



# 2021 CITY OF GENEVA Comprehensive Drainage Study

August 29, 2022



Prepared By:  
WBK Engineering, LLC  
116 W. Main Street, #201  
St. Charles, IL 60174  
[www.wbkengineering.com](http://www.wbkengineering.com)



# Table of Contents

<b>S</b>	<b>Executive Summary</b>	
<b>1</b>	<b>Project Overview and Study Development</b>	
1.1	Introduction, Purpose, and Scope	9
1.2	Data Collection and Analysis	11
1.3	Special Service Area (SSA) Review & Inspections	16
<b>2</b>	<b>Analysis &amp; Recommendations</b>	
2.1	Data Collection	20
2.2	Identification of Drainage Study Areas	26
2.3	Existing Conditions Hydrologic and Hydraulic Model Development	28
2.4	Critical Duration and Design Storms	29
2.5	Model Results	29
<b>3</b>	<b>Factors Impacting Drainage Concerns</b>	
3.1	Development in Geneva	33
3.2	Limited Storm Sewer Infrastructure	34
3.3	Yard Grading Challenges	35
3.4	Stormwater Basin Maintenance	36
3.5	Surrounding Area Drainage Impact	38
<b>4</b>	<b>Proposed Drainage Improvements</b>	
4.1	Capital Improvements	43
4.2	Green Infrastructure	45
<b>5</b>	<b>Study Area Capital Improvement Projects</b>	
5.1	Study Area 1 - 6th Street	49
5.2	Study Area 2 - Bennett and Dodson	52
5.3	Study Area 3 - Bluegrass Lane	55
5.4	Study Area 4 - Brian Court	58
5.5	Study Area 5 - Crawford Street	61
5.6	Study Area 6 - East Side Drive	64
5.7	Study Area 7 - Fisher Drive	67
5.8	Study Area 8 - Forest View Drive	70
5.9	Study Area 9 - 15 Garfield Street	74
5.10	Study Area 10 - Geneva High School	77
5.11	Study Area 11 - Gray Street	83

## Table of Contents

5.12	Study Area 12 - Greenwich Lane	87
5.13	Study Area 13 - Kansas Street	90
5.14	Study Area 14 - Longmeadow Drive	94
5.15	Study Area 15 - Maple Sherman Area	97
5.16	Study Area 16 - Miller Road	105
5.17	Study Area 17 - Oakwood Drive	114
5.18	Study Area 18 - Pheasant Run Place	120
5.19	Study Area 19 - Prairie Green Preserve	129
5.20	Study Area 20 - Randall Square	135
5.21	Study Area 21 - Sheffield Lane	152
5.22	Study Area 22 - Spring Street and Spring Court	155
5.23	Study Area 23 - Sudbury Lane	160
5.24	Study Area 24 - Westfield Course	163
5.25	Study Area 25 - Woodlawn Street and School Street	166
<b>6</b>	<b>Summary of Capital Improvement Projects</b>	
<b>7</b>	<b>Funding of Capital Improvement Projects</b>	
7.1	Funding Options	177
7.2	City Stormwater Utility Financial Forecast	180
<b>8</b>	<b>Other Recommendations</b>	
8.1	Leverage GIS for Data Capture	187
8.2	Rainfall Event Data Capture Protocols	187
8.3	Capital Plan Updates	187
8.4	Continued Public Engagement	187
<b>9</b>	<b>Definitions &amp; Acronyms</b>	
<b>10</b>	<b>Appendix A</b>	

S : Executive  
Summary

## **OVERVIEW & PURPOSE**

The overarching purpose of this study is to identify and effectively address the stormwater issues affecting the City and its residents and businesses. It is intended to: improve decision making by informing City staff and elected officials of concerns related to drainage infrastructure throughout the City; identify proposed drainage improvement projects; develop a plan to implement a drainage improvement program; and identify funding and budget needs for such a program. The study comprised of three main components: data gathering through public input, analysis of drainage issues and design of mitigation measures, and economic analysis and capital plan development.

## **PUBLIC INPUT**

Public engagement was the first step in providing a comprehensive understanding of drainage challenges and concerns experienced by residents and businesses. Three methods of gaining public input were completed: a public web portal, an Open House, and interaction with residents following a May 2020 storm event.

Development of a web portal was key to public engagement as the study was initiated in the spring of 2020 when the COVID pandemic was limiting public interactions. The drainage study web portal was open for public input for approximately ten weeks from Friday, September 18th, 2020, to Tuesday, December 1st, 2020. Over this period the online engagement platform received 3,148 total visits from 633 unique users. In total, the portal collected 147 comments and 17 individual property survey responses. Approximately 62% (91 out of 147) of the total number of comments provided were made in reference to specific drainage concerns on individual properties. Another 34% of comments (50 out of 147) responded in reference to On-Street Drainage Concerns. Just 4% (6 out of 147) public comments were made in reference to specific Erosion Concerns in the City. There were no Water Quality Concerns submitted through the portal.

In addition to the web portal, an open house meeting was hosted on October 1, 2020 from 4:00 PM to 7:30 PM in the City Public Works Training Room (1800 South Street) and followed CDC guidelines and COVID protocols. A total of thirty three (33) residents visited the Open House hosted by Public Works staff with assistance from WBK. A variety of base maps, aerials, and other exhibits were available to help facilitate the discussion.

On May 15 through May 18, 2020 the Fox Valley experienced a significant rainfall event which resulted in numerous service requests from Public Works. Over this time period, staff from Public Works and WBK performed field visits, documenting drainage problems and discussions with residents on their drainage issues. Photos and video were collected to record the location of each specific concern. The rain event produced a total of forty-six (46) records, of which all have been merged with information collected within the interactive map tool of the web-based community engagement and other concerns documented in the public workshop. The final element was tapping the institutional knowledge of Public Works staff who maintain the drainage system and routinely respond to citizen service requests.

## SUMMARY OF ANALYSIS AND EVALUATIONS

The location and severity of drainage issues varied across the City. Drainage concerns which were similar in nature and proximate to a particular neighborhood or subdivision were aggregated into one study area. Other study areas remained as isolated incidents to be evaluated separately. A total of 25 study areas were identified. Each study area was evaluated to determine the cause of the issue, and drainage improvements identified to resolve the drainage concern documented. Several study areas in particular were complex and necessitated detailed hydrologic and hydraulic analyses and development of a series of alternatives prior to the final recommended improvements. Other study areas were simple, such that a basic drainage analysis was adequate to identify required improvements. In five study areas the nature of the recommendations warranted a phased and multi-year approach to construction of drainage improvements. Current (Bulletin 75) rainfall data was used to evaluate the effectiveness of existing and proposed conditions even though much of the infrastructure was designed with previous rainfall data. The current rainfall data have values which are as much as 30% to 35% more than the previous Bulletin 70 rainfall values.

Although we have identified many drainage challenges throughout the City, in general we do not find significant structure (house) flooding to be prevalent. In general, the concerns and issues identified are the result of the lack of drainage infrastructure in mature neighborhoods, and inadequate capacity of drainage infrastructure when considering the current rainfall data. The lack of adequate drainage infrastructure and suitable outlets for overflows and sump pump discharges results in yard flooding.

## ADDITIONAL FACTORS EVALUATED

Stormwater basin maintenance is also identified as a challenge in some areas of the City. A majority of stormwater basins throughout the City are privately owned and maintained. Even where Special Service Areas (SSA) exist to provide funding for remedial work, it is likely inadequate for major rehabilitation activities.

The study also identified offsite areas draining into the City and assessed the risk of changes or impacts to City drainage systems. The most notable item identified was a large diameter storm sewer running from St. Charles near Geneva High School to the Geneva Golf Club. The integrity of this sewer is critical to continued conveyance of flows since failure of this pipe would cause drainage issues in this portion of the City.

We evaluated the conversion of roadways with ditches to a roadway section with curb and gutter, inlets and storm sewer, similar to most current day urban roadway standards. Based on drainage concerns expressed by residents we did not find that curb and gutter with inlets would significantly improve drainage conditions. Furthermore, the front yard drainage swales are considered a stormwater best management practice promoting infiltration and removal of pollutants. Accordingly, a recommendation to systemically change uncurbed roadways to curb and gutter was not made.

Very little interest was expressed by citizens with respect to green infrastructure and water quality related to stormwater. That is not to suggest it does not exist or that the City should not advocate for green infrastructure. The benefits of green infrastructure are well documented. However, based on the response, no detail or specific actions are recommended at this time in this study.

This study was not conceived as a result of concern over climate change. However, during the course of the study the discussion on rainfall data changes has made it clear to City staff and WBK that the outcomes from the study will make Geneva more resilient to increasing rainfall amounts and extreme weather events. Community resilience can only be built if adequate resources are allocated for proper planning and construction of drainage infrastructure.

## CAPITAL PLAN OVERVIEW

One of the primary objectives for the study is the development of a capital plan to address stormwater drainage issues throughout the City. The plan is intended to be long range with a horizon of 10 years split into two distinct phases. The first phase of the plan develops annual programs for the first five years, and second phase addressed the remaining five years. For the 25 identified Study Areas, project costs were developed which included construction as well as soft costs for engineering and in some cases land acquisition. For the more complex projects, or those anticipating third party approvals, the soft costs and construction costs are separated and programmed in consecutive years. Any project not programmed in the first five years is included in the second five year horizon or “B-List”. No specific year or implementation schedule is provided for these projects. Projects were prioritized and programmed through an interactive discussion with City staff recognizing community benefit, risk and an effort to spread costs across a five year horizon. Concept level drainage improvements along with opinion of costs were identified for each of the 25 project areas. Three of the project areas have multiple phases based on scope and complexity. Two project areas consist of entire neighborhood drainage improvements and were assigned as annual programs to be coordinated with roadway maintenance and utility improvements in those neighborhoods. The total cost for all project is estimated to be \$16.2 Million. Phase one of the plan (years 1 through 5) has an estimated cost of \$7.4 M with an average annual expenditure of \$1.5M. All costs are expressed in 2022 dollars.

## FINANCIAL OPTIONS

The financial forecast developed by NewGen Strategies and Solutions, LLC includes the most recently available actual stormwater financial data and forecasts that incorporate the necessary operating and maintenance (“O&M”) and capital expenses of the system. Several key assumptions were made to develop the revenue requirement forecast:

- » Larger projects are assumed to be financed with new debt.
- » The City would establish a new Stormwater Fund with a General Fund transfer of \$500,000, to be paid back at nominal interest over a five-year period.
- » Reserve contributions would be made in the early years of the Stormwater Fund to meet a recommended minimum reserve balance of 90 days of O&M spending plus one year of debt service.

The following table shows the revenue requirement forecast for fiscal years 2022 through 2027.

**Table 1- Stormwater Net Revenue Requirement Forecast**

	FY 2022 Estimated	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast	FY 2026 Forecast	FY 2027 Forecast
Operating Expenses	\$65,181	\$116,596	\$119,293	\$122,054	\$124,880	\$127,774
Cash Funded Capital	\$551,000	\$1,082,544	\$1,520,399	\$1,363,990	\$1,064,877	\$1,246,319
Debt Service	\$ -	\$ -	\$59,860	\$123,828	\$318,846	\$318,846
GF Loan Repayment	\$ -	\$106,079	\$106,079	\$106,079	\$106,079	\$106,079
Reserve Contributions	\$ -	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
<b>Total Revenue Requirement</b>	<b>\$616,181</b>	<b>\$1,355,219</b>	<b>\$1,855,631</b>	<b>\$1,765,951</b>	<b>\$1,664,683</b>	<b>\$1,849,019</b>
Less Misc. Revenues	\$ -	(\$1,479)	(\$1,877)	(\$2,249)	(\$3,523)	(\$5,822)
<b>Net Revenue Requirement</b>	<b>\$616,181</b>	<b>\$1,353,740</b>	<b>\$1,853,755</b>	<b>\$1,763,701</b>	<b>\$1,661,160</b>	<b>\$1,843,197</b>

The fee necessary to support the Stormwater system was estimated for three different types of fees: a monthly fee per water customer, a monthly fee per parcel, or the tax rate per \$100 of assessed value within the City. The fee forecast maintains the minimum recommended reserve balance in each Fiscal Year.

**Table 2- Stormwater Fee Forecast**

	<b>FY 2022 Estimated</b>	<b>FY 2023 Forecast</b>	<b>FY 2024 Forecast</b>	<b>FY 2025 Forecast</b>	<b>FY 2026 Forecast</b>	<b>FY 2027 Forecast</b>
<b>Monthly Fee</b>						
Per Water Account	\$1.00	\$13.50	\$18.50	\$18.50	\$18.50	\$18.50
Per Parcel	\$1.00	\$13.00	\$17.50	\$17.50	\$17.50	\$17.50
<b>Annual Tax Rate</b>						
Per \$100 Assessed Value	\$0.0110	\$0.1238	\$0.1697	\$0.1697	\$0.1697	\$0.1697

The forecasts shown above depend on various estimates and assumptions and may materially change based on updated data inputs or changes in assumptions.

**OPERATIONAL RECOMMENDATIONS**

Throughout the study we became aware of City operations and maintenance procedures as well as data collection and capture methods for the City’s drainage infrastructure. Several recommendations for process improvements include the following:

- » Leverage GIS for data capture
- » Rainfall Event Data Capture Protocols
- » Capital Plan Updates
- » Continued Public Engagement



# 1 : Project Overview and : Study Development



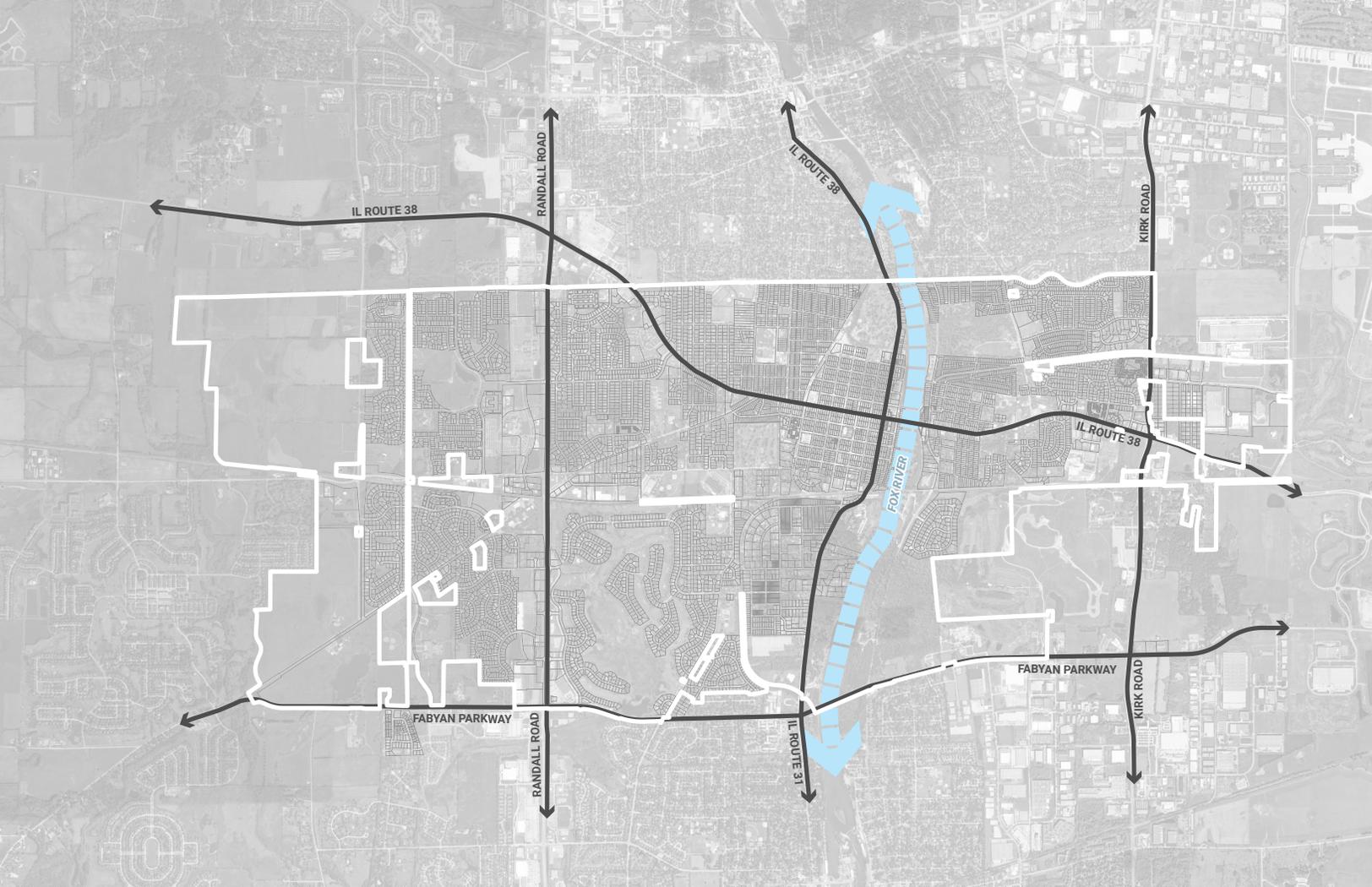


Figure 1- City of Geneva Corporate Limits

## Project Overview and Study Development

### 1.1 Introduction, Purpose, and Scope

Historically, the City of Geneva (known hereafter as “the City”) has experienced a variety of drainage challenges throughout its corporate limits affecting not only City-owned right-of-way and streets, but also privately-owned properties and in some cases structure inundation in primarily residential areas within the community. These challenges have proven difficult to address as they have occurred from a range of storm events with varying degrees of intensity and duration.

To effectively address the stormwater issues affecting the City, WBK Engineering LLC (WBK) was retained by the City to develop a comprehensive City-wide Stormwater Management Report and Plan (known hereafter as “the Plan”) to identify and develop proposed drainage improvement projects. This Report presents the results of significant stormwater management outreach and investigation of the numerous drainage challenges impacting the City, its residents, and businesses.

The City is defined by the Fox River, which bisects the corporate limits from north to south and consists of three (3), primary watersheds. The westerly portion of the City lies within the Mill Creek watershed. Although Mill Creek ultimately flows into the Fox River, these areas in the City of Geneva primarily drain south and west to Mill Creek prior to its convergence with the Fox. Areas within this watershed include residential and commercial uses which have been developed in the last 40 years.

Much of the City and surrounding areas adjacent, flow into the Fox River through a network of existing storm sewers and overland flow channels with a great portion having been developed prior to modern-day stormwater regulation and development design practices. A number of drainage studies have been performed over the years and improvements implemented to supplement original drainage infrastructure within the area’s tributary to the Fox River.

A small portion of the far east side of the City flows east and lies within the West Branch DuPage River Watershed (Kress Creek). Much of the development in this watershed includes residential and more recently developed industrial land uses. See “Figure 4- Primary Watersheds” on page 13.



### Project Kick-Off

WBK Engineering LLC (WBK) was engaged to assist the City in identifying drainage challenges and to develop a long-range approach and plan to address these challenges and to maintain the public drainage infrastructure throughout the City. The following primary services were performed and deliverables provided.

- » Outreach, Investigation and Selection of Study Areas
- » Evaluation, Alternatives and Preferred Solution
- » Capital Plan Development
- » NPDES & Financial Considerations
- » Final Report Compilation
- » Coordination with City GIS & Continued Monitoring
- » Investigation & Discovery

This task included procurement of City data (Storm Sewer GIS, prior studies, etc.), meeting with City staff to identify known drainage and flooding concerns and a public outreach program. The public outreach program consisted of two primary elements; a conventional open house for the public to provide feedback and a Web based mapping engagement platform. Through outreach, discussion of staff and review of data we identified primary study areas for further analysis.

### Alternatives & Solutions

Depending on the nature and extent of the problem we developed hydrologic and hydraulic models to mimic existing conditions and upon which to develop and test alternatives. Working exhibits were created to communicate with City staff the scope of the alternatives and benefits. With input from City staff we identified a preferred solution and continued to develop, costs, land right impacts, third party and permit requirements.

### Capital Planning

This task is a culmination of prior evaluations and discussions into formal programs to be utilized for policy discussions, budget decisions and potentially an implementation plan. The final deliverable is a 10-year capital plan.

Through our discussion and study we evaluated operational efficiencies (Storm Basin SSA's) as well as NPDES compliance and considering future risks relative to the budget. We have identified funding shortfall or "gap" as well as typical and common municipal strategies

### Final Report

We have prepared a final report which is an assembly of all prior tasks and work products into a document intended to be utilized by City staff and elected officials in making informed decisions related to stormwater management throughout the City and the allocation of City resources.

### Maintenance & Follow-Up

We have coordinated the data collected, including citizen, outreach with the City's GIS staff for integration into the City's GIS system. WBK also continues to monitor flooding areas serving as a resource to document conditions as well as respond to citizen concerns during extreme rainfall events. To date no additional events have warranted WBK involvement.

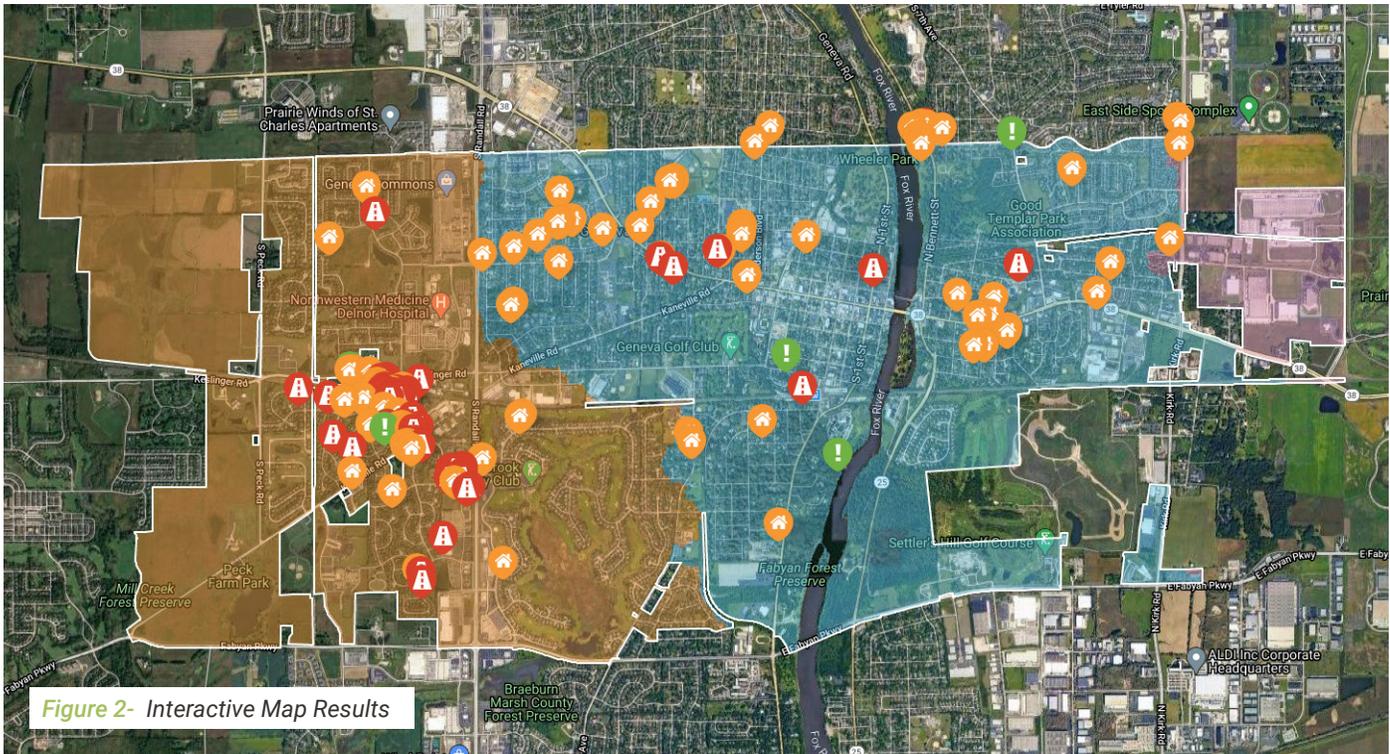


Figure 2- Interactive Map Results

## 1.2 Data Collection and Analysis

### 1.2.1 Public Engagement

Public engagement plays a critical role in documenting the concerns faced by residents and others in the community. Ultimately, the City's ability to address those concerns through an organized capital improvement plan relies on an effective public outreach process and on the quality of feedback received.

The original scope of work identified a two-phased approach for public engagement; face-to-face collaboration between City Staff/Consultant Team with residents and other public stakeholders via a traditional public meeting (i.e. "Workshop") and employment of a web-based toolbox to raise awareness about the Plan and collect consistent feedback over a predetermined time frame via digital mapping and surveys.

Authorization of the Plan in February of 2020 occurred at the outset of the COVID pandemic. At this time, priorities shifted to initiate the use of the web-based portal versus a traditional public-meeting to respect public health guidance and social distancing protocols required by the County.

### Web-Based Community Engagement

WBK utilized "Social Pinpoint", an online community engagement platform that offers a customizable range of tools and capabilities to help develop a comprehensive approach to understanding and managing existing drainage and infrastructure conditions and the challenges they present within the City's limits. The online tool allowed residents and project stakeholders an opportunity to share their opinions and feedback in a forum that could not otherwise exist due to the ongoing pandemic.



The web portal was designed to present key information about the Plan including Project FAQs, Project Timeline, Project Schedule, and links to other relevant resources pertaining to stormwater such as FEMA Flood Maps as well as Past Plans and Studies completed by the City.

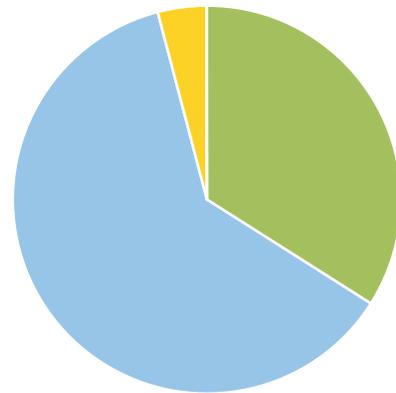
The most valuable component of this tool was the interactive map which provided residents and stakeholders an opportunity to “pin” or identify specific commentary over a base map of the City utilizing Google’s aerial map platform with an overlay of the City of Geneva’s corporate limits and breakdown of existing watersheds. WBK collaborated with Staff to identify and color code current concerns/challenges faced by the City with regards to stormwater. Elements identified included:

- » On-Street Drainage Concerns,
- » Private Property Drainage,
- » Erosion Concerns, and
- » Water Quality Concerns.

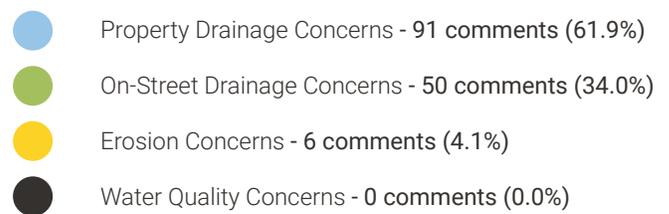
Based on their inherent knowledge of the City, participants were encouraged to drag the corresponding color-coded icon to the map to identify each concern or challenge. Once located, a text box was introduced allowing participants to share their name, contact information, a description of their concern, and even a photograph or video of the issue/challenge as described. For those residents concerned with identifying a drainage issue on their own individual property, a web-based survey was integrated within the map to collect the important feedback aside from public view with access to the information limited strictly to WBK and City Staff.

The web portal went live for community feedback on Friday, September 18th, 2020, and remained open and active until Tuesday, December 1st, 2020. Over a period of approximately ten (10) weeks, the online engagement platform received 3,148 total visits from 633 unique users of which 112 provided feedback in one way or another. In total, the tool collected 147 comments and 17 individual property survey responses.

The majority of comments fell between Property Drainage and On-Street Drainage Concerns. Approximately 62% (91 out of 147) of the total number of comments provided were made in reference to specific drainage concerns on individual properties. Another 34% of comments (50 out of 147) responded in reference to On-Street Drainage Concerns. Just 4% (6 out of 147) public comments were made in reference to specific Erosion Concerns in the City. There were no Water Quality Concerns registered in the Study. A full data export in Microsoft Excel file format has been provided to Staff for further review and analysis to be integrated within the City’s long-range plans.



**Figure 3- Summary of Responses**



Name of Watershed	Property Drainage	On-Street Drainage	Erosion	Water Quality
Mill Creek	53	42	3	0
Fox River	33	8	3	0
Kress Creek	5	0	0	0

**Table 3- Comment Distribution by Watershed**

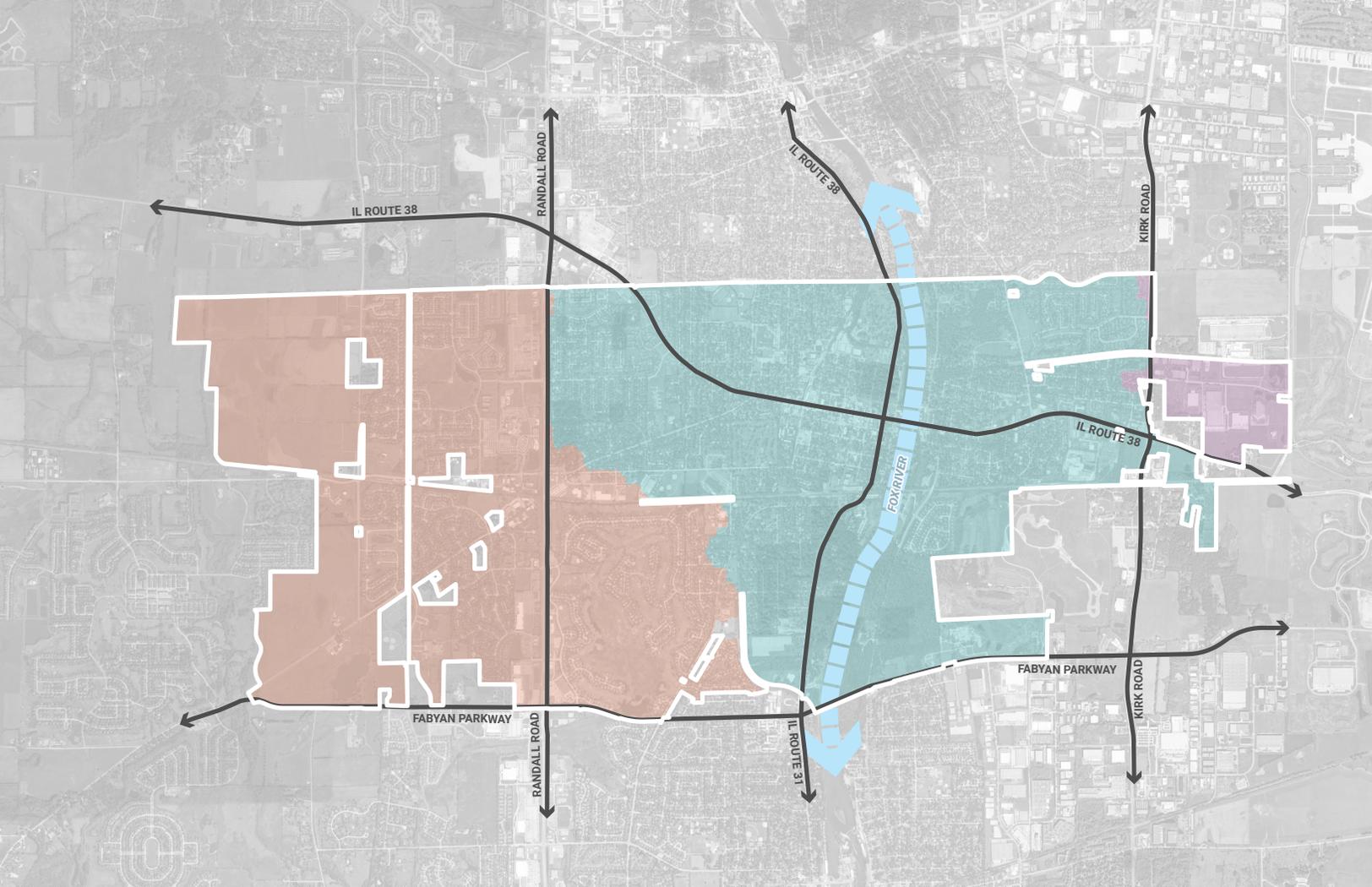


Figure 4- Primary Watersheds

- Mill Creek Watershed
- Fox River Watershed
- West Branch DuPage River (Kress Creek) Watershed



May 2020 Rainfall Event

### Open House

An open house public meeting was hosted on October 1, 2020, from 4:00 PM to 7:30 PM in the City Public Works Training Room (1800 South Street). A total of thirty-three (33) residents visited the Workshop which was facilitated by Rich Babica and Brian Schiber from the City of Geneva and John Witte and Greg Chismark from WBK Engineering. The first resident arrived a few minutes prior to 4:00 PM with a steady stream of attendees until just after 7:00 PM. A variety of base maps, aerials, and other exhibits were available to help facilitate the discussion.

Upon entrance residents were greeted at the door by either City or WBK Staff. A number of residents provided pictures and written notes to describe the challenges faced at their residence. On several occasions a specific drainage concern was represented by a group of neighbors who attended the meeting to express their concerns as a collective whole. All conversations were constructive and cordial, even leading to discovery of additional areas of concern which had previously gone undocumented. Residents were provided comment forms which included space for their contact information so that City Staff members and WBK Staff could follow up. Forms collected during the meeting have been logged into the project record.

### May 2020 Rainfall Event

On May 15 through May 18 the Fox Valley experienced a significant rainfall event which resulted in increased calls from residents to the City for assistance with drainage concerns. WBK Staff was utilized to assist the City's staff in responding to these calls and in documentation of the specific concerns. The Team utilized a web-based spreadsheet called "SmartSheet" to capture and document interactions with the public. Photos and video were collected and attached to record the location of the specific concern. The rain event produced a total of forty-six (46) records, of which all have been merged with information collected within the interactive map tool of the web-based community engagement and other concerns documented in the public workshop.

### City Staff Input

WBK received input from City staff through a variety of meetings and discussions throughout the duration of the study. On several occasions, WBK met formally with Public Works staff to identify recent and past drainage concerns. Certain Staff, some with over twenty (20) years of experience in the City proved invaluable to understanding those historic challenges faced by the City. WBK mapped the major watersheds in the City and located closed depressions based on County GIS data. Locations identified by City staff were added to the map and given a numeric identifier with a written description of the type of drainage deficiency observed. Also added to the map were areas observed from the May 2020 rainfall event. From this document, study areas and their prioritization for evaluation were determined.

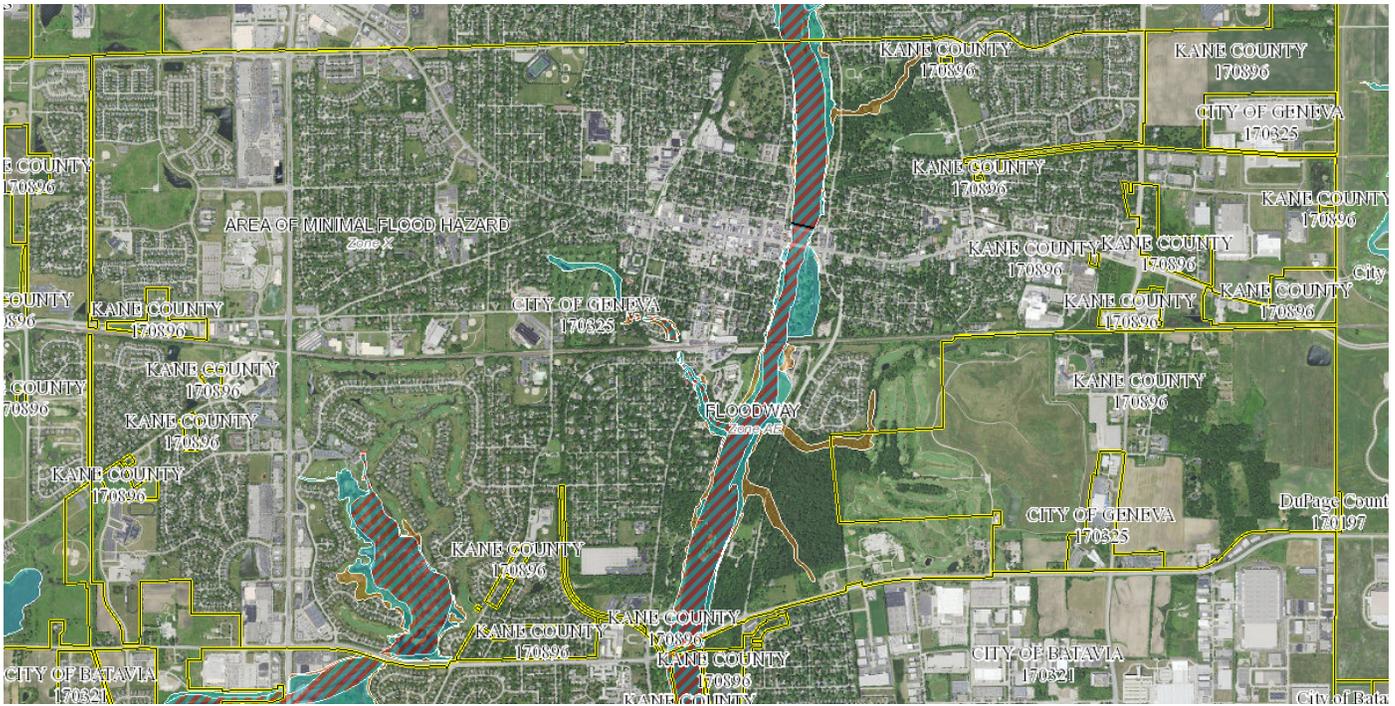


Figure 5- FEMA Flood Map - City of Geneva

### GIS, Storm Sewer Data Collection & Floodplain Maps

WBK obtained data from a variety of sources to gain an understanding of drainage patterns and conditions throughout the City. Data sources included:

- » City Storm Sewer GIS data
- » County Parcel Data
- » County Topographic data
- » FEMA flood maps

WBK also requested access to City records including prior drainage studies and reports. Many of the drainage reports were prepared as a result of a specific development projects and included drainage calculations for those properties currently under development.

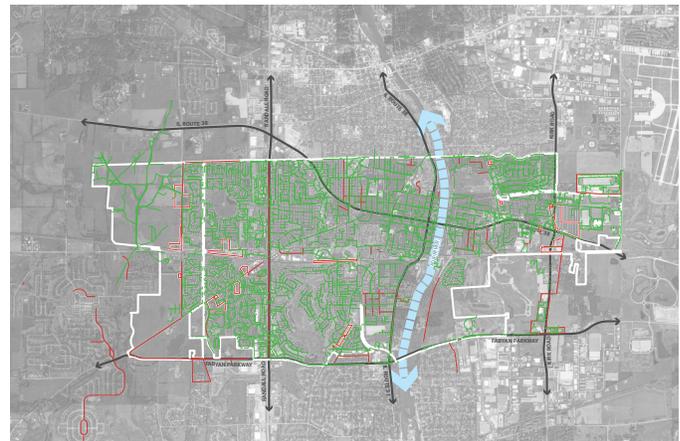


Figure 6- City GIS Data

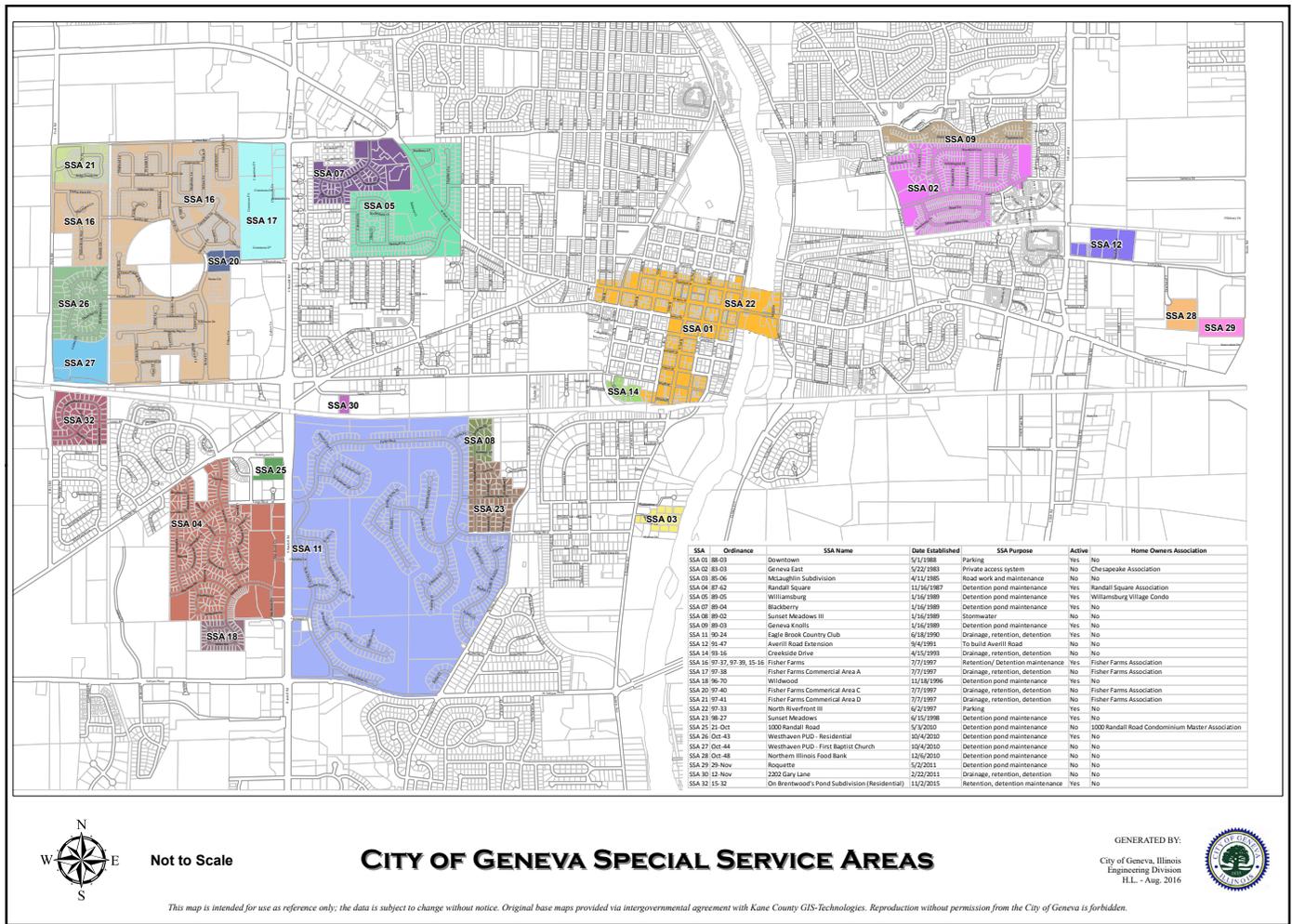


Figure 7- City SSA Map

### 1.3 Special Service Area (SSA) Review & Inspections

Stormwater detention basins are both publicly and privately owned and maintained. Even when privately owned, stormwater basins provide a public purpose by protecting downstream properties from increases in stormwater runoff rates from land that has been developed. In order for stormwater basins to meet their intended purpose and operate as intended, proper maintenance is critical. While this does not require daily or even weekly attention like other public infrastructure elements, stormwater management and detention areas must be treated with an asset management approach to ensure proper functionality when required. Since 2001, the Kane County ordinance established a practice of requiring a Special Service Area (SSA) to serve as a backup funding mechanism when stormwater basins are privately owned.

City staff has a total of 32 SSA's throughout the City with 10 SSA's being levied for a stormwater management or drainage function.

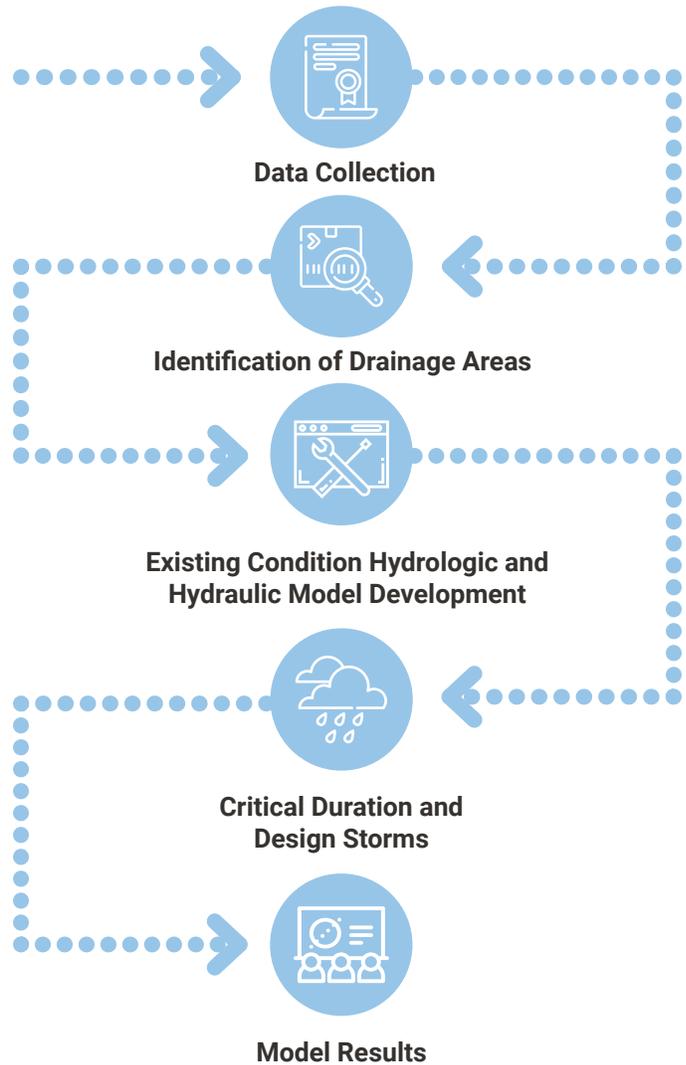
City Public Works staff is knowledgeable and attentive to the needs and challenges of the basins for which an SSA is levied. Annual inspections have identified several basins in the City with existing deficiencies. While none of these appear to be the primary cause of any specific City drainage challenges, maintenance and enhancement must be considered as part of a long-range capital improvement plan. WBK has cataloged all City SSA's and documented purpose, levy, and specific City staff observations in a spreadsheet included in Appendix A.

# 2 : Analysis & : Recommendations



# Analysis & Recommendations

A clear definition and understanding of a problem are the first step in identifying the causes of the problem. Success in solving the problem will be determined by the strength of these first critical steps. This study has planned and executed numerous means to engage citizens and City staff in a comprehensive effort to define drainage challenges within the City. Our analysis seeks to ascertain the primary cause of the problem and apply a range of solutions providing a reasonable level of service to those areas of the City. Recommendations are based on a balance of cost, benefit and consideration of all City neighborhoods and districts. One significant factor we encountered in our evaluation was the updated rainfall data used as the standard for drainage design. Since the late 1980's the depth of rainfall for the 24-hour duration 100-year event has changed three times; from TP-40 @ 6.4 in. to Bulletin 70 @ 7.58 in. to Bulletin 75 @ 8.57 in. This 33% increase is due to the continued collection of rainfall data and statistical analysis focused on Illinois. Applying Bulletin 75 rainfall data to infrastructure designed prior to the March 2020 release of Bulletin 75 may give the perception that infrastructure is undersized or inadequate. In fact, good design provides for emergency overland routes and potential failures in sewers and conveyance systems. In general, we did not find house flooding or neighborhood street flooding in Geneva. There are reports of limited structure flooding and streets that become inundated during heavy rainfall events. The focus of this study will target the yard and street flooding due to stormwater basin storage limitations, localized storm sewer deficiencies and overland flow route limitations.



## 2.1 Data Collection

### 2.1.1 Rainfall Events

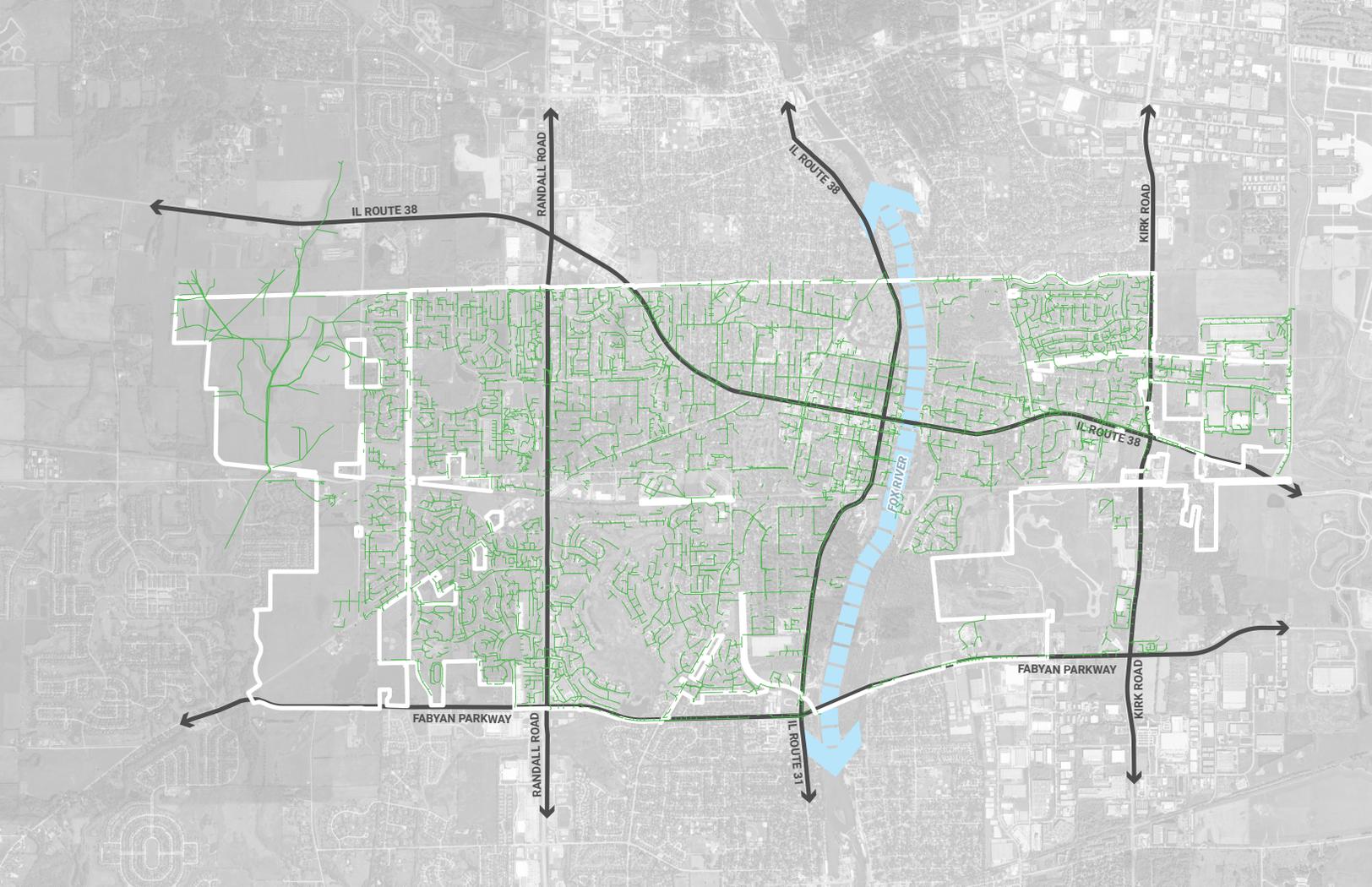
Soon after this study was authorized in May of 2020, the City experienced a significant rainfall event from May 15 through May 18. During this period approximately 6.0 to 6.5 inches of rain fell with two periods of intensity where a majority (approximately 4.0 inches) of precipitation fell. Three separate rain gages from DuPage Airport, FemiLab and Ferson Creek were evaluated to identify rainfall data related to Geneva. While this significant event was not a 100-year storm event it did help us identify those areas most likely to experience drainage challenges during extreme rainfall events.

WBK staff collaborated with City staff to respond to resident concerns and documenting water surface elevations and observations from impacted residents. These responses started on the morning of May 15 with follow up visits lasting through the end of May. We began tracking each resident or staff service request in a cloud-based spreadsheet where we collected basic data such as address, inundation type (house, yard, street, etc.) and any other data or information from the resident (pictures, video, etc.). This process was successful in capturing impacts of the rainfall events and we are coordinating with City staff to incorporate observations into a GIS layer for future reference and staff accessibility.

### 2.1.2 Stakeholder Feedback

Input from primary stakeholders was sought as to historic and known drainage challenges throughout the City. An initial list of drainage concerns was provided by City staff through several meetings in early 2020 and was refined as the project study progressed from 2020 through 2021. Monthly progress meetings provided an opportunity for previously unidentified concerns to be raised and cataloged. The May 2020 rainfall event also created collaboration between City and WBK staff resulting in confirmation and additional data collection. Discussion of maintenance concerns including those related to SSA's were critical to identify where operational challenges exist within existing drainage infrastructure.

As noted previously, public involvement was crucial to identify and understand drainage conditions throughout the City. Between the Open House and Web Portal we received hundreds of photos, videos and descriptions to document observed conditions which are critical for this study and to support further study of drainage challenges. Public engagement continued after the May 2020 event, web portal and open house ended. While generally facilitated by City staff, resident inquiries, concerns, and information were communicated to WBK for consideration in the report. A monthly progress meeting with City and WBK staff, provided an opportunity for discussion and to ensure any resident information was passed on for use in the study.



**Figure 8-** City of Geneva Storm Sewer

### 2.1.3 Existing System Review

The City's staff maintains a GIS layer of the storm sewer infrastructure throughout the corporate limits of the City ("Figure 8- City of Geneva Storm Sewer"). This layer includes data attributes for pipes and manholes including pipe diameter, material, active status, maintenance zone, etc. The City also maintains drainage studies and has record plans for developments including stormwater basins, outlet control structures and other drainage system information. WBK collected additional field survey to supplement storm sewer information identifying pipe elevations, drainage channel and overflow routes & elevations. WBK also utilized Kane County one-foot topographic information where appropriate to understand drainage conditions and patterns.

During this study, the City initiated a separate asset management effort to document the condition of major culverts and roadway drainage crossings. These culverts are the primary roadway conveyance locations for which the City is responsible and therefore considered critical infrastructure. The result of the study is a condition rating with recommendations for maintenance and capital improvements. Primary recommendations from the study are included herein.



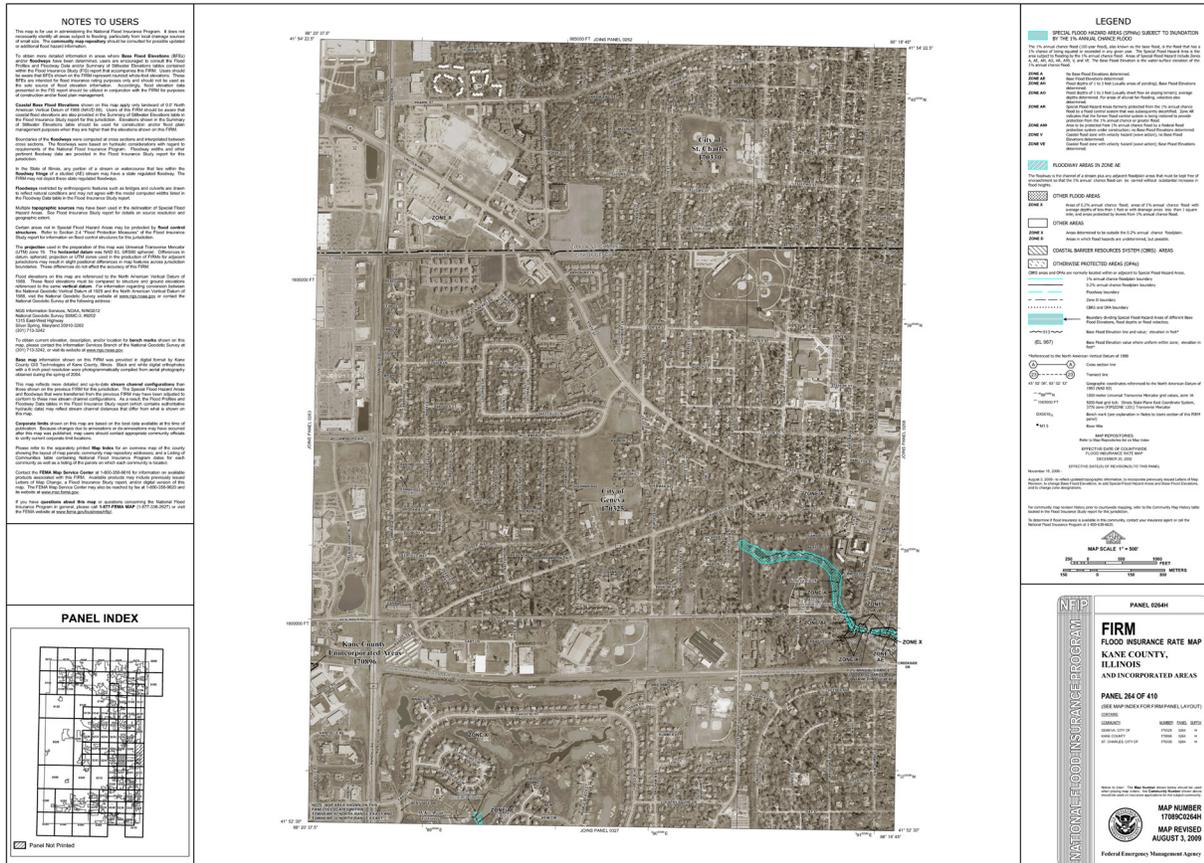


Figure 10- FEMA Firm Panel 264

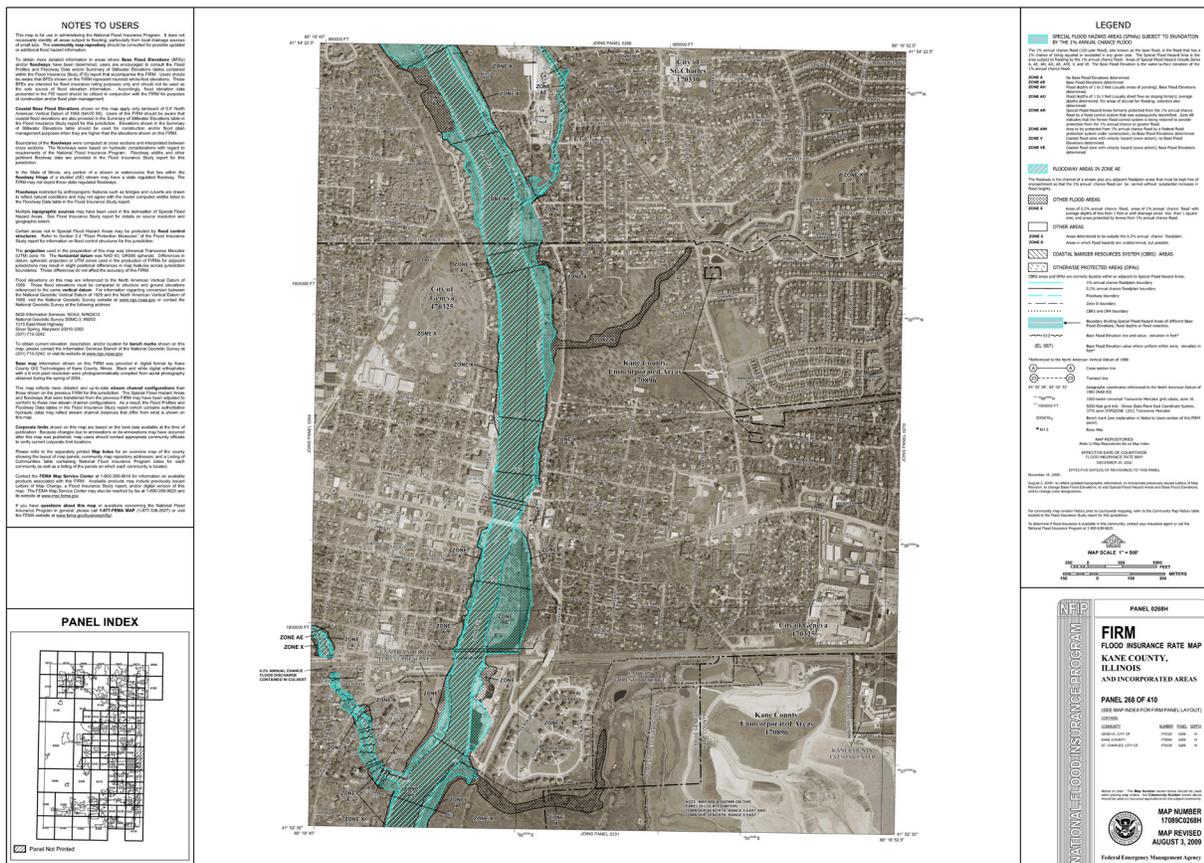


Figure 11- FEMA Firm Panel 268





## 2.2 Identification of Drainage Study Areas

As a result of the public outreach process, observations from the May 2020 event and historically known flood problem areas WBK created a list of potential Drainage Study Areas (DSA). Through discussions with City staff the primary DSA's were identified for further evaluation.

All drainage challenges and concerns were plotted on a map of the City and were grouped related to some of the concerns to a neighborhood or more regional drainage system within the City. Others were fairly specific to a single location or block. Accordingly, we established five "neighborhood" and seven "localized" drainage study areas. It should be noted that there were concerns identified that are not considered germane to the scope of this study for a variety of reasons including; the concern is more related to sanitary sewer operations than surface drainage, the concern is limited to a single location or determined to not be a City responsibility (i.e. homeowner sump pump) or there is no reasonable ability or expectation for the City to remediate the concern (i.e. lowering Fox River base flood elevations). It should also be noted that this study represents a snapshot in time and that additional concerns may be identified or caused by actions or conditions not present at the time of the study.

The naming convention for DSA are intended to be a general location description of the area, subdivision, or primary roadways within the area. The methodology for analyzing the stormwater management system for each DSA varies depending on the complexity of the tributary area and drainage infrastructure. The analyses vary but generally follows a holistic approach to capture relationships between drainage basins and the total tributary areas to each DSA. This process also included the collection of the storm sewer system GIS data, supplemental survey collection, resident and City staff discussions, firsthand accounts, detailed hydrologic and hydraulic modeling of the existing drainage system, identification of system limitations and development of proposed drainage improvements.

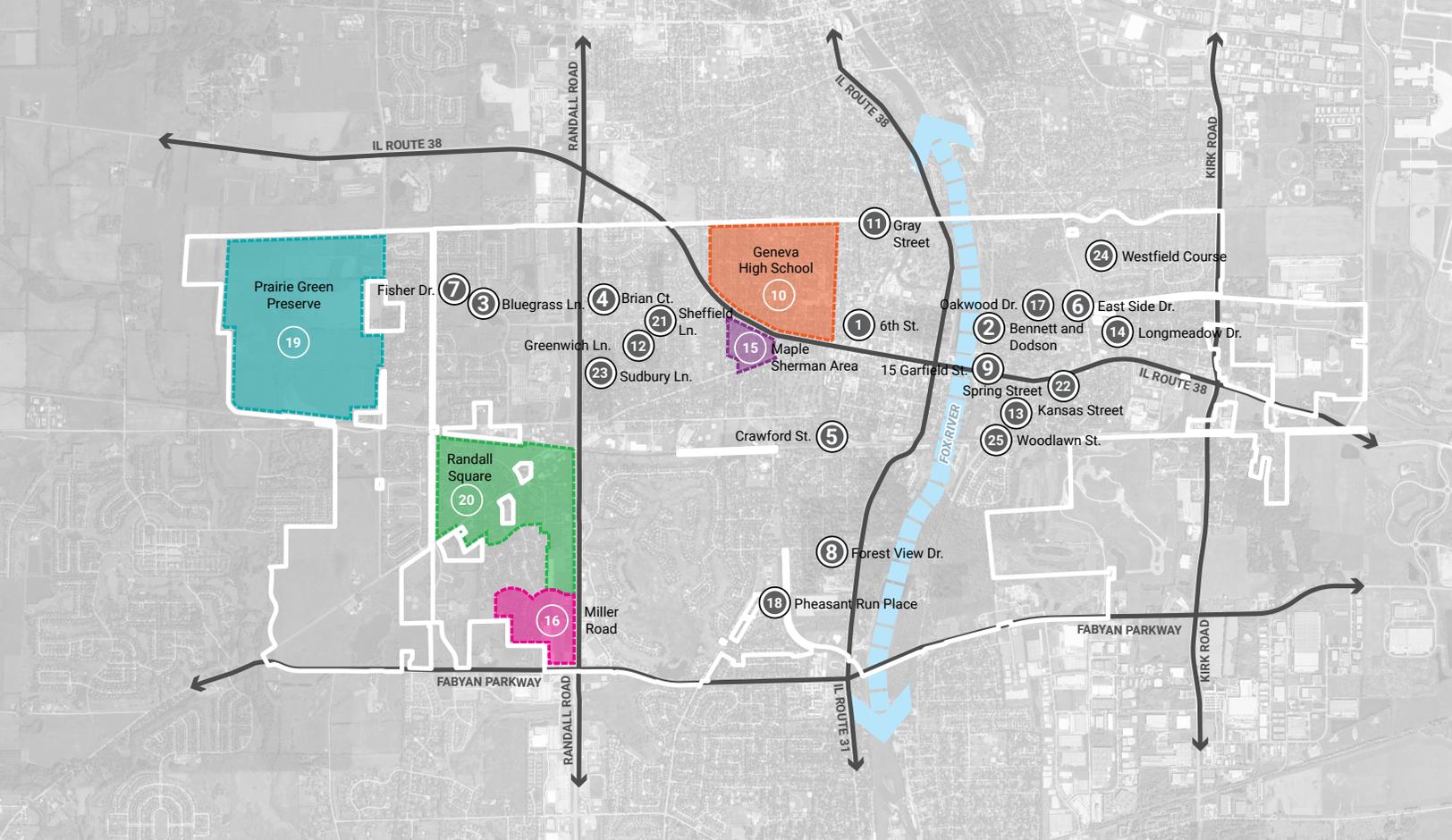


Figure 16- City of Geneva Storm Study Areas Map

Area #	Location	Area #	Location
1	6th Street	14	Longmeadow Drive
2	Bennett and Dodson	15	Maple Sherman Area
3	Bluegrass Lane	16	Miller Road
4	Brian Court	17	Oakwood Drive
5	Crawford Street	18	Pheasant Run Place
6	East Side Drive	19	Prairie Green Preserve
7	Fisher Drive	20	Randall Square
8	Forest View Drive	21	Sheffield Lane
9	15 Garfield Street	22	Spring Street / Spring Court
10	Geneva High School	23	Sudbury Lane
11	Gray Street	24	Westfield Course
12	Greenwich Lane	25	Woodlawn Street
13	Kansas Street		

Table 4- Geneva Study Areas

### 2.3 Existing Conditions Hydrologic and Hydraulic Model Development

Where detailed hydrologic and hydraulic analyses were warranted a HEC-HMS model was created for each DSA. Hydraulic evaluations including storm sewers and culverts were performed by Hydraflow Storm Sewer Program. In less complex situations more simplified and conservative analyses using Rational Method and FHWA's HY-8 were utilized to evaluate alternatives and develop solutions.

#### 2.3.1 Sub-Basin Delineation

The City's utility database was combined with specific ground survey and 2021 Kane County one-foot aerial topography in the GIS database. The tributary areas for each DSA were delineated and subdivided into Sub-Basins as required and based on storm sewer data, land use and aerial topography. Ground survey was utilized in areas where drainage systems and/or boundaries warranted additional definition. Existing drainage studies were also utilized to verify tributary areas or sub basin boundaries.

#### 2.3.2 Land Use & Data Entry

Hydrologic parameters including area, Runoff Curve Number (RCN) and Time of Concentration (Tc) were calculated using the National Resource Conservation Service (NRCS) TR-55 methodology based on topography and land use using current aerial photography for each of the Sub-Basins. RCNs were further defined by the hydrologic soil group provided by the NRCS. WBK entered the hydrologic parameters and existing depressional and stormwater basin parameters into the HEC-HMS model. Basin outlet conditions, storm sewer, and tailwater conditions were also considered in establishing outlet rating curves. In less complex drainage areas, C values, time of concentration and drainage areas were used in the Rational Method to determine peak discharges.

#### 2.3.3 Existing Model Calibration

The goal of any hydrologic and hydraulic model is to simulate the existing stormwater basins, storm sewer system, overland flow routes, and the relationship between these elements to identify system constraints and to evaluate proposed drainage system improvements. It is important that the model be calibrated to the greatest extent possible to known rainfall events. For this study, the resident accounts and photographs from the May 2020 storm event were utilized to validate the Randall Square, Miller Road and Pheasant Run Place analyses. The other drainage areas relied on more simplified methods where calibration was not as relevant or critical.

As part of the calibration process, the RCNs and Tc were modified until the peak of the output water surface elevations from the HEC-HMS analyses reasonably matched observations. This was done by adjusting the RCNs and Tc for subareas to refine the model.

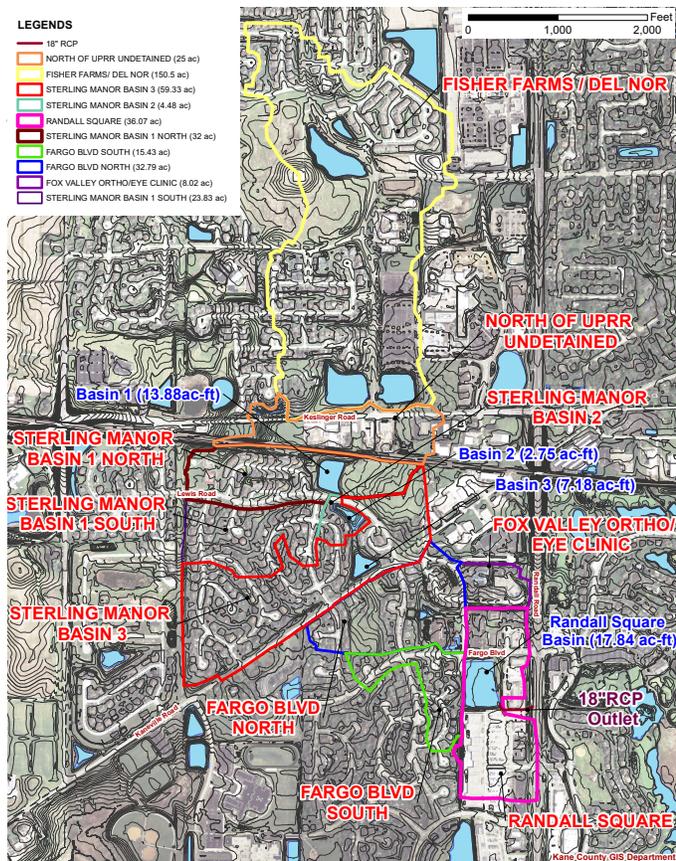


Figure 17- Example: Randall Square Sub-Basin Delineation

## 2.4 Critical Duration and Design Storms

Subsequent to calibration, critical duration analyses were completed using the HEC-HMS model for each DSA. The critical duration was determined utilizing rainfall depths published in Bulletin 75 – Frequency Distributions of Heavy Precipitation in Illinois by the Illinois State Water Survey (ISWS) March 2020. The critical duration refers to the duration of rainfall that produces the most runoff and maximum water surface elevations for each DSA. It is generally noted that the critical duration rainfall event will generally “scale” the Tc for the tributary watershed area. For example, small tributary areas of several acres will have short Tc values and generally the critical event will be the short duration events (1 hour or less). The converse is also true where the most critical event for larger watersheds typically has longer duration (several hours to 24 hours)

All analyses in this report utilized the most current rainfall data from ISWS Bulletin 75 published in March of 2020. It should be noted that all the drainage infrastructure (stormwater basins, storm sewers and overland flow routes) were designed and constructed with different regulatory rainfall data with smaller rainfall amounts for any particular rainfall event. Based on calculations we reviewed, the designs and approvals used the best available information available at that time. The table below compares rainfall depths for the 100-year 24-hour event for various recognized standards over the last 60 years.

Standard	Year Published	100-Year 24-hour Event Rainfall Depth (in.)	% of Current Rainfall Depth Standard
TP-40	1961	5.8	68%
Bulletin 70	1992	7.58	88%
Bulletin 75	2020	8.57	100

**Table 5-** Rainfall Depths at Various Recognized Standards

## 2.5 Model Results

Analyzing existing drainage infrastructure utilizing current rainfall data indicates that a majority of drainage infrastructure is deficient. This is common for most municipalities in Northeast Illinois and especially those with development prior to the 1960’s. Identifying a reasonable level of service that considers costs and benefits is a typical approach for capital planning. For purposes of this study we have identified the level of service based on industry standard and drainage condition for each DSA. For example, storm sewer would be designed for the 10-year event and stormwater basins designed for the 100-year event.

It is also noted that drainage concerns were prioritized within a hierarchy relating to public impact and service. That hierarchy starting with the most important is as follows:

1. Property damage as a result of public infrastructure deficiencies, including:
  - Residential
  - Commercial
  - Public
2. Service Impacts
  - Emergency Response Services
  - Roadways / access
  - Utility service
3. Miscellaneous Impacts
  - Prolonged Ponding
  - Erosion
  - Saturated Ground Conditions



# 3 Factors Impacting Drainage Concerns



# Factors Impacting Drainage Concerns

A variety of drainage concerns were reported as a result of public outreach and City staff input. While each situation is unique there are also common elements between the Drainage Study Areas (DSA) which help us identify the origin of the “deficiency” that is causing observed conditions. A vast majority of drainage concerns report yard and street inundation with limited instances of structure encroachment. This is corroborated with drainage study area modelling and calculations. Structure inundation is when water surface elevations from ponded runoff exceed a window well elevation or low entry elevation of a structure and physically enters the structure. This does not include failure of foundation drainage systems and sump pumps. There are a number of factors related to reported drainage concerns throughout the City and include the following:

- » Development prior to current day stormwater management practices
  - Inadequate storm sewer capacity
  - Inadequate overland flow and conveyance routes
  - Inadequate stormwater storage
- » Limited and inadequate storm sewer infrastructure in neighborhoods
- » Yard grading deficiencies (depressional areas)
- » Maintenance of Stormwater Detention Basins

Although Geneva has a river running through the middle of the City, it is not the Fox River floodplain that originates a majority of concerns from residents or City staff. Impervious surfaces created from development of the community and the management of excess runoff is the primary challenge for the City. This is not unique to Geneva and is a common challenge for municipalities in the Chicago region whereby suburban development was often ahead of stormwater management practices. The result is areas within neighborhoods that would benefit from stormwater improvements so that the expectations from residents can be met.

## 3.1 Development in Geneva

Development in the City can be separated into three stages with respect to stormwater management infrastructure. Older sections of the City adjacent to the Fox River were developed prior to stormwater management practices requiring stormwater detention. In the era prior to 1970, conveyance of excess flow downstream was the protocol and limited storm sewer was constructed to facilitate neighborhood drainage. It should also be noted that foundation drains were often connected to the sanitary sewer as an acceptable practice. From the 1970’s to the year 2000 stormwater detention and more robust storm sewer infrastructure was recognized as essential to mitigate impacts to downstream land and neighborhoods. However, there was not a unified approach or ordinance which incorporated the best and most current stormwater management practices. As a result, the design and construction of drainage infrastructure experienced a lack of rigor and consistency. From 2001 to current day, development is regulated by the Kane County Stormwater Management Ordinance which implements current and best identified practices to mitigate increases in runoff rates as a result of development.

Census	Population	Change
1860	997	-
1950	5,139	4,142
1960	7,646	2,507
1970	9,049	1,403
1980	9,881	832
1990	12,617	2,736
2000	19,515	6,898
2010	21,495	1,980
2019 (est)	21,809	314

Source: U.S. Decennial Census

**Table 6-** Geneva Population Change

It is noted that the second and third highest growth decades for the City were 1950 to 1960 (See Table 6) where modern day stormwater practices were not utilized and from 1990 to 2000 where modern-day concepts were available but utilized on an inconsistent basis. It should also be noted that rainfall data defining the design event has changed significantly from the 1960’s to current day.

As communities develop and mature, the drainage impacts are often not observed or understood until many years after a significant growth period within a community. This is in part due to the inconsistent frequency of heavy rainfall events which may not occur for several years after a significant growth period. Furthermore, a one-time inundation occurrence is not always understood to be a problem and it often takes two or more clearly documented observations to be recognized and cause action on the part of the responsible agency.

### 3.2 Limited Storm Sewer Infrastructure

Modern day drainage infrastructure includes stormwater detention, planned emergency overflow routes and a comprehensive storm sewer network so that every lot has access to the storm sewer at a manhole or inlet at or very near the property boundary. Unfortunately, areas developed 40 or more years ago typically lack one or all of these elements. Furthermore, areas developed prior to 2000 relied on local stormwater ordinances and did not have the benefit of the Kane County Stormwater Ordinance to ensure robust infrastructure was constructed.

In Geneva, the lack of storm sewer is a significant factor leading to poor drainage conditions and observed ponding in several of the DSA's. This is reported on both the east and west sides of the Fox River primarily in neighborhoods over 50 years old. Where topography is steeper, adjacent to the Fox River, overflow routes compensate for the lack of storm sewer and the lack of sewers is not as critical as in upland areas away from the River (GHS DSA and Woodward DSA).

The capacity of the storm sewer can also be a drainage system limitation causing neighborhood inundation. The City has experienced and addressed this limitation by studying and constructing relief storm sewers to provide reasonable drainage to upstream areas. Most notable is the work performed on the west side of the City north of State Street (IL 38) (Geneva High School DSA). In general, we have not identified storm sewer capacity as a cause of drainage concerns in Geneva.

Expanding the storm sewer system to areas not fully served will reduce the extent and duration of inundation observed by many residents. We do not believe significant downstream infrastructure improvements will be necessary to provide residents an improved and reasonable level of service.



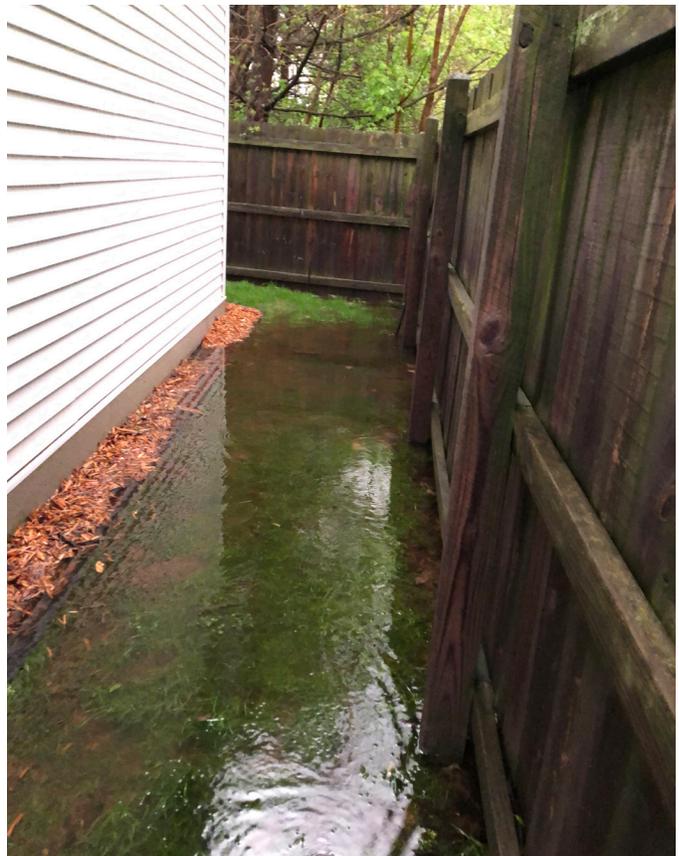
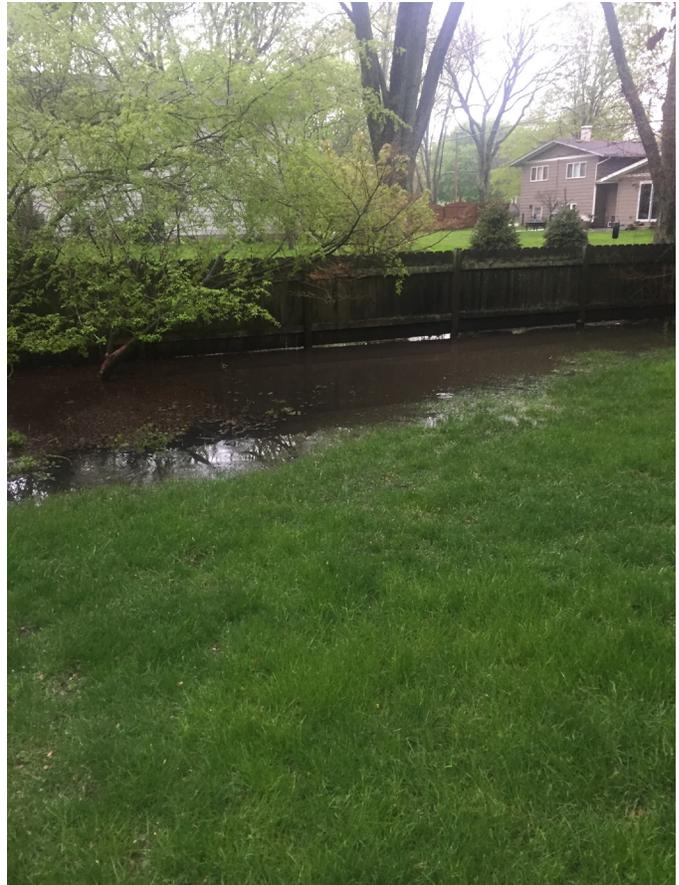
*Example of Neighborhood Inundation*

### 3.3 Yard Grading Challenges

Where extensive storm sewer systems are not available within a neighborhood, reliance on yard grading becomes more critical. Furthermore, landscaping, fences, gardens, and other residential yard uses can interfere with overland flow causing yard inundation, typically occurring in a rear yard. The same can occur in a front yard and drainage swales adjacent to roadways are commonly susceptible to siltation and poor drainage. In many cases, the cause of the inundation is the result of private actions and is not commonly a City responsibility. The level of resident engagement is a matter of City policy.

- » **Low Engagement** – Identify public and private responsibility. If the matter is private there is no further engagement and limited communication.
- » **Limited Engagement** - Identify public and private responsibility. Assist resident with potential solutions based on staff resources even when a situation is private. Identify other resources resident can utilize (contractors, engineers) but no budget impact. Moderate engagement and communication. This is the current City staff practice relative to private yard drainage issues.
- » **High Engagement** - Identify public and private responsibility. Assist resident with potential solutions based on staff resources and possibly survey or outside engineering opinions. Identify project scope and identify budget resources needed to resolve. Regular communication and establish a schedule.

It is commonplace that a drainage concern is the result of a combination of actions or conditions making the public / private determination challenging. In an effort to create a consistent level of service across the community related to drainage infrastructure we advocate for a Limited Engagement policy to provide for resources to



*Typical Yard Grading Challenges*

assist residents within reasonable limits and budget constraints.

### 3.4 Stormwater Basin Maintenance

The City maintains a GIS database of storm sewer and stormwater basins within its corporate boundaries. The City also keeps a list of stormwater basins that are funded through an SSA and those maintained by the City. Proper maintenance of stormwater basins is imperative to ensure the function of the basin is preserved. During this study one stormwater basin was observed to overflow as a result of a blocked outlet. Such occurrences lead to resident concern and calls to the City. Stormwater basin challenges include the following elements:

#### Outlet / Control Structure Function

Maintenance of unobstructed outlet conditions is intuitive to ensure basin operations. Regular inspections and a debris management plan is essential. Stormwater basins will collect debris and it will eventually end up at the outlet. Even with such a plan the access to control structures and the type of control may need improvement or modification.

#### Sedimentation

Sedimentation is a condition we can try to limit but will never eliminate. Depending on the size of the watershed, amount of development and level of soil erosion and sediment control measures implemented, sediment removal may need to be a regularly scheduled activity (i.e. 5 to 10 years). This is true even in fully developed water sheds. Sediment can block basin inlets and outlets fostering volunteer vegetation growth and additional sediment accumulation. Most important is the allocation of financial resources as sediment removal can be relatively expensive.

#### Vegetation Control

Vegetation management is a commonly overlooked aspect of stormwater infrastructure. Native plants will thrive and provide environmental benefit when planned and maintained properly. However, putting native plants in a non-native setting (stormwater basin) means there needs to be monitoring and effort to get the system to a sustainable state. It will, in fact, take more effort and funding to establish than conventional wet basins or dry lawn-type stormwater basins. Failure of these type of basis have been experienced in Geneva leading to resident concerns and City expenditure. As a result of this experience, a policy recommendation is to ensure adequate controls are in place to make the basin sustainable in a natural state or, as a worst case, convert it to a non-native basin. Controls include a maintenance and monitoring plan requiring documentation, review and oversight and a financial guarantee.

#### Poor Drainage (Dry Basin)

Dry bottom stormwater basins can suffer from poor drainage where maintenance (vegetation cutting) cannot be performed due to extended wet conditions. This can lead to an accumulation of vegetation that increases sediment deposition. Stagnant water can also produce foul odors resulting in resident complaints. Retrofitting this condition is a challenge and the outcome may be reducing and managing the poorly drained areas as much as possible.

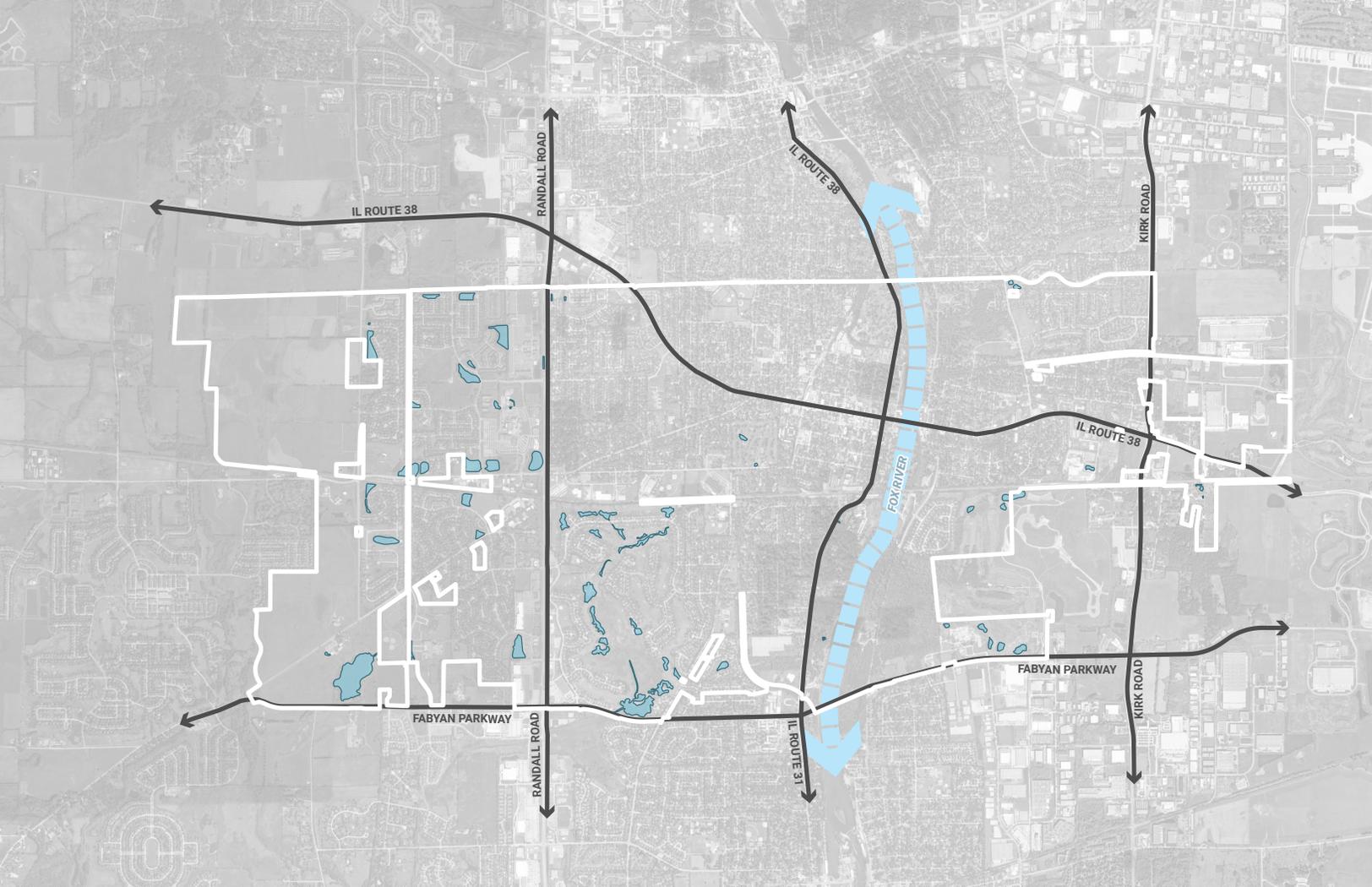


Figure 18- GIS Database of Stormwater Basin



Vegetation management



Stagnant water due to poor drainage - Note sediment in the water.

### 3.5 Surrounding Area Drainage Impact

Like most municipalities the City of Geneva facilitates runoff and drainage from areas outside its corporate boundaries. This is consistent with Illinois Drainage Law. The most basic principle of Illinois Drainage Law is that landowners are responsible for the drainage that occurs on their property and that landowners must accept surface water flowing naturally from higher ground. The owners of lower ground, known as a “servient tenement,” are bound to receive surface water that naturally flows onto it from higher ground, known as the “dominant tenement.”

An evaluation of topography and storm sewer infrastructure around the perimeter of the City reveals approximately 12 distinct locations where drainage areas outside the City (off-site) drain into the City and is then managed and facilitated by drainage systems within the City. It is noted that not all drainage systems, such as open channels, stormwater basins, etc. are owned nor the responsibility of the City of Geneva. The 12 locations were named based on nearby feature or roadway and several other characteristics identified; such as tributary area size, element of potential concern, etc. Finally, the locations were ranked based on subjective judgement of risk for adverse impact on City drainage systems. These areas and their characteristics are depicted on “Figure 19- Off-Site Drainage Influence”.

The purpose of this evaluation and exhibit is to create awareness of potential influence and impact. Drainage concerns in or near these areas could be the result of off-site influence, development and / or land use changes.

-  Mill Creek Watershed
-  Fox River Watershed
-  West Branch DuPage River (Kress Creek) Watershed
-  Floodplain
-  Off-Site Flow

	Description	From	Drainage Area	Description	Tributary To:
A	Prairie Green	St. Charles	Large	Developed except WWTP Expansion	Drain Tile and Overland Flow
B	Geneva High School	St. Charles	Large	Developed - Some Redevelopment	60-inch Storm Sewer
C	4th / McKinley Street Trib	St. Charles	Small	Residential	Existing City Sewer - Confirm Size
D	East Side Drive Division Trib	St. Charles	Moderate	Residential	Drainage Swale
E	Geneva Drive @ Kautz Road.	Undeveloped County	Small	Agriculture	Geneva Drive at Kautz Road
F	White's Creek	Undeveloped County MIF & County (Cougars)		Agriculture - to be Developed	UPRR / Jain Development
G	Settlers Hill	Settler's Hill	Large	Landfill - to be Redeveloped	White's Creek
H	Kirk Road	Undeveloped County	Small	BEI Property	Storm Sewer
I	Fabyan Parkway	Batavia	Small	Residential	Unnamed Tributary
J	Braeburn East	Unincorporated Residential	Small	Residential	Storm Sewer
K	Windy Acres	Unincorporated Agriculture	Small	Agriculture / Commercial use	Storm Sewer
L	Water Treatment Plant	County Residential	Small	Residential	Storm Sewer

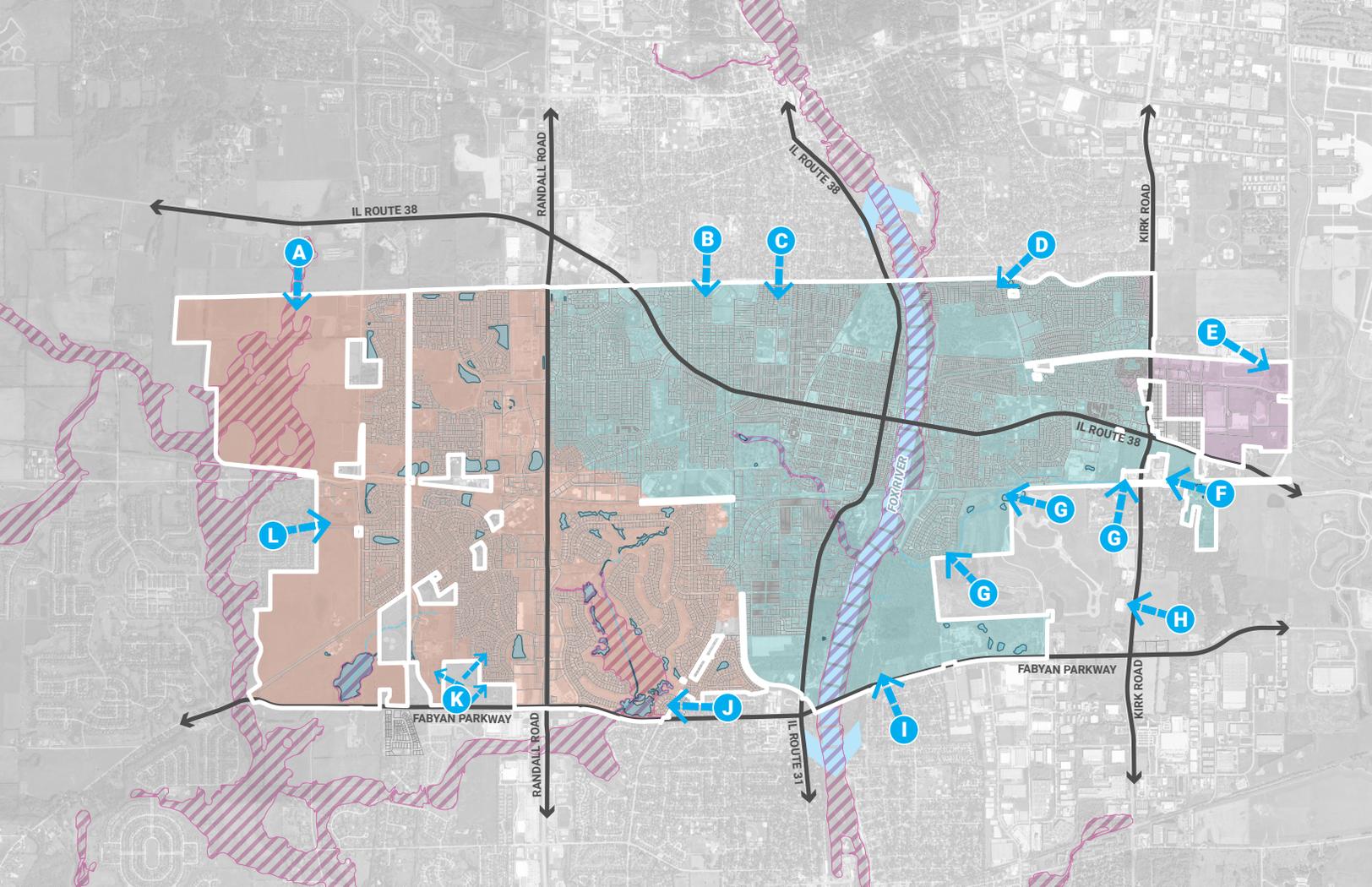


Figure 19- Off-Site Drainage Influence

To	Primary Concern	Secondary Concern	Rank
UPRR / Keslinger to Mill Creek to Fox River	Existing Tile Capacity / Condition	Wetland Viability	2
Geneva Golf Club to UPRR / Cheever to Fox River	Condition of Pipe (Repair or Replace?)		1
Storm Trunk to Wheeler Park to Fox River	None Identified		6
Good Templar Park to Fox River	None Identified		5
DuPage Airport to Kress Creek	None Identified		7
Johnson Controls Park Sandholm UPRR to White's Creek to Fox River	Urbanization of Channel	County Development / Redevelopment	4
Fox River	Leachate	Land Redevelopment	11
White's Creek to Fox River	None Identified		9
Fox River	None Identified		10
Braeburn to Mill Creek to Fox River			8
Miller Road Basin to Eagle - Braeburn Marsh to Mill Creek to Fox River	Development Low Flow	Development Overflow	3
Mill Creek to Fox River	None Identified		12



# 4 : Proposed Drainage : Improvements



## Proposed Drainage Improvements

---

Based on resident and City staff input Drainage Study Areas (DSA's) were identified so that existing conditions could be understood and alternative solutions developed. From the alternatives a recommended solution was developed and capital improvements proposed. In general, all DSA's were in residential neighborhoods. Significant issues were not reported in business or industrial areas. In some DSA's affected areas were small and only included several single-family lots. Some affected areas were larger and included an entire residential block or even an entire neighborhood. For those DSA's a series of capital projects were developed. In several instances smaller capital projects were proximate to each other and combined into a single DSA. A significant number of projects will involve cooperation from private landowners to construct storm sewer grading for a drainage swale. Verification of existing easements was not performed as part of this study and will be required as part of final engineering for each capital project. Third party permits were limited to just a few DSA's with Kane County Division of Transportation being the most notable and significant.

### 4.1 Capital Improvements

WBK identified capital improvement projects for each DSA that range from relatively simple local drainage improvements to larger neighborhood scale projects, including construction of new storm sewer, drainage inlets, overland flood routes, modifying stormwater basin outlets, adding stormwater storage volume and stormwater pumping stations. A concept plan was prepared for each DSA and in some cases an alternative plans and cost estimates were developed. For the more complicated situations the improvements considered a phasing approach and are considered cumulative. For two DSA's coordination with the City's annual street program is proposed to implement storm sewer construction and drainage improvements.

#### 4.1.1 Engineer’s Estimate of Probable Cost

A concept level engineer’s opinion of probable cost for capital improvements based on the recommendations for each DSA. Uncertainty of existing conditions including but not limited to soil conditions, utility conflicts and right-of-way limits will affect the final design and cost of drainage improvements. The cost estimates include a 25% contingency to account for these uncertain conditions. Soft costs including design and construction engineering for each project has also been included as either a percentage of the construction cost or based on experience of engineering costs for smaller and less complex projects. Unit prices were developed based on recently constructed project in Chicagoland municipalities and judgment based on the information known at this time. Unit prices are not adjusted for inflation and all values are based on 2022 pricing.

WBK made the assumptions hereafter in developing capital improvement budget values:

- » Legal fees and the costs of easement and land acquisition are generally not included. The exception is the Randall Square DSA in which additional stormwater storage is recommended. Property values are considered a placeholder and require review and revision as these elements are programmed in the City budget.
- » Utility crossings, conflicts and adjustment costs are generally not included. One exception is Gleneagle Drive roadway reconstruction which is recommended in the Miller Road DSA.
- » Curb and Roadway Patching quantities and costs are concept level values.
- » Trench backfill is incidental to storm sewer pipe construction except where the quantity was potentially significant to the overall cost of the project.
- » Traffic Control is only identified for collector and significant roadway or where costs are potentially significant to the overall cost of the project.
- » Unit prices are adjusted using judgment based on quantity as well as project type and conditions.
- » Restoration scope was adjusted based on the project. In some cases, limited pavement patching is included. In others detail such as topsoil, seeding and erosion blanket quantities are broken out separately.
- » The Prairie Green DSA is unique from all the others due to the context of the work within a wetland bank
- » The Randall Square and Miller Road DSAs are the most complex and have the greatest cost estimate detail.
- » The Geneva High School and Maple & Sherman DSAs consider annual drainage infrastructure improvements to be coordinated with the roadway maintenance programs.

The concept level engineer’s estimates of probable costs developed for capital improvements in each study area are included in in the following Chapter.

#### 4.1.2 Rural Roadway Section

A typical urban roadway section includes concrete curb and gutter as well as storm sewer to facilitate drainage as well as preserve pavement integrity. There are a number of local roadways within the City limits without curb and gutter considered a rural roadway section. These roadways are found in older neighborhoods and consist of an aggregate or turf grass shoulder and adjacent drainage ditches. Residential driveways include a drainage culvert to facilitate drainage flows within the swale. Challenges with this type of system include poor drainage and maintenance challenges within the drainage ditch, driveway culvert siltation and maintenance and pavement edge failure. In an effort to resolve these concerns we evaluated the costs of converting all rural section roadways within the City to a conventional curb and gutter section. This also includes construction of storm sewer extension in a majority of locations.

The total centerline miles of rural section roadways within the City, and under City responsibility, is approximately 20 miles or 17% of the total centerline miles within the City. The conceptual cost to convert these roadway sections is estimated at \$18,902,000. This estimate is based on general assumptions and include the following elements:

- » Curb and Gutter Length – 213,000 feet (2 times centerline length)
- » Storm Sewer – 106,000 feet (assumed as 12-inch & 15-inch diameter at centerline length)
- » Inlets – 532 (assumed 2 inlets every 400’ along centerline length)
- » Manholes – 266 (assume 1 every 400’ along centerline miles)
- » Earthwork and Restoration – 20 feet each side of roadway along centerline length at a unit price
- » Driveways and pavement replacement / rehabilitation – not included – incidental to roadway program costs.

In consideration of several factors we are not recommending comprehensive conversion of rural section roadways in Geneva to a curb and gutter section. We have not included this element of infrastructure in the capital improvements and planning in this study. These factors include:

- » On street vehicle parking on older, narrower streets
- » Cost of construction and long-term maintenance
- » Public perception of neighborhood character with rural sections
- » Vegetated swales are considered a stormwater best management practice

Note: this recommendation should not eliminate consideration of curb and gutter as part of a solution for a drainage concern at a particular location.

## 4.2 Green Infrastructure

### 4.2.1 Green Infrastructure Improvements

Many communities throughout our region and the country have improved resilience and sustainability by implementing green infrastructure in their approaches to stormwater management. Green infrastructure practices and techniques include utilizing vegetation to improve stormwater quality, restoring wetlands to retain excess runoff, installing permeable pavement to better mimic natural hydrology, and using or capturing and re-using stormwater more efficiently on site. By attempting to better simulate natural hydrologic functions, these approaches begin to address water quality and help to reduce runoff volume using natural features. Green infrastructure is typically implemented in conjunction with traditional stormwater management practices and will not replace current and conventional stormwater management infrastructure.

Green infrastructure should be considered as part of the City's stormwater management strategy given the long-term benefits. It should also be noted that grant and funding opportunities are becoming more readily available for green infrastructure projects.

Opportunities to be explored for implementation of green infrastructure include:

- » Vegetated swales for roadway drainage
  - Limited opportunities to convert curb and gutter to vegetated swales exist however preservation of existing drainage swales on local roadways is recommended.
- » Rain gardens
  - Closed drainage depressions landscaped with perennial and native vegetation are typically located on private property but can be considered for City projects where site development is necessary. City efforts can be focused on public education and collaboration with existing environmental groups to promote rain gardens.
- » Rain barrels and downspout disconnection
  - These are limited to private property applications and City efforts can be focused on public education and collaboration with existing environmental groups to promote rain barrels.
- » Permeable pavement
  - Utilizing permeable pavements for City parking lot rehabilitation projects should be considered.
  - Encouragement for private development to utilize permeable pavement to satisfy stormwater management requirements. The City has several examples of recent successful projects including a townhouse development at Batavia Avenue (IL 31) and Stevens Street.
- » Infiltration
  - This is limited to locations where soil conditions can reasonably facilitate infiltration. There have been locations in Geneva where infiltration has been utilized to reduce stormwater management requirements including the Geneva Public Library and Kane County Municipal Center.
- » Stormwater Basin Retrofit
  - In stormwater basins where turf grass is difficult to maintain or there is prolonged standing water, planting of native vegetation should be considered as a water quality improvement. It should be noted that native vegetation is NOT maintenance free and may in fact result in additional operational resources over current practices. However, because opportunities for treatment of runoff in a suburban setting are rare the additional cost is worth consideration due to limited opportunities for this benefit.

#### 4.2.2 Green Infrastructure Limitations

While green infrastructure systems will reduce runoff from smaller or more frequent rain events, these practices will not have a significant impact on heavy rainfall events such as the 50- or 100-year recurrence frequency events. Green infrastructure should be considered as a supplement to conventional stormwater management systems and practices related to flood control. This is particularly evident when considering increasing rainfall design data over the last several decades.

Limitations of green infrastructure become apparent when considering typical runoff volumes:

- » Rain Barrel
  - A 0.25-acre lot in the City would generate up to 18,735 gallons of runoff during a 10-year design storm (3.68 inches in 6 hours) and require 340 rain barrels (55 gallons each) per property to store all runoff.
- » Rain Garden
  - A 20-acre residential development would typically require approximately 9-acre feet (392,040 cubic feet) of stormwater storage to meet current stormwater ordinance release rate requirements. It would take 157 rain gardens (50 foot by 50 foot) storing one foot of water to provide the equivalent volume.

Green infrastructure practices can also be limited due to reliance on in-situ soils for infiltration as well as the long-term stewardship of native plants in a non-native setting such as a stormwater basin or single-family lot.

# 5 : Study Area Capital : Improvement Projects

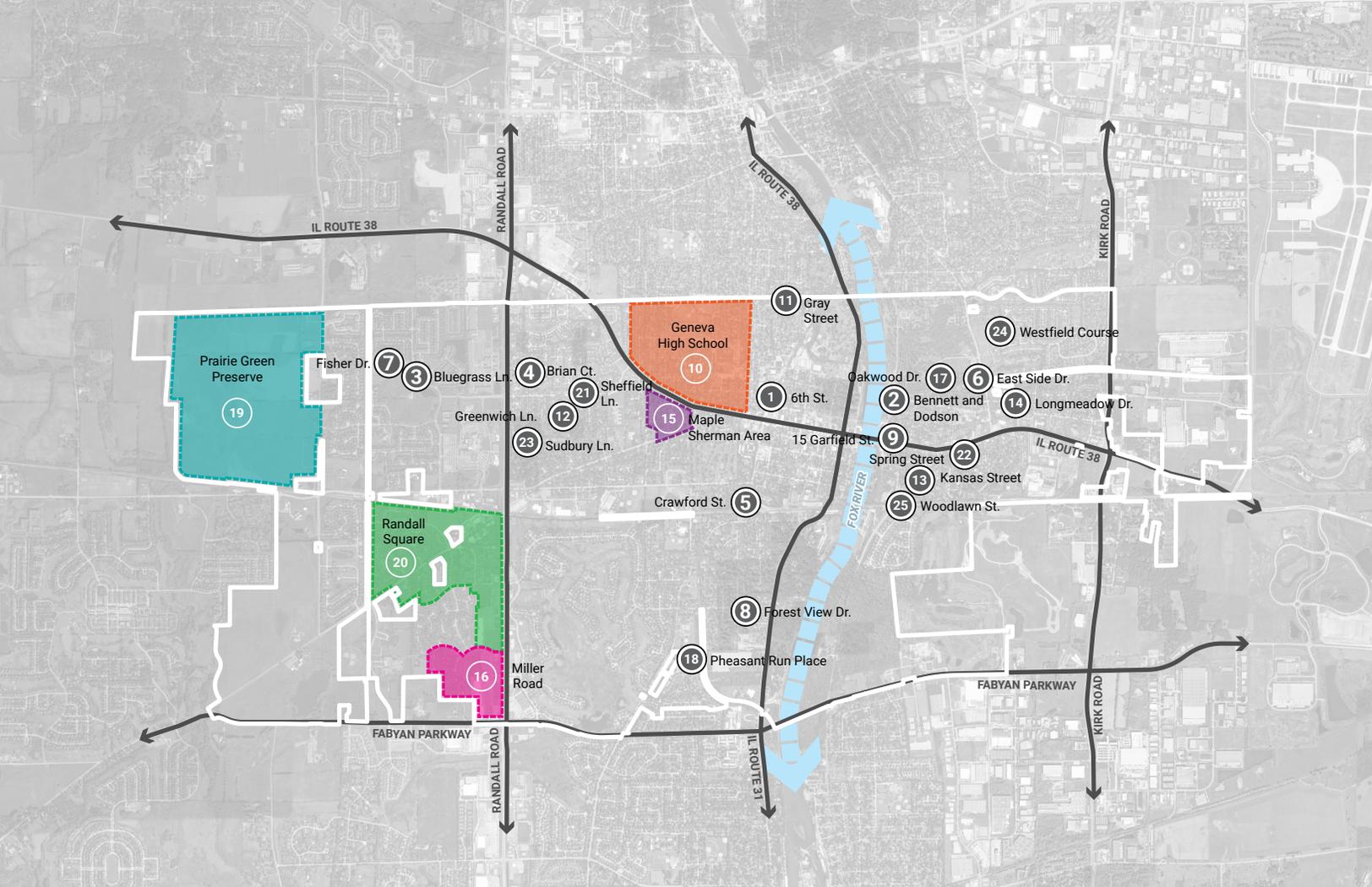


Figure 20- City of Geneva Storm Study Areas Map

Area #	Location	Area #	Location
1	6th Street	14	Longmeadow Drive
2	Bennet and Dodson	15	Maple Sherman Area
3	Bluegrass Lane	16	Miller Road
4	Brian Court	17	Oakwood Drive
5	Crawford Street	18	Pheasant Run Place
6	East Side Drive	19	Prairie Green Preserve
7	Fisher Drive	20	Randall Square
8	Forest View Drive	21	Sheffield Lane
9	15 Garfield Street	22	Spring Street / Spring Court
10	Geneva High School	23	Sudbury Lane
11	Gray Street	24	Westfield Course
12	Greenwich Lane	25	Woodlawn School Street
13	Kansas Street		

Table 7- Geneva Study Areas

# Study Area Capital Improvement Projects

## 5.1 Study Area 1 - 6th Street

A closed depression in the rear yards of residential lots along 6th Street causes rear and side yard ponding in the vicinity of 110 North 6th Street. Runoff from parking lots and open space behind the lot sheet drains to the rear of the lot and the lack of a defined outlet and relatively flat slope creates ponding water during heavy rainfall events. The proposed drainage improvements include installing a 10-inch storm sewer (~150 LF) extension from the right-of-way of 6th Street to the rear lot of 110 6th Street terminating at an inlet that will accept surface runoff, and modification of the entrance to Burgess Norton parking lot to route runoff to the roadway inlet. It is important to note that the City owns an electric substation in this vicinity.

Total estimated conceptual construction cost for the proposed improvement is **\$53,000**.

### Issue

Stormwater runoff from the adjacent parking lots and open space of 7th Street extension along with relatively flat rear yard creates nuisance ponding water in the rear and side yards after heavy rains. The resident reported standing water in the May 2020 event.

### Analysis

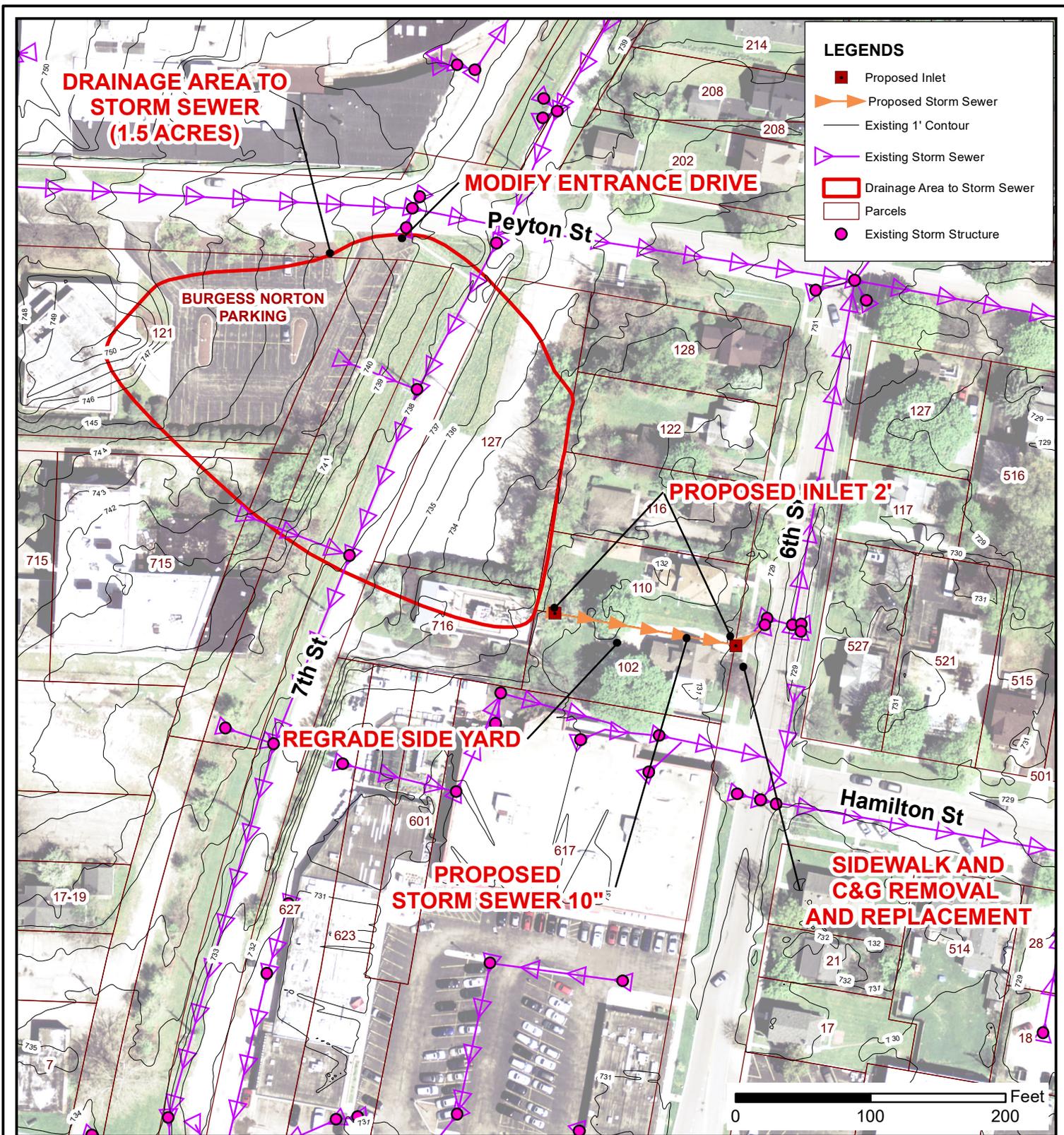
The Kane County GIS topographic data and site visit during a rain event was used to determine the drainage patterns to the lots along 6th Street. The area to the west of the lots along 6th Street sheet drain to the rear property lines and continue to sheet drain from west to east across the lots to 6th Street right-of-way. The runoff from the Burgess Norton parking lot drains north to southeast across the parking lot and exits the parking lot at the existing sidewalk in the south right-of-way of Peyton Street. This runoff then drains to the 7th Street extension and eventually to the parking lot between the 6th Street rear yards and 7th Street. GIS maps indicate a storm sewer in the 7th Street right-of-way, but no manhole lids were located during the field investigation. Running a lateral from this storm sewer may be an option if the storm sewer is of adequate depth. This would need to be investigated further in engineering design.

### Results

The results of the analysis indicate that the extension of the storm sewer from the 6th Street right-of-way to the rear yard of 110 North 6th Street would intercept runoff prior to entering the back and side yard. Also, the re-configuration of the entrance at Burgess Norton parking lot would reduce the total runoff to the parking lot behind the residential lots by forcing the runoff from the parking lot onto 7th Street instead of along the existing sidewalk into the adjacent parking to the east. A minimum pipe diameter of 10-inch was used since surface conveyance is generally adequate for large events and this improvement is primarily intended to alleviate extended surface inundation.

### Proposed Drainage Improvement

The proposed drainage improvement includes installing a 10-inch storm sewer lateral from the roadway 6th Street drainage structure in front of 110 6th Street along the south lot line of 110 6th Street to an inlet in the SW corner of the lot, and also modifying the east entrance/ exit to the Burgess Norton parking lot to divert the runoff from the parking lot to an inlet in Peyton Street instead of to the 7th Street extension. This modification to the entrance will reduce the total runoff to the parking lot behind the 6th Street lots, and runoff to the lots. The inlet will provide an outlet for the surface ponding. The estimated budget value for the proposed drainage improvement is **\$53,000**.



**LEGENDS**

- Proposed Inlet
- ▶ Proposed Storm Sewer
- Existing 1' Contour
- ▶ Existing Storm Sewer
- Drainage Area to Storm Sewer
- Parcels
- Existing Storm Structure



SOURCE:

SCALE: 1" = 100'

<p>CLIENT</p> <p><b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501</p>	<p>TITLE</p> <p><b>GENEVA WATERSHED STUDY</b></p>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<p><b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755</p>	<p><b>DRAINAGE IMPROVEMENTS SIXTH STREET</b></p>				<p>DATE</p> <p>04-12-2022</p>
					<p><b>EXHIBIT</b></p>

Figure 21- Drainage Improvements - 6th Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	160	\$50	\$8,000
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	RESTORATION	LSUM	1	\$8,000	\$8,000
4	REMOVE AND REPLACE CURB AND GUTTER	FOOT	25	\$60	\$1,500
5	REMOVE AND REPLACE SIDEWALK	SQ FT	100	\$15	\$1,500
6	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
7	PARKING LOT MODIFICATION	Llsum	1	\$10,000	\$10,000

**Table 8-** Concept Cost Estimate - 6th Street

	SUBTOTAL	\$34,000
	25% CONTINGENCY	\$8,500
	<b>CONSTRUCTION TOTAL</b>	<b>\$42,500</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$52,500</b>
	<b>CAPITAL BUDGET</b>	<b>\$53,000</b>

## 5.2 Study Area 2 - Bennett and Dodson

Overland flows at the intersection of Bennett and Dodson exceed roadway conveyance capacity and impact the resident at 224 North Bennett Street (IL 25). In May of 2020 water was reported in the house as a result of a severe rainfall event. The specific origin of the water was not identified.

Due to poor drainage severe conditions along Bennett Street (IL 25) our recommended solutions focus towards inlet capacity and efficiency as well as measures to mitigate storm sewer surcharges and overland flows. Work within the right-of-way of Dodson as well as the adjacent Commonwealth Edison property is recommended. Scope elements include revised drainage inlets compatible with steep slopes and storm sewer hydraulic improvements.

Total estimated construction costs for the proposed solution is **\$65,000**.

### Issue

The existing curb at Bennett Street (IL 25) along the residence has no curb height due to the depressed curb at driveway entrances along with roadway overlays which overlay the existing gutter. This combined with the flat roadway slope causes the roadway gutter to have very limited capacity before overtopping the back of curb. Runoff from Dodson in excess of the curb inlets at the intersection contribute to the drainage along Bennett Street (IL 25) which has lead to overtopping of the top of curb and water against the building.

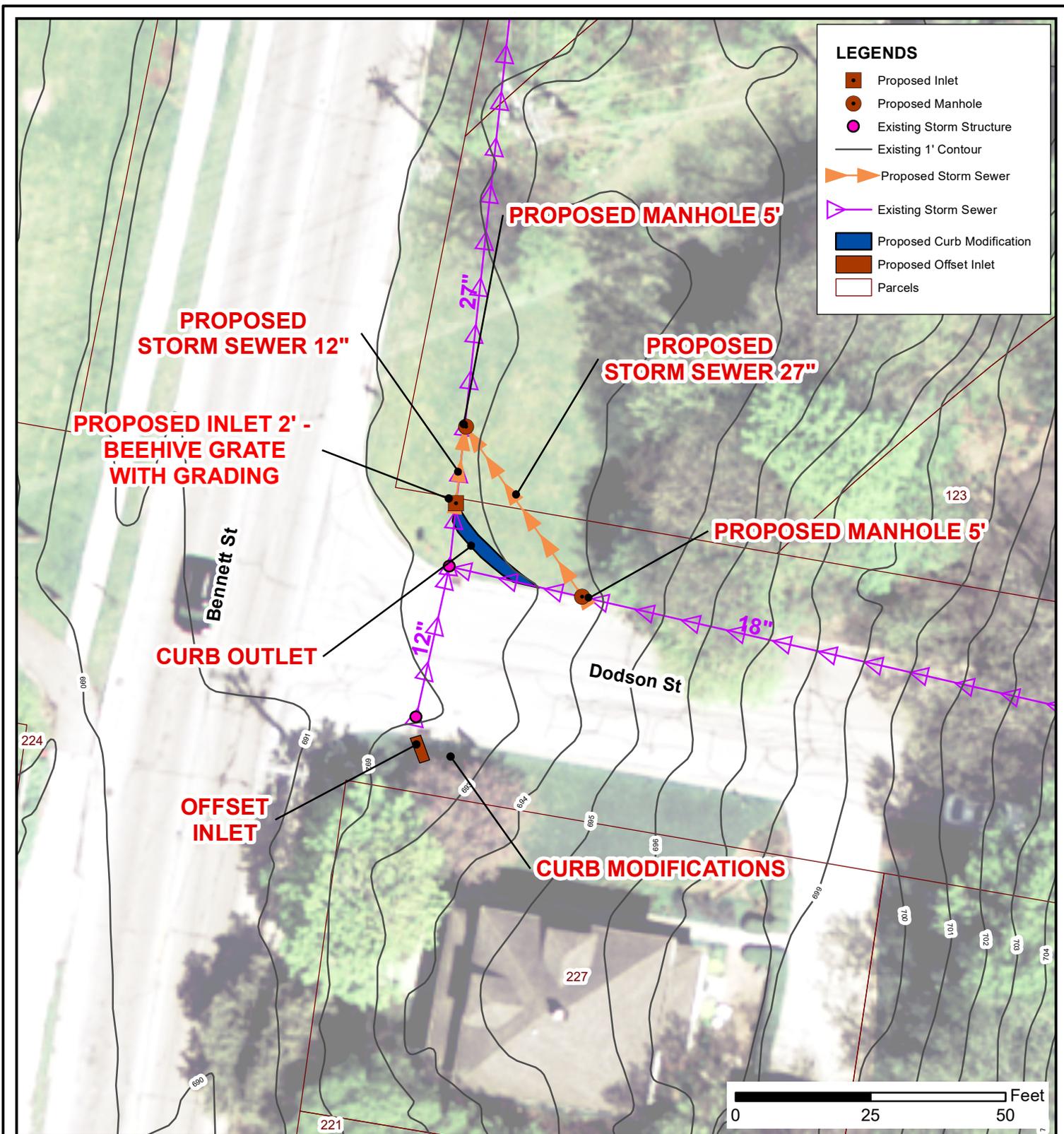
### Analysis

Two existing inlets on Dodson appear to have limited efficiency due to the slopes of Dodson and their location at the bottom of a steep slope. Replacement inlets are recommended consistent with those in other locations in Geneva. An offset type inlet is recommended but only for the southerly inlet as snow plow operations could be problematic for the north curb. At the north curb a curb outlet to a beehive yard inlet is recommended. The Kane County GIS topographic data was used to determine the tributary area to the north and south curb inlets on Dodson Street to determine if additional capacity is necessary.

Additionally, it is noted that while the storm sewer size changes at Bennett and Dodson, the upstream sewer is much steeper and a 90 degree bend is introduced at the north curb inlet. This leads to the potential for sewer surcharges and overland flows. Accordingly, we propose supplemental storm sewer effectively creating two 45 degree bends and sizing the sewer such that any surcharge would occur north of Dodson and 224N Bennett.

### Recommended Solution

Recommendations are centered around improving efficiency of surface runoff capture as well as improving storm sewer hydraulic conditions. Revising curb inlets along Dodson to direct water into inlets located behind the curb will increase capacity and help limit bypass flow. Additionally, storm sewer improvements will limit storm sewer surcharges and overflows. Coordination with ComEd is necessary to construct storm sewer as well as inlet improvements.



**LEGENDS**

- Proposed Inlet
- Proposed Manhole
- Existing Storm Structure
- Existing 1' Contour
- Proposed Storm Sewer
- Existing Storm Sewer
- Proposed Curb Modification
- Proposed Offset Inlet
- Parcels



SOURCE: SCALE: 1" = 25'

<p>CLIENT</p> <p style="text-align: center;"><b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501</p>	<p>TITLE</p> <p style="text-align: center;"><b>GENEVA WATERSHED STUDY</b></p>	DWN.	RB	CHKD.	GJC
		JOB#			19-0206
<p><b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755</p>	<p><b>DRAINAGE IMPROVEMENTS BENNETT &amp; DODSON STREETS</b></p>				<p>DATE</p> <p>04-12-2022</p>
					<p><b>EXHIBIT</b></p>

Figure 22- Drainage Improvements - Bennett & Dodson

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 27" RCP	FOOT	40	\$120	\$4,800
2	STORM SEWER, 12" RCP	FOOT	14	\$80	\$1,120
3	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
4	OFFSET INLET	EACH	1	\$3,000	\$3,000
5	MANHOLE, 5' DIA	EACH	2	\$6,000	\$12,000
6	CURB AND GUTTER OUTLET	FOOT	15	\$100	\$1,500
7	GRADING AND RESTORATION	LSUM	1	\$10,000	\$10,000
8	TRAFFIC CONTROL	LSUM	1	\$5,000	\$5,000

Table 9- Concept Cost Estimate - Bennett & Dodson

	SUBTOTAL	\$39,920
	25% CONTINGENCY	\$9,980
	<b>CONSTRUCTION TOTAL</b>	<b>\$49,900</b>
	ENGINEERING & PERMITTING	\$10,000
	CONSTRUCTION ENGINEERING	\$5,000
	<b>GRAND TOTAL</b>	<b>\$64,900</b>
	CAPITAL BUDGET	\$65,000

### 5.3 Study Area 3 - Bluegrass Lane

The rear yards of lots on the east side of Bluegrass Lane accepts runoff from the right-of-way of Fisher Drive which abuts the rear property lines. The runoff from the bike path along Fisher Drive creates standing water along the foundation and in the yard of 427 Bluegrass Lane. A resident has installed french drains to alleviate the situation, but this has not solved the water issue during and after large rainfall events.

Since there is an existing storm sewer in the west right-of-way of Bluegrass Lane, a proposed solution is to construct a lateral from the sewer to the north property line of 427 Bluegrass Lane. The lateral will provide a reliable and improved outlet for the existing french drains and will also add an inlet to capture surface drainage from the side yard.

Total estimated construction cost for the proposed solution is **\$40,000**.

#### Issue

Stormwater runoff from the right-of-way of Fisher Drive creates standing water adjacent to the residential structure at 427 Bluegrass Lane. The resident identified a concern with standing water as a result of the May 2020 event.

#### Analysis

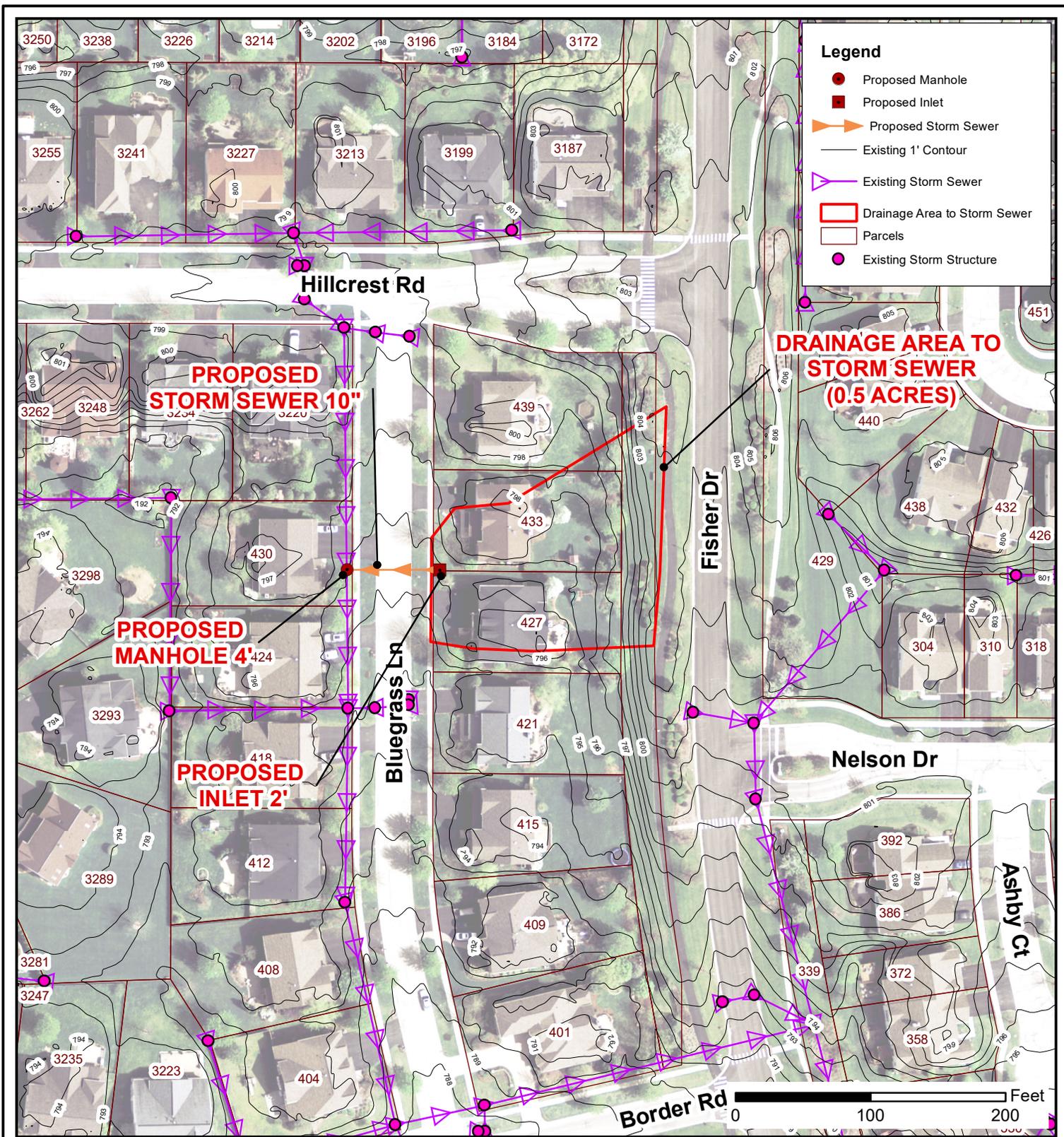
The Kane County GIS topographic data was used to determine the drainage patterns between Bluegrass Lane and Fisher Drive. The western right-of-way of Fisher Dr drains to the rear yards of lots along Bluegrass Lane, and there is no well-defined drainage routes or slope between the rear yard and front yard. A minimum pipe diameter of 10 inches was used since surface conveyance is generally adequate for large events and this improvement is primarily intended to alleviate extended surface inundation.

#### Results

The results of the topographic analysis indicate that there is inadequate slope between the rear yards and the parkway to provide adequate conveyance and that a storm sewer would provide drainage relief for the flat side yard. The proposed 10-inch storm sewer lateral would include an inlet behind the sidewalk at a depth to allow the homeowner to regrade the side yard with a greater slope from the rear yard to the parkway.

#### Recommended Solution

Construct a 10-inch diameter storm sewer lateral off the storm sewer within the west parkway of Bluegrass Lane to an inlet behind the sidewalk along the north property line of 427 Bluegrass Lane. The sewer would allow connection of existing French drains, and also provide an inlet for surface drainage, and allow possible regrading of the side yard to provide greater positive slope from the rear yard to the parkway. The proposed cost for the recommended solution is **\$40,000**. The proposed improvement would require coordination with and easements from affected property owners.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          BLUE GRASS LANE</b>	DATE			
		04-12-2022			

Figure 23- Drainage Improvements - Bluegrass Lane

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" RCP	FOOT	64	\$50	\$3,200
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	RESTORATION	LSUM	1	\$5,000	\$5,000
4	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
5	PAVEMENT PATCH (6" HMA BASE)	SQ YD	22	\$100	\$2,200
6	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
7	REMOVE AND REPLACE CURB AND GUTTER	FOOT	20	\$60	\$1,200
8	REMOVE AND REPLACE SIDEWALK	SQ FT	125	\$15	\$1,875

Table 10- Concept Cost Estimate - Bluegrass Lane

	SUBTOTAL	\$23,475
	25% CONTINGENCY	\$5,869
	<b>CONSTRUCTION TOTAL</b>	<b>\$29,344</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$39,344</b>
	CAPITAL BUDGET	\$40,000

## 5.4 Study Area 4 - Brian Court

The rear yard of lot 272 Brian Court receives runoff from several adjacent residential lots as well as the right-of-way of Randall Road. A drainage structure in the rear yard has an open grate but surcharges causing surface ponding and potentially impacting sump pump operations. The Randall Road right-of-way directly west of the property has a relatively undefined drainage swale to route flows south rather than east towards Brian Court. Furthermore, there appears to be a drainage pipe from Randall Road to the City storm sewer. There is a stormwater basin directly nearby which has potential to facilitate excess flows from rainfall events. It is noted the basin is within a drainage easement but owned by several homeowners within the subdivision. Further review of City GIS information indicates an 8-inch diameter sump line storm sewer running north along Randall Road serving homes in Brian and Clover Courts.

Improvements include removing Randall Road flows from the City's sump collection storm sewer. Additionally, we recommend a relief drainage pipe be extended from the City storm sewer to the stormwater basin. This pipe would be set at an elevation such that the existing storm sewer capacity is maximized before discharge to the stormwater basin is realized. Finally, an improved overland drainage route would alleviate extended duration surface inundation.

Total estimated construction costs for the proposed improvements is **\$47,000**.

### Issue

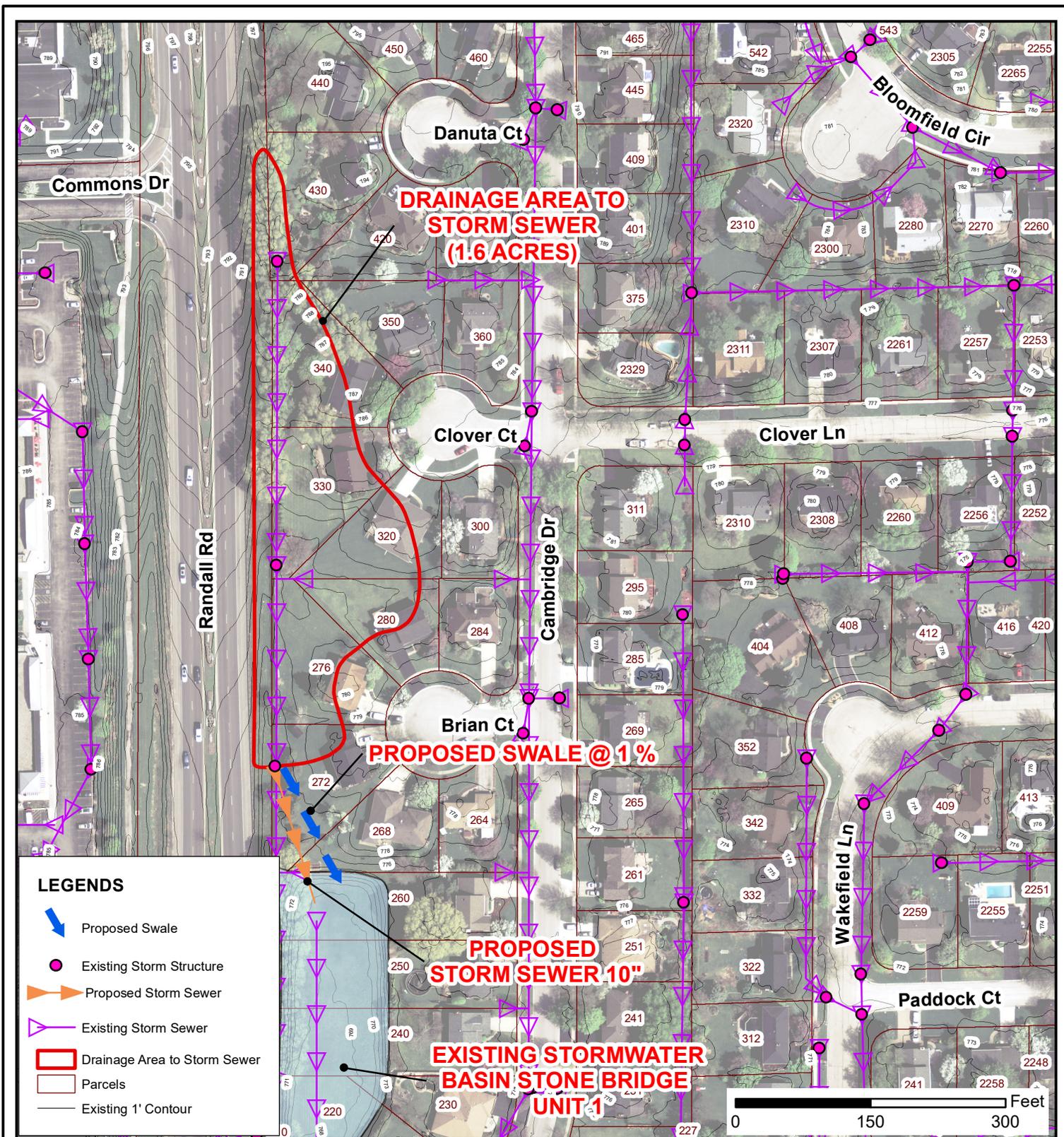
Excessive runoff and limited pipe capacity is causing storm sewer surcharges and surface inundation at the rear of 272 Brian Court. The head condition has an adverse effect on the sump pump resulting in potential for failure. It appears adjacent road right-of-way may be draining towards and into a sump collection storm sewer.

### Analysis

The Kane County GIS topographic data was used to determine the tributary area to the southwest corner of 272 Brian Court. Inadequate grades facilitate emergency overflows resulting in surface ponding. A minimum pipe diameter of 10-inch was used since the sewer is intended to be a sump collection sewer and this improvement is primarily intended to alleviate extended surface inundation.

### Recommended Improvements

Identify the portions of Randall Road which flow overland or through a drainage pipe to the sump pump collection system. These flows need to be removed from the system. Any work associated with Randall Road right-of-way is assumed to be the responsibility of KDOT. Investigative work and coordination activities will be included in the estimate of cost. Construct a 10-inch diameter storm sewer from the existing drainage structure at 272 Brian Court to the stormwater basin. Provide an overland flow route from the rear yard the stormwater basin. The proposed cost for all elements of the recommended improvements is **\$47,000**. It may also require cooperation from adjacent homeowners to gain access to the work area.



SOURCE:

SCALE: 1" = 150'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	GJC
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS BRIAN CT</b>	DATE			
		04-12-2022			

Figure 24- Drainage Improvements - Brian Court

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	125	\$50	\$6,250
2	GRADING AND SHAPING SWALES	FOOT	120	\$50	\$6,000
3	RESTORATION	LSUM	1	\$8,000	\$8,000
4	SURVEY AND KDOT COORD.	LSUM	1	\$5,000	\$5,000
5	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

Table 11- Concept Cost Estimate - Brian Court

	SUBTOTAL	\$27,750
	25% CONTINGENCY	\$6,938
	<b>CONSTRUCTION TOTAL</b>	<b>\$34,688</b>
	ENGINEERING & PERMITTING	\$8,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$46,688</b>
	CAPITAL BUDGET	\$47,000

## 5.5 Study Area 5 - Crawford Street

One of the drainage concerns raised by Geneva residents during the outreach phase of this study results from the inadequate size of the culvert at the intersection of Crawford and 8th Street. Although some prior studies were conducted for an adjacent subdivision and the UPRR track expansion, none of these studies included sizing of culvert that would reasonably convey flow resulting from the 10-year rainfall events (69cfs), the typical design event for storm sewer. Moreover, due to the size of existing culverts at the adjacent driveway crossing, significant amount of surface runoff was observed on the driveway and roadway during the rain event of May 2020 resulting in considerable volume of water ponding in the residential yards. Since the capacity of existing 36-inch CMP culvert is only 45.5cfs and the capacity of the two parallel 15-inch driveway culverts is 11 cfs, it becomes necessary to remove and replace both the driveway and roadway culverts. The total drainage area to the culvert is 118.6 acres which includes the drainage area between UPRR and culvert as well as a significant area from the south of UPRR.

To improve the capacity of existing culvert, several culvert alternatives were evaluated in the HY-8 program by varying the size, shape (i.e. Box culvert) and number of culverts that would handle the design flow from the 10- year events without overtopping the roadway. Also, it was necessary to drop the existing culvert invert by at least six inches in order to provide the minimum cover requirements of 1.5 ft over the culvert.

The total estimated construction cost for this alternative is \$102,000.

### Issue

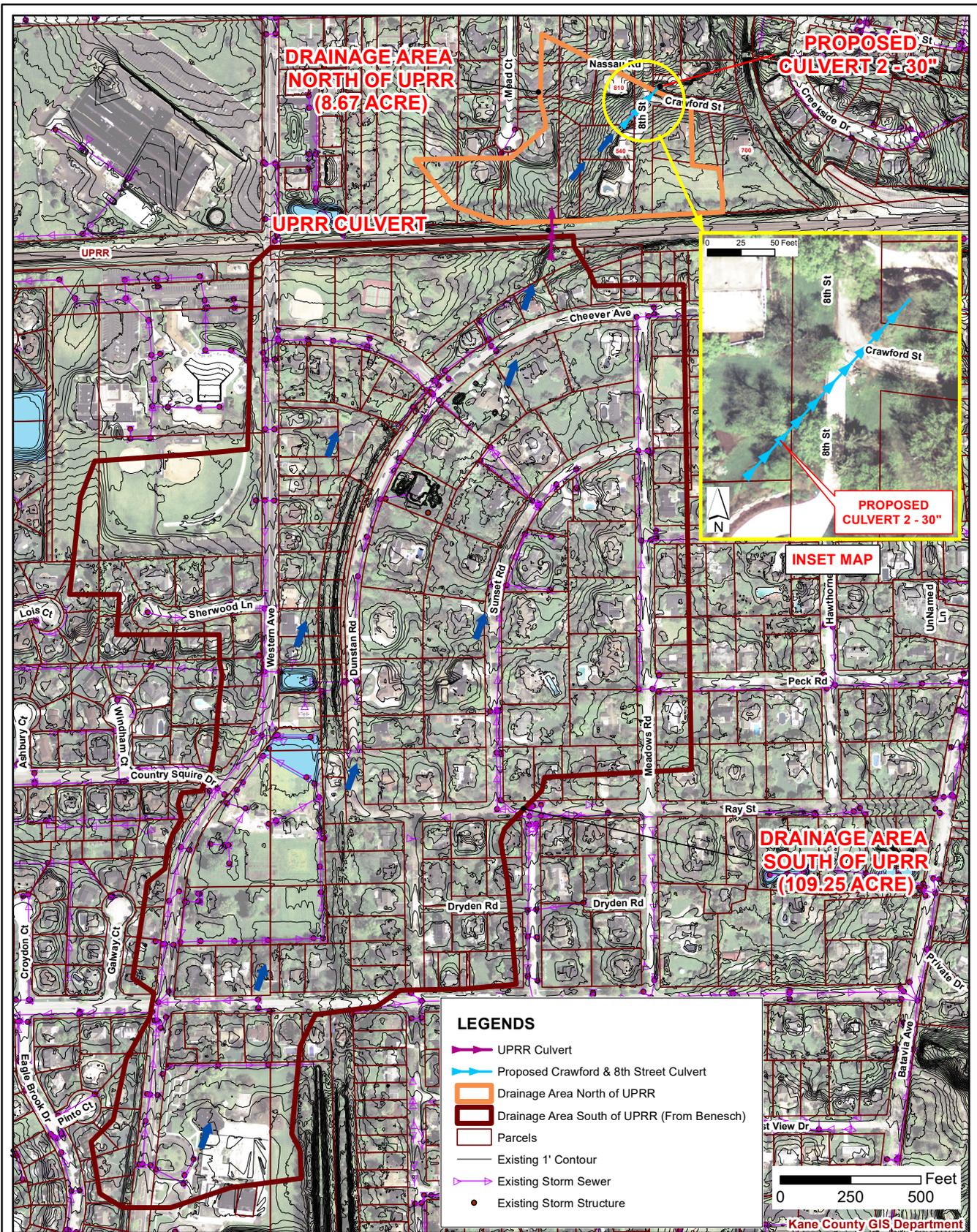
The culverts located at the intersection of Crawford and 8th Street were likely constructed prior to knowledge of the upstream tributary area and rigorous design calculations. At present, there are two parallel 15-inch HDPE storm sewer running crossing a residential driveway on the south side of the intersection while the Crawford Street culvert consists of a single 36-inch CMP storm sewer. The tributary area to these culverts is 118 acres with 109 acres south of the UPRR Railroad (See exhibit). The 10-year overland flow coming from this large tributary drainage area of 118.6 acres coupled with the inadequate culvert size, creates frequent inundation of residential yards and on the upstream side of the culvert. Resident at 540 South 8th Street, 810 Nassau Lane and 700 Crawford Street have all raised concerns about the adequacy of existing drainage infrastructure.

### Analysis

#### Recommended Improvements

The recommendation for this project are:

- » Replacing the existing driveway and roadway culverts with two 30-inch diameter RCP culverts.
- » Ditch grading and riprap construction to lower the invert and provide energy dissipation.



CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN, RB	CHKD, GC
		JOB# 19-0206	 DATE 4-12-2022
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>CULVERT IMPROVEMENTS          CRAWFORD &amp; 8TH STREET</b>	<b>EXHIBIT</b>	

Figure 25- Drainage Improvements - Crawford Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 30" RCP	FOOT	200	\$125	\$25,000
2	FLARED END SECTION, 30"	EACH	4	\$3,000	\$12,000
3	PAVEMENT PATCH	SQ YD	200	\$100	\$20,000
4	DITCH REGRADING-EXCAVATION	CU YD	37	\$45	\$1,665
5	DITCH TOPSOIL & SEED	SQ YD	222	\$15	\$3,330
6	RIP RAP	SQ YD	89	\$20	\$1,780

Table 12- Concept Cost Estimate - Crawford Street

SUBTOTAL	\$63,775
25% CONTINGENCY	\$15,944
<b>CONSTRUCTION TOTAL</b>	<b>\$79,719</b>
ENGINEERING & PERMITTING	\$12,000
CONSTRUCTION ENGINEERING	\$10,000
<b>GRAND TOTAL</b>	<b>\$101,719</b>
CAPITAL BUDGET	\$102,000

## 5.6 Study Area 6 - East Side Drive

A drainage area identified through public outreach is located in the vicinity of Oakwood Drive and East Side Drive. During the rain event in May of 2020, several residential properties along Oakwood Drive and the property at 408 East Side Drive experienced ponding water in their back yards which caused sump pumps to run, and basement seepage. The area is flat with no defined drainage swale.

The area behind 408 East Side Drive is also flat with no drainage infrastructure. The resident reports ponding water in their back yards during high intensity storm events.

A proposed solution consists of an extension of an existing rear yard storm sewer to allow draining of the flat back yards of 408 East Side Dr/ 411 Park Avenue

Total estimated construction cost for drainage improvements is **\$39,000**.

### Issue

The poorly drained rear yards of 408 East Side Dr/ 411 Park Avenue causes prolonged periods of standing water in the rear yards and water adjacent to the foundation of 408 East Side Drive.

### Analysis

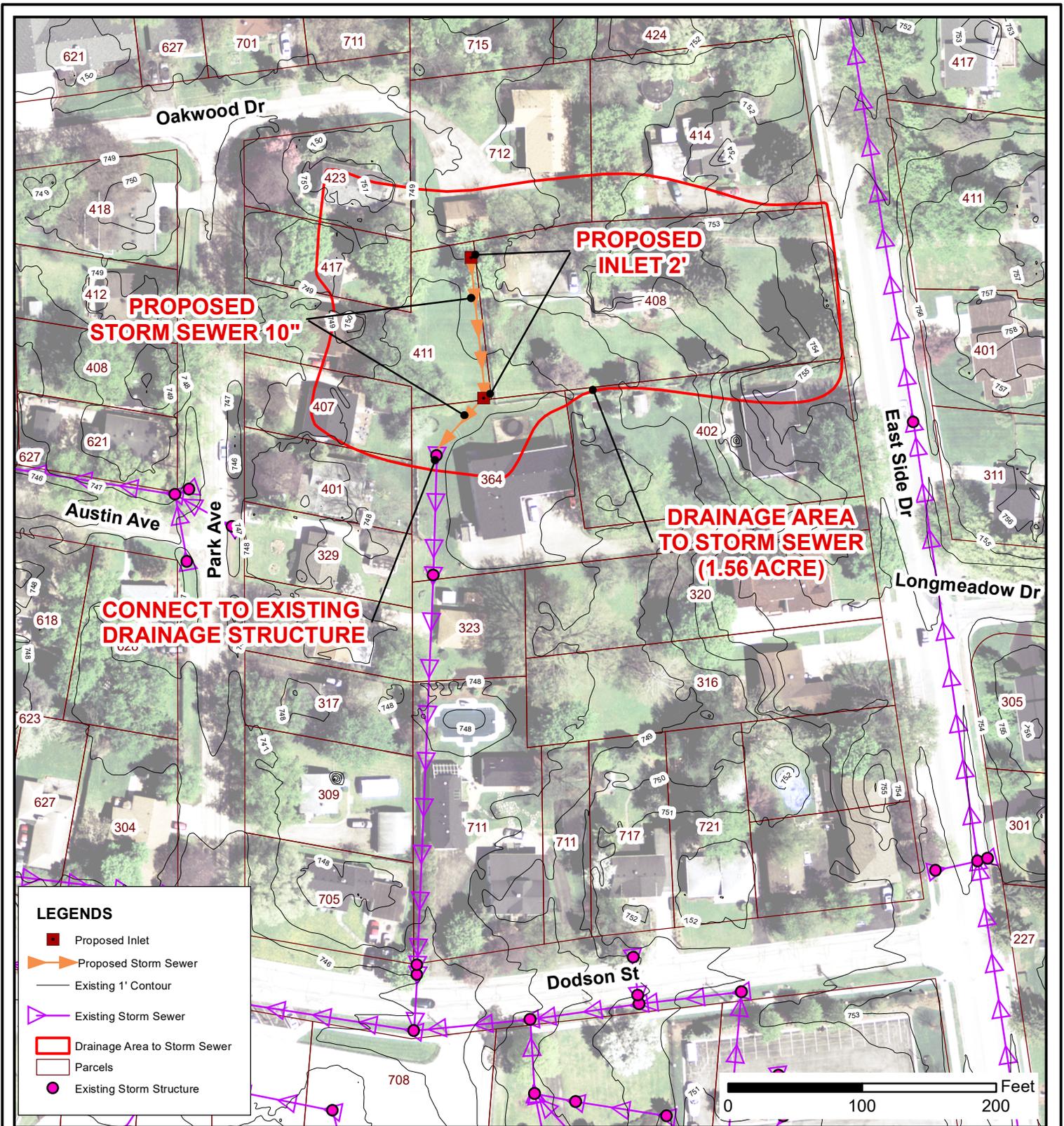
The Kane County GIS topographic data was used to determine the drainage patterns in the vicinity of the residential lots, and assess the tributary area to the subject locations. A minimum pipe diameter of 10-inch was used since surface conveyance is generally adequate for large events and this improvement is primarily intended to alleviate extended surface inundation.

### Results

An existing storm sewer extension is located in the rear yard of 364 East Side Drive. The proposed solution is to extend this storm sewer along the rear property line of 408 East Side Drive to provide an outlet for the low area and ponding water along the residential house

### Proposed Improvements

Construct and extend a 10-inch storm sewer from the existing sewer located in the rear/ side yard of 364 East Side Drive to provide drainage inlet for the flat area in the rear yard. Approximately 150 LF of sewer would be required with an estimated cost of **\$39,000**. Coordination with the resident at 364 East Side Drive would be required for construction of this proposed drainage improvement.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS EAST SIDE DRIVE</b>	DATE			
		04-12-2022			

Figure 26- Drainage Improvements - East Side Drive

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	150	\$50	\$7,500
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	RESTORATION	LSUM	1	\$8,000	\$8,000
4	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 13-** Concept Cost Estimate - East Side Drive

SUBTOTAL	\$23,000
25% CONTINGENCY	\$5,750
<b>CONSTRUCTION TOTAL</b>	<b>\$28,750</b>
ENGINEERING & PERMITTING	\$6,000
CONSTRUCTION ENGINEERING	\$4,000
<b>GRAND TOTAL</b>	<b>\$38,750</b>
CAPITAL BUDGET	\$39,000

## 5.7 Study Area 7 - Fisher Drive

Roadway icing has been observed on Fisher Drive between Larsdotter Lane and Border Road. It has been reported that ice has encroached across one through lane and creates a maintenance challenge for City Public Works operations. The source of the icing condition can be traced back to the driveway entrance to the FAA facility west of Fisher Drive. No drainage concerns or issues are reported during warm weather conditions.

Due to sensitivity in working on or near the access drive the preferred solution would not involve grading on or near the FAA driveway and site. Due to proximity of public storm sewer within Fisher Drive a yard inlet and trench drain are recommended to capture a majority of the surface runoff and minimize roadway icing.

Total estimated construction cost for the proposed solution is **\$56,000**.

### Issue

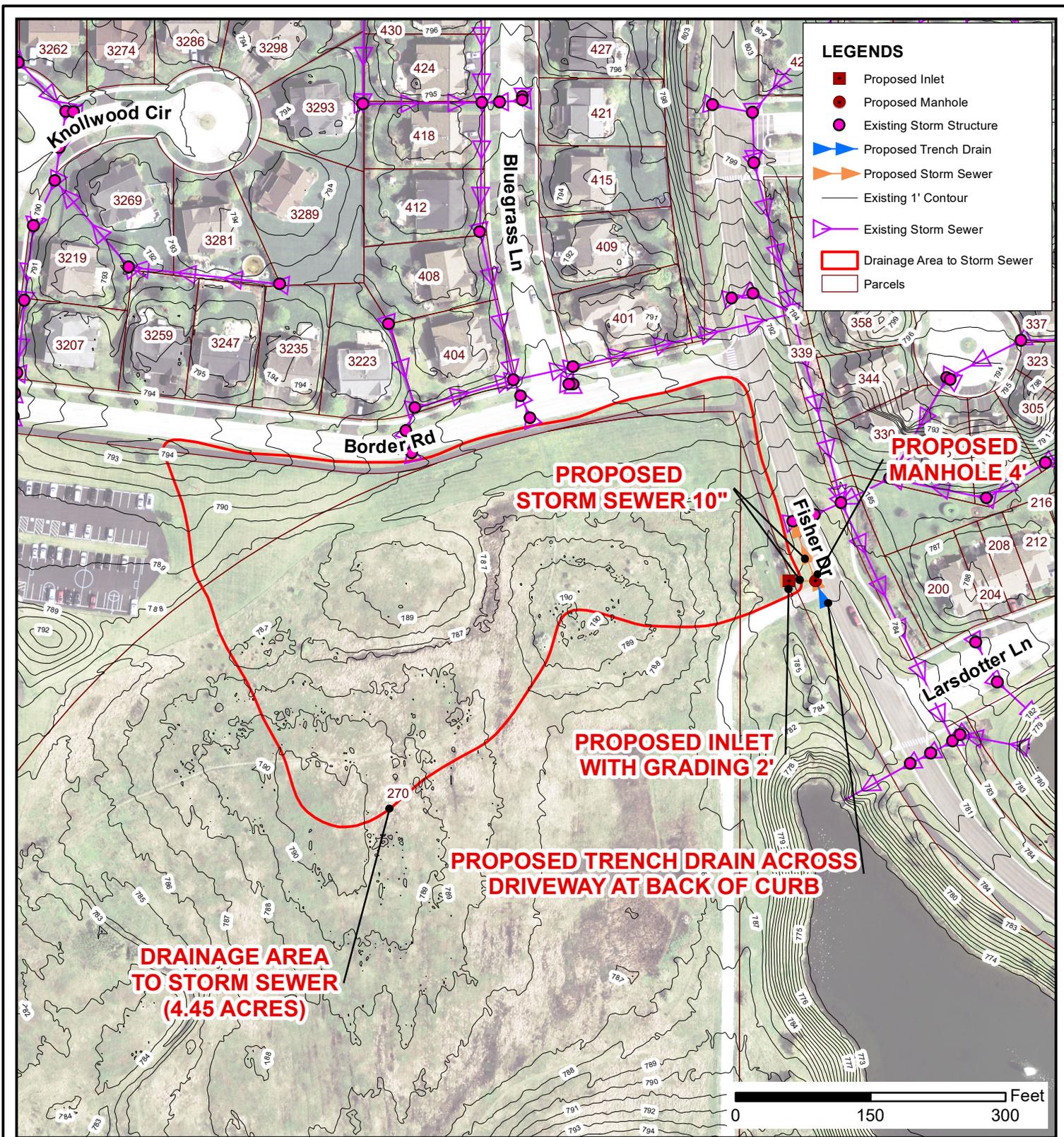
Winter snow melt and subsequent freezing causes and icing condition in Fisher Drive. This condition creates operational issues as well as potential for challenging driving conditions in the winter.

### Analysis

The Kane County GIS topographic data was used to determine the tributary area to the FAA driveway location. The total tributary area to the FAA driveway is 4.45 Acres. It appears the FAA driveway design did not consider the extent of the upstream area and conveyance of surface flows to the adjacent stormwater basin. Existing storm sewer along Fisher Drive is relatively close to the location of the icing conditions and storm sewer improvements will likely resolve the drainage concern. Sizing of the drainage elements was based on minimum pipe sizes since this is a low flow and inlet efficiency issue.

### Recommended Solution

Since this is a winter condition the efficiency of surface runoff capture is the focus of solutions for this condition. A yard inlet with a beehive grate is proposed as the initial measure to capture snow melt and runoff during freezing conditions. Additionally, a trench drain directly behind the back of curb at the driveway entrance will ensure any flows not captured by the yard inlet will be intercepted prior to reaching the roadway. An extension of the existing storm sewer from the north to this location is also proposed. Coordination with the FAA is necessary to keep access available at all times and comply with any security requirements.



SOURCE:

SCALE: 1" = 150'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS FISHER DRIVE</b>	DATE			
		04-12-2022			

Figure 27- Drainage Improvements - Fisher Drive

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" RCP	FOOT	165	\$50	\$8,250
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
4	TRENCH DRAIN	FOOT	30	\$50	\$1,500
5	REMOVE AND REPLACE CURB AND GUTTER	FOOT	30	\$60	\$1,800
6	GRADING AND RESTORATION	LSUM	1	\$8,000	\$8,000
7	TRAFFIC CONTROL	LSUM	1	\$3,000	\$3,000
8	MANHOLE 4' DIA	EACH	1	\$5,000	\$5,000

**Table 14-** Concept Cost Estimate - Fisher Drive

	SUBTOTAL	\$35,050
	25% CONTINGENCY	\$8,763
	<b>CONSTRUCTION TOTAL</b>	<b>\$43,813</b>
	ENGINEERING & PERMITTING	\$8,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$55,813</b>
	CAPITAL BUDGET	\$56,000

## 5.8 Study Area 8 - Forest View Drive

One of the drainage areas of concern in the City of Geneva is the drainage along Forest View Drive and the rear yards of the properties west of Illinois Route 31, between Fargo, and Forest View Drive. The subject area is drained by a 48-inch CMP storm sewer under Illinois Route 31. The residents complain of ponding water in their back yards during high intensity storm events. The total drainage areas to the culvert is approximately 43.9 acres. The rear yards are drained by a high capacity stool grate with inadequate opening area to adequately drain the rear yards without ponding. Also, the drainage swale draining the rear yards to the inlet is flat contributing to standing water in the back yards.

Two proposed alternatives were evaluated to alleviate rear yard ponding include: Proposed Alternative 1) reconfiguring the inlet structure to provide a greater waterway opening and also lower the inlet elevation to allow for construction of a drainage swale with adequate capacity and slope, and Proposed Alternative 2) construction of storm sewer extension with inlet structures from existing inlet structure to provide additional inlet structures to increase total waterway opening into the cross road culvert.

The recommended alternative is Alternative 2 due to the following reasons:

- » Alternative 2 provides sump pump connections for homeowners
- » Alternative 2 requires less rear yard grading than Alternative 1.
- » Alternative 2 provides for future extension of storm sewer to all rear yards on Forest View.

Total construction costs for Alternative 2 is **\$108,000**.

### Issue

Stormwater runoff from Forest View between IL Route 31 and Meadows Road is conveyed between a side yard overland flow route from the IL Route 31 right-of-way to the back yards where it travels to a 48-inch cross road culvert conveying the discharge under IL Route 31. During a large storm event, the discharge is conveyed through an overland flow route between lots 521 and 601 Forest View and into the depressional area in the rear yards between Fargo, and Forest View. In discussion with both property owners, the main drainage issue is the ponding water in their back yards. During large rain events, water may pond 2+ feet deep in the rear yard of Lot 521.

### Analysis

In June 2020, WBK prepared a topographic surveyed the front and rear properties of 501, 521, and 601 Forest View, and the rear yards of opposing lots on Fargo. The tributary areas to; the side yard swale between 521, and 601 Forest View, and to the cross road culvert under IL Route 31 located along the rear yard lot line between properties on Forest View and Fargo was also assessed. A hydrologic analysis of the watersheds to determine peak runoff discharges was performed using the Hydrologic Engineering Center's (HEC) modeling program HEC-HMS. Inputs into the program included Runoff Curve Numbers, lag time, drainage area, and updated Bulletin 75 Rainfall data. The side yard swale was hydraulically analyzed using HEC-RAS to determine the depth of water in the overland flow route during storm events. The storm events analyzed included the 2,10, 25, 50, 100-year critical duration events. The rear yards were analyzed as a basin in the model with the discharge calculated from the grate capacity of the structure that accepts runoff from the back yard.

## Results

The results of the analysis indicated that the discharge in the overland flow route between the two residential properties does not threaten water entering either residential structures. This was supported by discussions with the homeowners that they do not have problems with water entering their house or water in their basements. The HEC-HMS analysis determined that significant ponding will occur in the rear yards during intense storm events. The ponding depth is approximately 0.5 feet for a 10-year storm, 0.8' for the 25-year storm, and 1.2 feet for the 100-year event. These depths do not assume reduction in grate capacity due to debris at the inlet, which would increase the depth of ponding in the rear yards. Another factor in the poor rear yard drainage is the flat slope between the depression in the rear of Lot 601, and inlet structure at the IL Route 31 right-of-way. The slope is approximately 0.22% with variations in elevation along the route which invariably causes puddles of water. This was supported by personal observation during the field visit following the May 15, 2020 rain event. Conveyance of the water was low along the rear property line due to the flat slope of the swale.

The inlet structure draining the rear yards is located just west of the IL Route 31 west right-of-way. The structure consists of a concrete box structure with a large concrete pipe inletting from the north, and a PVC pipe entering from the northwest. There is a high capacity grate on the top of the box which accepts runoff from the rear yards. The drop from the grate to the invert of the box is significant. The invert of the CMP culvert under IL Route 31 could not be surveyed due to its location back under the lid of the box structure, therefore is assumed to be at the same elevation as the bottom of the concrete box.

## Proposed Alternatives

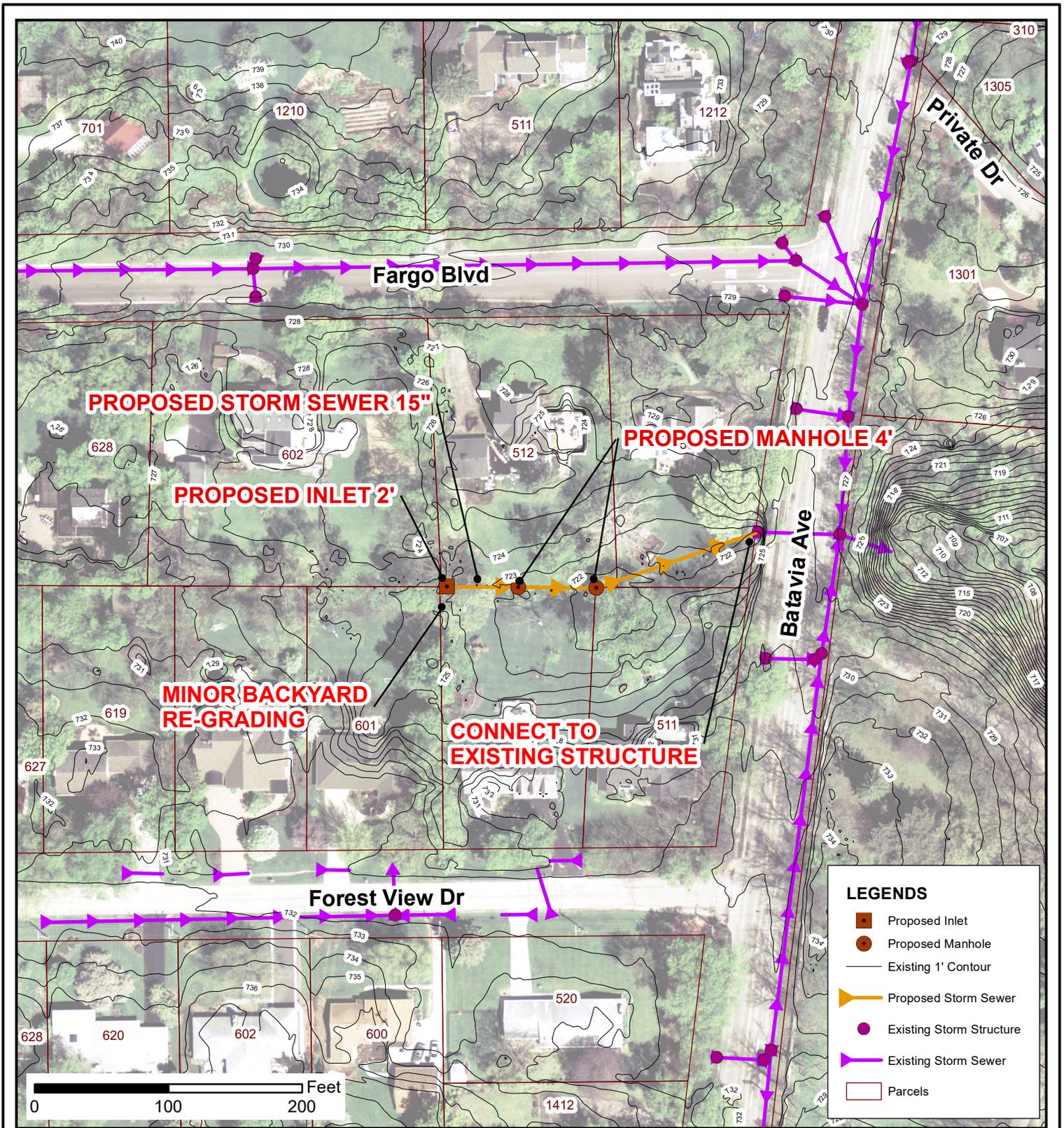
In discussions with the homeowners and through the modeling results, the goal of the drainage improvement would be to reduce the depth and duration of ponding in the rear yards. The limited waterway opening of the single grate draining the depression along with the flat overland slope of the swale in the back yard directing the runoff to the grate both contribute to the depth and duration of ponding. Two conceptual alternatives are proposed to alleviate the back yard flooding. The alternatives include conceptual costs which include a 25% contingency due to the conceptual nature of the estimate. Both options would require coordination and easements from affected property owners

### Proposed Alternative 1

Modify the concrete box inlet structure to allow water to enter the box at a lower elevation and provide a greater waterway opening. An IDOT drop box (modified Inlet Box Type 48) with a grate would allow the water to enter at a lower elevation and with a greater waterway opening increasing the capacity of the structure and reducing the duration of ponding. The lower inlet elevation would allow regrading of the rear yard swale with a greater slope.

### Proposed Alternative 2

Provide additional storm sewer in the back yards from the concrete junction box west along the rear property lines with additional inlet structures. This option would increase the total waterway opening and allow a greater discharge to enter the junction box than in the existing conditions. The inlet structures would allow grading of low points in the rear yards to facilitate drainage in lieu of the current conditions of the flat rear yard swale. The additional structures would also allow residents to connect sump pump discharge lines directly to the storm sewer system instead of discharging directly to the rear yards. The conceptual cost for Alternative 2 is **\$108,000**.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 22 S. FIRST STREET GENEVA, IL 60134 630-232-7494	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>FOREST VIEW DRIVE:          PROPOSED ALTERNATIVE 2</b>	DATE			
		04-12-2022			

Figure 28- Drainage Improvements - Forest View Drive

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	TREE REMOVAL	LSUM	1	\$5,000	\$5,000
2	STORM SEWER, 15" RCP	FOOT	230	\$100	\$23,000
3	INLET, TYPE-A, TYPE 8 GRATE	EACH	1	\$2,500	\$2,500
4	MANHOLE, 4'-DIAMETER, TYPE 8 FRAME AND GRATE	EACH	2	\$5,000	\$10,000
5	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
6	GRADING AND SHAPING SWALES	FOOT	230	\$50	\$11,500
7	RESTORATION	LSUM	1	\$15,000	\$15,000

**Table 15-** Concept Cost Estimate - Forest View Drive

	SUBTOTAL	\$69,500
	25% CONTINGENCY	\$17,375
	<b>CONSTRUCTION TOTAL</b>	<b>\$86,875</b>
	ENGINEERING & PERMITTING	\$10,425
	CONSTRUCTION ENGINEERING	\$10,425
	<b>GRAND TOTAL</b>	<b>\$107,725</b>
	CAPITAL BUDGET	\$108,000

## 5.9 Study Area 9 - 15 Garfield Street

The rear yards of lots between Garfield Street and School Street, and between State Street and Wall Street drain south to the rear yard of 15 Garfield Street. The overland flow path is on the west side of 15 Garfield to the right-of-way of Garfield. Any significant rainfall causes ponding of water in the rear yard.

Since there is an existing storm sewer along the south property line that extends to the residential structure (assume for sump pump discharge), the proposed improvement includes extending the storm sewer from the front yard to the rear yard to provide an inlet for drainage of the depressional area in the rear yard.

Total estimated construction cost for the proposed improvement is **\$34,000**.

### Issue

Stormwater runoff from the rear yards of ten residential lots between Garfield Street and School Street, and between State Street and Wall Street, drains to the rear yard of 15 Garfield Street. The homeowner reported ponding water and extended periods of wet back yard after significant rainfall. It appears that there is a closed depression or inadequate slope from the back yard to the Garfield Street right-of-way to drain the back yard.

### Analysis

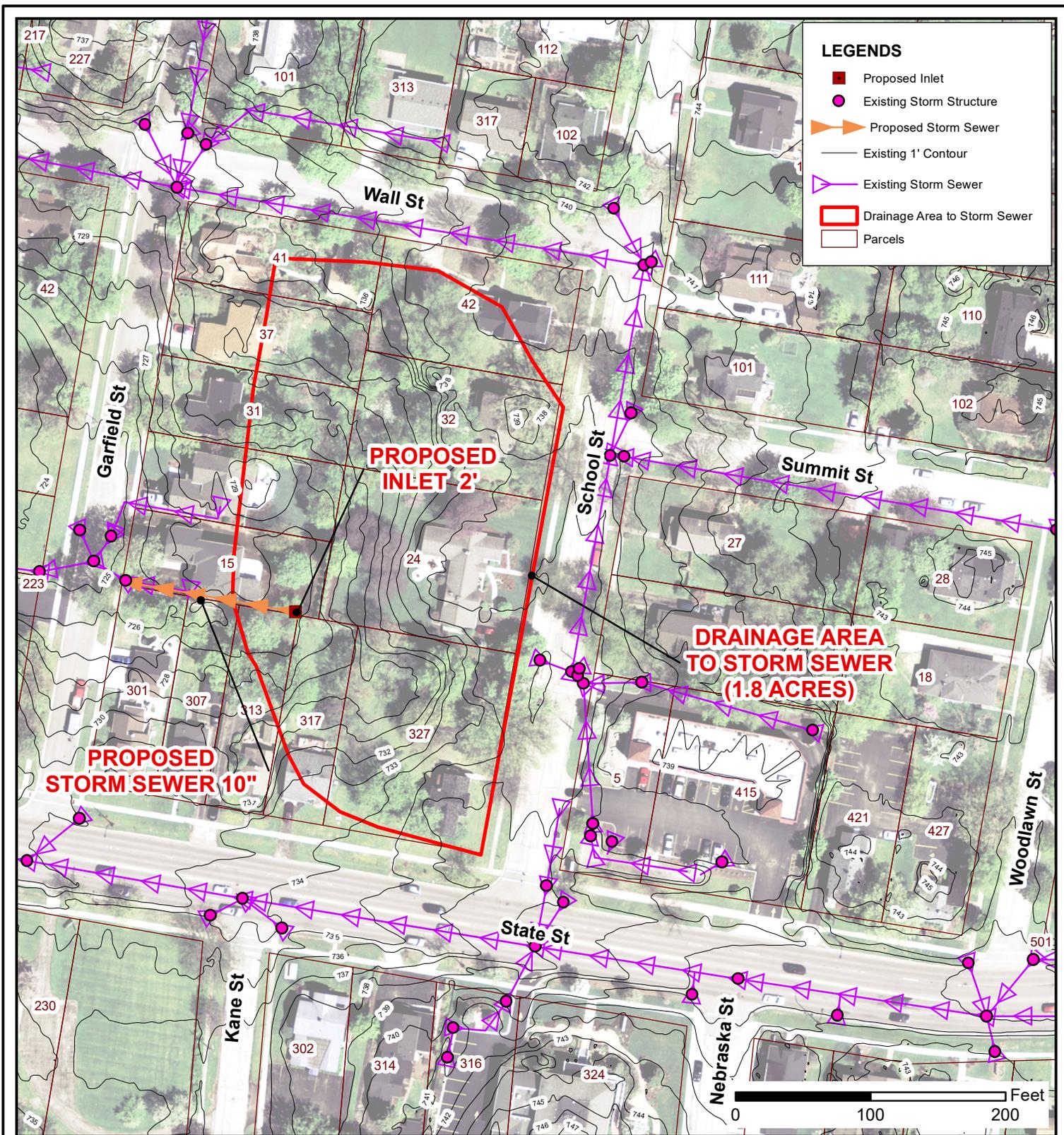
The Kane County GIS topographic data was used to determine the drainage patterns within the block. The total drainage area to the back yard is 1.8 acres. The minimum pipe diameter of 10-inch was used since surface conveyance is generally adequate for large events and this improvement is primarily intended to alleviate extended surface inundation.

### Results

The results of the topographic analysis indicate that there is inadequate slope between the rear yards and the parkway to provide adequate conveyance and that a storm sewer would provide drainage relief for the flat back yard. The proposed storm sewer would extend from the existing manhole in the front yard near the right-of-way to the back yard. The existing side yard sewer is unknown and would be replaced if smaller than 10-inch diameter. The purpose of the sewer extension is to assist in draining the rear yard during a storm and not be sized to convey the peak discharge from the drainage area.

### Recommended Improvement

Construct a storm sewer extension from the front of the lot along the south property line to the rear yard with an inlet at the terminus. The proposed cost for the recommended improvement is **\$34,000**. This work will require cooperation from the homeowner of 15 Garfield to allow construction of a storm sewer across their rear property line and possibly the need for an easement. It may also require cooperation from adjacent homeowners to gain access to the work area.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	GJC
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS GARFIELD STREET</b>	DATE			
		04-12-2022			

Figure 29- Drainage Improvements - 15 Garfield Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" RCP	FOOT	124	\$50	\$6,200
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	RESTORATION	LSUM	1	\$8,000	\$8,000
4	CONNECT TO EXISITING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 16-** Concept Cost Estimate - 15 Garfield Street

	SUBTOTAL	\$19,200
	25% CONTINGENCY	\$4,800
	<b>CONSTRUCTION TOTAL</b>	<b>\$24,000</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$34,000</b>
	CAPITAL BUDGET	\$34,000

## 5.10 Study Area 10 - Geneva High School

An area of the City that received numerous responses from citizen outreach involved an area west of Anderson Boulevard and north of State Street (IL 38) generally around Geneva High School. The limits are depicted on the attached Exhibit and the total area consists of 240 Acres. The Geneva High School Drainage Study Area (GHS DSA) is unique in that a large 60-inch diameter storm sewer from St Charles to the north is bypassed through the neighborhood to outlet to the Geneva Golf Club. The origin an history of this sewer is not known. This “trunk” storm sewer increases in size to a 72-inch sewer south of State Street and serves a majority of the GHS DSA. It is also noted that the eastern portion of the GHS DSA drains eastward through several moderately sized storm sewers (18 to 24-inch) and ultimately discharge directly to the Fox River.

Drainage concerns reported in the GHS DSA relate to yard and street flooding. Structure (house or building) flooding from drainage overflows has not been reported. As we overlaid reported concerns with City storm sewer infrastructure it appeared a lack of infrastructure (storm sewer) and location of infrastructure could be the root cause and potential solution. While some blocks within this area do not have curb and gutter, many blocks do, and still have reported drainage concerns. We do not believe adding curb and gutter for the sake of resolving drainage concerns is a primary solution and we are not including that element in our analysis.

Recommendations for the GHS DSA include the following elements:

- A. Televising the primary “trunk” storm sewer and identify defects requiring repair or further monitoring. Establish an interval for reinspection and budget values for repairs and reinspection.
- B. Construct storm sewer within right-of-way in conjunction with roadway pavement maintenance program. Consider a 5-10 year horizon for all improvements. Prioritize segments based on reported or observed drainage concerns.
- C. Construct laterals to rear yard areas based on reported or observed drainage concerns. Consider a 10 to 20 year horizon for all drainage improvements with budget adjustments based on actual implementation rate.

Total estimated costs for Recommendations A, B & C is **\$3,700,000** with the following breakdown:

- A. Televising - \$25,000
- B. Street Storm Sewer - \$2,403,000
- C. Lateral – Yard Storm Sewer - \$1,272,000

Assuming a 15-year project horizon the annual budget allocation is **\$245,000** based on 2022 dollars.

### Issue

Neighborhoods adjacent to Geneva High School, bounded by Anderson Boulevard to the east, Gray Street to the north, Highbury Lane to the south and State Street to the south, were constructed prior to modern day stormwater management infrastructure. No stormwater storage is provided for residential areas and limited storm sewer and overflow routes are provided for rear yard residential conveyance. Furthermore, many streets do not have curb and gutter and rely on drainage swales and driveway culverts to convey excess runoff. Despite the lack of drainage infrastructure in this area, reports of residential or structure flooding from surface flows are limited. Observed concerns relate to localized poor drainage conditions resulting in ponding water in rear yards or adjacent to streets. This standing water creates a set of problems including potential for foundation seepage, sump pump overload, sanitary sewer infiltration and disease vector breeding.

In addition to localized drainage concerns, a large storm sewer conveys stormwater from St. Charles through this area. This large storm sewer originates at Geneva's north corporate limits as a 60-inch diameter pipe draining residential and commercial areas in St. Charles. The pipe size increases as it flows south, generally through rear yards and then along Pine Street. Several significant lateral storm sewers connect to this trunk sewer near State Street. Crossing State Street the flows are conveyed through a 72-inch diameter pipe. The pipe continues south through Geneva neighborhoods discharging at the Geneva Golf Club. No reports of problems were identified by resident outreach or City staff. The tributary area at the upstream end of the pipe is not known however the pipe size indicates it is likely to be significant. Failure within any segment of this pipe will cause significant flooding within the GHS DSA. Accordingly, we consider this segment to be critical infrastructure in need of regular inspections, and maintenance and replacement when necessary to facilitate the drainage functions it serves.

### Analysis

WBK utilized City of Geneva storm sewer GIS data along with Kane County one-foot topo to evaluate drainage routes and drainage patterns. Additionally, closed depressions were identified based on County topo to further emphasize where storm sewer function was critical. To develop a schematic layout of proposed storm sewer, each block was assessed relative to adjacent storm sewer infrastructure. Storm sewer extensions along streets were generally based on topographic slope and intending to provide an opportunity for a rear yard lateral or sump pump connection within a reasonable distance to every house. Proposed rear yard laterals were also based on evaluation of topo seeking low or flat spots. These locations are only schematic and would only be if a resident or City concern needs to be addressed. The locations are variable based on need and to establish the initial budget target for this aspect of drainage infrastructure.

These initial pipe sizes were selected based on existing system limitations and range from 10 to 15-inch diameter. Initial sizing criteria was providing a minimum 12-inch diameter pipes in the streets, and 10-inch diameter lateral to rear yards to remove nuisance flow and provide sump pump connections. We anticipate these proposed sewers to greatly improve drainage in areas where there is no sewer. Ponding may still be experience for extreme events, however we expect it to be limited and greatly improved over existing conditions. We also expect final engineering of street and rear yard laterals to refine the pipe sizes based on more detailed information and project needs.

### Proposed Alternatives

As a result of feedback from residents and discussions with the City, the primary goal is determined to be reducing the depth and duration of ponding in the rear yards and streets within the DSA. The limited extent of storm sewer infrastructure within the DSA as well as the number and location of rear yard inlets were identified as primary reasons residents experience ponding water. Accordingly, storm sewer improvements are expected to provide a reasonable level of service to resolve recognized concerns.

It is noted that storm sewer conveyance is limited to the existing storm sewer size and capacity within the DSA. No reasonable opportunity exists for stormwater storage within the DSA. Furthermore, the concerns raised were not of a nature where conveyance from the DSA is the cause of observed ponding.

Storm sewer improvements were evaluated and classified in two primary categories; right-of-way storm sewer extensions and rear yard storm sewer laterals. Right-of-way storm sewer segments were developed as extension of the existing storm sewers. In general, pipe diameters were matched and topography dictated the beginning and extent of each segment. Pipe diameters range from 12 to 15-inch. Segments also considered providing a connection location for rear yard laterals.

The rear yard laterals connect to the right-of-way sewer extensions. Each block was evaluated, and sewer extensions and laterals depicted to provide all lots within the DSA public storm sewer within a reasonable distance.

Several alternatives for rear yard laterals were developed including an initial alternative where every lot had a storm inlet at the rear lot line or at a lot corner. This would allow for sump pump discharge as well as surface water collection. The result from this initial concept was excessive storm sewer and a more tempered approach was developed. After several iterations we developed an approach to provide at least two rear yard laterals for each block. With this approach, the City could plan budget resources to address the concerns currently raised as well as provide resources for future drainage concerns. Rear yard laterals are sized as 10-inch minimum and terminate with an open grate structure to facilitate localized surface drainage, sump pump connections and to provide an opportunity for extension. It is unlikely all rear yard laterals depicted will be needed and the locations are expected to be revised to address a specific concern.

Adding curb and gutter to streets where it does not exist was considered within the DSA. Because curb and gutter would require the same, if not more, storm sewer infrastructure, there is no infrastructure cost savings to facilitate drainage. Furthermore, our experience tells us that residents are often divided on their interest in curb and gutter in their neighborhood. Finally, the uncurbed rural section is a stormwater best management practice and viewed as favorable with respect to water quality. Accordingly, curb and gutter is not included in our recommendation. However, roadway drainage is critical to ensure pavement longevity. Therefore, analysis of roadway swale slopes and driveway culverts in the areas of resident concerns is necessary to ensure positive drainage to proposed storm sewer improvements. We recommend this occur on a case by case basis along with storm sewer improvements noted herein.

Eliminating standing water in older neighborhoods has the tangential benefit of reducing inflow and infiltration (I & I) into the sanitary sewer. Aged sanitary sewer (public and private) can exhibit high rates of I & I into the sewer and in severe cases cause system backup. With no place else to go, ponding water often finds its way into the sanitary sewer. Sump pumps discharging to a poorly drained closed depression can have the same result. Providing a comprehensive storm sewer network has benefits beyond resolving localized drainage concerns.

Finally, we evaluated alternatives how the proposed storm sewer network within the DSA can be developed and constructed. The typical stand alone construction project, even with multiple phases, would resolve the concerns, but would come at a cost and inconvenience that does not appear warranted based on the number and types of concerns raised. An alternative is to gradually build the right-of-way storm sewer network based on an annual street maintenance program or a need to address urgent drainage concerns. The rear yard laterals are depicted only to address resident concerns and only when concerns are raised. Since rear yard laterals will be on private property and require property owner cooperation this approach is most logical.

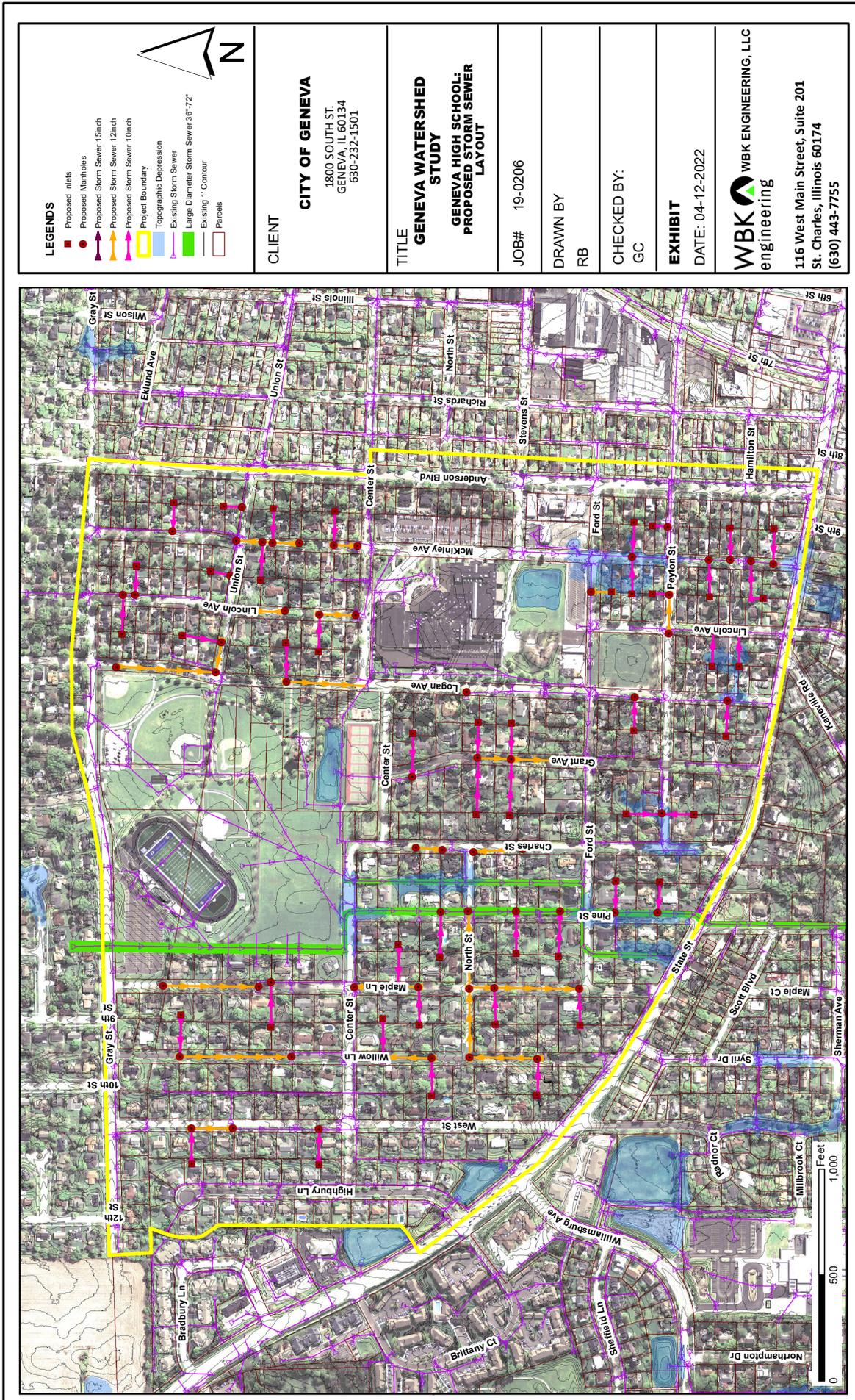


Figure 30- Drainage Improvements - Geneva High School

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	TELEVISIONING STORM SEWER	FOOT	4850	\$4	\$19,400

**Table 17- Concept Cost Estimate - Geneva High School (Recommendation A)**

SUBTOTAL	\$19,400
25% CONTINGENCY	\$4,850
<b>CONSTRUCTION TOTAL</b>	<b>\$24,250</b>
<b>GRAND TOTAL</b>	<b>\$24,250</b>
<b>CAPITAL BUDGET</b>	<b>\$25,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP MAIN	FOOT	6222	\$80	\$497,760
2	PAVEMENT PATCH (6" HMA BASE) *	SQ YD	2765	\$100	\$276,500
3	TRAFFIC CONTROL *	LSUM	1	\$50,000	\$50,000
4	TRENCH BACKFILL	CU YD	3687	\$60	\$221,220
5	INLET, 2' DIA	EACH	6	\$2,500	\$15,000
6	MANHOLE, 4' DIA	EACH	40	\$5,000	\$200,000
7	DITCH REGRADING-EXCAVATION (20%)	CU YD	4158	\$30	\$124,740
8	DITCH TOP SOIL & SEED (20%)	SQ YD	12474	\$10	\$124,740
9	DRIVEWAY- CULVERT (20%)	FOOT	1095	\$45	\$49,275
10	DRIVEWAY- PAVEMENT PATCHING (20%)	SQ YD	1947	\$50	\$97,350

**Table 18- Concept Cost Estimate - Geneva High School (Recommendation B)**

SUBTOTAL	\$1,656,585
25% CONTINGENCY	\$414,146
<b>CONSTRUCTION TOTAL</b>	<b>\$2,070,731</b>
ENGINEERING & PERMITTING	\$165,659
CONSTRUCTION ENGINEERING	\$165,659
<b>GRAND TOTAL</b>	<b>\$2,402,048</b>
<b>CAPITAL BUDGET</b>	<b>\$2,403,000</b>

\* Storm sewer is anticipated to be constructed at the same time as a roadway pavement maintenance project. Surface, level binder and primary traffic control by others

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC LATERAL	FOOT	7309	\$50	\$365,450
2	PAVEMENT PATCH	SQ YD	487	\$100	\$48,700
3	TRAFFIC CONTROL	LSUM	1	\$50,000	\$50,000
4	RESTORATION-LANDSCAPE	SQ YD	16242	\$10	\$162,420
5	INLET, 2' DIA	EACH	46	\$2,500	\$115,000
6	MANHOLE, 4' DIA	EACH	27	\$5,000	\$135,000

**Table 19-** Concept Cost Estimate - Geneva High School  
(Recommendation C)

	SUBTOTAL	\$876,570
	25% CONTINGENCY	\$219,143
	<b>CONSTRUCTION TOTAL</b>	<b>\$1,095,713</b>
	ENGINEERING & PERMITTING	\$87,657
	CONSTRUCTION ENGINEERING	\$87,657
	<b>GRAND TOTAL</b>	<b>\$1,271,027</b>
	CAPITAL BUDGET	\$1,272,000

## 5.11 Study Area 11 - Gray Street

One of the drainage areas of concern in the City of Geneva is the drainage in the rear yards of residential properties along Gray Street. During the rain event in May of 2020, several residential properties had significant runoff in their back yards which caused sump pumps to run continuously, and water overtopping window wells. The rear yards of the properties are flat with no defined drainage swale and with the low point in the rear yards adjacent to the homes. The residents complain of ponding water in their back yards during high intensity storm events. The total drainage areas to the rear yards is 2.12 acres. Upstream runoff sheet flows across the backyard of these properties from west to east.

Two proposed alternatives were evaluated to alleviate rear yard ponding including: Proposed Alternative 1) construction of a storm sewer extension serving an inlet in the parkway of Gray Street for creation of a side yard swale between lot 612 and lot 602 which will direct the runoff to the roadway instead of the backyards, and Proposed Alternative 2) construction of storm sewer extension serving an inlet in the parkway of Gray Street for creation of a side yard swale between lot 602 and 600. For both alternatives we assume side yard regrading from the inlet to the rear yard would be performed by the homeowner(s)

The recommended alternative is Alternative 1 due to the following reasons:

- » Alternative 1 captures the runoff before it enters the rear yard of 602 Gray Street
- » There is a greater slope differential between the rear yard and the parkway between lots 602 and 612, than between lots 600, and 602.

Total estimated construction costs for Alternative 1 is **\$54,000**

### Issue

Stormwater runoff from 2.12 acres west of 602 Gray Street sheet drains through the rear yard adjacent to the house. In the May 2020 event, this created ponding water adjacent to the foundation and window well creating infiltration into the basement of the structure. Also, flooding reports at 612 Gray Street (two houses downstream) were reported. This situation occurs for 600, 602 and 612 Gray Street due to a lack of a well-defined drainage pathway in the rear yards which contributes to standing water near the houses.

### Analysis

The Kane County GIS topographic data was used to determine the tributary area to the rear yards. A hydrologic analysis of the tributary area to 602 Gray Street was performed using the Rational Method to determine peak runoff discharges to the rear yard. Inputs into the program included C value, Bulletin 75 rainfall intensity, and drainage area. The peak 10 and 50-year discharge to the rear yards is 3.1 and 4.7 cfs, respectively. A topographic survey of the side yards between 612 and 602 Gray Street and of the local storm sewer was performed in summer of 2021.

### Results

The results of the topographic analysis indicate that there is inadequate slope between the rear yards and the curb in the front of the lots to drain the runoff directly from the rear yards to the roadway curb. To provide adequate slope, an inlet in the parkway of Gray Street is proposed. This inlet is to be set approximately 2 feet below the curb line to accept runoff from a proposed swale from the rear yard to the parkway. This swale would be graded at 2 percent and have a minimum depth of 0.5 feet to convey the 50-year discharge. This solution was proposed at two locations, the east and west property lines of 602 Gray Street for the two proposed alternatives.

### Proposed Alternatives

The goal of the drainage improvement would be to re-direct the runoff into a defined swale to the Gray Street right-of-way and away from the rear yards. Two conceptual alternatives are proposed to alleviate the back yard flooding. The alternatives include conceptual cost estimates which include a 25% contingency due to the conceptual nature of the estimate. Gray Street is the dividing line between the City of Geneva and the City of St Charles with the city of Geneva owning the south right-of-way of the street. The mainline storm sewer serving this street is located in the north right-of-way (St Charles) and extension of the storm sewer may require coordination with the City of St Charles. Also the regrading will require checking the cover over the existing water main in the south parkway to ensure adequate protection of the watermain.

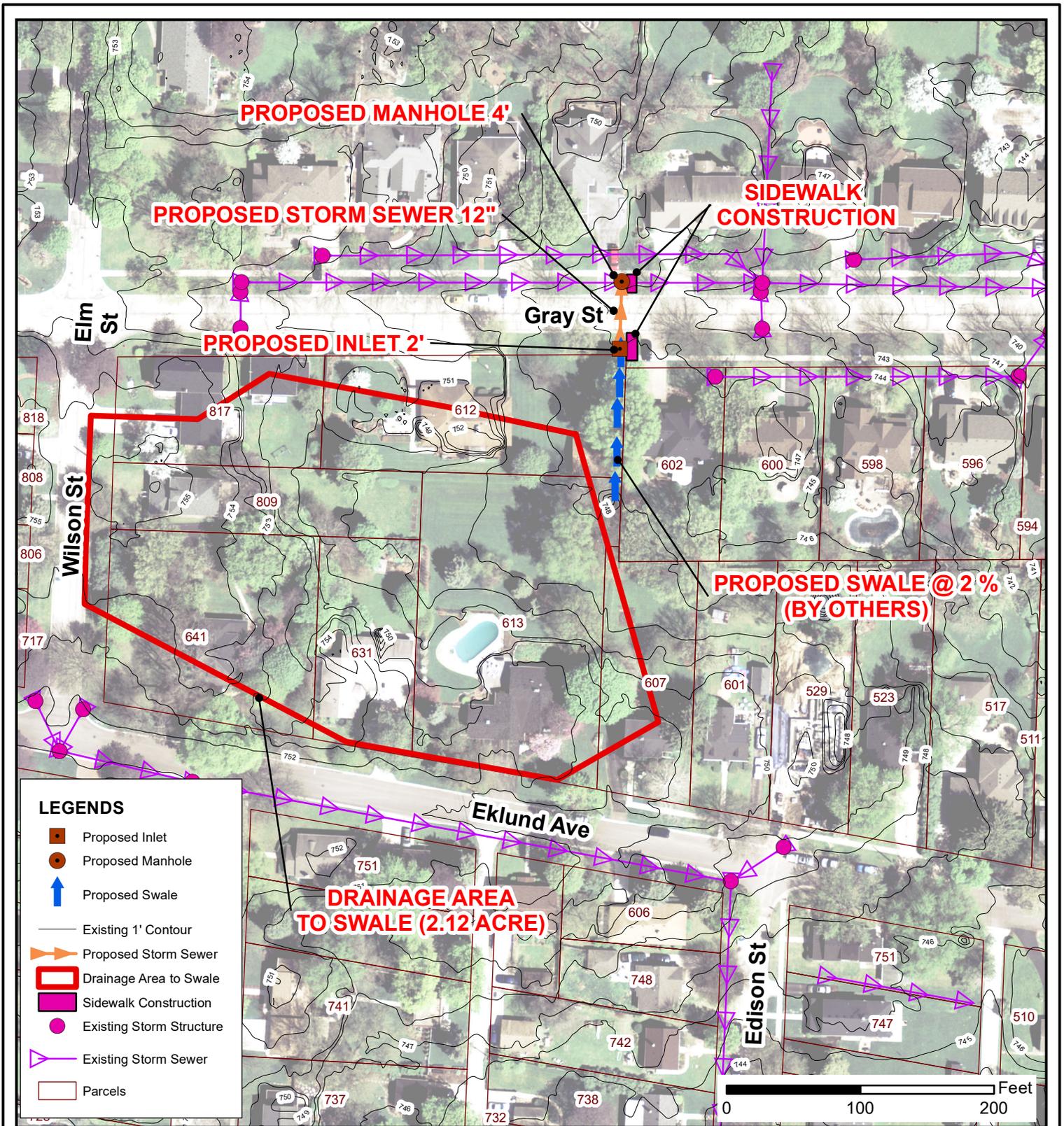
#### Proposed Alternative 1

Extend the existing storm sewer from the north parkway to the south right-of-way for construction of an inlet behind the curb in the parkway at the property line between 612 and 602 Gray Street. This inlet would be set at an elevation which would allow grading of a swale at 2% from the rear of the yard to the parkway and thus re-directing the runoff from the rear yards. A survey of the existing storm sewer confirmed that the existing sewer is deep enough to serve this inlet. This alternative redirects the runoff prior to crossing the rear yard to 602 Gray Street. This alternative requires cooperation between homeowners of 612 and 602 for construction of a side yard swale. There is limited room for a swale between the garage on 612 and the sidewalk on 602. The conceptual cost for Alternative 1 is **\$54,000**. See the attached exhibit.

#### Proposed Alternative 2

Extend the existing storm sewer from the inlet in the south curb line to drain a proposed inlet in the parkway between 602 and 600 Gray Street. The right-of-way is wider between these lots than on 612 Gray Street and the inlet would be placed between the sidewalk and the right-of-way line. The inlet would be set at an elevation to provide positive slope for a swale from the rear yard to the parkway and may require minor re-grading at the front of the lot to match the proposed rim grade into the existing surrounding grades. This inlet could also be used to tie the sump pump discharge from the lot which presently discharges to a structure in the front yard between 602 and 600 and is conveyed in a sewer in the front yards heading east.

Both options would allow either grading of a swale from the parkway to the rear yards, or construction of a private storm sewer extension to the rear yards. We assume the cost of the side yard swales of both options would be the responsibility of the homeowner(s) to construct.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          GRAY STREET - ALTERNATIVE 1</b>	DATE			
		04-12-2022			

Figure 31- Drainage Improvements - Gray Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	40	\$80	\$3,200
2	PAVEMENT PATCH (6" HMA BASE)	SQ YD	22	\$100	\$2,200
3	MANHOLE, 4' DIA	EACH	2	\$5,000	\$10,000
4	RESTORATION	LSUM	1	\$8,000	\$8,000
5	REMOVE AND REPLACE SIDEWALK	SQ FT	270	\$15	\$4,050
6	REMOVE AND REPLACE CURB AND GUTTER	FOOT	40	\$60	\$2,400
7	GRADING AND SHAPING SWALES	FOOT	100	\$50	\$5,000

**Table 20-** Concept Cost Estimate - Gray Street

	SUBTOTAL	\$34,850
	25% CONTINGENCY	\$8,713
	<b>CONSTRUCTION TOTAL</b>	<b>\$43,563</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$53,563</b>
	CAPITAL BUDGET	\$54,000

## 5.12 Study Area 12 - Greenwich Lane

Standing water in the southwest corner of 14 North Greenwich Lane and sump pump discharge creates ice buildup along the public right-of-way which is necessitating evaluation of this area. The proposed improvements include constructing a lateral from the existing storm sewer in the parkway along the south property line (side yard) to accept sump pump discharge. Although there is reasonable grade between the front and rear yards to provide positive drainage, the storm sewer should be extended to an inlet in the side yard and set at an elevation to increase the slope from the rear yard to the front.

Total estimated construction cost for the proposed improvement is **\$36,000**.

### Issue

Stormwater runoff from the rear yards of 11 and 15 Bridgeport Lane drain to the southwest corner of 14 North Greenwich Lane and through the side yard of 14 North Greenwich Lane to a drainage structure within the Greenwich Lane roadway. Water and ice on the sidewalk in front of 14 North Greenwich Lane creates a safety concern for pedestrians on the sidewalk.

### Analysis

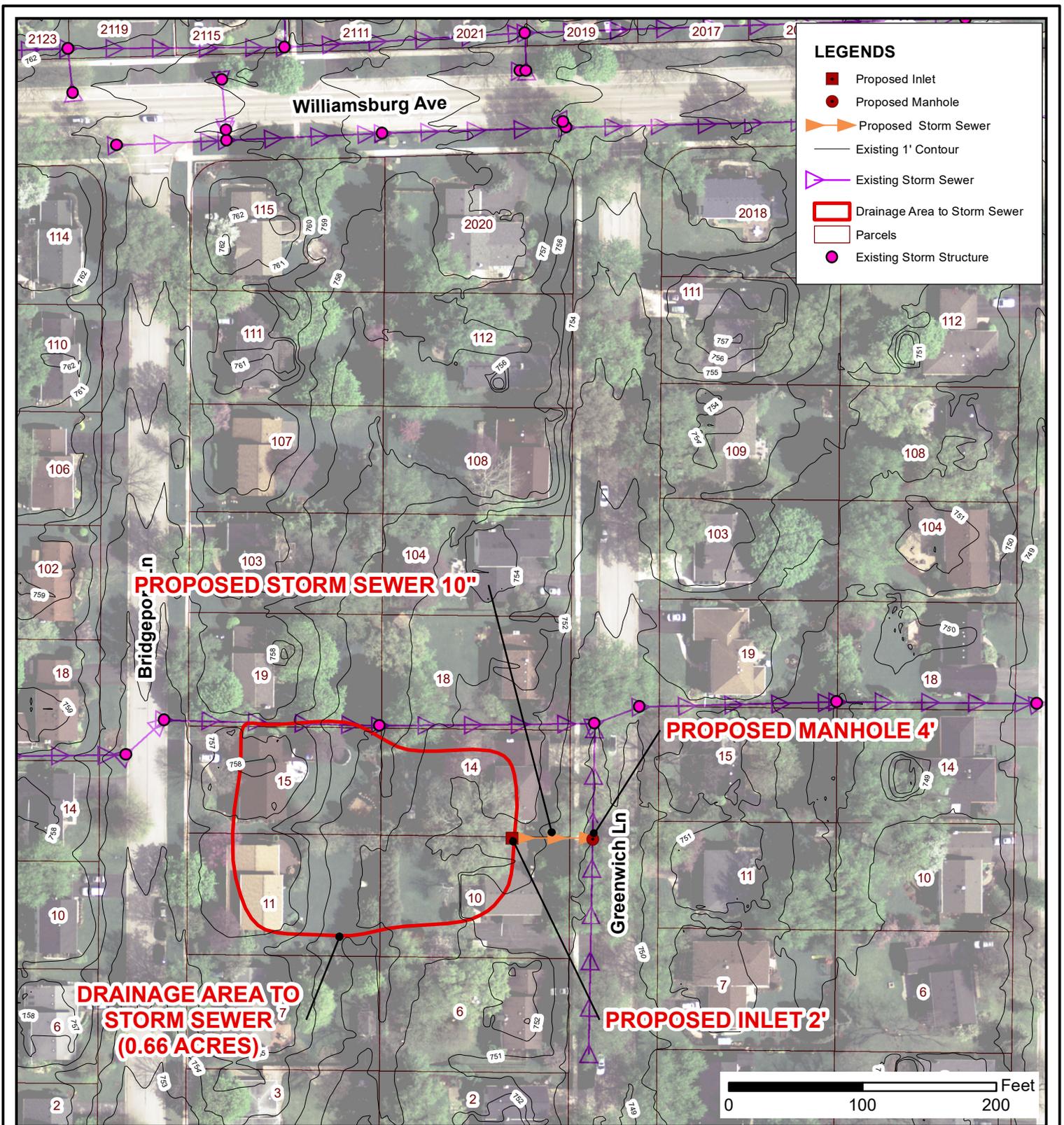
The Kane County GIS topographic data was used to determine the drainage patterns between Bridgeport Lane and Greenwich Lane in the vicinity of 14 North Greenwich Lane. Adequate slope between the front and rear property lines exists from the southwest corner of the lot to the southeast corner. The drainage area to the southwest corner is relatively minor (0.4 acres). A storm sewer recommended to improve drainage conditions and facilitate the discharge from the sump pump eliminating discharge across the sidewalk.

### Results

The results of the topographic analysis indicate that there is adequate slope between the rear yard and the parkway to provide positive drainage to the front yard and that regrading in the rear yard by the homeowner would alleviate the ponding water. The proposed storm sewer lateral would include an inlet in the side yard behind the sidewalk at a depth to allow the homeowner to regrade the side yard with a greater slope from the rear yard to the parkway and allow connection of sump pump discharge.

### Recommended Improvement

Construct a 10-inch storm sewer lateral off the existing public storm sewer within the west parkway of Greenwich Lane to an inlet behind the sidewalk in the side yard. The sewer lateral would facilitate sump pump discharge and also provide an inlet for surface drainage and allow possible regrading of the side yard to provide greater positive slope from the rear yard to the parkway. The proposed cost for the recommended improvement is **\$36,000**.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS GREENWICH LANE</b>	DATE			
		04-12-2022			

Figure 32- Drainage Improvements - Greenwich Lane

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	51	\$50	\$2,550
2	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
3	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
4	RESTORATION	LSUM	1	\$8,000	\$8,000
5	REMOVE AND REPLACE CURB AND GUTTER	FOOT	20	\$60	\$1,200
6	REMOVE AND REPLACE SIDEWALK	SQ FT	75	\$15	\$1,125

**Table 21- Concept Cost Estimate - Greenwich Lane**

	SUBTOTAL	\$20,375
	25% CONTINGENCY	\$5,094
	<b>CONSTRUCTION TOTAL</b>	<b>\$25,469</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$35,469</b>
	<b>CAPITAL BUDGET</b>	<b>\$36,000</b>

### 5.13 Study Area 13 - Kansas Street

Drainage concerns identified as a result of community outreach, include the rear yards of 24, 28 and 108 Kansas Street. During the rain event in May of 2020, the rear yards of the subject lots were inundated with water with the water extending to house foundations. The rear yards of 24, 28 Kansas Street are flat with no rear yard sewers, and 108 Kansas Street has a rear yard closed depression that collects water during rain events. The homeowner at 108 Kansas Street have previously installed drains from the rear yard to the parkway, however ponding of water occurs during heavy rainfall events. Approximately 2.06 acres of residential properties drain to the rear yard closed depression at 108 Kansas Street, and 1.7 acres drains to the rear yards of 24 and 28 Kansas Street.

The recommended solutions include the following:

1. For 108 Kansas Street, installing an inlet in the parkway along the north property line of 108 Kansas Street, which will facilitate grading of a swale from the closed depression to the road right-of-way. The objective is to effectively eliminate the closed depression in the rear yard. Construction of the swale may require landscape retaining walls to facilitate the grading due to existing AC units and planter beds. Therefore, cooperation from and coordination with homeowners will be required for construction of the swale.
2. The recommended solution at 24/ 28 Kansas Street is installation of a storm sewer (210 L.F.) lateral from the storm sewer in Oak Street right-of-way to the rear yards with inlets to accept surface runoff. The lateral will reduce the occurrence of standing water during intense storm events.

Total estimated construction costs for the recommended solution at 108 Kansas Street is **\$30,000** and **\$72,000** for improvements to 24/28 Kansas Street.

**Issue**

Stormwater runoff from 2.06 acres north and east of 108 Kansas Street sheet drains to a closed depression in the rear yard causing standing water in the rear yard and adjacent to the residential house during high intensity storm events. The rear yard experienced ponding water in the May 2020 event. The inundation of the rear yard has occurred multiple times throughout the last several years.

Runoff from 1.7 acres of residential properties drains to the rear yards of 24 and 28 Kansas Street. The rear yards are relatively flat with no storm sewers. Extended periods of standing water in the rear yards creates maintenance issues for the residents.

**Analysis**

The Kane County GIS topographic data was used to determine the tributary area to the rear yards of 108, and 24/28 Kansas Street. A hydrologic analysis of the tributary area to 108 Kansas Street was performed using the Rational Method to determine peak runoff discharges to the rear yard. Inputs into the program included C value, Bulletin 75 rainfall intensity, and drainage area. The peak 10-year discharge to the rear yard is 5.1 cfs. A topographic survey of the side yards between 102 and 108 Kansas Street and of the rear yard of 108 Kansas Street along with the roadway storm sewer was performed in summer of 2021 which verified that adequate depth to the storm sewer and slope is provided for the selected alternative.

**Results**

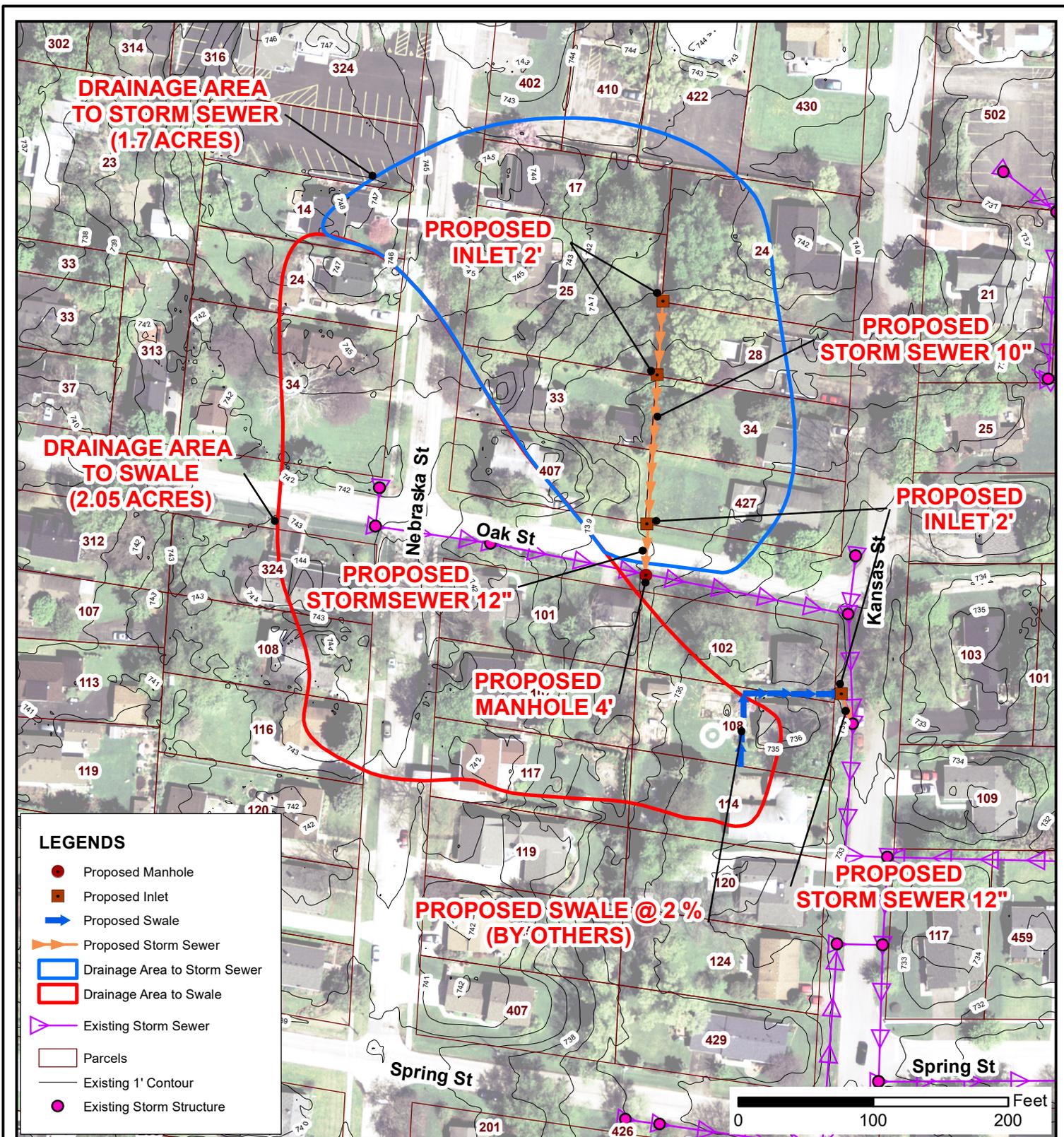
The results of the topographic analysis indicate that a 0.8-foot-deep closed depression exists in the rear yard of the property. Survey of the storm sewer resulted in the conclusion that an inlet could be provided in the roadway right-of-way in the front of the house with a rim of sufficient elevation to allow grading of a minimum (2%) slope swale from the rear yard to the roadway.

For 24/ 28 Kansas Street, the survey of the storm sewer in Oak Street verified that the sewer is at adequate depth to provide an inlet in the rear yards to assist with collecting surface runoff. Proposed 12-inch and 10-inch diameter storm sewer are to be provided for the lateral with the 12-inch storm sewer in the roadway, and 10-inch diameter in the rear yards for the proposed storm sewer extension. The 10-inch diameter sewer is designed to assist in draining the rear yards and not designed to convey the 10-year design storm.

**Recommended Solution**

At 108 Kansas Street, installation of an inlet in the parkway with the rim grade at approximate elevation of 732.1 to provide enough grade difference to allow construction of a swale at two percent from the sag in the rear of the lot to the inlet in the roadway parkway. The swale would eliminate the closed depression and standing water issue in the rear yard. The grading and restoration of a swale along the common property line of 102 and 108 Kansas Street may require landscape retaining walls to maintain the existing planter beds and not affect the existing AC unit pad, and other landscape items.

At 24/28 Kansas Street, the recommendation is to install a storm sewer lateral (12-inch and 10-inch dia.) with inlets to assist in conveying surface runoff out of the rear yards. This extension would, if needed, also provide connection points for sump pump discharges from the residential structures.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS KANSAS STREET</b>	DATE			
		04-12-2022			

Figure 33- Drainage Improvements - Kansas Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	50	\$80	\$4,000
2	STORM SEWER, 10" PVC	FOOT	160	\$50	\$8,000
3	PAVEMENT PATCH (6" HMA BASE)	SQ YD	20	\$100	\$2,000
4	INLET, 2' DIA	EACH	3	\$2,500	\$7,500
5	RESTORATION	LSUM	1	\$3,000	\$3,000
6	MANHOLE, 4' DIA	EACH	5	\$5,000	\$25,000

Table 22- Concept Cost Estimate - 24/28 Kansas Street

	SUBTOTAL	\$49,500
	25% CONTINGENCY	\$12,375
	<b>CONSTRUCTION TOTAL</b>	<b>\$61,875</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$71,875</b>
	<b>CAPITAL BUDGET</b>	<b>\$72,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	22	\$80	\$1,760
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	RESTORATION	LSUM	1	\$3,000	\$3,000
4	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
5	GRADING AND SHAPING SWALES	FOOT	120	\$50	\$6,000

Table 23- Concept Cost Estimate - 108 Kansas Street

	SUBTOTAL	\$15,760
	25% CONTINGENCY	\$3,940
	<b>CONSTRUCTION TOTAL</b>	<b>\$19,700</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$29,700</b>
	<b>CAPITAL BUDGET</b>	<b>\$30,000</b>

### 5.14 Study Area 14 - Longmeadow Drive

It has been reported that sump pump discharge at 921 Longmeadow Drive has caused ice issues in front of the driveways of 907 and 911 Longmeadow Drive and along the sidewalk. A storm sewer extension is proposed to facilitate sump pump discharge from 921 Longmeadow so that it does not cause maintenance issues along Longmeadow. The recommended solution is to extend the storm sewer on Longmeadow Drive east (~ 250 LF) to the west property line of 921 Longmeadow and provide a sump structure within the curb line at this address.

Total estimated construction costs for the recommended alternative is **\$78,000**.

A majority of the work is contemplated within the right-of-way except the sump pump connection may require some work outside the right-of-way. This work does may involve obtaining permission from property owners to connect the sump pump discharge to the storm sewer.

#### Issue

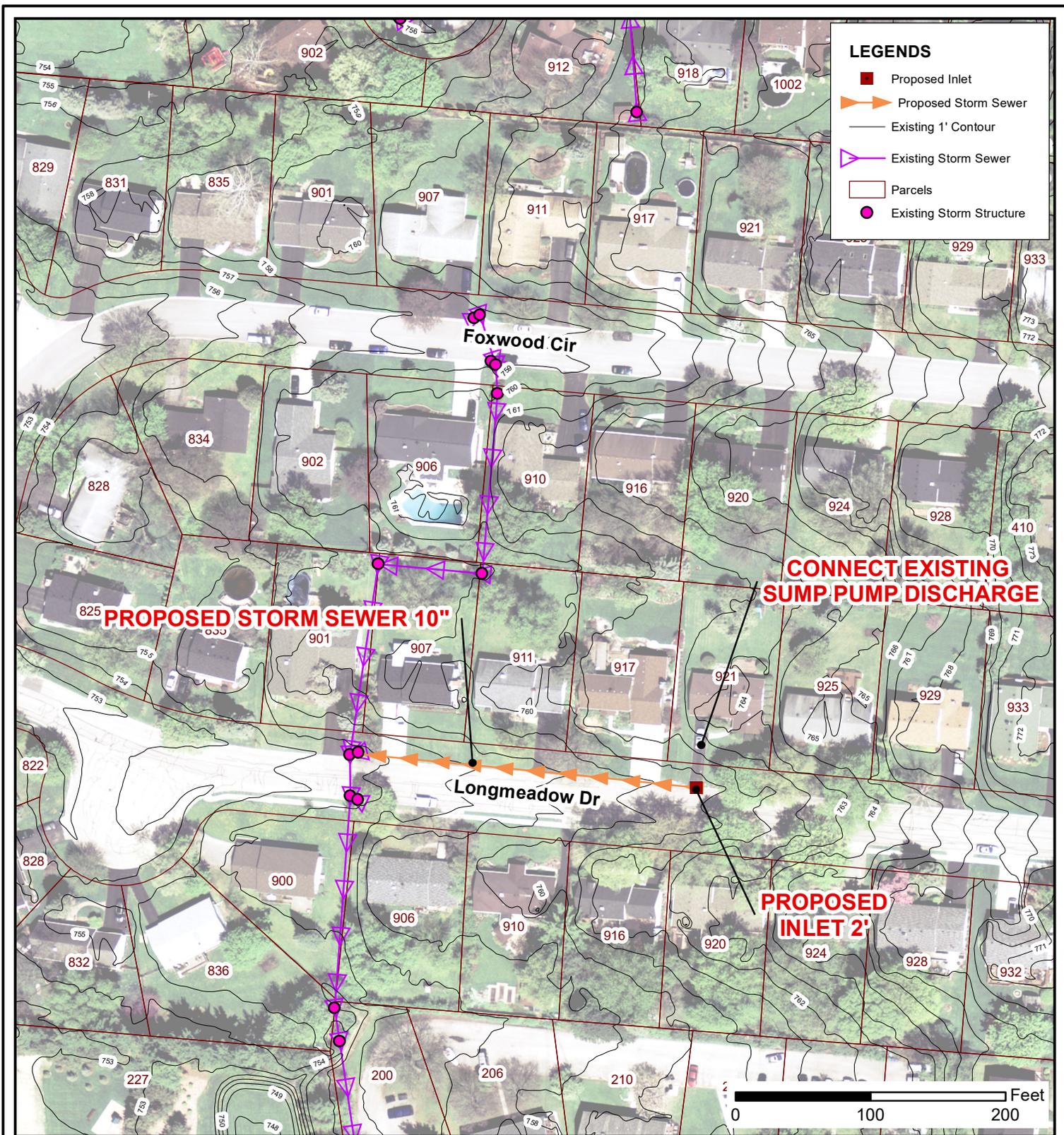
Sump Pump discharge from 921 Longmeadow Drive causes icing problems in Longmeadow Drive Roadway including in front of 907, 911, and 917 Longmeadow.

#### Analysis

The Kane County GIS topographic data was used to determine the drainage patterns at the subject properties. Since the proposed solution is to facilitate sump pump flows the tributary area is not relevant. A minimum pipe size of 12-inch diameter is used within Longmeadow right-of-way. This allows future extensions and sump pump connections as needed in the future

#### Results

Constructing a storm sewer along the curb will facilitate sump pump discharge and also add an inlet to capture surface runoff within the north curb of Longmeadow Drive. No additional storm sewer capacity is added but this improvement will improve the ability the sewer to capture sump pump nuisance flows as well as improve drainage inlet efficiency and redundancy.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          LONGMEADOW DRIVE</b>	DATE			
		04-12-2022			

Figure 34- Drainage Improvements - Longmeadow Drive

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	255	\$80	\$20,400
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
4	RESTORATION	LSUM	1	\$1,500	\$1,500
5	REMOVE AND REPLACE CURB AND GUTTER	FOOT	250	\$45	\$11,250
6	PAVEMENT PATCH	SQ YD	55	\$100	\$5,500
7	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
8	TRAFFIC CONTROL	LSUM	1	\$3,000	\$3,000

Table 24- Concept Cost Estimate - Longmeadow Drive

	SUBTOTAL	\$51,650
	25% CONTINGENCY	\$12,913
	<b>CONSTRUCTION TOTAL</b>	<b>\$64,563</b>
	ENGINEERING & PERMITTING	\$8,000
	CONSTRUCTION ENGINEERING	\$5,000
	<b>GRAND TOTAL</b>	<b>\$77,563</b>
	CAPITAL BUDGET	\$78,000

### 5.15 Study Area 15 - Maple Sherman Area

Similar to the area north of State Street (IL 38) by Geneva High School (GHS) in the area south of State Street (IL 38) from West to Pine Streets also received numerous responses from citizen outreach. The limits are depicted on the attached Exhibit and the total area consists of 41 Acres. This area is designated as the Maple / Sherman Drainage Study Area based on two street names within the study area. Similar to the GHS Drainage Study Area, a large diameter bypass storm sewer transects the study area. This "trunk" storm sewer increases in size from a 72-inch sewer south of State Street to a 58 by 90 elliptical pipe at Kaneville Road.

Drainage concerns reported in the Maple / Sherman DSA relate to yard and street flooding. Structure (house or building) flooding from drainage overflows was not reported. As we overlaid reported concerns with City storm sewer infrastructure a lack of infrastructure (storm sewer) is the apparent root cause of yard and street inundation. Many blocks within this area do not have curb and several remnant overflow drainage routes are noted through evaluation of County topography. We do not believe adding curb and gutter for the sake of resolving drainage concerns is a primary solution and we are not including that element in our analysis.

Another drainage concern in the area is stormwater storage basin within the DSA located northwest of West Street and Radnor Court. This basin is reported by City staff to drain poorly resulting in prolonged standing water and hindering mowing and proper maintenance of the dry basin. Survey of the outfall storm sewer indicate an opportunity to lower the outlet approximately one foot from existing outlet conditions. This would create improved drainage conditions within the basin and help alleviate the standing water.

Recommendations for the Maple and Sherman DSA include the following elements:

- A. Televising the primary "trunk" storm sewer and identify defects requiring repair or further monitoring. Establish an interval for reinspection and budget values for repairs and reinspection.
- B. Construct storm sewer within right-of-way in conjunction with roadway pavement maintenance program. Consider a 10-15 year horizon for all improvements. Prioritize segments based on reported or observed drainage concerns.
- C. Construct laterals to rear yard areas based on reported or observed drainage concerns. Consider a 10 to 20 year horizon for all drainage improvements with budget adjustments based on actual implementation rate.
- D. Improve basin outlet conditions to alleviate the frequency and duration of standing water and enhance maintenance.

Total estimated costs for Recommendations A, B, C & D is **\$777,000** with the following breakdown:

- A. Televising - \$6,000
- B. Street Storm Sewer - \$451,000
- C. Lateral – Yard Storm Sewer - \$144,000
- D. Basin Outlet Improvements \$176,000

### Issues

Much of the area south of State Street (IL 38) to Kaneville Road and between West and Pine Streets, was constructed prior to modern day stormwater management infrastructure. The exception appears to be along West Street where a stormwater basin, curb and gutter and storm sewer are prevalent. In all other areas, no stormwater storage is provided and limited storm sewer exists to facilitate roof and sump pump drainage. Additionally, some streets do not have curb and gutter and rely on drainage swales and driveway culverts to convey excess runoff. Despite the lack of drainage infrastructure in this area, reports of residential or structure flooding from surface flows was not reported. Observed concerns relate to localized poor drainage conditions resulting in ponding water in rear yards or adjacent to streets. This standing water creates a set of problems including potential for foundation seepage, sump pump overload, sanitary sewer infiltration and disease vector breeding.

In addition to localized drainage concerns a large off-site storm sewer is bypassed through this area. The pipe originates at Geneva's north corporate limits as a 60-inch diameter pipe drainage residential and commercial areas in St. Charles. The pipe size increases as it flows south, generally through rear yards and then along Pine Street. Several significant lateral storm sewers connect to this trunk and at the south end crossing State Street the sewer is a 72-inch diameter pipe. The pipe continues south through Geneva neighborhoods discharging at the Geneva Golf Club. The tributary area at the upstream end of the pipe is not known however the pipe size indicates it is likely to be significant. Failure within any segment of this pipe will cause significant flooding within the GHS and Maple/Sherman DSAs. Accordingly, we consider this segment to be critical infrastructure in need of regular inspections, and maintenance and replacement when necessary to facilitate the drainage functions it serves. One concern was reported from a resident along Kaneville Road where a remnant drainage route became active during a significant rainfall event. Given the topography of the area and age of the infrastructure overland flows are not entirely surprising but ensuring the flows do not enter or damage structures remains critical. The resident has indicated they will make grading modifications to manage overflows.

The stormwater basin within the DSA is at the upstream end of areas draining into the DSA from the west. The basin was constructed to mitigate peak flows from upstream development flowing into the DSA. This basin lies within City Special Service Area 05 (SSA-05). City staff has indicated that the basin has standing water in the bottom for most of the year which prevents mowing on a regular basis. Vegetation indicative of poor drainage conditions are observed.

### Analysis

WBK utilized City of Geneva storm sewer GIS data along with Kane County one-foot topo to evaluate drainage routes and drainage patterns. Additionally, closed depressions were identified based on County topo to further emphasize where storm sewer function was critical. Each block was evaluated relative to adjacent storm sewer infrastructure. Storm sewer extensions along streets were generally based on topographic slope and intending to provide an opportunity for a rear yard lateral or sump pump connection within a reasonable distance to every house. Rear yard laterals were also based on evaluation of topo seeking low or flat spots. These locations are only schematic and would only be if a resident or City concern needs to be addressed. The locations are variable based on need and to establish the initial budget target for this aspect of drainage infrastructure.

These initial pipe sizes were selected based on existing system limitations and range from 10 to 15-inch diameter. Initial sizing criteria was providing a minimum 12-inch diameter pipes in the streets, and 10-inch diameter lateral to rear yards to remove nuisance flow and provide sump pump connections. We anticipate these proposed sewers to greatly improve drainage in areas where there is no sewer. Ponding may still be experience for extreme events, however we expect it to be limited and greatly improved over existing conditions. We also expect final engineering of street and rear yard laterals to refine the pipe sizes based on more detailed information and project needs.

The storm sewer at Radnor Court and West Street was surveyed to determine pipe elevations flowing into and out of the basin within SSA-05. Also, storm sewer downstream of the basin was surveyed to determine potential for re-laying and lowering the outlet pipe. Surveyed elevations indicate that a 24-inch pipe constructed at minimum slope along West Street would provide an opportunity to lower the outlet approximately one-foot. This would allow for improved drainage conditions within the basin.

### Proposed Alternatives

As a result of feedback from residents and discussions with the City, the primary goal is determined to be reducing the depth and duration of ponding in the rear yards and streets within the DSA. The limited extent of storm sewer infrastructure for surface drainage collection and sump pump connections was identified as primary reasons residents experience ponding water. Accordingly, storm sewer improvements are expected to provide a reasonable level of service to resolve recognized concerns.

It is noted that storm sewer conveyance is limited to the existing storm sewer size and capacity within the DSA. An opportunity exists for some stormwater storage within the DSA but it is uncertain the amount of storage or benefit the storage would provide to the DSA. Because the upstream area is large and complex (extending into St. Charles), it is considered outside the scope of this study to perform a detailed cost benefit analysis, however future evaluation should be considered and budgeted.

Storm sewer improvements were evaluated and classified in two primary categories; right-of-way storm sewer extensions and rear yard storm sewer laterals. Right-of-way storm sewer segments were developed as extension of the existing storm sewers. In general, pipe diameters were matched and topography dictated the beginning and extent of each segment. Pipe diameter range from 12 to 15-inch. Segments also considered providing a connection location for rear yard laterals.

The rear yard laterals connect to the right-of-way sewer extensions. Each block was evaluated, and sewer extensions and laterals depicted to provide all lots within the DSA public storm sewer within a reasonable distance.

Several alternatives for rear yard laterals were developed including an initial alternative where every lot had a storm inlet at the rear lot line or at a lot corner. This would allow for sump pump discharge as well as surface water collection. The result from this initial concept was excessive storm sewer and a more tempered approach was developed. After several iterations we developed an approach to provide at least two rear yard laterals for each block. With this approach, the City could plan budget resources to address the concerns currently raised as well as provide resources for future drainage concerns. Rear yard laterals are sized as 10-inch minimum and terminate with an open grate structure for surface drainage localized sump pump connections and to provide an opportunity to be extended. It is unlikely all rear yard laterals depicted will be needed and the locations are expected to be revised to address a specific concern.

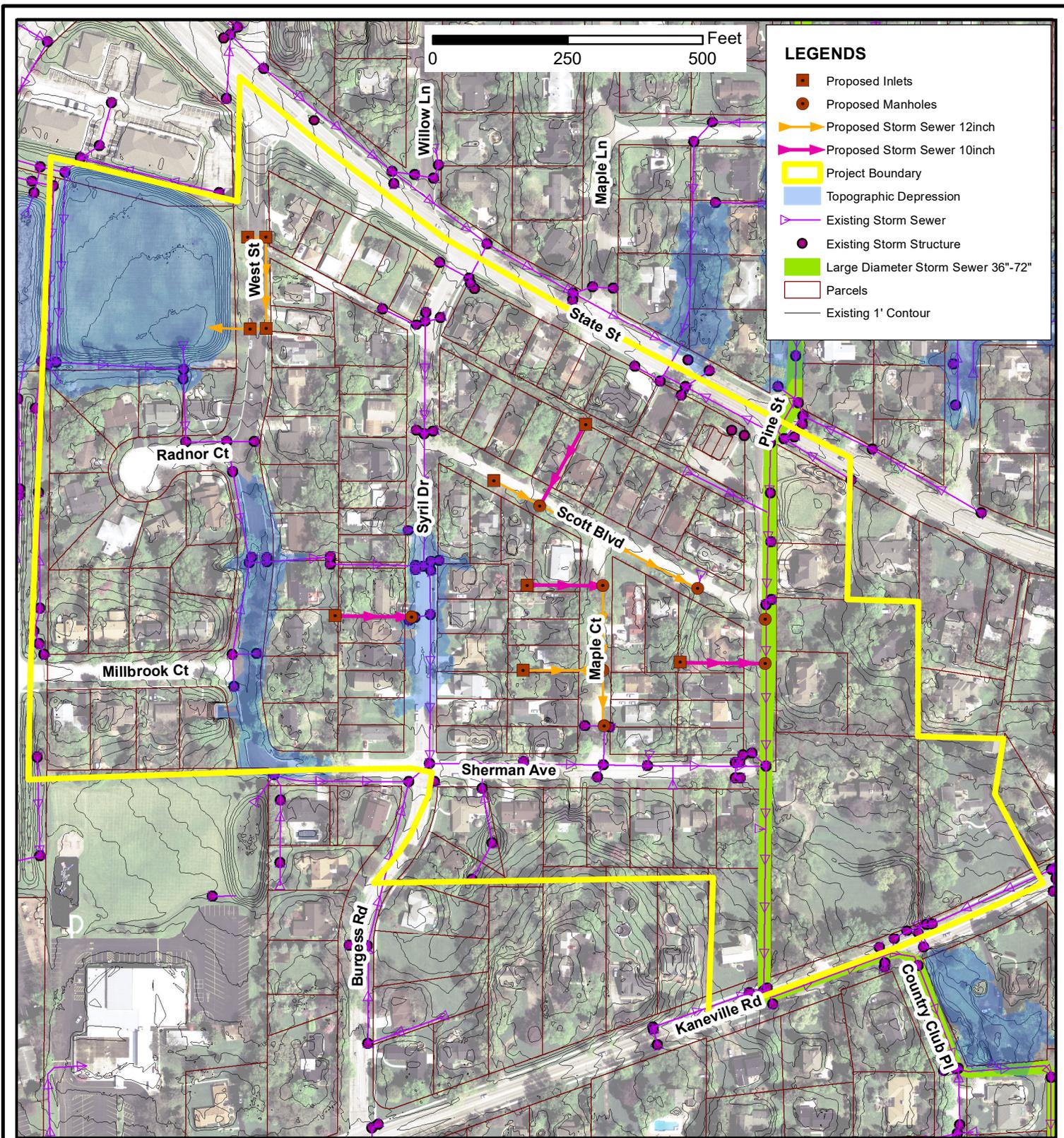
Adding curb and gutter to streets where it does not exist was considered within the DSA. Because curb and gutter would require the same, if not more, storm sewer infrastructure, there is no cost benefit from a purely drainage perspective. Furthermore our experience tells us that residents are often divided on their interest in curb and gutter in their neighborhood. Finally, the uncurbed rural section is a stormwater best management practice and viewed as favorable with respect to water quality. Accordingly, curb and gutter is not included in our recommendation. However, roadway drainage is critical to ensure pavement longevity. Therefore, analysis of roadway swale slopes and driveway culverts in the areas of resident concerns is necessary to ensure positive

drainage to proposed storm sewer improvements. We recommend this occur on a case by case basis along with storm sewer improvements noted herein.

Eliminating standing water in older neighborhoods has the tangential benefit of reducing inflow and infiltration (I & I) into the sanitary sewer. Aged sanitary sewer (public and private) can exhibit high rates of I & I into the sewer and in severe cases cause system backup. With no place else to go, ponding water often finds its way into the sanitary sewer. Sump pumps discharging to a poorly drained closed depression can have the same result. Providing a comprehensive storm sewer network has benefits beyond resolving localized drainage concerns.

We evaluated alternatives how the proposed storm sewer network within the DSA can be developed and constructed. The typical standalone construction project, even with multiple phases, would resolve the concerns, but would come at a cost and inconvenience that does not appear warranted based on the number and types of concerns raised. An alternative is to gradually build the right-of-way storm sewer network based on an annual street maintenance program or as need to address urgent drainage concerns. The rear yard laterals are constructed only to address resident concerns and only when concerns are raised. Since rear yard laterals will be on private property and require property owner cooperation this approach makes the most sense.

Reconstruction and lowering the existing 24-inch storm sewer along West Street would allow for improved drainage conditions of the stormwater basin within the DSA (SSA-05). Two alternatives to minimize standing water include 1) construction of an underdrain system of pipes and 2) grading a pilot channel to collect and better manage base flow conditions. The pilot channel alternative would also involve regrading of the pond bottom with greater cross slope to help alleviate standing water. In either alternative the potential to include wetland type areas is recommended and may be necessary. This would provide a stormwater BMP within the basin and would also seek to limit and isolate native vegetation maintenance activities. Alternative 1, which includes an underdrain system for basin improvements, is included for capital planning purposes.



SOURCE:

SCALE: 1" = 250'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#		19-0206	
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>MAPLE / SHERMAN PROPOSED STORM SEWER LAYOUT</b>	DATE			
		04-12-2022			

Figure 35- Drainage Improvements - Maple Sherman Area

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	TELEVISIONING STORM SEWER	FOOT	1080	\$4	\$4,320

**Table 25- Concept Cost Estimate - Maple Sherman Area (Recommendation A)**

SUBTOTAL	\$4,320
25% CONTINGENCY	\$1,080
<b>CONSTRUCTION TOTAL</b>	<b>\$5,400</b>
<b>GRAND TOTAL</b>	<b>\$5,400</b>
<b>CAPITAL BUDGET</b>	<b>\$6,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP MAIN	FOOT	1114	\$80	\$89,120
2	PAVEMENT PATCH (6" HMA BASE)*	SQ YD	495	\$100	\$49,500
3	TRAFFIC CONTROL*	LSUM	1	\$15,000	\$15,000
4	TRENCH BACKFILL	CU YD	660	\$60	\$39,600
5	INLET, 2' DIA	EACH	6	\$2,500	\$15,000
6	MANHOLES, 4' DIA	EACH	5	\$5,000	\$25,000
7	DITCH REGRADING-EXCAVATION (20%)	CU YD	599	\$30	\$17,970
8	DITCH TOP SOIL & SEED (20%)	SQ YD	1796	\$10	\$17,960
9	DRIVEWAY- CULVERT (20%)	FOOT	160	\$45	\$7,200
10	DRIVEWAY- PAVEMENT PATCHING (20%)	SQ YD	284	\$50	\$14,200

**Table 26- Concept Cost Estimate - Maple Sherman Area (Recommendation B)**

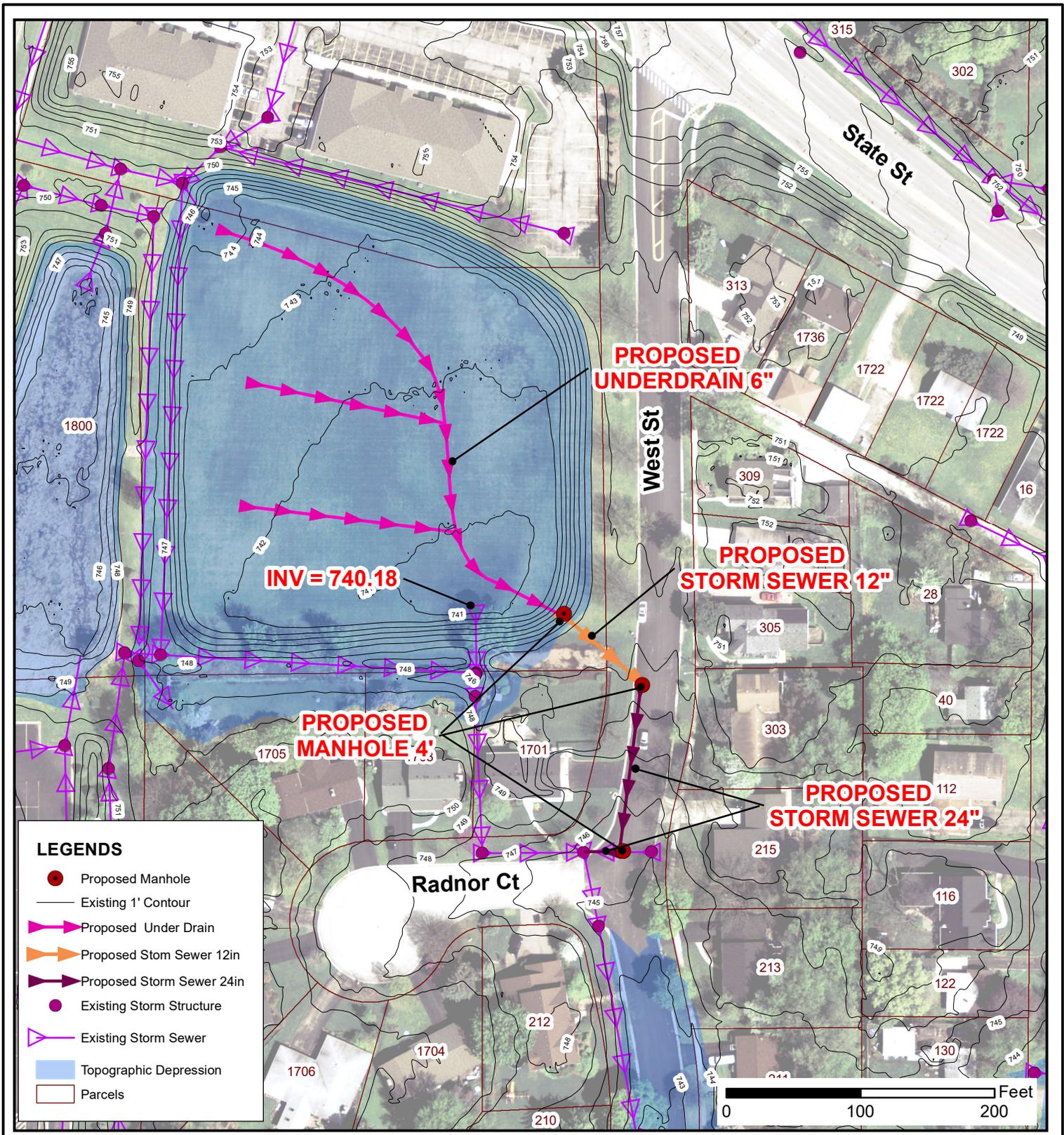
SUBTOTAL	\$290,550
25% CONTINGENCY	\$72,638
<b>CONSTRUCTION TOTAL</b>	<b>\$363,188</b>
ENGINEERING & PERMITTING	\$43,583
CONSTRUCTION ENGINEERING	\$43,583
<b>GRAND TOTAL</b>	<b>\$450,353</b>
<b>CAPITAL BUDGET</b>	<b>\$451,000</b>

\* Storm sewer is anticipated to be constructed at the same time as a roadway pavement maintenance project. Surface, level binder and primary traffic control by others

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC LATERAL	FOOT	588	\$50	\$29,400
2	PAVEMENT PATCH	SQ YD	39	\$100	\$3,900
3	TRAFFIC CONTROL	LSUM	1	\$15,000	\$15,000
4	RESTORATION-LANDSCAPE	SQ YD	1307	\$15	\$19,600
5	INLETS, 2' DIA	EACH	4	\$2,500	\$10,000
6	MANHOLES, 4' DIA	EACH	3	\$5,000	\$15,000

**Table 27-** Concept Cost Estimate - Maple Sherman Area  
(Recommendation C)

SUBTOTAL	\$92,900
25% CONTINGENCY	\$23,225
<b>CONSTRUCTION TOTAL</b>	<b>\$116,125</b>
ENGINEERING & PERMITTING	\$13,935
CONSTRUCTION ENGINEERING	\$13,935
<b>GRAND TOTAL</b>	<b>\$143,995</b>
CAPITAL BUDGET	\$144,000



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          WEST STREET BASIN          ALTERNATIVE 1</b>	DATE			
		04-12-2022			

Figure 36- Drainage Improvements - Maple Sherman Area (Alternative 1)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 24" RCP	FOOT	142	\$120	\$17,040
2	STORM SEWER, 6" UNDERDRAIN	FOOT	715	\$20	\$14,300
3	RESTORATION - UNDERDRAIN TRENCH / BASIN ACCESS	LSUM	1	\$25,000	\$25,000
4	STORM SEWER, 12" RCP	FOOT	76	\$80	\$6,080
5	PAVEMENT PATCH (6" HMA BASE)*	SQ YD	157	\$100	\$15,700
6	TRAFFIC CONTROL	LSUM	1	\$10,000	\$10,000
7	TRENCH BACKFILL	CU YD	147	\$60	\$8,820
8	MANHOLES, 4' DIA	EACH	3	\$5,000	\$15,000
9	REMOVE AND REPLACE CURB AND GUTTER	FOOT	20	\$60	\$1,200

**Table 28- Concept Cost Estimate - Maple Sherman Area**  
(Recommendation D - Alternative 1)

	SUBTOTAL	\$113,140
	25% CONTINGENCY	\$28,285
	<b>CONSTRUCTION TOTAL</b>	<b>\$141,425</b>
	ENGINEERING & PERMITTING	\$16,971
	CONSTRUCTION ENGINEERING	\$16,971
	<b>GRAND TOTAL</b>	<b>\$175,367</b>
	CAPITAL BUDGET	\$176,000

## 5.16 Study Area 16 - Miller Road

Miller Road is a local roadway west of Randall Road serving Randall Square Shopping Center Units 1 & 2 as well as a variety of Randall Square single and multi-family subdivisions and the Wildwood Subdivision (single family residential) at the far south and west end of Miller Road. There are several drainage concerns in this area related to roadway and yard inundation during heavy rainfall events. The drainage concerns include: 1) Inundation of Miller Road at a sag location which is the only access point to 46 houses within Wildwood Subdivision, 2) ponding water in rear yards adjacent to the Miller Road stormwater basin servicing the single family and commercial development, and 3) ponding water in rear yards within the Wildwood Subdivision adjacent to an agricultural field.

The roadway sag in Miller Road at the Wildwood Subdivision is drained by a storm sewer discharging to the Miller Road stormwater basin located east of Miller Road and at the west terminus of Gleneagle Drive. The Miller Road Stormwater basin east of the sag has an emergency overland flow route along Gleneagle Drive which then flows south to Randall Road. The causes of the ponding of the roadway sag include undersized storm sewer draining the sag to the Miller Road stormwater basin, and also that the roadway sag is 0.6 feet lower than the emergency overland flow route from the Miller Road stormwater basin. When the Miller Road stormwater basin fills to capacity, the roadway sag will be inundated. The 18-inch diameter pipe at the sag currently conveys runoff from the upstream tributary area of 55 acres which includes 23 acres of undeveloped offsite area to the west. By today's standards the 18-inch pipe is undersized to provide a 10-year level of service. Three proposed alternatives were analyzed to increase the capacity of the storm sewer, and two alternatives were analyzed to reduce ponding by lowering the emergency overland flow route.

In order to minimize ponding of water in the rear yards of the homes at the far west end of Miller Road adjacent to the agricultural field, two alternatives were analyzed including increasing conveyance with storm sewer improvements and control / containment adjacent to the residential areas.

The recommended alternatives for the Miller Road DSA are:

1. Gleneagle Drive: Reconstruct and lower the Gleneagle Drive overflow route. This is the preferred alternative since it alleviates ponding in Miller Road and increases the freeboard between the overtopping elevation and the low openings of the structures adjacent to the pond. The conceptual cost for this alternative is **\$351,000**.
2. Miller Road Culvert Improvements: Replace the existing 18-inch storm sewer at the Wildwood Subdivision sag in Miller Road with a 6'W x 2'H reinforced concrete box culvert (RCBC). This is the preferred alternative since it has the smallest development footprint with minimal increase in cost. The conceptual cost for this alternative is **\$241,000**.
3. Wildwood Berm: Construct a berm at the west end of the Wildwood Subdivision to isolate the ponding during heavy rainfall events in the adjacent agricultural field. The conceptual cost of this alternative is **\$252,000**.

## Issues

### Miller Road

During intense rainfall events, ponding occurs at a sag location on Miller Road south of Berkshire Drive. The ponding creates an overflow condition that impedes access to the far south and west end of Miller Road and is the only access to 46 houses within Wildwood Subdivision. The City has taken steps to reduce ponding by eliminating barrier curb at the sag and regrading the overland flow route from the sag to the basin. However, concerns with the depth and frequency of inundation remain. The roadway sag drains to the Miller Road stormwater basin directly east of Miller Road and at the west terminus of Gleneagle Drive. The emergency overland flow route from the detention pond is eastward along Gleneagle Drive to Randall Road where flow continues south. Ultimately flow continues east crossing Randall Road into the Eaglebrook Subdivision where it discharges to Mill Creek.

Additional concerns relate to the elevation of the emergency overflow route from the Miller Road stormwater basin as it related to adjacent structures and the sag in Miller Road. The overflow elevation could be a limiting factor in conveyance from the sag as well as building protection. Residents along Miller Road which back up to the Miller Road stormwater basin have raised concerns with standing water in their back yards and near foundations. Reports of water entering structures was not noted in the May 2020 storm event.

### Miller Road / Agricultural Field

Concerns have been raised by residents at the west end of Miller Road which lie adjacent to the undeveloped agricultural field to the west. Reports indicate that during heavy rainfall storm events, water collects debris and ponds in the field behind their house. Ultimately this causes an overflow condition through the subdivision resulting in standing water and debris on their lots.

## Analysis

WBK utilized City of Geneva storm sewer GIS data, Kane County one foot topo, and surveyed topography of Miller Road, Gleneagle Drive, storm sewer and structure low openings to evaluate function of the drainage system, the roadway, and the Miller Road stormwater basin.

A HEC-HMS model was developed for the drainage areas to the Miller Road stormwater basin, agricultural field to the west, and the roadway sag, to determine peak discharges to the roadway and storm sewer system, and peak water elevations. The model included SCS Curve Numbers, time of concentrations, SCS unit hydrographs, and Bulletin 75 rainfall data to calculate 2, 10, 50, 100, and 500- year peak discharges. Based on the modeling results, and survey data, the following conclusions were developed.

- » The Miller Road stormwater basin overtops in the less than 100-year event.
- » The overtopping occurs for a maximum of 6 hours at a maximum depth of approximately 0.5 ft in Gleneagle Drive.
- » The elevations of the low openings of the structures adjacent to the Miller Road stormwater basin are higher than the emergency overland flow route.
- » The capacity of the storm sewer draining the roadway sag is less than the 10-year peak discharge from the tributary area and only conveys 10% of the required discharge.
- » The storm sewer draining the agricultural field (12-inch) is undersized for the tributary area and only conveys 14% of the 10-year discharge, and 8% of the 100-year discharge. A 24-inch storm sewer would be required to convey the 10-year discharge from the agricultural depression.

Please note these evaluations utilize Bulletin 75 rainfall data which is greater than the rainfall data used in the design of subdivision improvements at the time.

## Proposed Alternatives

### Roadway Sag

The ponding of water in the roadway sag is caused by two primary factors: inadequate capacity of the storm sewer, and the roadway being lower in elevation than the emergency overland flow route from the Miller Road stormwater basin. The undersized storm sewer causes the flooding during the lower more frequent storm events whereas the overland flow route issue is the cause during large storm events when the Miller Road stormwater basin fills to capacity.

### Overland Flood Route

Two alternatives are possible for alleviating the flooding of the roadway sag due to the elevation difference between the sag, and the emergency overtopping elevations:

1. Re-profile Miller Road to raise the low point in the roadway at or above the elevation of the emergency overland flow route elevation which will require removal and replacement of the roadway, curb and gutter, several driveway aprons, and installation of storm sewer to drain the parkways. This conceptual cost for this alternative is **\$300,000**. Note: This was not a preferred alternative.
2. Re-profile Gleneagle Drive to lower the emergency overflow elevation of the Miller Road stormwater basin to equal the low elevation of the Miller Road sag at the roadway centerline. This alternative will require installing an additional low point in the Gleneagle Drive to lower the roadway peak elevation. In addition to the benefit of alleviating roadway inundation, it also increases the freeboard between the emergency overflow elevation of the Miller Road stormwater basin and the low openings of the structures adjacent to the basin. One challenge with this alternative is that Gleneagle Drive and Merchants Drive are the primary service drives from Randall Road to the commercial businesses along Randall. Disruptions to traffic will be significant during construction. The conceptual cost for this alternative is **\$351,000**.

### Storm Sewer

Alternatives for replacing the undersized storm sewer draining the Miller Road sag to the Gleneagle stormwater basin (GSB) are based on improvements which will provide a 10-year level of service Alternatives evaluated include:

1. Replace the existing 18-inch storm sewer with 543 LF of 6'W x 2'H RCBC.
2. Replace the existing 18-inch storm sewer (1,400 LF) with 3- 27-inch diameter storm sewers.

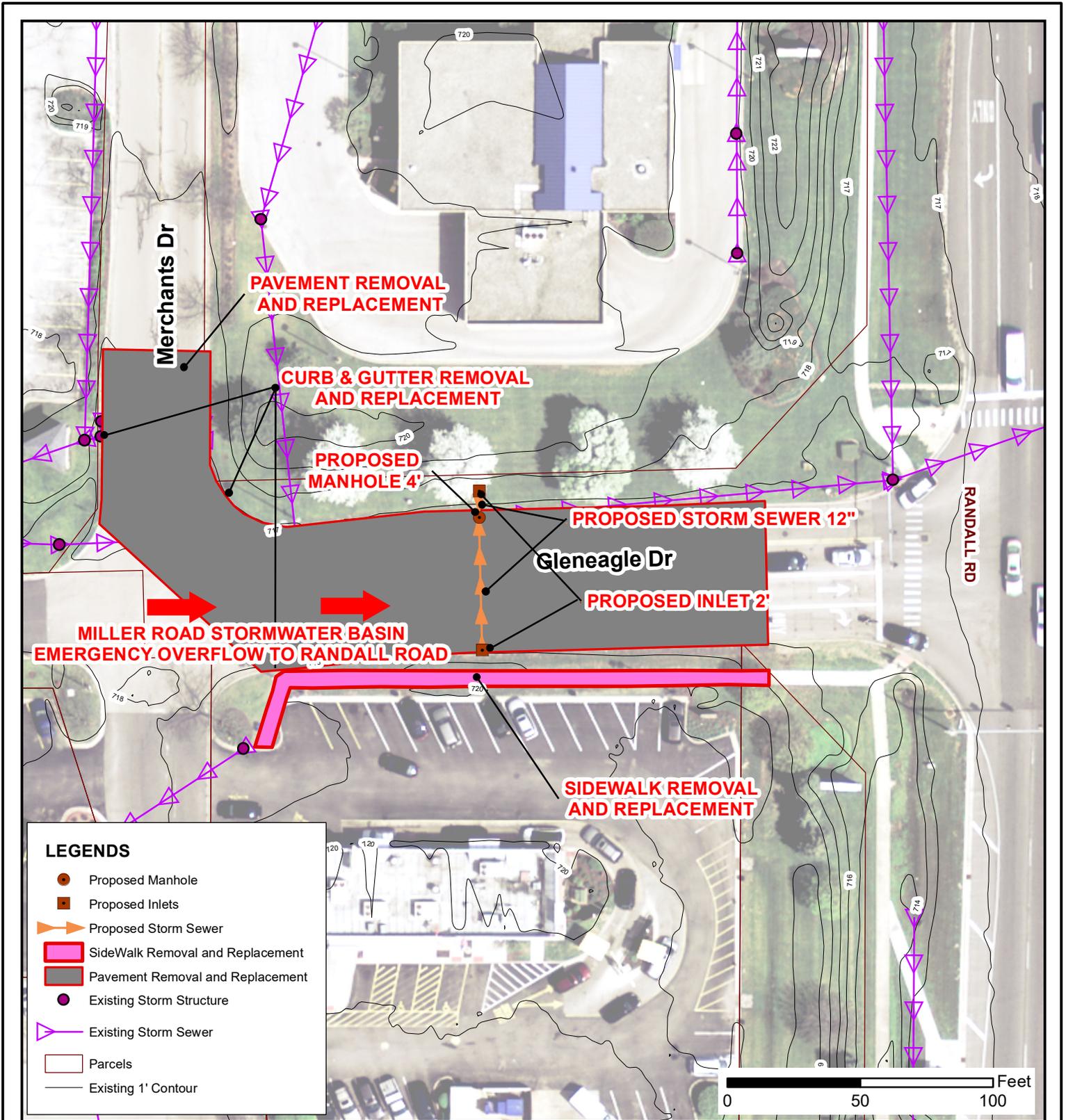
The conceptual estimate of cost for Options 1 and 2 are **\$241,000**, and **\$300,000**, respectively.

### Miller Road / Wildwood Berm

Two alternatives were reviewed to alleviate the ponding and overflow issues in the rear yards adjacent to the agricultural field within the Wildwood Subdivision. These include:

1. Reconstruction of the storm sewer from the agricultural field to the Miller Road Sag. This alternative would require replacement of approximately 550 LF of storm sewer through back yards of the residential homes. Due to this extensive disruption to residents and difficulty of construction, this alternative was not evaluated in detail.
2. Construction of a berm where the agricultural field drains to Wildwood Subdivision to isolate the ponding from the residential properties. This would require construction of 550 LF of berm, and extension of the existing storm sewer. The berm would temporarily inundate the agricultural field but eventually drain to conditions that exist today. The berm elevation is established to control the 100 year event within the agricultural field expanding the storage volume from 1.1 acre-feet to 3.9 acre-feet. Since this field is not owned by the City, approval and potentially an easement would be required from the property owner for this improvement to be constructed. The conceptual cost for this alternative is **\$252,000**.

Any future development of the agricultural field will require construction of a detention basin which would attenuate and restrict the discharge from the offsite area and may resolve the concerns of the residents. The restricted release from future development would reduce flows to the Wildwood subdivision storm sewer system.



SOURCE:

SCALE: 1" = 50'

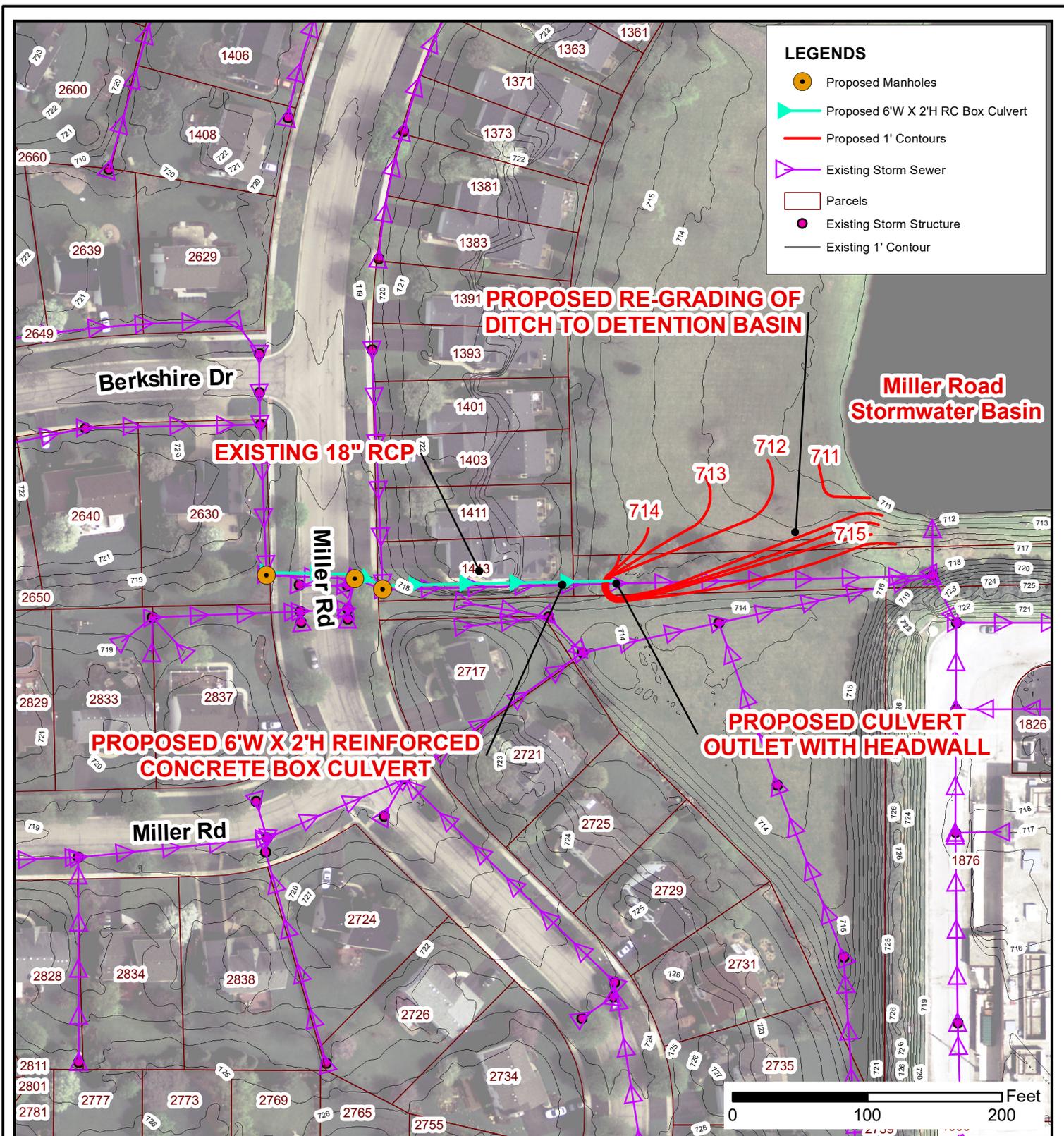
CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>MILLER ROAD          GLENEAGLE DRIVE RECONSTRUCTION</b>	DATE			
		04-12-2022			

Figure 37- Drainage Improvements - Miller Road (Gleneagle Drive)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	PAVEMENT REMOVAL	SQ YD	1636	\$16	\$26,176
2	EARTH EXCAVATION	CU YD	300	\$30	\$9,000
3	HOT-MIX ASPHALT SURFACE COURSE, 2"	TON	188	\$95	\$17,860
4	HOT-MIX ASPHALT BINDER COURSE, 3"	TON	282	\$90	\$25,380
5	AGGREGATE BASE COURSE MATERIALS, TYPE A, 12"	SQ YD	1636	\$20	\$32,720
6	REMOVE AND REPLACE CURB AND GUTTER	FOOT	527	\$35	\$18,445
7	STORM SEWER, 12" RCP	FOOT	54	\$80	\$4,320
8	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
9	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
10	RESTORATION	LSUM	1	\$15,000	\$15,000
11	TRAFFIC CONTROL	LSUM	1	\$30,000	\$30,000
12	TRAFFIC SIGNAL LOOPS & COORD	LSUM	1	\$8,000	\$8,000
13	MISC UTILITY ADJUSTMENTS	LSUM	1	\$20,000	\$20,000
14	REMOVE AND REPLACE SIDEWALK	SQ FT	1234	\$15	\$18,510

Table 29- Concept Cost Estimate - Miller Road (Gleneagle Drive)

SUBTOTAL	\$235,411
25% CONTINGENCY	\$58,853
<b>CONSTRUCTION TOTAL</b>	<b>\$294,264</b>
ENGINEERING & PERMITTING	\$28,000
CONSTRUCTION ENGINEERING	\$28,000
<b>GRAND TOTAL</b>	<b>\$350,264</b>
CAPITAL BUDGET	\$351,000



SOURCE:

SCALE: 1" = 100'

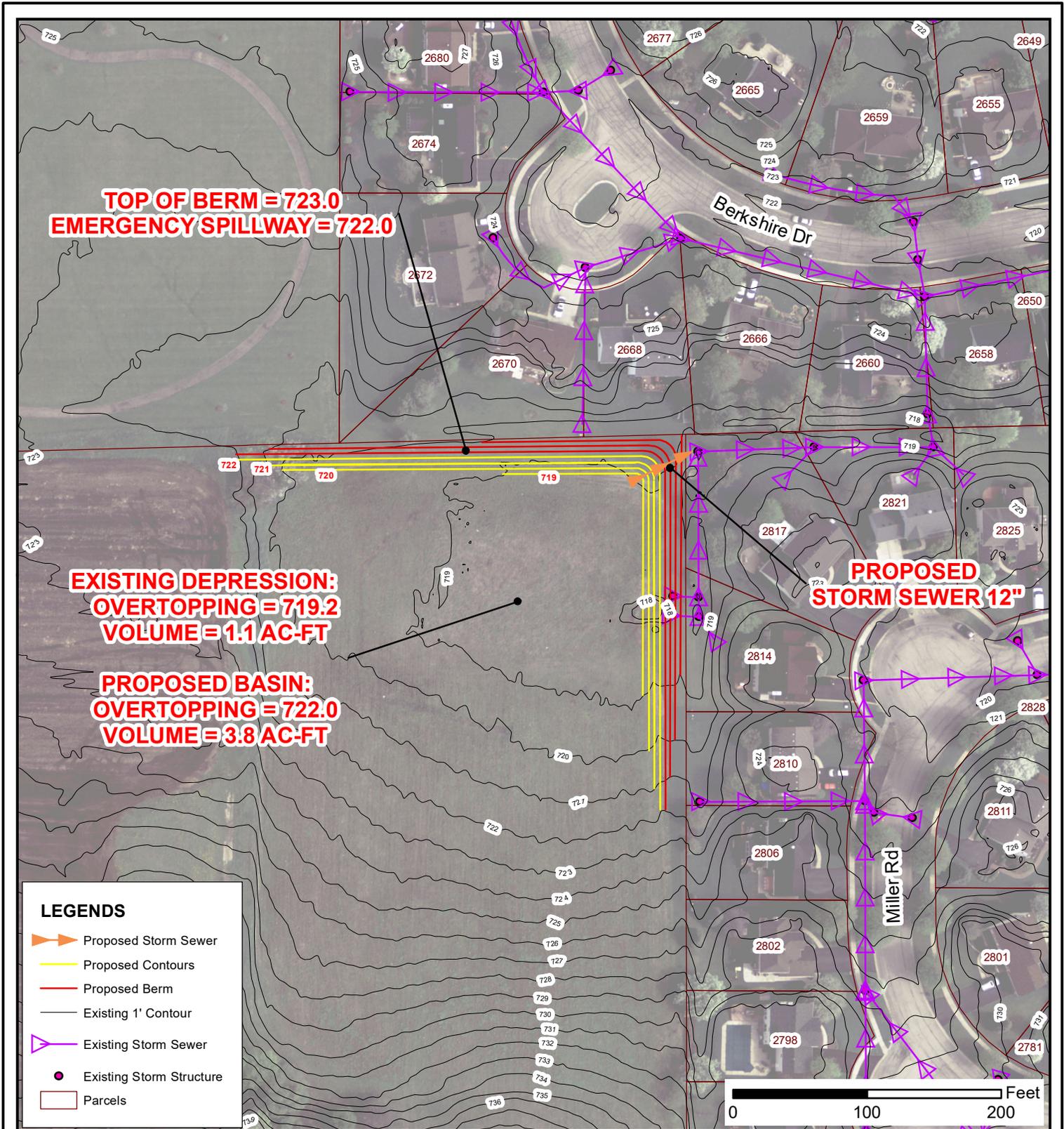
CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>MILLER ROAD CULVERT IMPROVEMENTS</b>				DATE
					<b>EXHIBIT</b>

Figure 38- Drainage Improvements - Miller Road (Culvert Improvements)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	TRAFFIC CONTROL	LSUM	1	\$8,000	\$8,000
2	STORM SEWER REMOVAL, 18"	FOOT	259	\$25	\$6,475
3	PAVEMENT PATCH	SQ YD	38	\$100	\$3,800
4	CONCRETE VAULT	EACH	3	\$10,000	\$30,000
5	6'W x 2'H REINFORCED CONCRETE BOX CULVERT	FOOT	259	\$300	\$77,700
6	RESTORATION	SQ YD	576	\$15	\$8,640
7	PRECAST BOX END SECTION W/ GRATE	EACH	1	\$8,000	\$8,000
8	REMOVE AND REPLACE CURB AND GUTTER	FOOT	60	\$60	\$3,600
9	REMOVE AND REPLACE SIDEWALK	SQ FT	300	\$15	\$4,500
10	GRADING AND SHAPING SWALE	FOOT	200	\$50	\$10,000

**Table 30-** Concept Cost Estimate - Miller Road (Culvert Improvements)

SUBTOTAL	\$160,715
25% CONTINGENCY	\$40,179
<b>CONSTRUCTION TOTAL</b>	<b>\$200,894</b>
ENGINEERING & PERMITTING	\$20,000
CONSTRUCTION ENGINEERING	\$20,000
<b>GRAND TOTAL</b>	<b>\$240,894</b>
CAPITAL BUDGET	\$241,000



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	GC
		JOB#		19-0206	
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>MILLER ROAD WILDWOOD BERM</b>	DATE			
		EXHIBIT			

Figure 39- Drainage Improvements - Miller Road (Wildwood Berm)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	EARTH WORK	CU YD	6000	\$25	\$150,000
2	STORM SEWER, 12" RCP	FOOT	50	\$80	\$4,000
3	PERIMETER EROSION BARRIER	FOOT	700	\$4	\$2,450
4	RESTORATION & SEEDING	LSUM	1	\$15,000	\$15,000
5	FLARED END SECTION, 12"	EACH	1	\$1,500	\$1,500

**Table 31- Concept Cost Estimate - Miller Road (Wildwood Berm)**

	SUBTOTAL	\$172,950
	25% CONTINGENCY	\$43,238
	<b>CONSTRUCTION TOTAL</b>	<b>\$216,188</b>
	ENGINEERING & PERMITTING	\$20,000
	CONSTRUCTION ENGINEERING	\$15,000
	<b>GRAND TOTAL</b>	<b>\$251,188</b>
	<b>CAPITAL BUDGET</b>	<b>\$252,000</b>

### 5.17 Study Area 17 - Oakwood Drive

Several residents along Oakwood Drive noted ponding water and water against their foundation in the 2020 storm event. Their lots back up to a ComEd utility open area south of Woodward Avenue, which includes high power lines. The area within the ComEd Easement area is flat with no well-defined drainage pattern. To alleviate the standing water, it is recommended to install a storm sewer lateral from East Side Drive to the ComEd easement area with inlets to accept stormwater runoff. Approval from ComEd would be required for installation of the storm sewer.

Total estimated construction cost for the recommended improvement is **\$124,000**.

#### Issue

A large flat area between Woodward Avenue and Oakwood Drive within a ComEd parcel lacks a well-defined outlet leads to ponding water within the rear yards of residential lots along Oakwood Drive during intense storm events.

#### Analysis

The Kane County GIS topographic data was used to determine the tributary area and drainage pattern at the location. A hydrologic analysis of the tributary area to the flat area was performed using the Rational Method to determine peak runoff discharges to the rear yard. Inputs into the program included C value, Bulletin 75 rainfall intensity, and drainage area. The peak 10-year discharge from the 3.0 acre drainage area is 3.0 cfs. A topographic survey of the storm sewer within East Side Drive right of way was performed in summer of 2021 and was found to be of adequate depth to provide a lateral deep enough to drain the low area.

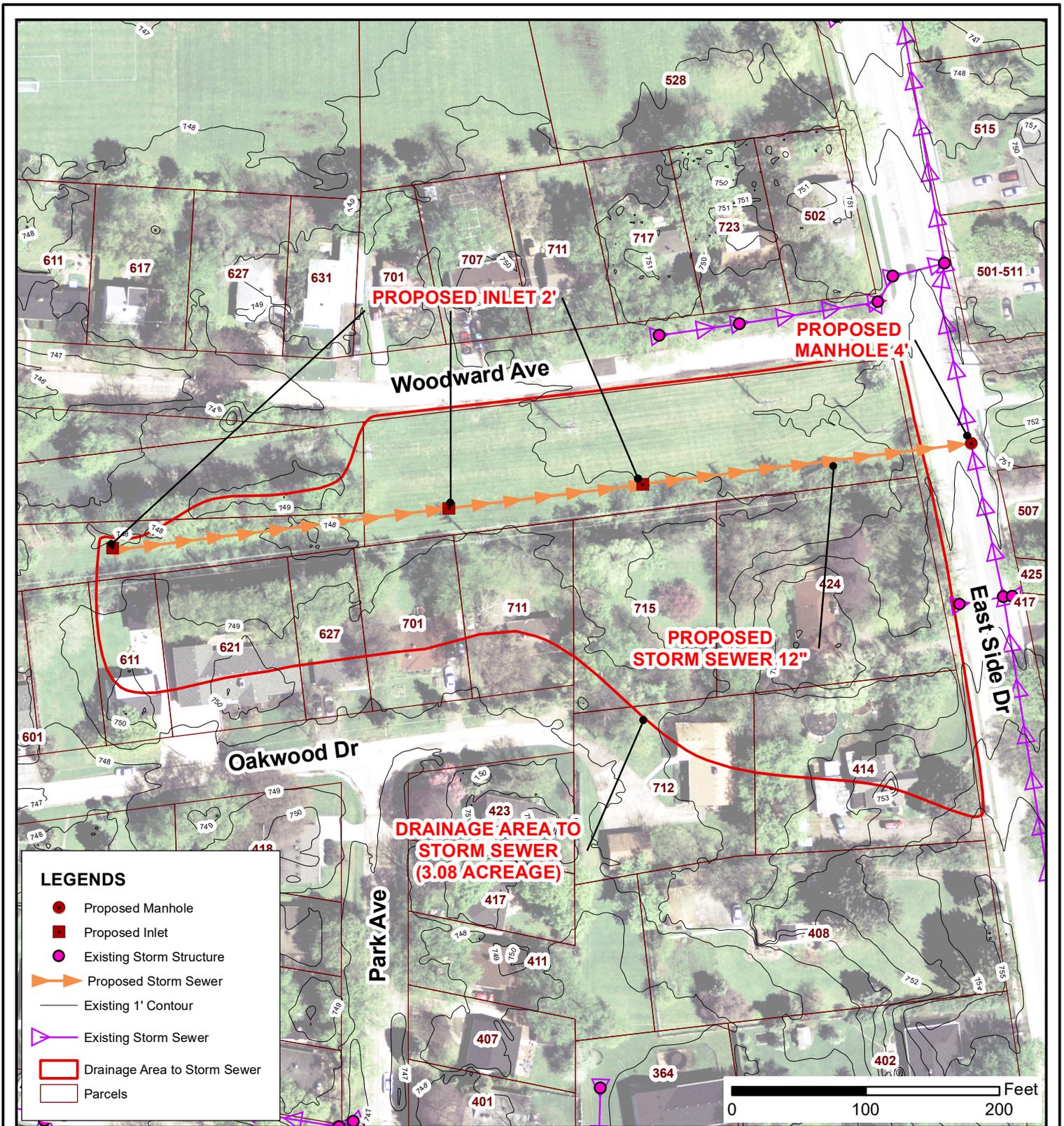
A second alternative was investigated which included grading of a swale from the culvert under School Street approximately 800 feet to the east to drain the flat area. This option would require disturbing more area, deeper cuts with possible material haul off, and tree removal. Due to these factors, this option was not the preferred alternative.

#### Results

The storm sewer along East Side Drive is of sufficient depth for installation of a storm sewer within the ComEd easement area. It was estimated that a 12-inch diameter storm sewer would be sufficient to convey the 10-year runoff from the tributary area. It is anticipated that several storm inlets would be installed to drain the flat area and also provide outlet points for sump pump discharge lines from the residential lots along Oakwood Drive.

#### Recommended Improvement

Install 12-inch diameter storm sewer lateral from East Side Drive to the ComEd parcel south of Woodward Avenue to drain the flat area within the easement. The proposed cost for this recommended improvement is **\$124,000**.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS OAKWOOD EAST</b>	DATE			
		04-12-2022			

Figure 40- Drainage Improvements - Oakwood Drive (East)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	646	\$80	\$51,680
2	INLET, 2' DIA	EACH	3	\$2,500	\$7,500
3	RESTORATION	LSUM	1	\$12,000	\$12,000
4	REMOVE AND REPLACE CURB AND GUTTER	FOOT	40	\$60	\$2,400
5	REMOVE AND REPLACE SIDEWALK	SQ FT	150	\$15	\$2,250
6	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
7	PAVEMENT PATCH (6" HMA BASE)	SQ YD	30	\$100	\$3,000
8	TRAFFIC CONTROL	LSUM	1	\$5,000	\$5,000

Table 32- Concept Cost Estimate - Oakwood Drive - East

	SUBTOTAL	\$88,830
	25% CONTINGENCY	\$22,208
	<b>CONSTRUCTION TOTAL</b>	<b>\$111,038</b>
	ENGINEERING & PERMITTING	\$8,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$123,038</b>
	CAPITAL BUDGET	\$124,000

The resident of lot 431 located along Oakwood Drive noted ponding water and water against their foundation in the 2020 storm event. The lots back up to a poorly defined swale on ComEd property that drains to a culvert located underneath School Street. To alleviate the standing water at the backyard of the house, it is recommended to regrade the swale into a trapezoidal channel to properly drain the stormwater runoff from the backyard of the lot 431.

Total estimated construction cost for the recommended solution is **\$37,000**.

### **Issue**

The poorly defined swale lacks a well-defined drainage way leading to ponding water within the rear yards of residential lot 431 along Oakwood Drive during intense storm events.

### **Analysis**

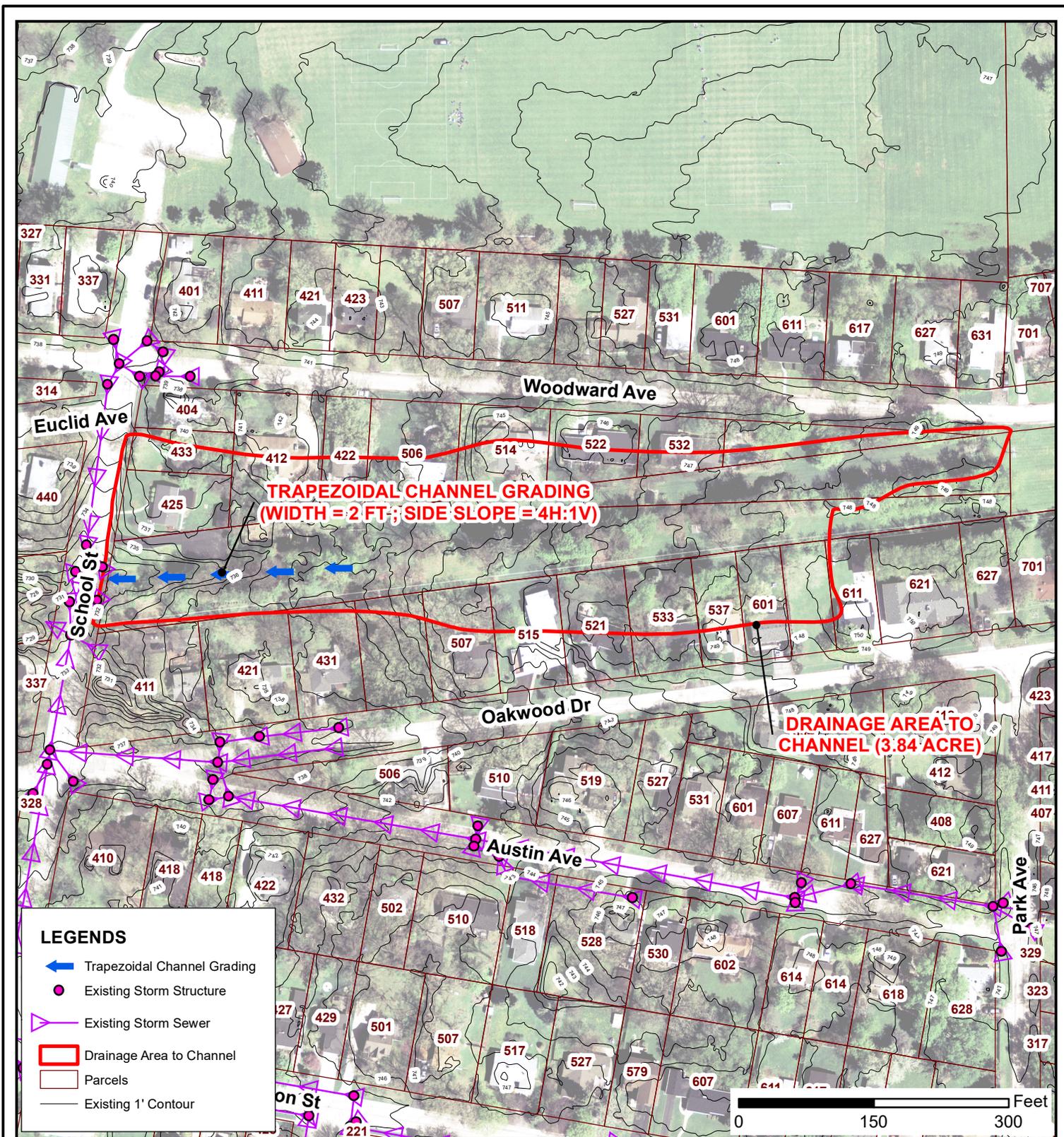
The Kane County GIS topographic data was used to determine the tributary area and drainage pattern at the location. A hydrologic analysis of the tributary area to the flat area was performed using the Rational Method to determine peak runoff discharges to the rear yard. Inputs into the program included C value, Bulletin 75 rainfall intensity, and drainage area. The peak 10-year discharge from the 3.85 acre drainage area is 4.5 cfs. A hydrologic analysis performed using the hydraulic toolbox depicts the construction of trapezoidal channel approximately 800-feet to the east to drain the flat area with the base width of 2 ft and side slope of 4h:1V. The drainage improvements would also require possible material haul off, and tree removal.

### **Results**

The analysis resulted in the regrading of existing swale in between Oakwood Drive and Woodward Avenue. It was estimated that a 2 ft bottom width, 4H:1V side slope, 300-foot long trapezoidal channel would be sufficient to convey the 10-year runoff from the tributary area towards the culvert on School Street. It is anticipated that tree removal would also be required to drain the flat area and also provide outlet points for sump pump discharge lines from the residential lots.

### **Recommended Solution**

Regrade the existing swale present on ComEd property to properly drain the flat area adjacent to Lot 431 Oakwood Dr. The proposed cost for this recommended improvement is **\$37,000**.



SOURCE:

SCALE: 1" = 150'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#		19-0206	
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS OAKWOOD - SCHOOL STREET</b>	DATE			
		EXHIBIT			

Figure 41- Drainage Improvements - Oakwood Drive (School Street)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	GRADING AND SHAPING SWALES	FOOT	300	\$50	\$15,000
2	TREE REMOVAL	LSUM	1	\$3,000	\$3,000
3	RESTORATION	SQ YD	1	\$3,000	\$3,000

**Table 33-** Concept Cost Estimate - Oakwood Drive - School Street

SUBTOTAL	\$21,000
25% CONTINGENCY	\$5,250
<b>CONSTRUCTION TOTAL</b>	<b>\$26,250</b>
ENGINEERING & PERMITTING	\$6,000
CONSTRUCTION ENGINEERING	\$4,000
<b>GRAND TOTAL</b>	<b>\$36,250</b>
<b>CAPITAL BUDGET</b>	<b>\$37,000</b>

### 5.18 Study Area 18 - Pheasant Run Place

This drainage study area consists of two areas of concern in relative proximity to each other. The first is a stormwater basin east of Pheasant Run Place and the second is along Fargo Boulevard.

A stormwater basin within the rear yards of several single family lots along Pheasant Run Place experiences extended inundation and prolonged overland runoff from the north during large storm events. The Pheasant Run stormwater basin receives direct runoff from 16.1 acres adjacent to Western Avenue School and from storm sewer discharge draining 12.7 acres of residential properties west of the stormwater basin and north of the Houghton Mifflin site. Additionally, 6.6 acres from the Houghton Mifflin site is tributary to the stormwater basin. Discharge from the stormwater basin is controlled by a 10-inch diameter restrictor in the outlet storm sewer; which is undersized for the total tributary area. It was determined that the existing basin would require an additional six acre-feet of storage volume to prevent it from overtopping in a 100-year event. An abandoned railroad embankment runs north to south along the rear property lines and continues to the north from the Pheasant Run Place lots.

Proposed stormwater improvements investigated for the Pheasant Run Basin include; adding additional storage in the green space behind Houghton Mifflin building, re-directing the storm sewer outfall from residential area to the east to the green space behind Houghton Mifflin, and adding a storm sewer extension and inlets to drain the undeveloped area north of the basin (old railroad right-of-way) to better manage low flows into the existing storm sewer network.

The recommended improvement for Pheasant Run Basin is adding a 12-inch dia. storm sewer extension from the basin underdrain to the north to convey runoff from the area to the north to the storm sewer system and reduce the overland flow from the north into the existing subdivision basin. Total estimated conceptual construction cost for the recommended improvement is **\$119,000**.

A second area of concern is an area along Fargo Boulevard adjacent to 1101 North Fargo Boulevard in the abandoned railroad right-of-way. This area is a closed depression which causes ponding water within the area during storm events and eventually overtop the front yard and sidewalk in front of 1101 North Fargo prior to draining to the Fargo Avenue right-of-way.

The proposed and recommended stormwater improvement for Fargo Boulevard is construction of a 12-inch diameter (92 L.F) storm sewer extension from the existing storm sewer in the south right-of-way of Fargo Boulevard to the depression area directly north of the north right-of-way of Fargo Boulevard adjacent to 1101 North Fargo. The conceptual cost for this improvement is **\$46,000**

The total estimated conceptual cost for both recommended improvements (**Pheasant Run Place and Fargo Boulevard**) is **\$165,000**.

## Issue

### Pheasant Run Place

Stormwater runoff from the adjacent residential lots along with direct runoff from Western Avenue School and the abandoned railroad embankment behind the school to the north results in prolonged overland runoff into the Northeast stormwater basin of Allendale Subdivision Unit #3 located in the rear yards of houses on Pheasant Run Place. The basin accepts direct runoff from; 16.1 acres of area adjacent to Western Avenue School and Pheasant Place lots, storm sewer discharge from an 18-inch storm sewer draining 12.7 acres of residential development to the north and east, and 6.6 acres of the Houghton Mifflin site directly to the east. The basin is drained by a 10-inch diameter restrictor pipe into a storm sewer that flows west to the storm sewer in Pheasant Run Place right-of-way. The former railroad right-of-way along the rear property line drains from north to south from Fargo Boulevard to the stormwater basin. The City recently installed a 6-inch drain from the railroad right-of-way north of the basin into the storm sewer in the basin as an initial effort to reduce the amount of runoff overtopping the north end of the basin. A very large volume of woody debris was observed in the swales on either side of the original railroad embankment which caused blockage of the recently installed drainage grate. During the 2020 storm event, water was observed overtopping the north end of the basin, and discharge from the 18-inch storm sewer was draining south from the outfall along the subdivision / Houghton Mifflin property line and then draining into the basin at the middle of the basin. A rock lined overflow from the north into the basin has been constructed by the residents to direct water away from the basin. Pictures of drainage during the event note standing water and debris in the railroad embankment north of the basin. Overall, a large amount of drainage area is tributary to the residential subdivision basin. No reports of water intrusion into the adjacent houses have been reported.

### Fargo Boulevard

A closed depression in the old railroad right-of-way north of Fargo Boulevard causes extended periods of standing water for the adjacent residents and occasional overtopping of the depression area across the front yard of 1101 Fargo Boulevard, sidewalk, and eventually into the Fargo Boulevard right-of-way.

## Analysis

### Pheasant Run Place

The Kane County GIS topographic data was used to determine the drainage patterns adjacent to the detention basin. Original engineering plans for the development (Allendale Subdivision Unit 3) were also provided from the City depicting the existing storm sewer, restrictor, pond, and house elevations, and proposed overland flow route(s). Also a topographic survey was performed in the summer of 2021 within the basin to determine the as-built elevations of the basin and overland flow routes. The survey indicates that the basin has two overtopping points, one to the west between the houses on Pheasant Run Place, and the second to the south to a swale on the west side of the original railroad embankment. The original subdivision grading plan indicated that the planned overland flow route is to the south approximately 2 feet below the elevations of the overtopping between the houses. Per the plan, the swale to the south was to be re-graded to allow for the lower overland flow route to the south. Per the survey, the elevations of the overland routes are approximately the same at 729.66 to the west between the houses, and 729.7 to the south, which seems to indicate that the swale was not regraded per the plan. However, since the primary issue reported is the off-site flow from the north and there are no reports of stormwater basin overtopping or structure flooding, regrading an overflow route was not pursued as a project element.

The City GIS data was also used to determine the adjacent storm sewer sizes and direction.

A hydrologic model (HEC-HMS) was prepared to simulate the basin and included the basin and areas tributary to the basin. The model included three drainage areas including a portion of the building of the Houghton Mifflin site, the subdivision north of Houghton Mifflin, and the residential lots of Pheasant Run Place, Railroad embankment and of Western Avenue school to the north. A stage discharge rating curve of the stormwater basin and also the depression in the green area behind the Houghton Mifflin building was also included to determine the elevation in the basins during different recurrence intervals. Bulletin 75 rainfall data was used to model the volume of runoff from the site, and from the tributary area to the basins. An existing conditions critical duration storm analysis was performed including the 2-, 6-, 12-, and 24-hour storms for the 10, 25, 50, and 100- year recurrence intervals. The model was used to determine the capacity of the existing system.

Proposed models were developed to determine the volume of storage required to contain the 100-year runoff from the tributary area without overtopping the existing basin, and also the effects of several proposed runoff reduction alternatives. These alternatives included: 1) provided additional detention storage in the green space behind the Houghton Mifflin building, 2) re-directing the discharge pipe from the residential subdivision to the north to the Houghton Mifflin green space. However the challenges related to redirecting flows or providing additional storage caused us to drop these alternatives from consideration and our final recommendation.

#### **Fargo Boulevard**

Inclusion of an inlet in the closed depressional area will allow water to drain from the depression and reduce the occurrence of ponding water and overtopping into the yard and across the existing sidewalk.

### **Results**

#### **Pheasant Run Place**

The results of the modeling indicate that approximately six acre-feet of additional storage would be required to contain the runoff from the tributary within the existing basin. Alternative 1 included excavation of the green space behind Houghton Mifflin to provide an additional 3.5 acre- feet of storage, which was the approximate maximum volume attainable. This alternative reduced the overtopping of the basin from all storm events (10, 25, 50, and 100) in the existing conditions to just the 100-year event. The conceptual cost for this alternative is approximately **\$298,000**. Note: This was not a preferred alternative.

Alternative 2 did not include any additional storage but conveyed the storm sewer runoff to the depressional area behind Houghton Mifflin instead of directly to the Pheasant Run Basin. The basis for this was to access the storage in the green space depressional area behind Houghton Mifflin prior to filling up the subdivision basin. In discussions with City staff, the 18-inch storm sewer original outfall was on the east side of the railroad embankment and discharge was conveyed to the Houghton Mifflin depressional area. The results of this modeling indicated that this alternative did not reduce the recurrence of overtopping of the subdivision basin. Since this alternative did not affect the overtopping, it was not considered and a conceptual cost was not determined.

Alternative 3 includes adding another 12-inch diameter storm sewer extensions from the basin storm sewer underdrain to additional inlets in the drainageway north of the detention pond to convey the runoff from the north directly to the basin storm sewer instead of overland to the north side of the basin. Multiple inlets are to be provided to allow redundancy for blockage of the existing grate from debris from the area (old railroad embankment). This alternative includes excavation of a stilling basin in the area to attenuate the discharge and assist in collecting debris. The basin would need to be located as to not disturb the existing power poles for the power lines that run through the area. The purpose of this alternative was to manage discharges and reduce the occurrence of overland flow routes rather than increase detention volume. The conceptual cost for this alternative is **\$119,000**. It should be noted that the 12-inch pipe size is larger than the basin restrictor (10-inch) and the existing underdrain pipe (8-inch). Even though the result could be a surcharge condition on the inlets at the bottom of the stormwater basin this solution would still mitigate surface overflows. This would also provide the ability to extend the 12-inch pipe to the basin outlet pipe (18-inch) in the future and have off-site flows bypass the basin altogether. At this time we are not recommending the bypass alternative since downstream impacts are uncertain.

Regardless of which alternative is chosen, annual woody debris removal in the abandon railroad embankment north of the basin is highly recommended to reduce the occurrence of water overtopping the north side of the basin from offsite areas and focusing the runoff to the storm sewer system instead of overland through rear yards. Considering there is an existing power line that runs north to south through this area, maintenance of the woody debris should be coordinated with maintenance and tree trimming/removal for the existing power line. Periodic inspection and maintenance of the existing underdrain inlet is also recommended. Accordingly, development of an access route for equipment along with an agreement from the School District is recommended.

### Proposed Drainage Improvement

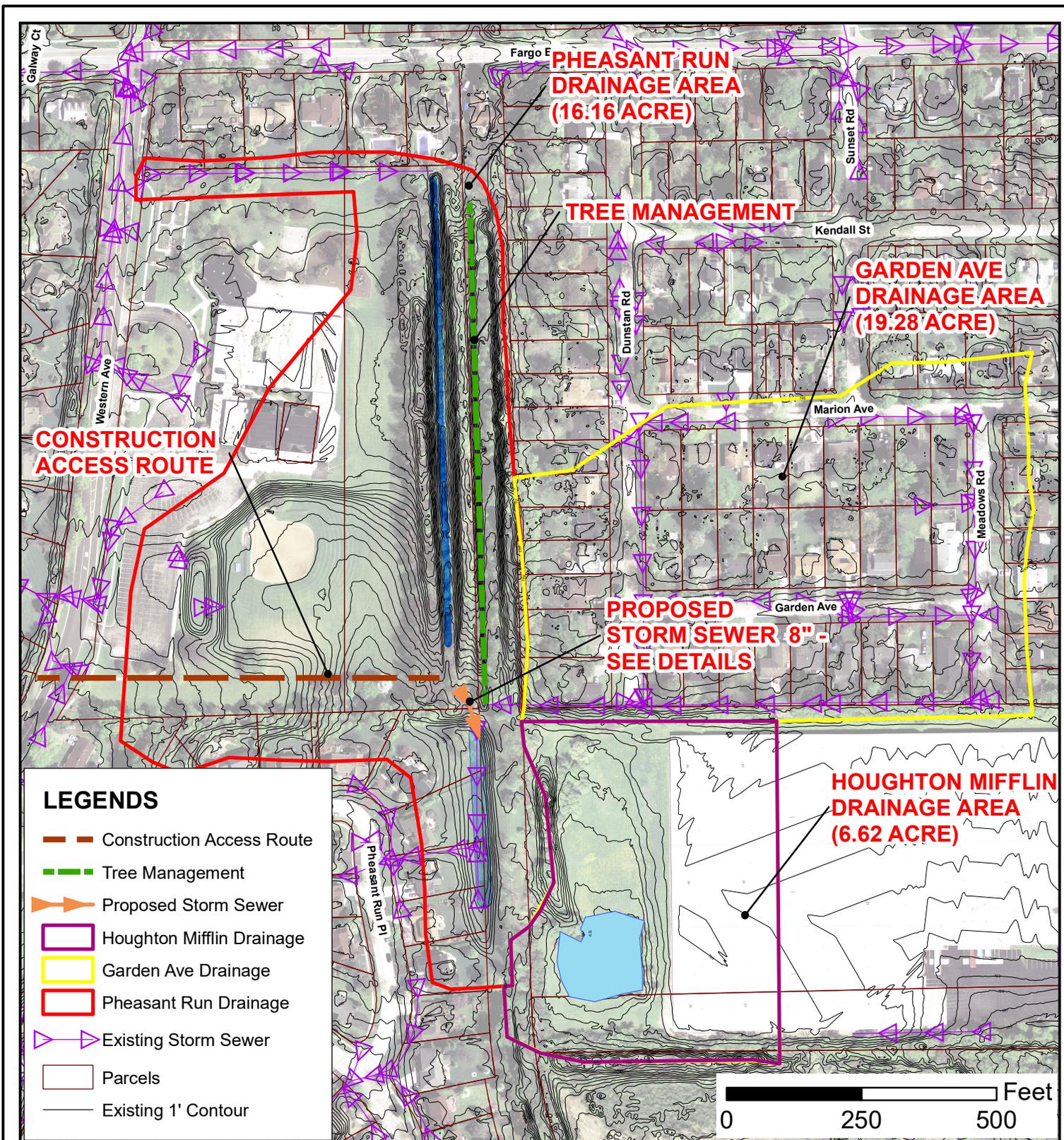
Considering the cost of stormwater storage alternatives and the difficulties associated with obtaining permission to construct a stormwater basin on private property compared to the benefits of reduced occurrence of overtopping of the basin, alternatives 1 and 2 were discarded.

Drainage issues raised from the 2020 storm event focused on water “overflowing” from the area to the north into the basin. Alternative 3 mitigates the occurrence of overtopping from the north by allowing water to utilize the existing underdrain within the stormwater basin. Considering the volume of woody debris observed in the drainageway north of the pond, along with the observance of the blocked grate of the recently installed storm sewer extension, the inclusion of an additional drain with multiple inlets with grates will provide redundancy in case the exiting grate(s) become clogged is the recommended alternative. Periodic maintenance of this area is highly recommended to clean the grates of debris and also manage and reduce the volume of woody debris from the drainage area to the north.

#### Fargo Boulevard

The proposed and recommended stormwater improvement for Fargo Boulevard is construction of a storm sewer extension from the storm sewer in the south right-of-way of Fargo Boulevard to the depression area directly north of the north right-of-way of Fargo Boulevard. The conceptual cost for this improvement is **\$46,000**.

The total estimated conceptual cost for both recommended improvements (Pheasant Run Place and Fargo Boulevard) is **\$165,000**.

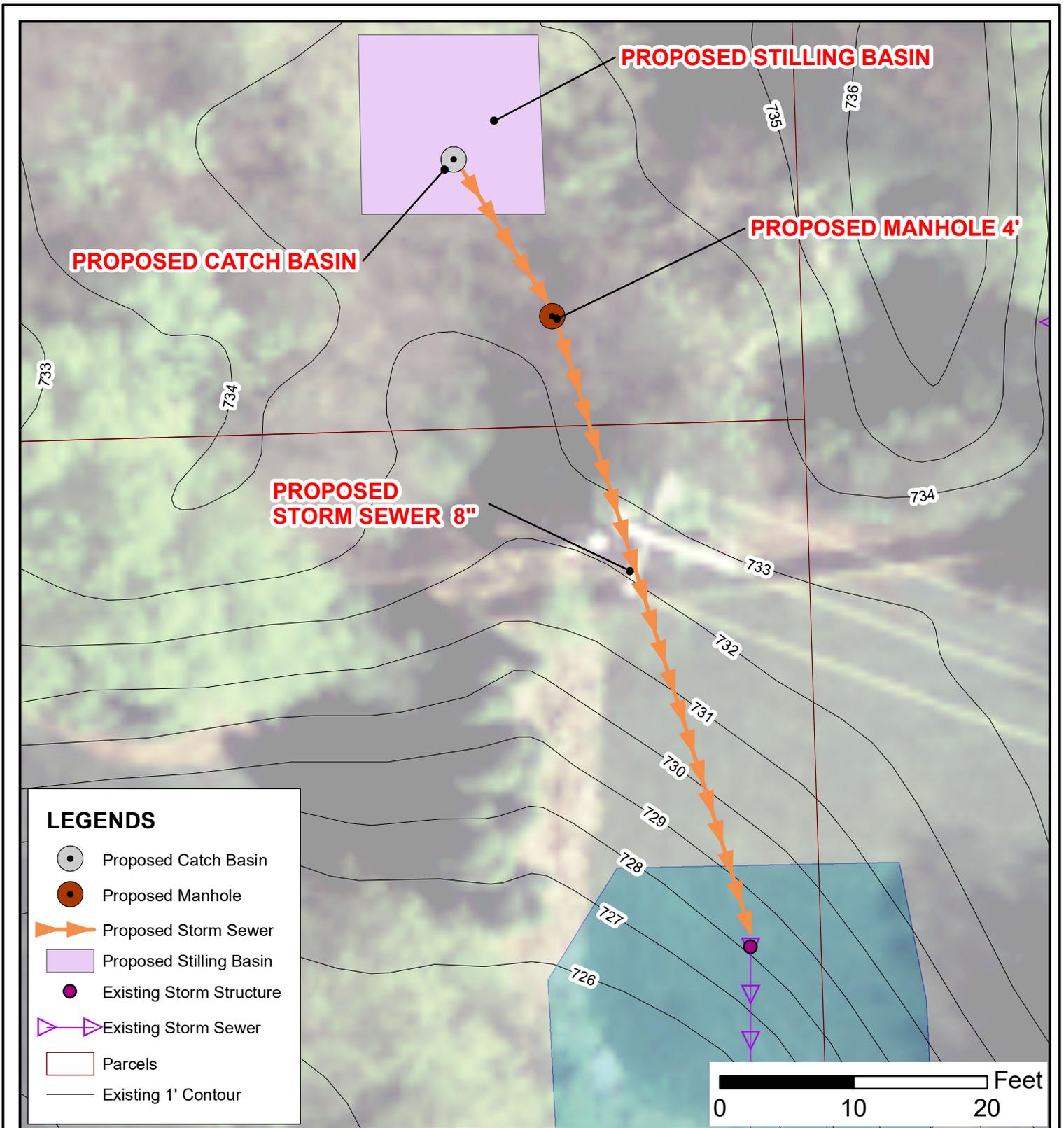


SOURCE:

SCALE: 1" = 250'

CLIENT <b>CITY OF GENEVA</b> 22 S. FIRST STREET GENEVA, IL 60134 630-232-7494	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	GJC
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          PHEASANT RUN PLACE</b>	DATE			
		4-12-2022			

Figure 42- Drainage Improvements - Pheasant Run Place



SOURCE:

SCALE: 1" = 10'

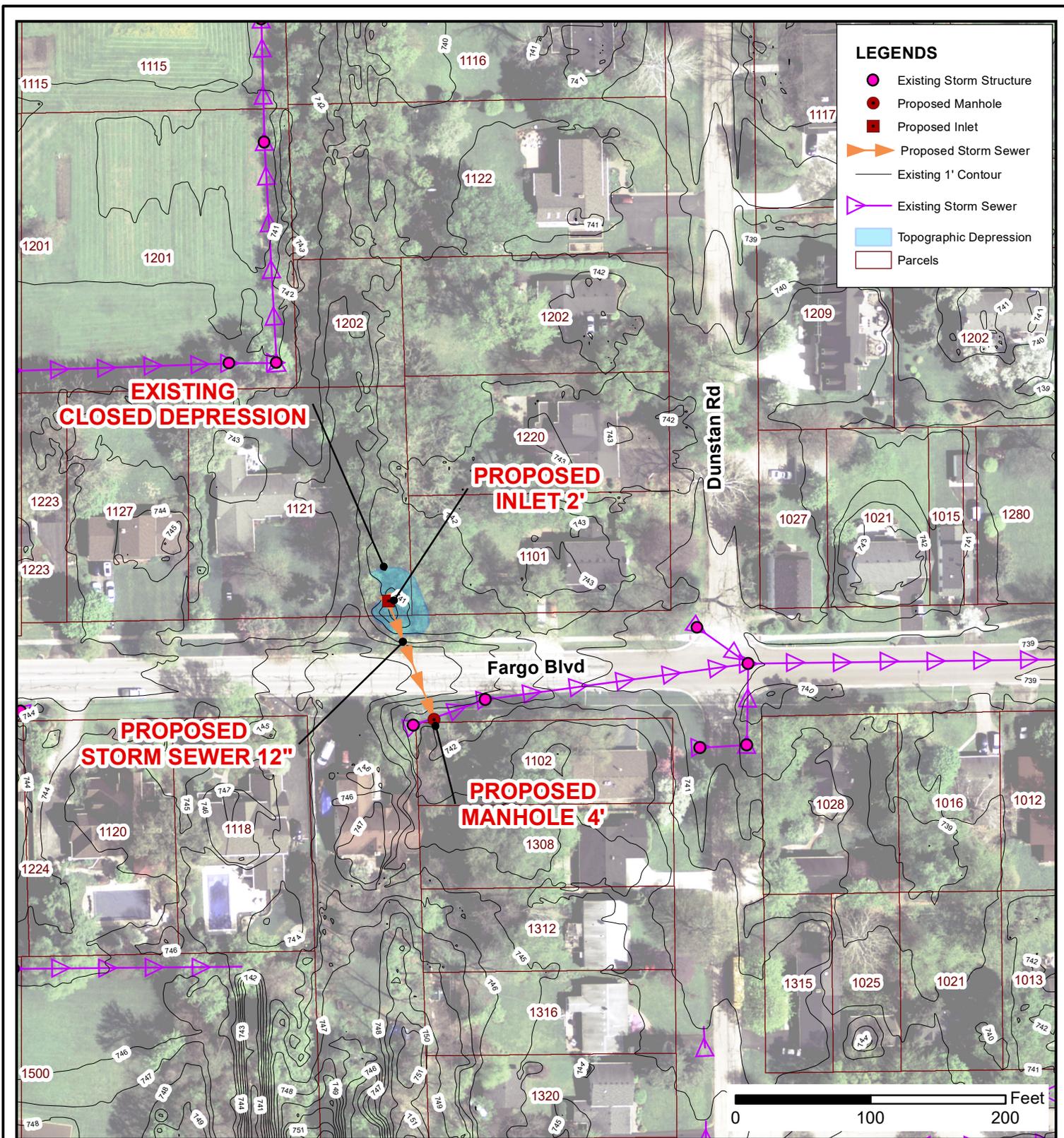
CLIENT <b>CITY OF GENEVA</b> 22 S. FIRST STREET GENEVA, IL 60134 630-232-7494	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	GJC
		JOB#			19-0206
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>PHEASANT RUN PLACE          PROPOSED ALTERNATIVE          DETAILS</b>	DATE			
		4-12-2022			

Figure 43- Drainage Improvements - Pheasant Run Place (Alternative)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 8" PVC	FOOT	100	\$80	\$8,000
2	CLEARING AND GRUBBING AND WOODY DEBRIS REMOVAL	LSUM	1	\$25,000	\$25,000
3	INLETS, 2' DIA HIGH CAPACITY GRATE	EACH	2	\$3,500	\$7,000
4	CONNECTION TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
5	GRADING AND SHAPING-STILLING BASIN	LSUM	1	\$20,000	\$20,000
6	RESTORATION	LSUM	1	\$15,000	\$15,000

**Table 34-** Concept Cost Estimate - Pheasant Run Place

	SUBTOTAL	\$77,500
	25% CONTINGENCY	\$19,375
	<b>CONSTRUCTION TOTAL</b>	<b>\$96,875</b>
	ENGINEERING & PERMITTING	\$12,000
	CONSTRUCTION ENGINEERING	\$10,000
	<b>GRAND TOTAL</b>	<b>\$118,875</b>
	CAPITAL BUDGET	\$119,000



**LEGENDS**

- Existing Storm Structure
- Proposed Manhole
- Proposed Inlet
- ▶ Proposed Storm Sewer
- Existing 1' Contour
- ▶ Existing Storm Sewer
- Topographic Depression
- Parcels



SOURCE:

SCALE: 1" = 100'

<p>CLIENT</p> <p style="text-align: center;"><b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501</p>	<p>TITLE</p> <p style="text-align: center;"><b>GENEVA WATERSHED STUDY</b></p>	DWN.	RB	CHKD.	JWW
		JOB# 19-0206			
<p><b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755</p>	<p><b>DRAINAGE IMPROVEMENTS FARGO BLVD</b></p>			<p>DATE</p> <p>04-12-2022</p>	
				<p><b>EXHIBIT</b></p>	

Figure 44- Drainage Improvements - Pheasant Run Place (Fargo Boulevard)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	92	\$80	\$7,360
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
4	RESTORATION	LSUM	1	\$8,000	\$8,000
5	REMOVE AND REPLACE CURB AND GUTTER	FOOT	20	\$60	\$1,200
6	REMOVE AND REPLACE SIDEWALK	SQ FT	100	\$15	\$1,500
7	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 35-** Concept Cost Estimate - Pheasant Run Place (Fargo Boulevard)

	SUBTOTAL	\$28,060
	25% CONTINGENCY	\$7,015
	<b>CONSTRUCTION TOTAL</b>	<b>\$35,075</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$45,075</b>
	<b>CAPITAL BUDGET</b>	<b>\$46,000</b>

### 5.19 Study Area 19 - Prairie Green Preserve

Prairie Green Preserve is a open space project initiated by the City two decades ago. Tenant farming of the northerly portion of the project has become increasing difficult in recent years due to the extent and duration of soil saturation and surface ponding.

It is recognized that the project is located in a closed depression and serves as a collection point for many historic drain tiles serving adjacent agricultural fields. Striking a balance between wetland restoration, public access and farming is a challenge.

Constructing drainage piping to supplement the existing field tiles will improve conveyance and increase reliability and reduce impacts from frequent rainfall events. Additionally, improving overland flows conditions to create a greater differential between upstream ground and downstream overflow elevations is recommended. Several alternatives to determine the extent of piping necessary were evaluated. Our recommended approach is to phase the project evaluating results on both upstream and downstream areas. It is noted that regulatory wetlands lie downstream of the agricultural fields and any improvements will require rigorous permit evaluation. Additionally, crossing the UPRR and Keslinger Roads will require jack and bore operations to facilitate replacement drainage piping.

Recommendations for the Prairie Green DSA include the following elements:

- A. Phase 1 - Construction of a supplemental drainage pipe from the north end of Prairie Green to south end of the agricultural fields (approximately 1,970 feet). Modifying the overland flow northernmost berm by lowering it 2 feet.
- B. Phase 2 - Continuation of a supplemental drainage pipe from Phase 1 to the north side of the UPRR tracks. This would add 3,810 feet of pipe.
- C. Phase 3 – Continuation of a replacement drainage pipe from Phase 2 to Mill Creek. This includes a jack and bore of the UPRR tracks as well as Keslinger Road. For planning purposes in-kind removal and replacement is anticipated.

Total estimated costs for Recommendations A, B & C is **\$1,095,000** with the following breakdown:

- A. Phase 1 Drainage Pipe and Overland Flow Improvements - \$222,000
- B. Phase 2 Drainage Pipe to UPRR- \$359,000
- C. Phase 3 Drainage Pipe to Mill Creek - \$514,000

### Issue

Prairie Green Preserve is a 580-acre publicly-owned prairie/wetland restoration and passive recreation site. The primary objective of the project is to establish a large publicly owned open space that defines the west edge of the City. In addition, the following benefits are derived:

- » Restore the pre-settlement native vegetation, including native prairie plants and wetlands;
- » Create opportunities for passive recreation activities such as hiking, biking, birding etc.;
- » Enhance surface water quality and provide additional management in the Mill Creek Watershed.
- » Tenant Farming - The City has leased part of the preserve for farming since 2000.

A concern has been raised by the tenant farmer at the north end of the site, related to the extent and duration of field inundation in the areas leased from the City. Soil saturation and surface inundation is reported to be getting worse each year affecting crop yields and the ability to farm. This has resulted in a loss of revenue by the City in addition to a loss of use of the land.

### Analysis

Prairie Green is within a very large, closed depression constricted by the UPRR embankment at the south end adjacent to Keslinger Road. An extensive network of historic drain tiles has been constructed to serve naturally tributary upland areas making them suitable for farming. Residential development has occurred in many of the upland areas which ultimately rely on the historic drain tile system. While modern stormwater management techniques and ordinances require detention to slow the rate of runoff from development it does little to address the increase in volume resulting from increases in impervious surfaces. The increase in volume has a tendency to increase the duration of flow. Where downstream capacity may be limited, as can be the case with historic drain tiles, the increase can cause extended soil saturation and surface inundation.

Since Prairie Green is open space, the management of flood events is less of a concern than the management of flows from frequent events, particularly through the areas where farming is desirable. Accordingly, our focus is managing flow from frequent events in contrast to other DSA's where the flood events are focus of a solution. Providing a new and reliable conveyance system from the north limits of Geneva to Mill Creek to supplement the existing drainage system is necessary to convey flows from frequent rainfall events.

The existing tributary area which flows through Prairie Green at the north limits of Geneva is approximately 3.3 Sq Mi. The primary drain tile serving Prairie Green appears to be an 18-inch diameter plastic (PVC or HDPE) pipe along with some historic 10-inch diameter clay drain tile. Although the slopes of the pipes are not known, regional topography indicates a flat slope approximated as 0.1%; or very flat. Conveyance of flows are primarily driven by upstream and downstream head differential.

The Prairie Green project has intentionally created closed depressional areas in an effort to foster wetland hydrology and plants through grading and creation of a series of berms across the natural topography. The northernmost berm has a crest elevation very close to that which will inundate upstream agricultural fields (726). Two berms downstream have crest elevations approximately 2 feet lower. Through the course of this study it was reported that the northernmost berm was modified to improve upstream field conditions. Since this has not been confirmed, for the purposes of this study, we are assuming the original berm elevation require modification with the extent to be determined with future design efforts.

## Proposed Alternatives

Several alternatives were considered to resolve the frequent inundation of agricultural fields.

Two alternatives were developed to improve conveyance of upstream flows north of Prairie Green to a point where overland flows will not create backwater inundation of the agricultural fields.

### Alternative 1

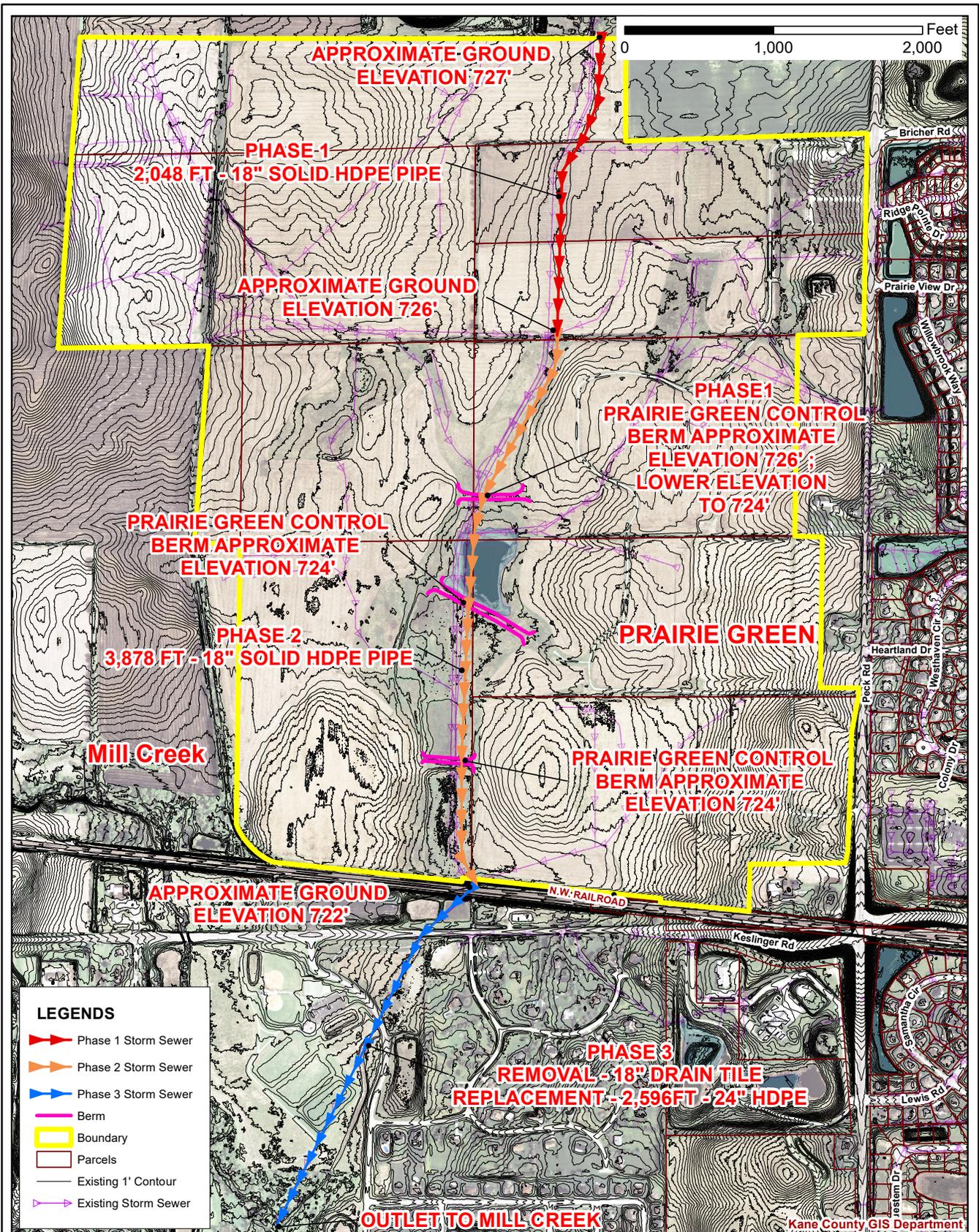
Construction of a supplemental 18-inch diameter drainage pipe from the north end of Prairie Green to south end of the agricultural fields (approximately 1,970 feet) combined with lowering the northernmost berm by 2 feet. This would double the current capacity of the primary drain tile which will reduce the frequency of system surcharging and allow for an additional 2 feet of pipe head and overland flow prior to field inundation.

### Alternative 2

Construction of a supplemental 18-inch diameter drainage pipe from the north end of Prairie Green to a point south of the northernmost berm (approximately 3,345 feet). This would double the current capacity of the primary drain tile which will reduce the frequency of system surcharging and allow for an addition 2 feet of pipe head and overland flow prior to field inundation.

Based on the age and reports of repairs to the existing primary field tile, continuation of the supplemental drainage pipe (18-inch diameter) to the UPRR tracks should be considered as a second phase for either Alternative 1 or 2. Further extending the pipe from the UPRR to Mill Creek is also recommended as a third and final phase for the project. This will entail a jack and bore of the UPRR tracks as well as Keslinger Road. Pipe sizing needs to be determined upon further analysis but for the purposes of this report we assumed a 24-inch diameter pipe which has approximate equivalent capacity as the two 18-inch diameter pipes that are present on-site. Removal and replacement may be necessary for portions of this segment based on access and availability of land rights.

Our recommendation is to pursue Alternative 1 which results in the least amount of initial pipe infrastructure and creates an overland flow condition that more closely mimics historic conditions. It is noted that impacts to wetland areas and plant sustainability are critical to determine if this approach is compatible with the current wetland conditions and regulatory requirements. We further recommend two additional phases based to be planned based on the success of Phase 1 to resolve upstream field saturation and condition of the existing field tile system.



SOURCE:		DWN	RB	CHKD	GC
CLIENT	<b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE	<b>GENEVA WATERSHED STUDY</b>	JOB#	19-0206
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755		<b>DRAINAGE IMPROVEMENTS PRAIRIE GREEN</b>		DATE	4-12-2022
				EXHIBIT	

Figure 45- Drainage Improvements - Prairie Green Preserve

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 18" SOLID HDPE	FOOT	2048	\$50	\$102,400
2	EARTH WORK, BERM REVISION	LSUM	1	\$20,000	\$20,000
3	WETLAND RESTORATION	LSUM	1	\$10,000	\$10,000
4	RESTORATION NON-WETLAND	LSUM	1	\$15,000	\$15,000

**Table 36- Concept Cost Estimate - Prairie Green Preserve (Phase 1)**

	SUBTOTAL	\$147,400
	25% CONTINGENCY	\$36,850
	<b>CONSTRUCTION TOTAL</b>	<b>\$184,250</b>
*Requires USACE Permit	ENGINEERING & PERMITTING*	\$22,110
	CONSTRUCTION ENGINEERING	\$14,740
	<b>GRAND TOTAL</b>	<b>\$221,100</b>
	<b>CAPITAL BUDGET</b>	<b>\$222,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 18" SOLID HDPE	FOOT	3878	\$50	\$193,900
2	WETLAND RESTORATION	LSUM	1	\$30,000	\$30,000
3	RESTORATION NON-WETLAND	LSUM	1	\$15,000	\$15,000

**Table 37- Concept Cost Estimate - Prairie Green Preserve (Phase 2)**

	SUBTOTAL	\$238,900
	25% CONTINGENCY	\$59,725
	<b>CONSTRUCTION TOTAL</b>	<b>\$298,625</b>
*Requires USACE Permit	ENGINEERING & PERMITTING*	\$35,835
	CONSTRUCTION ENGINEERING	\$23,890
	<b>GRAND TOTAL</b>	<b>\$358,350</b>
	<b>CAPITAL BUDGET</b>	<b>\$359,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 24" SOLID HDPE	FOOT	2596	\$60	\$155,760
2	DRAIN TILE REMOVAL, 18"	FOOT	2596	\$25	\$64,900
3	JACK AND BORE CASING PIPE (KESLINGER)	FOOT	120	\$250	\$30,000
4	JACK AND BORE CASING PIPE (RAIL ROAD)	FOOT	130	\$450	\$58,500
5	FLARED END SECTION, 24"	EACH	1	\$3,000	\$3,000
6	RESTORATION NON-WETLAND	LSUM	1	\$30,000	\$30,000

**Table 38-** Concept Cost Estimate - Prairie Green Preserve (Phase 3)

	SUBTOTAL	\$342,160
	25% CONTINGENCY	\$85,540
	<b>CONSTRUCTION TOTAL</b>	<b>\$427,700</b>
	ENGINEERING & PERMITTING*	\$51,324
	CONSTRUCTION ENGINEERING	\$34,216
	<b>GRAND TOTAL</b>	<b>\$513,240</b>
	CAPITAL BUDGET	\$514,000

\*Requires USACE, UPRR, & KCDOT Permit

## 5.20 Study Area 20 - Randall Square

The Randall Square stormwater basin overflows during heavy rainfall events on a frequent basis (nearly annual) closing Merchants Drive and a portion of Randall Square Shopping Center parking lot due to overland water flow. Additional concerns with ponding water upstream in the watershed near Lewis and Kaneville Roads have also been reported. A hydrologic and hydraulic analysis of the watershed to the basin and the outlet storm sewer indicated that the outlet pipe from the Randall Square basin is undersized for the tributary area and there is inadequate storage in the watershed to meet the allowable release rate without exceeding stormwater basin capacity.

Multiple proposed alternatives were prepared and tested using HEC-HMS to determine the benefits of each alternative and also which alternatives met the goal of eliminating overflows from the Randall Square Basin and upstream ponding at Lewis and Kaneville Roads for the 100- year rainfall event. The alternatives included increasing discharges from stormwater basins, adding storage volume in existing basins and construction of addition stormwater basins in the watershed.

The five alternatives modeled include:

1. Increase all restrictors in the basins to meet the allowable release rate (0.1 cfs/ acre release rate for the upstream areas tributary to basins) and any undetained runoff. Construct new outfall pipes for Randall Square basin to Randall Road right-of-way
2. Alternative 1 and Increase storage volume in upstream basins (Basins 1 and 3)
3. Alternatives 1 and 2 Increase storage volume in Randall Square with pump station.
4. Alternatives 1, 2, and 3 Construct a new stormwater basin at Lewis Road.
5. Alternatives 1 thru 4 and Construct a new stormwater basin along Kaneville Road

The results of the analysis indicate that 63.63 acre-feet of additional storage along with increasing the outfall from the Randall Square Basin will eliminate the overflows from the Randall Square basin and surface ponding in upstream areas for all rainfall events up to the 100-year recurrence frequency and eliminate water running through the parking lot for all of the 100-year event durations. This preliminary study indicates a 100-year level of protection can be achieved with construction of all improvements identified in Alternative 5. The total anticipated construction costs to implement Alternative 5 which includes: improving outlet conditions at all major stormwater basins in the watershed south of the UPRR tracks, expanding storage volume in the Randall Square Basin, Basin 1, and Basin 3 and associated storm sewer improvements, and constructing new stormwater basins at Lewis Road and Kaneville Road is estimated at **\$8.70 million**.

The recommendation for construction of proposed drainage improvements follows the analysis of alternatives in a cumulative manner. Recommended capital improvements in order of construction include:

- » Randall Square Basin outlet improvements and upstream restrictor modifications.
- » Increase storage volume in basins 1 and 3 with storm sewer improvements
- » Increase stormwater storage at Randall Square basin with pump facility
- » Construct new basin at Lewis Road with storm sewer improvements
- » Construct new basin at Kaneville Road with storm sewer improvements

### Issue

Randall Square is a commercial development on the west side of Randall Road bordered by Fargo Boulevard on the North and Miller Road on the south. A dry detention basin is located at Fargo Boulevard just west of Merchants Drive which provides detention for the commercial development and adjacent residential developments. During large storm events, the existing detention basin overflows the basin and crosses Merchant Drive and the commercial parking lot before discharging to Randall Road west ditch. This overtopping results in the closing of Merchant Drive due to the flowing water across the road. This occurred recently during the storm event of May 15, 2020.

In addition, public outreach has indicated that several stormwater basins adjacent and within the Sterling Manor Subdivision overflow and cause ponding within adjacent public roadways. Rear yard ponding was also reported however no house or structure inundation was reported due to stormwater basin overflows. This area is generally located at Lewis and Kaneville Roads and is south of the UPRR tracks.

### Analysis

For purposes of this study, the outlet from the Randall Square Basin and all upstream areas defines the drainage study area. The Kane County and City GIS data was evaluated for watershed modeling to determine the tributary area, basin connectivity and also the outlet for the drainage study area. The Randall Square basin and entire upstream watershed is conveyed by an 18-inch storm sewer crossing Randall Road and discharges on the east side of Randall Road directly upstream of 2- 48-inch RCP culverts under Bent Tree Drive. The total tributary area to the basin is 387.5 acres and extends north to Fieldstone Drive just south of Bricher Road (see Exhibit OV). There are approximately 175.5 acres north of the UPRR Railroad that includes Delnor Hospital, residential subdivisions, commercial developments, and the FAA site at Williamsburg Avenue. Tributary area north of Keslinger road includes several detention basins with controlled release rates. An area between Keslinger Road and UPRR is undetained. All runoff north of the UPRR is conveyed through a 48-inch culvert under the UPRR tracks. The tributary area south of the UPRR tracks is residential and commercial subdivisions with several open water and dry detention basins. The basin between Lewis Road and UPRR tracks (Basin 1) overtopped during the May 15, 2020, event however, outlet clogging was a likely factor causing this condition. Considering the entire upstream tributary area to the Randall Square basin in addition to runoff from the undetained area, a calculated

allowable release from the Randall Square basin is 77.9 cfs (0.1 cfs/ac + 39.2 cfs). The capacity of the 18-inch outlet pipe from the Randall Square basin is 9 cfs, which is approximately 12 % of the expected release rate. The result is frequent basin overflows that are conveyed overland through the Randall Square parking lot to the drainage ditch along the west side of Randall Road where it is conveyed under Randall Road through two elliptical culverts. No reports of roadway flooding on Randall Road have been observed or reported. It is noted that areas downstream of Randall Road are to be unaffected since the 100-year peak flow is unchanged or decreased as a result of additional storage volume proposed.

A HEC-HMS 4.3 model was developed for the watershed which includes four existing stormwater basins (including Randall Square Basin) in series. The outlet control structures for the four basins along with storm sewers connecting the basins were surveyed as part of the study. It is noted that several smaller stormwater basins are present in the watershed but were not included in this preliminary analysis. Future analysis and refinement of improvements should include these basins. Bulletin 75 rainfall data (adopted in 2020) was used for the event storm hydrologic analysis, and the model was calibrated using the one rainfall event that was available, which is the May 15, 2020, event. Rainfall data for this calibration event was obtained from Fermilab rain gauge recordings. The HEC-HMS model used SCS Runoff Curve Numbers based on land use and soil types, time of Concentration based on longest flow path together with Clark Storage Coefficients as a transformation method for all the tributary areas. Critical duration (1, 2, 6, 12, and 24 hour) analysis for the 10, 25, 50, and 100-year return events were performed for the existing condition and proposed alternative conditions. The area upstream (North) of Keslinger Road was assumed to be detained with a 0.1 cfs per acre release rate for the 150 acres.

## Results

The results of the modeling determined that the Randall Square and upstream basins overflow during all storm events. This is not surprising since all the basins were designed when the regulatory rainfall was significantly less than that of current Bulletin 75 rainfall depths. Also, the outlet control structures for the four basins were undersized relative to upstream tributary area. This results in a greater likelihood of overflow and is most pronounced and significant in the Randall Square Basin.

## Proposed Alternatives

Proposed alternatives were developed with the goal of eliminating the overflows from the Randall Square Basin and Sterling Manor subdivision basins for all storm events (up to 100-year) using current Bulletin 75 rainfall. A series of HEC-HMS models were developed which start with modifying the existing basin outlets and then increased in complexity by adding additional storage in the existing basins, and then adding new stormwater basins within the watershed. A description of the five proposed alternatives, along with exhibits for each (Exhibits 1-5), and estimate of costs including a 25% contingency, are provided as follows:

### Alternative 1

This alternative includes modification of all basin restrictors, including increasing the size of the orifice diameters, resulting in an increased discharge from the basins to meet an acceptable release rate; equal to 0.1 cfs per acre for the upstream detained areas tributary to a basin, and also runoff from undetained area between UPRR and Keslinger Road. This modeling resulted in basins overflowing for most of the recurrence intervals for all the storm events. Consequently, the peak 100-year event release from the Randall Square basin would include 9 cfs from the existing 18-inch storm sewer, and also 68.86 cfs from proposed twin 4'W x 2'H reinforced concrete box culverts which would outlet to the west Randall Road ditch (Figure 47). Due to cover restrictions, the maximum allowable culvert height is 2 feet. The capital budget cost for this alternative is **\$869,000**.

### Alternative 2

This alternative includes the improvements of Alternative 1 in addition to lowering the Normal water levels by lowering of the outlet storm sewers of Basins 1 and 3 by four feet to provide more storage volume than existing conditions. This alternative includes modification of the restrictors, together with the reconstruction. Basins 1 and 3 gain an additional 4.9 ac-ft and 2.9 ac-ft respectively. See (Figure 48). This alternative eliminates the overtopping for Basin 1 for the 10-, 25-, and 50-year events, and eliminates overtopping of Basin 3 for the 10-year event. The capital budget cost for this alternative is **\$1,793,000**.

### Alternative 3

This alternative includes the improvements listed in Alternatives 1 and 2 and also expanding the depth of Randall Square Basin by four feet to gain an additional 14.5 acre-feet of storage. This alternative will require a pump to discharge water from the bottom of the basin since the basin bottom would be lower than the gravity outlet (Figure 49). It was assumed the pump would be a ~2,300 GPM (5 cfs) pump. This alternative would require perpetual maintenance of the pumping system. This alternative slightly improved the overtopping of Randall Square basin for the 25- and 50-year events. The capital budget cost for this alternative is **\$4,596,000**.

**Alternative 4**

This alternative includes the improvements of Alternatives 1, 2, and 3, and also adding an additional 12.35-acre-foot dry detention basin at the NE corner of Kaneville Road and Lewis Road (Lewis Road Basin). The basin would accept runoff from Basin 1 through a proposed 48-inch storm sewer connecting the two basins (Figure 50). The release from Basin 1 would be over-restricted to allow runoff from Basin 1 to discharge to the Lewis Road Basin. This Lewis Road Basin outlets to the existing storm sewer located at the NE corner of the intersection. This basin is an expansion of the proposed basin for this area as part of the Emma’s Landing development. The outlet pipe from the basin constructed by Emma’s Landing has been sized to accommodate future basin expansion under this Alternative. This alternative eliminates the overtopping for all events for Basin 1, up to the 100- year event for Basin 3 and eliminates the overtopping in the Randall Square basin for the 10-year event. The capital budget cost for this alternative is **\$7,426,000** including 2.8 acres of land acquisition for basin construction.

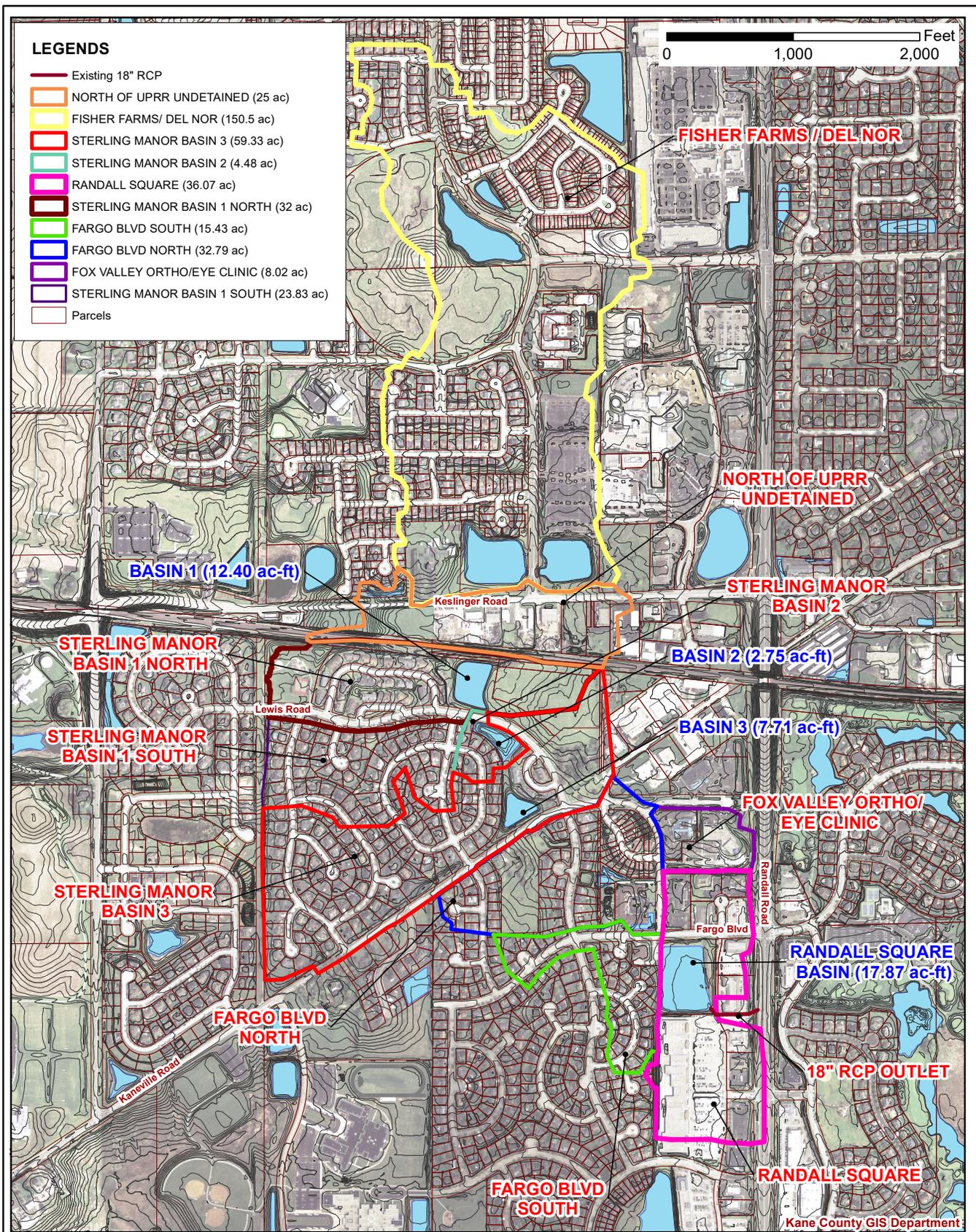
**Alternative 5**

Included Alternative 1-4 improvements and the addition of a 29-acre-foot stormwater basin at Kaneville Road to supplement the storage in Basin 3. The addition of a 29 ac-ft basin is proposed at the current undeveloped property located south of Kaneville Road southwest of Basin 3 (Figure 51). This basin would supplement the storage in Basin 3. In the model, Basin 3 was over-restricted to maximize the storage in both basins (Kaneville and Basin 3) for the critical duration event. This alternative eliminated overtopping of the all the basins for all the events for all the events except there was still minor (<6-inch) ponding on the Merchants Drive for the 100-year event. The capital budget cost for this alternative is **\$8,926,000** including 3.7 acres of land acquisition for basin construction.

A summary of the alternative’s matrix was developed to establish a sense of the benefits of each alternative relative to each other and their costs and is provided in the table below.

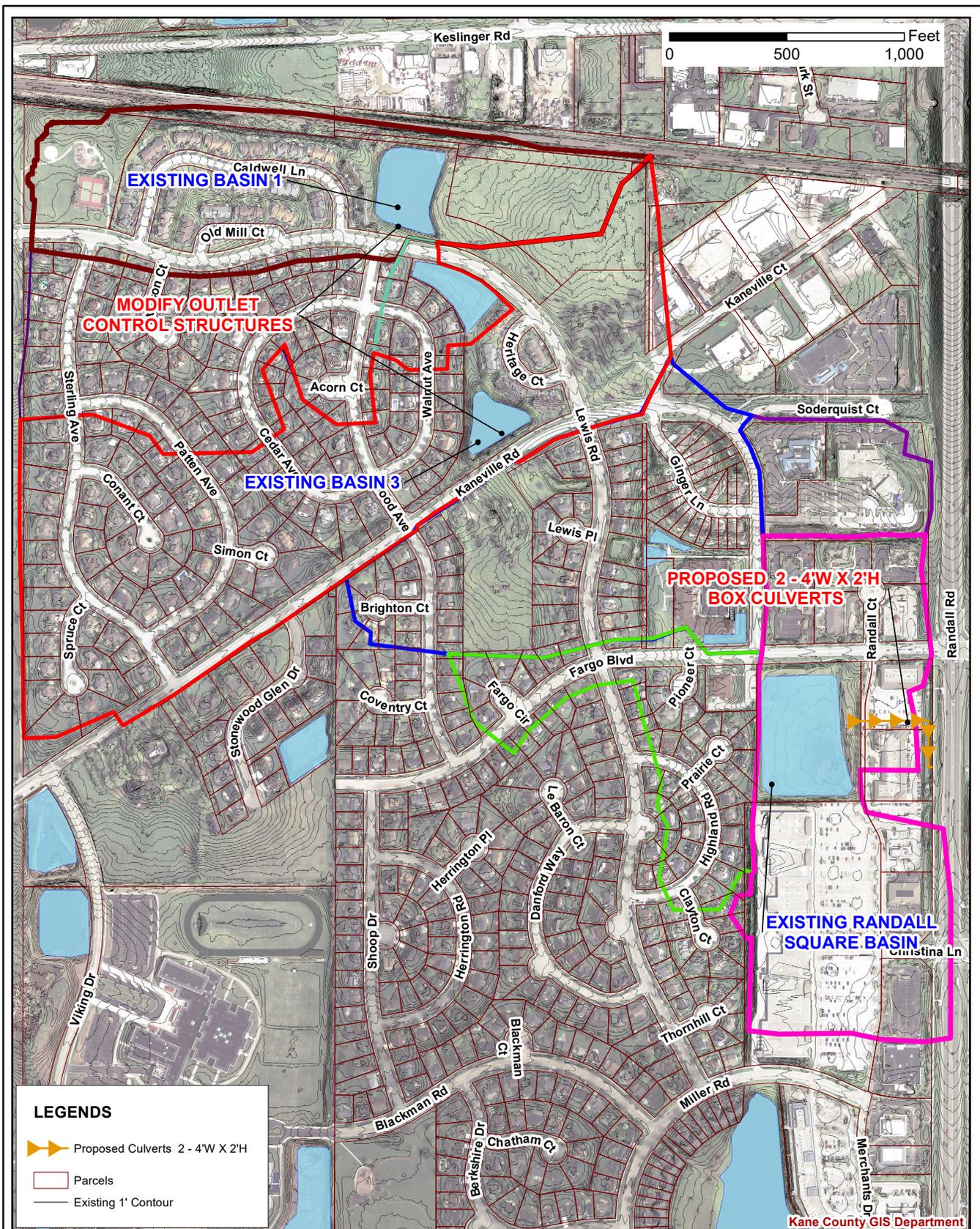
Condition/Alternative	Basin 1	Basin 3	Randall Square	Cost
Existing	●	●	●	
Alternative 1	●	●	●	\$869,000
Alternative 2	●	●	●	\$1,793,000
Alternative 3	●	●	●	\$4,596,000
Alternative 4	●	●	●	\$7,426,000
Alternative 5	●	●	●	\$8,926,000

- Overtops for Majority of Storm Events
- Overtops for One/Few Storm Events
- Does not Overtop for Storm Events



CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN. RB	CHKD. JWW
		JOB# 19-0206	 DATE 4-12-2022
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE AREA - RANDALL SQUARE BASIN</b>	EXHIBIT OV	

Figure 46- Drainage Improvements - Randall Square (Overall)



SOURCE:		DWN.	RB	CHKD.	JWW
CLIENT	<b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE	<b>GENEVA WATERSHED STUDY</b>		JOB# 19-0206
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755		<b>PROPOSED ALTERNATIVE 1 IMPROVEMENTS</b>		DATE 4-12-2021	 N
				<b>EXHIBIT 1</b>	

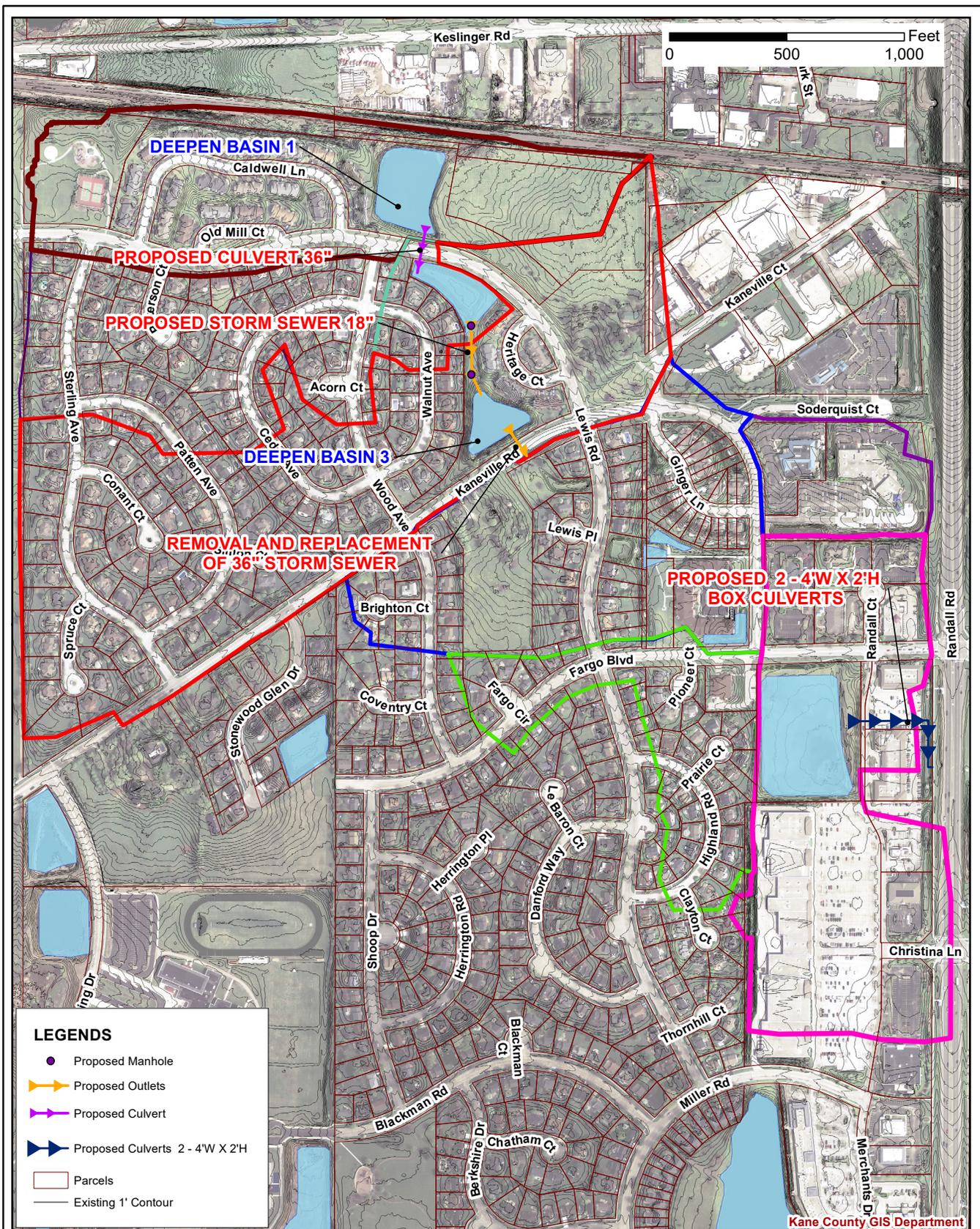
Figure 47- Drainage Improvements - Randall Square (Alternative 1)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	PRECAST CONCRETE BOX CULVERT 4'X2' (TWIN)	FOOT	950	\$440	\$418,000
2	JUNCTION BOX	EACH	2	\$18,000	\$36,000
3	FLARED END SECTION	EACH	2	\$22,000	\$44,000
4	TRENCH BACKFILL	CU YD	300	\$60	\$18,000
5	RESTORATION	LSUM	1	\$20,000	\$20,000
6	PAVEMENT PATCHING	SQ YD	340	\$100	\$34,000
7	REMOVE AND REPLACE SIDEWALK	SQ FT	125	\$15	\$1,875
8	TRAFFIC CONTROL	LSUM	1	\$15,000	\$15,000
9	RISER STRUCTURES	EACH	1	\$2,000	\$2,000
10	MODIFY OUTLET CONTROL STRUCTURES	EACH	2	\$5,000	\$10,000

**Table 39- Concept Cost Estimate - Randall Square (Alternative 1)**

Alternative 1 includes proposed storm sewer outlet from Randall Square Basin to Randall Road.

	SUBTOTAL	\$598,875
	25% CONTINGENCY	\$149,719
	<b>CONSTRUCTION TOTAL</b>	<b>\$748,594</b>
	ENGINEERING & PERMITTING	\$59,888
	CONSTRUCTION ENGINEERING	\$59,888
	<b>GRAND TOTAL</b>	<b>\$868,369</b>
	CAPITAL BUDGET	\$869,000



SOURCE:		DWN. RB	CHKD. JWW
CLIENT	<b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE	JOB#
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755		<b>GENEVA WATERSHED STUDY</b>	19-0206
		<b>PROPOSED ALTERNATIVE 2 IMPROVEMENTS</b>	
			<b>EXHIBIT 2</b>

Figure 48- Drainage Improvements - Randall Square (Alternative 2)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 36"	FOOT	187	\$170	\$31,790
2	FLARED END SECTION, 36"	EACH	2	\$3,000	\$6,000
3	RESTORATION	LSUM	1	\$20,000	\$20,000
4	TRAFFIC CONTROL	LSUM	1	\$8,000	\$8,000
5	TRENCH BACKFILL	CU YD	50	\$60	\$3,000
6	POND DEWATERING	LSUM	1	\$10,000	\$10,000

**Table 40- Concept Cost Estimate - Randall Square (Alternative 2)**

Includes Alternative 1 and proposed storm sewer from Basin 1 to Basin 2.

SUBTOTAL	\$78,790
25% CONTINGENCY	\$19,698
<b>CONSTRUCTION TOTAL</b>	<b>\$98,488</b>
ENGINEERING & PERMITTING	\$7,879
CONSTRUCTION ENGINEERING	\$7,879
<b>GRAND TOTAL</b>	<b>\$114,246</b>
<b>CAPITAL BUDGET</b>	<b>\$115,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER REMOVAL AND REPLACEMENT, 18"	FOOT	301	\$115	\$34,615
2	MANHOLE, 4' DIA	EACH	2	\$5,000	\$10,000
3	FLARED END SECTION, 18"	EACH	2	\$3,000	\$6,000
4	RESTORATION	LSUM	1	\$10,000	\$10,000

Includes storm sewer improvements upstream of Basin 3.

SUBTOTAL	\$60,615
25% CONTINGENCY	\$15,154
<b>CONSTRUCTION TOTAL</b>	<b>\$75,769</b>
ENGINEERING & PERMITTING	\$6,062
CONSTRUCTION ENGINEERING	\$6,062
<b>GRAND TOTAL</b>	<b>\$87,892</b>
<b>CAPITAL BUDGET</b>	<b>\$88,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER REMOVAL AND REPLACEMENT, 36"	FOOT	130	\$170	\$22,100
2	REMOVE AND RESET FLARED END SECTION	EACH	1	\$1,000	\$1,000
3	MANHOLE, 5' DIA	EACH	1	\$6,500	\$6,500
4	RESTORATION	LSUM	1	\$20,000	\$20,000
5	TRAFFIC CONTROL	LSUM	1	\$10,000	\$10,000
6	TRENCH BACKFILL	CU YD	75	\$60	\$4,500
7	POND DEWATERING	LSUM	1	\$10,000	\$10,000

Includes removal and replacement of existing sewer downstream of Basin 3.

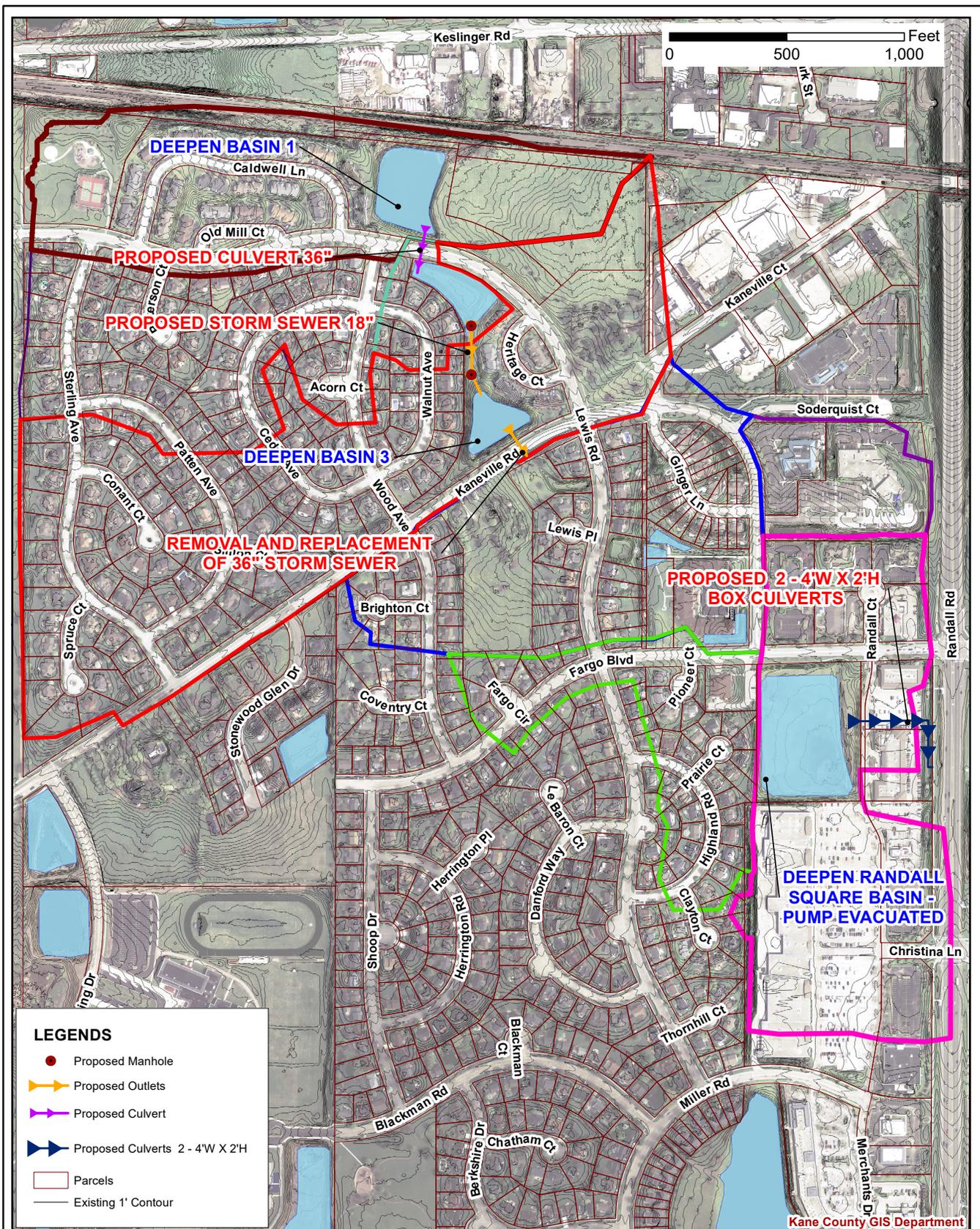
SUBTOTAL	\$74,100
25% CONTINGENCY	\$18,525
<b>CONSTRUCTION TOTAL</b>	<b>\$92,625</b>
ENGINEERING & PERMITTING	\$7,410
CONSTRUCTION ENGINEERING	\$7,410
<b>GRAND TOTAL</b>	<b>\$107,445</b>
<b>CAPITAL BUDGET</b>	<b>\$108,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	EARTH EXCAVATION & HAULOFF	CU YD	2700	\$50	\$135,000
2	SEEDING	ACRE	0.5	\$10,000	\$5,000
3	EROSION CONTROL BLANKET	SQ YD	2000	\$3	\$6,000
4	POND DEWATERING	LSUM	1	\$100,000	\$100,000

Includes increased storage volume for Basin 1.

SUBTOTAL	\$246,000
25% CONTINGENCY	\$61,500
<b>CONSTRUCTION TOTAL</b>	<b>\$307,500</b>
ENGINEERING & PERMITTING	\$24,600
CONSTRUCTION ENGINEERING	\$24,600
<b>GRAND TOTAL</b>	<b>\$356,700</b>
<b>CAPITAL BUDGET</b>	<b>\$357,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	EARTH EXCAVATION & HAULOFF	CU YD	1350	\$50	\$67,500
2	SEEDING	ACRE	0.4	\$10,000	\$4,000
3	EROSION CONTROL BLANKET	SQ YD	1500	\$3	\$4,500
4	POND DEWATERING	LSUM	1	\$100,000	\$100,000
Includes increased storage volume for Basin 3.				SUBTOTAL	\$176,000
				25% CONTINGENCY	\$44,000
				<b>CONSTRUCTION TOTAL</b>	<b>\$220,000</b>
				ENGINEERING & PERMITTING	\$17,600
				CONSTRUCTION ENGINEERING	\$17,600
				<b>GRAND TOTAL</b>	<b>\$255,200</b>
				CAPITAL BUDGET	\$256,000
<b>TOTAL ALTERNATIVE 2 COST</b>					<b>\$1,793,000</b>



SOURCE:		DWN. RB	CHKD. JWW
CLIENT	<b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE	JOB#
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755		<b>GENEVA WATERSHED STUDY</b>	19-0206
		<b>PROPOSED ALTERNATIVE 3 IMPROVEMENTS</b>	
			<b>EXHIBIT 3</b>

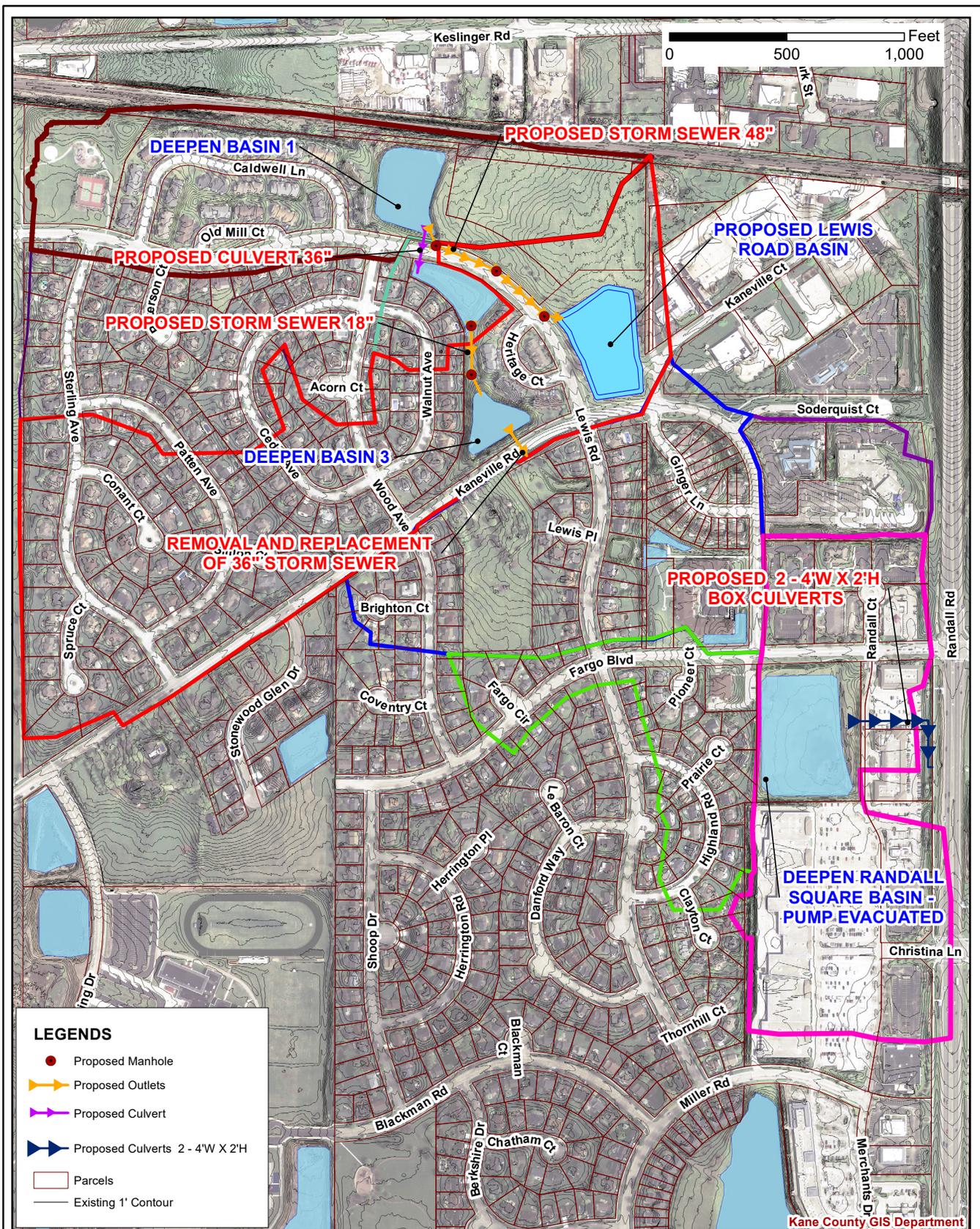
Figure 49- Drainage Improvements - Randall Square (Alternative 3)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	EARTH EXCAVATION & HAULOFF	CU YD	30000	\$40	\$1,200,000
2	TOPSOIL RESPREAD AND SEEDING	ACRE	5	\$12,000	\$60,000
3	EROSION CONTROL BLANKET	SQ YD	24200	\$3	\$72,600
4	DISCHARGE PUMPS AND WET WELL	LSUM	1	\$500,000	\$500,000
5	BASIN DEWATERING	LSUM	1	\$100,000	\$100,000

**Table 41- Concept Cost Estimate - Randall Square (Alternative 3)**

Includes Alternative 2 and increased storage volume for Randall Square Basin with pumps.

	SUBTOTAL	\$1,932,600
	25% CONTINGENCY	\$483,150
	<b>CONSTRUCTION TOTAL</b>	<b>\$2,415,750</b>
	ENGINEERING & PERMITTING	\$193,260
	CONSTRUCTION ENGINEERING	\$193,260
	<b>GRAND TOTAL</b>	<b>\$2,802,270</b>
	CAPITAL BUDGET	\$2,803,000
	<b>TOTAL ALTERNATIVE 3 COST</b>	<b>\$4,596,000</b>



SOURCE:		DWN. RB	CHKD. JWW
CLIENT	<b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE	<b>GENEVA WATERSHED STUDY</b>
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755		JOB#	19-0206
		<b>PROPOSED ALTERNATIVE 4 IMPROVEMENTS</b>	
			<b>EXHIBIT 4</b>

Figure 50- Drainage Improvements - Randall Square (Alternative 4)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	FLARED END SECTION, 48"	EACH	1	\$5,000	\$5,000
2	WEIR CONTROL STRUCTURE	EACH	1	\$12,000	\$12,000
3	STORM SEWER, 48"	FOOT	700	\$200	\$140,000
4	MANHOLE, 6' DIA	EACH	1	\$8,000	\$8,000
5	TRENCH BACKFILL	CU YD	1050	\$60	\$63,000
6	RESTORATION	LSUM	1	\$65,000	\$65,000
7	POND DEWATERING	LSUM	1	\$10,000	\$10,000
8	TRAFFIC CONTROL	LSUM	1	\$8,000	\$8,000

**Table 42- Concept Cost Estimate - Randall Square (Alternative 4)**

Includes Alternative 3 and proposed storm sewer outlet from Basin 1 to Lewis Road Basin

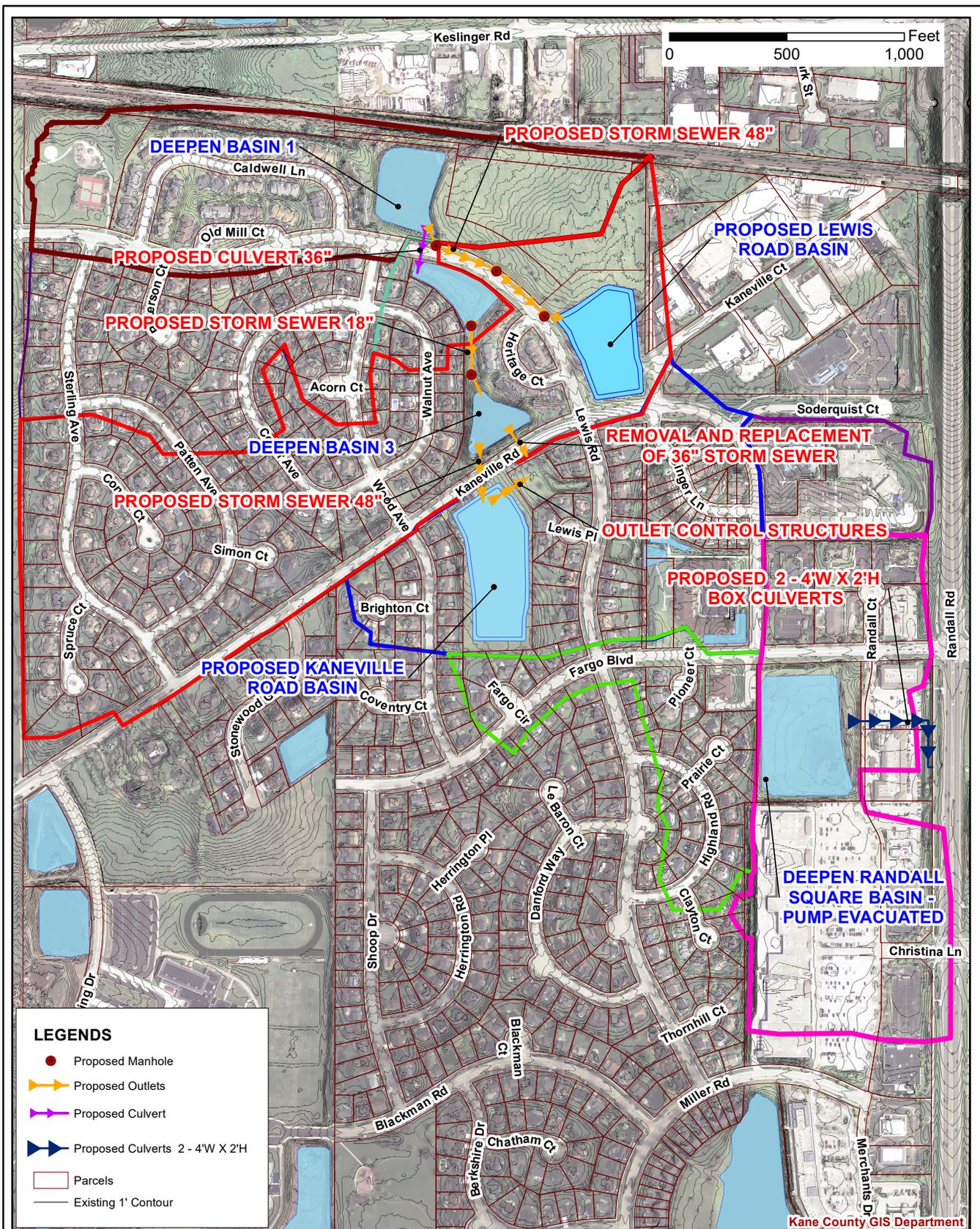
SUBTOTAL	\$311,000
25% CONTINGENCY	\$77,750
<b>CONSTRUCTION TOTAL</b>	<b>\$388,750</b>
ENGINEERING & PERMITTING	\$31,100
CONSTRUCTION ENGINEERING	\$31,100
<b>GRAND TOTAL</b>	<b>\$450,950</b>
<b>CAPITAL BUDGET</b>	<b>\$451,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	EARTH EXCAVATION & HAULOFF	CU YD	38336	\$40	\$1,533,440
2	TOPSOIL RESPREAD AND SEEDING	ACRE	3	\$12,000	\$36,000
3	EROSION CONTROL BLANKET	SQ YD	13600	\$3	\$40,800
4	OUTLET CONTROL STRUCTURE	LSUM	1	\$10,000	\$10,000
5	EROSION CONTROL MEASURES	LSUM	1	\$20,000	\$20,000

Lewis Road Basin construction

SUBTOTAL	\$1,640,240
25% CONTINGENCY	\$410,060
<b>CONSTRUCTION TOTAL</b>	<b>\$2,050,300</b>
ENGINEERING & PERMITTING	\$164,024
CONSTRUCTION ENGINEERING	\$164,024
<b>GRAND TOTAL</b>	<b>\$2,378,348</b>
<b>CAPITAL BUDGET</b>	<b>\$2,379,000</b>

**TOTAL ALTERNATIVE 4 COST \$7,426,000**



SOURCE:		DWN. RB	CHKD. JWW
CLIENT	<b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE	JOB#
		<b>GENEVA WATERSHED STUDY</b>	19-0206
 <b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755		<b>PROPOSED ALTERNATIVE 5 IMPROVEMENTS</b>	
		DATE 4-12-2021  <b>EXHIBIT 5</b>	

Figure 51- Drainage Improvements - Randall Square (Alternative 5)

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	EARTH EXCAVATION & HAULOFF	CU YD	20500	\$40	\$820,000
2	TOPSOIL RESPREAD AND SEEDING	ACRE	3	\$12,000	\$36,000
3	OUTLET CONTROL STRUCTURE	LSUM	1	\$10,000	\$10,000
4	EROSION CONTROL BLANKET	SQ YD	15000	\$3	\$45,000
5	EROSION CONTROL MEASURES	LSUM	1	\$20,000	\$20,000

**Table 43-** Concept Cost Estimate - Randall Square (Alternative 5)

Includes Alternative 4 and Kaneville Road basin construction.

SUBTOTAL	\$931,000
25% CONTINGENCY	\$232,750
<b>CONSTRUCTION TOTAL</b>	<b>\$1,163,750</b>
ENGINEERING & PERMITTING	\$93,100
CONSTRUCTION ENGINEERING	\$93,100
<b>GRAND TOTAL</b>	<b>\$1,349,950</b>
<b>CAPITAL BUDGET</b>	<b>\$1,350,000</b>

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	OUTLET CONTROL STRUCTURES	EACH	1	\$10,000	\$10,000
2	FLARED END SECTION, 48"	EACH	1	\$5,000	\$5,000
3	STORM SEWER, 48"	FOOT	215	\$200	\$43,000
4	TRENCH BACK FILL	CU YD	332	\$60	\$19,920
5	POND DEWATERING	LSUM	1	\$10,000	\$10,000
6	RESTORATION	LSUM	1	\$15,000	\$15,000

Storm sewer from Basin 3 to Kaneville Road Basin

SUBTOTAL	\$102,920
25% CONTINGENCY	\$25,730
<b>CONSTRUCTION TOTAL</b>	<b>\$128,650</b>
ENGINEERING & PERMITTING	\$10,292
CONSTRUCTION ENGINEERING	\$10,292
<b>GRAND TOTAL</b>	<b>\$149,234</b>
<b>CAPITAL BUDGET</b>	<b>\$150,000</b>

**TOTAL ALTERNATIVE 5 COST      \$8,926,000**

All materials are assumed to be clean construction demolition debris disposal.

## 5.21 Study Area 21 - Sheffield Lane

The side yard of 2019 Sheffield and 329 Olson Court are saturated for days following large rain events. Approximately 0.38 acres of residential properties to the north drain south towards the subject lots which ultimately drain to the Sheffield Lane right-of-way.

Reports during the 2020 storm event indicate that the standing water is a nuisance since no mention of water entering a structure was noted. The proposed solution is to provide a storm sewer extension (185 L.F.) with an inlet in the lot to assist in draining the flat area during storm events. The extension would drain to the existing catch basin located at the northeast corner of the intersection of Olson Court and Sheffield Lane.

Total estimated construction costs for the proposed project are **\$42,000**.

### Issue

Standing water in side and rear yards after rainfall event caused by flat topography. The resident noted that the side yard was saturated during the 2020 Storm event.

### Analysis

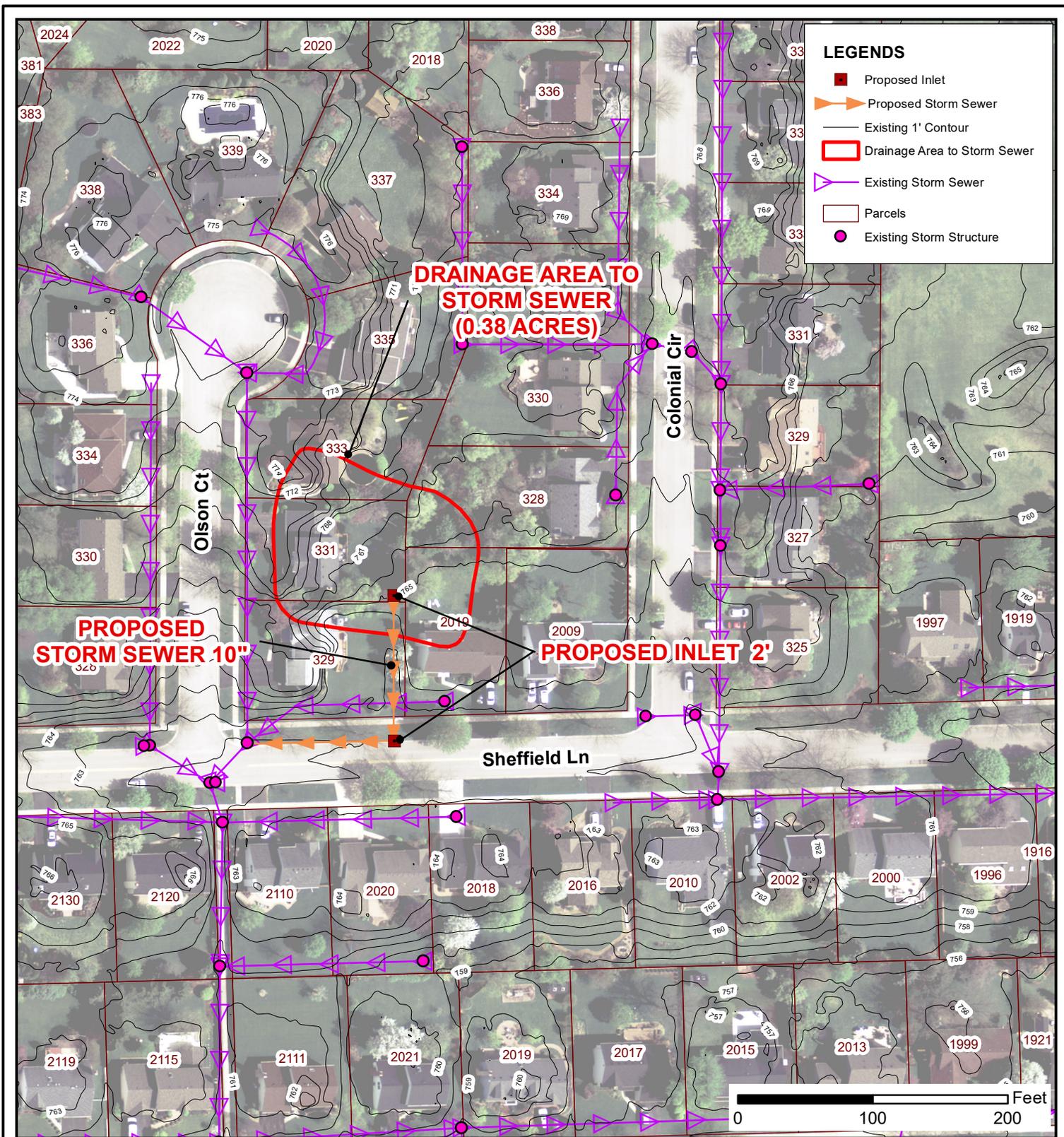
The Kane County GIS topographic data was used to determine the drainage patterns on and adjacent to the lot. Approximately 0.38 acres of residential lots drains to the side/ rear yard.

### Results

The results of the topographic analysis indicate that there is a flat rear yard on 329 Olson Court that causes standing water during storm events. The proposed storm sewer would include provide a drain in the rear yard to provide an outlet for nuisance standing surface water and also provide an inlet for any sump pump discharges from the adjacent lots. The purpose of the extension would be to assist in draining the rear yard during a storm and not be sized to convey the peak discharge from the drainage area.

### Recommended Improvement

Construct a storm sewer extension from the structure at the northeast corner of Olson Court and Sheffield Lane east (in the parkway) to the rear property line of 329 Olson Court (side yard of 2019 Sheffield) then north to the northeast property corner to assist in draining nuisance surface standing water in the flat area of the yard. The proposed cost for the recommended improvement is **\$42,000**.



**LEGENDS**

- Proposed Inlet
- ➔ Proposed Storm Sewer
- Existing 1' Contour
- ▭ Drainage Area to Storm Sewer
- ▽ Existing Storm Sewer
- ▭ Parcels
- Existing Storm Structure



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS SHEFFIELD LANE</b>				DATE 04-12-2022
					<b>EXHIBIT</b>

Figure 52- Drainage Improvements - Sheffield Lane

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	185	\$50	\$9,250
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	REMOVE AND REPLACE SIDEWALK	SQ FT	50	\$15	\$750
4	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
5	RESTORATION	LSUM	1	\$8,000	\$8,000

Table 44- Concept Cost Estimate - Sheffield Lane

	SUBTOTAL	\$25,500
	25% CONTINGENCY	\$6,375
	<b>CONSTRUCTION TOTAL</b>	<b>\$31,875</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$41,875</b>
	CAPITAL BUDGET	\$42,000

## 5.22 Study Area 22 - Spring Street and Spring Court

Two drainage areas of concern identified through public outreach are located on the east side of the Fox River and south of State Street (IL 38) adjacent to Spring Street and Spring Court. The first area of concern is located between Sandholm Woods Park and Spring Street. The resident at 601 Spring Street have reported water standing in their back yards after heavy rains and flowing through a side yard to the street. In May of 2020, the side yard overflow occurred and went into the window well at 601 Spring Street. The second area of concern is rear yard ponding at 610 Spring Court. WBK surveyed the storm sewer adjacent to these area in Summer of 2021. During the rain event in May of 2020, the rear yard of 610 Spring Court was inundated with water with the ponding limits extending to near the foundation.

The recommended solution at 601 Spring Street is to construct two drainage inlets along the south boundary of Sandholm Woods Park, and to construct a storm sewer to the existing storm sewer in Harrison Street. Construction of a swale along the west lot line of 601 Spring Street is also recommended as an additional drainage improvement but is not included in the project scope at this time. The recommended solution at 610 Spring Court is to construct a storm sewer extension along Harrison Street to accept runoff from the depression in the rear yard of 610 Spring Court.

Total estimated construction costs for the recommended solution at 601 Spring Street is **\$57,000** and for 610 Spring Court the estimated cost is **\$72,000**. Supplemental drainage swales are not included in these costs.

### Issue

A large tributary area and lack of a well-defined side yard drainage swale at 601 Spring Street is causing ponding and overland flows during sever rainfall events. A closed depression with no outlet at 610 Spring Court is causing extended ponding in the rear yard of this locations

### Analysis

The Kane County GIS topographic data was used to determine the tributary area to each of the two locations noted herein. 601 Spring Street has a tributary area of 3.11 acres draining to the side yard. The drainage area to the rear yard of 610 Spring Court is 1.62 acres. A hydrologic analysis of the tributary area to 601 Spring Street was performed using the Rational Method to determine peak runoff discharges to the rear yard. Inputs into the program included C value, Bulletin 75 rainfall intensity, and drainage area. The peak 10 and 50-year discharge to the side yard are 8.3 and 12 cfs, respectively. Similarly, the peak 10 and 50-year discharge to the rear yard of 610 Spring Court are 2.3 and 3.3 cfs, respectively. A topographic survey of the side yards between 601 Spring Street and 181 Harrison Street and of the rear yard of 610 Spring Court along with the roadway storm sewer was performed in summer of 2021.

### Results

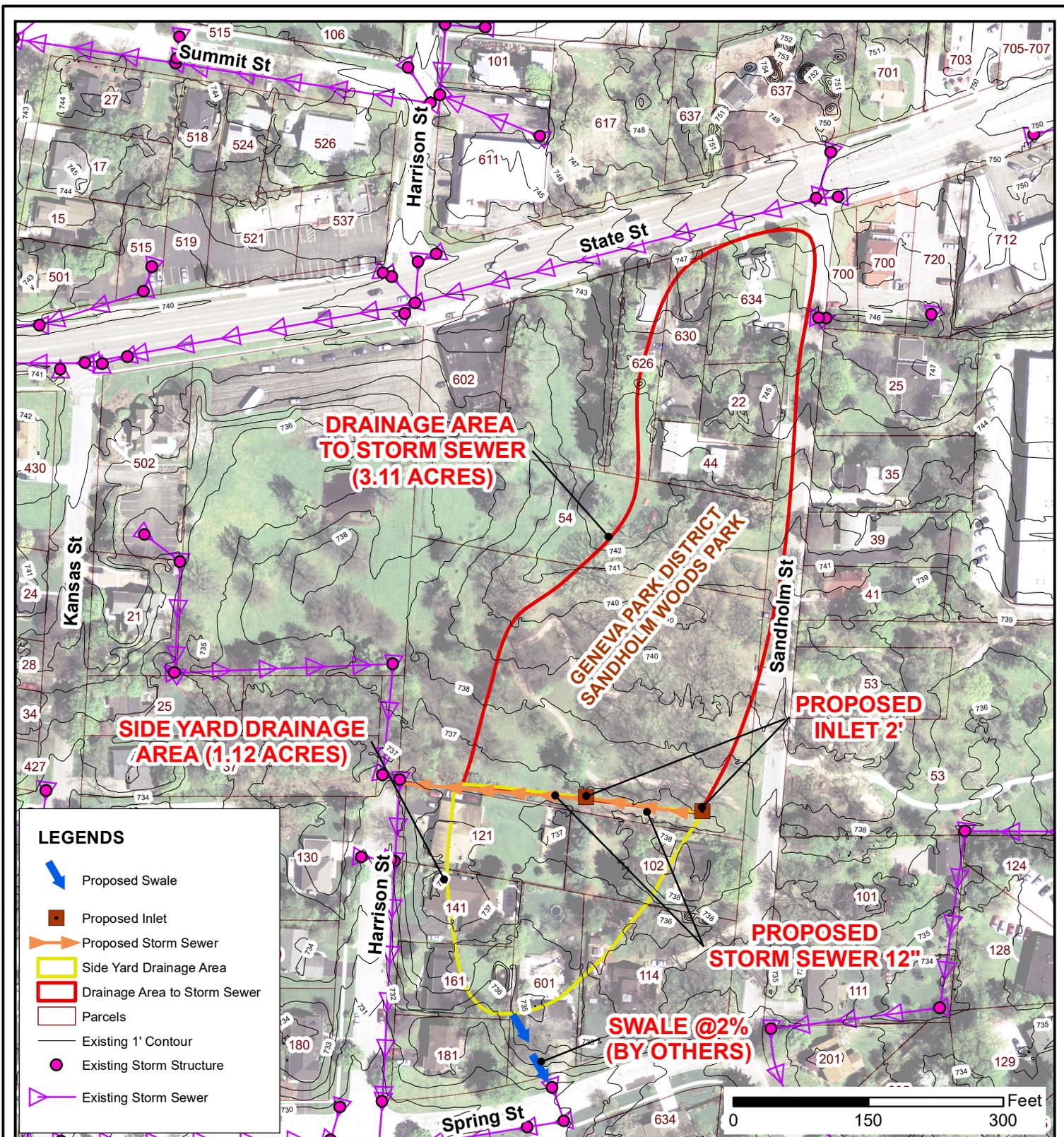
The survey performed determined the storm sewer along Harrison Street is of sufficient depth to provide an inlet at the southern property line of Sandholm Woods Park. The results of the topographic analysis indicate that a 1-foot-deep closed depression exists in the rear yard of 610 Spring Court. The area to the south of the lot is bermed blocking any overland flow route in that direction. The review of the grades at the rear of 610 Spring Court indicated that positive grading of a swale to Spring Court or Harrison Street as an outlet is not possible. A storm sewer inlet would be required.

### Recommended Solution

**601 Spring Street:** An extension of the storm sewer from Harrison Street along the southern property line of Sandholm Woods Park to accept runoff from 3.1 acres to the north will reduce the runoff to the rear yards of the lots along Sandholm St. and Spring Street. Coordination with the Park District would be required for the construction of this storm sewer. The proposed cost for this recommended improvement is **\$57,000**.

As an additional measure, it is also recommended to grade a swale from the front parkway along the west side of 601 Spring Street to provide a defined swale and to convey water out of the rear yard. The swale has been determined to be the responsibility of the homeowners in the current proposal.

**610 Spring Court:** Due to the closed depression in the rear yard, extension of the storm sewer from an inlet on South Harrison Street to the rear of the lot will be required. Grading of ancillary yard areas to the depression and inlet would be the responsibility of the homeowner. This option would require excavation and repair of South Harrison Street. The cost for this alternative is **\$72,000**.



SOURCE:

SCALE: 1" = 150'

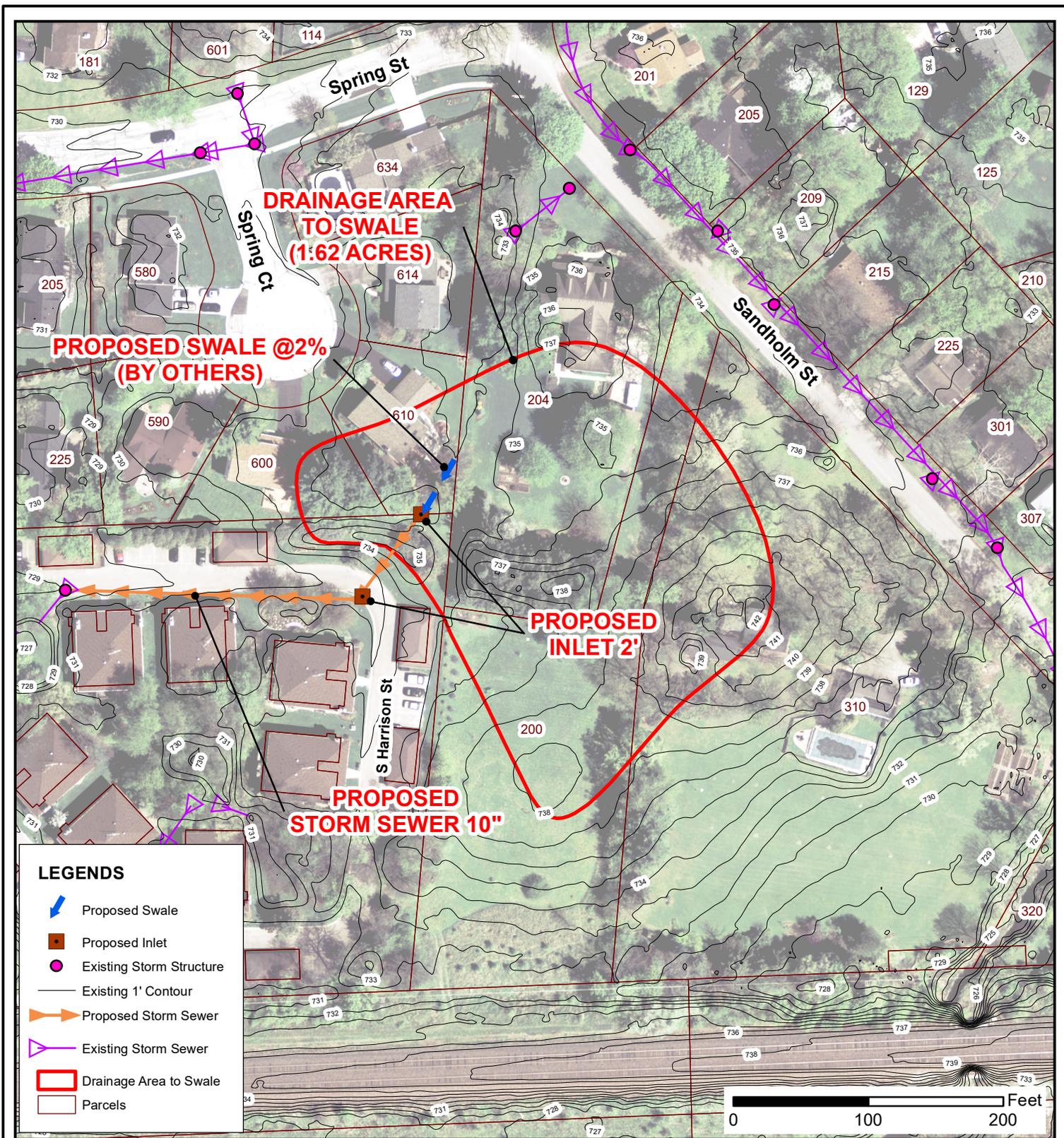
CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          SPRING STREET</b>	DATE			
		04-12-2022			

Figure 53- Drainage Improvements - Spring Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 12" RCP	FOOT	311	\$80	\$24,880
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	RESTORATION	LSUM	1	\$5,000	\$5,000
4	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 45-** Concept Cost Estimate - Spring Street

	SUBTOTAL	\$37,380
	25% CONTINGENCY	\$9,345
	<b>CONSTRUCTION TOTAL</b>	<b>\$46,725</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$56,725</b>
	CAPITAL BUDGET	\$57,000



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          SPRING COURT</b>	DATE			
		04-12-2022			

Figure 54- Drainage Improvements - Spring Court

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	310	\$50	\$15,500
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	RESTORATION	LSUM	1	\$10,000	\$10,000
4	REMOVE AND REPLACE CURB AND GUTTER	FOOT	215	\$45	\$9,675
5	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 46- Concept Cost Estimate - Spring Court**

	SUBTOTAL	\$42,675
	25% CONTINGENCY	\$10,669
	<b>CONSTRUCTION TOTAL</b>	<b>\$53,344</b>
	ENGINEERING & PERMITTING	\$10,000
	CONSTRUCTION ENGINEERING	\$8,000
	<b>GRAND TOTAL</b>	<b>\$71,344</b>
	<b>CAPITAL BUDGET</b>	<b>\$72,000</b>

### 5.23 Study Area 23 - Sudbury Lane

One of the drainage areas identified through the comprehensive outreach process is the drainage in the rear yard of several residences on Sudbury Lane just north of Deerfield Way and Pepper Valley Drive. During the rain event in May of 2020, the rear yards of 2258 and 2246 Sudbury Lane were inundated with the excess runoff. There is also reported a large water accumulation in the southeast corner of 2258 Sudbury Lane and other adjacent yards when there is large rain fall. Predominantly ponding occurs in 2257 Deerfield Way. The inundation lasts 3-5 days. It has been observed since 1987. Adjacent lot grading and pool construction may have affected drainage. The rear yard of these two properties is a closed depression that collects water during rain events from nine to ten single family lots for a total of approximately 1.76 acres of tributary area. Although a 6-inch drainage pipe extends from Pepper Valley Drive Road to the vicinity of inundation, ponding of water still occurs.

The recommended solution is installing an inlet in the rear yard in between the property line of lot 2558 and 2246 Sudbury Lane. The inlet will be accompanied by the installation of 10-inch RCP storm sewer pipe from the rear yard to the existing 12-inch storm sewer located within the right-of-way of Sudbury Lane. Construction of the storm sewer will require coordination and cooperation of the homeowners as it may involve limited surface grading to as well as access and construction outside existing easements.

Total estimated construction cost for the recommended solution is \$41,000.

#### Issue

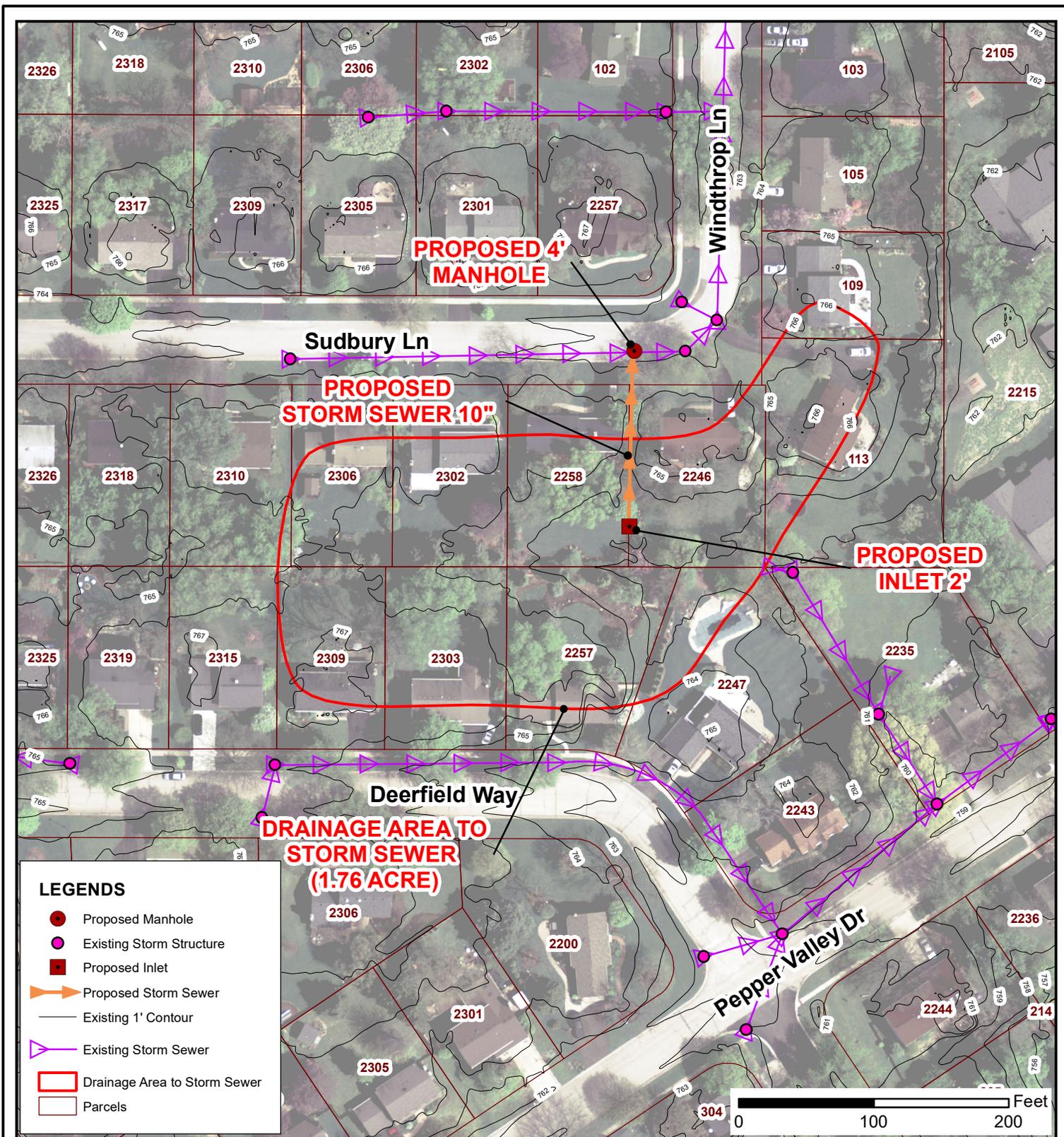
Stormwater runoff from 1.76 acres drains towards the closed depression in the rear yard causing water ponding in the rear yard and adjacent to the residential house during high intensity storm events. The rear yard has historically experienced ponding water which occurred again in the May 2020 rainfall event.

#### Analysis

The Kane County GIS topographic data was used to determine the tributary area to the closed depression in the rear yards. A hydrologic analysis of the tributary area to Sudbury Lane was performed using the Rational Method to determine peak runoff discharges to the rear yard. Inputs into the program included runoff coefficient value, Bulletin 75 rainfall intensity, and drainage area. The peak 10 and 50-year discharge to the rear yard is 3.2 and 4.7 cfs, respectively. The two alternatives were analyzed separately. The first alternative includes the installation of an inlet drainage structure in the rear yards as close as possible to the low point with a 10-inch storm sewer pipe connecting the inlet to an existing 12-inch storm sewer in Sudbury Lane with an estimated slope of 0.5%. The second alternative includes construction of swale that would discharge to the 6-inch storm sewer that runs to Pepper Valley Drive. It is noted that the proposed 10-inch pipe does not have flowing full capacity for the 10-year event. This may result in some surface ponding. However, the drainage conditions will be greatly improved, and the ponding will be limited in terms of duration and extent.

#### Results and Recommended Solution

The result of the topographic analysis indicates that a 0.5-foot-deep closed depression exists in the rear yard of the Sudbury addresses noted herein. A 2-foot diameter storm drainage structure the backyard of these house connected to 10-inch RCP storm sewer running from the rear yard inlet to the existing 12-inch storm sewer within the roadway will drain excess runoff from the closed depression. Moreover, this inlet would also facilitate additional rear yard drainage connections for adjacent houses as needed in future. The restoration and landscape items for a storm sewer installation along the common property line of lot 2246 and lot 2258 of Sudbury Lane would also be included in the project.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          SUDBURY LANE</b>	DATE			
		4-12-2022			

Figure 55- Drainage Improvements - Sudbury Lane

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	126	\$50	\$6,300
2	INLET, 2' DIA	EACH	1	\$2,500	\$2,500
3	MANHOLE, 4' DIA	EACH	1	\$5,000	\$5,000
4	RESTORATION	LSUM	1	\$8,000	\$8,000
5	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 47- Concept Cost Estimate - Sudbury Lane**

SUBTOTAL	\$24,300
25% CONTINGENCY	\$6,075
<b>CONSTRUCTION TOTAL</b>	<b>\$30,375</b>
ENGINEERING & PERMITTING	\$6,000
CONSTRUCTION ENGINEERING	\$4,000
<b>GRAND TOTAL</b>	<b>\$40,375</b>
CAPITAL BUDGET	\$41,000

## 5.24 Study Area 24 - Westfield Course

It has been reported that the rear yard of lots 549 Westfield Course has nuisance ponding after heavy rainfall. The area accepts runoff from several residential lots including those on Kingston Drive, and Westfield Course. There is no drainage structure in the rear yard of 549 Westfield Course and the rear yard is relatively flat. A 4-inch storm line is present in the front yard of 549 Westfield, and an existing 12-inch storm sewer is located along far property line of the adjacent lot to the south. Two proposed alternatives to alleviate the nuisance ponding were considered including the possibility of utilizing the 4-inch sump pump collection trunk in the front yard of 549 Westfield. Based on discussions with City staff this alternative was eliminated. The second alternative consists of extending a rear yard storm sewer across the lot to the north including two inlets to accept surface runoff. This alternative is recommended.

Total estimated construction costs for the recommended alternative are **\$39,000**.

### Issue

Stormwater runoff from the adjacent residential lots along with relatively flat back yard of 549 Westfield Course creates nuisance ponding water in the rear yard after heavy rains. The resident reported of standing water in the May 2020 event.

### Analysis

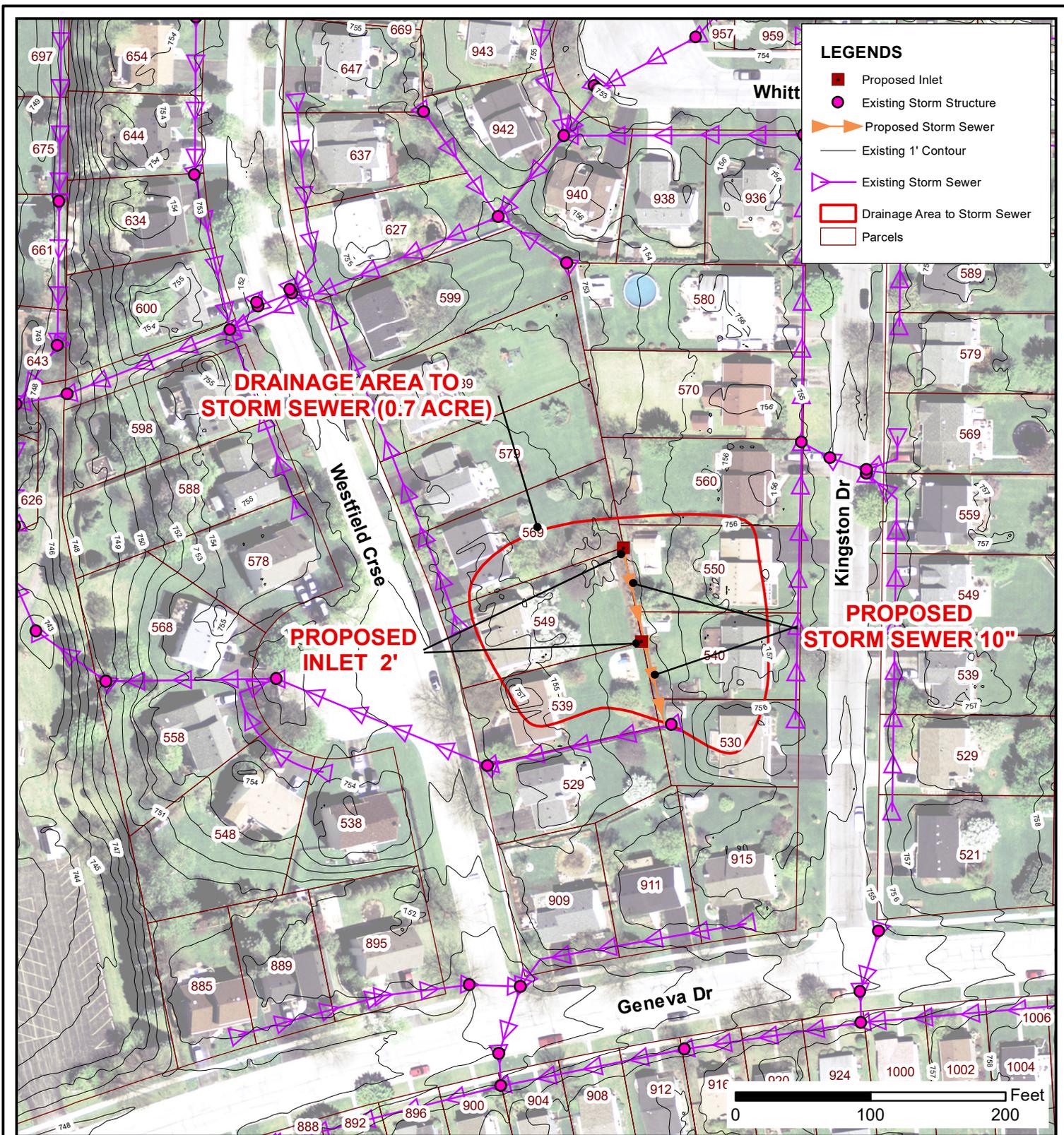
The Kane County GIS topographic data was used to determine the drainage patterns between Westfield Course and Kingston Drive. The drainage area to the rear yard of 549 Westfield Course is relatively minor, therefore a minimum pipe diameter of 10-inch was used since surface conveyance is generally adequate for large events and this improvement is primarily intended to alleviate extended surface inundation.

### Results

The results of the topographic analysis indicate that slope in the rear yard does not provide adequate surface conveyance to the storm sewer inlet to the south. A storm sewer extension would provide drainage relief for the flat rear yard. The proposed storm sewer extension would include two inlets in the rear yard of 549 Westfield Course to accept surface water and allow the adjacent homeowners to tie in underdrains as necessary.

### Proposed Alternatives

Two alternatives were evaluated for consideration; extending a 4-inch drainage pipe from the front yard to the rear to accept surface water or extend the storm sewer from the southeast corner of 539 Westfield Course across the rear yard of 549 to accept surface runoff and provide an outlet for the surface ponding. The second alternative is recommended at a cost of **\$39,000**. This alternative will require cooperation from the homeowner of 549 Westfield to allow construction of a storm sewer across the rear property line and possibly the need for an easement. It may also require cooperation from adjacent homeowners to gain access to the work area.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#			19-0206
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          WESTFIELD COURSE</b>	DATE			
		04-12-2022			

Figure 56- Drainage Improvements - Westfield Course

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" PVC	FOOT	145	\$50	\$7,250
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	RESTORATION	LSUM	1	\$8,000	\$8,000
4	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500

**Table 48-** Concept Cost Estimate - Westfield Course

	SUBTOTAL	\$22,750
	25% CONTINGENCY	\$5,688
	<b>CONSTRUCTION TOTAL</b>	<b>\$28,438</b>
	ENGINEERING & PERMITTING	\$6,000
	CONSTRUCTION ENGINEERING	\$4,000
	<b>GRAND TOTAL</b>	<b>\$38,438</b>
	CAPITAL BUDGET	\$39,000

## 5.25 Study Area 25 - Woodlawn Street and School Street

It has been reported that the rear yards of several residential lots between School Street and Woodlawn Street experience standing water after heavy rainfall events. The area accepts runoff from the rear yards of nine residential lots on Woodlawn Street and School Street. There is no drainage structure in the rear yards and the topography is relatively flat. A proposed drainage improvement for this location is to construct a storm sewer lateral (~200 LF) from the roadway inlet along the south property line of 119 School Street to an inlet in the rear yard to accept surface runoff.

Total estimated conceptual construction cost for the proposed improvement is **\$44,000**.

### Issue

Stormwater runoff from the adjacent residential lots along with relatively flat rear yards creates nuisance ponding water in the rear yards after heavy rains. The resident reported of standing water in the May 2020 event.

### Analysis

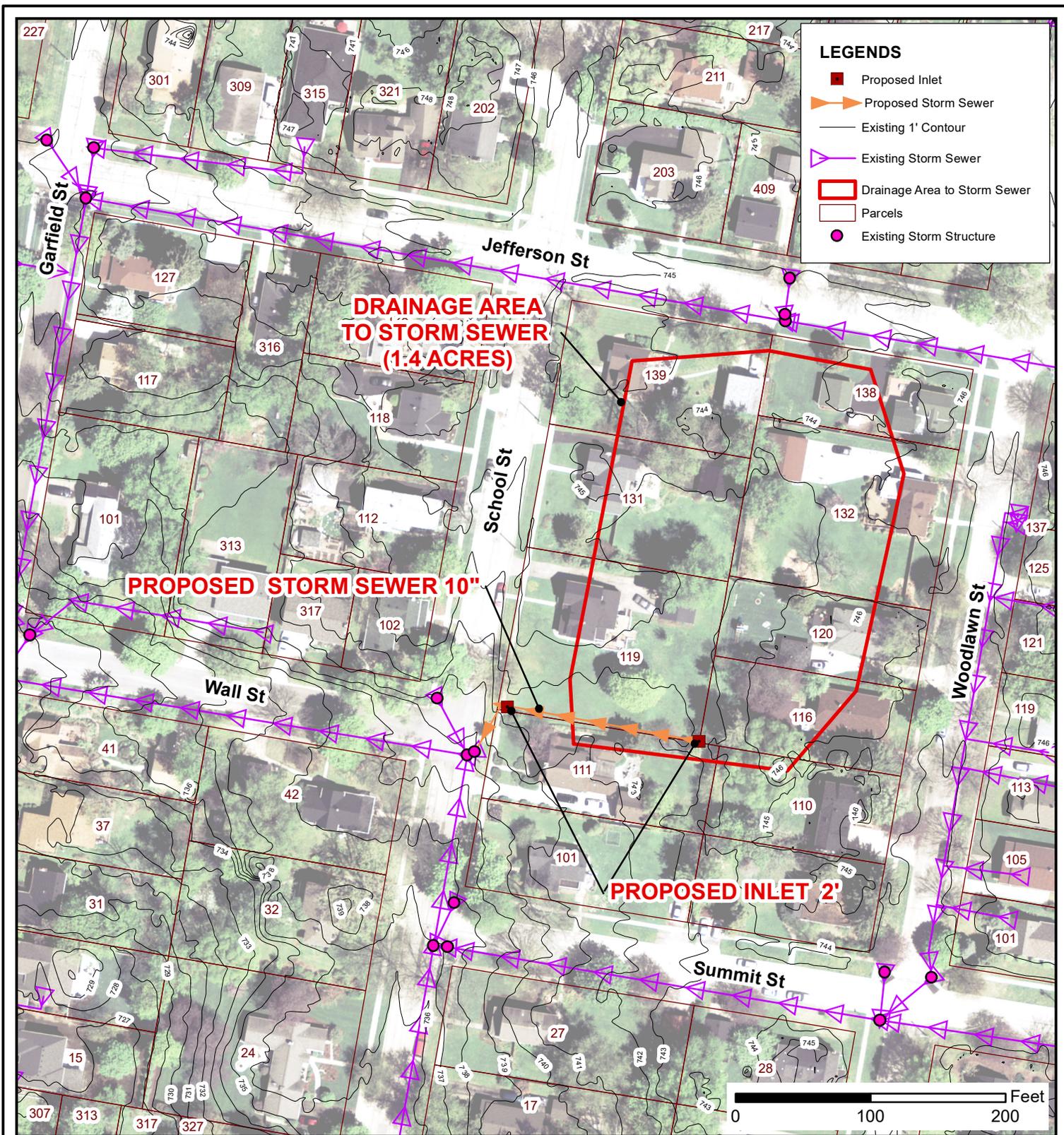
The Kane County GIS topographic data was used to determine the drainage patterns between School Street and Woodlawn Street, and the drainage area to the rear yard of 119 School. The outlet from the rear yards of the lots on the block bounded by Jefferson Street to the north, Summit Street to the south, School Street to the west, and Woodlawn Street to the east. A storm sewer extension to the rear yard would alleviate standing water and provide a closed drainage outlet for the rear yards. The depth of existing drainage structures indicates the sewer is deep enough to extend a sewer lateral to the rear yard.

### Results

The results of the topographic analysis indicate that there is inadequate slope in the rear yard to provide adequate conveyance to the storm sewer inlet to the south and that a storm sewer extension would provide drainage relief for the flat rear yard. The proposed storm sewer extension would include an inlet in the rear yard of 116 Woodlawn and 119 School Street to accept surface water.

### Proposed Drainage Improvement

The proposed drainage improvement includes installing a 10-inch storm sewer lateral at the intersection of School and Wall Streets to the rear yard of 119 School Street terminating in an inlet which would accept surface runoff and provide an outlet for the surface ponding. The estimated cost for the proposed drainage improvement is **\$44,000**. This work will require cooperation from the homeowner of 119 or 111 School Street to allow construction of a storm sewer and possibly the need for an easement. It may also require cooperation from adjacent homeowners to gain access to the work area.



SOURCE:

SCALE: 1" = 100'

CLIENT <b>CITY OF GENEVA</b> 1800 SOUTH ST. GENEVA, IL 60134 630-232-1501	TITLE <b>GENEVA WATERSHED STUDY</b>	DWN.	RB	CHKD.	JWW
		JOB#		19-0206	
<b>WBK ENGINEERING, LLC</b> 116 West Main Street, Suite 201 St. Charles, Illinois 60174 (630) 443-7755	<b>DRAINAGE IMPROVEMENTS          WOODLAWN STREET</b>	DATE			
		EXHIBIT			

Figure 57- Drainage Improvements - Woodlawn Street

	Description	Unit of Measure	Qty.	Unit Cost	Cost
1	STORM SEWER, 10" RCP	FOOT	180	\$50	\$9,000
2	INLET, 2' DIA	EACH	2	\$2,500	\$5,000
3	RESTORATION	LSUM	1	\$8,000	\$8,000
4	REMOVE AND REPLACE CURB AND GUTTER	FOOT	25	\$60	\$1,500
5	CONNECT TO EXISTING STRUCTURE	EACH	1	\$2,500	\$2,500
6	REMOVE AND REPLACE SIDEWALK	SQ FT	75	\$15	\$1,125

**Table 49- Concept Cost Estimate - Woodlawn Street and School Street**

SUBTOTAL	\$27,125
25% CONTINGENCY	\$6,781
<b>CONSTRUCTION TOTAL</b>	<b>\$33,906</b>
ENGINEERING & PERMITTING	\$6,000
CONSTRUCTION ENGINEERING	\$4,000
<b>GRAND TOTAL</b>	<b>\$43,906</b>
CAPITAL BUDGET	\$44,000

# 6 Summary of Capital Improvement Projects

## Summary of Capital Improvement Projects

No.	Drainage Study Area	Problem Statement	Improvement Description	Total Project Cost	Schedule from "5 Yr. Plan" tab	Land Rights	Parcels Benefitted	Cost / Parcel
1	6th Street	Lots are experiencing inundation and prolonged ponding in rear yards.	Installation of a new storm sewer lateral through the affected rear yards.	\$53,000	Design and Construction in one-year; includes construction on private property.	Yes	3	\$17,667
2	Bennett & Dodson	Area yards experiencing flooding due to overland flow.	Installation of stormwater inlets on Dodson Street (local roadway).	\$65,000	Design and Construction in one-year; includes construction in ComED right-of-way.	Yes	1	\$65,000
3	Bluegrass Lane	Lots are experiencing inundation and prolonged ponding in rear and side yards.	Installation of new storm inlets in front yards with new storm sewer lateral.	\$40,000	Design and Construction in one-year; includes construction on private property.	No	2	\$20,000
4	Brian Court	Lots are experiencing inundation and prolonged ponding in rear yards which is causing unnecessary stress on sump pumps.	Extension of new storm sewer to adjacent stormwater basin.	\$47,000	Design and Construction in one-year; includes KDOT coordination.	Yes	2	\$23,500
5	Crawford Street	Local roadways and adjacent yards experiencing inundation.	Replacement of existing culverts with two (2), 30" DIA RCP culverts with grading enhancements and riprap.	\$102,000	Design precedes construction; includes construction on private property.	Yes	4	\$25,500
6	East Side Drive	Lots are experiencing inundation and prolonged ponding in rear yards.	Installation of a new storm sewer extension.	\$39,000	Design precedes construction; includes construction on private property.	Yes	5	\$7,800
7	Fisher Drive	Freezing of prolonged ponding on Fisher Drive at FAA driveway.	Installation of a new storm inlet and trench drain along the existing curb.	\$56,000	Design and Construction in one-year.	Yes	1	\$56,000
8	Forest View Drive	Lots are experiencing inundation in rear yards.	Installation of a new, 15" diameter storm sewer extension with additional drainage structures.	\$108,000	Design precedes construction; includes IDOT permitting.	Yes	4	\$27,000
9	15 Garfield Street	Lots are experiencing inundation and prolonged ponding in rear yards.	Installation of new storm sewer lateral and inlets in rear yard locations.	\$34,000	Design and Construction in one-year; includes construction on private property and likely a permanent easement.	Yes	4	\$8,500
10	Geneva High School	Lots are experiencing inundation and prolonged ponding negatively affecting residential sump pump reliability, causing sanitary sewer backups, impacting roadway longevity, and property maintenance concerns.	Televise the primary storm sewer trunk line to identify existing condition.	\$25,000	No design; consists of in-house bid and management.	No		
			Reconstruct storm sewer within the right-of-way and construct new storm sewer laterals to rear yards of affected areas; should include regular pavement maintenance.	\$3,675,000	Design and construction to occur concurrently with street program.	Yes	540	\$6,806
11	Gray Street	Lots are experiencing inundation and prolonged ponding in various yards.	Installation of a new, 12" storm sewer extension and side yard swale between lots 612 and 602.	\$54,000	Design precedes construction; includes construction on private property.	Yes	4	\$13,500
12	Greenwich Lane	Discharge of sump pump in various yards.	Installation of a new, 10" storm sewer lateral to side and rear yards	\$36,000	Design and Construction in one-year; includes construction on private property.	Yes	2	\$18,000
13	Kansas Street	Lots are experiencing yard inundation.	Installation of a new storm inlet and re-grade existing swale.	\$102,000	Design precedes construction; includes two locations for rear yard access.	Yes	9	\$11,333
14	Longmeadow Drive	Freezing of prolonged ponding in front yards and along curbs caused by sump pump discharges.	Installation of a new, storm sewer along curb to capture sump pump flows.	\$78,000	Design and Construction in one-year; includes private sump pump connection.	Maybe	3	\$26,000
15	Maple Sherman Area	Lots are experiencing inundation and prolonged ponding.	Televise the primary storm sewer trunk line to identify existing condition.	\$6,000	No design; consists of in-house bid and management.	No		
			Reconstruct storm sewer within the right-of-way and construct new storm sewer laterals to rear yards of affected areas; should include regular pavement maintenance.	\$595,000	Design and construction to occur concurrently with street program.	Yes	122	\$4,877
			Improve basin outlet including replacement of basin underdrain.	\$176,000	B-List; includes SSA Contribution	No	9	\$19,556

No.	Drainage Study Area	Problem Statement	Improvement Description	Total Project Cost	Schedule from "5 Yr. Plan" tab	Land Rights	Parcels Benefitted	Cost / Parcel
16	Miller Road	Roadway inundation caused by agricultural debris blocking overland flow and emergency overflow routes through yards.	Construction of improvements to overflow along Gleneagles Drive.	\$351,000	Design precedes construction; includes reconstruction of access on private property and KDOT coordination.	Yes	67	\$5,239
			Sag conveyance along Miller Road.	\$241,000	Design precedes construction; includes construction on private property.	Maybe	48	\$5,021
			Agricultural field debris management.	\$252,000	B-list; relies on future development to facilitate resolution.	Yes	8	\$31,500
17	Oakwood Drive	Lots are experiencing inundation and prolonged ponding in rear yards.	Installation of a new storm sewer extension and re-grade existing swale.	\$161,000	Design precedes construction; includes two project locations, coordination with ComED, and construction on private properties.	Yes	11	\$14,636
18	Pheasant Run Place	Properties are experiencing inundation and prolonged ponding caused by excessive surface flow compounded by debris.	Improvements to upstream catchment at Fargo Boulevard and installation of storm sewer extension with stilling basin. Includes debris management of existing drainage channel.	\$165,000	Includes three projects: Fargo, Pheasant Run Place basin, Railroad right-of-way Debris Management (operational impacts). Requires easement from the School District.	Yes	8	\$20,625
19	Prairie Green Preserve	Property is experiencing inundation and prolonged ponding.	Installation of a new, 18" drainage pipe and grading improvements to existing berm.	\$222,000	Design precedes construction; includes Prairie Green funding and USACE permitting.	No	1	\$222,000
			Extension of new, 18" drainage pipe from Phase 1 to UPRR tracks.	\$359,000	B-list; includes Prairie Green funding and USACE permitting.	No	2	\$179,500
			Extension of new, 18" drainage pipe from UPRR tracks to Mill Creek.	\$514,000	B-list; includes Prairie Green funding and USACE permitting.	No	2	\$257,000
20	Randall Square	Roadways and lots are experiencing inundation and prolonged ponding throughout Sterling Manor caused by frequent overflow through commercial properties and existing public roadway (Merchants Drive).	Increase all restrictors & construct new outfall to Randall Road right-of-way.	\$869,000	Design precedes construction; includes KDOT coordination and construction on private property.	Yes	43	\$20,209
			Regrade to expand storage volume in Basins 1 and 3.	\$924,000	Design precedes construction; includes HOA coordination and coordination of access on private property.	No	67	\$13,791
			Regrade to expand storage volume in Randall Square basin and installation of a new pump facility.	\$2,803,000	Design precedes construction.	No	67	\$41,836
			Construction of a new stormwater management basin at Lewis Road.	\$2,830,000	B-list; Property Acquisition; Evaluate prior improvement performance.	Yes	67	\$42,239
			Construction of a new stormwater management basin at Kaneville Road.	\$1,500,000	B-list; Property Acquisition; Evaluate prior improvement performance.	Yes	67	\$22,388
21	Sheffield Lane	Lots are experiencing inundation and prolonged ponding in rear yards and side yards.	Construction of a new, storm sewer lateral and installation of new storm inlets in rear yards.	\$42,000	Design and Construction in one-year; includes construction on private property.	Yes	3	\$14,000
22	Spring Street/ Spring Court	Lots are experiencing inundation and prolonged ponding in rear yards and side yards.	Construction of a new, storm sewer extension.	\$129,000	Design precedes construction; includes two project locations, coordination of access, and construction on private properties.	Yes	4	\$32,250
23	Sudbury Lane	Lots are experiencing inundation and prolonged ponding in rear yards.	Construction of a new, storm sewer extension.	\$41,000	Design and Construction in one-year; includes construction on private property.	Yes	4	\$10,250
24	Westfield Course	Lots are experiencing inundation and prolonged ponding in rear yards.	Construction of a new, storm sewer extension.	\$39,000	Design and Construction in one-year; includes coordination of access and construction on private property.	Yes	5	\$7,800
25	Woodlawn School Street	Lots are experiencing inundation and prolonged ponding in rear yards.	Construction of a new, storm sewer extension.	\$44,000	Design and Construction in one-year; includes construction on private property and likely a permanent easement.	Yes	4	\$11,000

## Five-Year Capital Plan

No.	Drainage Study Area	Improvement Description	Phase - Duration	Total Project Cost	Design Budget	Construction Budget	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	B-List
1	6th Street	Installation of a new storm sewer lateral through the affected rear yards.	Single-year	\$53,000	\$6,000	\$47,000					\$53,000	
2	Bennett & Dodson	Installation of stormwater inlets on Dodson Street (local roadway).	Single-year	\$65,000	\$10,000	\$55,000	\$10,000	\$55,000				
3	Bluegrass Lane	Installation of new storm inlets in front yards with new storm sewer lateral.	Single-year	\$40,000	\$6,000	\$34,000		\$40,000				
4	Brian Court	Extension of new storm sewer to adjacent stormwater basin.	Single-year	\$47,000	\$8,000	\$39,000		\$47,000				
5	Crawford Street	Replacement of existing culverts with two (2), 30" DIA RCP culverts with grading enhancements and riprap.	Single-year	\$102,000	\$12,000	\$90,000	\$12,000	\$90,000				
6	East Side Drive	Installation of a new storm sewer extension.	Single-year	\$39,000	\$6,000	\$33,000	\$39,000					
7	Fisher Drive	Installation of a new storm inlet and trench drain along the existing curb.	Single-year	\$56,000	\$8,000	\$48,000		\$58,000				
8	Forest View Drive	Installation of a new, 15" diameter storm sewer extension with additional drainage structures.	Single-year	\$108,000	\$10,425	\$97,575	\$10,425	\$97,575				
9	15 Garfield Street	Installation of new storm sewer lateral and inlets in rear yard locations.	Single-year	\$34,000	\$6,000	\$28,000					\$34,000	
10	Geneva High School	Televise the primary storm sewer trunk line to identify existing condition.	Single-year	\$25,000		\$25,000	\$25,000					
		Reconstruct storm sewer within the right-of-way and construct new storm sewer laterals to rear yards of affected areas; should include regular pavement maintenance.	Multi-year (10-20 yrs)	\$3,675,000	\$441,000	\$3,234,000	\$245,000	\$245,000	\$245,000	\$245,000	\$245,000	\$245,000
11	Gray Street	Installation of a new, 12" storm sewer extension and side yard swale between lots 612 and 602.	Single-year	\$54,000	\$6,000	\$48,000		\$6,000	\$48,000			
12	Greenwich Lane	Installation of a new, 10" storm sewer lateral to side and rear yards	Single-year	\$36,000	\$6,000	\$30,000	\$36,000					
13	Kansas Street	Installation of a new storm inlet and re-grade existing swale.	Single-year	\$102,000	\$12,000	\$90,000		\$12,000	\$90,000			
14	Longmeadow Drive	Installation of a new, storm sewer along curb to capture sump pump flows.	Single-year	\$78,000	\$8,000	\$70,000			\$78,000			
15	Maple Sherman Area	Televise the primary storm sewer trunk line to identify existing condition.	Single-year	\$6,000		\$6,000	\$6,000					
		Reconstruct storm sewer within the right-of-way and construct new storm sewer laterals to rear yards of affected areas; should include regular pavement maintenance.	Multi-year (10-20 yrs)	\$595,000	\$71,400	\$523,600	\$39,667	\$39,667	\$39,667	\$39,667	\$39,667	\$396,667
		Improve basin outlet including replacement of basin underdrain.	Single-year	\$176,000	\$21,120	\$154,880						\$176,000
16	Miller Road	Construction of improvements to overflow along Gleneagles Drive.	Single-year (cumulative)	\$351,000	\$28,000	\$323,000		\$28,000	\$323,000			
		Sag conveyance along Miller Road.	Single-year (cumulative)	\$241,000	\$20,000	\$221,000			\$20,000	\$221,000		
		Agricultural field debris management.	Single-year	\$252,000	\$20,000	\$232,000						\$252,000
17	Oakwood Drive	Installation of a new storm sewer extension and re-grade existing swale.	Single-year	\$161,000	\$14,000	\$147,000	\$14,000	\$147,000				
18	Pheasant Run Place	Improvements to upstream catchment at Fargo Boulevard and installation of storm sewer extension with stilling basin. Includes debris management of existing drainage channel.	Single-year (cumulative)	\$165,000	\$18,000	\$147,000	\$18,000	\$147,000				

No.	Drainage Study Area	Improvement Description	Phase - Duration	Total Project Cost	Design Budget	Construction Budget	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	B-List
19	Prairie Green Preserve	Installation of a new, 18" drainage pipe and grading improvements to existing berm.	Single-year	\$222,000	\$22,110	\$199,890				\$22,110	\$199,890	
		Extension of new, 18" drainage pipe from Phase 1 to UPRR tracks.	Single-year	\$359,000	\$35,835	\$323,165						\$359,000
		Extension of new, 18" drainage pipe from UPRR tracks to Mill Creek.	Single-year	\$514,000	\$51,324	\$462,676						\$514,000
20	Randall Square	Increase all restrictors & construct new outfall to Randall Road rightof-way.	Single-year (cumulative)	\$869,000	\$59,888	\$809,113	\$59,888	\$809,113				
		Regrade to expand storage volume in Basins 1 and 3.	Single-year (cumulative)	\$924,000	\$63,551	\$860,449		\$63,551	\$860,449			
		Regrade to expand storage volume in Randall Square basin and installation of a new pump facility.	Single-year (cumulative)	\$2,803,000	\$193,260	\$2,609,740			\$193,260	\$2,609,740		
		Construction of a new stormwater management basin at Lewis Road.	Single-year (cumulative)	\$2,830,000	\$179,184	\$2,650,816						\$2,830,000
		Construction of a new stormwater management basin at Kaneville Road.	Single-year (cumulative)	\$1,500,000	\$102,394	\$1,397,606						\$1,500,000
21	Sheffield Lane	Construction of a new, storm sewer lateral and installation of new storm inlets in rear yards.	Single-year	\$42,000	\$6,000	\$36,000	\$42,000					
22	Spring Street/ Spring Court	Construction of a new, storm sewer extension.	Single-year	\$129,000	\$16,000	\$113,000				\$16,000	\$113,000	
23	Sudbury Lane	Construction of a new, storm sewer extension.	Single-year	\$41,000	\$6,000	\$35,000	\$41,000					
24	Westfield Course	Construction of a new, storm sewer extension.	Single-year	\$39,000	\$6,000	\$33,000	\$39,000					
25	Woodlawn School Street	Construction of a new, storm sewer extension.	Single-year	\$44,000	\$6,000	\$38,000					\$44,000	
<b>Total Costs</b>				\$16,777,000	\$1,485,491	\$15,291,510	\$636,979	\$1,882,905	\$1,897,376	\$3,153,517	\$728,557	\$8,477,667
				<i>Total Project Cost</i>	<i>Total Design Budget</i>	<i>Total Construction Budget</i>	<i>Total 2022/2023</i>	<i>Total 2023/2024</i>	<i>Total 2024/2025</i>	<i>Total 2025/2026</i>	<i>Total 2026/2027</i>	<i>Total B-List</i>



# 7 : Funding of Capital : Improvement Projects



# Funding of Capital Improvement Projects

## 7.1 Funding Options

### 7.1.1 Pay- as -you -go Capital Funding

One option to funding of stormwater capital improvement projects is Pay as You go, in which each project is funded out of the traditional stormwater fund with the City. We anticipate this process would require identifying projects as part of the fiscal budget to fund the required capital. This would require yearly approval of projects for the following year and would be subject prioritization of capital projects with other projects within the City.

### 7.1.2 Municipal Bonds

Another option for funding the projects would be issuance of municipal bonds. Municipal bonds are bonds issued by states, cities or counties and other government entities to raise money to fund public projects. The City would issue these bonds to fund the stormwater projects and the bonds could range in maturities from 15 to 30 years.

### 7.1.3 Special Service Areas (SSA)

Special Service Areas are local tax districts that fund expanded services and programs through a localized property tax levy within the Service Area. The City currently has 33 active SSA's. In discussions with the City, many of the residential areas have their own SSA's to cover maintenance of public areas including stormwater detention areas. Many of the current SSA's are underfunded to provide adequate capital to modify or fix drainage related issues within the stormwater areas. Typical maintenance issues include silt buildup and removal, end section maintenance, storm sewer maintenance, and vegetation control. New Special Service Areas could be set up to fund localized stormwater capital improvement projects. Developing a new tax for specific areas of the City would be politically difficult to pass.

### 7.1.4 Outside Funding Sources

The Federal Emergency Management Agency (FEMA) provides several different types of grants to fund stormwater public infrastructure. Three most common grants include; Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant Program, and Flood Mitigation Assistance. A short summary of all three programs are listed below:

#### FEMA Hazard Mitigation Grant Program

The HMGP program BRIC program seeks to support risk reduction and increase community resilience through funding of hazard mitigation grant projects and activities. Besides inland and coastal flooding, the grant program covers other hazards such as wildfires, tornadoes, and power outages. The grant program covers the United States and is a competitive program. The 2021 funding was 1.6 billion.

FEMA Pre-Disaster Mitigation Grant Program makes federal funds available to state, local, tribal and territorial governments to plan for and implement sustainable cost- effective measures designed to reduce the risk to individual and property from future natural hazards. The Fiscal Year 2022 total funds for the program were approximately 154 million for 68 congressionally directed projects. These funds can be used to cover projects related to storm sewer, stormwater detention, flood walls and flood relief, dam removal, and other stormwater projects. Cost share is required for this program and generally the cost share is 75% federal and 25% non-federal.

#### Flood Mitigation Assistance

This program's goal is to reduce or eliminate claims under the National Flood Insurance Program with a focus on mitigating Severe Repetitive Loss and Repetitive Loss properties. Various types of projects are eligible for FMA grants including; elevation of structures, flood control, acquisitions, mitigation reconstruction, and engineering, environmental, feasibility and/ or cost benefit analysis.

### 7.1.5 Stormwater as a Utility

Establishing a stormwater utility is a viable strategy for local governments to respond to the challenge of generating reliable revenue to support stormwater management activities. Setting up a stormwater utility allows a community to establish a user fee based on the demands property owners place on the drainage system. It subsequently provides a dedicated revenue stream for stormwater programs.

#### Legal Issues

When stormwater utilities have been challenged in court, litigants have sometimes argued that the fee is a real estate tax and that the tax is improperly levied – for instance, levied on a church or other institution that is exempt from property taxes. However, stormwater fees have withstood this type of legal challenge in Illinois and multiple other states. Case law supports the proposition that a stormwater charge that meets a basic legal test is not a tax.

The most recently decided case in Illinois regarding the legality of a stormwater fee is *Green v. Village of Winnetka*, 2019 IL App (1st) 182153, in which a Winnetka citizen alleged both that the Fee was really a tax and that the Fee is not proportional to use of the stormwater system because it does not vary according to the amount of stormwater actually discharged by property in the Village, as the Village does not measure each parcel's stormwater discharge into the system in order to assess the Fee. The First District Appellate Court, Sixth Division, ruled that the Village was lawful in charging the Fee for stormwater service (which was not a tax) and that their basis for assessing the Fee – impervious area - was reasonable.

A second question is whether local governments have the legal authority to institute the fee. Home rule units of local government, with their relatively broad powers to institute fees and taxes, should have no legal difficulty in establishing stormwater fees. Most municipalities in Illinois that have established stormwater fees have done so under their home rule powers. While non-home rule units are more restricted in the fees they may establish, all municipalities have the power to own and operate utilities under the Illinois Municipal Code. The non-home rule Village of Libertyville, Village of Morton, City of East Moline, and Village of Richton Park, and Village of Villa Park have established stormwater fees.

#### Benefits of a Stormwater Utility

There are several benefits to a local government of a dedicated stormwater utility fee.

- » **Revenue** – A dedicated stormwater fee generates a stable source of revenue to fund stormwater BMPs.
- » **Structure** – A distinct Stormwater Utility creates an organized entity to solve the problems regarding stormwater management including aging infrastructure, development, and legal challenges.
- » **Environment** – Increased focus on stormwater issues such as erosion, flooding, preservation of source water and water quality can encourage environmental initiatives.
- » **Regulation** – A dedicated Stormwater Utility can focus on meeting the requirements of NPDES permits and other regulatory mandates.

Most importantly, a stormwater utility provides the means of collecting the revenue required to construct and maintain large stormwater capital improvements needed to protect City businesses and residents from the effects of flooding.

#### Key Policy Issues

There are several policy issues that impact the cost needed to sustain a stormwater utility, and therefore the fees that are charged to support the utility. The City must first define the Level of Protection it will provide with its stormwater investments, the funding mechanism by which it will generate revenue to cover the costs related to the LOP, and the administrative process by which stormwater fees may be appealed or reduced for particular customers.

#### Level of Protection

The Level of Protection is the likelihood of a storm occurring that might result in structural damage. However, weather is unpredictable, and it is somewhat misleading to characterize a storm as a “10-year” or “100-year” event, since it is statistically possible that multiple 100-year storms could occur during a 100-year period. It is more precise to say the LOP has a 1% probability of being exceeded in any given year. The proposed improvements for most small yard inundation issues were designed to convey the discharge with the goal of providing an outlet for the stormwater. The large projects were sized for a 100 year (1% level of protection), therefore the capital costs for those improvements could be reduced if a lower level of protection was implemented.

### Funding Mechanisms

There are several funding mechanisms that may be used to generate revenue for the operation of a stormwater utility. Examples are ad valorem taxes, rates based on water consumption, and fees based on impervious area. Each funding mechanism has benefits and disadvantages. When deciding the funding mechanism of a stormwater utility a balance must be made between the administrative simplicity and understandability of the fee and the detail and equity by which it allocates costs to customers. In all cases, assumptions and allocations must be made due to the impracticality of measuring the actual runoff contribution of each customer parcel within a stormwater system. In general, impervious area is considered the most equitable funding mechanism for a stormwater utility because it most accurately reflects the stormwater contribution of each customer's parcel to the system. Since the purpose of this study was to provide information on the stormwater issues throughout the City, and the costs associated with drainage solutions, this study did not calculate the fee based on lot impervious area. With this study information in hand, if the City were to decide that a funding mechanism is to be implemented, a separate analysis may be warranted to develop a fee based on parcel impervious area.

### Credits / Incentives

A local government may choose to make certain credit programs available to its stormwater customers. In general, credits may be offered to parcels that either do not contribute runoff to the system, parcels that build and maintain BMPs separate from the system, or parcels whose owners try to reduce impervious area. Credits and incentives increase the cost of stormwater management to those who do not qualify since the cost of operating a stormwater management system is largely fixed. A key policy consideration when developing a stormwater utility is the credits offered and the process by which they may be granted. Also, the duration of any credits and the process by which they are reviewed and renewed is a key consideration. Periodic reviews would be required to ensure the BMP is still active and functioning.

## 7.2 City Stormwater Utility Financial Forecast

The financial forecast developed by NewGen Strategies and Solutions, LLC (“NewGen”) includes the most recently available actual stormwater financial data and forecasts that incorporate the necessary operating and maintenance (“O&M”) and capital expenses of the system.

### Coordination with the City

To develop the forecasted costs and revenue of a stormwater utility for the City, NewGen coordinated with Public Works staff and their consulting engineers at WBK Engineering, LLC, as well as City Finance staff. The forecasts detailed below are estimates based on the latest available data and will change materially with changes in assumptions and the timing at which decisions are made to implement key policies. As the City makes decisions on the path forward, NewGen recommends updating the forecast with the latest available data.

### Revenue Requirement

There are three cost components of the stormwater system’s revenue requirement, which is the total amount of revenue necessary to support the stormwater management system each year: Operating and Maintenance (O&M), Capital (including Pay-as-you-go and debt financed projects), and Reserve Contributions. NewGen used the City’s FY 2022 budget as the basis for forecasting stormwater costs, as well as the Capital Improvement Plan (CIP) developed by WBK Engineering.

### Operating Expenses

NewGen’s forecast assumes that the City would add labor costs to support additional FTEs related to the stormwater system beginning in FY 2023. Other allocations of FTE costs would remain consistent with FY 2022 allocations and are escalated at an assumed increase in labor costs. The forecast is presented in “Table 50- Forecasted Stormwater O&M Expenses”. Going forward, the City should evaluate the need for labor hours as the capital projects recommended by Going forward, the City should evaluate the need for labor hours as the capital projects recommended by WBK are completed. Capital Expenses

**Table 50- Forecasted Stormwater O&M Expenses**

	FY 2022 Budget	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast	FY 2026 Forecast	FY 2027 Forecast
FT Employee #1	\$5,757	\$5,901	\$6,048	\$6,200	\$6,355	\$6,514
FT Employee #2	\$9,804	\$10,049	\$10,300	\$10,558	\$10,822	\$11,092
FT Employee #3	\$8,107	\$8,310	\$8,517	\$8,730	\$8,949	\$9,172
FT Employee #4	\$6,858	\$7,029	\$7,205	\$7,385	\$7,570	\$7,759
FT Employee #5	\$6,486	\$6,648	\$6,814	\$6,985	\$7,159	\$7,338
FT Employee #6	\$6,689	\$6,856	\$7,028	\$7,203	\$7,383	\$7,568
Maintenance	\$21,480	\$21,802	\$22,129	\$22,461	\$22,798	\$23,140
Additional FTEs	\$ -	\$50,000	\$51,250	\$52,531	\$53,845	\$55,191
<b>Total O&amp;M Expenses</b>	<b>\$65,181</b>	<b>\$116,596</b>	<b>\$119,293</b>	<b>\$122,054</b>	<b>\$124,880</b>	<b>\$127,774</b>

### Capital Expenses

WBK Engineering provided NewGen with a long-term forecast of necessary stormwater capital improvement projects. "Figure 58- Ten-Year Stormwater Capital Improvement Plan Spending" summarizes the annual amount of project costs and the assumed funding source for stormwater projects.

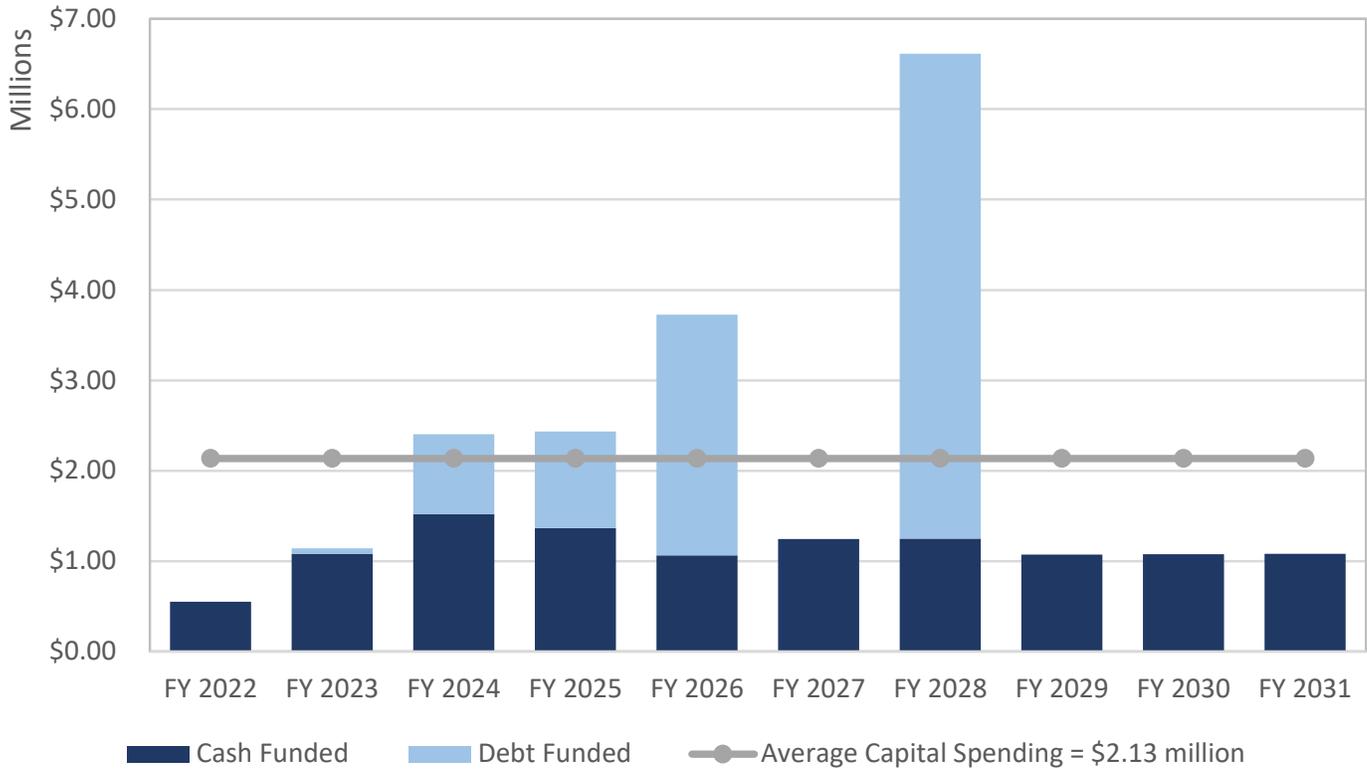


Figure 58- Ten-Year Stormwater Capital Improvement Plan Spending

NewGen assumes that approximately \$10.0 million of the City’s stormwater capital plan will be financed with new loans. NewGen assumed loan terms of 20 years and interest of 3.0% for each new debt issue. “Figure 59- Ten-Year Debt Service Forecast” shows the new debt service payments that result from the estimated capital financing plan.

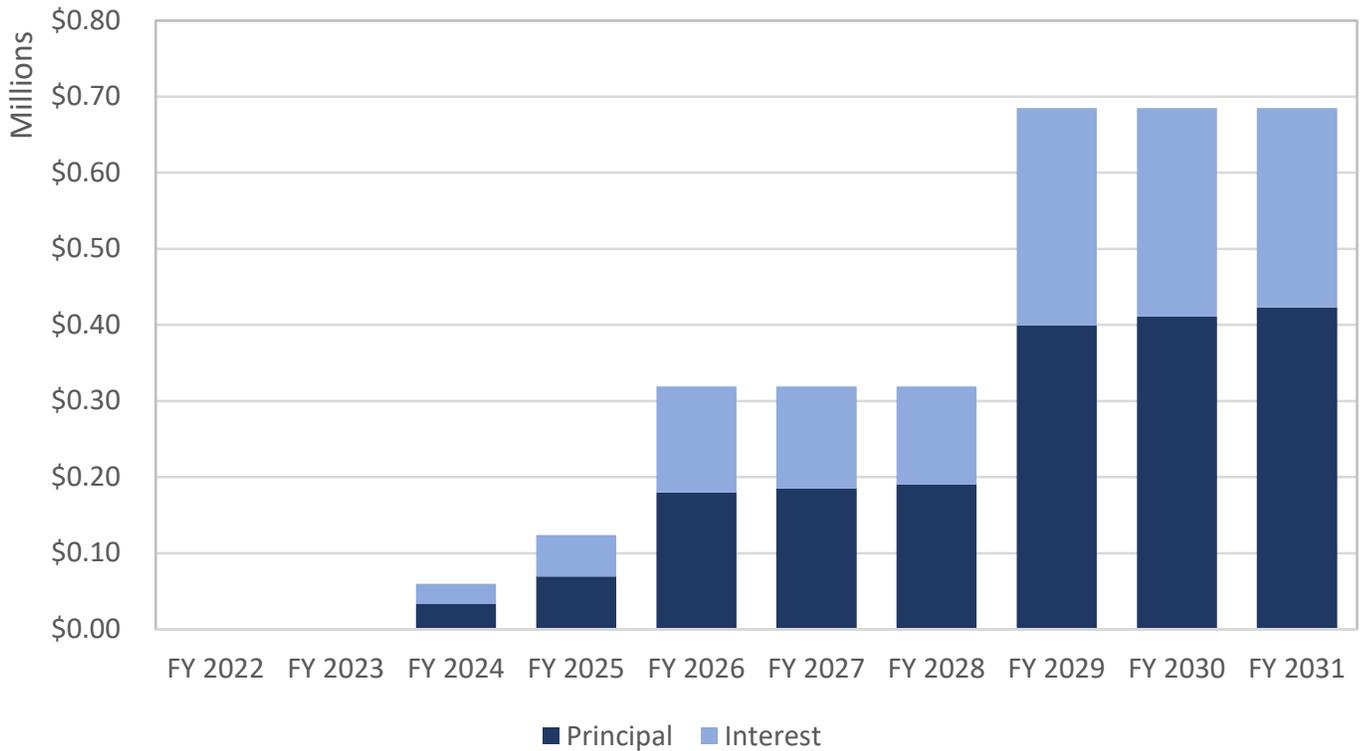


Figure 59- Ten-Year Debt Service Forecast

### Reserves

To maintain the financial health of the City’s stormwater utility, NewGen recommends that the City maintain a minimum fund balance equal to 90 days (25%) of annual O&M expenses and 100% of annual debt service. Reserve contributions would be made in the early years of the Stormwater Fund to meet a recommended minimum reserve balance. Total

Table 51- Stormwater Fund Minimum Reserve Recommendation

	FY 2022 Estimated	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast	FY 2026 Forecast	FY 2027 Forecast
Operating Reserve	\$16,072	\$28,750	\$29,415	\$30,095	\$30,792	\$31,506
Debt Service Reserve	\$ -	\$ -	\$59,860	\$123,828	\$318,846	\$318,846
Total Minimum Reserve	\$16,072	\$28,750	\$89,275	\$153,923	\$349,638	\$350,352

### Miscellaneous Revenues

The City may decide to establish a Stormwater Fund to segregate the costs of its stormwater program. NewGen developed estimates if the City establishes a new Stormwater Fund with a General Fund transfer of \$500,000, to be paid back at nominal interest over a five-year period. The only other non-rate revenue included in the revenue requirement forecast is interest earned on Stormwater Fund balances, which NewGen included at 1.0% per year.

### Revenue Requirement Forecast

The following table shows the revenue requirement forecast for fiscal years 2022 through 2027. To support the

**Table 52-** Stormwater Net Revenue Requirement Forecast

	FY 2022 Estimated	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast	FY 2026 Forecast	FY 2027 Forecast
Operating Expenses	\$65,181	\$116,596	\$119,293	\$122,054	\$124,880	\$127,774
Cash Funded Capital	\$551,000	\$1,082,544	\$1,520,399	\$1,363,990	\$1,064,877	\$1,246,319
Debt Service	\$ -	\$ -	\$59,860	\$123,828	\$318,846	\$318,846
GF Loan Repayment	\$ -	\$106,079	\$106,079	\$106,079	\$106,079	\$106,079
Reserve Contributions	\$ -	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
<b>Total Revenue Requirement</b>	<b>\$616,181</b>	<b>\$1,355,219</b>	<b>\$1,855,631</b>	<b>\$1,765,951</b>	<b>\$1,664,683</b>	<b>\$1,849,019</b>
Less Misc. Revenues	\$ -	(\$1,479)	(\$1,877)	(\$2,249)	(\$3,523)	(\$5,822)
<b>Net Revenue Requirement</b>	<b>\$616,181</b>	<b>\$1,353,740</b>	<b>\$1,853,755</b>	<b>\$1,763,701</b>	<b>\$1,661,160</b>	<b>\$1,843,197</b>

Stormwater Fund at the forecasted revenue requirement, the City would need to implement a distinct revenue source in the form of a stormwater rate or fee.

### Stormwater Fee Basis

The fee necessary to support the Stormwater system was estimated for three different types of fees: a monthly fee per water customer, a monthly fee per parcel, or the tax rate per \$100 of assessed value within the City. The fee forecast maintains the minimum recommended reserve balance in each Fiscal Year. The following table shows the monthly fees necessary to support the revenue requirement forecast.

**Table 53-** Stormwater Fee Forecast

	FY 2022 Estimated	FY 2023 Forecast	FY 2024 Forecast	FY 2025 Forecast	FY 2026 Forecast	FY 2027 Forecast
<b>Monthly Fee</b>						
Per Water Account	\$1.00	\$13.50	\$18.50	\$18.50	\$18.50	\$18.50
Per Parcel	\$1.00	\$13.00	\$17.50	\$17.50	\$17.50	\$17.50
<b>Annual Tax Rate</b>						
Per \$100 Assessed Value	\$0.0110	\$0.1238	\$0.1697	\$0.1697	\$0.1697	\$0.1697



# 8 : Other : Recommendations



## Other Recommendations

---

Throughout the study we became aware of City operations and maintenance procedures as well as data collection and capture methods for the City's drainage infrastructure. Several recommendations for process improvements include the following:

### 8.1 Leverage GIS for Data Capture

Changes in both property ownership and City staff can lead to a loss of documentation and understanding of drainage issues. The City's GIS system can be used to organize, store, and retain resident concerns and service requests to establish a history and trend of drainage issues. This data can be used to further evaluate the existing systems and the effectiveness of constructed drainage improvements. Utility information from all completed projects should be input into the GIS system to keep the system current.

### 8.2 Rainfall Event Data Capture Protocols

Future service requests from extreme weather events will require capturing photographic data as well as clearly documenting discussions with residents. Establishing a set of resident question forms and data collection protocols will help City staff efficiently collect information for future analyses. A standardized form will maintain consistency among reports even though they may be filled out by different residents or City staff.

### 8.3 Capital Plan Updates

We recommend the 10-year plan be reviewed and updated every three to five years depending on budget resources and drainage priorities. The scope of the update can be determined based on the success of the prior plan to ameliorate drainage concerns with the City. The capital plan can be updated to align with the completed projects and re-prioritize projects.

### 8.4 Continued Public Engagement

With aging infrastructure and changing rainfall data it is critical the City proactively seek citizen input. Even though it is likely service calls will identify locations of concern it should not be assumed service calls alone are adequate. Engagement can be combined with capital plan updates or considered a separate effort altogether.



# 9 : Definitions & : Acronyms



## Definitions and Acronyms

**Bulletin 70** | Frequency Distributions and Hydroclimatic Characteristics of Heavy Rainstorms in Illinois- Floyd A. Huff, James Angel, 1989

**Bulletin 75** | ISWS Contract Report 2019-05-Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70; James Angel, Momcilo Markus, 3/2019

**DSA** | Drainage Study Areas

**FEMA** | Federal Emergency Management Agency

**FHWA HY-8** | Culvert Hydraulic Analysis Program, Federal Highway Administration, USDOT,

**FIRM** | Flood Insurance Rate Map

**GIS** | Geographic Information System

**HEC-HMS** | Hydrologic Engineering Center- Hydrologic Modeling System

**HEC-Ras** | Hydrologic Engineering Center- River Analysis System

**NFIP** | National Flood Insurance Program

**NPDES** | National Pollution Discharge Elimination System

**O&M** | Operation and Maintenance

**Rational Method** | a method of computing peak discharge from an area using three components; drainage area, C value, and rainfall intensity

**RCBC** | Reinforced Concrete Box Culvert

**Runoff Curve Number** | an empirical parameter used in hydrology calculations for predicting direct runoff or infiltration from excess rainfall.

**SFHA** | Special Flood Hazard Area

**Smartsheet** | online project management software, Smartsheet, Inc.

**SSA** | Special Service Area

**Tc** | Time of concentration

**TP-40** | Technical Paper No 40 Rainfall Frequency Atlas of the United States, Soil Conservation Service- US Dept. of Agriculture, May 1961

**TR-55** | Urban Hydrology for Small Watersheds TR-55, (Technical Release 55) Natural Resource Conservation Service, USDA, June 1986



# List of Figures

Figure 1- City of Geneva Corporate Limits..... 9

Figure 2- Interactive Map Results ..... 11

Figure 3- Summary of Responses ..... 12

Figure 4- Primary Watersheds ..... 13

Figure 5- FEMA Flood Map - City of Geneva ..... 15

Figure 6- City GIS Data ..... 15

Figure 7- City SSA Map ..... 16

Figure 8- City of Geneva Storm Sewer ..... 21

Figure 9- FEMA Firm Panel 263 ..... 22

Figure 10- FEMA Firm Panel 264 ..... 23

Figure 11- FEMA Firm Panel 268 ..... 23

Figure 12- FEMA Firm Panel 326 ..... 24

Figure 13- FEMA Firm Panel 327 ..... 24

Figure 14- FEMA Firm Panel 331 ..... 25

Figure 15- FEMA Firm Panel 332 ..... 25

Figure 16- City of Geneva Storm Study Areas Map..... 27

Figure 17- Example: Randall Square Sub-Basin Delineation ..... 28

Figure 18- GIS Database of Stormwater Basin ..... 37

Figure 19- Off-Site Drainage Influence ..... 39

Figure 20- City of Geneva Storm Study Areas Map..... 48

Figure 21- Drainage Improvements - 6th Street..... 50

Figure 22- Drainage Improvements - Bennett & Dodson..... 53

Figure 23- Drainage Improvements - Bluegrass Lane ..... 56

Figure 24- Drainage Improvements - Brian Court ..... 59

Figure 25- Drainage Improvements - Crawford Street..... 62

Figure 26- Drainage Improvements - East Side Drive..... 65

Figure 27- Drainage Improvements - Fisher Drive..... 68

Figure 28- Drainage Improvements - Forest View Drive..... 72

Figure 29- Drainage Improvements - 15 Garfield Street ..... 75

Figure 30- Drainage Improvements - Geneva High School..... 80

## List of Figures

Figure 31- Drainage Improvements - Gray Street .....	85
Figure 32- Drainage Improvements - Greenwich Lane.....	88
Figure 33- Drainage Improvements - Kansas Street .....	92
Figure 34- Drainage Improvements - Longmeadow Drive .....	95
Figure 35- Drainage Improvements - Maple Sherman Area.....	100
Figure 36- Drainage Improvements - Maple Sherman Area (Alternative 1) .....	103
Figure 37- Drainage Improvements - Miller Road (Gleneagle Drive) .....	108
Figure 38- Drainage Improvements - Miller Road (Culvert Improvements) .....	110
Figure 39- Drainage Improvements - Miller Road (Wildwood Berm).....	112
Figure 40- Drainage Improvements - Oakwood Drive (East) .....	115
Figure 41- Drainage Improvements - Oakwood Drive (School Street).....	118
Figure 42- Drainage Improvements - Pheasant Run Place.....	124
Figure 43- Drainage Improvements - Pheasant Run Place (Alternative) .....	125
Figure 44- Drainage Improvements - Pheasant Run Place (Fargo Boulevard).....	127
Figure 45- Drainage Improvements - Prairie Green Preserve .....	132
Figure 46- Drainage Improvements - Randall Square (Overall).....	139
Figure 47- Drainage Improvements - Randall Square (Alternative 1).....	140
Figure 48- Drainage Improvements - Randall Square (Alternative 2).....	142
Figure 49- Drainage Improvements - Randall Square (Alternative 3).....	146
Figure 50- Drainage Improvements - Randall Square (Alternative 4).....	148
Figure 51- Drainage Improvements - Randall Square (Alternative 5).....	150
Figure 52- Drainage Improvements - Sheffield Lane.....	153
Figure 53- Drainage Improvements - Spring Street.....	156
Figure 54- Drainage Improvements - Spring Court.....	158
Figure 55- Drainage Improvements - Sudbury Lane .....	161
Figure 56- Drainage Improvements - Westfield Course.....	164
Figure 57- Drainage Improvements - Woodlawn Street.....	167
Figure 58- Ten-Year Stormwater Capital Improvement Plan Spending .....	181
Figure 59- Ten-Year Debt Service Forecast .....	182

## List of Tables

Table 1- Stormwater Net Revenue Requirement Forecast .....	4
Table 2- Stormwater Fee Forecast .....	5
Table 3- Comment Distribution by Watershed .....	12
Table 4- Geneva Study Areas .....	27
Table 5- Rainfall Depths at Various Recognized Standards.....	29
Table 6- Geneva Population Change .....	33
Table 7- Geneva Study Areas .....	48
Table 8- Concept Cost Estimate - 6th Street .....	51
Table 9- Concept Cost Estimate - Bennett & Dodson.....	54
Table 10- Concept Cost Estimate - Bluegrass Lane.....	57
Table 11- Concept Cost Estimate - Brian Court .....	60
Table 12- Concept Cost Estimate - Crawford Street.....	63
Table 13- Concept Cost Estimate - East Side Drive.....	66
Table 14- Concept Cost Estimate - Fisher Drive.....	69
Table 15- Concept Cost Estimate - Forest View Drive .....	73
Table 16- Concept Cost Estimate - 15 Garfield Street .....	76
Table 17- Concept Cost Estimate - Geneva High School (Recommendation A).....	81
Table 18- Concept Cost Estimate - Geneva High School (Recommendation B).....	81
Table 19- Concept Cost Estimate - Geneva High School (Recommendation C).....	82
Table 20- Concept Cost Estimate - Gray Street.....	86
Table 21- Concept Cost Estimate - Greenwich Lane.....	89
Table 22- Concept Cost Estimate - 24/28 Kansas Street.....	93
Table 23- Concept Cost Estimate - 108 Kansas Street .....	93
Table 24- Concept Cost Estimate - Longmeadow Drive .....	96
Table 25- Concept Cost Estimate - Maple Sherman Area (Recommendation A).....	101
Table 26- Concept Cost Estimate - Maple Sherman Area (Recommendation B).....	101
Table 27- Concept Cost Estimate - Maple Sherman Area (Recommendation C).....	102
Table 28- Concept Cost Estimate - Maple Sherman Area (Recommendation D - Alternative 1)	104
Table 29- Concept Cost Estimate - Miller Road (Gleneagle Drive) .....	109
Table 30- Concept Cost Estimate - Miller Road (Culvert Improvements) .....	111

## List of Tables

Table 31- Concept Cost Estimate - Miller Road (Wildwood Berm).....	113
Table 32- Concept Cost Estimate - Oakwood Drive - East .....	116
Table 33- Concept Cost Estimate - Oakwood Drive - School Street .....	119
Table 34- Concept Cost Estimate - Pheasant Run Place.....	126
Table 35- Concept Cost Estimate - Pheasant Run Place (Fargo Boulevard).....	128
Table 36- Concept Cost Estimate - Prairie Green Preserve (Phase 1) .....	133
Table 37- Concept Cost Estimate - Prairie Green Preserve (Phase 2) .....	133
Table 38- Concept Cost Estimate - Prairie Green Preserve (Phase 3) .....	134
Table 39- Concept Cost Estimate - Randall Square (Alternative 1) .....	141
Table 40- Concept Cost Estimate - Randall Square (Alternative 2) .....	143
Table 41- Concept Cost Estimate - Randall Square (Alternative 3) .....	147
Table 42- Concept Cost Estimate - Randall Square (Alternative 4) .....	149
Table 43- Concept Cost Estimate - Randall Square (Alternative 5) .....	151
Table 44- Concept Cost Estimate - Sheffield Lane.....	154
Table 45- Concept Cost Estimate - Spring Street.....	157
Table 46- Concept Cost Estimate - Spring Court.....	159
Table 47- Concept Cost Estimate - Sudbury Lane .....	162
Table 48- Concept Cost Estimate - Westfield Course .....	165
Table 49- Concept Cost Estimate - Woodlawn Street and School Street .....	168
Table 50- Forecasted Stormwater O&M Expenses.....	180
Table 51- Stormwater Fund Minimum Reserve Recommendation.....	182
Table 52- Stormwater Net Revenue Requirement Forecast.....	183
Table 53- Stormwater Fee Forecast .....	183

# 10 Appendix A - Stormwater Basin SSA Summary

## Appendix A - Stormwater Basin SSA Summary

SSA No.	Ord. No.	SSA Name	Date Established	SSA Purpose	Active Levy	HOA Management	Staff Observations (9/2020)	Capital Project Candidate
SSA 01	88-03	Downtown	05/01/88	Parking	Yes	No		No
SSA 02	83-03	Geneva East	05/22/83	Private access system	No	Chesapeake Association & Park District	No concerns	No
SSA 03	85-06	McLaughlin Subdivision	04/11/85	Road work and maintenance	No	No		No
SSA 04	87-62	Randall Square	11/16/87	Detention pond maintenance	Yes	Randall Square Association	Fire Station - Pipe exposed with joints separating, "berm" storm exposed and separating, cat tails and numerous FES maintenance issues, Lewis Road East -SE corner hold minor amount of water, Lewis Road west - OK, Best Buy pond overflow route! HOA request to have trees trimmed, east pond slope maintenance.	Yes
SSA 05	89-05	Williamsburg	01/16/89	Detention pond maintenance	Yes	Williamsburg Village Condo	Highbury west pond - erosion, West St pond hold water year round washouts, Highbury East OK	Yes
SSA 07	89-04	Blackberry	01/16/89	Detention pond maintenance	Yes	No	FES maintenance, Walgreens basin - flat bottom holds water, Bricher basin outlet maintenance	No
SSA 08	89-02	Sunset Meadows III	01/16/89	Stormwater	No	No	No concerns	No
SSA 09	89-03	Geneva Knolls	01/16/89	Detention pond maintenance	Yes	No	Algal blooms, outfall maintenance	Hold
SSA 11	90-24	Eagle Brook Country Club	06/18/90	Drainage, retention, detention	Yes	No	Actively managed by consultant	Hold
SSA 12	91-47	Averill Road Extension	09/04/91	To build Averill Road	No	No	End section and inlet maintenance	No
SSA 14	93-16	Creekside Drive	04/15/93	Drainage, retention, detention	No	No	Pavement settling, culvert failure?	No
SSA 16	97-37, 97-39, 15-16	Fisher Farms	07/07/97	Retention/Detention maintenance	Yes	Fisher Farms Association	Most ponds good. Planters Row basin north inlet - willow tree. Drainage issue across trail due to snow melt also impacts roadway - drainage improvement	Hold
SSA 17	97-38	Fisher Farms Commercial Area A	07/07/97	Drainage, retention, detention	No	Fisher Farms Association		No
SSA 18	96-70	Wildwood	11/18/96	Detention pond maintenance	Yes	No	Inlet maintenance	No
SSA 20	97-40	Fisher Farms Commercial Area A	07/07/97	Drainage, retention, detention	No	Fisher Farms Association	no issue	No
SSA 21	97-41	Fisher Farms Commercial Area D	07/07/97	Drainage, retention, detention	No	Fisher Farms Association	South Pond - Northeast inlet vegetation blockage. outlet blocked numerous FES maintenance issues.	Hold
SSA 22	97-33	North Riverfront III	06/02/97	Parking	Yes	No		No
SSA 23	98-27	Sunset Meadows	06/15/98	Detention pond maintenance	Yes	No	South end cat tails FES maintenance	Hold

SSA No.	Ord. No.	SSA Name	Date Established	SSA Purpose	Active Levy	HOA Management	Staff Observations (9/2020)	Capital Project Candidate
SSA 25	21-Oct	1000 Randall Road	05/03/10	Detention pond maintenance	No	1000 Randall Road Condominium Master Association	Vegetation maintenance - Letter to Owner	No
SSA 26	Oct-43	Westhaven PUD - Residential	10/04/10	Detention pond maintenance	Yes	No	Erosion at inlet, FES maintenance	No
SSA 27	Oct-44	Westhaven PUD - First Baptist Church	10/04/10	Detention pond maintenance	No	No	No concerns	No
SSA 28	Oct-48	Northern Illinois Food Bank	12/06/10	Detention pond maintenance	No	No	Vegetation and outfall access - Letter to Owner	No
SSA 29	29-Nov	Roquette	05/02/11	Detention pond maintenance	No	No	Vegetation and outfall maintenance - Letter to Owner	No
SSA 30	12-Nov	2202 Gary Lane	02/22/11	Drainage, retention, detention	No	No	Vegetation maintenance, access limited	No
SSA 32	15-32	On Brentwood's Pond Subdivision (Residential)	11/02/15	Retention/Detention maintenance	Yes	No	Actively maintained by consultant	Hold