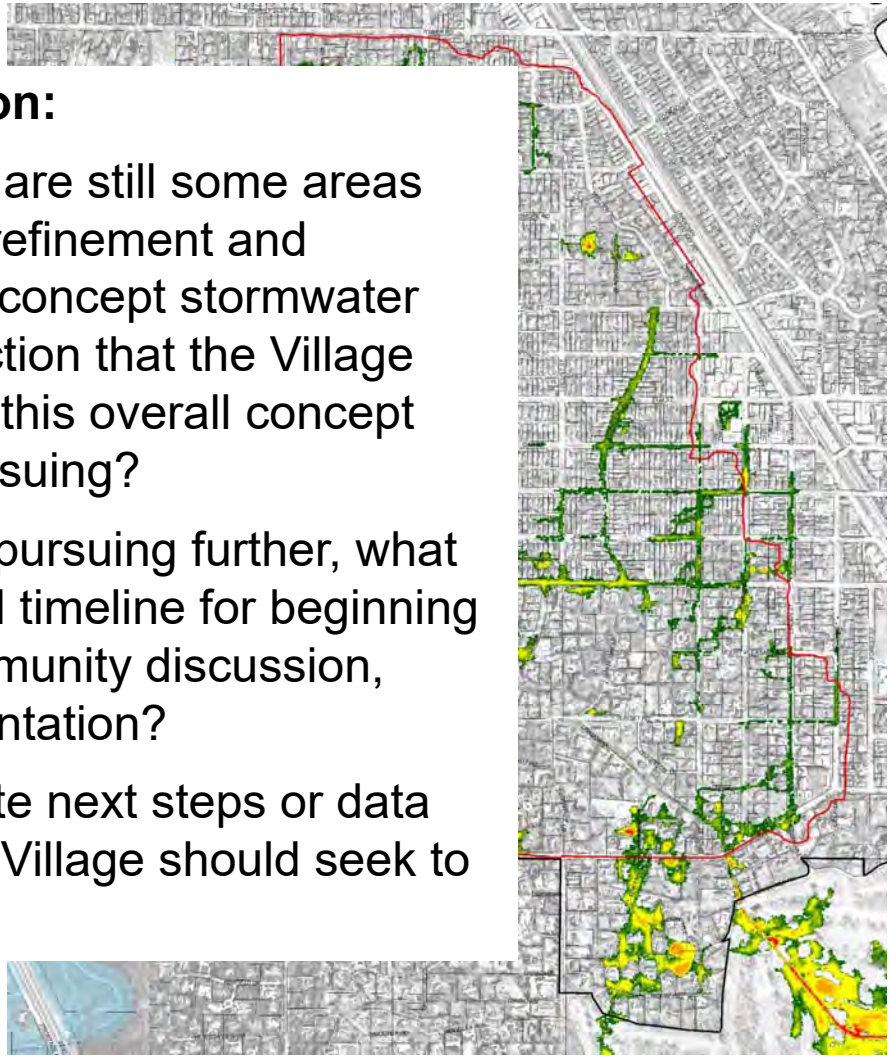


Solution

EXISTING CONDITIONS, 100-YR, 3-HR EVENT



PROPOSED CONDITIONS, 100-YR, 3-HR EVENT



Questions for Consideration:

1. Recognizing that there are still some areas that require additional refinement and discussion, is Strand's concept stormwater vision the general direction that the Village would like to follow? Is this overall concept vision worth further pursuing?
2. If it seems to be worth pursuing further, what is the right process and timeline for beginning next steps toward community discussion, adoption, and implementation?
3. Are there any immediate next steps or data gathering activities the Village should seek to undertake?

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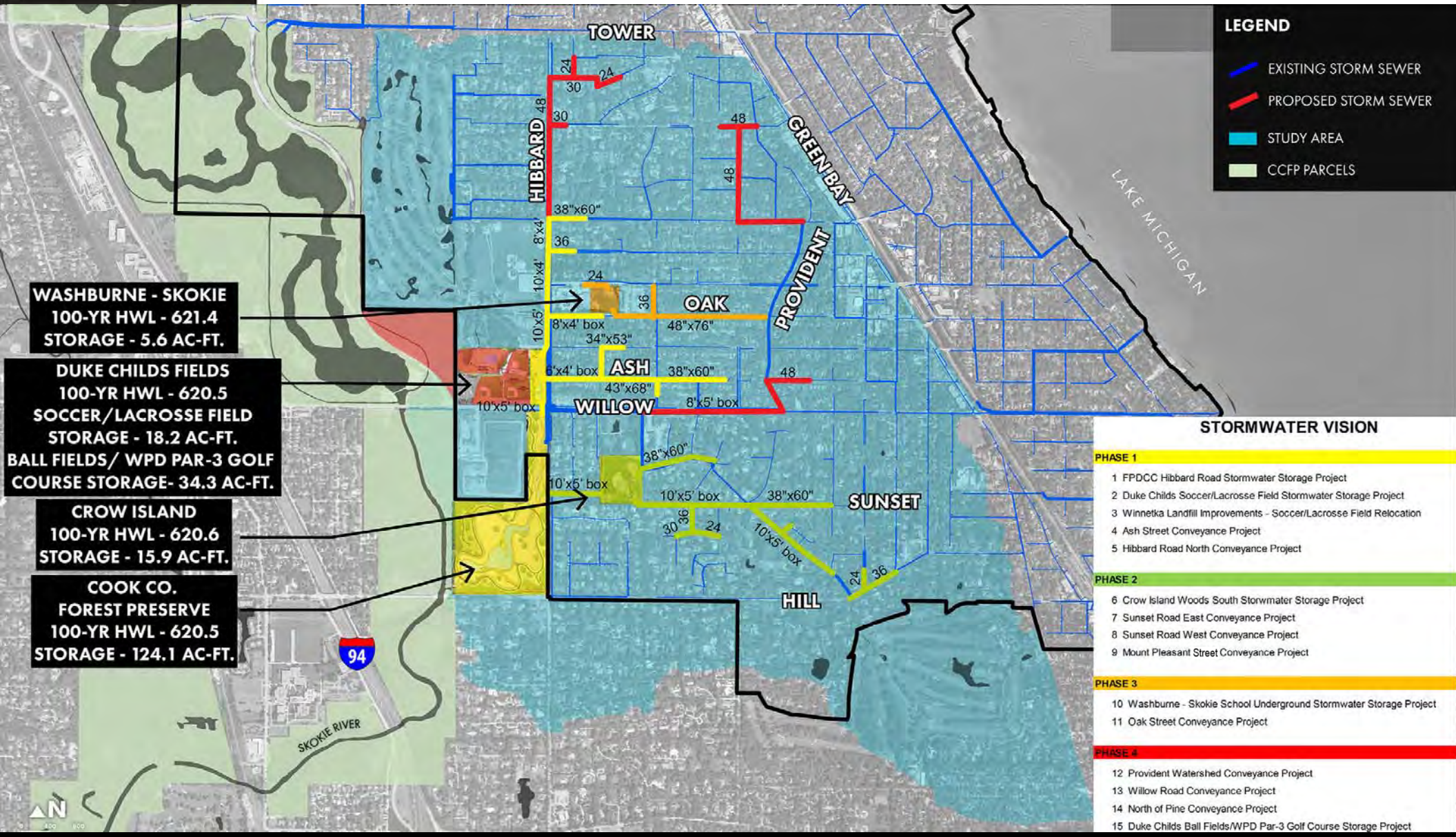

STORMWATER VISION

PHASE 1

1 FPDCC Hibbard Road Stormwater Storage Project
2 Duke Childs Soccer/Lacrosse Field Stormwater Storage Project
3 Winnetka Landfill Improvements - Soccer/Lacrosse Field Relocation
4 Ash Street Conveyance Project
5 Hibbard Road North Conveyance Project

PHASE 2

6 Crow Island Woods South Stormwater Storage Project
7 Sunset Road East Conveyance Project
8 Sunset Road West Conveyance Project
9 Mount Pleasant Street Conveyance Project

PHASE 3

10 Washburne - Skokie School Underground Stormwater Storage Project
11 Oak Street Conveyance Project

PHASE 4

12 Provident Watershed Conveyance Project
13 Willow Road Conveyance Project
14 North of Pine Conveyance Project
15 Duke Childs Ball Fields/WPD Par-3 Golf Course Storage Project