North Sandwich Stormwater Conveyance Analysis Study

City of Sandwich Flood Reduction Program

Presented By:

Timothy N. Paulson, P.E., CFM
Jeffrey W. Freeman, P.E., CFM, LEED AP
Tyler A. Meyer, E.I., CFM
Engineering Enterprises, Inc.

Stakeholder Outreach Meeting
City of Sandwich, IL

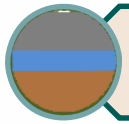
October 1, 2018

Presentation Overview

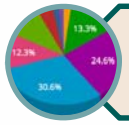
Acronym Soup/Definitions

Overview and Project Approach

Stakeholder Outreach Survey Summary



Stormwater Modeling



Investigation Areas; Causes, Solutions, and Cost Estimates

Next Steps

Q&A

Acronym Soup/Definitions

Acre-Foot= 1 foot of water over 1 acre of land – Stormwater Storage is expressed in terms of Acre-Feet of storage

CFS= Cubic Feet per Second – Stormwater Conveyance is expressed in terms of CFS

Critical Duration: The duration of the storm event that produces the peak runoff flow rate for a watershed area.

Design Storm Event: A rainfall event of a specific rainfall total over a designated duration and distribution

Hydraulic Grade Line: The surface of the water profile flowing in the storm sewer or when surcharging the elevation the water level would rise to above the surface

Acronym Soup/Definitions

Recurrence Interval: Designation to describe frequency of Design Storm Events (i.e. 10 year storm or 100 year storm)

Surcharging/Flooding (in context of Storm Sewer Modeling): When the storm sewer runs out of capacity for the runoff from the Design Storm Event the system surcharges; when the system surcharges flooding occurs at the storm sewer structures

Stormwater Conveyance: Transporting runoff from one place to another

Stormwater Storage: Collection of excess runoff until conveyance is available

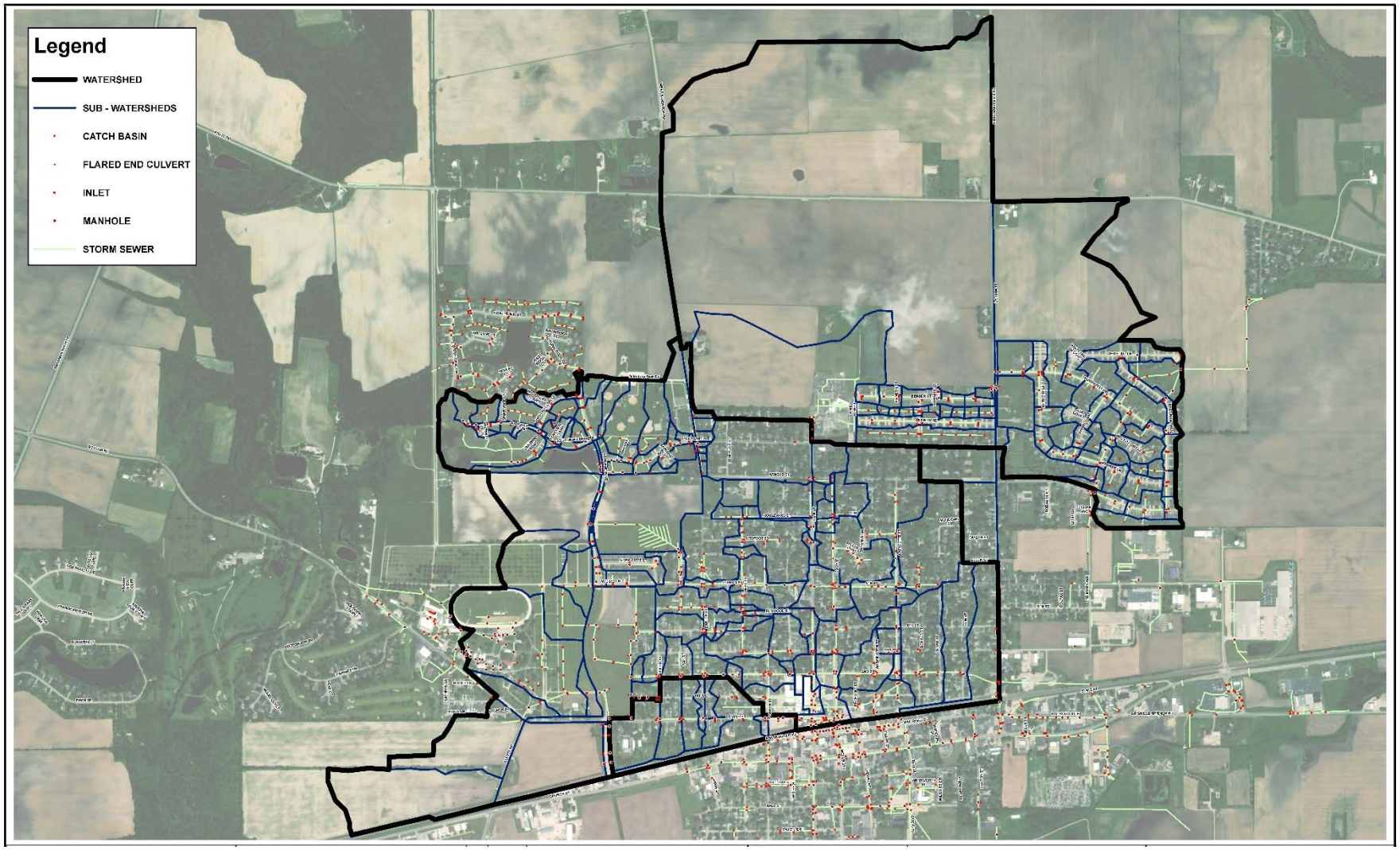
Overview and Project Approach

Stormwater System Conveyance Analysis

- Base Mapping & Surveying
- Stakeholder Outreach
- Sub-Watershed Delineations
- Existing Conditions Model
- Overland Flow Route Analysis
- Proposed Conditions Model
- Cost Estimates
- Implementation Plan
- Ordinance Review
- Report

Overview and Project Approach

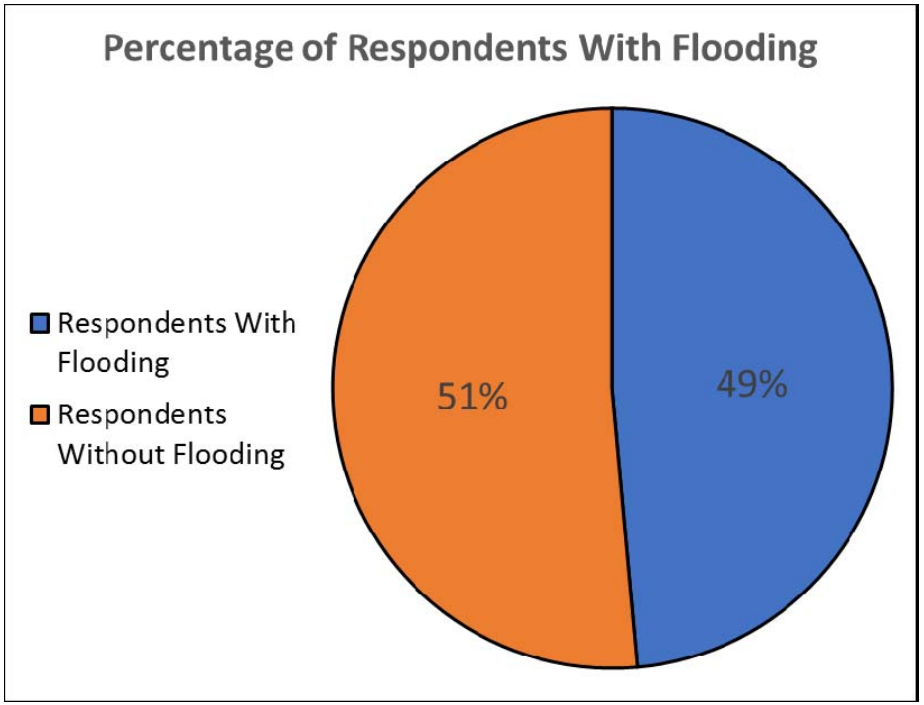
Watershed Exhibit



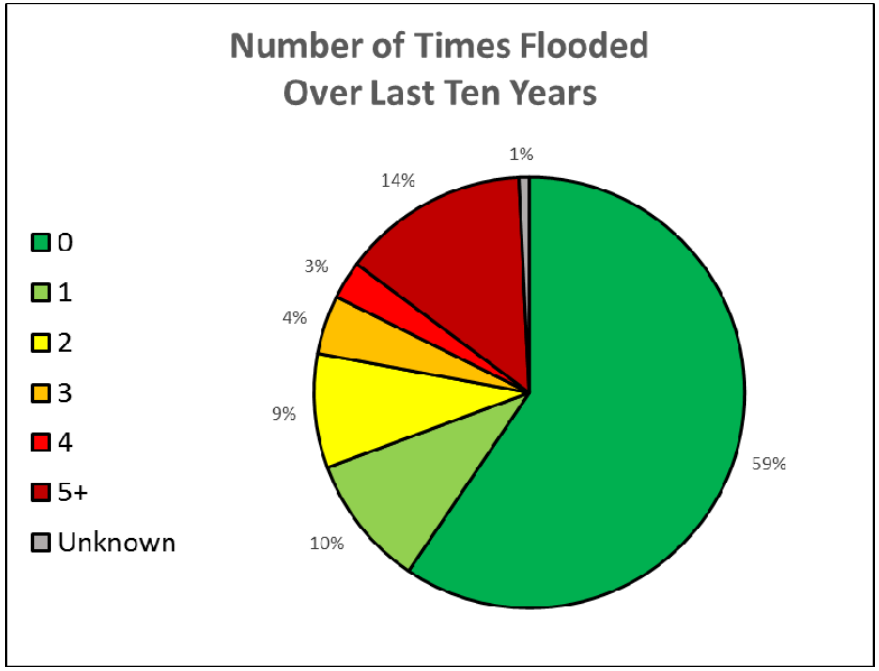
Stakeholder Outreach Survey Summary

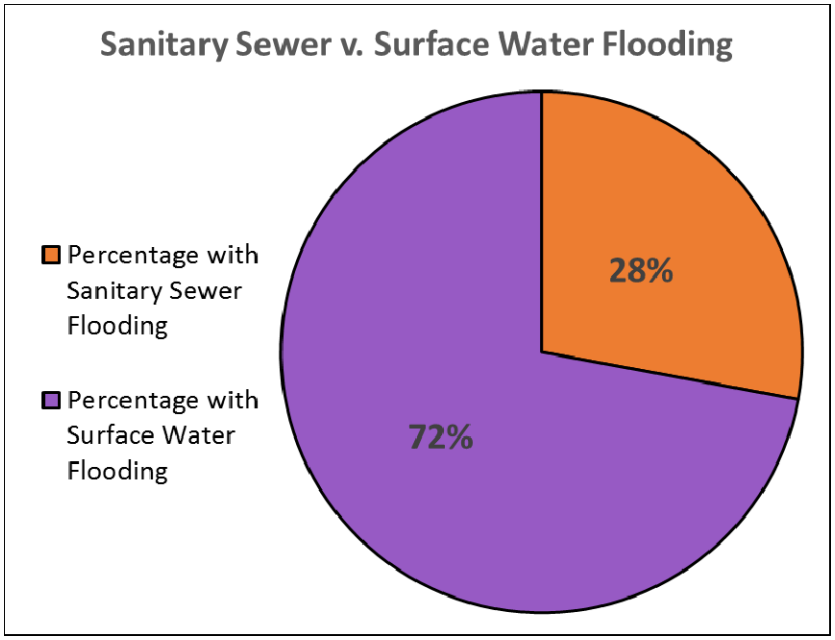
Survey Statistics (8/22/18)

- 1,855 Delivered
- 385 Respondents
- 20.8% Return Rate
- 187 Experienced Flooding



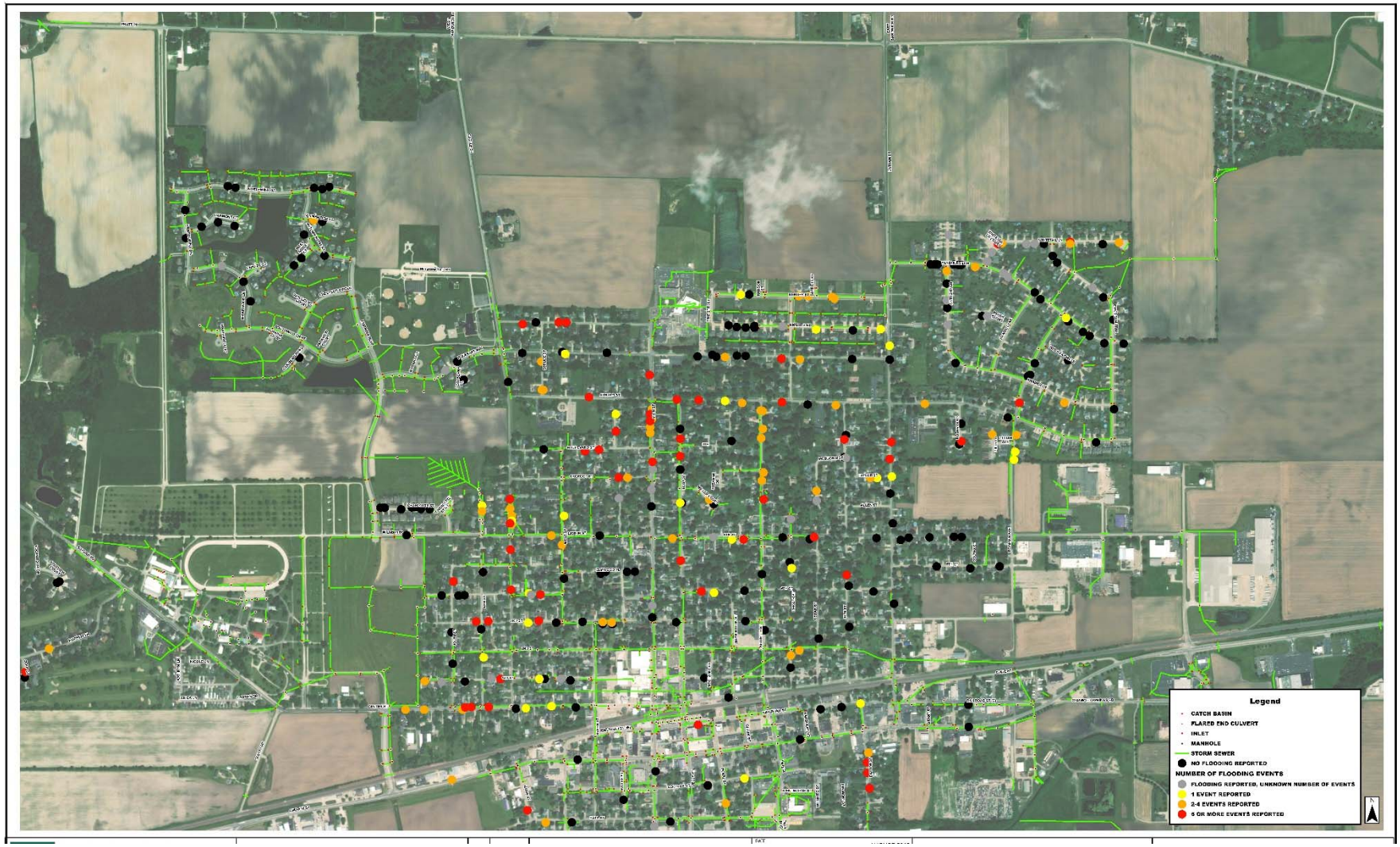
Stakeholder Outreach Survey Summary





Stakeholder Outreach Survey Summary

Survey Respondent Flooding Frequency



Stormwater Modeling

Existing Conditions - Modeling

- Sub-Watershed Delineation
  - ➔ City One Foot Topography
  - ➔ Field Investigation and Survey
- Build Existing Conditions Model
  - ➔ Existing Storm Sewer, Basins, Depressional Storage, Overflows
  - ➔ City Atlas Maps, Record Drawings, Previous Studies
  - ➔ Rims, Inverts, Connections, Storage Volumes
- Model Inputs/Assumptions
  - ➔ Percent Impervious
  - ➔ Initial Storage
  - ➔ Infiltration
  - ➔ Routing

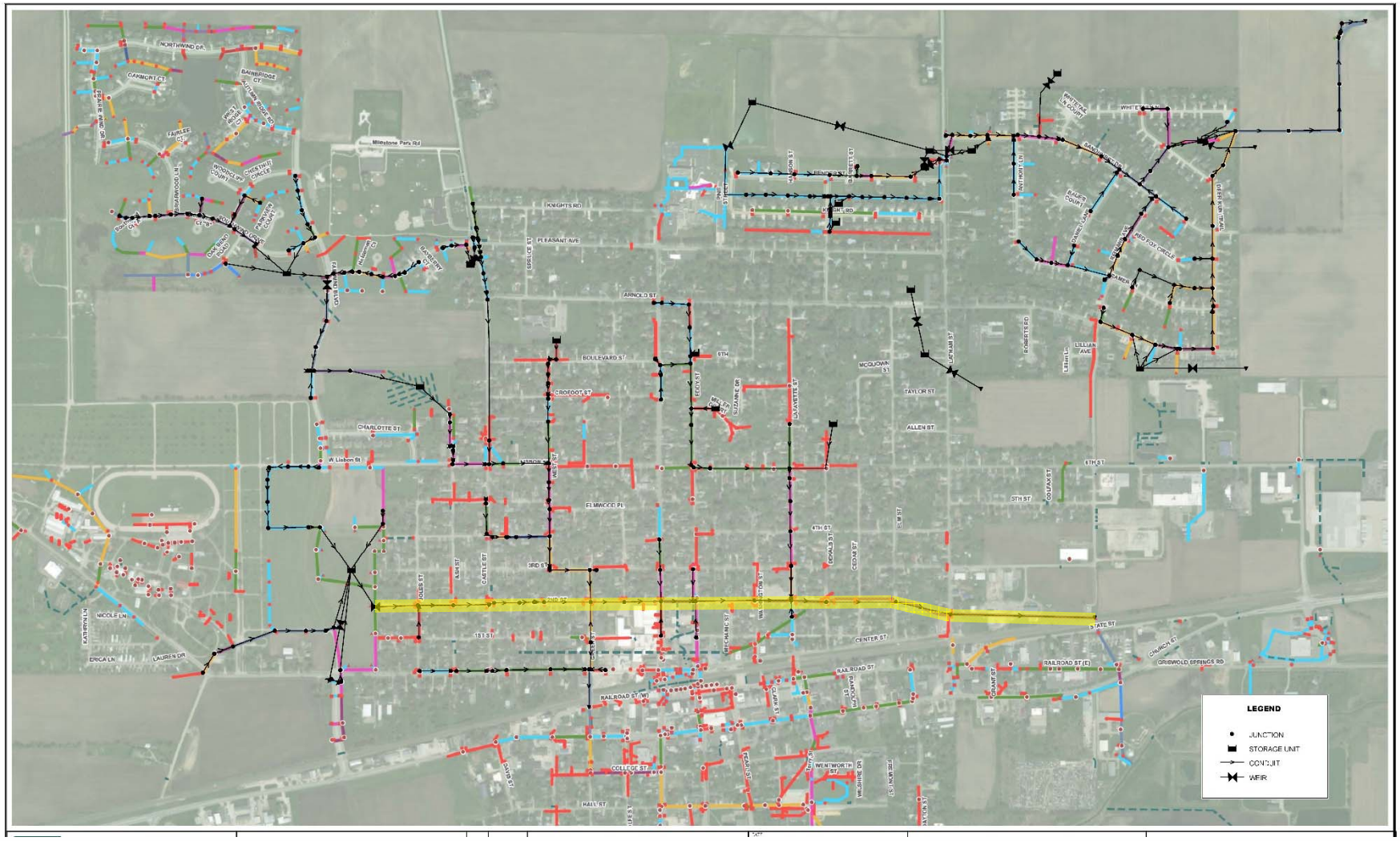
Stormwater Modeling

Existing Conditions - Modeling

- Results
  - ➔ Run of series of Design Storm Events
    - 2, 5, 10 year design storms for storm sewer
    - 10, 25, 50, and 100 year for overland flooding
  - ➔ Critical Duration for Storm Sewer
    - 1 hour duration
  - ➔ Critical Duration for Storage, Flooding and Overflows
    - 24 hour duration

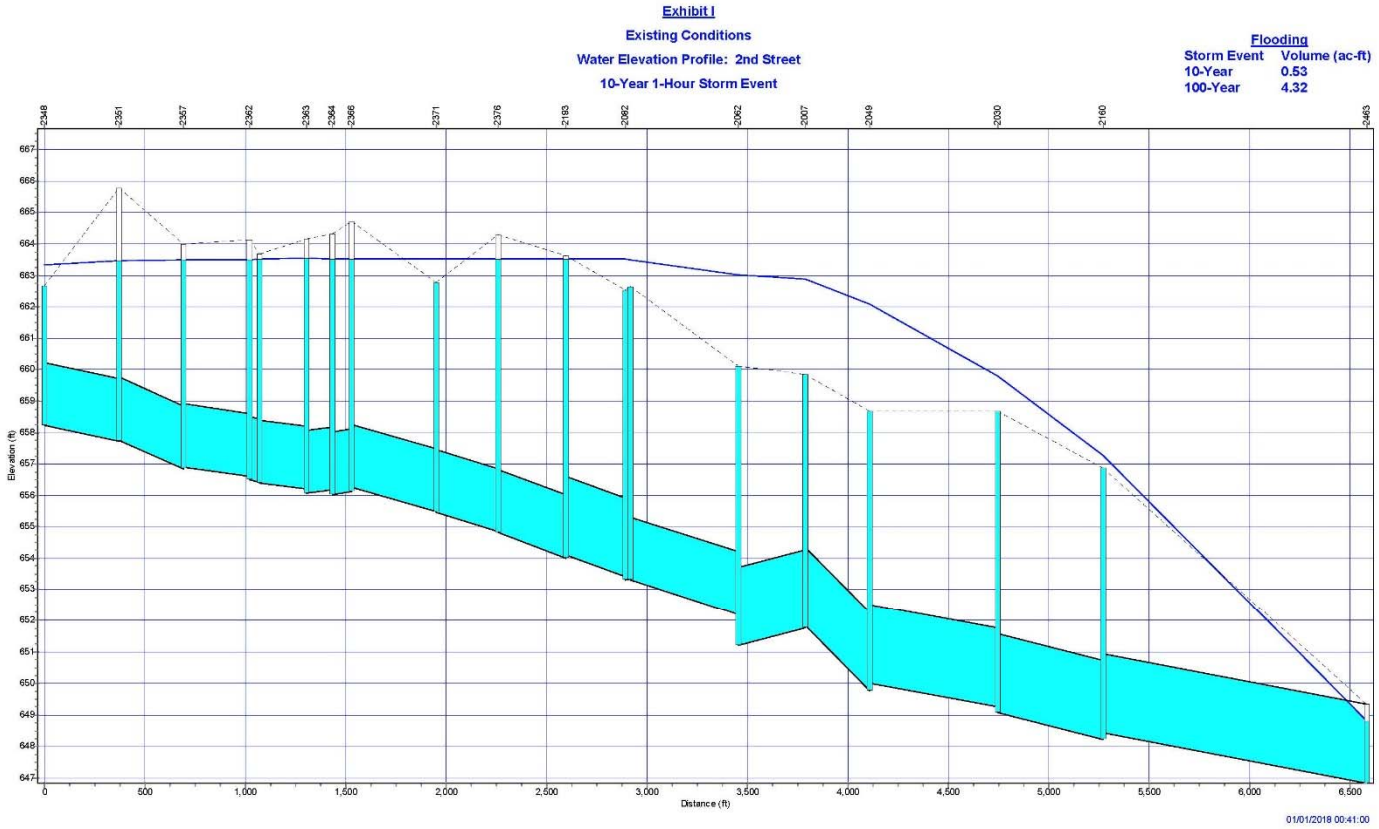
Stormwater Modeling

Existing Conditions – EPASWMM Model



Stormwater Modeling

Existing Conditions – Profile Exhibit



SWMM 5

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Stormwater Modeling

Proposed Conditions

- Identify System Wide and Regional Improvements to Address Key Problem Areas
  - ➔ Sandhurst
  - ➔ Fieldcrest
  - ➔ Downtown Storm Sewer System
- 10 Year Design Capacity for Storm Sewers
  - ➔ 1 Hour Critical Duration, Same as Existing
- 100 Year Design Capacity for Large Overflow/Flooding Concerns
  - ➔ 24 Hour Critical Duration, Same as Existing

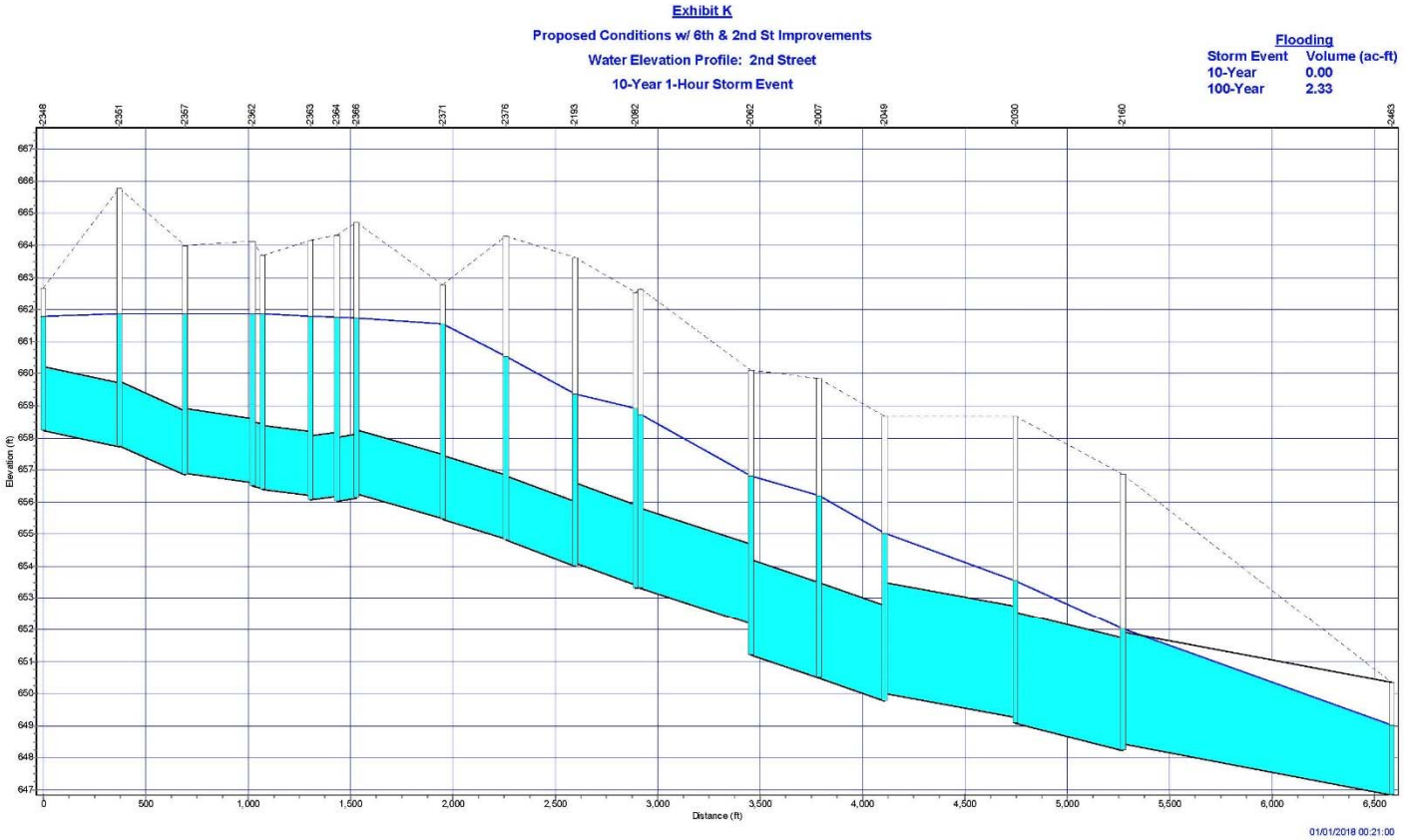
Stormwater Modeling

Proposed Conditions

- Model Various Alternatives
  - ➔ Increase Storm Sewer Sizes
  - ➔ Additional Storm Sewers
  - ➔ Regional Detention
- Optimize Alternatives to Meet Goals
- Concept Cost Estimates
- System Wide Improvements Allow for Capacity to Address Localized Problems
  - ➔ Knights Park
  - ➔ Local Drainage Relief Concept

Stormwater Modeling

Proposed Conditions – Profile Exhibit



SWMM 5

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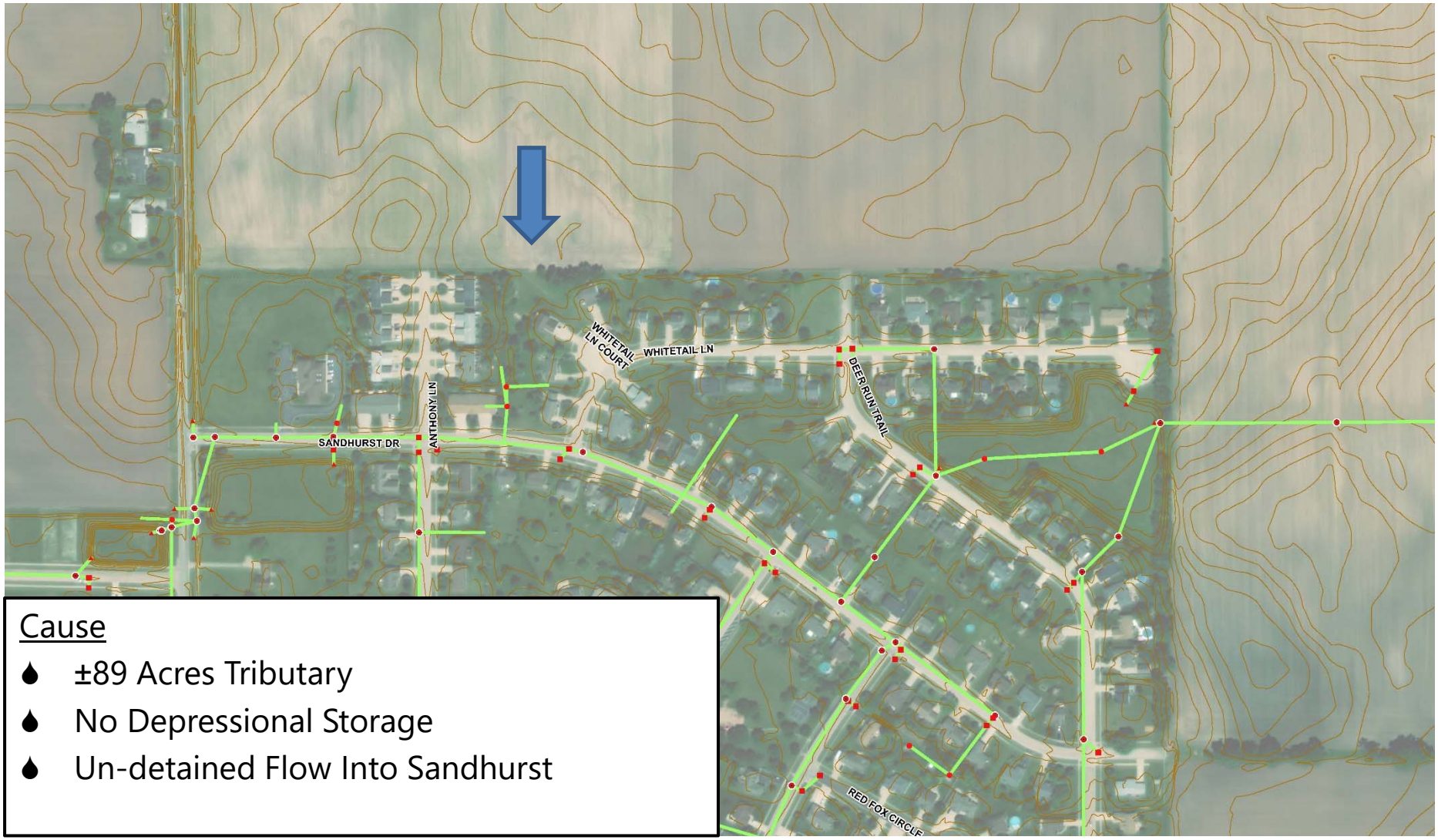
Investigation Areas: Causes, Solutions, Cost Estimates

Stormwater System Conveyance Analysis

- Sandhurst
- Fieldcrest
- Downtown Storm Sewer System
- Knights Park
- Local Drainage Relief Sewer Concept

Investigation Areas: Causes, Solutions, Cost Estimates

Sandhurst

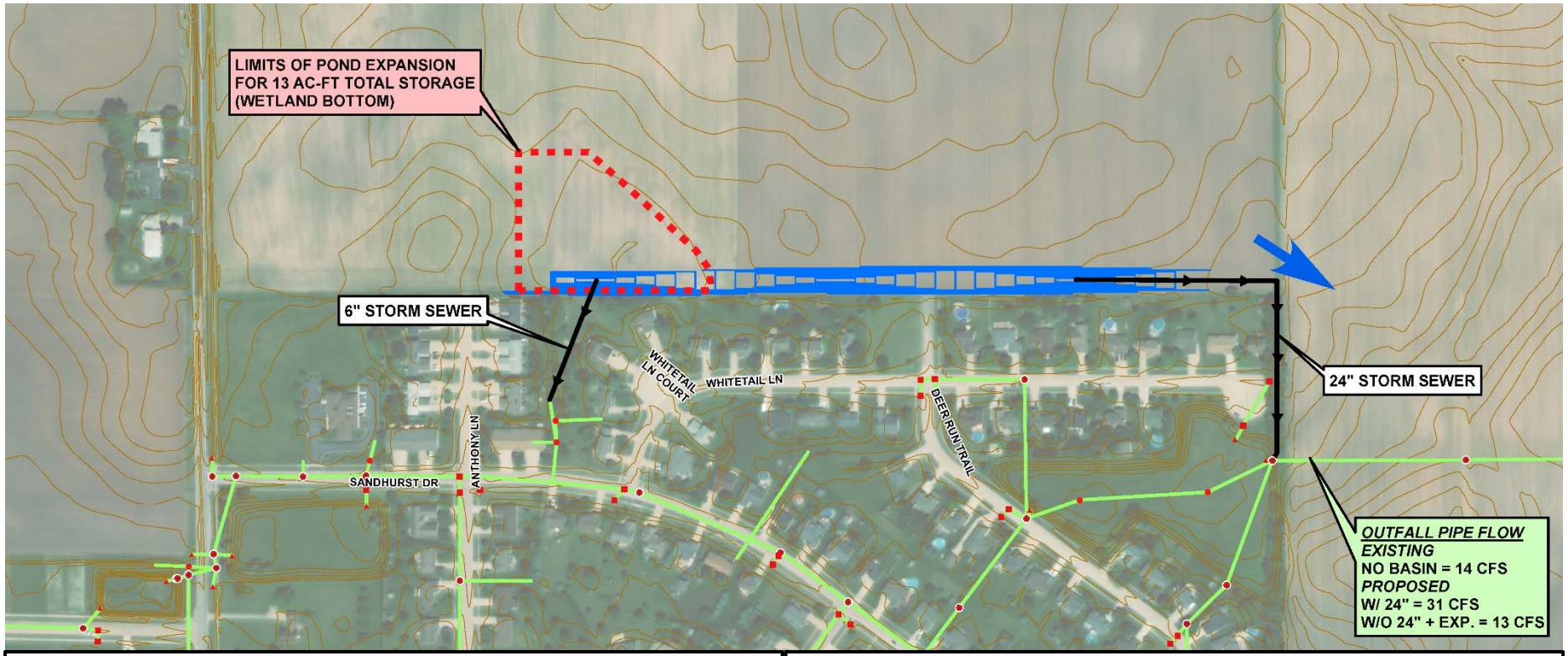


Cause

- ±89 Acres Tributary
- No Depressional Storage
- Un-detained Flow Into Sandhurst

Investigation Areas: Causes, Solutions, Cost Estimates

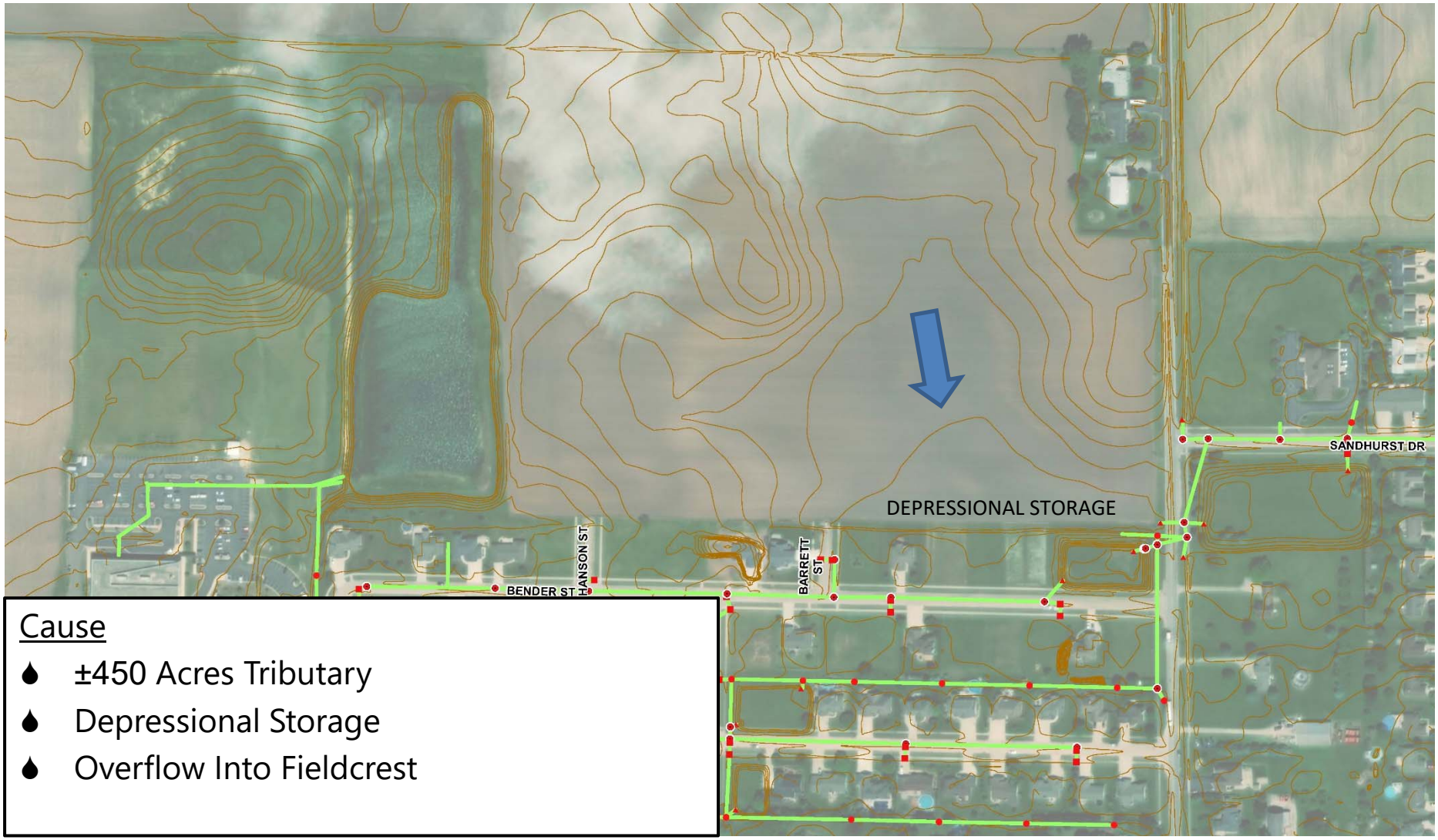
Sandhurst



Solution	Concept Cost
♦ 100-Year Design	♦ Total Construction Cost = $570,000
♦ Berm Along North, Overflow to East	♦ 20 Year Bond = $42,000/year
♦ 5 ac-ft Dry Basin with 24" Storm Sewer	♦ Total Construction Cost = $830,000
♦ 13 ac-ft Dry Basin with Wetland Expansion	♦ 20 Year Bond = $61,100/year

Investigation Areas: Causes, Solutions, Cost Estimates

Fieldcrest

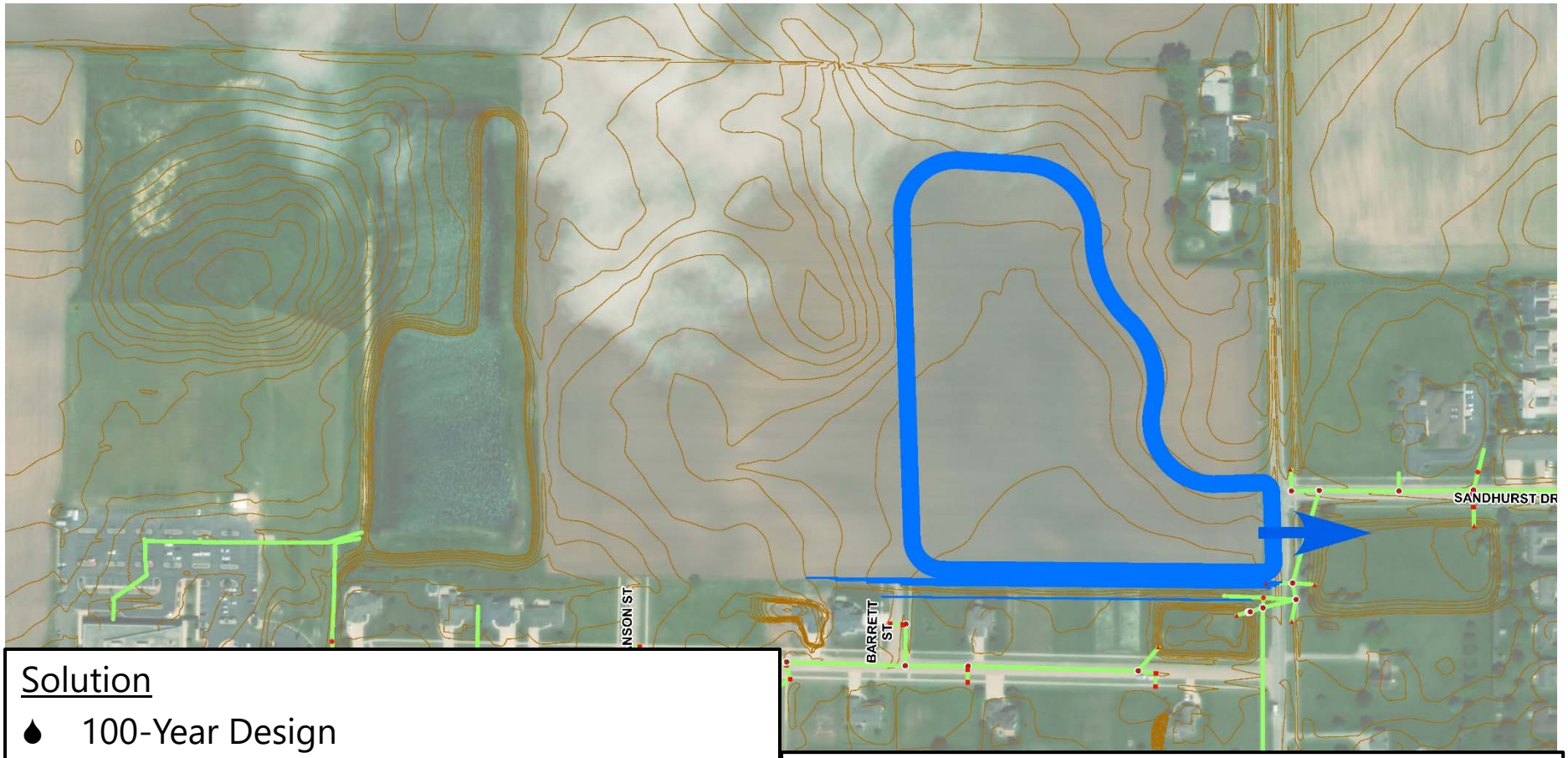


Cause

- ±450 Acres Tributary
- Depressional Storage
- Overflow Into Fieldcrest

Investigation Areas: Causes, Solutions, Cost Estimates

Fieldcrest



Solution

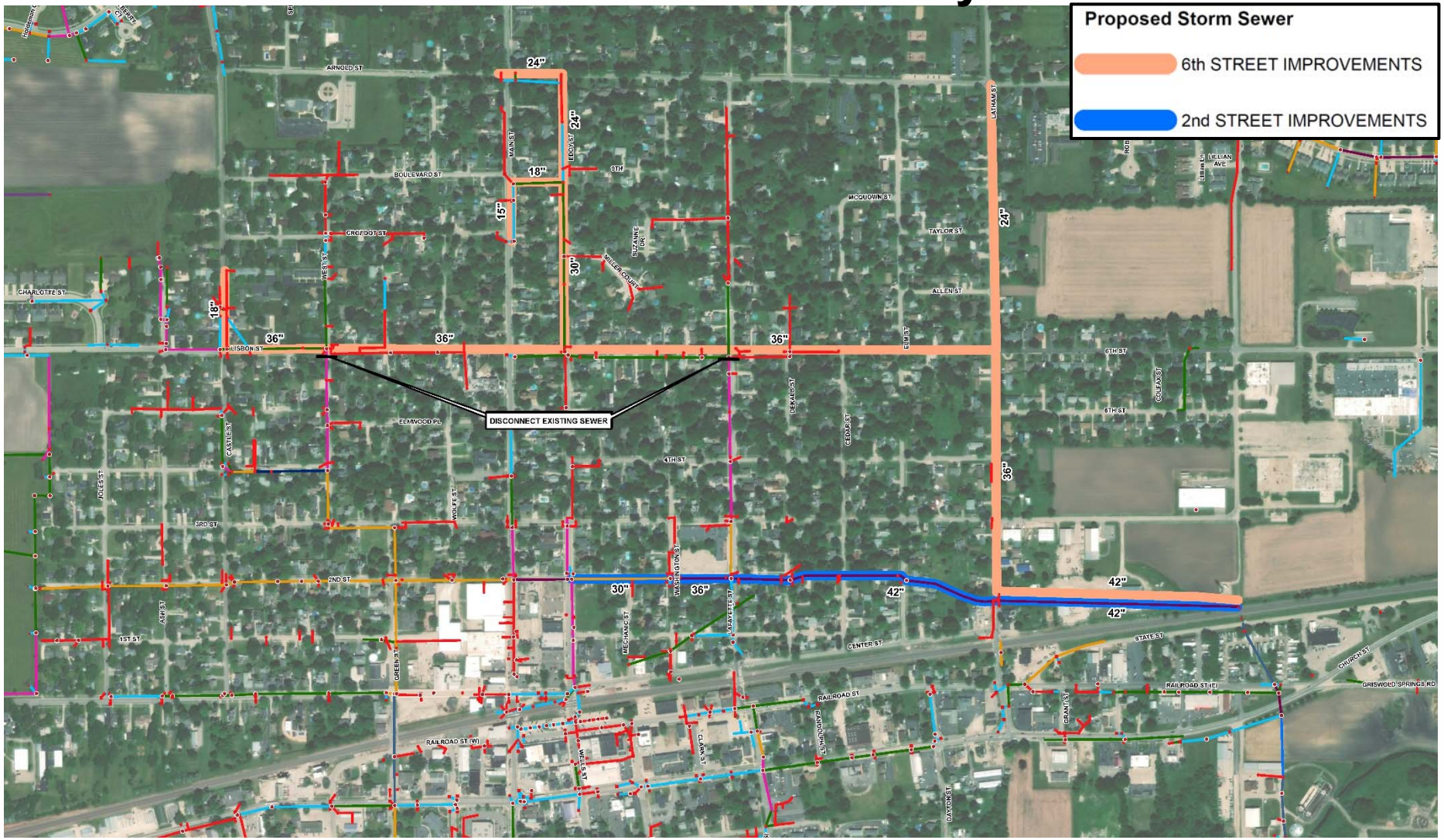
- 100-Year Design
- Berm Along North, Overflow to East
- 76 ac-ft Wetland Basin
- Incorporate into Watershed Planning

Concept Cost

- Total Construction Cost = $2,280,000
- 20 Year Bond = $167,800/year

Investigation Areas: Causes, Solutions, Cost Estimates

Downtown Storm Sewer System



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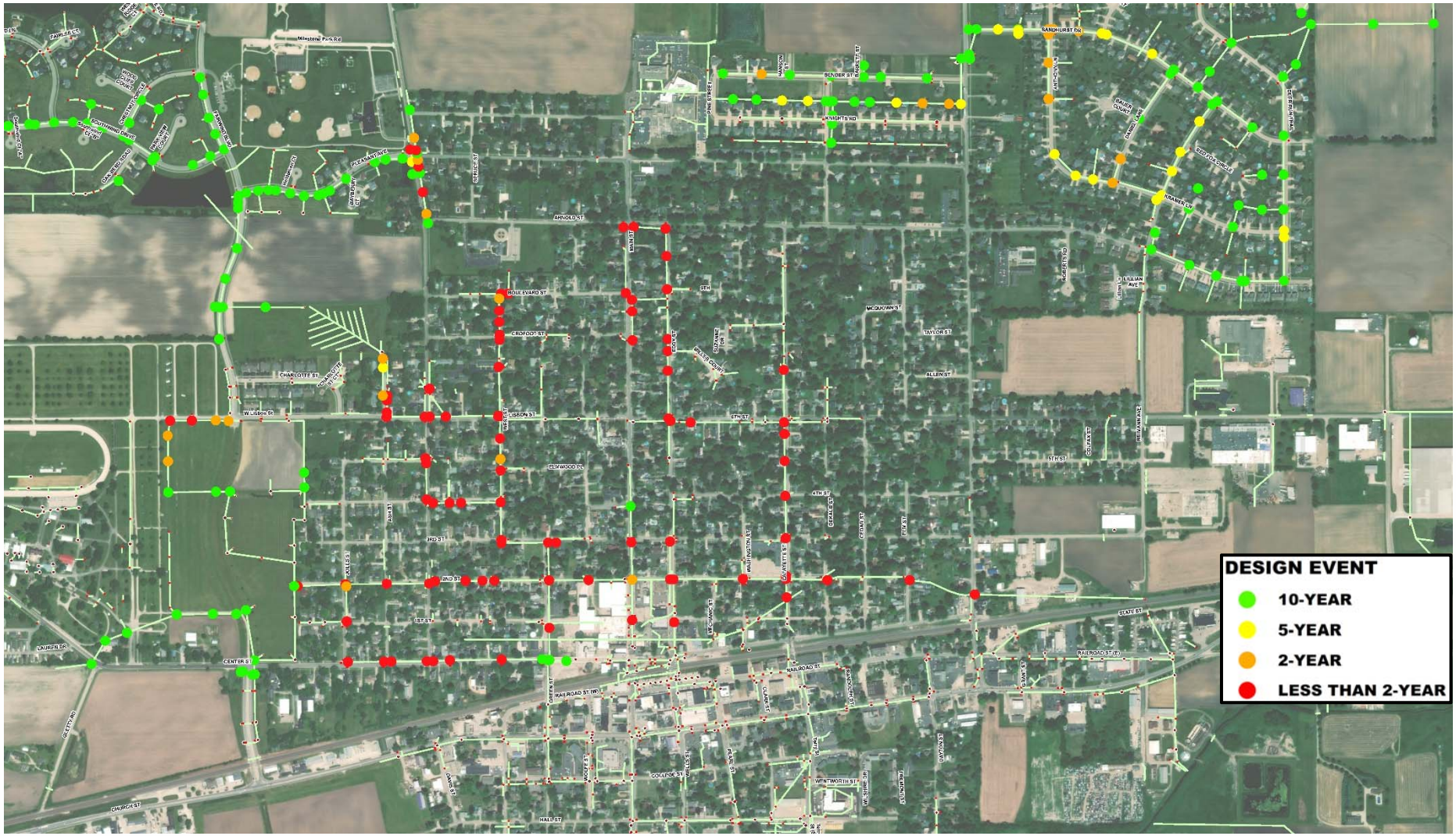
Investigation Areas: Causes, Solutions, Cost Estimates

Downtown Storm Sewer System Design Storm Capacity



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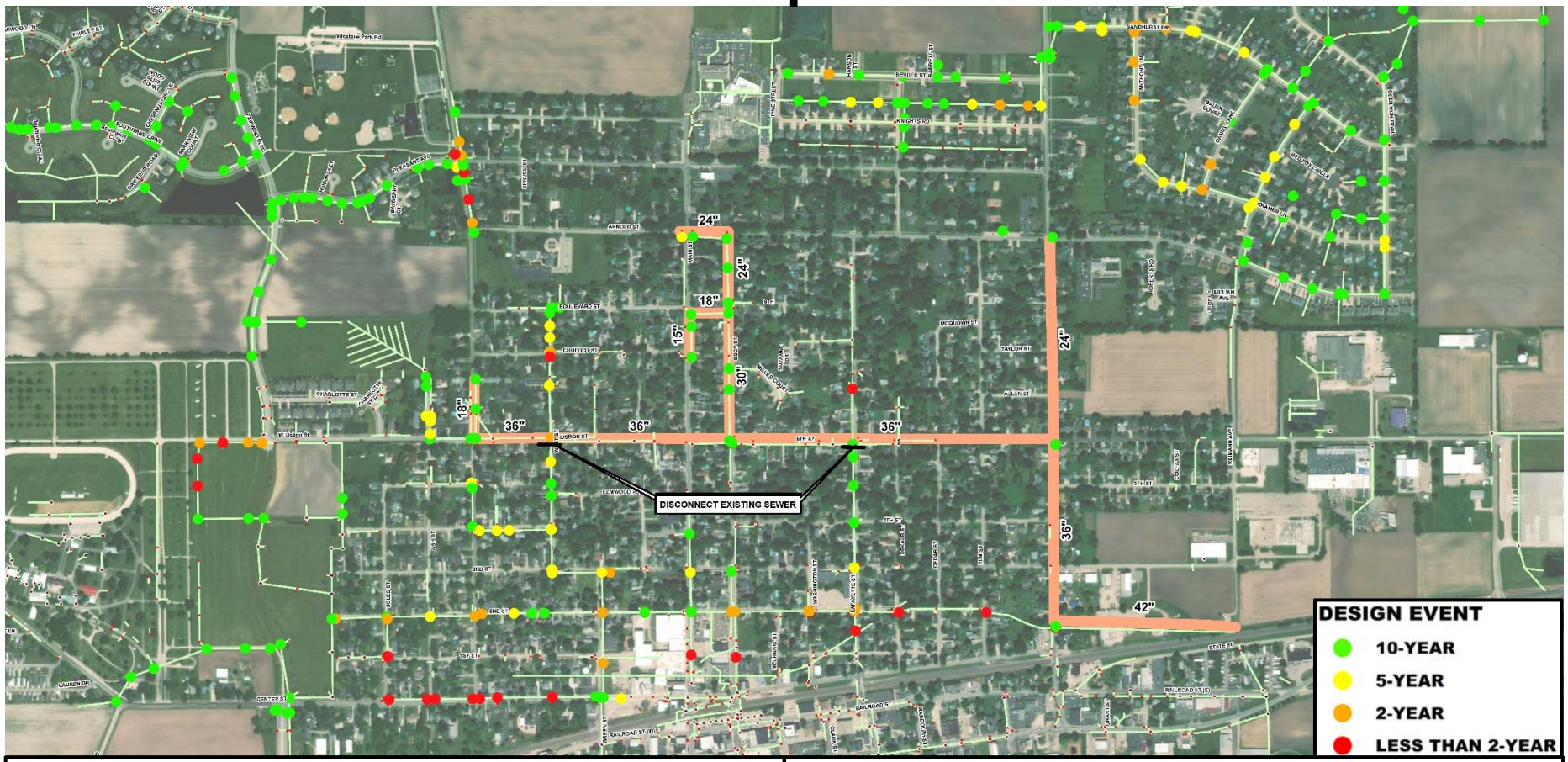
Investigation Areas: Causes, Solutions, Cost Estimates

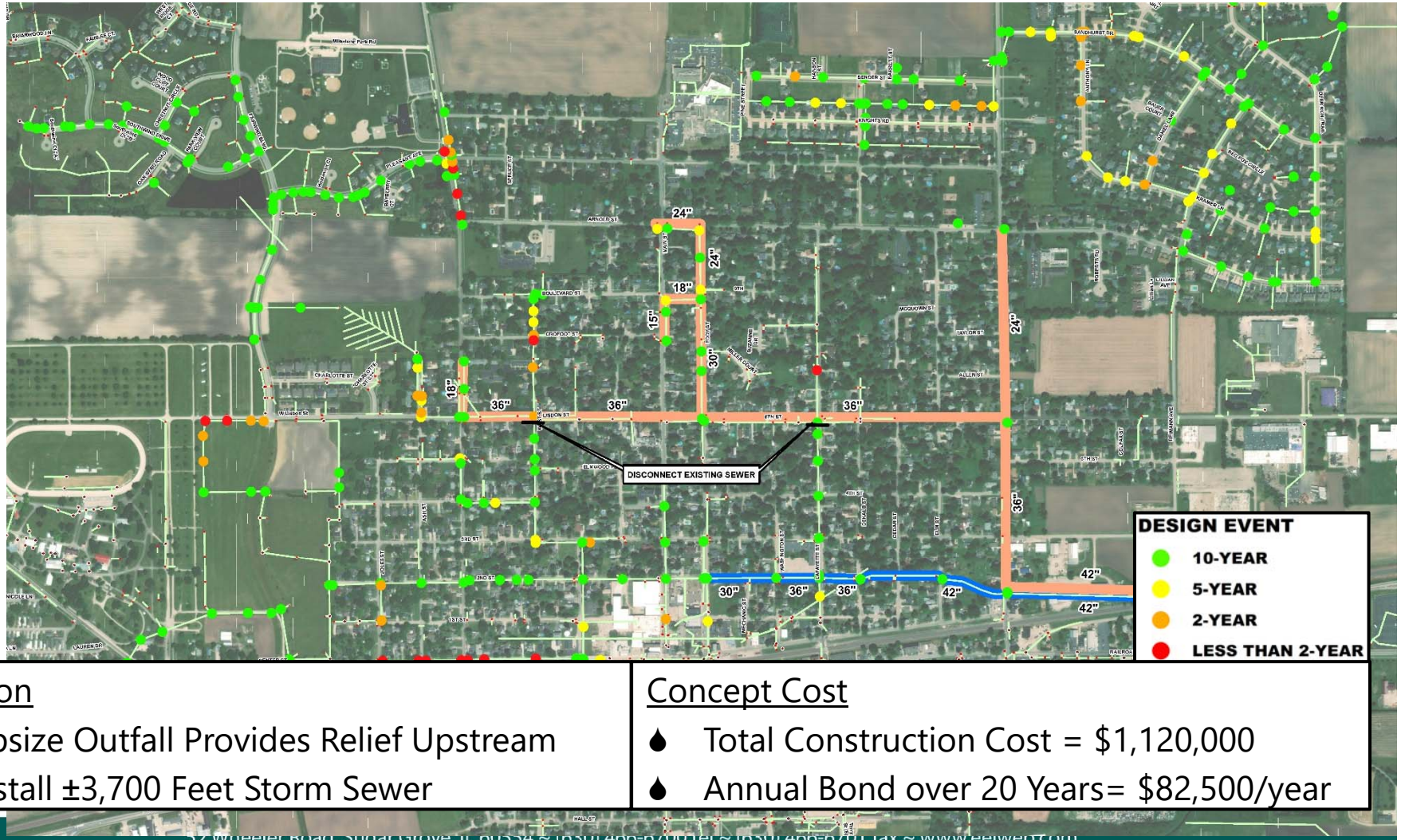
6th Street Improvements



Solution	Concept Cost
♦ Separate 2nd St & 6th St Watershed	♦ Total Construction Cost = $3,600,000
♦ Install ±13,000 Feet Storm Sewer	♦ 20 Year Bond = $265,000/year

Investigation Areas: Causes, Solutions, Cost Estimates

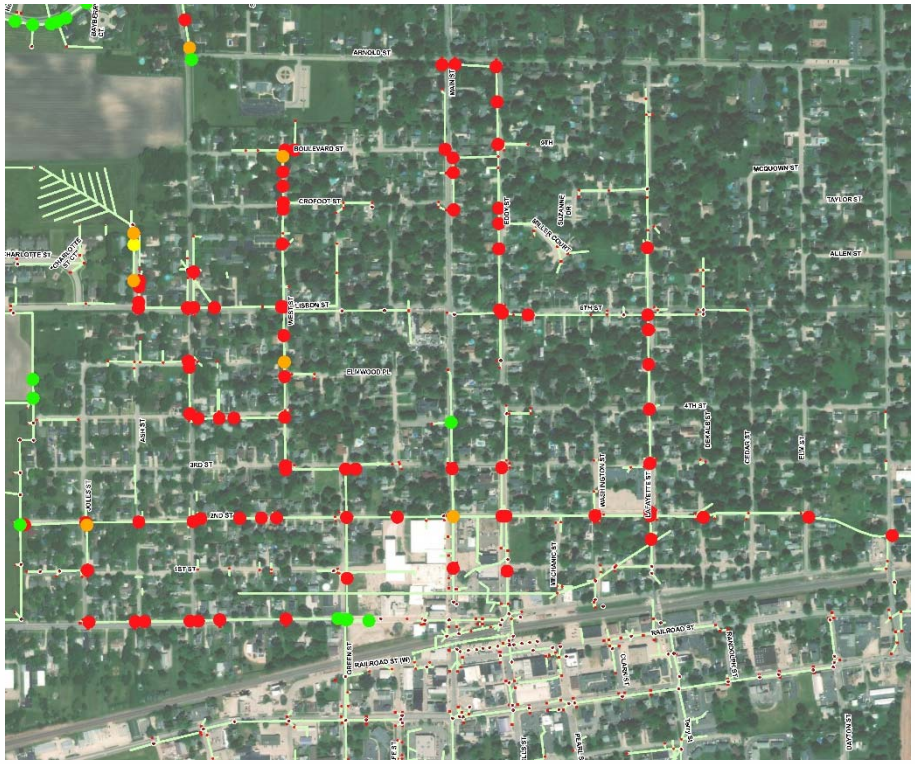
2nd Street Improvements

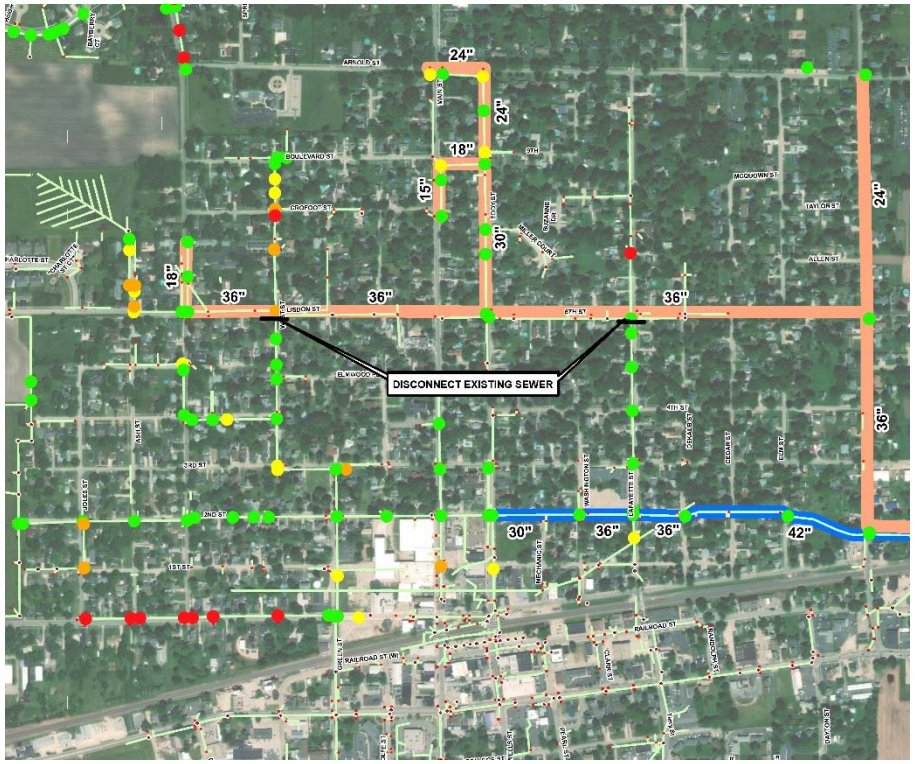


Solution	Concept Cost
♦ Upsize Outfall Provides Relief Upstream	♦ Total Construction Cost = $1,120,000
♦ Install ±3,700 Feet Storm Sewer	♦ Annual Bond over 20 Years= $82,500/year

Investigation Areas: Causes, Solutions, Cost Estimates

Storm Sewer Design Storm Capacity Summary





Existing

DESIGN EVENT
- 10-YEAR
- 5-YEAR
- 2-YEAR
- LESS THAN 2-YEAR

6th & 2nd St Improvements

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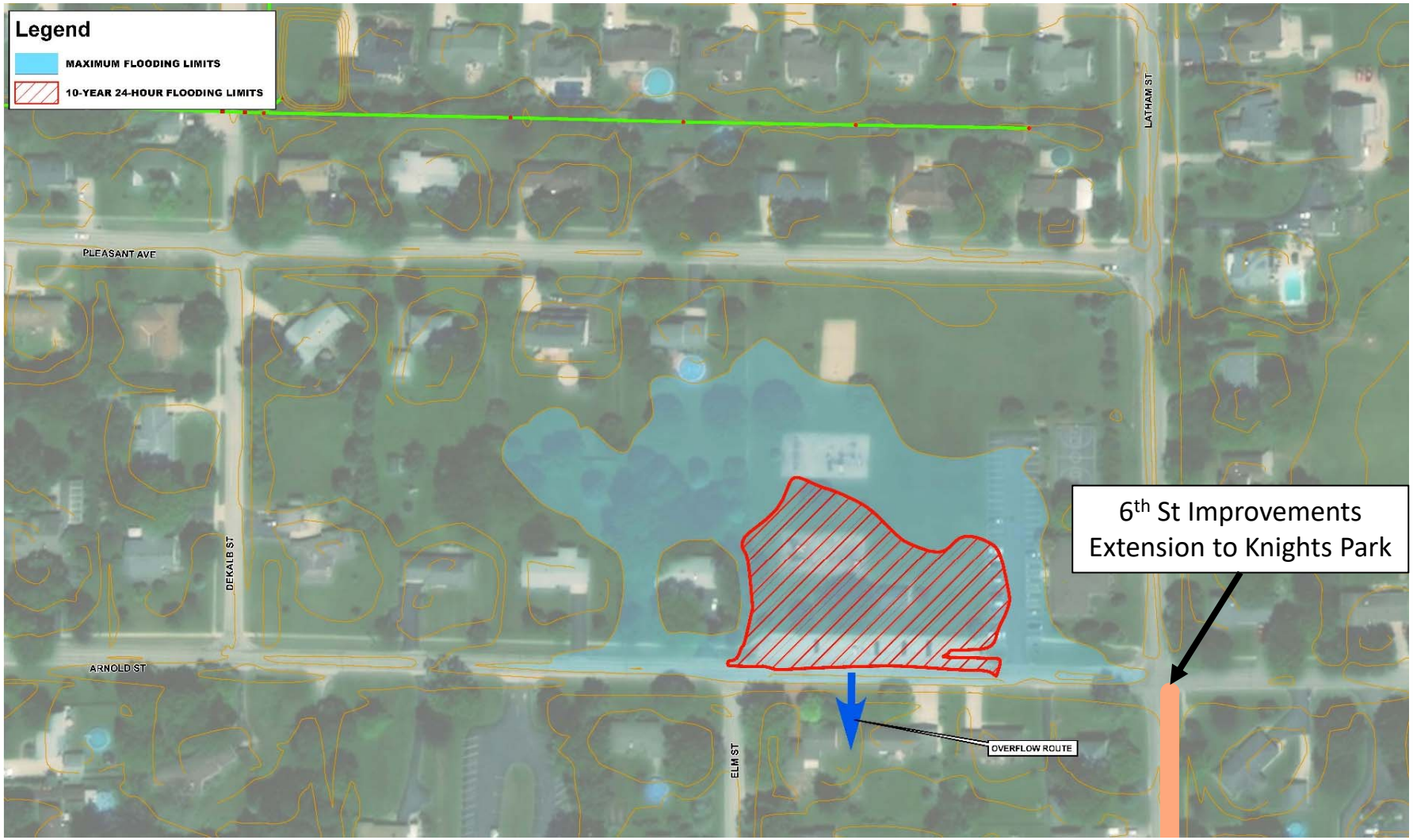
Investigation Areas: Causes, Solutions, Cost Estimates

Knights Park



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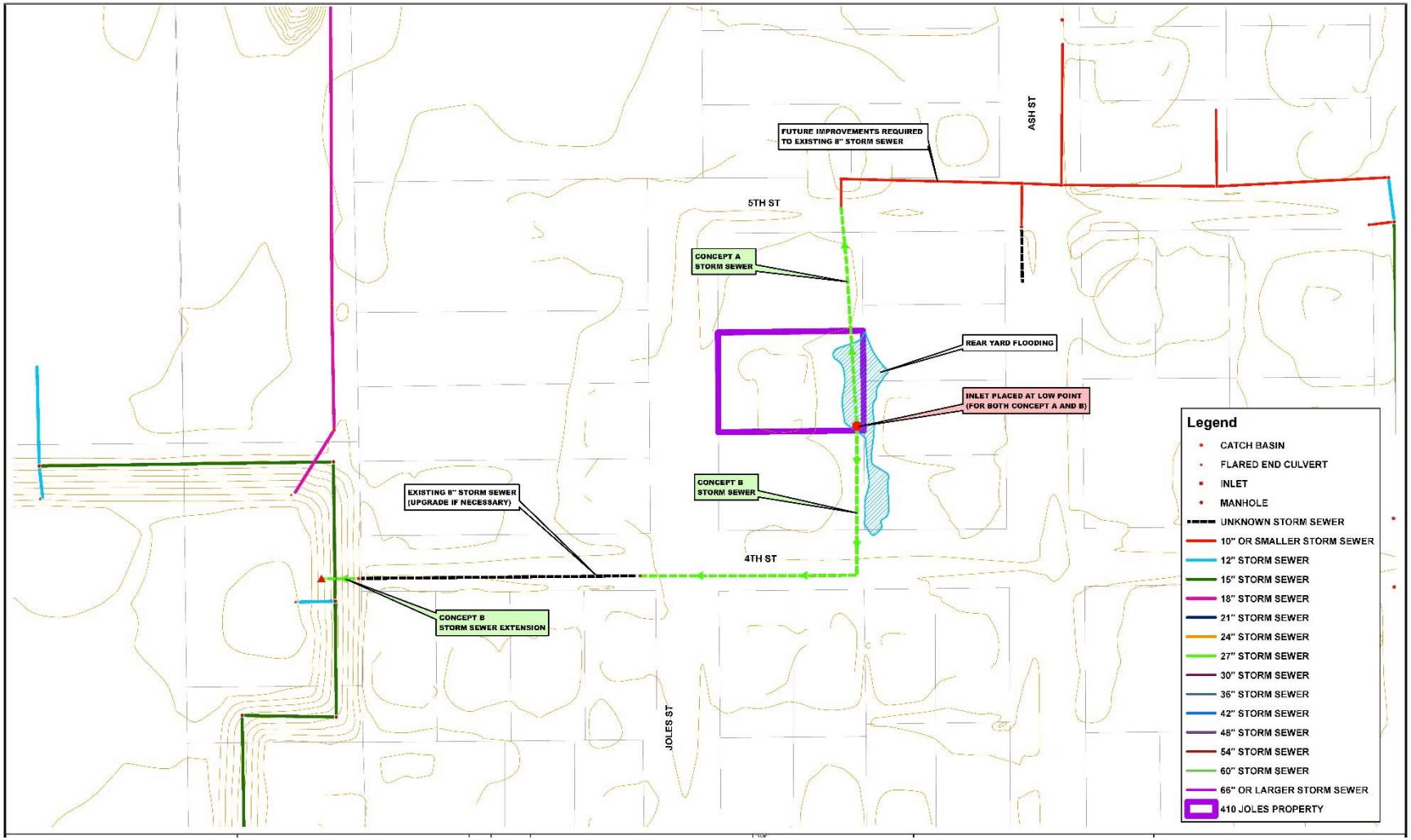
Stormwater Modeling

Concept Construction Cost Summary

	Concept Cost	Annual Bond
♦ Sandhurst Basin Options		
➔ Narrow Basin	$ 570,000	$ 42,000 /yr
➔ Wetland Expansion	$ 830,000	$ 61,100 /yr
♦ Fieldcrest Wetland Basin	$2,280,000	$167,800 /yr
♦ 6th St Improvements	$3,600,000	$265,000 /yr
♦ 2nd St Improvements	$1,120,000	$ 82,500 /yr

Investigation Areas: Causes, Solutions, Cost Estimates

Local Drainage Relief Sewer Concept



Next Steps

Stormwater System Conveyance Analysis

- Ordinance Review
- Implementation Plan
- Summary Report and Recommendations
  - ➔ Draft Report 10/31/18
    - Staff Review
  - ➔ Final Report 11/30/18

Q&A

Timothy N. Paulson, P.E., CFM
Project Manager
Engineering Enterprises, Inc.
tpaulson@eeiweb.com
(630) 466-6700

Jeffrey W. Freeman, P.E., CFM, LEED AP
Vice President
Engineering Enterprises, Inc.
jfreeman@eeiweb.com
(630) 466-6700