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Illinois State Water Survey

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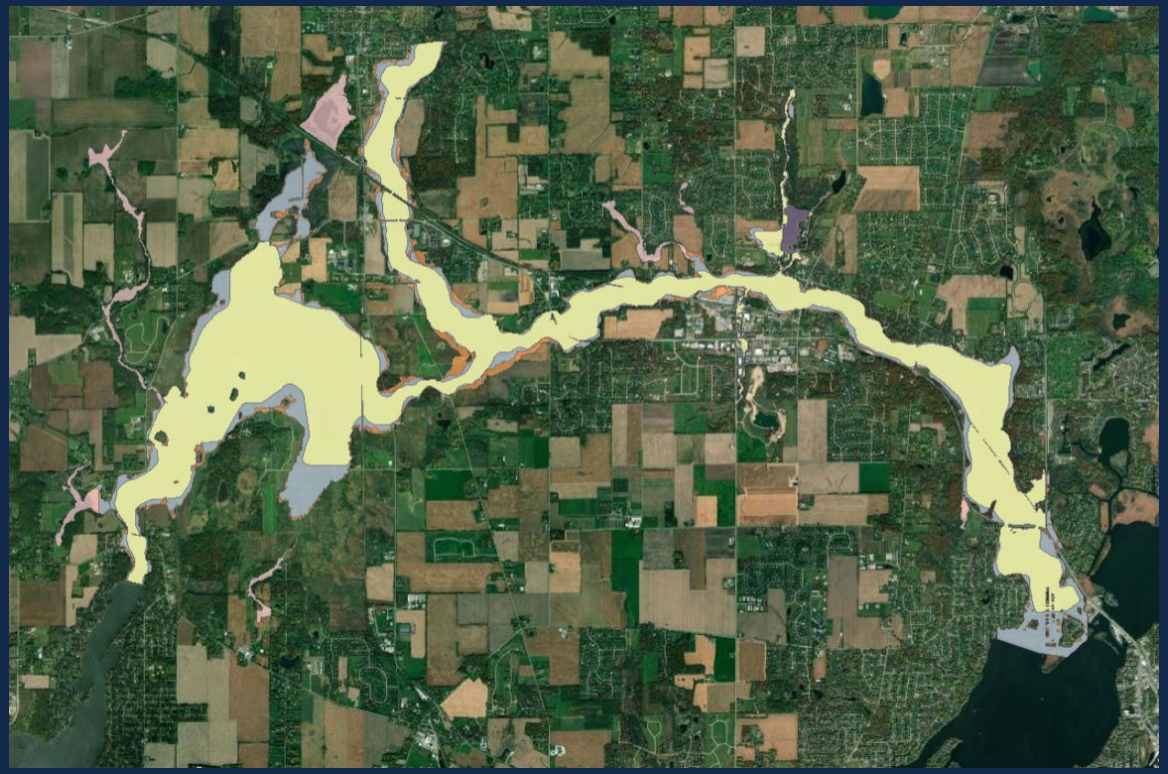
Nippersink Creek Watershed Flood Risk Review Meeting

June 7, 2023



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FEMA

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NIPPERSINK CREEK WATERSHED FLOOD RISK REVIEW MEETING: JUNE 7, 2023

PRE-MEETING SURVEY

1. How much do you know about your community's flood risk?

   ◯ a lot
   ◯ some
   ◯ not much

2. How much do you know about the FEMA Risk Mapping, Assessment and Planning (Risk MAP) process?

   ◯ a lot
   ◯ some
   ◯ not much

3. Are you able to communicate flood risk to your community?

   ◯ yes
   ◯ no

4. Would you know where to go to get flood mitigation help?

   ◯ yes
   ◯ no

Agenda

- Rollcall
- Introduction
- Project Scope
- Hydrologic Study Methods
- Hydraulic Study Method and Models
- Web Map Overview and Draft Floodplain Review
- Communication and Estimated Schedule
- Community Specific and Open Discussion

Rollcall

Communities/County

- Village of Fox Lake*
- Village of Richmond*
- Village of Ringwood*
- Village of Spring Grove*
- Village of Wonder Lake*
- Lake County (Unincorporated Areas)*
- McHenry County (Unincorporated)*

Others

- FEMA
- IDNR
- Other Agencies

* Participates in the NFIP

Introduction

Introduction

Who We Are

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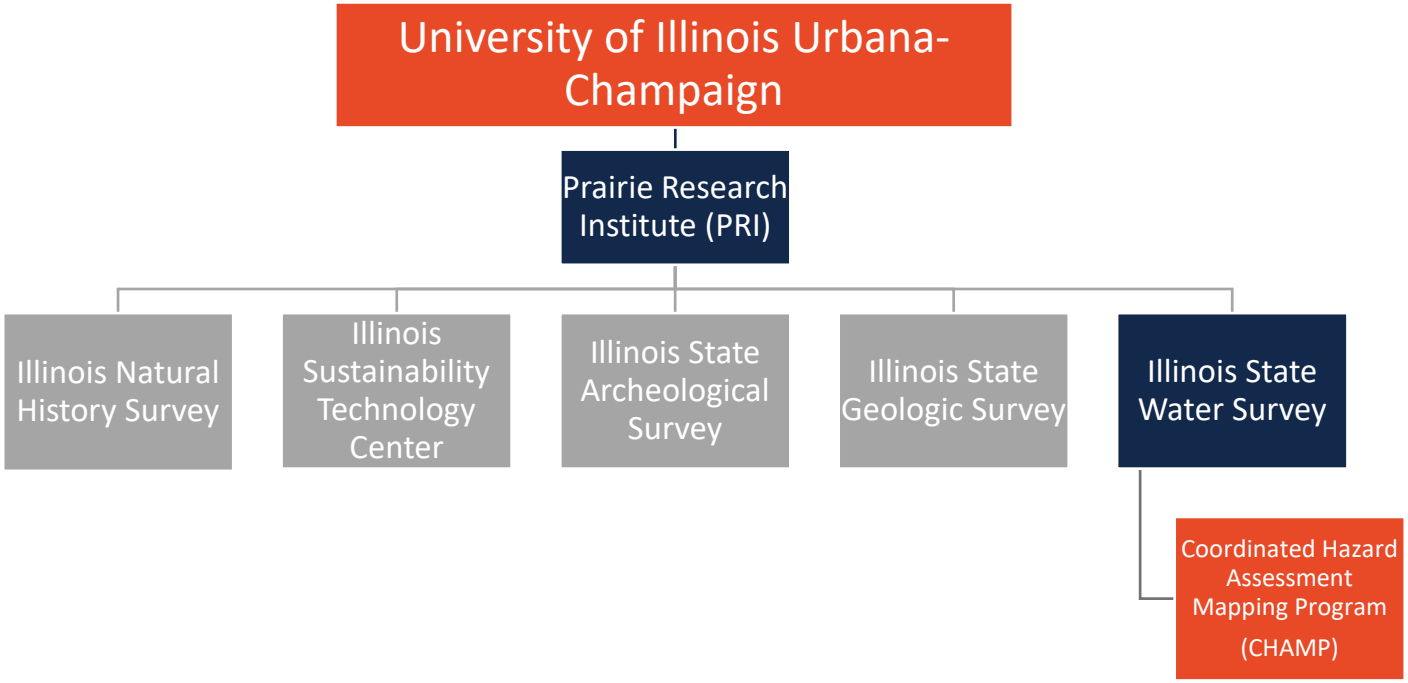

https://www.illinoisfloodmaps.org/

https://www.isws.illinois.edu/champ

Introduction

Our Partners

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FEMA

ISWS is a Cooperating Technical Partner (CTP) with the Federal Emergency Management Agency. (FEMA)

IDNR-OWR

ISWS partners with The Illinois Department of Natural Resources-Office of Water Resources (IDNR-OWR). Together we prioritize Illinois floodplain studies and mapping projects.

Your Community

ISWS provides ongoing engagement with state and local officials and watershed stakeholders to reduce flood risk.

Project Phases

Data Development <-- --> Regulatory Mapping

Today

map phase

Draft Map
(not released)

For Flood Risk Review (FRR)

web map

review & comment

map phase

Updated Draft Map

For FEMA Data Submission Notification Letter- AKA "621"

web map & Db

review & comment

map phase

Preliminary
(released)

For Community and Public Review

Comment Period & Appeal Period

LFD

map phase

Final
(released as pending)

For Community Ordinance Review and Adoption

(Limited FP Mgt use)

map phase

Effective
(regulatory)

For Flood Insurance & Floodplain Management Use

Flood Risk Review Meeting

draft engineering model results and draft floodplain delineations

End of Data Development

Resolve FRR comments
If necessary, update the models/delineations/Db
Issue FEMA "621" letter

Preliminary Products

Released as Preliminary Products
(FIRM Db, FIRM Panels, FIS)

Plus PSOMA

Post Preliminary Processing

Final Products

Released as Final Products - Pending
(FIRM Db, FIRM Panels, FIS)

Plus FSOMA

Effective Products

Previously released Final Products are Effective
(FIRM Db, FIRM Panels, FIS)

Plus Revalidation Letters

What is a Special Flood Hazard Area?

The FEMA Special Flood Hazard Area (SFHA) represents areas mapped as having a 1% annual chance of being inundated by the base flood in any given year.

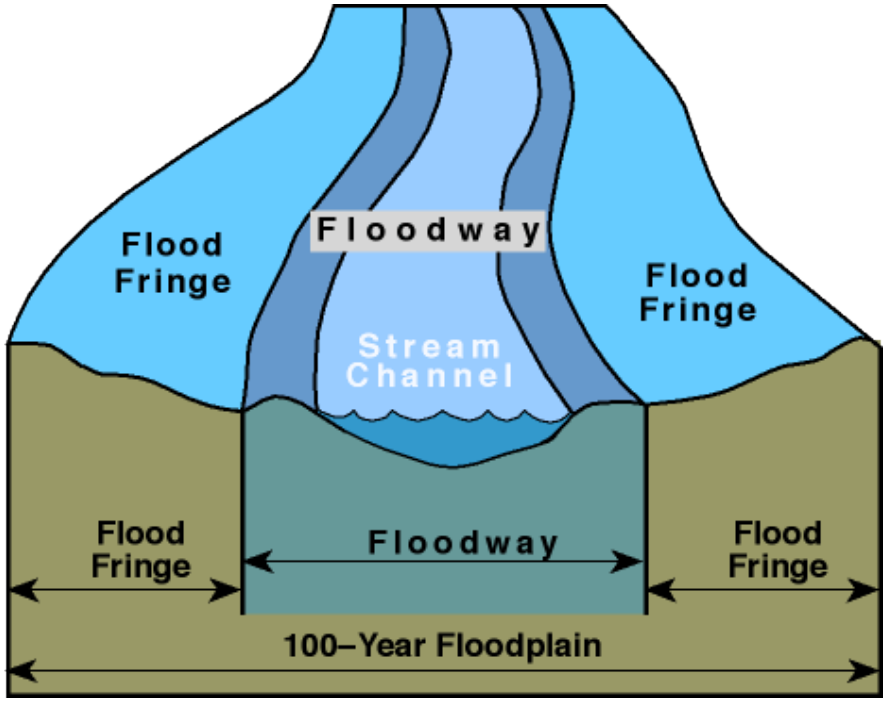
Riverine hydraulic analysis typically results in SFHA designation as **Zone A** or **Zone AE,** based on the analysis level deemed appropriate for the study area.

The Base Flood Elevation (BFE) is the elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year.

Zone A	Areas subject to inundation by the 1-percent-annual-chance flood event. **NO** Base Flood Elevations are shown.
Zone AE	Areas subject to inundation by the 1-percent-annual-chance flood event. Base Flood Elevations **ARE** shown.
Zone AO	Areas subject to inundation by the 1-percent-annual-chance shallow flooding event, usually in the form of sheet flow with an average depth ranging from 1-3 feet. Average flood depths **ARE** shown

Floodway

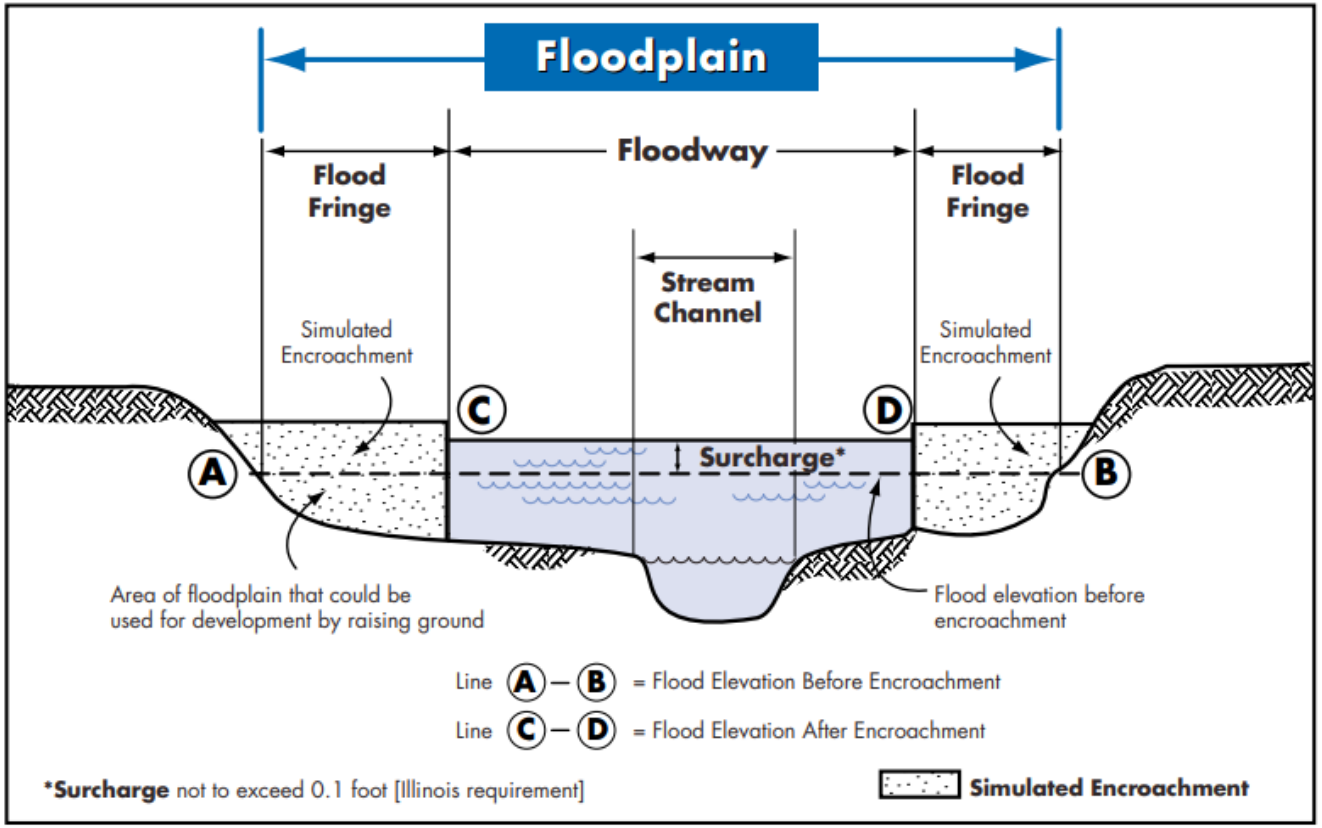
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.



Floodway

Illinois Floodway requirements:

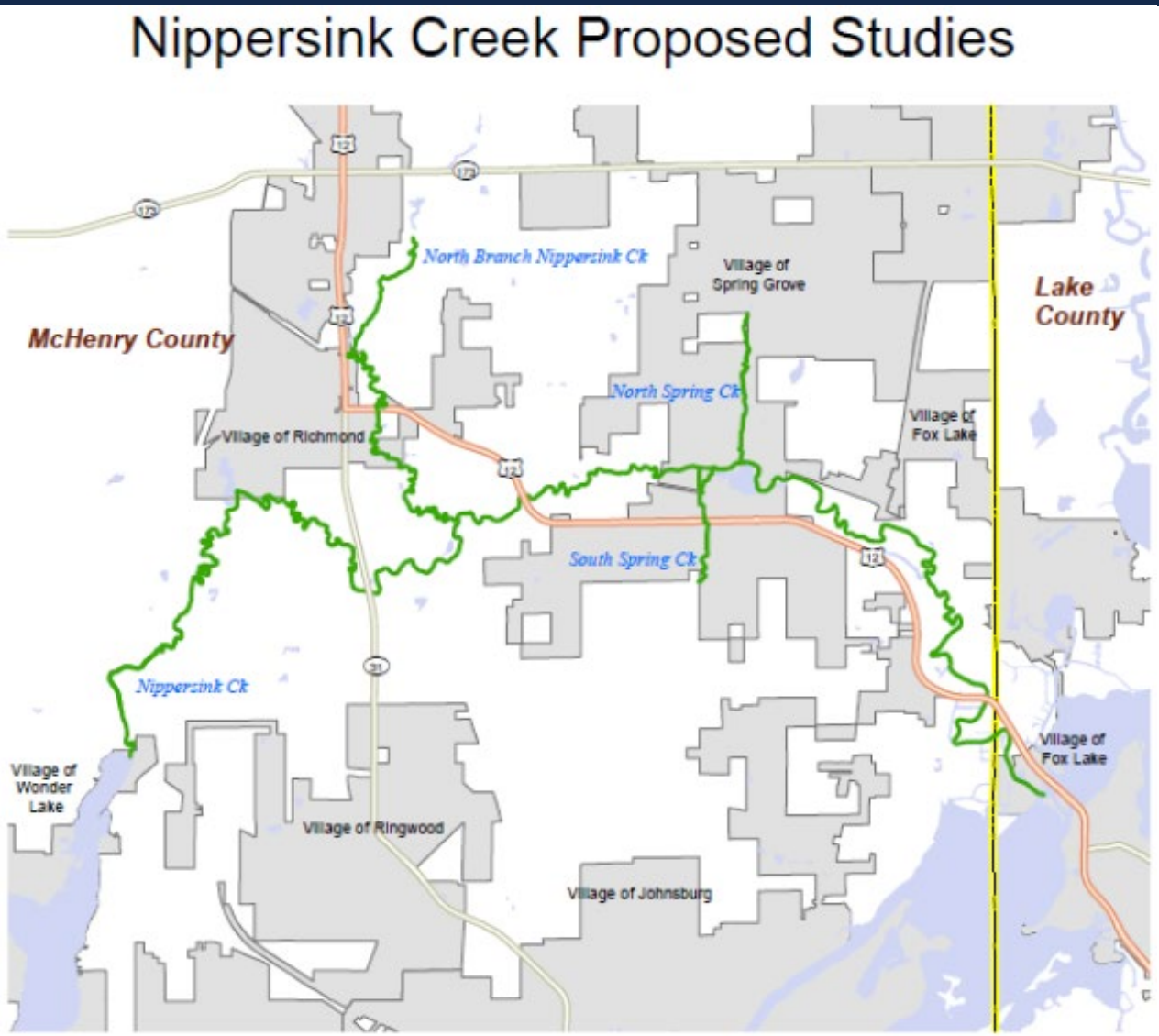
- 0.1-foot maximum surcharge
- Max 10% reduction in storage volume
- Max 10% increase in flow velocity



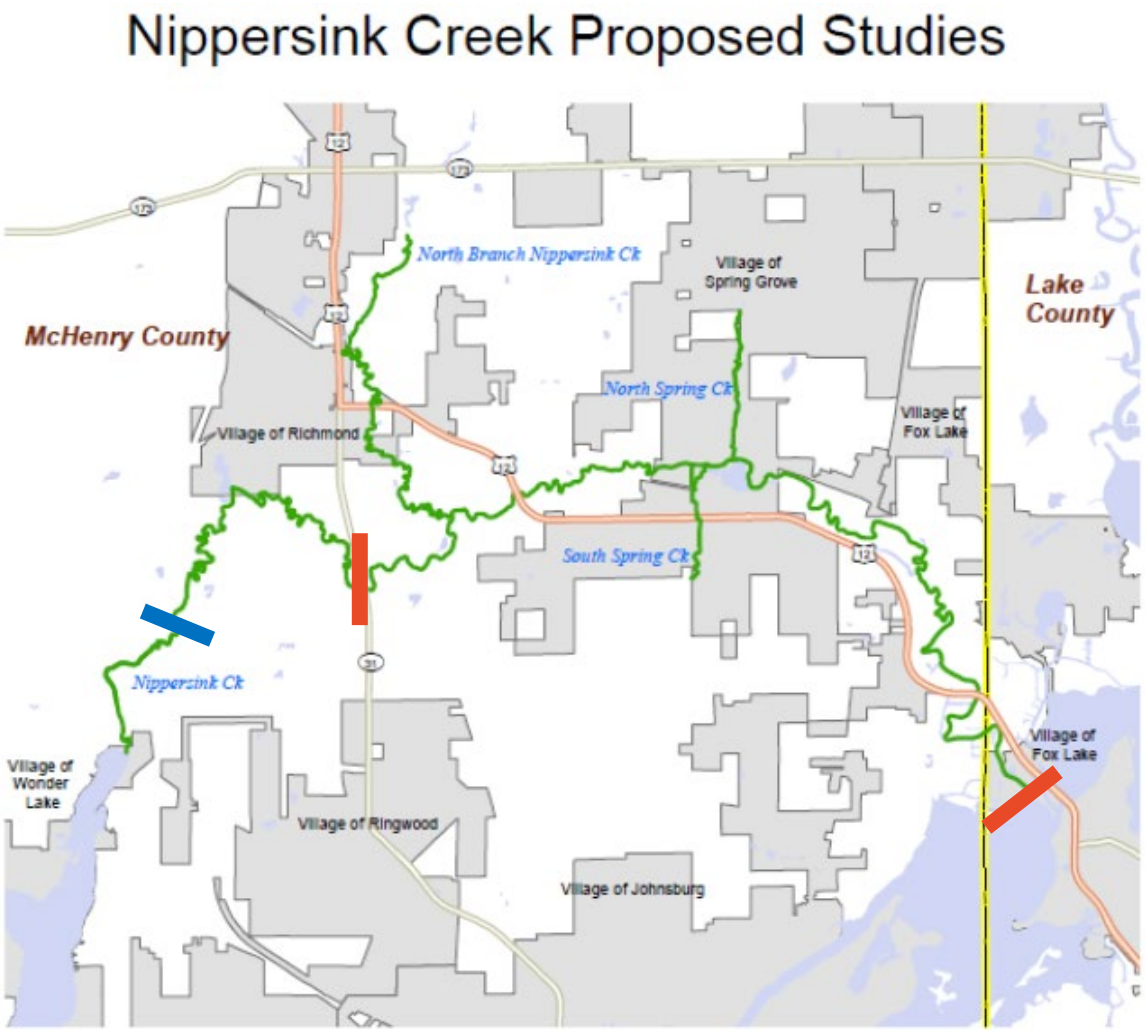
Credit: https://www2.illinois.gov/dnr/WaterResources/Documents/Resman_ILFPMQuickGuide.pdf

Project Scope

Project Scope



Nippersink Creek-Project History



FY2015:

- Nippersink Creek Watershed Hydrology (Atlas 14) and limited mainstem hydraulics

FY2019:

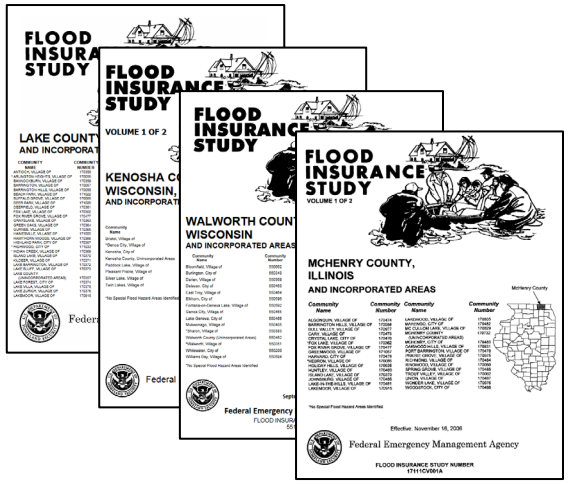
- Additional hydraulic reaches

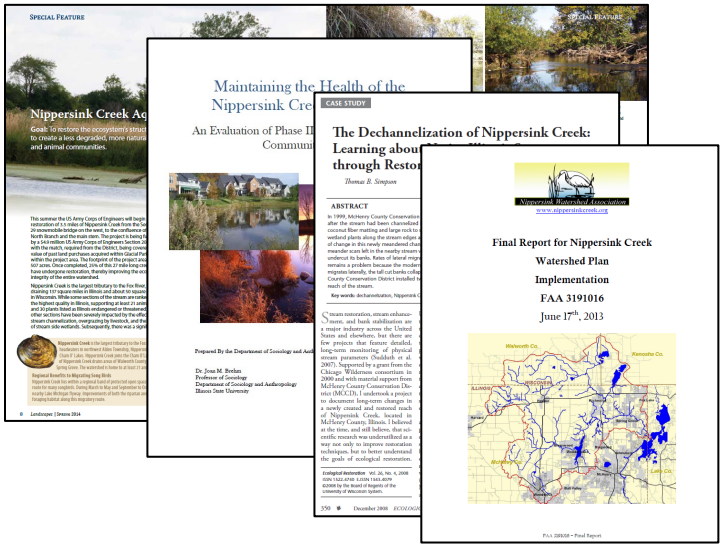
FY2019 (revised due to community comments):

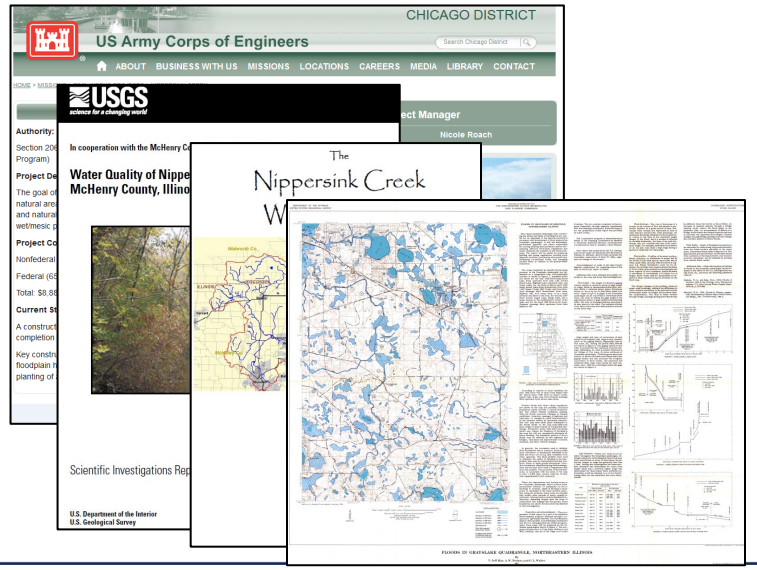
- Updated hydrology (Bulletin 75), additional hydraulic reaches, revised topographic data

Study Background

- Effective Flood Insurance Studies
  - Lake County and Incorporated Areas – 2016
    - USGS Gage Analysis, HEC-1 with TP-40 rainfall (1961)
  - McHenry County and Incorporated Areas – 2006
    - USGS Gage Analysis, HEC-1 with TP-40 rainfall (1961)
    - Regional Regression Equations (1973, 1977)
    - Floodplain Mapping on 10 ft contour interval topography
  - Walworth County and Incorporated Areas – 2014
    - SCS Method with TP-40 Rainfall and Regional Regression
  - Kenosha County and Incorporated Areas – 2012





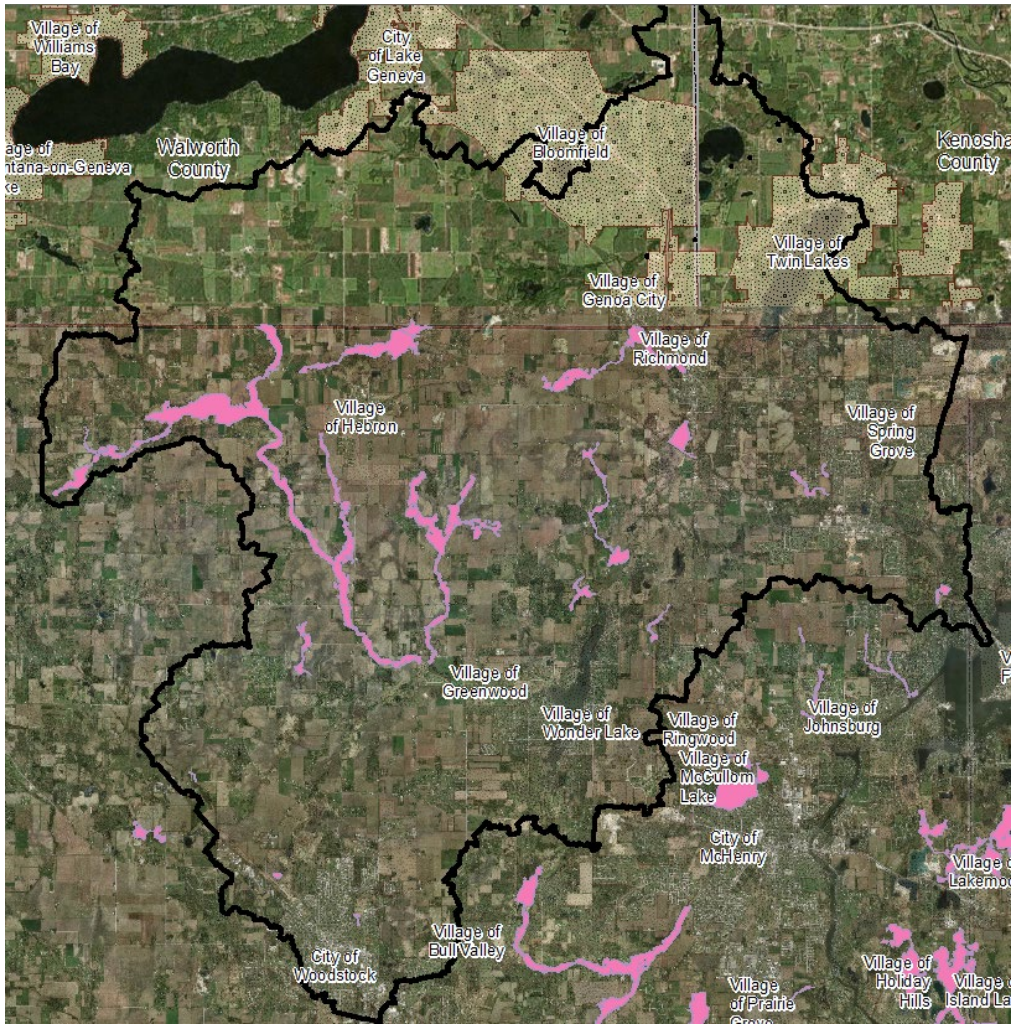


Additional Map Updates

Nippersink Creek Zone A: STARR/CDM Study

New Zone A study (no structures) [Completed August 2016]

- All streams denoted as invalid or unknown in the Coordinated Needs Management Strategy (CNMS) database for the Upper Fox River Watershed which includes Nippersink Creek
- Includes HEC-RAS modeling of the 10-, 4-, 2-, 1-, (1%+), 0.2-% Annual Chance Events
- Includes Floodplain mapping for the 1% Annual Chance Event
- Discharges from Regional Regression Equations
- These updates appear with the draft ISWS mapping within the study reach



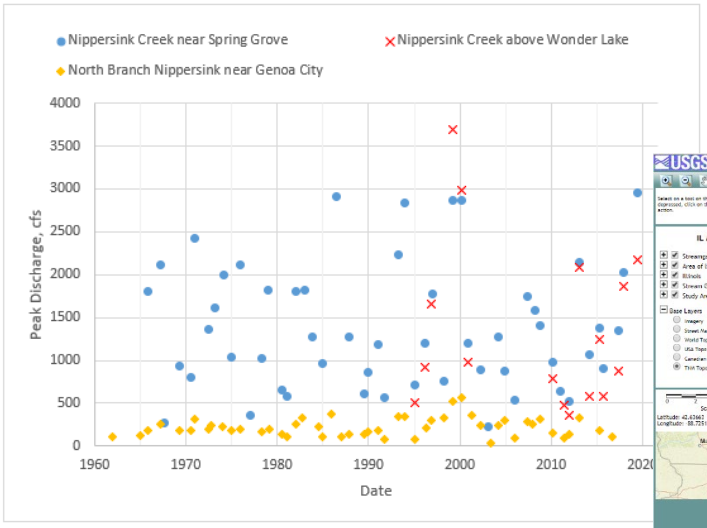
Hydrologic Study Methods

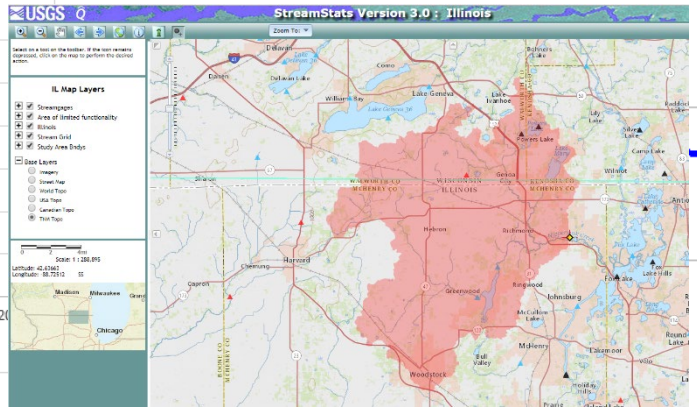
Hydrology

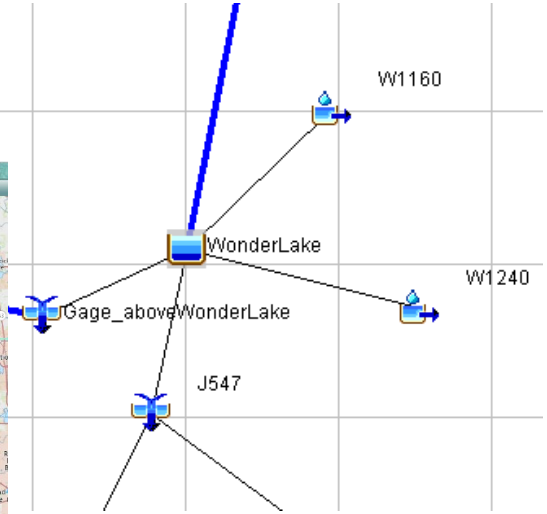
What is the peak streamflow during the base flood?

Three common methods:

- Stream gage analysis- Historical stream data
- Regression Equations- Regional averages and physical characteristics
- **Rainfall runoff model**- Based on physical characteristics and rainfall frequency

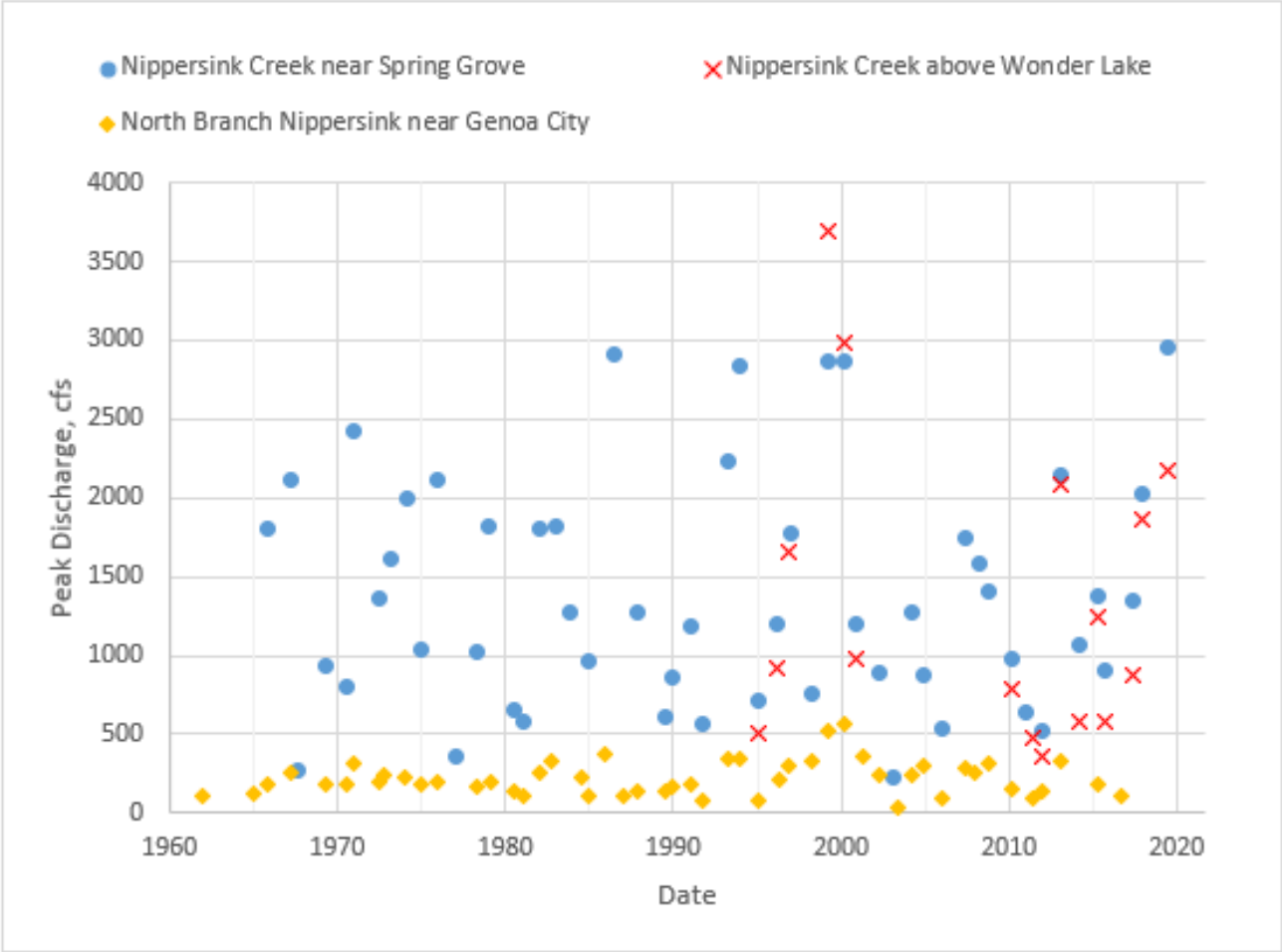






Stream Gage Analysis

Nippersink Creek Annual Peak Streamflow Data



Gage Analysis

USGS Bulletin 17B/C

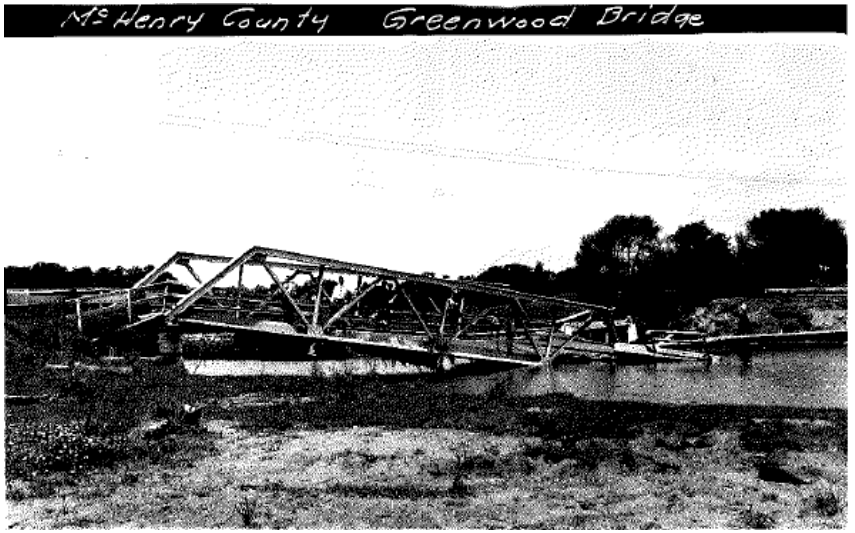
Nippersink Creek near Spring Grove

(USGS 05548280)

[1960, 1966-2019]

Stream Gage Analysis

From USGS Water Year Summary,
"EXTREMES OUTSIDE PERIOD OF RECORD - SURFACE-WATER DISCHARGE AND STAGE:
Flood in April 1960 reached a stage of 13.7 ft, from information by local resident, and flood in July 1938 reached a stage of about 4 to 6 ft higher than that in April 1960."

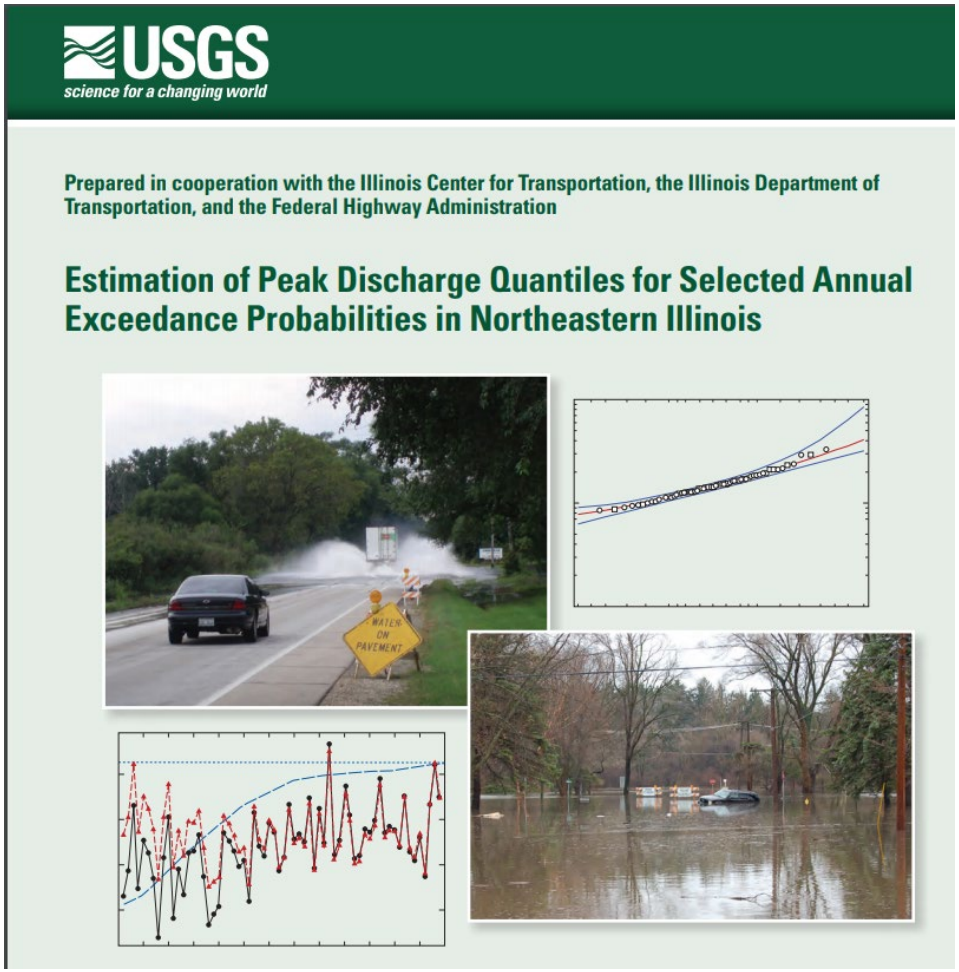


Credit: McHenry County DOT, 1938 Nippersink Creek Flood, Greenwood


Credit: wonderlakealive.com, 1938 Nippersink Creek Flood, Greenwood

No estimates of the 1938 peak streamflow are available.

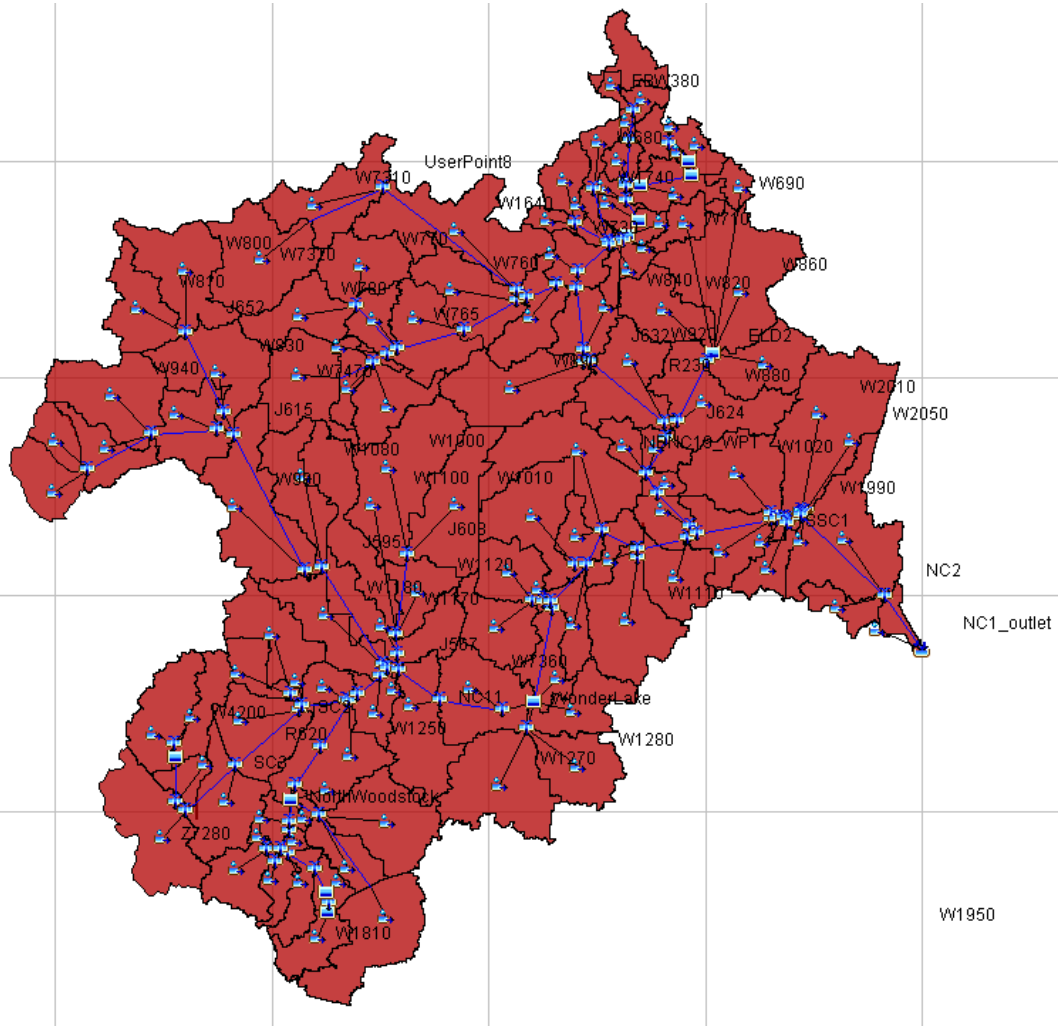
Regression Analysis



USGS Scientific Investigations Report 2016-5050

includes stream gage and regression analysis result with Nippersink Creek near Spring Grove gage data up to 2009. Includes results of gage analysis, gage analysis with adjustment for urbanization, and updated regression equation results.

Rainfall Runoff Modeling



HEC-HMS Version 4.2

- Soils: NRCS SSURGO
- Land Use: National Land Cover Database
- Lake County Clark Transformation Parameters
- Reservoir modeling at Wonder Lake, Lake Elizabeth/Mary, and select depressional areas
- Rainfall: ISWS Bulletin 75, AMC II
- Incorporation of Wisconsin East Branch of North Branch Nippersink Creek
- Calibration/Validation – 2000, 2013, 2019 at Spring Grove, supplemental at other gaged locations

Rainfall Runoff Modeling

Design Rainfall – Northeastern Illinois

Design Rainfall Source	100 Year – 24 hour Design Rainfall (in)	100 Year – 72 hour Design Rainfall (in)
Technical Paper 40 (1961) [Effective FIS]	5.75	NA
ISWS Bulletin 70 (1989)	7.58	8.78
NOAA Atlas 14 (2004, not trend adjusted)	6.04	7.03
ISWS Bulletin 75 (2020) [Current Standard]	8.57	9.85
For comparison: Observed rainfall during 1938 event	~ 6.75	~ 7.26

Calculated Design Discharges

Nippersink Creek near Spring Grove

Analysis Details	Base Flood Peak Streamflow (cfs)
Effective	7,506
Regression Equations (USGS, 2016*)	5,820
Statistical Gage Analysis	4,939
HEC-HMS using Atlas 14 (72 hr)	6,940
HEC-HMS using ISWS Bulletin 70 (72 hr)	11,990
HEC-HMS using ISWS Bulletin 75 (72 hr)	**13,111**
Estimated 1938 peak flow – (Approximately 20- to 30-year B75 precipitation event)	~7,000-11,000

Calculated Design Discharges

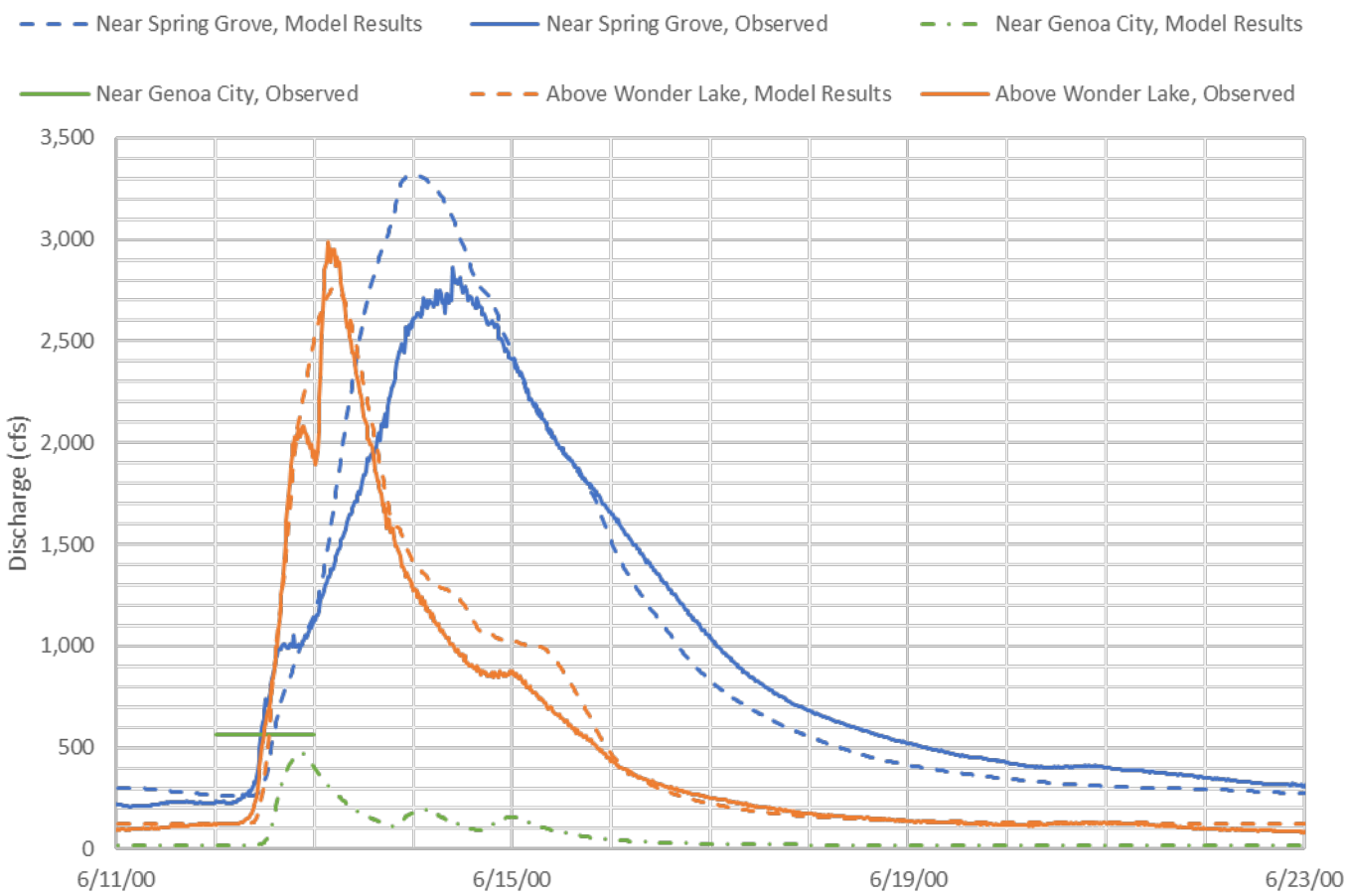
North and South Spring Creek

North Spring Creek	Base Flood Peak Streamflow (cfs)
Effective (Cairns 1973 Regression Equations)	750
Regression Equations (USGS, 2016)	1,310
HEC-HMS using ISWS Bulletin 75 (18 hr)	**875**

South Spring Creek	Base Flood Peak Streamflow (cfs)
Effective (Cairns 1973 Regression Equations)	215
Regression Equations (USGS, 2016)	336
HEC-HMS using ISWS Bulletin 75 (18 hr)	**444**

Rainfall Runoff Model Calibration

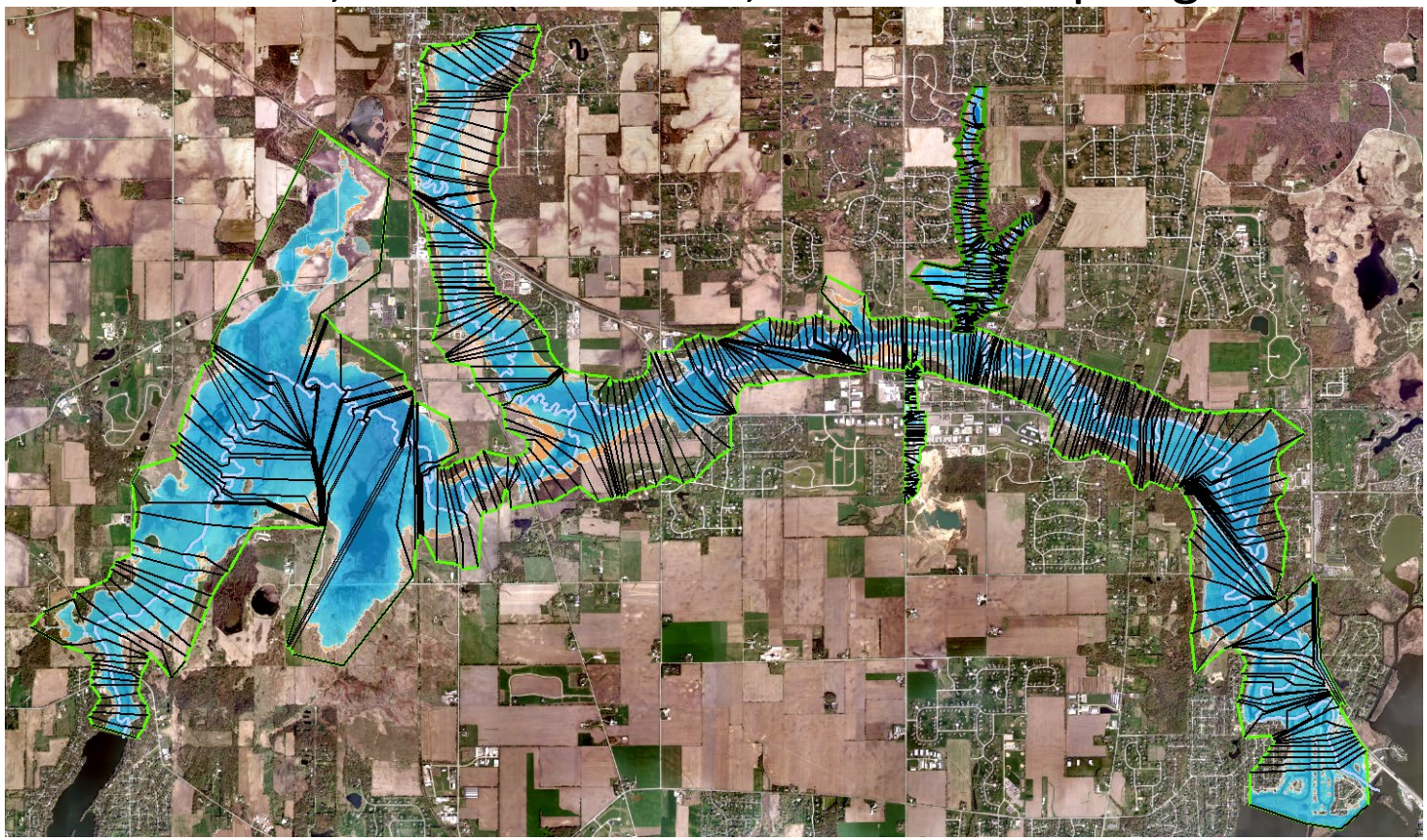
June 2000



Hydraulic Study Methods

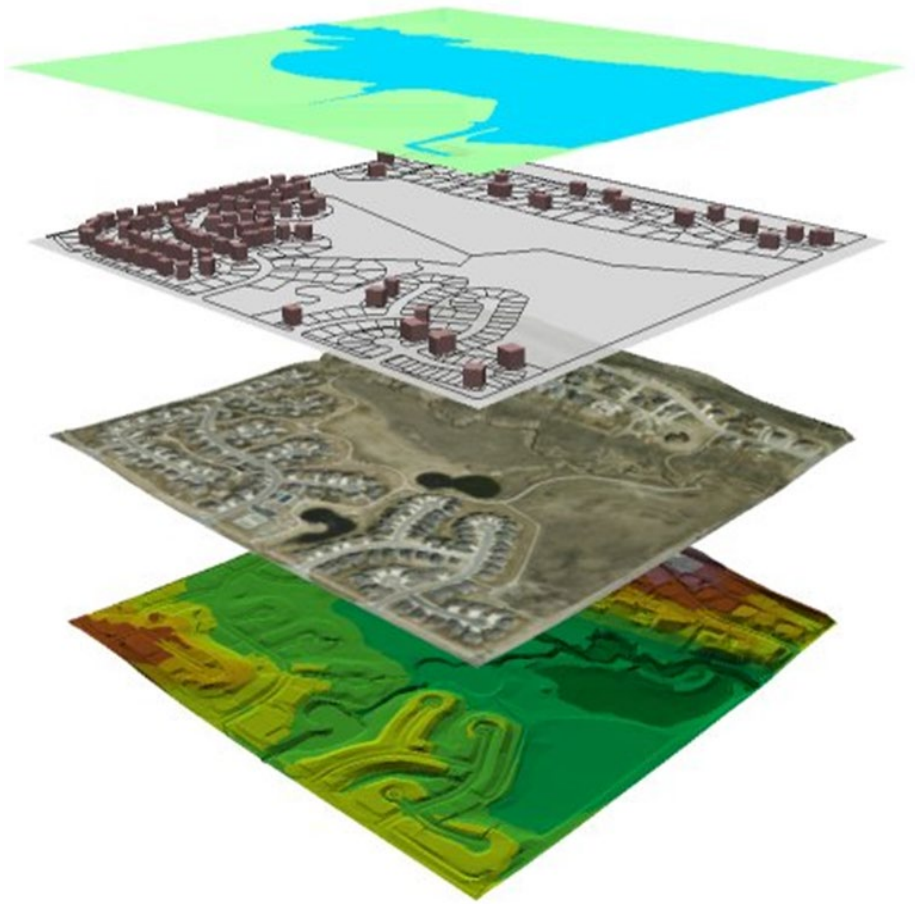
ISWS Hydraulic Analysis

- Chain O' Lakes to Wonder Lake Dam (including USACE data)
- North Branch to confluence of Elizabeth Lake Drain
- Effective North, East Fork North, and South Spring Creek



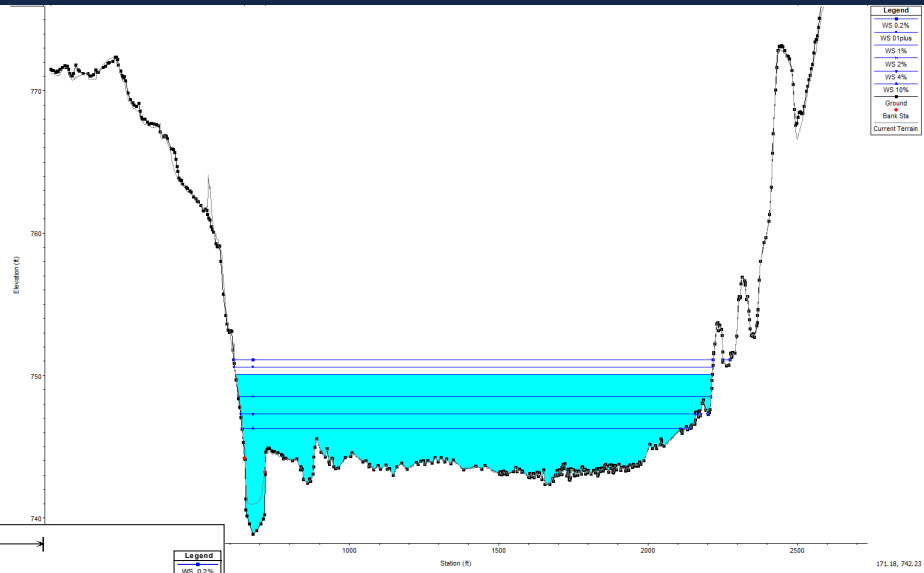
Hydraulic Data

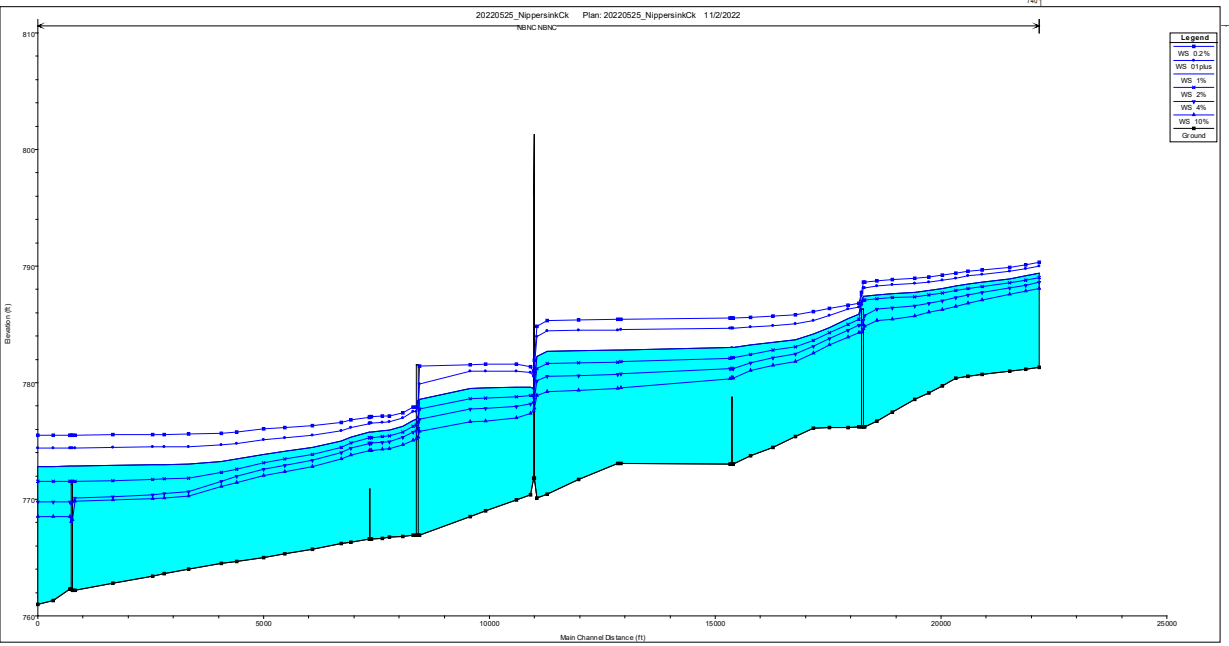
- LiDAR – 2017
- As-built Plans
- Field Survey – Collected in 2016 by IDNR-OWR and American Surveying 2019
- USGS - National Land Cover Database
- Basemap Ortho Photos



Hydraulics

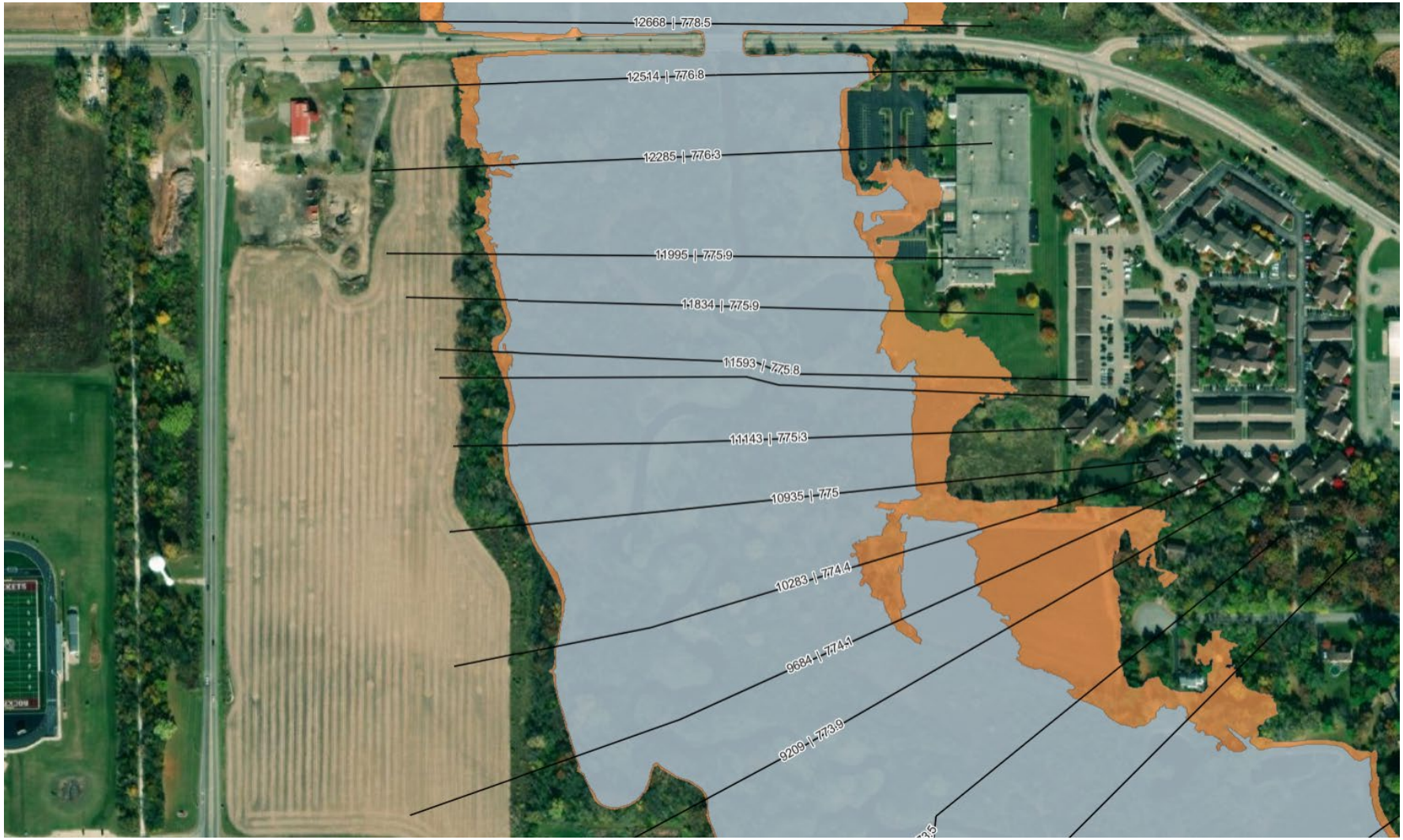
- Water Surface Elevations
- Exported to GIS for mapping





Hydraulics

Resulting Floodplain



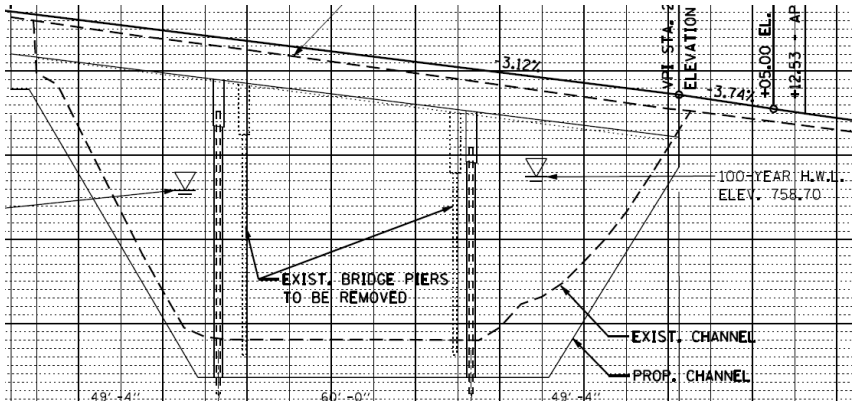
Hydraulic Modeling

- Hydraulic Modeling (HEC-RAS 6.0.0 1-D Steady State)
  - Cross Section Survey: 2016 IDNR-OWR Survey Channel with 2017 LiDAR overbank
  - Structure Survey: 2016 IDNR-OWR Survey or bridge as-built plans
  - Manning's Roughness: Field visit, survey documentation, orthophotos
- Floodway Modeling
  - State of Illinois Requirements
    - Less than 0.1 foot rise in 1% Annual Chance Elevation
    - Less than 10% increase in velocity
    - Less than 10 % reduction in conveyance (measured as cross-sectional area)
- Floodplain and Floodway Mapping
  - 1%, 0.2% Annual Chance and Floodway floodplain maps for review
  - 10, 4, 2, 1, (1%+), 0.2% Annual Chance Events during regulatory process
    - Floodplain Maps
    - Depth Grid Maps
  - Floodplain Comparison Maps

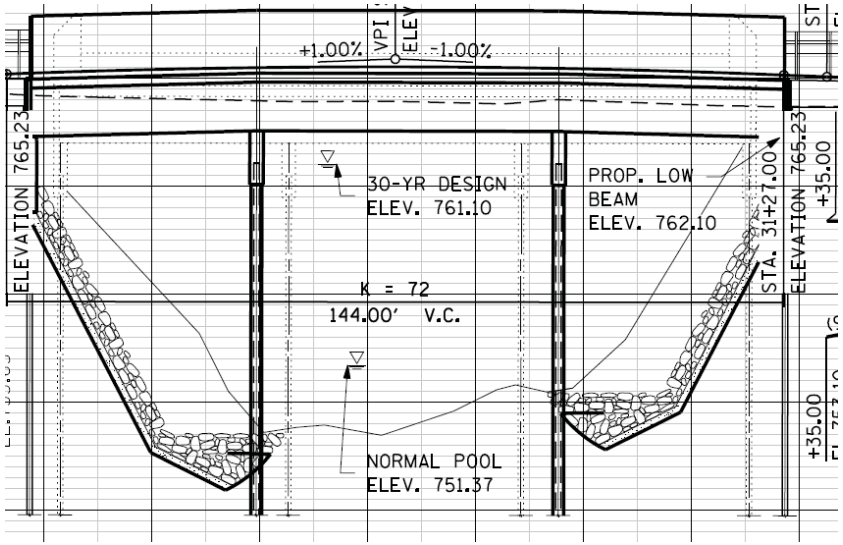
Detailed Hydraulic Modeling

Hydraulic Calibration

- Rating curve and event calibration at Nippersink Creek near Spring Grove and at high water marks as available
- The USGS rating curve for Nippersink Creek near Spring Grove is impacted by bridge replacements at
  - Wilmot Road
  - Winn Road
  - Blivin Street

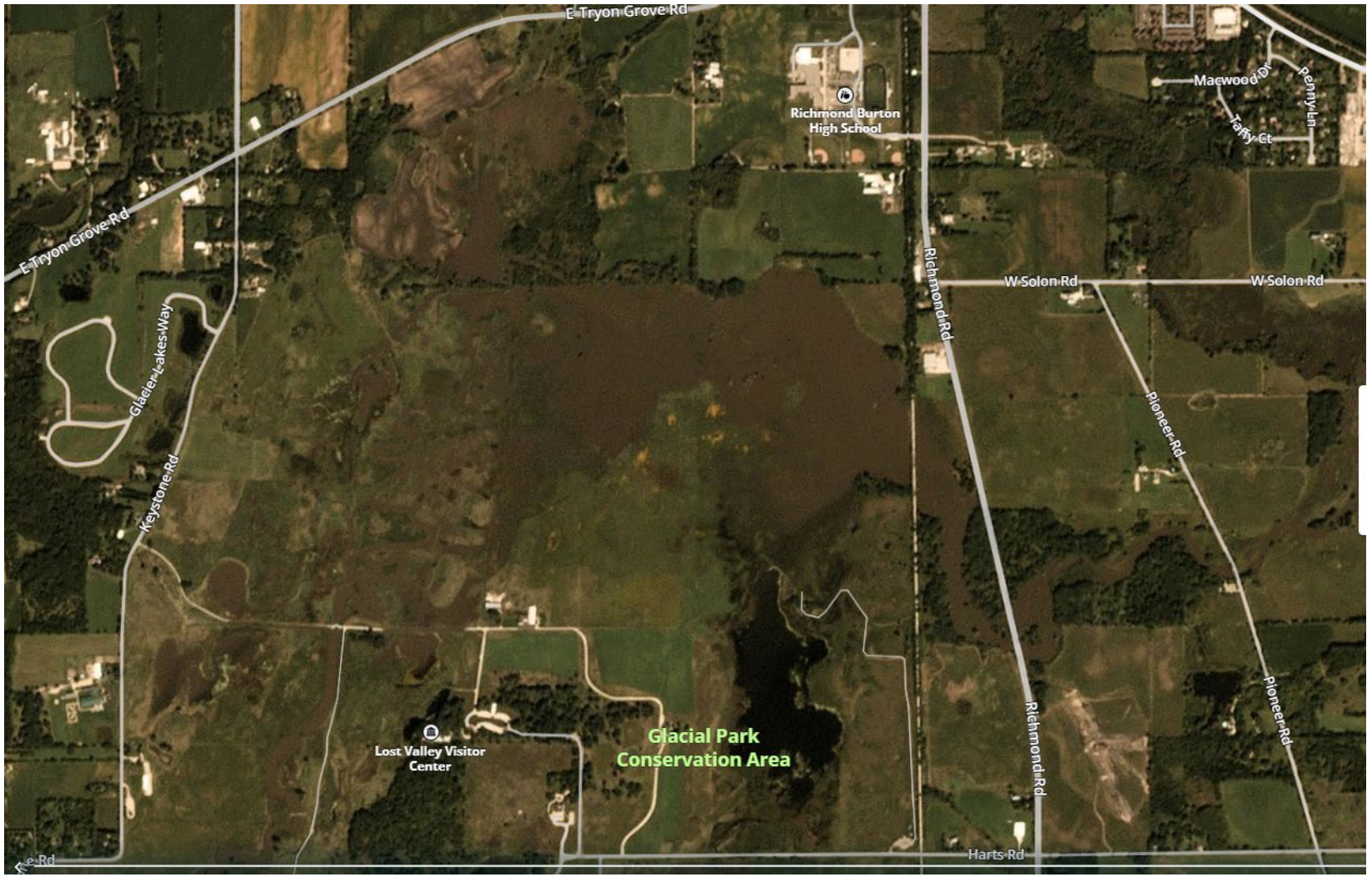


Blivin Street Bridge Replacement



Winn Road Bridge Replacement

Hydraulic Validation



Planet Imagery - Daily Satellite Imagery Service (September 14, 2019)

Draft Elevation Comparison

Nippersink Creek Landmark	ISWS Station (feet above mouth)	ISWS Discharge (cfs)	ISWS Elevation (ft NAVD88)	FIS Station (feet above mouth)	Effective FIS Discharge (cfs)	FIS Elevation (ft NAVD88)	Difference (feet)
Effective XS A (Lake County FIS)	3054.5	12,089	742.7	4277	7,681	742.9	-0.2
Effective XS A (McHenry County FIS)	4576.421	12,089	743.1	6336	7,681	743.9	-0.8
Effective XS B, (DS US Highway 12)	9236.812	12,089	744.3	10935	7,681	745.8	-1.5
Effective XS C	11608.63	12,089	746.0	13411	7,681	747.4	-1.4
Effective XS D (US Railroad)	14441.91	13,076	748.7	15845	7,681	749.2	-0.5
Effective XS E	23912.37	13,059	750.2	24605	7,681	750.3	-0.1
Effective XS F (Wilmot Road)	25756.16	13,059	754.5	26611	7,681	752.4	2.1
Effective XS G	31258.31	13,059	757.0	31786	7,681	755.1	1.9
US Blivin Street	34004.43	13,059	760.4	34800	7,460	759.5	0.9
US Winn Road	38047.59	13,111	765.9	38900	7,460	763.7	2.2
Effective XS H	39520.41	13,084	767.0	40130	7,506	764.2	2.8
Effective XS I	40600.57	13,084	767.2	41501	7,506	764.7	2.5
Effective XS J	41821.66	13,084	767.4	42293	7,506	764.9	2.5
Effective XS K (DS Railroad)	43780.77	13,084	767.8	44357	7,506	765.1	2.7
Effective XS L (DS US Highway 12)	48914.7	13,119	769.4	49004	7,506	766.7	2.7
Effective XS M	52865.39	13,119	772.6	53328	7,506	769.6	3.0
Effective XS N	53731.86	9,332	772.7	53909	4,678	769.7	3.0
Effective XS O (US Pioneer Road)	56992.71	9,332	775.3	56887	4,678	773.1	2.2
Effective XS P	58752.12	9,332	776.4	58819	4,678	774	2.4
US State Route 31	61234.61	9,332	778.2	61200	4,678	775	3.2
Effective XS Q	63466.09	9,257	778.5	63096	4,678	775.6	2.9
Effective XS R (DS Railroad)	64898.06	9,257	778.9	64527	4,678	775.9	3.0
Effective XS S	67892.86	9,257	780.2	66686	6,150	778.3	1.9
Effective XS T	76898.42	9,257	780.2	75351	6,150	778.3	1.9
Effective XS U	84805.24	9,587	780.3	79126	5,641	779.3	1.0
Effective XS V	87427	9,587	781.2	81470	5,641	781	0.2
Effective XS W	89782	9,587	782.9	83482	5,641	782.9	0.0
Effective XS X (DS Barnard Mill Road)	93029	8,955	786.0	87125	5,641	785.5	0.5
Effective XS Y (DS Wonder Lake Dam)	95785	8,955	792.9	89760	5,641	791.9	1.0

Draft Elevation Comparison

North Branch Nippersink Creek Landmark	ISWS Station (feet above mouth)	ISWS Discharge (cfs)	ISWS Elevation (ft NAVD88)	FIS Station (feet above mouth)	Effective FIS Discharge (cfs)	FIS Elevation (ft NAVD88)	Difference (feet)
Effective XS A	4209	5,876	772.8	1800	2,735	769.6	3.2
Effective XS B	8612	5,876	773.5	7767	2,735	771.8	1.7
Effective XS C	13787	5,836	779.5	12994	2,735	776.6	2.9
Effective XS D	16189	5,836	782.7	15951	2,735	779.7	3.0
Effective XS E	24536	5,836	788.3	24610	2,735	787.5	0.8

South Spring Creek Landmark	ISWS Station (feet above mouth)	ISWS Discharge (cfs)	ISWS Elevation (ft NAVD88)	FIS Station (feet above mouth)	Effective FIS Discharge (cfs)	FIS Elevation (ft NAVD88)	Difference (feet)
Effective XS A (near confluence with Nippersink Creek)	350.69	390[b]	763.9	180	215	762.1	1.8
Effective XS B (us of railroad)	1540	404	778.6	1260	215	775.3	3.3
Effective XS C (us of Highview St)	2275	64[c]	784.7	1915	215	784.9	-0.2
Effective XS D (us of Westward Dr)	2615	202[d]	790.5	2290	215	788.2	2.3
Effective XS E (detention pond us of US-12 highway)	3254	376	794.6	2898	215	794.7	-0.1
Effective XS F (ds of the Spring Grove Road crossing)	6332	376	821.7	5681	215	821.4	0.3

Draft Elevation Comparison

North Spring Creek Landmark	ISWS Station (feet above mouth)	ISWS Discharge (cfs)	ISWS Elevation (ft NAVD88)	FIS Station (feet above mouth)	Effective FIS Discharge (cfs)	FIS Elevation (ft NAVD88)	Difference (feet)
Effective XS A (us of Main Street)	197	885	762.2	190	720	761.1	1.1
Effective XS B (us of the confluence with East Fork N Spring)	520	368	763.5	580	155	764.0	-0.5
Effective XS C (just ds of the inline pond)	2362	9[a]	782.8	2380	155	780.7	2.1
Effective XS D (inside the inline pond)	2472	9[a]	789.5	2475	210	791.2	-1.7
Effective XS E (us of the inline pond)	2968	9[a]	790.1	2960	210	791.2	-1.1
Effective XS F	6843	488	812.9	5800	210	806.0	6.9
Effective XS G	8282	488	826.0	7150	210	824.1	1.9

East Fork North Spring Creek Landmark	ISWS Station (feet above mouth)	ISWS Discharge (cfs)	ISWS Elevation (ft NAVD88)	FIS Station (feet above mouth)	Effective FIS Discharge (cfs)	FIS Elevation (ft NAVD88)	Difference (feet)
Effective XS A (near confluence with North Spring)	164	491	766.2	170	560	765.7	0.5
Effective XS B	3974	235	789.0	2985	560	788.5	0.5

Webmap Results

Webmap Demonstration

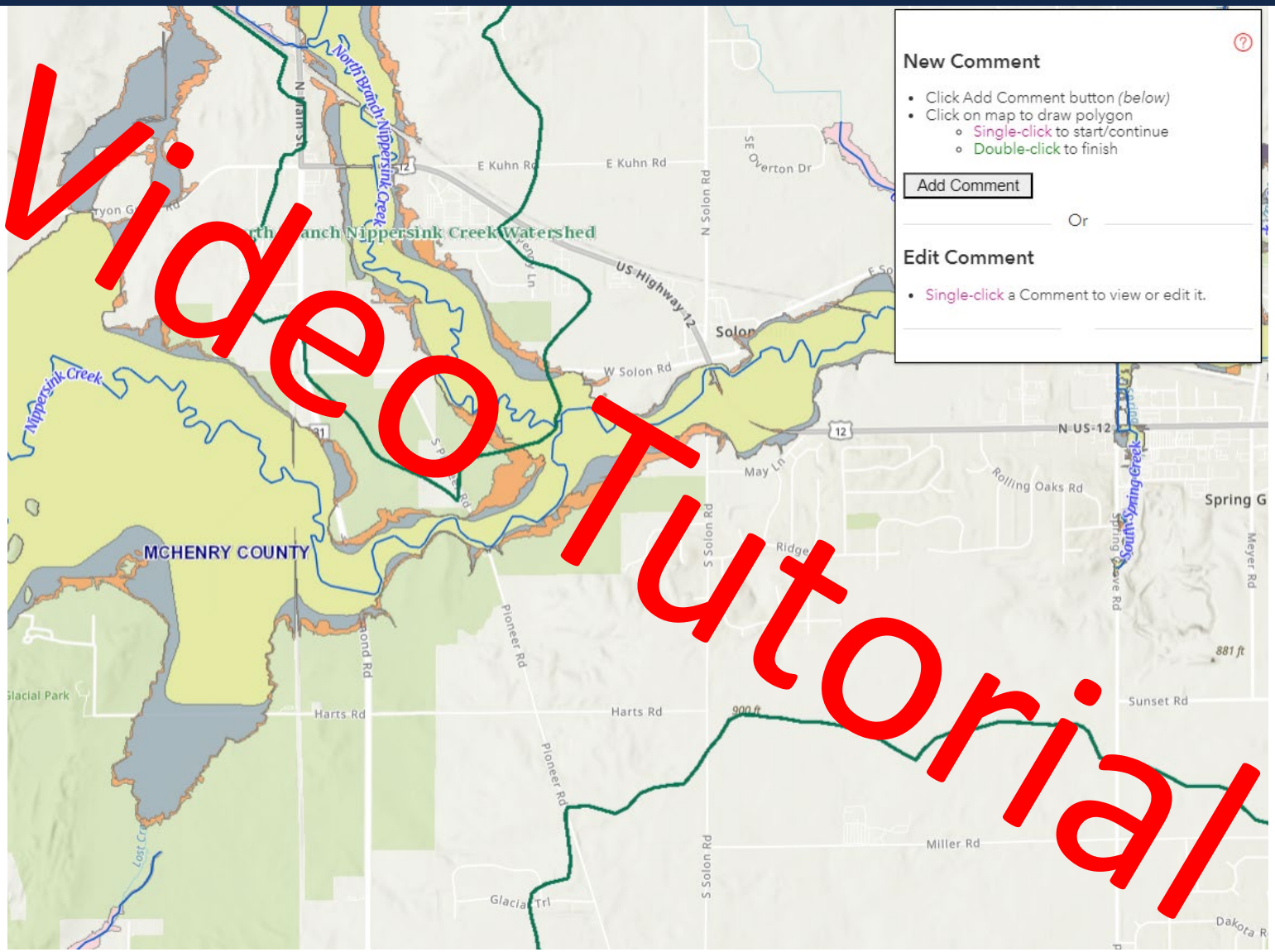
Webmap URL:

https://go.isws.illinois.edu/nippersink

Log in: watershed

Password: illinoisfloods!123

Webmap Comment Feature



Communication and Next Steps

Communication Plan

- FY2015 Nippersink Creek Flood Risk Review Meeting – June 11, 2019
  (Project scope expanded by FY2019 Mapping Activity Statement)
- Proposed Engineering Methods Notification (FEMA SID 620) Letter- February 6, 2020
- Flood Risk Review Meeting (today)
- 30-Day Comment Period starts today
- Data Submission Notification (FEMA SID621) Letter

Data Submission Notification Letter FEMA SID 621

Mailed to community CEO's

Informs the communities that the data collection and analysis (Data Development) phase of the project is concluding, and the FIRM database is being validated by FEMA

Gives Communities 30 days to comment on the data in the FIRM database

Schedule

~~FY 2015 Flood Risk Review Meeting June 11, 2019~~

~~FY 2019 FEMA SID 620 Letter February 6, 2020~~

Flood Risk Review Meeting (today)

FEMA SID621 Letters once draft database is completed

Submit Flood Studies to IDNR for State review

Digital Flood Insurance Rate Map (DFIRM) Project to follow pending conclusion of data development. (not currently funded)

Community Participation

Community Impact

Why a New Floodplain Map Can Affect a Community:

Can affect which residents are required to carry flood insurance

Depicts areas of communities which are subject to floodplain management regulations

Can affect community planning and flood mitigation

Community Participation

- Now is the time to review the draft floodplain mapping for your community
- Who is affected?
- Is the mapping reasonable and/or consistent with your community's experience with flooding?
- Make comments if something does not look right or make sense.
- Provide data or information if it could support a change in the draft mapping
- Ask questions.

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NIPPERSINK CREEK WATERSHED FLOOD RISK REVIEW MEETING: JUNE 7, 2023

POST-MEETING SURVEY

1. **After this meeting how much more do you know about your community's flood risk?**

   ◯ a lot
   ◯ some
   ◯ not much

2. **After this meeting how much do you know about the FEMA Risk Mapping, Assessment and Planning (Risk MAP) process?**

   ◯ a lot
   ◯ some
   ◯ not much

3. **Has this meeting helped you know how to better communicate flood risk to your community?**

   ◯ yes
   ◯ no

4. **Has this meeting helped you know where to go to get flood mitigation help?**

   ◯ yes
   ◯ no

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Questions?

Community Specific Discussion

Nippersink Creek- Downstream limit of floodway community preferences

(Village of Fox Lake, Lake County, and McHenry County)

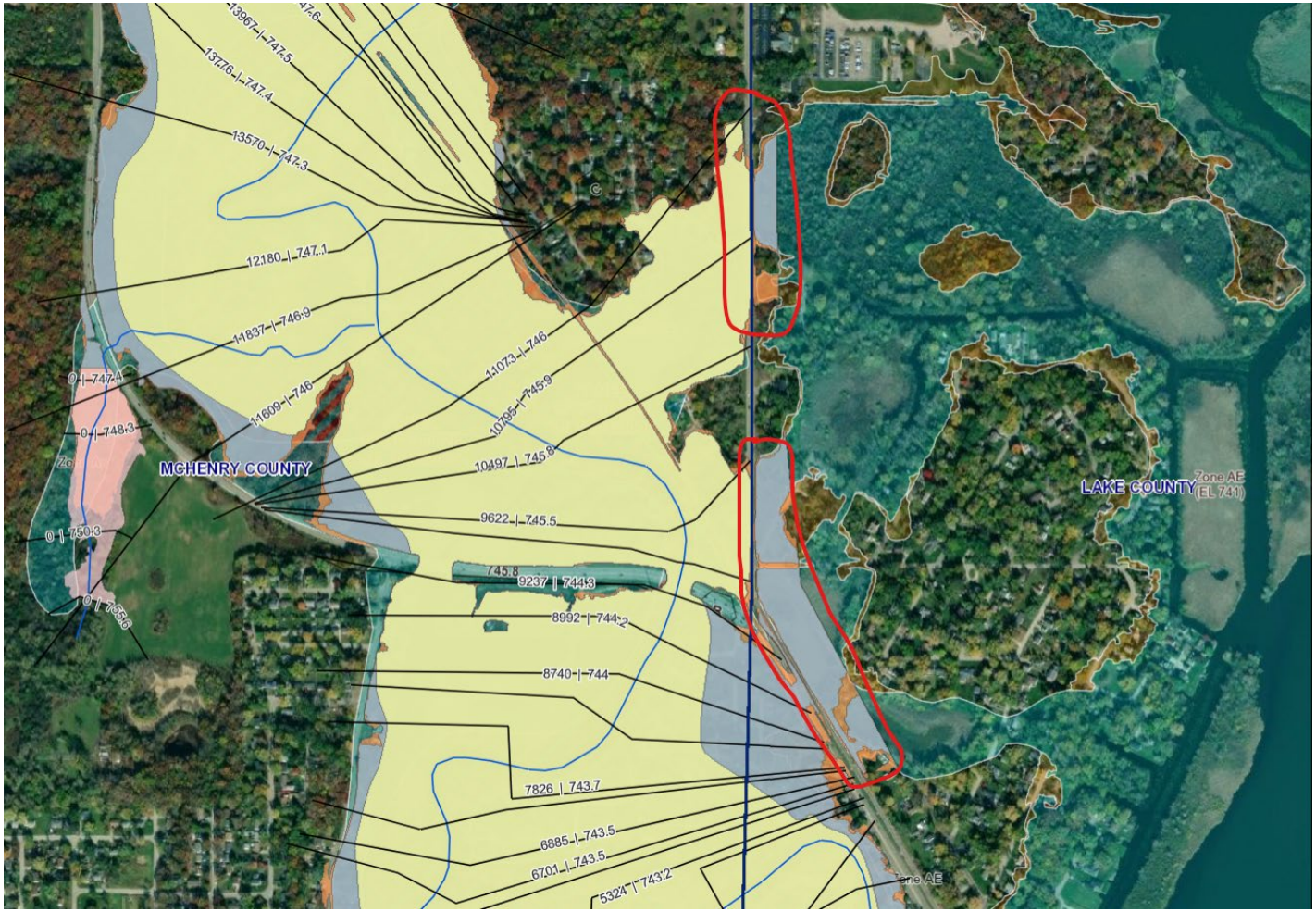
Effective Floodway Limit

New Floodway Study Extents

Community Specific Discussion

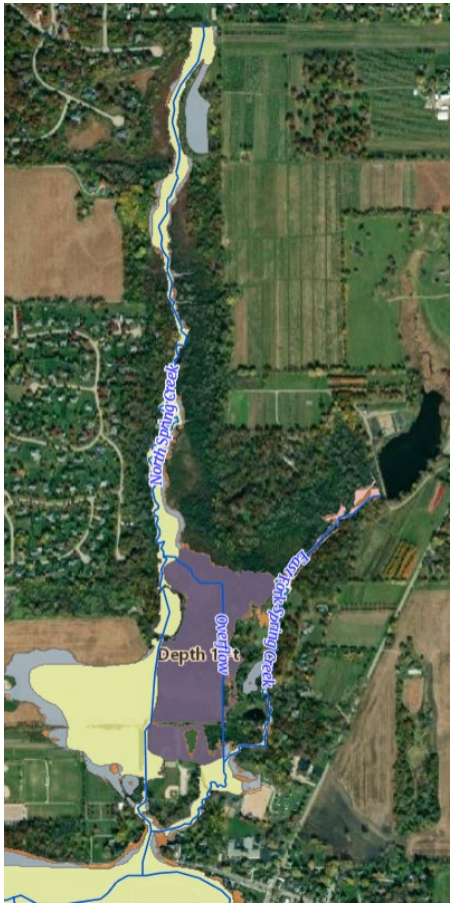
Nippersink Creek – Overtopping Watershed Divide

(Village of Fox Lake and Lake County)

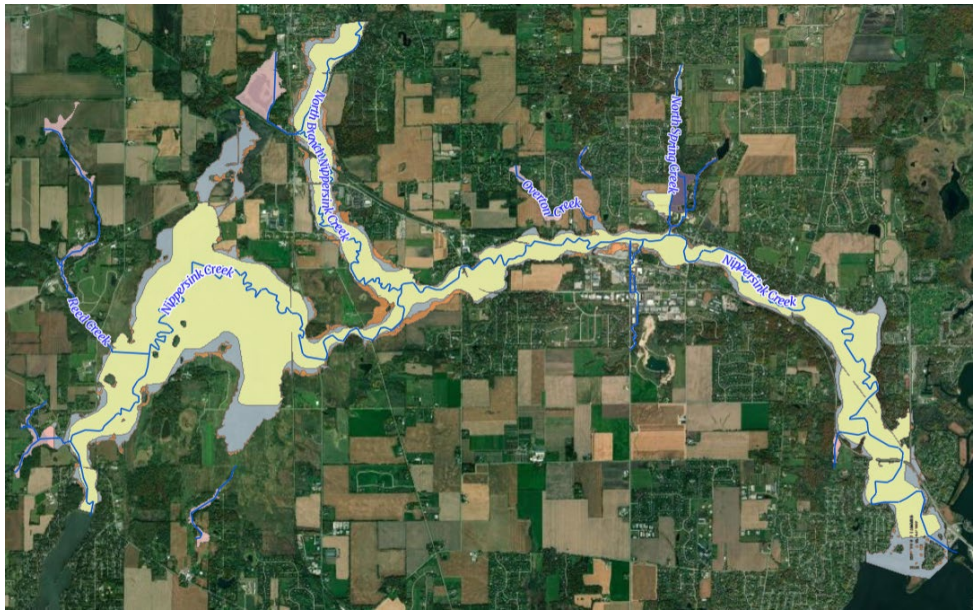


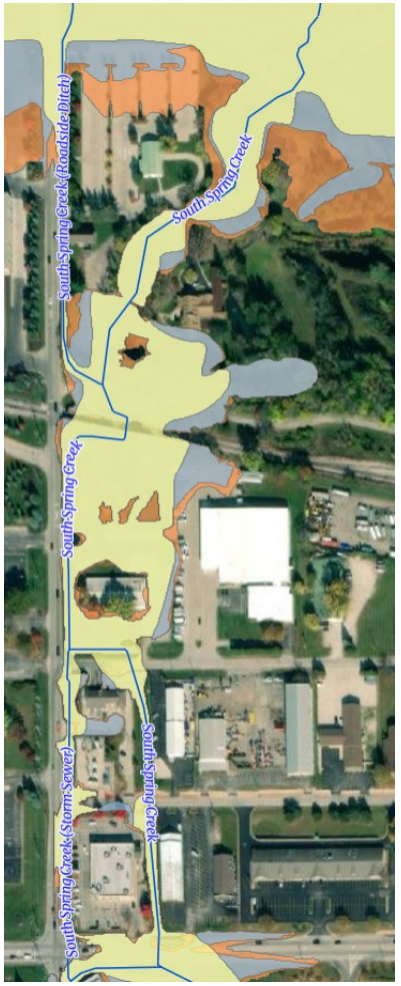
Community Specific Discussion

Stream Naming - community preferences
(All Communities)



- Geographic Names Information System (GNIS)
- Effective Flood Insurance Study
- Local Stream Name

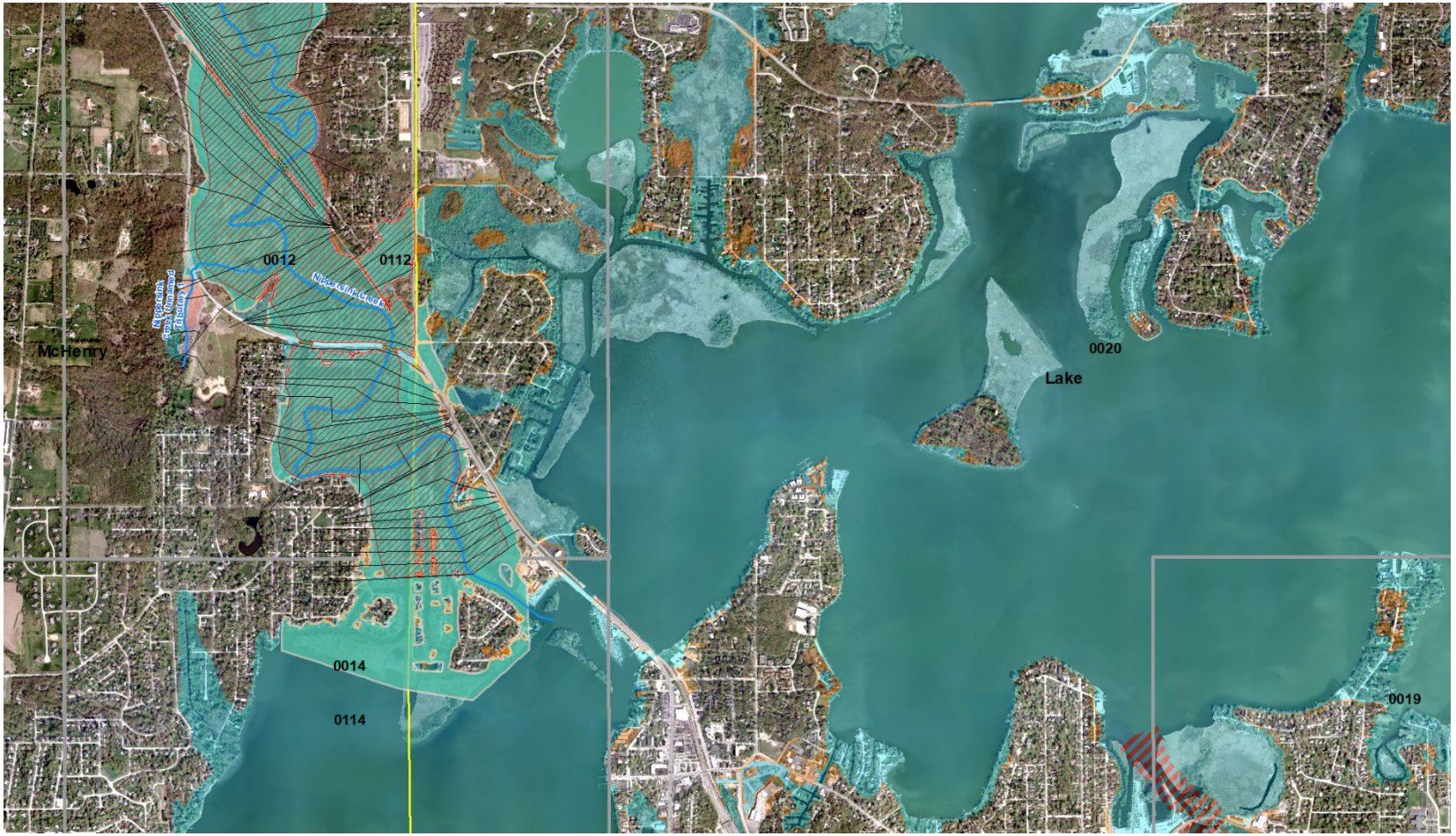




Community Specific Discussion

Regulatory Map Adoption - Community Preferences

(Village of Fox Lake and Lake County)



Community Specific Discussion

Flow Diversions – North and South Spring Creek

(Village of Spring Grove and McHenry County)