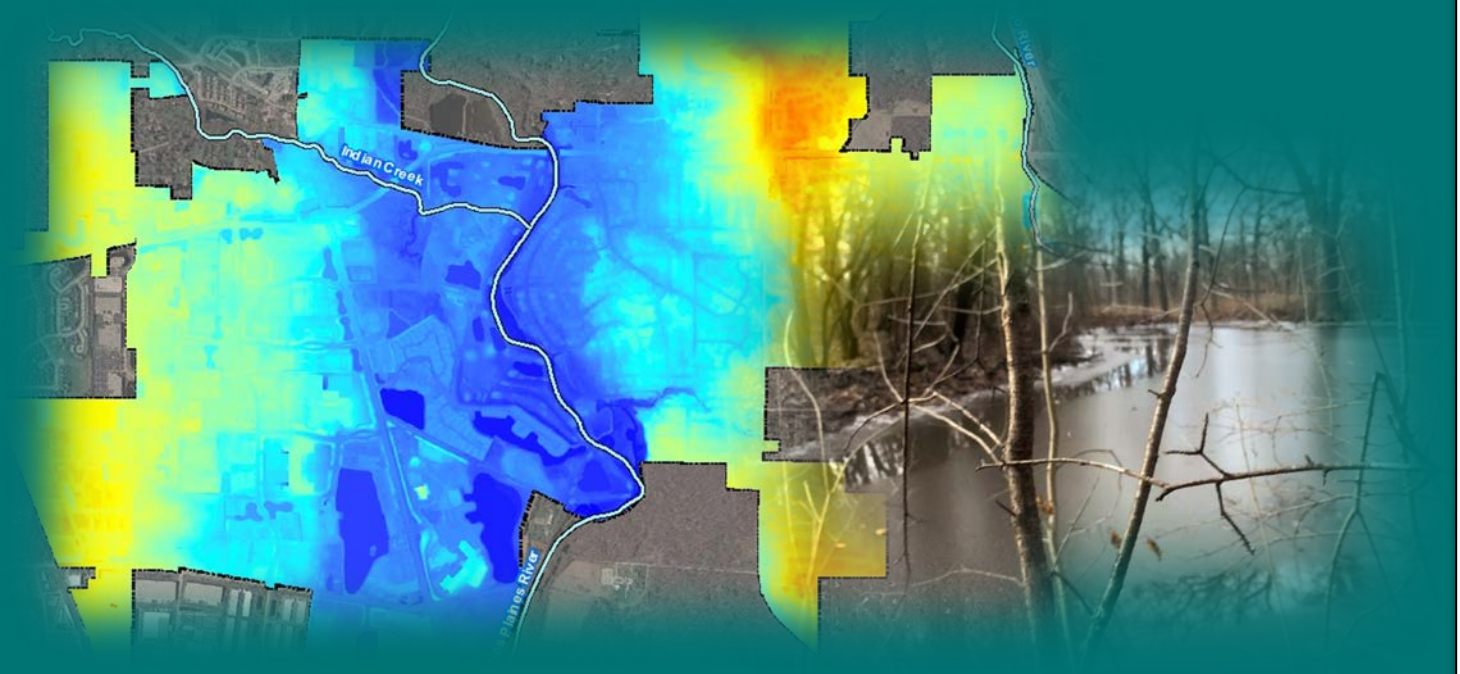
Village of Lincolnshire

Stormwater Management Plan

April 2020



Prepared for:

Village of Lincolnshire

1 Olde Half Day Road

VILLAGE OF
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LIST OF ABREVIATIONS, ACRONYMS AND DEFINITIONS

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Acre – Feet (ac-ft) – Flood volumes are typically quantified in acre-feet. One acre-foot is the volumetric equivalent of an acre of land that is flooded one foot deep.

Base Flood Elevation (BFE) – The BFE is the water surface elevation of the 1% annual chance flood.

Design Storm Event - The term "10-year storm" is used to define a rainfall event recurrence interval that statistically has the same 10% chance of occurring in any given year. **Table 1** shows the recurrence and statistical probability of a storm happening in a given year.

Recurrence Interval in Years	Probability of Occurrence in any Given Year	Percent Chance of Occurrence in any Given Year
100	1 in 100	1
10	1 in 10	10
5	1 in 5	20
2	1 in 2	50

Table 1. Design Storm Statistics

Hydraulic Grade Line (HGL) – The HGL is the surface or profile of water flowing in a storm sewer flowing partially full. The HGL represents the piezometric head (datum head + pressure head) of a flowing fluid. HGL can be obtained for open channel flow, as well as for pipe flow. If a pipe is under pressure, the hydraulic grade line is the elevation that the water rises to on the ground surface or the line that the water level would rise to in a small, vertical tube connected to the pipe.

Level of Flood Protection - This is design storm associated with the elevation at which a structure begins to flood.

Level of Service – For this study, the level of service or capacity of a drainage system (including, storm sewers, overland flow paths, drainage swales, open channels and detention basins) refers to the point at which the system begins to surcharge. The surcharged drainage system refers to the condition where stormwater begins to collect in the streets, side yards, overland flow paths and low areas. Storm sewers provide a level of service up to street flooding for a design storm.

RCBC – Reinforced Concrete Box Culvert

RCP – Reinforced Concrete Pipe

Regulatory Floodway - The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Structure Low Entry Elevation – The elevation equal to the elevation at which a structure begins to flood.

Tailwater – The water surface in the recioeving system downstream of an outlet pipe. Flow from the outlet pipe can decrease if the tailwater level exceeds the normal of the outlet.

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XP-SWMM – XP-Software Stormwater and Wastewater Management Model (XP-SWMM) is an unsteady flow, dynamic modeling program that determines the hydrologic response (runoff mode) from a storm event and routes the runoff through a storm sewer network (hydraulic mode).

Zone A – Special Flood Hazard Area – FEMA defines Zone A as a SFHA subject to inundation by the 1% annual chance flood with no defined elevation.

Zone AE – Special Flood Hazard Area – FEMA defines Zone AE as a SFHA subject to inundation by the 1% annual chance flood with a defined elevation.

Zone X – Other Flood Areas – A Zone X is defined as an area of 0.2% chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1% annual chance flood.

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EXECUTIVE SUMMARY

Due to localized surface flooding in numerous locations during moderate to heavy rain fall events, the Village of Lincolnshire (Village) initiated the development of a village-wide Stormwater Management Plan (Plan) to identify and develop proposed flood reduction projects and policies to address drainage problems within the residential portions of the Village.

The methodology for analyzing the storm sewer system for the Plan included a comprehensive review of the existing storm sewer system, resident meetings, hydrologic and hydraulic modeling of the existing drainage system, identification of system limitations and development of proposed drainage improvements. The proposed drainage improvements in this Plan can be incorporated into the Village's current infrastructure projects, green infrastructure planning and long-term capital improvement plan.

Public input was a significant component of the development of the Plan, and a public open house was held in July 2019 prior to the start of the detailed analysis. Approximately 60 residents attended the open house. In addition to this, online flood questionnaires were made available to every resident through the Village website. During the public input portion of the analysis, the Village experienced a significant storm event on September 12-13th 2019 which recorded a burst of 1.6 inches in a half hour. In addition to this short duration event, Lake County and areas in Wisconsin within the Des Plaines River Watershed received several inches of rainfall, which caused flooding on the Des Plaines River. This high-intensity short burst of precipitation is becoming a common occurrence. CBBEL was able to collect drone footage and additional public input relative to this storm event. Overall the outreach effort generated over 250 total responses.

CBBEL identified 10 Flood Study Areas (FSA) where detailed drainage analyses were completed. CBBEL developed and calibrated hydrologic and hydraulic models for each FSA using the detailed accounts and pictures from residents. The modeling was verified based on the high water marks observed during the September 12-13 storm event. The existing drainage systems in some of the FSAs have approximately a 2-year level of service before street flooding begins, which is less than the current design standard of a 10-year level of service. This is due largely to the fact that these portions of the Village were developed prior to modern stormwater management practices.

CBBEL developed proposed drainage improvements to provide a minimum 10-year level of service in the storm sewer systems as well as a stormwater management mapping system and accounting table with maintenance plan. A conceptual engineer's estimate of probable cost for each of the proposed drainage improvement alternatives was prepared. These long-term capital improvements projects range in cost from $2.2 to $7.6 Million and total approximately $19 Million. Based on discussions with the Village, the recommended proposed improvements are summarized in Table 2.

In addition to the underground drainage system, the Village has numerous existing detention and stormwater management facilities scattered throughout the residential portions of the Village. There are approximately 69 stormwater storage areas within the residential study area, where there is not an established responsibility of how maintenance is handled on these private properties that receive stormwater runoff from public roadways/property or neighboring properties. The subdivisions were designed in such a way that documentation does not exist on how the future maintenance of issues caused by this type of stormwater runoff would be addressed. Many basins are in various states of disrepair and in need of restoration and

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ongoing maintenance to function properly. It is estimated that an additional $1.25 Million would be required to restore and maintain the detention basins within Village-owned property. This figure would grow to approximately $4.7 Million if detention basins on private property were included (Table 3).

Finally, numerous reports of flooding on private property throughout the residential portions of the Village were received through the data collection process. There were approximately 140 reported instances of yard flooding on private property. Many of these are due to the nature of development in the Village, which sought to preserve mature trees and environmentally sensitive areas rather than mass grade development sites. This has led to low-lying areas and drainageways with shallow slopes with standing water after storm events. The proposed capital improvement projects and detention basins will be designed to accept this water, but it is our recommendation that the residential drainage improvements be the responsibility of the landowners in accordance with Illinois Drainage Law. Should the Village take responsibility for private drainage concerns, an estimated additional $3 Million in funding would be required. This figure would likely be higher given the response rate of the survey. One option for the Village to consider is the possibility of providing design assistance to property owners that wish to implement drainage improvements on their property.

Flood Study Area	Engineer's Estimate of Probable Cost (2020 Dollars)	Number of Properties Benefitted (10-year)
Lincolnshire Drive North	$4,300,000	111
Lincolnshire Drive South	$7,500,000	83
Lincolnshire Creek – Coventry Lane	$2,200,000	38
Southeast – Windsor Drive	$4,300,000	101
Surrey Lane – East of Riverwoods Road	$546,000	10
Capital Improvement Total	**$18,759,000**	**343**
Detention Basin Improvements	$2,400,000 - $4,700,000	Village Wide
Yard Flooding Improvements	$3,000,000	Village Wide
Total	**26,500,000[1]**	**343**

[1]Includes all detention basin improvements and 10-year maintenance costs.

Table 2. Summary of Proposed Improvements per FSA

Proposed Level of Flood Protection	Number of Identified Locations	Construction Cost	Total Cost Year 5	Total Cost Year 10
Designed Detention on Village Property	17	$674,000	$962,000	$1,250,000
Designed Detention on Private Property	37	$1,150,000	$1,807,000	$2,476,000
DETENTION BASIN TOTAL	**54**	**$1,824,000**	**$2,769,000**	**$3,726,000**
Natural Stormwater Storage Areas on Private Property	15	$537,000	$742,000	$948,000
TOTAL	**69**	**$2,361,000**	**$3,511,000**	**$4,674,000**

Table 3. Detention Basin Improvement Summary based on Property Ownership

CHAPTER 1 PROJECT OVERVIEW

1.1 INTRODUCTION

The Village of Lincolnshire (Village) has historically experienced street, yard and structure flooding throughout the residential areas of the Village resulting from a wide range of storm events with varying degrees of intensity and duration.

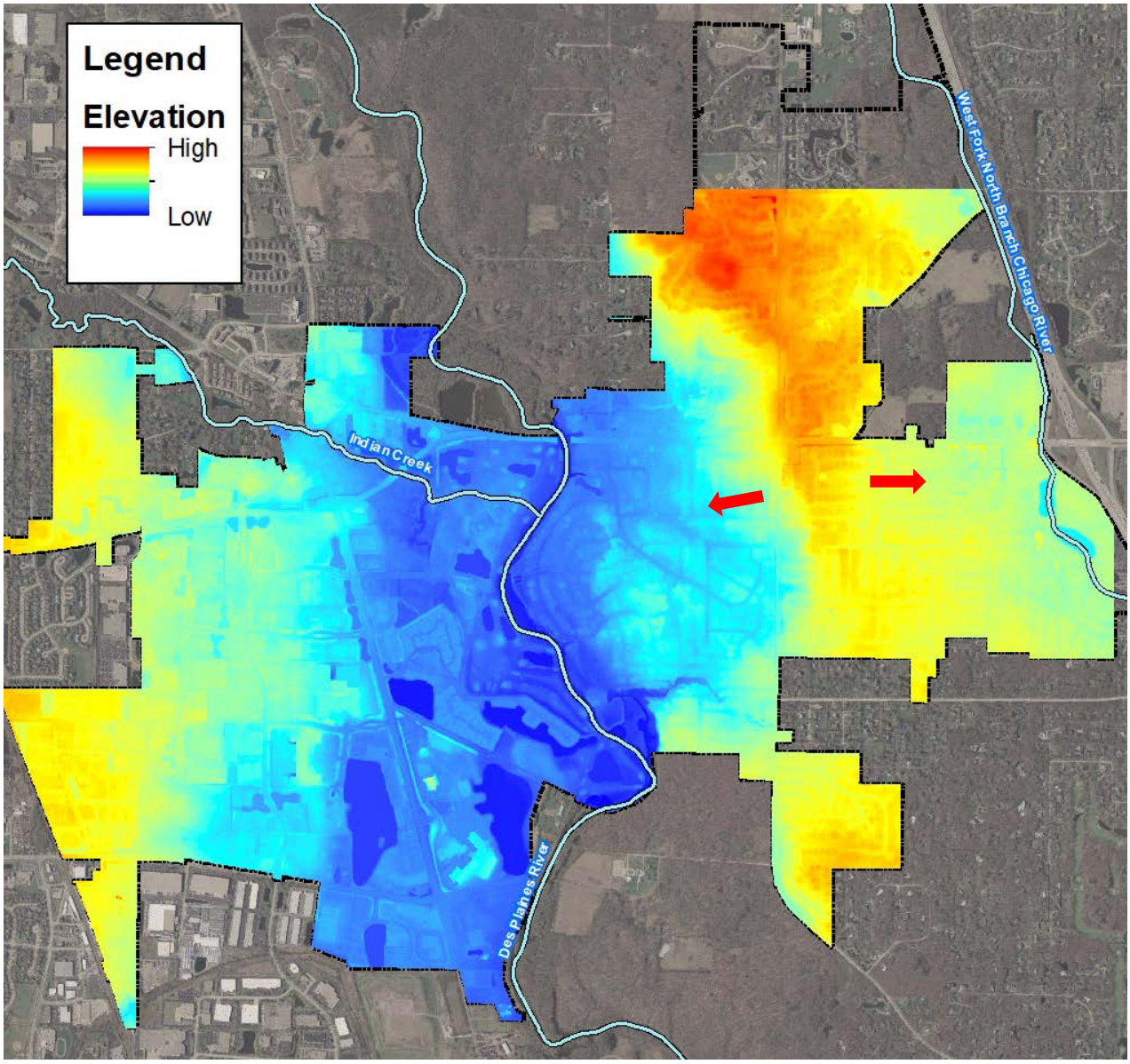

Figure 1. Village of Lincolnshire Existing Topography

To effectively address the stormwater and flooding issues in the residential portions of the Village, Christopher B. Burke Engineering, Ltd. (CBBEL) was retained by the Village to develop a village-wide Stormwater Management Plan (Plan) for residential areas to identify and develop proposed flood reduction projects. This Plan presents the results of an extensive stormwater management investigation of the storm sewer system within the residential portions of the Village.

The Village is in both the Des Plaines River and the West Fork North Branch Chicago River (West Fork North Branch) watersheds. Runoff from the land west of Riverwoods Road flows west to the Des Plaines River and runoff east of Riverwoods Road flows east to the West Fork North Branch (Figure 1). The Des Plaines River and the West Fork North Branch both drain south while the (east/west) lateral drainage pattern is similar for residential areas north and south of Half Day Road where runoff drains laterally to the watercourse before draining south. The areas north of Half Day Road were developed with detention ponds incorporated into proposed residential subdivisions while the areas south of Half Day Road are older and have limited stormwater storage. A majority of the residential portions of the Village were developed prior to modern stormwater management practices

1.2 PURPOSE AND SCOPE

The purpose of this Plan is to present the findings of detailed analyses and provide recommended improvements in a prioritized manner. This Plan identifies capital improvement projects, opportunities for green infrastructure and provides homeowner guidance to reduce the risk of future flooding. The recommended improvements are designed to:

- Reduce existing flood/drainage problems, including structure and street flooding,
- Provide infrastructure for private property drainage systems to connect,
- Provide homeowner guidance for private property flooding, and
- Help preserve and enhance stormwater quality.

This Plan includes detailed hydrologic and hydraulic modeling of specifically targeted study areas to identify flood damages and existing bottlenecks in the existing stormwater conveyance system serving residential areas. The detailed modeling was used to identify optimal locations and sizes for capital drainage improvement projects. The scope of the Plan includes the identification of projects that provide a 10-year level of service in each of the targeted areas. The level of service refers to a water surface elevation from runoff during a storm event does not exceed the pavement or street elevation as to create ponding. The level of service will accommodate the stormwater runoff in the storm sewer below the street pavement elevation.

The outline of this Plan includes all background discussion for the study development, assumptions, modeling techniques and proposed improvement development in the front portion of the document. The background discussion is followed by detailed discussions with exhibits, modeling results and proposed improvements for specific study areas as separate sections. The approach to each study area is similar and was developed using the methods outlined in this report.

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CHAPTER 2 STUDY DEVELOPMENT

During the initial phase of the study, the Village experienced a significant storm event September 12th – 13th, 2019, where over 3.4 inches of precipitation in approximately 5 hours was recorded, prompting village-wide street and yard flooding. Within this storm event, a high intensity burst of 1.63 inches in a half hour was recorded at the Deerfield rain gage (nearest USGS precipitation gage) located at Deerfield Road on the West Fork North Branch. According to the rainfall depths and intensities in the updated Bulletin 70, this is equivalent to approximately a 20-year design storm. In total, the September 12-13th storm event produced approximately 2.24 inches in just under 2 hours in the early morning of September 12th, 2019 and another burst of 3.4 inches of precipitation in 5 hours, early September 13th. While significant, this storm was not a 100-year storm event but did allow CBBEL staff to better understand the Village's drainage system.

CBBEL collected aerial drone video as well as conducted site investigations throughout the Village during the afternoon of September 14th, 2019. This information included highwater marks in the form of debris lines showing maximum water surface elevations that occurred during the storm event. Using the USGS stream gage data for the Des Plaines River at Half Day Road, CBBEL compared the time of the rise in water surface elevation on the Des Plaines River with the time of the precipitation peaks.

The nature of the September 12-13 storm event includes periods of high intensity precipitation while the water surface elevation in the receiving waters (Des Plaines River and the West Fork North Branch) were rising in response to rainfall further upstream in these watersheds. As the storm system migrated over the region, residential areas in the Village experienced two types of flooding, localized street and yard flooding, followed by riverine flooding.

CBBEL initially observed street flooding due to a lack of conveyance capacity in the Village's storm sewer system. Yard flooding was also prevalent due to drainage deficiencies on private property. This was followed by a rise in water surface elevations along the Des Plaines causing overbank yard flooding within the Des Plaines River floodplain. The focus of this study will target the street and yard flooding due to localized storm sewer, overland flow and storage limitations.

2.1 DATA COLLECTION

Participation from Village staff, decision-makers, and the public is essential to understanding the flooding and drainage issues throughout the residential portions of the Village. This input is necessary to identify the extent and type of flooding problems (overland flow, street flooding, yard flooding, seepage, etc.). The extent and nature of known existing stormwater conditions and concerns in the Village were identified through various means including discussions with the Village Engineering staff, Public Works staff, Trustees, public meetings, as well as interview and questionnaire distribution to residents.

2.1.1 Village Staff and Public Involvement

Online flood questionnaires were made available to every resident through the Village website. There were 122 responses to the online questionnaire, over 20 email responses and 26 responses received in the mail. The Village also provided all known drainage complaints (approximately 60) that have been received in the

past. Additionally, CBBEL staff conducted field inspections to observe flooding, interview residents, take pictures and collect data such as High-Water Marks (HWM) during the September 12-13th 2019 storm event.

A resident open house conducted by CBBEL and Village staff was held in July 2019 where approximately 60 **residents attended**. CBBEL collected first-hand accounts of flooding from residents where maps were presented. Residents were given the ability to mark-up maps and indicate what/where flooding had been experienced in the past.

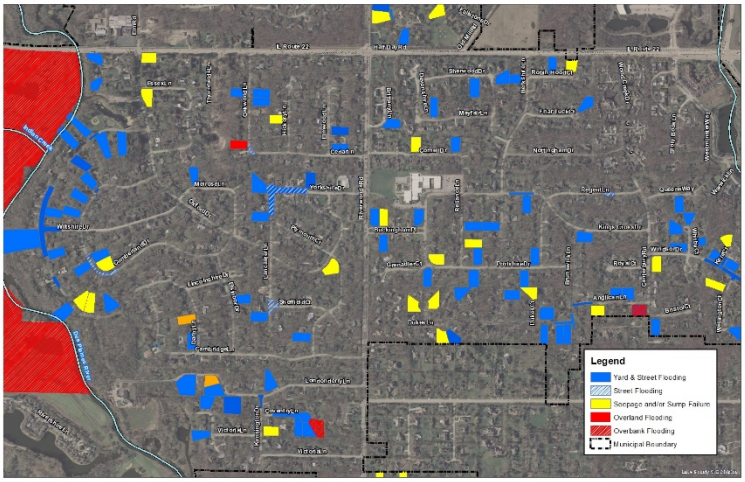

Figure 2. Compilation of Questionnaire Data (representation)

CBBEL also reviewed numerous accounts, videos and photographs of flooding from Village staff and residents, as well as reviewed applicable Village plans, codes, GIS data, previous studies and construction documents. The information shown in Figure 2 is a representation of the information compiled from the residents that provided information at the open house, questionnaires and email responses. **Overall the outreach effort generated over 250 total responses.** It is noted that flooding is widespread and not limited to only the information obtained from resident questionnaires. As noted throughout this Plan, detailed consideration has been taken to quantify the full extent of the flooding problems throughout the residential portions of the Village.

2.1.2 Storm Sewer Data Collection

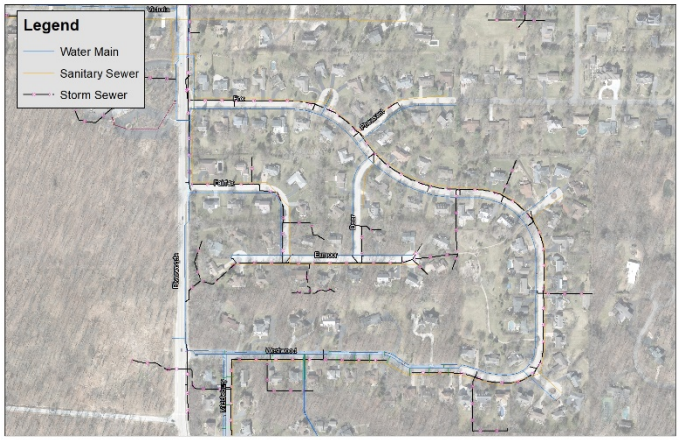

Figure 3. GIS Database Village of Lincolnshire Existing Sewer Network

The Village maintains a database of storm sewer, sanitary sewer and watermain information. The Village also maintains as-built plans of subdivisions including detention basins, detention pond outlet control structures and other detailed information that is readily available. CBBEL and our subconsultant Thompson Surveying also collected additional field survey to supplement missing storm sewer information. This information was compiled into a GIS database and used for detailed model development (Figure 3).

2.1.3 Floodplain Maps

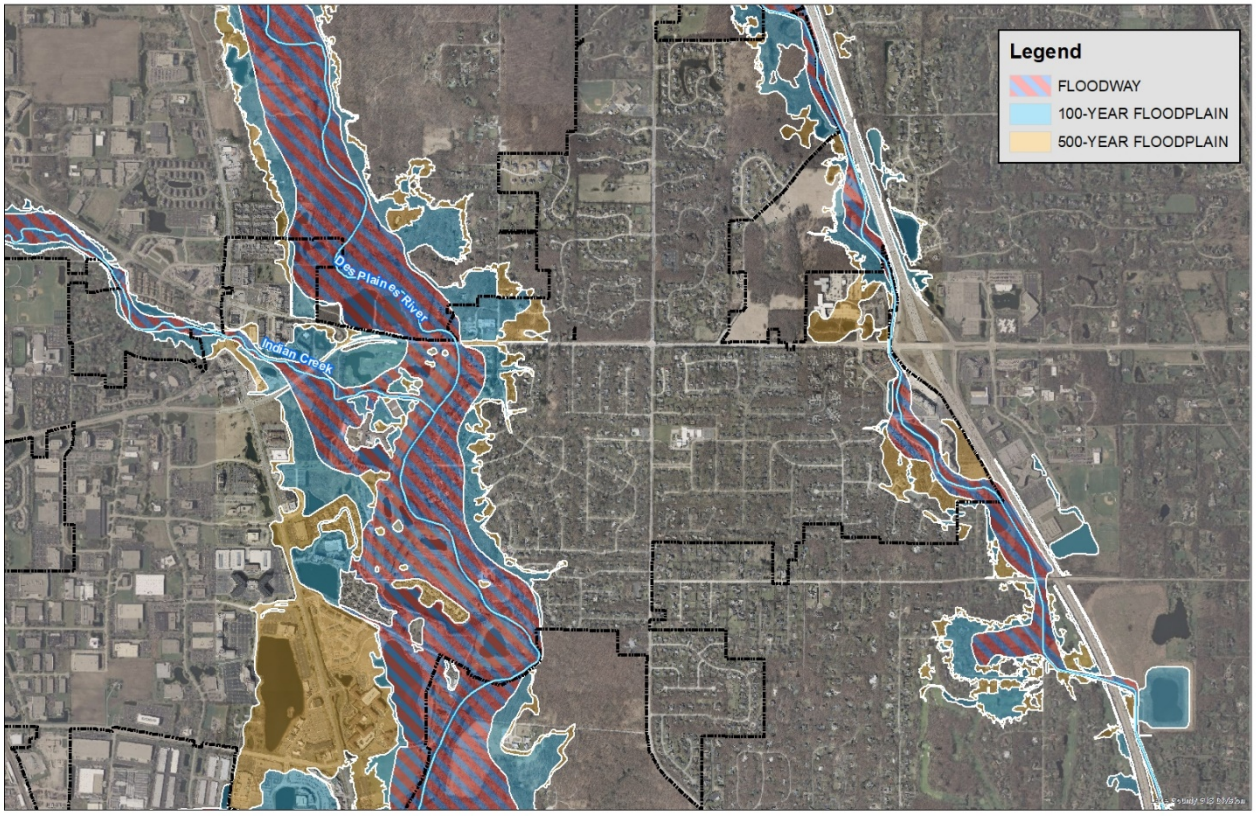

Figure 4. Adapted from the Lake County FEMA FIRM – Lincolnshire Study Area

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 258, 259, 266 and 267, for Lake County and Incorporated areas, effective September 18, 2013; the Residential portions of the Village are bounded by Zone AE Special Flood Hazard Areas (SFHAs) and Zone X (Other Flood Areas) associated with the Des Plaines River on the west and the West Fork North Branch on the east (Figure 4). FEMA defines Zone AE as a SFHA subject to inundation by the 1% annual chance flood with a defined elevation.

The Village is susceptible from overbank flooding in low areas along the Des Plaines River, specifically those areas shown in the Zone AE floodplain and floodway associated with the Des Plaines River along Lincolnshire and Cumberland Drives south of Half Day Road. This is the oldest section of the Village that was developed prior to implementation of the National Flood Insurance Program (NFIP) that established floodplain and floodway boundaries and rules governing development within them. The NFIP the program developed by FEMA to help reduce the impact of flooding on private and public structures by providing affordable insurance by encouraging communities to adopt and enforce floodplain management regulation. The NFIP was created as a result of the passage of the National Flood Insurance Act of 1968. The portions of the Village adjacent to the Des Plaines River were developed prior 1960. The Zone AE SFHA shown on the FIRM for the areas along the banks of the Des Plaines River includes both residential areas as well as non-residential or commercial areas.

2.2 IDENTIFICATION OF FLOOD STUDY AREAS

By combining the historically known flood problem areas with the flooding reports following the data collection process from residents, CBBEL created a GIS database to identify Flood Study Areas (FSA) throughout the Village. CBBEL combined the Village storm sewer and utility database with questionnaire data to create a GIS database. The GIS database combines all the flood questionnaire data and firsthand accounts to provide a tool that displays flooded areas, "hot spots", areas of concentrated overland flooding, type of flooding experienced, etc. Using the database, Village and CBBEL staff conducted multiple meetings to identify these areas, which are a result of the compilation of CBBEL issued flood questionnaires, open house information, online response information and calls fielded by Village staff during storm events. These study areas have also been configured with respect to the existing stormwater management system and outfall serving each system. The Flood Study Areas (FSAs) are shown on Figure 5 and listed below.

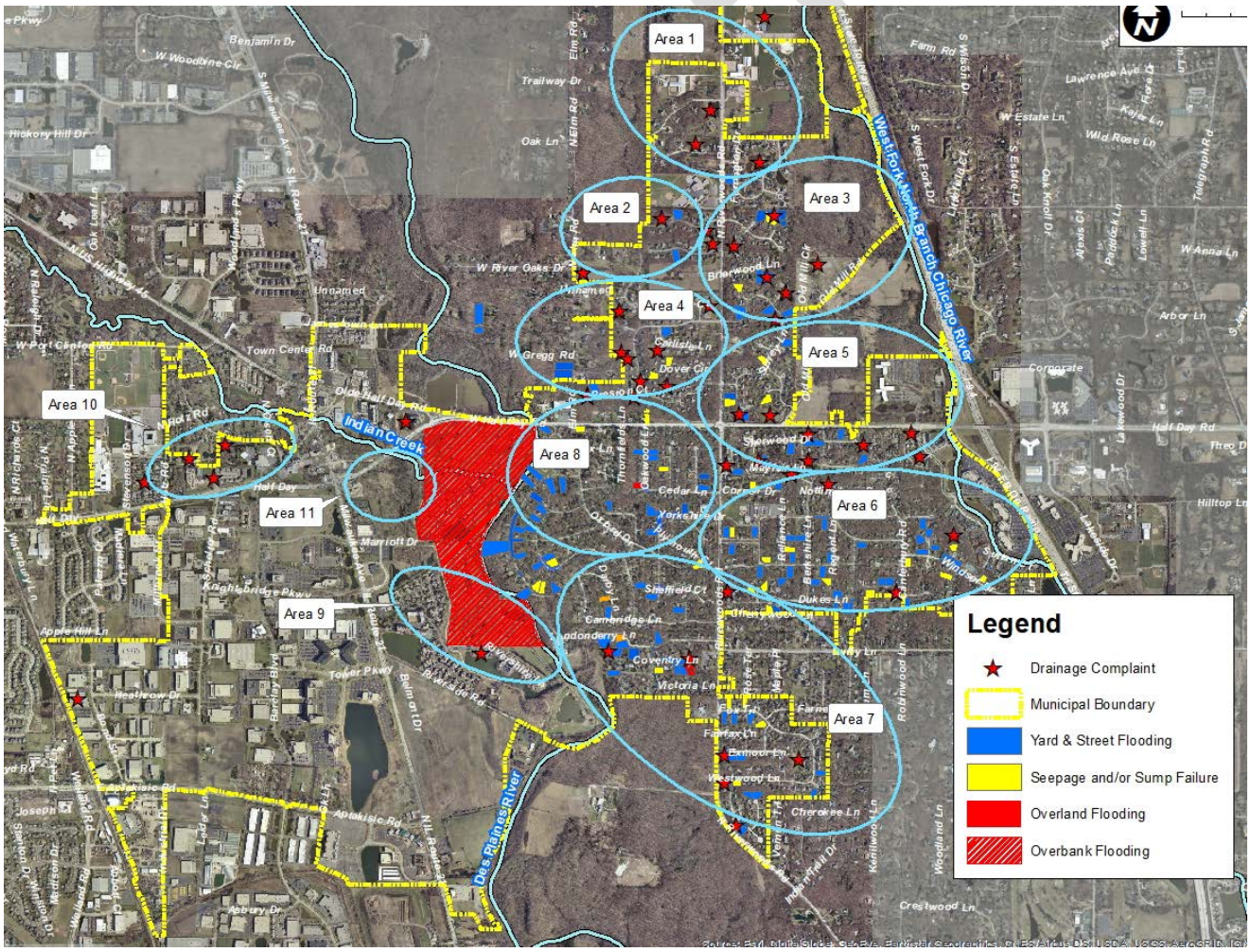

Figure 5. Lincolnshire Flood Study Areas

Area	Description
1	Northampton Lane, Farmington Drive
2	Brampton Lane (West), Hamilton Court, Whitmore Lane
3	Brampton Lane (East), Brampton Court, Stafford Court, Briarwood Lane
4	Surrey Lane (West), Carlisle Lane, Pembroke Drive, Dover Circle, Preston Court
5	Surrey Lane (East), Fallstone Drive, Brittany Lane, Sherwood Drive, Devonshire Lane, Mayfair Lane
6	Southeast, Windsor Drive, Wellington Court, Canterbury Road, Anglican Lane, Dukes Lane, Kings Cross Drive, Wood Creek Drive,
7	Fox Trail, Exmoor Lane, Westwood Lane, Middlebury Lane, Coventry Lane, Vitoria Lane, Kensington Drive
8	Southwest, Lincolnshire Drive, Wiltshire Drive, Cumberland Drive, Oxford Drive, Lancaster Lane, Yorkshire Drive, Oakwood Land Cedar Lane, Essex Lane
9	Rivershire Lane, Rivershire Court, Rivershire Place
10	Westgate Drive, Abbey Road, Beaconsfield Court

Table 4. Lincolnshire Study Area Description

The naming convention for FSA are intended to be a general location description of the roadways that bound areas and should not be considered the limits of the detailed study for flood reduction measures. The methodology for analyzing the stormwater management system for each FSA follows a holistic approach to capture interactions with adjacent drainage basins and the total tributary areas to each FSA. This process included the collection of the storm sewer system plans, supplemental storm sewer survey collection, resident meetings, firsthand accounts, detailed hydrologic and hydraulic modeling of the existing drainage system, identification of system limitations and development of proposed drainage improvements.

2.3 EXISTING CONDITION HYDROLOGIC AND HYDRAULIC MODEL DEVELOPMENT

An XP-Software Stormwater and Wastewater Management Model (XP-SWMM) was created for each FSA. The XP-SWMM software is a dynamic hydrologic and hydraulic modeling program that determines the hydrologic response (runoff mode) from a storm event and routes the runoff through a storm sewer network (hydraulic mode). The XP-SWMM software was chosen for the analyses for its ability to simulate overland flows and surface storage in combination with a storm sewer network to identify localized flooding problems.

2.3.1 Subbasin Delineation

The Village's utility database, additional pick-up survey areas and plan information was combined with the 2017 Lake County 1-foot aerial topography in the GIS database. The tributary area in each of the FSA's were delineated and subdivided into subbasins ranging in size from 2 acres to 50 acres based on storm sewer data, land use and aerial topography (Figure 6). More specific detail was used in areas where drainage boundaries were required to capture known drainage problems identified by Village staff and residents on a block by block basis.

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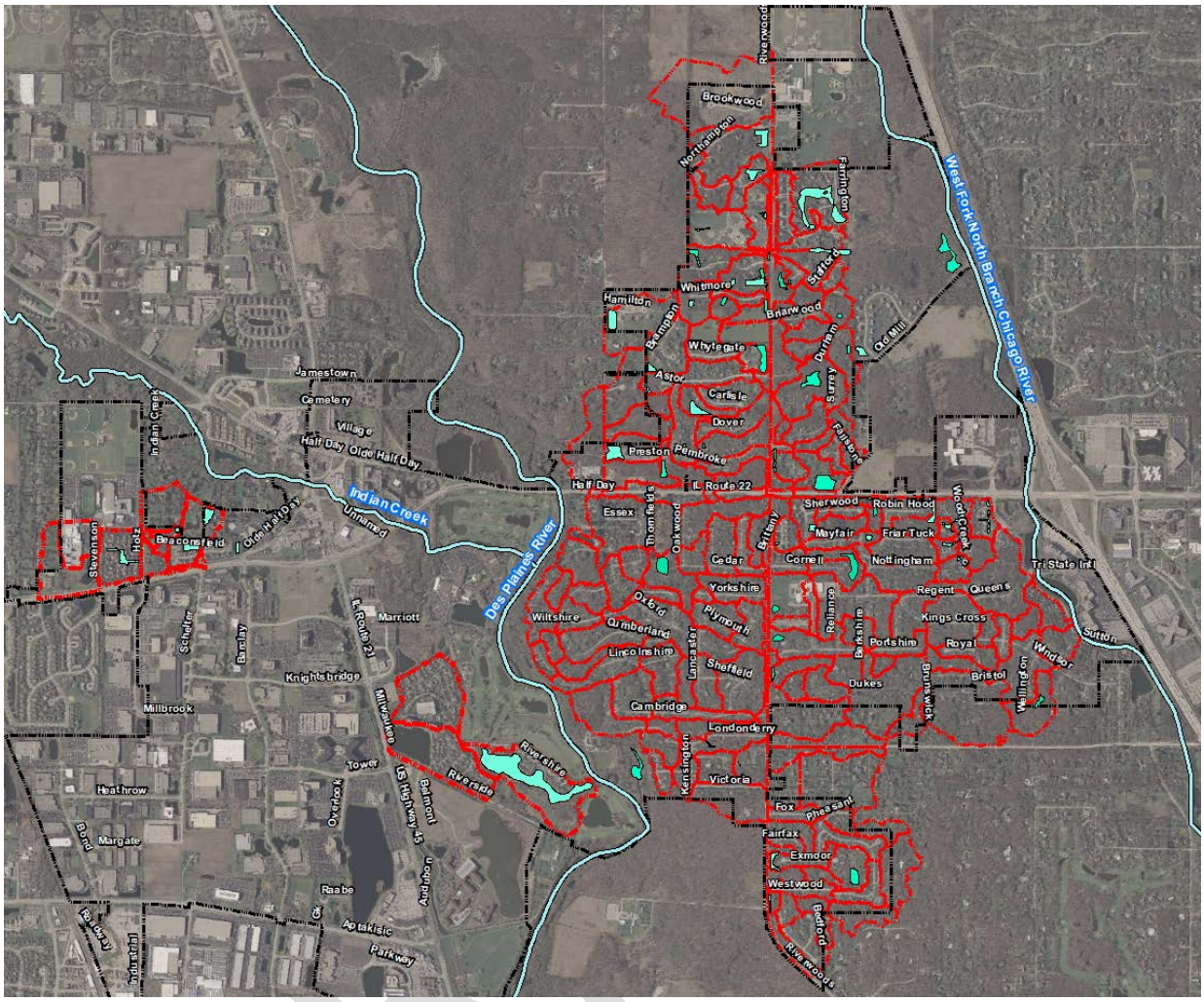

Figure 6. Lincolnshire Flood Study Areas Subbasin Delineation

2.3.2 Land Use

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 subbasins. The directly connected impervious areas in each subbasin were identified using digital shapefiles and broken out separately for each subbasin. The remaining land use was characterized using a combined land use cover shapefile created from shapefiles provided by Lake County and a hydrologic soil group shapefile from the NRCS.

2.3.3 Data Entry

CBBEL entered the hydrologic parameters, trunk and lateral storm sewers (survey) into the XP-SWMM software. In addition to the storm sewer network, overland flow paths and depressional storage areas were entered into the model using Lake County 1- foot aerial topography. CBBEL also entered the appropriate tailwater elevation to represent the associated receiving waterways including the Des Plaines River and West Fork North Branch.

2.3.4 Existing Condition Modeling Calibration

The purpose of the XP-SWMM analysis is to simulate the existing storm sewer system, overland flow system, storage areas and the interactions between these components to identify system bottlenecks and evaluate proposed drainage system improvements. Prior to completing these analyses, it is important that the model be calibrated to known storm events. For this study, the firsthand accounts and photographs collected from the September 12-13, 2019 storm event proved to be an invaluable tool during the calibration process.

This field data was combined with measured precipitation rainfall data for the September 12-13th storm event and entered into the XP-SWMM model. The simulated high-water marks throughout the Village were compared to observed high water marks. As part of the calibration process, the RCNs and T_c were modified until the peak of the output hydrographs from the XP-SWMM analysis reasonably matched the observed high-water mark. This was done by reducing the calculated RCNs by approximately 20% and increasing the calculated Tc throughout each study area for the pervious area land use component only.

The elevations of the high water-marks used for calibration were determined through comparing resident and staff photographs with aerial photography and the Lake County 1-foot aerial topography. Debris lines in photographs and videos were identified and the elevation calculated from the aerial topography. Additional detail for this process was obtained by using the original detailed LIDAR or Light Detection and Ranging technology data to create a digital terrain model (DTM) in GIS where elevations of a specific location shown on an aerial photograph could be assigned an elevation to the nearest tenth of a foot. A couple examples of locations where the calibration was verified are shown in Figure 7.

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Lincolnshire and Wiltshire Drives

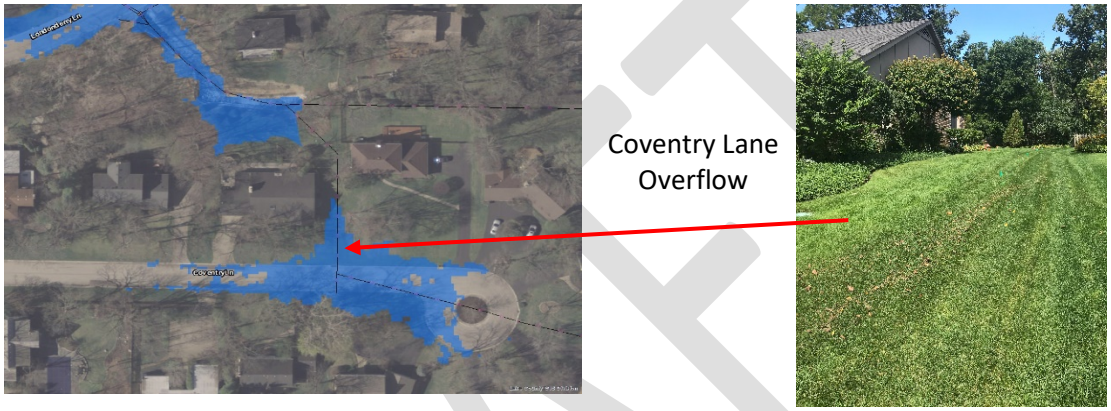

Figure 7. September 2019 Inundation Areas and XP-SWMM Analysis – Verification of Results

2.4 CRITICAL DURATION AND DESIGN STORMS

Following the calibration process, a critical duration analysis was completed using the XP-SWMM model for each FSA. The critical duration was determined utilizing rainfall depths published in the *Updated Bulletin 70* – Frequency Distributions of Heavy Precipitation in Illinois by the Illinois State Water Survey (ISWS) and adopted by the Lake County Stormwater Management Commission (SMC) March 10, 2020. The critical duration refers to the duration of a storm that produces maximum water surface elevations, flood depths or flow rates for each FSA. For example, the 100-year critical duration analysis included executing the XP-SWMM model for the 1-hour through 48-hour duration storm events. The storm event producing the highest flood elevation is the critical duration storm event, and all proposed improvements are then designed for the critical duration storm. There are multiple FSAs for which an XP-SWMM analysis was completed, therefore each FSA may have a different critical duration. This will be discussed further in the Plan for each FSA.

The rainfall depths published in the updated Bulletin 70 for design storms are the design standards recently adopted throughout northeast Illinois to design stormwater infrastructure and are now referenced in most local and county ordinances. The rainfall data used in the statistical analysis to develop the updated design rainfall depths is based on measured rainfall data recently collected that is trending towards more intense storm events. The resulting design rainfall depths in the updated Bulletin 70 are higher (i.e. 6.5 inches versus 8.57 inches over 24 hours) that what was previously used in Lake County. These higher design rainfall depths been used in the development of this Plan.

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2.5 MODEL RESULTS

A distinction has been made to define the **level of service** or capacity of the existing storm sewer system. Throughout this Plan, the level of service or capacity of a storm sewer refers to the point at which the systems begin to surcharge, which means stormwater begins to collect in the streets because the storm sewer is at capacity. Using this criteria, CBBEL determined that the many of the storm sewers throughout the FSAs south of Half Day Road have a 2-year level of service. Therefore, the Village's existing storm sewer system can convey runoff from less than 2 inches of rain over a 1- to 3-hour period before the storm sewer begins to surcharge and stormwater begins to collect on the streets in the lowest areas.

CBBEL used the critical duration water surface elevations from the calibrated XP-SWMM analysis to create existing condition inundation maps for the 10- and 100-year design storms for each of the FSAs. The inundation maps were combined with Village flood response maps and flood questionnaire responses from the open houses to identify specific flooding impacts within each FSA. The existing condition inundation areas for each FSA is discussed further in the Plan for each FSA.

2.5.1 Estimated Number of Properties Impacted by Flooding

A desktop GIS analysis was used to determine the number of properties impacted by flooding through overlaying the inundation areas onto the parcel boundaries. CBBEL used the LIDAR data to create a digital terrain model (DTM) where water surface elevations produced from the XP-SWMM analysis were assigned to a subbasin to develop an inundation area for that subbasin. A property is considered impacted by flooding when the inundation area of the delineated water surface elevation of the surrounding water exceeds the lowest property elevation within a parcel boundary. A discussion of the structures impacted in each FSA is provided further in this Plan. **There was a total of 3 responses reporting structure flooding from overland flow.**

CHAPTER 3 FACTORS CONTRIBUTING TO FLOODING

While each FSA throughout the Village experiences flooding unique to site specific conditions in the area, much of the reported flooding collected from the public outreach efforts indicate yard and street flooding with few instances of overland flooding (3 of 250). This is consistent with modeling results throughout the residential portions of the Village. Overland flooding is the instance where water surface elevations from ponding water on a property exceed a window well elevation or low entry elevation of a structure. The overland flow enters the structure, causing basement flooding or first floor flooding. Overland flooding can also result from overbank flooding, as in the case of the properties and structures located in the in the floodway and floodplain adjacent to the Des Plaines River. With the exception of the floodplain and floodway areas adjacent to the Des Plaines River and Lincolnshire Creek (Coventry Lane), street and yard flooding is the prominent flood type throughout the residential portions of the Village. There are a number of factors related to flooding throughout the Village and include the following:

- Development prior to stormwater management practices
    - Development in the floodway and floodplain associated with the Des Plaines River prior to the National Flood Insurance Program.

    - Insufficient overland flow routes and storm sewer conveyance
    - Insufficient stormwater storage
- Deferred Maintenance of Stormwater Detention Basins
- Development patterns that preserved mature trees in lieu of mass grading
    - Shallow slopes within yards
- Low areas within yards without positive drainage

The drainage systems in the Village areas are generally split into two categories where the area south of Half Day Road have no detention basins and insufficient conveyance to receiving waters. The areas north of Half Day Road are drained through many small detention basins scattered throughout each subdivision where each detention system is independent. Further explanation of these flooding factors is given below.

3.1 LINCOLNSHIRE DEVELOPMENT OVER TIME

A review of historical aerial photographs shows that development in the Village over time can be split into two categories with respect to stormwater management infrastructure. Older sections of the Village (south of Half Day Road and east of the Des Plaines River) were developed prior to modern stormwater management practices (no stormwater detention). The newer sections were built with stormwater detention and several of these were built after implementation of the Lake County Watershed Development Ordinance (WDO). The stormwater detention basins constructed prior to the implementation of the WDO and are undersized based on modern stormwater standards.

3.1.1 South of Half Day Road

The residential area southwest of the intersection of Half Day Road and Riverwoods Road were built prior to modern stormwater management practices. Figure 8 shows development in progress prior to stormwater management practices where there is no detention provided and overland flow paths to the Des Plaines River were blocked with roads and residential structures.

Figure 9 shows a common occurrence on the southwest side of the study area where historic drainage ways leading to the Des Plaines River are blocked by residential structures. In addition, the older residential properties were not graded with sufficient slope or elevation in comparison to the streets, leading to property flooding once the flood depth in the street exceeds the curb. The flooding can impact residential structures from water entering basement window sills, stair wells, first floor openings, footing drains or excessive seepage from severely saturated ground adjacent to the home. The same conditions exist east of Riverwoods Drive and south of Half Day Road where overland flow paths to the West Fork North Branch are blocked by residential structures (Figure 10).

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Figure 9. Pre-Development (1946) Compared to Development in Progress (1961)

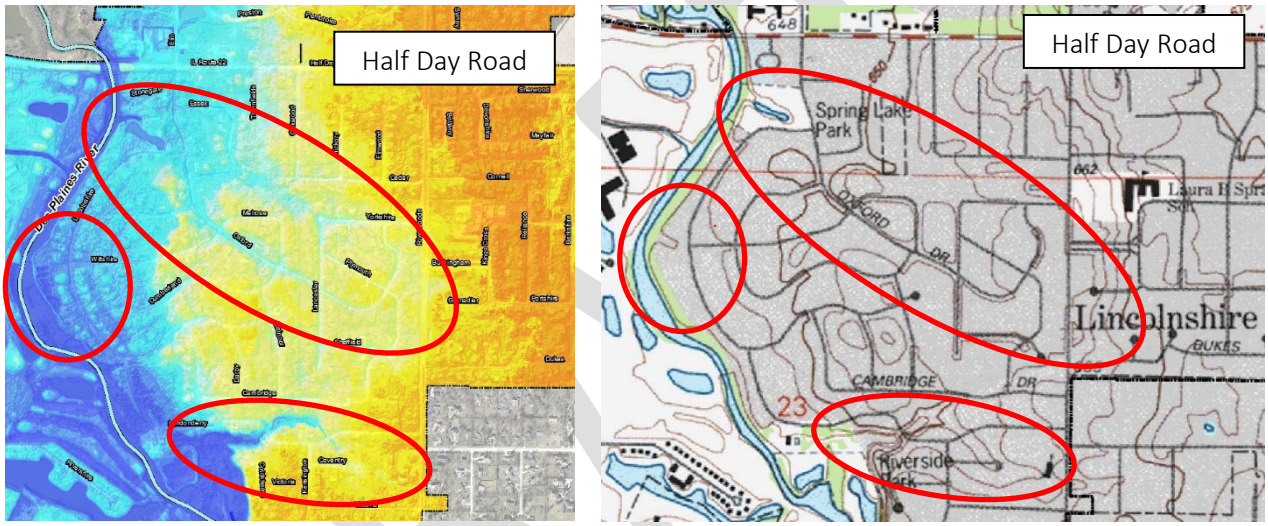

Figure 8. Historical overland Flow Paths – Hydrologic Atlas Compared to Existing Topography Southwest

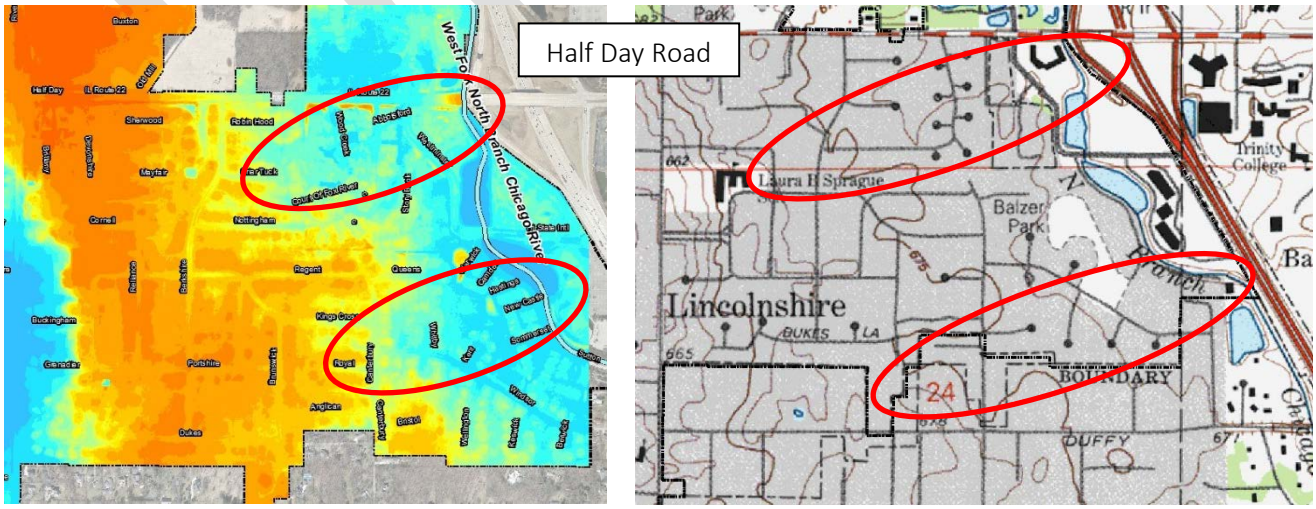

Figure 10. Historical overland Flow Paths – Hydrologic Atlas Compared to Existing Topography Southeast

The land use throughout the Village south of Half Day Road is composed of residential land use with minimal areas set aside for stormwater management. These conditions which result in the significant flooding experienced by the Village during severe storm events also contribute to the difficulties in retrofitting the existing system to reduce the risk of future flooding. There are very few open places where excess runoff can be directed and stored; specifically, in the older sections of the Village. In some cases, the storm sewer conveyance systems are clay drain tiles or other antiquated pipes that are failing. Storm events that exceed a few inches of rain in a short time period cause significant street, yard and residential structure flooding. In the areas that experience flooding, there is limited stormwater storage, insufficient overland flow routes and the storm sewer system was not designed based on current rainfall standards.

3.1.2 North of Half Day Road

The newer sections of the Village are located north of Half Day Road and have much fewer drainage problems for smaller and more frequent storm events. All of the residential areas north of Half Day Road and the residential areas on the west side of the Village included in this Plan have been developed with some type of stormwater detention area, storm sewer and overland conveyance system. Flooding throughout most of these areas is limited to yard flooding. The yard flooding is caused by blocked overland flow routes, and shallow slopes and low areas within yards. While the subdivisions north of Half Day Road have been designed with formal stormwater management systems, maintenance of stormwater infrastructure presents a challenge as these facilities are scattered throughout the Village on private property, Village-owned property and within conservancy easements also on private property. In addition, development in the Village is focused on preserving natural areas and mature trees to the greatest extent possible which is a point of pride for both the Village and its residents. While this policy has led to the large mature trees within the naturalized landscape of the Village, it creates limitations during development as sites cannot be mass graded to create traditionally sloped yards to promote positive drainage.

3.2 DEVELOPMENT & NATURALIZED AREA PRESERVATION

The Village has standards in the Municipal Code of the Village of Lincolnshire (Village Code) to protect and maintain open spaces, natural areas, conservancy area, trees and stormwater management facilities. The tree preservation policy and the avoidance of mass grading activities represent a commitment to natural resource preservation and responsible stewardship to land development throughout the Village. The residential areas north of Half Day Road have many dedicated areas for naturalization or conservation practices on private property. In some instances, the natural areas are in the same location as the detention basin, conveyance swales or stormwater management areas. Naturalized areas require consistent maintenance and debris removal if these areas encompass or are part of a designed stormwater management practice. Lack of maintenance in conservancy areas results in these areas accumulating leaf debris, woody material or detritus. Residents are often unaware that these swales exist in naturalized areas and in some cases have landscaped, placed fences, or otherwise impacted the function of these swales where runoff can no longer flow overland. The build-up of organic matter causes detention areas and overland flow paths to be blocked, which can lead to yard flooding. Additionally, over long periods of time the accumulating organic matter can cause the already shallow yard slopes to become altered, leading to increased standing water in yards. Lot settlement and accumulated debris along lot lines create ponding conditions and contribute to nuisance flooding. This type of flooding was reported throughout the outreach program and

verified during site investigations throughout the Village. Complaints of neighboring grade changes are hard to substantiate years after the work was completed. In most cases multiple properties are affected by blocked rear yard drainage paths, and multiple properties would require regrading to solve one localized issue. As properties turn over and are redeveloped the history of grade changes cannot be definitively determined.

3.3 EXISTING DETENTION BASINS, STORMWATER STORAGE & PRIVATE PROPERTY

The Village maintains a GIS database of detention facilities and stormwater management areas within its municipal limits. The Village also tracks complaints, nuisance flooding and records instances of multiple complaints in an area when tracking known drainage problems. According to the Village's GIS database there are approximately 135 stormwater management areas that the Village has either reconstructed, cleaned, maintained or applied resources to restore function in the past. Of the 135 stormwater management areas, 69 areas are located in the residential portions of the Village evaluated in this Plan, the remaining areas are within commercial sections of the Village.

The flood problems reported in the questionnaire data and online responses collected are consistent with conditions observed during field investigations. Many of the stormwater management areas are in various states of deferred maintenance. The reported flood issues are related to dense vegetation where debris blockages have caused water surface elevations in rear yard detention basins to encroach into the perceived useable portions of the yards. Once elevated, water surface elevations remain high and detention areas have delayed drain down times due to overgrowth, shallow slopes, and debris blockages.

Figure 11. Example of Detention Basin Blockage

The dense vegetation and shallow slopes within the detention basins present maintenance challenges (Figure 11). Historically, the maintenance responsibility of stormwater management areas, detention basins or conservation areas has been uncertain. The Village has historically responded to drainage complaints either on private or Village owned property in the past. A review of subdivision plats, associated drainage design and property ownership indicate that the 69 of 135 stormwater management areas in the study area can be organized into the following three categories:

- Designed stormwater detention basins on Village owned property (17 areas)
  - A detention facility or stormwater management area with a specific outlet and design elevation located on **Village** owned property.
- Designed stormwater detention basins on private property (37 areas)
  - A detention facility or stormwater management area with a specific outlet and design elevation located on **private** property.
- Natural stormwater storage areas on private property (15 areas)
  - Poorly drained areas on private property where the Village has historically allocated resources to assisting with drainage issues due to a known drainage issue on private property.
  - Typically, these areas occur within a conservancy easement or along side and rear yards on private property.

Drainage complaints related to the stormwater detention basins and storage areas is a common occurrence throughout the flood study areas. Maintenance responsibility of these areas present challenges to ensure proper drainage function to prevent yard flooding. The lack of maintenance on the stormwater facility causes the stormwater storage area to fill and encroach into the surrounding properties.

Figure 12. Example of Detention Basin Blockage and Infrastructure Maintenance

CHAPTER 4 PROPOSED IMPROVEMENTS

Following concurrence and verification of the existing condition inundation areas, CBBEL developed proposed drainage improvements that will allow the storm sewer system to provide a minimum 10-year level of service. The proposed 10-year level of service goal will reduce the hydraulic grade line in the storm sewer network below the street elevations for the 10-year critical duration design storm event, which is similar to current WDO standards. The proposed drainage improvements to achieve this goal include long-term drainage improvement projects that can be supplemented with green infrastructure, recommendations to restore function to existing stormwater management areas, identification of required future maintenance of these areas and tools for residents to address private property flooding.

4.1 LONG TERM DRAINAGE IMPROVEMENTS

CBBEL identified long term capital improvement projects for FSAs that include increasing storm sewer sizes, adding relief storm sewers, and stormwater pumping stations to reduce flooding from the 10-year design storm below the street elevation and provide residential structure protection for larger events.

A concept plan was prepared for each improvement alternative. These long-term improvements were analyzed with the XP-SWMM model to determine the reduction in peak water surface elevations and to verify that the proposed drainage projects did not negatively impact downstream areas. A delineation of the proposed condition 10- and 100-year flood inundation areas for each alternative in each FSA was created to quantify the properties removed, reduction of street flooding and overall reduction in flood depths. The proposed condition improvements can be seen in the detailed discussion for each of the FSAs.

4.1.1 Engineer's Estimate of Probable Cost

A conceptual engineer's estimate of probable cost for each of the proposed drainage improvement alternatives was prepared. There are many unknowns including soil conditions, utility conflicts and right-of-way limits that will affect the ultimate design and cost of the improvements. Because of this, the engineer's estimate of probable cost includes a 20% contingency. Permitting, design and construction engineering for each project has also been included in the estimates as a percentage of the total cost of the project.

Figure 13. Typical Storm Sewer Construction

In preparation of the conceptual engineer's estimate of probable cost, CBBEL has completed a unit price analysis utilizing recently submitted bid prices from eleven awarded CBBEL projects in various municipalities in the Chicagoland area to develop applicable unit prices for the proposed improvements in the Village. These eleven projects were used to develop estimated unit prices as they are similar in scope and size to the improvements identified for this Plan.

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Average unit prices were adjusted for inflation from each of the respective bid dates to 2020 equivalent values during calculation. Inflation values were based on monthly inflation rates retrieved from www.statbureau.org, which were calculated using the US Consumer Price Index.

CBBEL calculated the quantities for the improvements based on the assumptions below:

- The patching width shall be the width of the storm sewer trench (per the IDOT trench backfill table) plus one additional foot on each side.
- Roadways with proposed storm sewers 60" in diameter and greater are shown to be completely reconstructed. If the proposed storm sewers are smaller than 60" in diameter then we assumed patching and resurfacing on the streets unless additional utilities need to be relocated due to the proposed storm sewer.
- The Surface Course is 2-inches, Binder Course is 4-inches, and Aggregate Base Course is 12-inches for roadways to be reconstructed.
- The Surface Course is 1.5-inches and the Leveling Binder is 0.75-inches for resurfaced roadways.
- Pavement Removal is for reconstructed roadways only; roadways to be resurfaced will receive a 2-inch surface removal.
- Aggregate Subgrade Improvement, Removal and Disposal of Unsuitable Material, and Geotechnical Fabric for Ground Stabilization are 5% of the reconstructed pavement.
- Trench backfill was calculated for proposed storm systems only; water/sanitary mains and services are included in those unit prices.
- Roadways with proposed storm sewer larger than 48" will have a parallel sanitary sewer installed.
- Roadways with a proposed box culvert or elliptical storm sewer will have a new water main installed.
- Each roadway intersection with a proposed storm sewer includes 200 feet of concrete curb and gutter removal and replacement, 400 square feet of concrete sidewalk removal and replacement, and the installation of 80 square feet of detectable warnings, 4 inlets (Inlet, Type A, High Capacity Frame and Grate), and 100 feet of lateral 12" RCP storm sewer.
- Each flared end section of proposed storm sewer includes 10 square yards of riprap with filter fabric.
- Each location where proposed storm sewer crosses an existing sewer line or water main includes 50 feet of that utility to be removed and replaced during installation.
- Boring pits for augured pipes are assumed to be 30' long x 20' wide.

The detailed engineer's estimates of probable costs developed for each alternative in each study area are in included in in the following corresponding Appendices for each FSA.

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4.2 RESIDENTIAL PROPERTY IMPROVEMENTS

For the purposes of providing recommendations to address drainage problems on private property, the recommended improvements were divided into those that address yard flooding versus structure flooding. To assist with residential property drainage problems, it is recommended that the Village consider enrolling in the Center for Neighborhood Technology (CNT) Rain Ready program. This program can assist property owners reduce their risk of flooding, become more climate resilient, and create healthy buildings and green neighborhoods. RainReady approaches are tailored to the specific needs of each building and community and can supplement the recommendations below for yard and structure drainage improvements.

4.2.1 Yard Drainage Improvements

The vast majority of drainage complaints received were involving yard flooding on private property. There were approximately 140 reported instances of yard flooding on private property. For the reasons described earlier in the Plan, many properties within the Village were not designed or constructed with sufficient slope to adequately drain runoff in a way that prevents standing water. Many lots also contain low areas that promote standing water. Accumulating debris and detritus from the vegetation canopy can exacerbate these issues. Given the large number of instances where these drainage problems occur and the fact they are on private property, it is recommended that the Village develop a policy that assigns responsibility of drainage improvements and maintenance of existing yard drainage to the individual property owner. This would be consistent with Illinois Drainage Law and policies adopted by other communities. It is acknowledged that the drainage problems may be complex and may involve several properties, and therefore some Village guidance could be provided to assist property owners as follows with corresponding examples in Appendix 2:

- Develop a web page and handout that clearly defines the Village policy on private property drainage issues that includes references to Illinois drainage law, development regulations, etc. See Village of Niles example.
- Allocate a limited amount of staff time to developing recommendations for drainage improvements on private property. This would include contacting multiple property owners where the drainage improvement involves more than one property.
- Provide a list of standard design details and typical cost estimates for green infrastructure and other yard drainage improvement practices such as:
    - Rain gardens and native vegetation
    - Underdrains
    - Yard inlets
- Develop a list of recommended engineering firms with fixed fees for initial drainage investigations. See Village of Wilmette example.
- Provide a list of recommended landscaping or sewer companies that have successfully completed drainage projects within the Village or surrounding communities.
- Establish a cost share program for private property drainage improvements similar to the Village of Wilmette, Stormwater Incentive Program or the Village of Roselle, Flooding Assistance Program.

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Beyond residential private property guidance, CBBEL identified five improvement scenarios for private property yard drainage improvements based on email and online complaints as well as observations made during multiple site investigations. The five improvements scenarios include installing 6-inch underdrains or 12-inch RCPs though rear yards with connections to either a downstream detention basin or the nearest storm sewer structure. If a storm sewer structure was not nearby, a scenario was expanded to include the installation of a new manhole along with a 12-inch lateral storm sewer to provide a service connection into the Village's storm sewer system.

The proposed improvement scenarios would benefit multiple properties (3 at a time) and range in cost from $10,700 to $47,700 per property based on the engineer's estimate of probable cost and include a 25% contingency, design and permitting costs. The private property proposed improvements are based on the following main items including the following:

- Storm sewers ($80/linear foot)
- Underdrain ($30/linear foot)
- Inlets ($5,000/structure)
- Vegetation restoration ($11/square yard)

The detailed engineer's estimate of probable cost for each proposed scenario is included in Appendix 2. These costs do not include on-going maintenance. Assuming a median cost of 20,000 per property, the total cost for private property yard drainage improvements is approximately $3 Million. This does not include private property yard drainage that was not reported to the Village for inclusion in the Plan.

It is not recommended that the Village construct drainage infrastructure on private property for the purpose of improving drainage on those properties for several reasons. First, there is significant capital required for increasing the capacity of the Village owned drainage system, which must be improved to accept the water from private property drainage projects. Secondly, easements for future maintenance and replacement would be required over any Village improvements which would encumber portions of the private property. Finally, the Village must pay prevailing wages for its contract work.

4.2.2 Residential Structure Flood Proofing

It is anticipated that the level of structural flood protection in the Village could also be increased through flood-proofing of residential structures by homeowners. Flood-proofing of residential structures is the single most cost-effective measure that can be completed to protect homes from flooding. A few of these measures include:

- Overhead sewer: This can greatly reduce the occurrence of sanitary sewer backup into a structure. An overhead sewer consists of an ejector pit, ejector pump and backflow valve. All plumbing drains in the basement are directed to the new ejector pit and pumped into the building drain. The overhead sewer system reconfigures the existing sanitary plumbing system inside a residence such that the lowest elevation that the main sanitary line leaving the structure is above the ground elevation or above the above the basement floor, typically along the basement ceiling which is overhead. In this system, the sanitary pit and pump are installed indoors so less maintenance is

required, and there is nothing installed in the service line that has potential to get stuck or obstruct the line.

- Sanitary backflow valve: Valve that allows water to flow in one direction, but automatically closes when the direction of flow is reversed. When the HGL in the sanitary sewer line exceeds the adjacent basement floor elevation, the check valve will engage preventing sanitary backup into the basement.
- Sump pump with battery backup: In the event of an electrical outage during a flood, a battery backup to provide power to the sump pump is recommended to prevent basement flooding.
- Directing downspouts away from structures: Downspouts that outlet near a structure allows stormwater to infiltrate and collect against the foundation resulting in seepage and/or additional strain on the sump pump. Directing downspouts away from the structure is a simple flood-proofing measure to help reduce the amount of water against the foundation.
- Raising window wells or other low entry points: Raising the window wells and low entry points increases the level of flood protection around a home by blocking overland flood access into the structure (Figure 14).

Completing these flood-proofing measures in homes that are susceptible to flooding can provide a level of freeboard above the street flooding elevation that will significantly improve the effectiveness of the long-term capital improvement projects to be discussed in this report. Additional flood proofing measure and specific details area provided in Appendix 2.

Figure 14. Window Well Elevation

4.3 GREEN INFRASTRUCTURE

4.3.1 Green Infrastructure Improvements

Over the last 20 years many communities throughout our region have increased sustainability by adding green infrastructure to their toolkit of approaches for the management of stormwater. Green infrastructure techniques include using vegetation to control stormwater, restoring wetlands to retain floodwater, installing permeable pavement to mimic natural hydrology, and using or capturing and re-using stormwater more efficiently on site. By attempting to mimic natural hydrologic functions, such as infiltration and evaporation, these approaches prevent stormwater from flowing into surface waters or storm sewer systems already under great stress using natural features. Green infrastructure is typically used to compliment or assist traditional stormwater management practices and is not meant to replace traditional grey stormwater management practices. Although green infrastructure practices cannot single-handedly mitigate the flooding during extreme storm events, they provide a reduction in stormwater runoff volumes and improve water

quality. Green infrastructure should be an integral part of stormwater management strategies given the cost-effectiveness of green approaches across a variety of categories. On a national scale, policies that favor or stimulate the wider adoption of green infrastructure strategies have been gaining notoriety while providing opportunity and available financial resources.

Figure 15. Green Road with Bioswale

Future Village roadway projects and private property drainage issues throughout the Village present opportunities to implement green infrastructure practices. Recommendations of types are as follows:

- Green roads with bio-swales (Figure 15)
  - Future Village projects as warranted
- Rain gardens (Figure 16)
  - Rain gardens are depressional areas landscaped with perennial flowers and native vegetation that soak up rainwater. They are strategically located to capture runoff from impervious surfaces, such as roofs and streets. Rain gardens fill with a few inches of water after a storm and then water filters into the ground, rather than running off to a storm drain. Located on private property.
- Rain barrels and downspout disconnection (Figure 17)
  - Program for rain barrel assistance
  - Limited to private property

4.3.2 Green Infrastructure Limitations

Green infrastructure systems have a growing record of reducing runoff from smaller and more frequent rain events. However, these systems do not target low-frequency, high-volume rainfall events. Care should be taken to realize that while green infrastructure can be used to compliment a stormwater management system for frequent storm events, flooding will continue throughout the Village from extreme rainfall events due to the undersized storm sewer system. Many green infrastructure practices rely on high

Figure 16. Rain Garden

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infiltration rates. The Village's predominantly high clay soil content throughout make green infrastructure initiatives that rely on infiltration very difficult.

Figure 17. Rain Barrel

It is important to understand the magnitude of the flooding problem in the Village, the capacity of the existing storm sewer network and the relation of limitations of green infrastructure. In typical urban flood problem areas, the storage volumes required to reduce the flood depths to an acceptable level are significant. Flood volumes are typically quantified in acre-feet. One acre-foot is the equivalent of an acre of land that is flooded one foot deep. Comparing runoff volumes for a 0.5-acre lot in the Village to volumes provided by green infrastructure, the limitations of green infrastructure are apparent:

- Capacity limitations
  - A single 0.5-acre lot in the Village would generate up to 28,500 gallons of runoff during the a 10-year design storm (2.99 inches in 2 hours):
    - 520 rain barrels (55 gallons each) per property are required to store this water
  - 1 acre-ft of flood storage equals:
    - 5,925 rain barrels (55 gallons each)
    - 8,250 feet of green alleys (0.08 acre-feet per 660 ft block)
    - 2,520 feet of roadway with pervious pavement

The construction of green infrastructure techniques like green streets and rain gardens also has a heavy reliance on the in-situ soils for infiltration. Soil amendments to achieve proper infiltration rates to meet performance stands can increase construction costs and are limited in effectiveness by the underlying soils. Roadway jurisdictions and requirements can also limit the use and increase construction cost of green streets. Vegetation used in rain gardens and bio retention areas also requires establishment and maintenance.

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CHAPTER 5 FLOOD STUDY AREA CAPITAL IMPROVEMENT PROJECTS

This Plan identifies long term capital improvement projects and plans for detention basin issues for each of the FSAs (Figure 18). The recommended projects are described in the following sections.

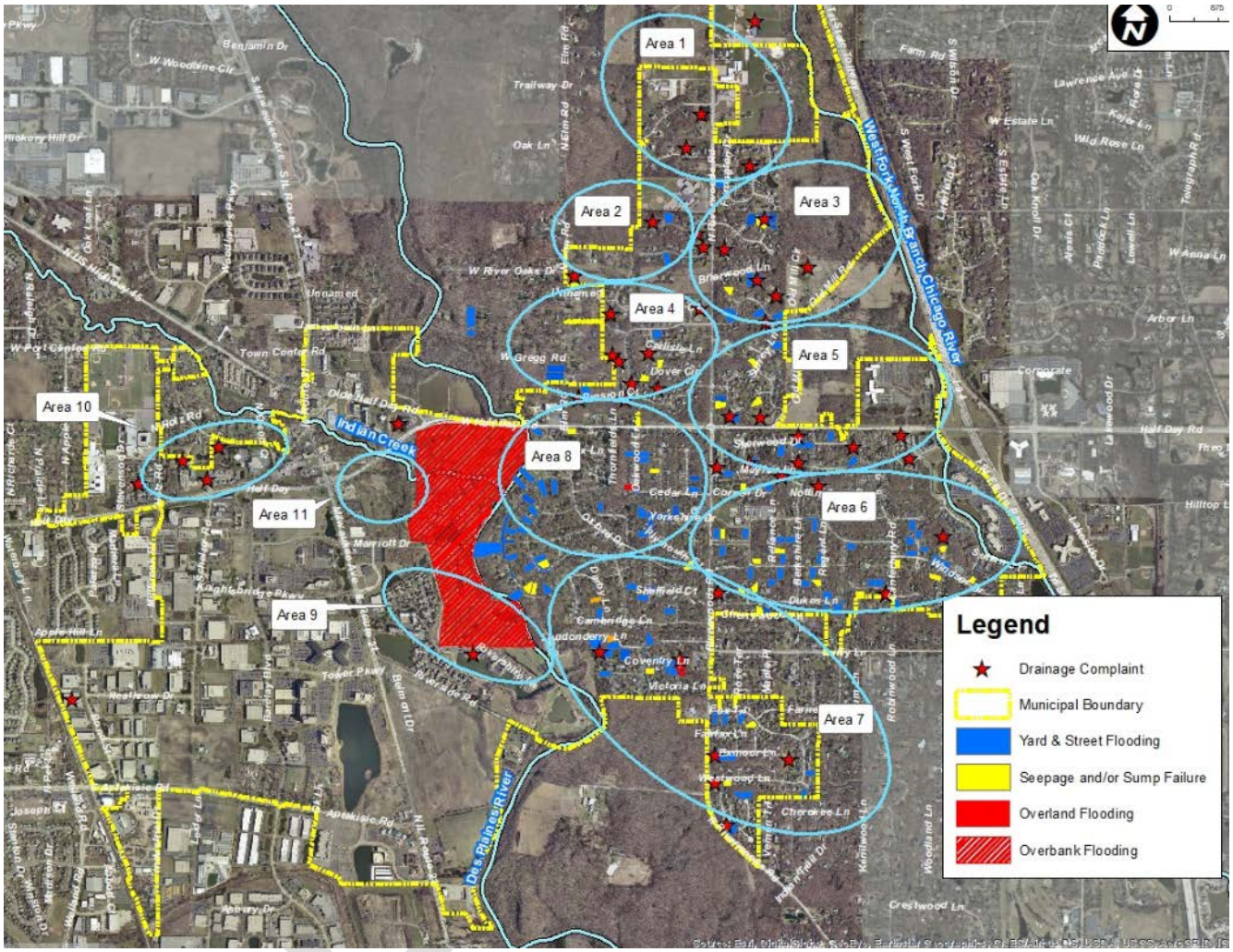

Figure 18. Lincolnshire Flood Study Areas

5.1 DETENTION BASIN IMPROVEMENTS

Stormwater drainage in Areas 1-5, the east portion of Area 7, Areas 9 and 10 is handled or directed to a stormwater detention basin. CBBEL conducted multiple field investigations of the detention and drainage components in these areas. According to the Village's GIS database there are approximately 135 areas that the Village has maintained or applied resources to throughout the entire Village (Figure 19). Of the 135 stormwater management areas Village's GIS database, 69 stormwater management areas are in the residential portions of the Village evaluated in this Plan (Figure 20). The remaining detention basins or stormwater management areas in the Village GIS database are associated with commercial or non-residential properties in the Village.

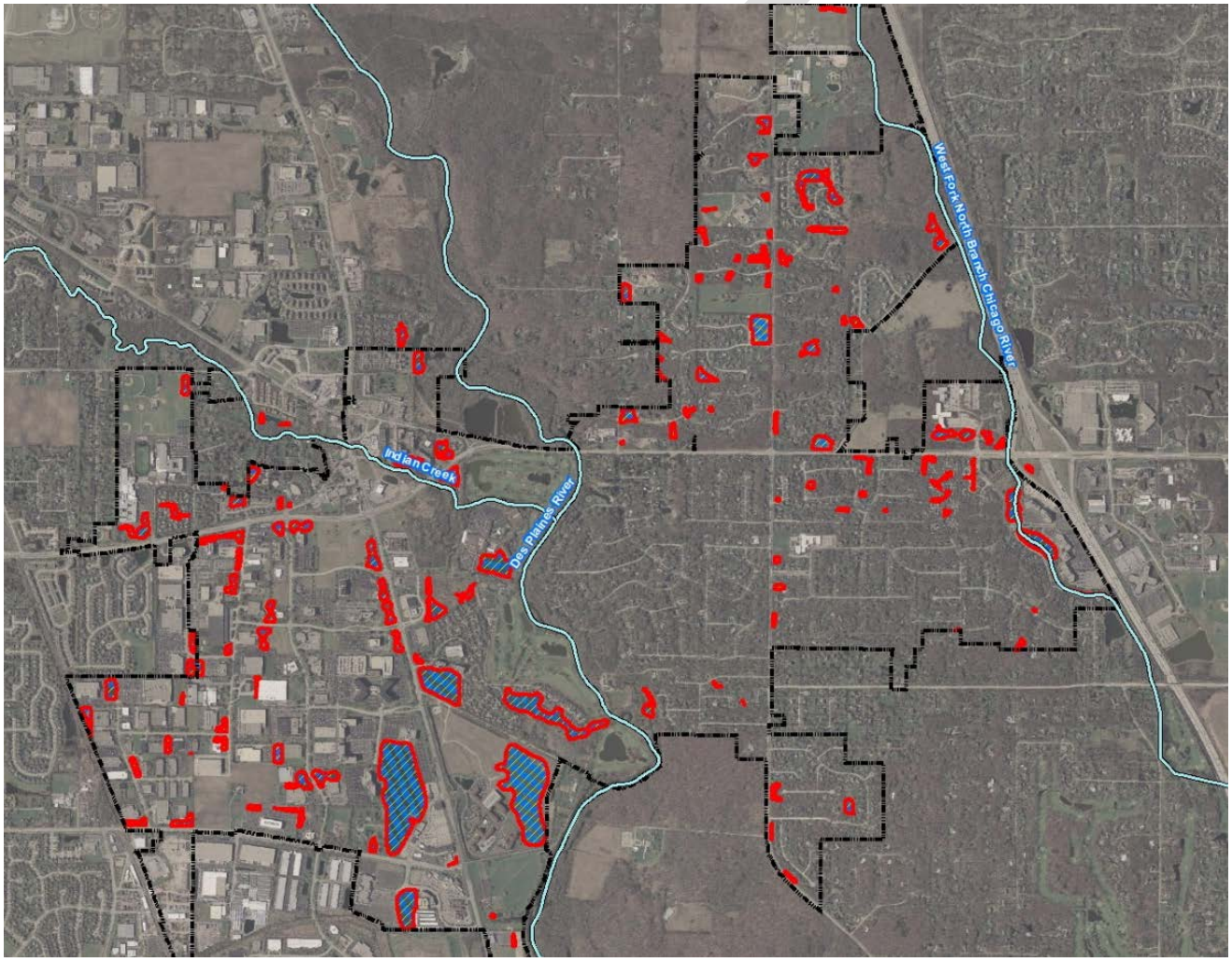

Figure 19. Lincolnshire Detention Basin Database (135 Total)

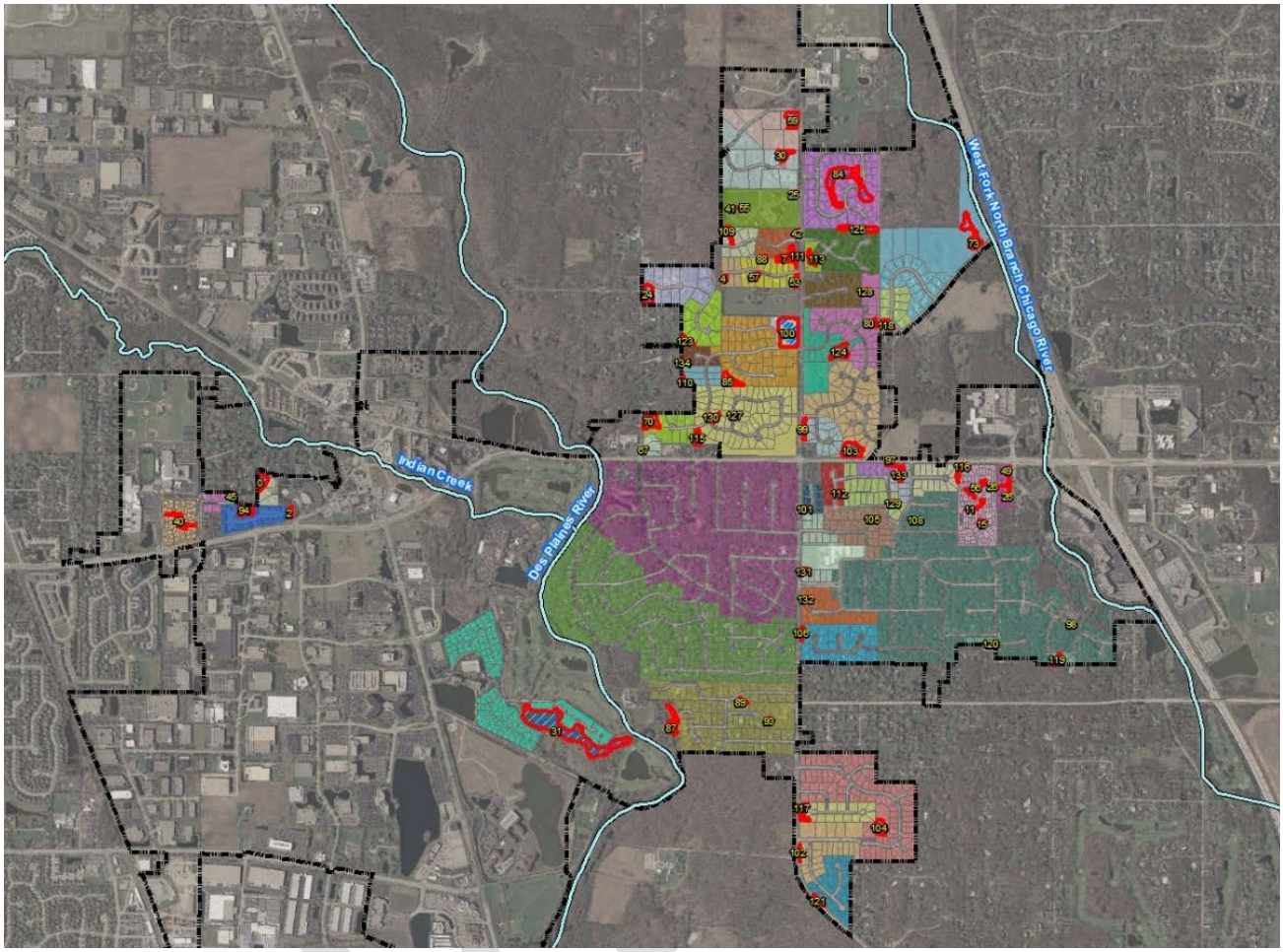

Figure 20. Lincolnshire Detention Basin Database Summarized in Plan (69 Total)

5.1.1 Detention Basin – Existing System

As discussed in previous sections, many of the stormwater management areas are in various states of disrepair. Maintenance of the 69 locations of stormwater infrastructure presents a challenge as these facilities are scattered throughout the Village on private property, Village property and conservancy easements also on private property. CBBEL conducted a review of all best available information for the detention areas in the Village GIS database included in this Plan. This information included subdivision plats, storm sewer atlases, grading and drainage plans as well as previous studies of detention areas conducted by the Village. The results of this analysis include the identification of stormwater management maintenance responsibility with respect to property ownership:

- Designed stormwater storage on Village property (17 areas)
- Designed stormwater storage on private property (37 areas)
- Natural stormwater storage areas on private property (15 areas)

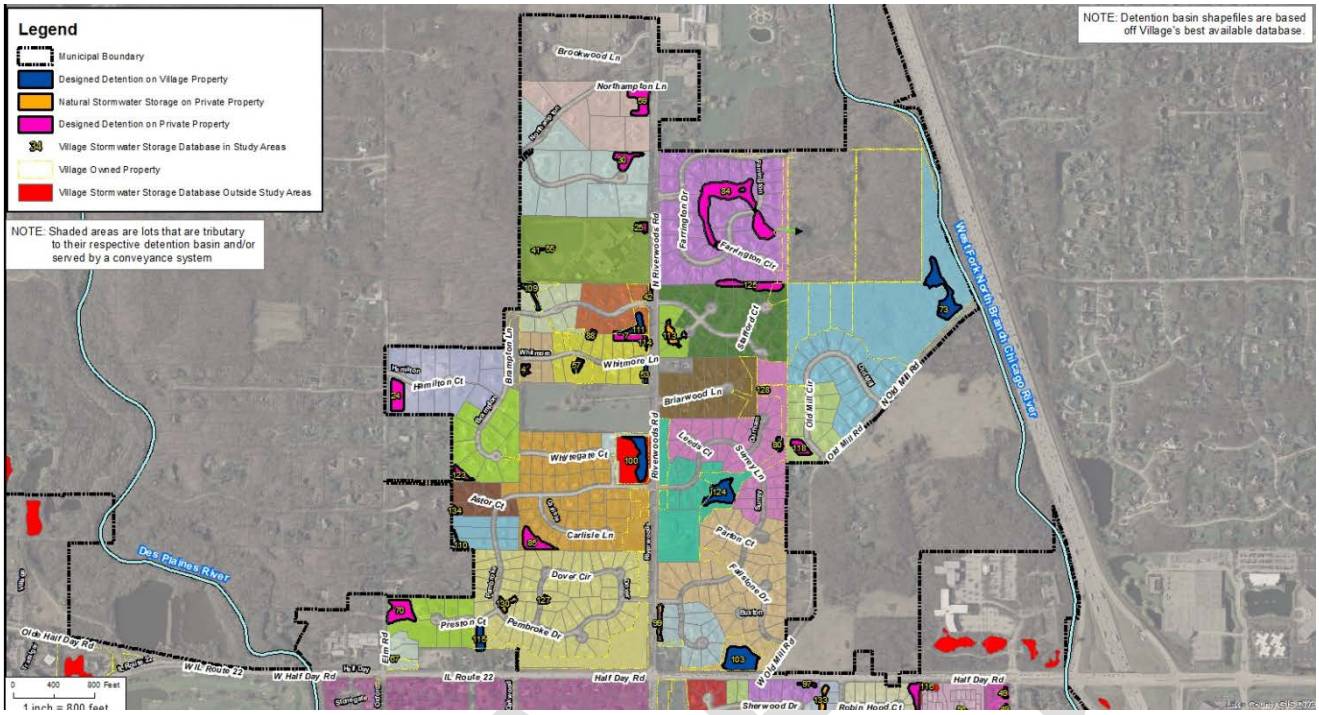

Figure 21. Lincolnshire Detention Basin Database Summarized in Plan (Parcels Served Example)

CBBEL identified stormwater detention basin service areas based on storm sewer sheds, tributary areas and plat of survey. An example of this database created is shown in Figure 21. Exhibits 1-4 - in Appendix 1 show the stormwater management areas included in this Plan and their respective service areas.

5.1.2 Detention Basin – Proposed Improvements

CBBEL identified a number of different improvement scenarios for the detention basins based on the observations made during multiple site investigations conducted throughout development of the Plan. These proposed scenarios would include a retrofit the existing detention facilities or stormwater management areas to prevent debris clogging, promote positive drainage and restore the originally intended function. It should be noted that these improvements would not bring the detention basins up to current design standards, as increasing the stormwater detention volume to achieve this would be prohibitively expensive and may require property acquisition. The Lake County SMC stormwater management design standards for detention basins have increased between 20% and 45% as a result of increasing rainfall trends for new developments and detention basins will need to be correspondingly larger to accommodate the additional runoff volume. It is recommended that the Village's existing detention basins are evaluated to determine capacity insufficiencies to meet current WDO standards for increased capacity before proposed detention basin improvements are performed. This may result in property acquisition and tree removal on private property to meet increased design capacity and larger detention basin footprints.

The proposed improvement scenarios range in cost from $23,000 to $88,000 based on the engineer's estimate of probable cost and include a 25% contingency, design and permitting costs. A detailed engineer's estimate of probable cost for each proposed scenario is included in Appendix 1. On-going maintenance

through 5 and 10 years is included in the overall summary of this section. Approximate increased costs required for retroactively increasing capacity to meet current WDO standards (1.5 times total cost including 10 year maintenance) have also been included in the summary tables below and in Appendix 1. The proposed condition scenarios to restore function for basins ranging in size from 0.1 acres to 1.0 acre consist of the following:

- 1.0 Acre Basin ($88,000)
  - Install maintainable outlet control structure, tree removal, debris clearing, sediment removal, side slope restoration
- 1.0 Acre Basin ($63,000)
  - Tree removal, debris clearing, sediment removal, side slope restoration
- 1.0 Acre Basin ($86,000)
  - Minimum restoration with back flow preventor, no outlet control, outlet ties into receiving storm sewer system
- 1.0 Acre Basin ($86,000)
  - No outlet control structure, 500 feet of underdrain system
- 0.5 Acre Basin ($69,000)
  - Install maintainable outlet control structure, tree removal, debris clearing, sediment removal, side slope restoration, 200 feet of underdrain system
- 0.5 Acre Basin ($51,000)
  - Tree removal, debris clearing, sediment removal, side slope restoration, 500 feet of underdrain system
- 0.25 Acre Basin ($50,000)
  - Install maintainable outlet control structure, tree removal, debris clearing, sediment removal, side slope restoration
- 0.25 Acre Basin ($32,000)
  - Tree removal, debris clearing, sediment removal, side slope restoration, 300 feet of underdrain
- 0.1 Acre Basin ($23,000)
  - Tree removal, debris clearing, sediment removal, side slope restoration, 200 feet of underdrain

CBBEL developed a concept level estimate to improve the 69 stormwater management areas using the improvement scenarios above. The complete summary table is provided in Appendix 1 and identifies the number of properties served by each stormwater management area. Table 5 below summarizes the total cost for the three scenarios with respect to land ownership. The total cost includes estimated yearly maintenance costs ranging from $1,500 – $5,000 depending on size with a 3.5% inflation rate over time, through ten years.

The cost to construct all improvements would be approximately $2.4 million. To perform the required maintenance over 10 years would be an additional $2.2 million. According to Section 13-2-8 of the Village Code, the maintenance and monitoring of stormwater management areas on private property is the responsibility of the property owner. Maintenance responsibility is defined for the three conditions for stormwater management areas and basins identified under existing conditions:

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- Designed stormwater detention basins on Village owned property (17 areas)
  - Maintenance is the Village's responsibility.
- Designed stormwater detention basins on private property (37 areas)
  - Maintenance responsibility is the private property owners per Section 13-2-8 of the Village Code.
  - The Village can provide guidance consistent with the recommendations for private property yard drainage improvements.
- Natural stormwater storage areas on private property (15 areas)
  - Maintenance responsibilities for these areas is the responsibility of the private property owners per Section 13-2-8 of the Village Code.
  - The Village can provide guidance consistent with the recommendations for private property yard drainage improvements.

Proposed Level of Flood Protection	Number of Identified Locations	Construction Cost	Total Cost Year 5	Total Cost Year 10	Retrofit Total Cost (x 1.5)
Designed Detention on Village Property	17	$674,000	$962,000	$1,250,000	$1,876,000
Designed Detention on Private Property	37	$1,150,000	$1,807,000	$2,476,000	$3,714,000
DETENTION BASIN TOTAL	54	$1,824,000	$2,769,000	$3,726,000	$5,590,000
Natural Stormwater Storage Areas on Private Property	15	$537,000	$742,000	$948,000	$1,421,000
TOTAL	69	$2,361,000	$3,511,000	$4,674,000	$7,011,000

Table 5. Detention Basin Improvement Summary based on Property Ownership

This information intended to aid in the decision-making and budgeting process for maintenance of these areas in the future. There are three options the Village can pursue for this situation:

1. Repair and maintain only basins on Village property, notify other property owners of their responsibility;
2. Perform one-time maintenance of all detention basins and stormwater areas within database and turn private property basins back over to property owners.
3. Take over all detention basins and stormwater areas within database and maintain them in perpetuity.

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5.2 LINCOLNSHIRE DRIVE – NORTH & SOUTH

5.2.1 Lincolnshire Drive (North) – Limitations of Existing System – Cause of Flooding

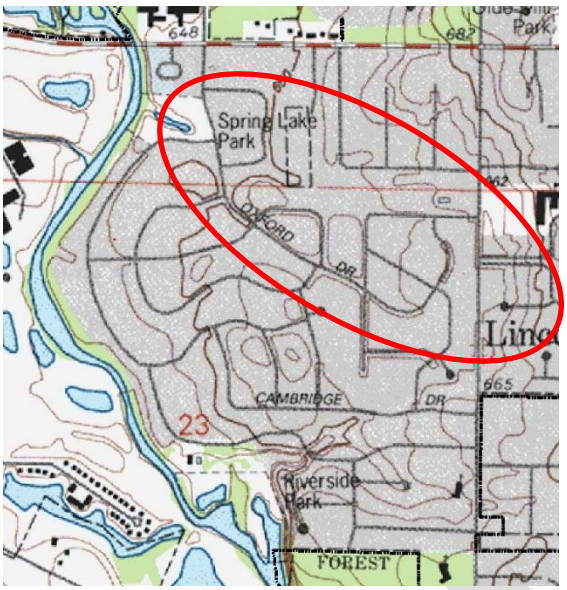

Figure 22. USGS Hydrologic Atlas (Historic Drainageways)

The Lincolnshire Drive study area includes a large tributary area south of Half Day Road beginning from just east of Riverwoods Road where drainage from the west ends of Brittany Lane, Cornel Drive, Buckingham Place (Sprague School), Grenadier Court and Dukes Lane is collected and drains west under Riverwoods Road through a historic drainage path to the Des Plaines River. The historic drainage path has since been contained in a 48-inch storm sewer along Oxford Drive and outlets to the Des Plaines River at Spring Lake Park through a 36-inch and 48-inch culverts where the total tributary area is approximately 195 acres (Figure 22 and 23). Runoff from Cedar Lane and Oakwood Lane drain into this system (Exhibit 5) before the outlet at the Des Plaines River. The invert of the trunk storm sewers is at Spring Lake Park is at elevation 638.0 feet and the 10-year water surface elevation is 644.5 feet according to the FEMA Flood Insurance Study (FIS) for the Des Plaines River at this location.

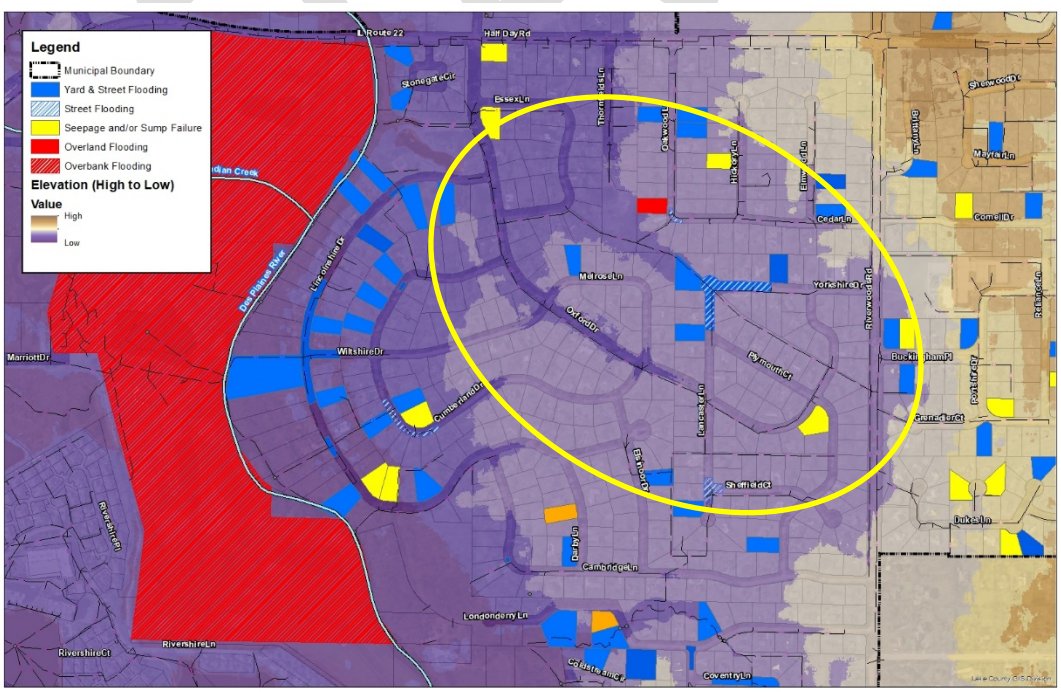

Figure 23. Lincolnshire Drive (North) FSA Topography

Side and rear yard drainage problems are widespread throughout this area. Reports of structure flooding due to overland flow outside the floodplain and floodway areas is limited to one. The existing level of service of this storm sewer system is a 2-year design storm (1.94 inches over 2 hours). During storm events in excess of the 2-year design storm, roadway flooding begins along Oxford Drive from Plymouth Court to Essex Lane. Ponding begins in the rear yards of Plymouth Court, as well as Yorkshire Drive and Lancaster Lane, and at Oakwood and Cedar Lanes. The Cedar Lane and Oakwood Lane single outfall drains through the side yards at the west end of Cedar Lane where there is no safe overland flow path. Rear yard flooding is noted along Oakwood and Hickory Lanes.

The areas along Lincolnshire Drive and Cumberland Drive are located in the both the FEMA regulatory floodway and floodplain associated with the Des Plaines River (Figure 24 and Exhibit 7 in Appendix 3). Flooding can result from overbank flooding from the Des Plaines River and when storm sewer capacity is exceeded from localized storm events. As the water level in the Des Plaines River rises, storm sewer capacity also decreases during localized storm events as the outlets to the Des Plaines River will not drain by gravity. The existing condition analysis for this storm system has been completed assuming the Des Plaines River water surface elevations is at normal water level or low. The XP-SWMM analysis under this condition highlights the limited storm sewer capacity along the historical overland flow routes which are blocked by residential structures. An analysis of the system using a 10-year tailwater condition at the outlets to the Des Plaines River indicate less than 2-year capacity in the system.

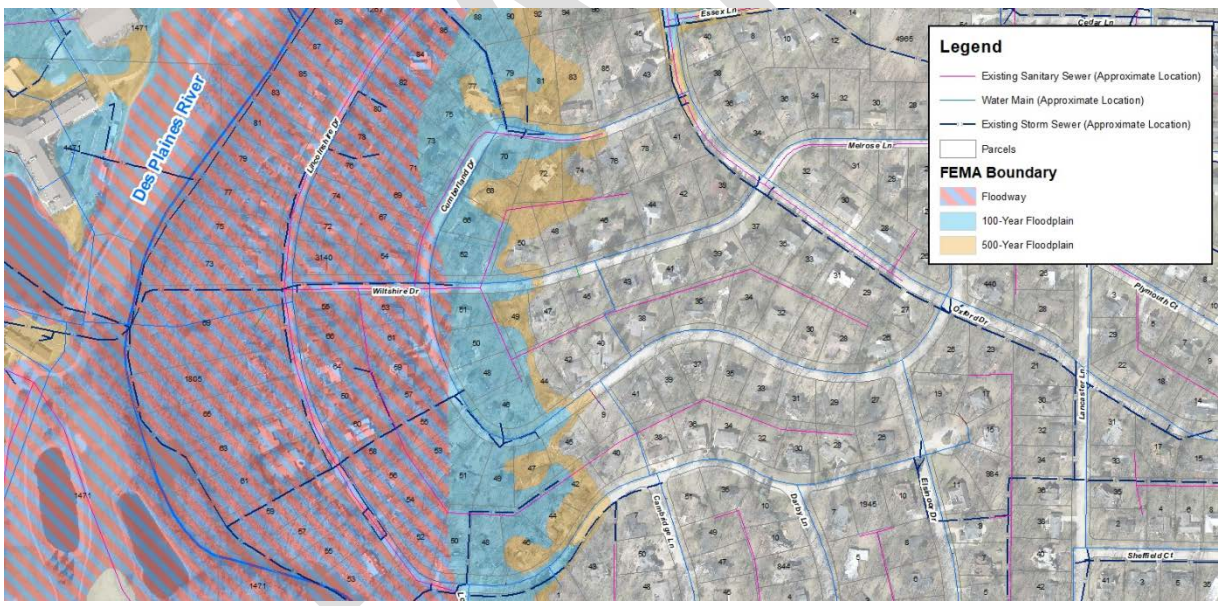

Figure 24. Lincolnshire Drive FSA, FEMA FIRM

5.2.2 Lincolnshire Drive (North) Proposed Improvements

CBBEL designed a relief storm sewer for this area to provide a 10-year level of service. Large storm sewers are required to safely convey runoff during large storm events to the Des Plaines River. ***Drainage on private property will be benefitted by this project as the capacity for private property drainage improvements (to be constructed by individual property owners) will be included in the new relief storm sewer design.*** The proposed

storm sewers are outlined below and have been determined using a 10-year tailwater elevation in the Des Plaines River.

- Install a new trunk storm sewer along Oxford Drive from Lancaster Lane to Essex Lane.
- Install laterals along Lancaster Lane to Yorkshire Drive and Lincolnshire Drive south to overlapping storm sewer system (Exhibit 6 in Appendix 3).
- Remove and replace the storm sewer at Oakwood Lane and Cedar Lane.
- Remove and replace the storm sewer between Buckingham Place and Grenadier Court.
- Increase parallel outfall to the Des Plaines River at Spring Lake Park.

Table 6 summarizes the existing and proposed level of flood protection, number of structure and properties benefited, and the cost associated with the proposed levels of flood protection in 2020 dollars.

Existing Level of Service	Proposed Level of Flood Protection	Number of Properties Benefitted	Total Cost	Cost/Property
2-year	10-year	111	$4,300,000	$39,000

Table 6. Lincolnshire Drive North FSA Summary

These improvements increase the level of service for the stormwater management system to a 10-year level of service, which is similar to current design standards and consistent with Village staff recommendations. It would also increase flood protection for properties served by the storm sewer system. Portions of this study area would still be susceptible to riverine flooding from the river as they are in the mapped regulatory floodplain and floodway of the Des Plaines River (Exhibit 7) and the engineers estimate of probable cost for this area is included in Appendix 3. Permitting and coordination for the proposed project includes the following agencies:

- Lake County SMC
- IEPA, NPDES permit
- ACOE
- IDNR-OWR

5.2.3 Lincolnshire Drive (South) – Limitations of Existing System – Cause of Flooding

The existing storm sewer system, drainage patterns and problems previously identified for Lincolnshire Dive (North) are consistent with the problems and conveyance issue for Lincolnshire Drive (South). The existing level of service of this storm sewer system is a 2-year design storm. During storm events in excess of the 2-year design storm, roadway flooding begins in the low area at the intersection of Lincolnshire Drive and Wiltshire Drive where there are two storm sewer outfalls to the Des Plaines River. This flooding is due to the lack of conveyance capacity of the existing 12-inch diameter outfalls to the Des Plaines River. As water surface elevations in the Des Plaines River increase, the capacity of the existing storm sewer system decreases which exacerbates flooding on Lincolnshire Drive. Significant flooding occurs several feet deep along the low points of Lincolnshire Drive. Flooding extends across the road and into the private properties making it impassable.

Village staff is required to deploy barricades and pump the floodwater from Lincolnshire Drive often over multiple days. The roadway inundation duration in this area is a function of the Village's temporary pumping capacity and the water surface elevation in the Des Plaines River. As the water surface elevations in the Des Plaines River exceed the 10-year elevation, the floodwaters overtop the rear yard berm, and the study area is entirely inundated. The Des Plaines River equalizes to its natural floodplain, and pumping must be terminated as to not recirculate floodwaters. Overbank yard flooding is common for the properties located in the floodway and Zone AE floodplain adjacent to the Des Plaines River (Figure 24). Side and rear yard drainage problems are widespread throughout this area. *Flooding along Lincolnshire Drive directly impacts resident's accessibility to their properties often preventing residents from entering or leaving their homes. The duration of inaccessibility due to roadway inundation is the most severe (more than any other location) throughout the residential portions of the Village.*

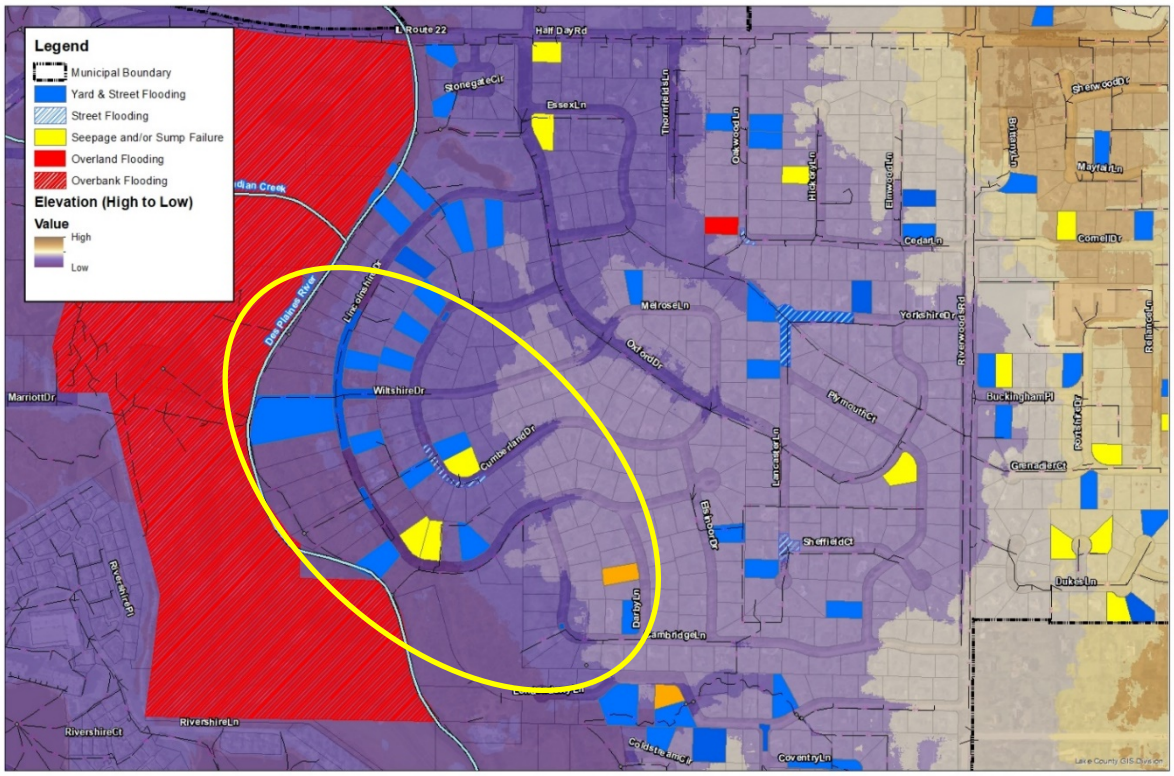

Figure 25. Lincolnshire Drive (South) FSA Topography

5.2.4 Lincolnshire Drive Rear Yard Berm

The rear yards along the Des Plaines River have an earthen berm at an elevation that is approximately equal to the 10-year floodplain elevation (644.7 to 644.1 feet through the reach). The berm has a history of studies conducted to report condition dating back to the 1980s. The most recent study was completed in 2016 by Engineering Resources Associates (ERA). This study included soil borings indicating various materials (topsoil, wood, rubber and other material) and concluded that the berm was unstable with areas of high permeability. Varying settlement rates, erosion and failing material have caused elevations along the berm to settle below the 10-year flood elevation of the Des Plaines River in certain sections. The ERA report identifies areas to be restored and identifies areas that are below the 10-year floodplain elevation.

While the berm was not designed to provide a specific level of protection, the berm is elevated to approximately the 10-year floodplain elevation of the Des Plaines River (approximately 644.5 feet); and the pavement elevation in areas along Lincolnshire Drive are at elevation 642.0 feet. As the water surface elevations in the river increase, the existing storm sewers draining from Lincolnshire Drive will not drain by gravity and conveyance capacity decreases throughout the storm sewer system. While there are flap gates on the storm sewer outfalls from Lincolnshire Drive to the river to prevent the river from backflowing through the storm sewer system, the condition and function of these older flap gates is unknown. As the water surface elevation in the river exceeds the 10-year floodplain elevation, the berm will overtop, and the study area becomes inundated. The existing condition 10- and 100-year inundation areas are shown on Exhibit 8 in Appendix 4.

The earthen berm can provide protection for the areas adjacent to river, however the areas in the floodplain and floodway will remain vulnerable to inundation as the elevation of the berm will eventually be exceeded by the Des Plaines River. According to the USGS gage at Half Day Road, water surface elevation data is available for the Des Plaines River dating back to June 2009. An evaluation of this data shows that the flood elevations in the Des Plaines River may have exceeded the average berm height twice and the lowest berm elevation six instances since 2009 (Figure 26).

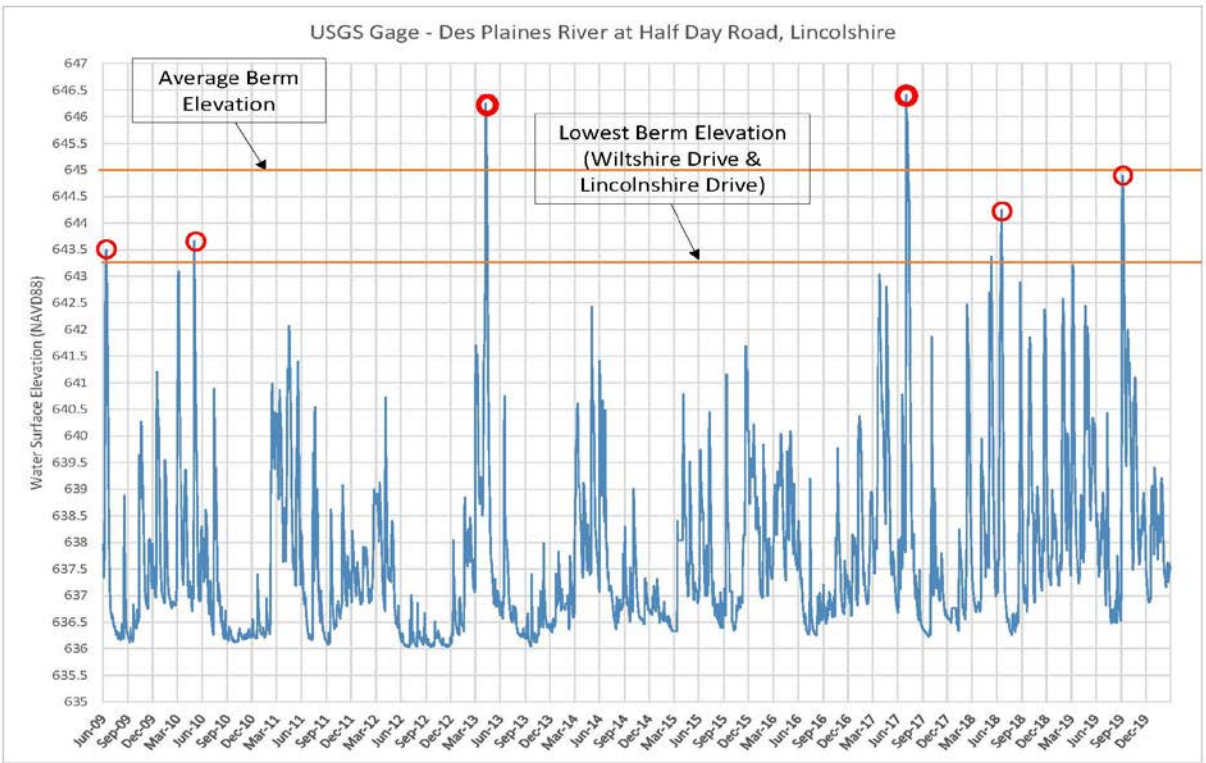

Figure 26. USGS Gage Data – Des Plaines River at Half Day Road, Lincolnshire

The Illinois Department of Natural Resources – Office of Water Resources (IDNR-OWR) has jurisdiction to oversee construction activities in the floodplain and floodway of the Des Plaines River. Increasing the height of this berm is not a viable solution for additional flood protection given the land constraints and condition of the current levee. In addition to the site constraint in this corridor presenting constructability challenges on private property, the permitting and land acquisition required for compensatory storage likely be cost

prohibitive. A detailed analysis of the berm was not included in the Plan, and the proposed improvements recommend for this FSA focus on stormwater conveyance to the Des Plaines River as the existing storm sewer system has only a 2-year design capacity.

5.2.5 Lincolnshire Drive (South) Proposed Improvements

CBBEL designed a relief storm sewer for this area to provide a 10-year level of service (Exhibit 9 in Appendix 4). Large storm sewers are required to safely convey runoff during large storm events to the Des Plaines River. A pump station is also required to provide a 10-year level of service while water surface elevations in the river are high. Consistent with the proposed system for Lincolnshire North, the proposed storm sewers are outlined below and have been determined using a 10-year tailwater elevation in the Des Plaines River. ***Drainage on private property will be benefitted by this project as the capacity for private property drainage improvements (to be constructed by individual property owners) will be included in the new relief storm sewer design.*** The 10-year tailwater condition from the Des Plaines River is approximately 2 feet above the Lincolnshire Drive roadway elevation, which necessitates a proposed pump station to keep the roadway pavement dry during high river levels.

- Install a new trunk storm sewer along Lincolnshire Drive south from Wiltshire Drive to Londonderry Lane.
- Install 30 cfs pump station on Village owned property west/southwest of Londonderry Lane.
- Install new fore main outlet to the Des Plaines River from the pump station.
- Install laterals along Cumberland Drive and Wiltshire Drive (Exhibit 9 in Appendix 4).

Table 7 summarizes the existing and proposed level of flood protection, number of structure and properties benefited, and the cost associated with the proposed levels of flood protection in 2020 dollars.

Existing Level of Service	Proposed Level of Flood Protection	Number of Properties Benefitted	Total Cost	Cost/Property
2-year	10-year	83	$7,500,000	$90,000

Table 7. Lincolnshire Drive South FSA Summary

These improvements increase the level of service for the stormwater management system to a 10-year level of service, which is similar to current design standards and consistent with Village staff recommendations. It would also increase flood protection for properties served by the storm sewer system. Portions of this study area would still be susceptible to riverine flooding from the river as they are in the mapped regulatory floodplain and floodway of the Des Plaines River. Exhibits 8-10 and the engineers estimate of probable cost for this area is included in Appendix 4. Permitting and coordination for the proposed project includes the following agencies:

- Lake County SMC
- IEPA, NPDES permit
- ACOE
- IDNR-OWR

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5.3 LINCOLNSHIRE CREEK – COVENTRY LANE

5.3.1 Limitations of Existing System – Cause of Flooding

The southwest portion of the study area west of Riverwoods Road is drained by a watercourse known as Lincolnshire Creek. Lincolnshire Creek flows from east to west into the De Plaines River. The tributary area extends east of Riverwoods Road including runoff from Fox Trail, Exmoor Lane and Fairfax Lane. Drainage is conveyed under Riverwoods Road just north of Victoria Lane through two 36-inch culverts that discharge to the upstream end of Lincolnshire. Lincolnshire Creek continues northwest from Riverwoods Road where the open channel is enclosed in a 42-inch culvert near Coventry Lane and wraps around the rear yards of the properties on Coventry Lane (Figure 28). The culvert outlets back to the open channel at the first crossing of Londonderry Lane, continues west through the rear yards between Londonderry Lane and Cambridge Lane before outletting to the Des Plaines River at Rivershire Park and the Nature Center.

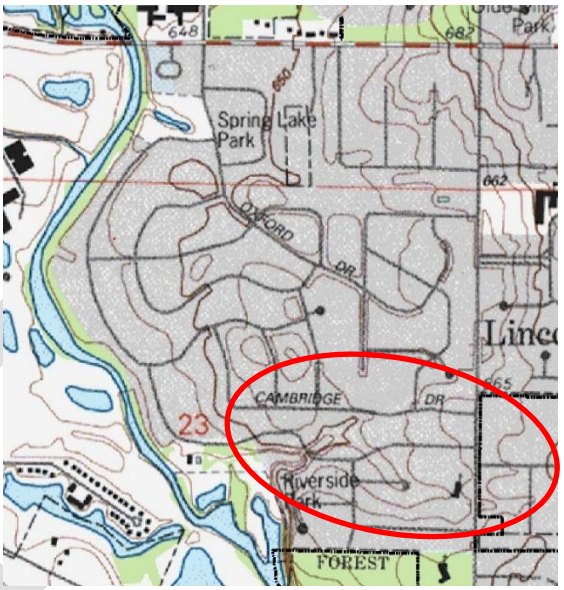

Figure 27. USGS Hydrologic Atlas (Historic Drainageway)

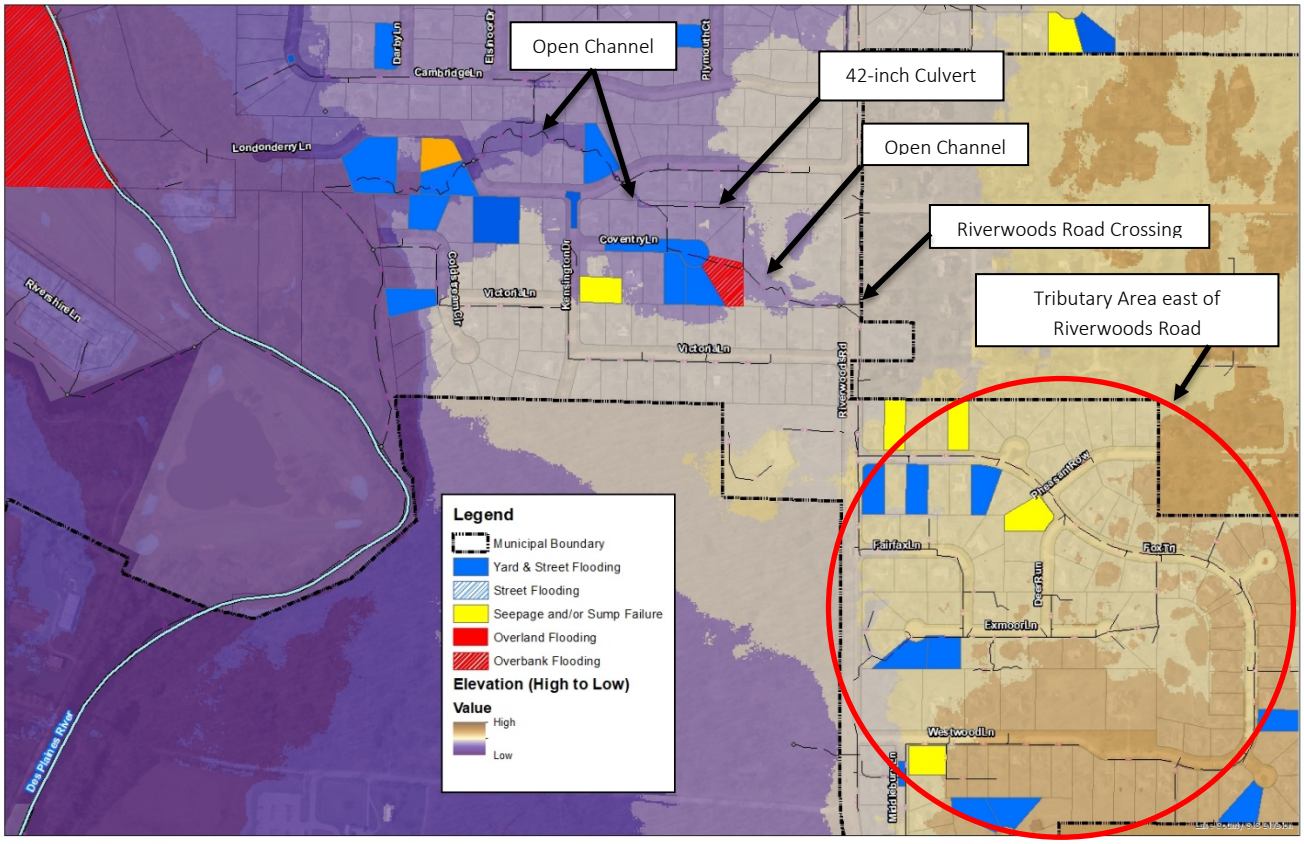

Figure 28. Lincolnshire Creek FSA Topography

In 2017, the Village completed streambank stabilization improvements along Lincolnshire Creek between Riverwoods Road to the upstream end of the 42-inch culvert. This work focused on stabilizing the incised streambanks to prevent further erosion and reduce flood flows during smaller events. These improvements were included in the XP-SWMM analysis completed for this area.

The calibrated XP-SWMM analysis shows that the existing condition 10-year water surface elevation upstream of the 42-inch culvert is contained in the open channel, however, begins to encroach into the rear yards on the east end of Coventry Lane. The stormwater from the open channel begins to flow overland, northwest between 10 and 11 Coventry Lane for storm events larger than the 10-year design storm. The 42-inch culvert and upstream open channel has approximability a 10-year design capacity. While the open channel has 10-year capacity, the existing level of service of the Coventry Lane storm sewer system is a 2-year design storm. During storm events in excess of the 2-year design storm, roadway flooding begins in the low area on Coventry Lane and encroaches north into the side yards between 4 and 6 Coventry Lane. The overland flow path between 4 and 6 Coventry Lane is toward the 42-inch culvert outfall where the open channel transition is located. During storm events greater than the 10-year, overland flow from the open channel flows into the cul-de-sac, creates additional ponding at the east end of Coventry and continues north between 4 and 6 Coventry Lane. The existing 10-and 100-year inundation areas are shown on Exhibit 11, in Appendix 5. The modeling results also indicate ponding along Victoria Lane for the 10-year design storm.

Side and rear yard drainage problems are concentrated on the properties around the east side of Coventry Lane with a report of overland structure flooding. Rear yard flooding was also reported along the rear yards adjacent to Lincolnshire Creek. Flood questionnaire data indicates side and rear yard flooding in the upstream areas east of Riverwoods Road along Fox Trail, Fairfax Lane, Exmoor and Westwood Lanes. These areas drain east to west to Riverwoods Drive. According to the Village storm sewer database there is an 8-inch lateral between 7 and 9 Exmoor Lane which is drained west by the storm sewer under Exmoor Lane. According to the atlas there are no other laterals drained by the Village storm sewer for these areas. Yard flooding in each of the areas is similar where overland flow paths are through wooded areas where flow is easily blocked by debris. Drainage is slow as there is little slope across individual properties.

5.3.2 Lincolnshire Creek (Coventry Lane) Proposed Improvements

CBBEL designed a relief storm sewer for this area to provide a 10-year level of service (Exhibit 12 in Appendix 5). Open space for detention is limited and overland flow paths between homes are blocked. Large storm sewers are required to safely convey runoff during large storm events to the Des Plaines River. The proposed storm sewers are outlined below and have been determined using a 10-year tailwater elevation in the Des Plaines River.

- Remove and replace outfall at the Des Plaines River (Coldstream Circle).
- Install parallel storm sewers along Victoria Lane, Kensington Drive, and Coventry Lane (Exhibit 12 in Appendix 5).
- Proposed side yard swale between 10 and 11 Coventry Lane.
    - This has been designed to allow overland from Lincolnshire Creek to be safely conveyed from Lincolnshire Creek to the relief sewer along Coventry Lane. The swale has been designed to

prevent structure flooding during storm events exceeding the 10-year design storm up to the 100-year design storm.

Table 8 summarizes the existing and proposed level of flood protection, number of structure and properties benefited, and the cost associated with the proposed levels of flood protection in 2020 dollars.

Existing Level of Service	Proposed Level of Flood Protection	Number of Properties Benefitted	Total Cost	Cost/Property
2-year	10-year	38	$2,200,000	$57,000

Table 8. Lincolnshire Creek – Coventry Lane FSA Summary

These improvements increase the level of service for the stormwater management system to a 10-year level of service, which is similar to current design standards and consistent with Village staff recommendations. It would also increase flood protection for properties served by the storm sewer system. The western portion of the study area would still be susceptible to riverine flooding from the river as they are in the mapped regulatory floodplain and floodway of the Des Plaines River. The rear yard flooding reported in areas east of Riverwoods Road is on private property. It is acknowledged that the drainage problems may be complex and may involve several properties, and therefore some Village guidance could be provided to assist property owners as follows with corresponding examples in Appendix 2. Exhibits 11-13 and the engineers estimate of probable cost for this area is included in Appendix 5. Permitting and coordination for the proposed project includes the following agencies:

- Lake County SMC
- IEPA, NPDES permit
- ACOE
- IDNR-OWR

5.4 SOUTHEAST – WINDSOR DRIVE

5.4.1 Limitations of Existing System – Cause of Flooding

The southeast portion of the study area (south of Half Day Road east of Riverwoods Road) is drained by a network of storm sewers draining east to the West Fork North Branch. The storm sewers in this area have three main outfalls and are referred to as north, central, and south in the drainage area description below and in Figure 29:

- North outfall – Half Day Road storm sewer system
    - The Half Day Road storm sewers drains west to east toward the North Brach just west of I-355.
    - The Half Day Road storm sewer is the outlet for the detention areas associated with Sherwood Drive, the rear yards of north Berkshire Lane, Robin Hood Court and the system of cascading detention ponds along Wood Creek Drive (Figure 29).

- The flood responses in these areas are related to detention basin function, rear and side yard drainage issues. These drainage issues and improvement options are discussed in the detention basin database section of the Plan.
- The existing condition 10- and 100-year inundation areas are shown on Exhibit 14, in Appendix 6.

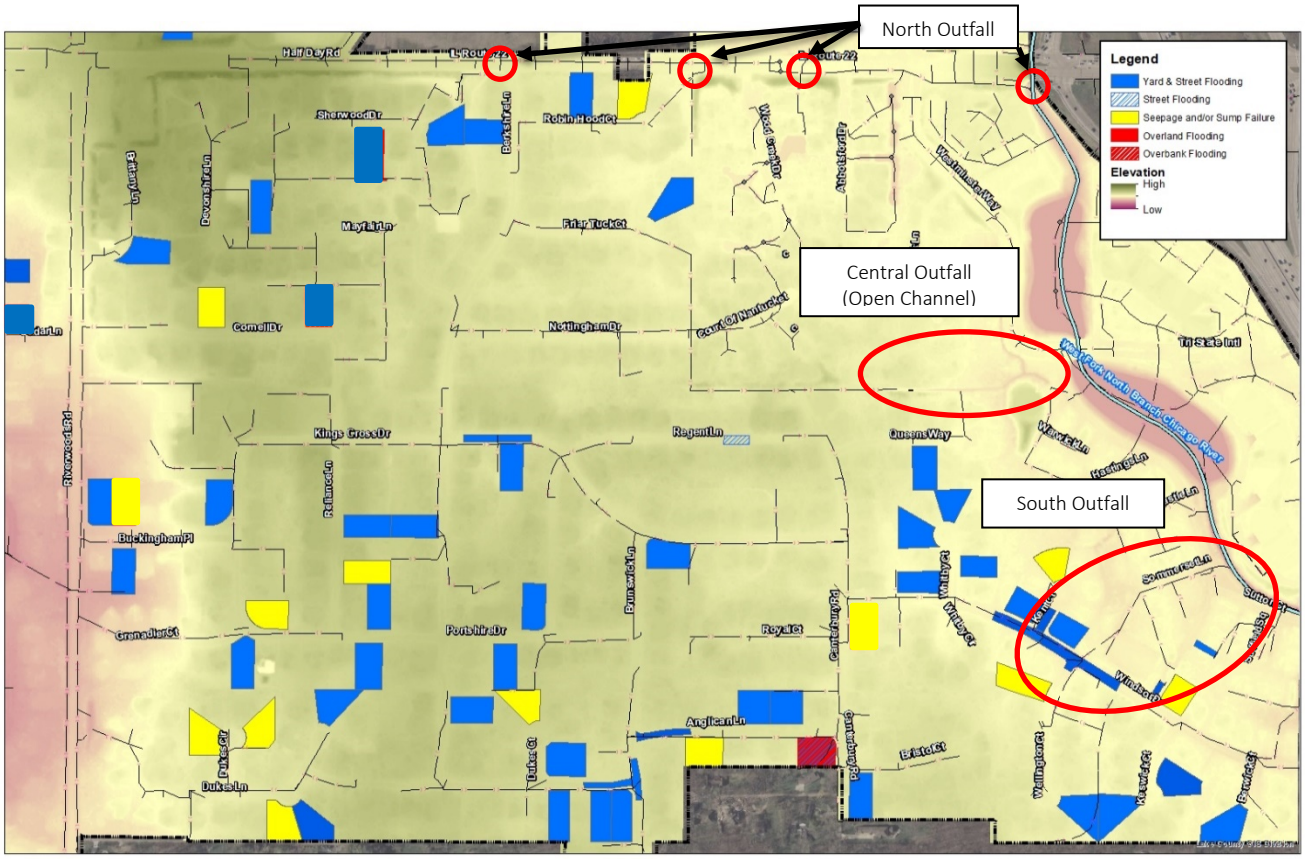

Figure 29. Southeast FSA Topography

- Central outfall – Drainage ditch along rear yards north of Queens Way (Figure 29).
  - The most recent study for this area was completed in December 2018 by Baxter & Woodman.
  - The drainage ditch serves as the outfall for the storm sewers draining Mayfair Lane, the east portion of Cornell Drive, Friar Truck Court and Nottingham Drive. Drainage from these areas is collected in 24-inch storm sewer at the east end of Nottingham Drive, extends south and is directed east along the rear yards on the north side of Regent Lane.
  - Drainage questionnaires from the upstream tributary areas indicated predominantly rear and side yard drainage problems. Rear yards throughout Friar Truck and Nottingham are wooded and poorly drained, along with Mayfair Lane, Sherwood Drive and Berkshire Lane.
  - The 24-inch storm sewer from Nottingham Drive outlets to and drainage ditch at Queens Way. According to as-built plans, the invert of the rear yard storm sewer along Regent Lane is approximately 5 feet below the invert of the open channel at the upstream end at Queens Way. The storm sewer design is a sump condition where the downstream section of the Nottingham Drive storm sewer is below the open channel invert and is never drained. Water elevations must rise within the manhole junction to discharge to the open channel.

  - A twin CMP culvert crossing (for homeowner accessibility) is located approximately 100 feet downstream from the upstream end of the drainage ditch. The culvert crossing is in poor condition and deteriorating from rusting. The crossing promotes debris collection and restricts flow.
  - Side slope erosion, scouring and debris in and on the banks of the drainage ditch was observed during the field investigation.
  - The drainage ditch is drained by a 30-inch storm sewer under Westminster Way to the West Fork North Branch. The downstream end of the open channel at the 30-inch outfall collects debris.
  - The XP-SWMM modeling indicates that the 10-year design storm is contained within the drainage ditch area. The existing condition 10- and 100-year inundation areas are shown on Exhibit 14, in Appendix 6.
  - The rear yard at the east end of Queens Way consistently remain saturated for long periods of time and ponding throughout the area is a common occurrence.
- South outfall – 42-inch storm sewer through Balzer Park
  - This outfall drains approximately 170 acres beginning with Kings Cross Drive, Dukes Lane east Portshire Drive and Brunswick Lane. The King Cross Drive storm sewer is separate from the Friar Truck and Nottingham storm sewer system.
  - Drainage from Kings Cross Drive and Anglican Lane combine at the intersection of Windsor Drive and Canterbury Road where the trunk continues east to Balzer Park along Windsor Drive. The storm sewer system extends from Windsor Drive under Balzer Park, along Sommerset Lane and outlets to the West Fork North Branch east of Westminster Way.
  - There are two areas where off-site tributary areas (Village of Riverwoods) drain into the Windsor Drive system from the south. There is approximately 15 acres tributary to the rear yards along Dukes Lane at Brunswick Lane and nearly 25 acres from the south that is tributary to the depressional area in the rear/side yards along Anglican Lane and Canterbury Road and Bristol Courts. Flood response data indicates overland structure flooding in this area.
  - Side and rear yard drainage problems are widespread throughout this area.
  - The level of service provided by this storm sewer system is a 2-year design storm for a free outfall condition where the West Fork North Branch is at normal water levels. Ponding begins at the lowest area in the system at Windsor Drive and Wellington Court during storm events greater than the 2-year design storm.
  - Balzer Park consistently remains inundated for long periods of time and ponding throughout the areas is a common occurrence.
  - The existing condition 10- and 100-year inundation areas are shown on Exhibit 14, in Appendix 6.

The areas along Westminster Way are located in the both the floodway and floodplain associated with the West Fork North Branch (Figure 30). Similar to Westminster Way and Sutton Court, the elevation of the pavement in locations along Windsor Drive are below the 100-year floodplain and are susceptible to overland flooding. The existing condition analysis for this storm system has been completed assuming the West Fork North Branch water surface elevations is at normal water level or low. This XP-SWMM analysis under this

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condition highlights the limited storm sewer capacity along at the Windsor Drive outfall location and the need for overland flow paths.

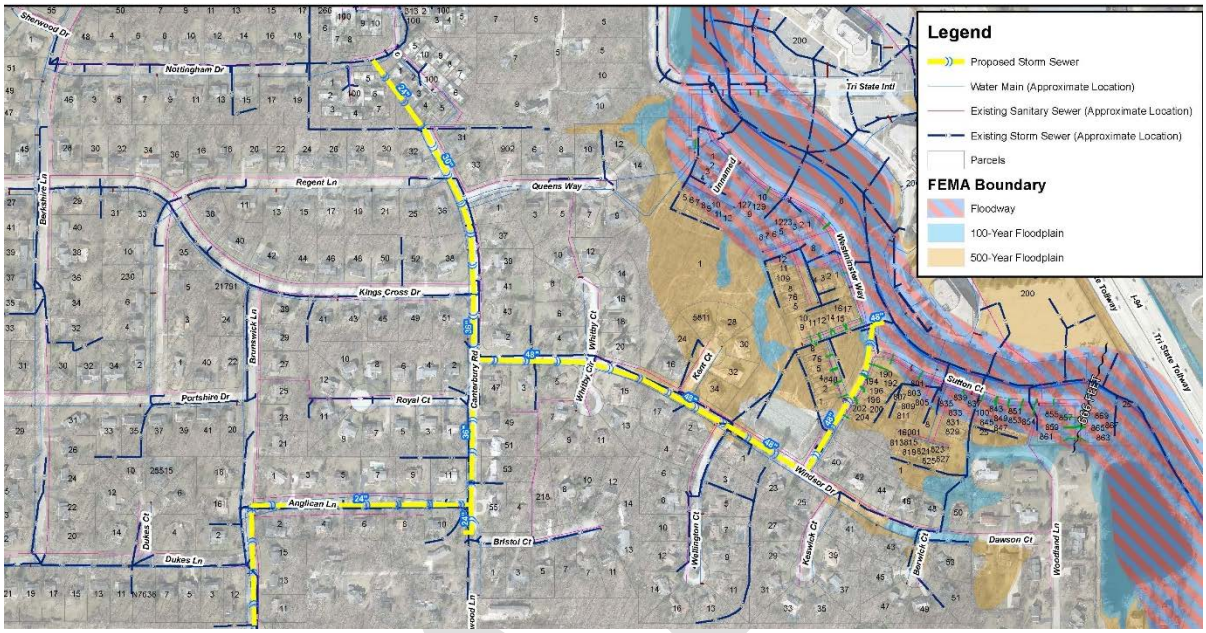

Figure 30. Southeast (Windsor Drive) FSA, FEMA FIRM

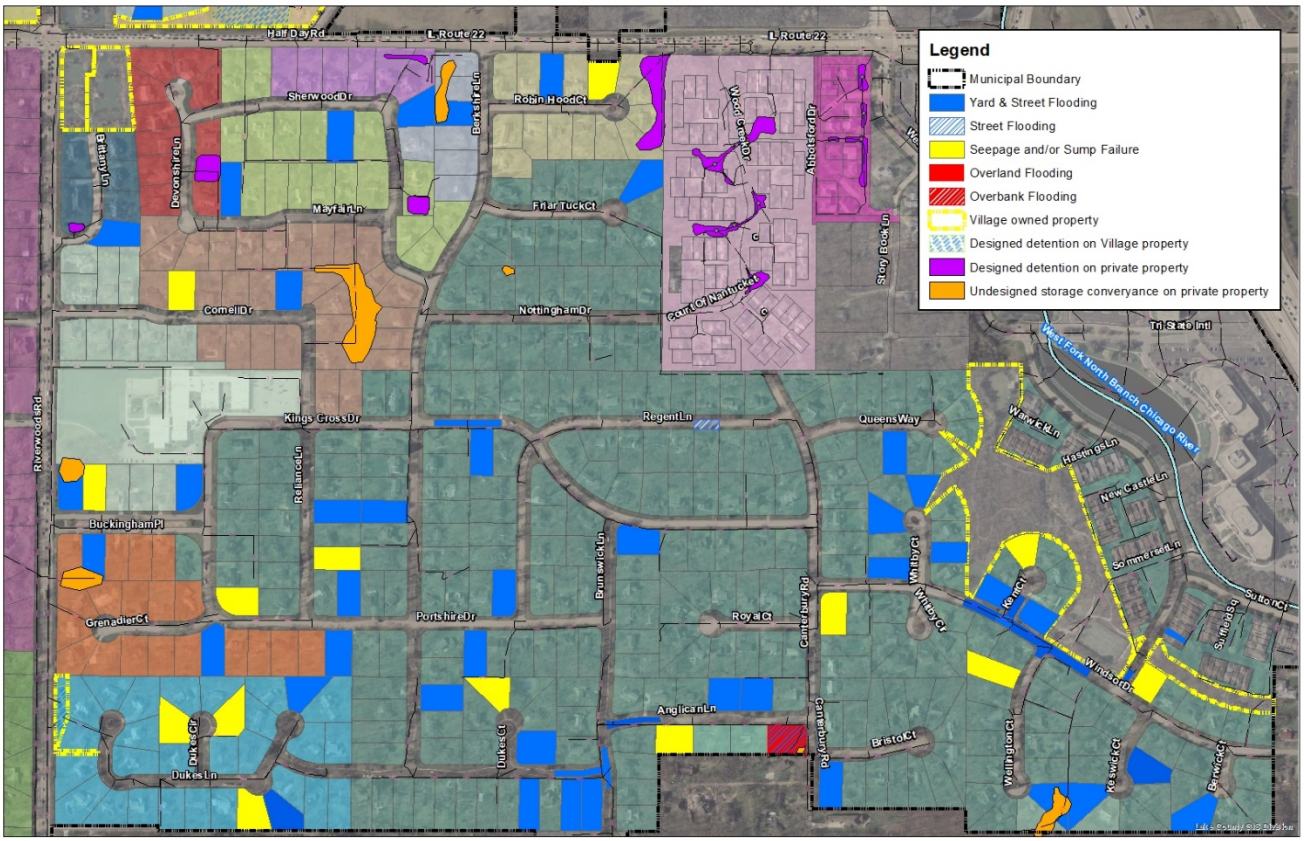

Figure 31. Lincolnshire Detention Basin Database Summarized in Plan (Parcels Served Southeast)

5.4.2 Southeast (Windsor Drive) Proposed Improvements

CBBEL designed a relief storm sewer for this area to provide a 10-year level of service. Large storm sewers are required to safely convey runoff during large storm events to the West Fork North Branch. ***Drainage on private property will be benefitted by this project as the capacity for private property drainage improvements (to be constructed by individual property owners) will be included in the new relief storm sewer design.*** The proposed storm sewer system will accommodate flows from noted off-site areas. The proposed storm sewers are outlined below and have been determined using a 10-year tailwater elevation in the West Fork North Branch.

- Install a parallel trunk storm sewer along Windsor Drive from Balzer Park to Canterbury Road (Exhibit 15 in Appendix 6).
- Install parallel laterals along Canterbury Road both North and South directions
    - North to Regent Lane, as well as continuing north to the Woodcreek Drive system of cascading detention basins.
    - South extending past Anglican Lane and Bristol Court to accommodate off-site tributary area from the south.
- Install parallel lateral along Anglican Lane west to Brunswick Lane.
- Install parallel lateral south extending beyond Dukes Lane to the cul-de-sac at the south limit of Brunswick Lane.
- Install parallel outfall through Balzer Park to the West Fork North Branch.
- Install laterals in Balzer Park to improve drainage in low areas.

This improvement will provide additional capacity and allow the remaining existing systems to provide a 10-year level of service. Table 9 summarizes the existing and proposed level of flood protection, number of structure and properties benefited, and the cost associated with the proposed levels of flood protection in 2020 dollars.

Existing Level of Service	Proposed Level of Flood Protection	Number of Properties Benefitted	Total Cost	Cost/Property
2-year	10-year	101	$4,300,000	$43,000

Table 9. Southeast (Windsor Drive) FSA Summary

These improvements increase the level of service for the stormwater management system to a 10-year level of service, which is similar to current design standards and consistent with Village staff recommendations. It would also increase flood protection for properties served by the storm sewer system. The eastern portion of the study area would still be susceptible to riverine flooding from the river as they are in the mapped regulatory floodplain and floodway of the West Fork North Branch. Exhibits 14-16 and the engineers estimate of probable cost for this area is included in Appendix 6. Permitting and coordination for the proposed project includes the following agencies:

- Lake County SMC
- IEPA, NPDES permit
- ACOE
- IDNR-OWR

5.5 SURREY LANE – EAST OF RIVERWOODS ROAD

5.5.1 Limitations of Existing System – Cause of Flooding

The north portion of Surrey Lane, east of Riverwoods Road is drained by a system of three detention basins hydraulically connected with storm sewers and overland flow paths draining west to east (Figure 32). This area was constructed with modern storm water management practices and is an accurate example of preservation of natural resources with residential lot configuration within the natural landscape.

The tributary area in this system begins with the detention basin at Whytegate Park west of Riverwoods Road. The detention basin outlets east under Riverwoods Road to a small channel in the rear yards on Surrey Lane continuing east through the side yards between 235 and 237 Surrey Lane. The channel is drained by a storm sewer under Surrey Lane to the next downstream detention basin east of Surrey Lane. The pipe sections at the downstream end of the storm sewer under Surrey Lane are exposed above ground. This portion of the system has less than a 5-year level of service where ponding occurs on Surrey Lane and in the side yard channel (Figure 32).

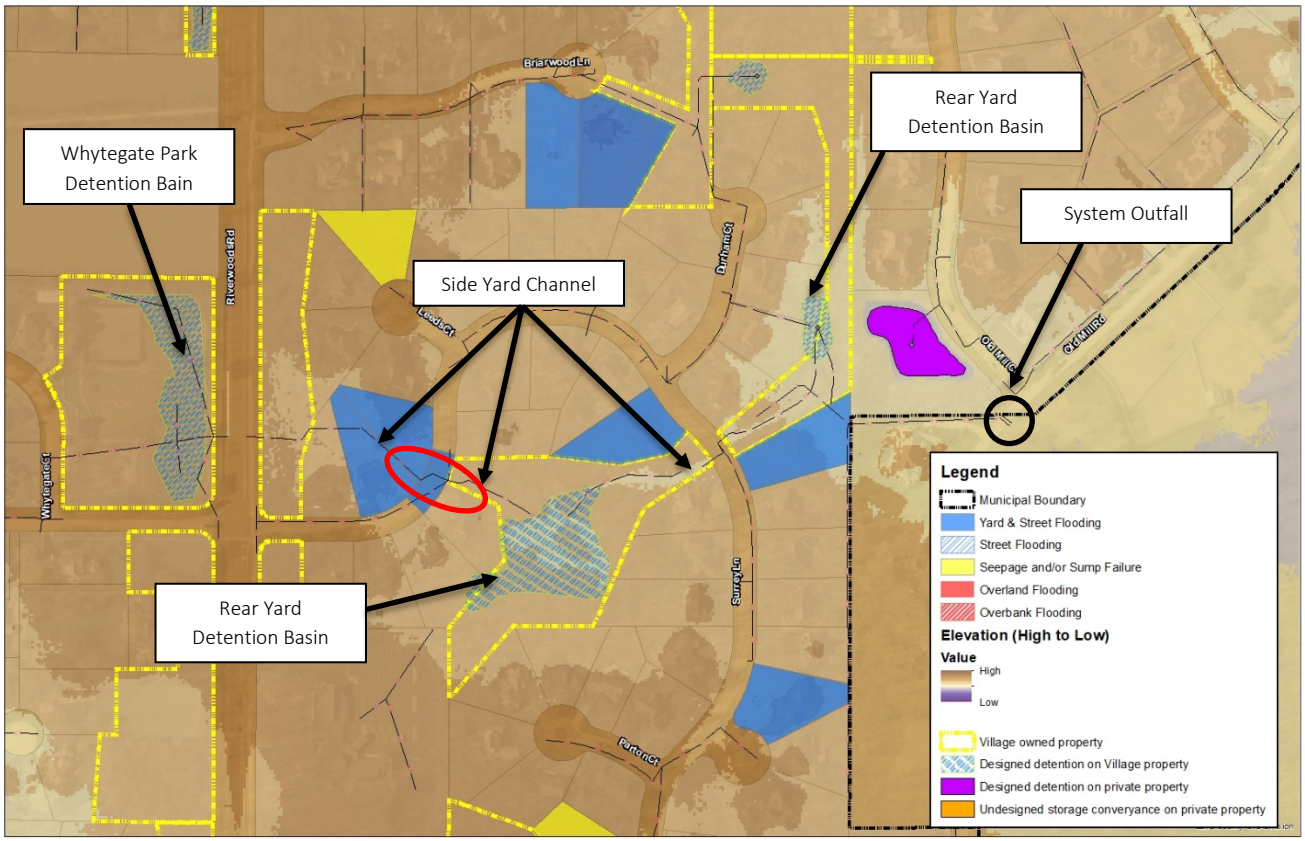

Figure 32. Surrey Lane (East of Riverwoods Road)

The storm sewer under Surrey Lane outlets to an open channel continuing east to an open water detention basin in the rear yards of the properties to the east within the Surrey Lane loop (Figure 32). This detention basin drains east to an open channel between 214 and 218 Surrey Lane continuing east under Surrey Lane to an open channel and to the final detention basin in the rear yards of 3, 5, and 7 Durham Court as well as 217 Surrey Lane. Questionnaire data indicates prolong rear yard and side yard flooding. The system of open

channels and two detention basins in the eastern oration of this study area exceeds a 10-year level of service. However, these areas are heavily wooded with thick underbrush and are susceptible to debris blockage at the storm sewer outfalls. The Village performs maintenance through this corridor by cutting and clearing vegetation and debris. The existing 10-and 100-year inundation areas are shown on Exhibits 17, in Appendix 7.

Rear yard flooding and prolonged inundation was also reported at the southeast end of Briarwood Lane however there are no reports of structural flooding in this area. This area is tributary to the Surrey Lane drainage system where the detention basin at the east end of Briarwood Lane drains to a storm sewer draining south to the Durham Court storm sewer. It is noted that the flared end section draining to the detention basin is above ground and does not allow the rear yards at 9 and 11 Briarwood Lane to fully drain. These areas are also heavily wooded and debris blockage is common.

5.5.2 Surrey Lane (east of Riverwoods Road) Proposed Improvements

CBBEL designed a relief storm sewer for this area to provide a 10-year level of service at the west portion of study area at Surrey Lane.

- Install a relief sewer routing the outfall from the Whytegate Park detention basin south to Surrey Lane and east to the open channel outfall (Exhibit 18, Appendix 7).
- Remove and replace the storm sewer under Surrey Lane from 235 and 237 Surrey Lane to the open channel at.

The detention basins in this study area are on Village property and have been addressed in the detention basin discussion. Table 10 summarizes the existing and proposed level of flood protection, number of structure and properties benefited, and the cost associated with the proposed levels of flood protection in 2020 dollars.

Existing Level of Service	Proposed Level of Flood Protection	Number of Properties Benefitted	Total Cost	Cost/Property
<5-year	10-year	10	$546,000	$55,000

Table 10. Surrey Lane (east of Riverwoods Road) FSA Summary

These improvements increase the level of service for the stormwater management system to a 10-year level of service, which is similar to current design standards and consistent with Village staff recommendations. It would also increase flood protection for properties served by the storm sewer system. Exhibits17-18 and the engineers estimate of probable cost for this area is included in Appendix 7. Permitting and coordination for the proposed project includes the following agencies:

- Lake County SMC
- IEPA, NPDES permit
- ACOE

5.6 RIVERSHIRE PLACE, LANE AND COURT

The residential areas along Rivershire Place, Rivershire Lane, Rivershire Court and the Lincolnshire Marriott Resort are immediately adjacent to the west bank of Des Plaines River. According to the FEMA FIRM, this area is surrounded by the regulatory floodway and floodplain associated with the Des Plaines River. Many of the rear yards of the properties along each of these roads is shown to be in the floodway (Figure 33). The floodway boundary is coincidental with the 100-year floodplain elevation in these areas.

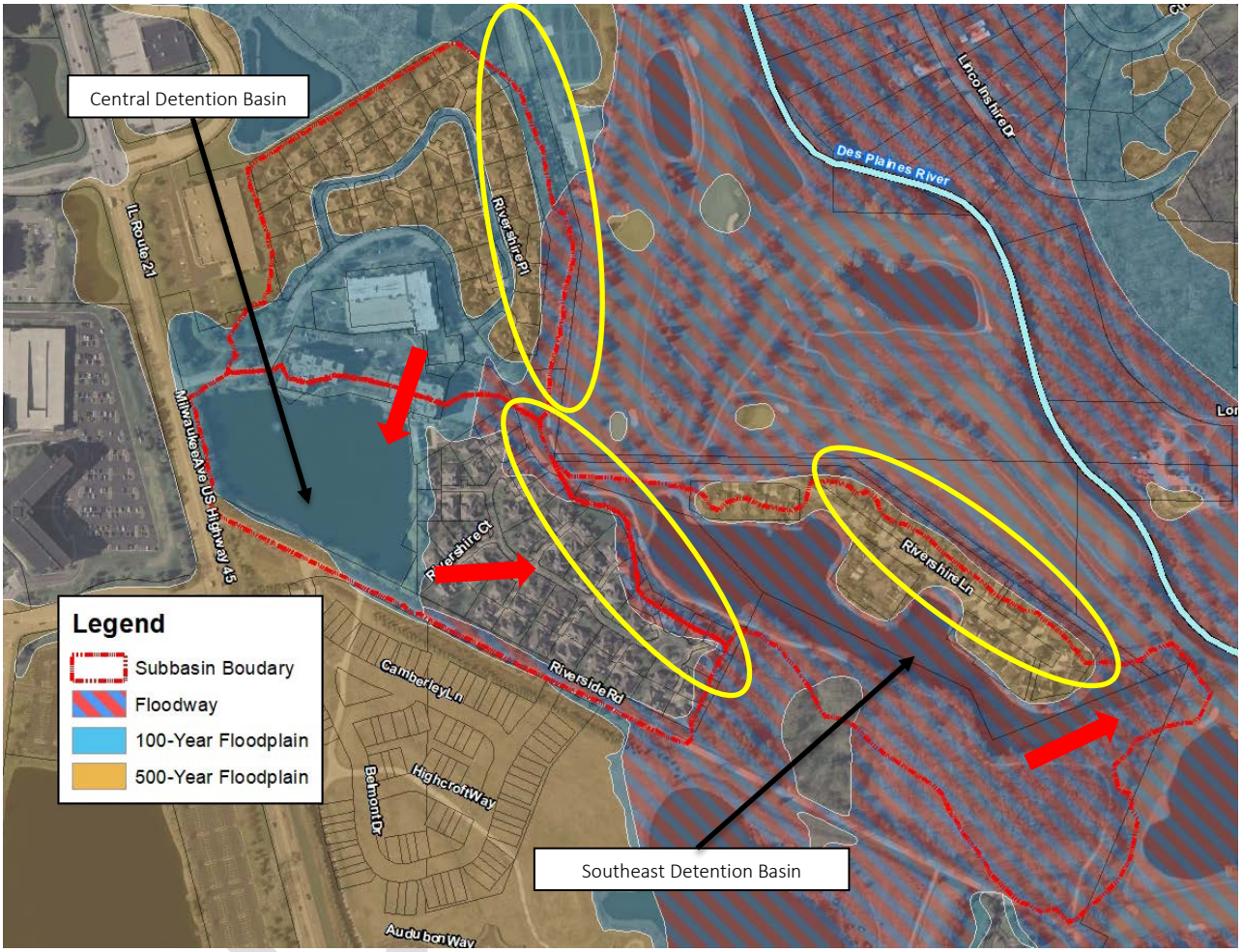

Figure 33. Rivershire FEMA FIRM (West of Des Plaines River)

There are two detention basins in this area where Rivershire Place is drained by a storm sewer network draining south to a central detention basin (adjacent to Milwaukee Avenue). Rivershire Court and Rivershire Lane are drained by a storm sewer network draining to a southeast detention basin adjacent to the Des Plaines River. The southeast detention basin is located between Rivershire Lane and Rivershire Court. According to the FEMA FIS, the southeast detention basin is shown to be in the floodway of the Des Plaines River. The detention basin outlets east to the Des Plaines River where the berm separating the detention basin from the river is below elevation 642.0 feet (2017 Lake County 1-foot aerial topography). The 10-year water surface elevation in the Des Plaines River ranges from 644.3 to 643.8 feet upstream to downstream. As the water surface elevation in the river exceeds the 10-year floodplain elevation, the berm will overtop, and the study area will be inundated (100-year floodplain shown in Figure 32).

The 100-year water surface elevation for the Des Plaines River ranges from 646.9 to 646.2 feet upstream to downstream according to the FEMA FIS. According to 2017 Lake County 1-foot aerial topography, majority of the properties in the area are elevated above elevation 647.0 feet however there are the rear yards along Rivershire Lane are below elevation 647.0 feet (Figure 34).

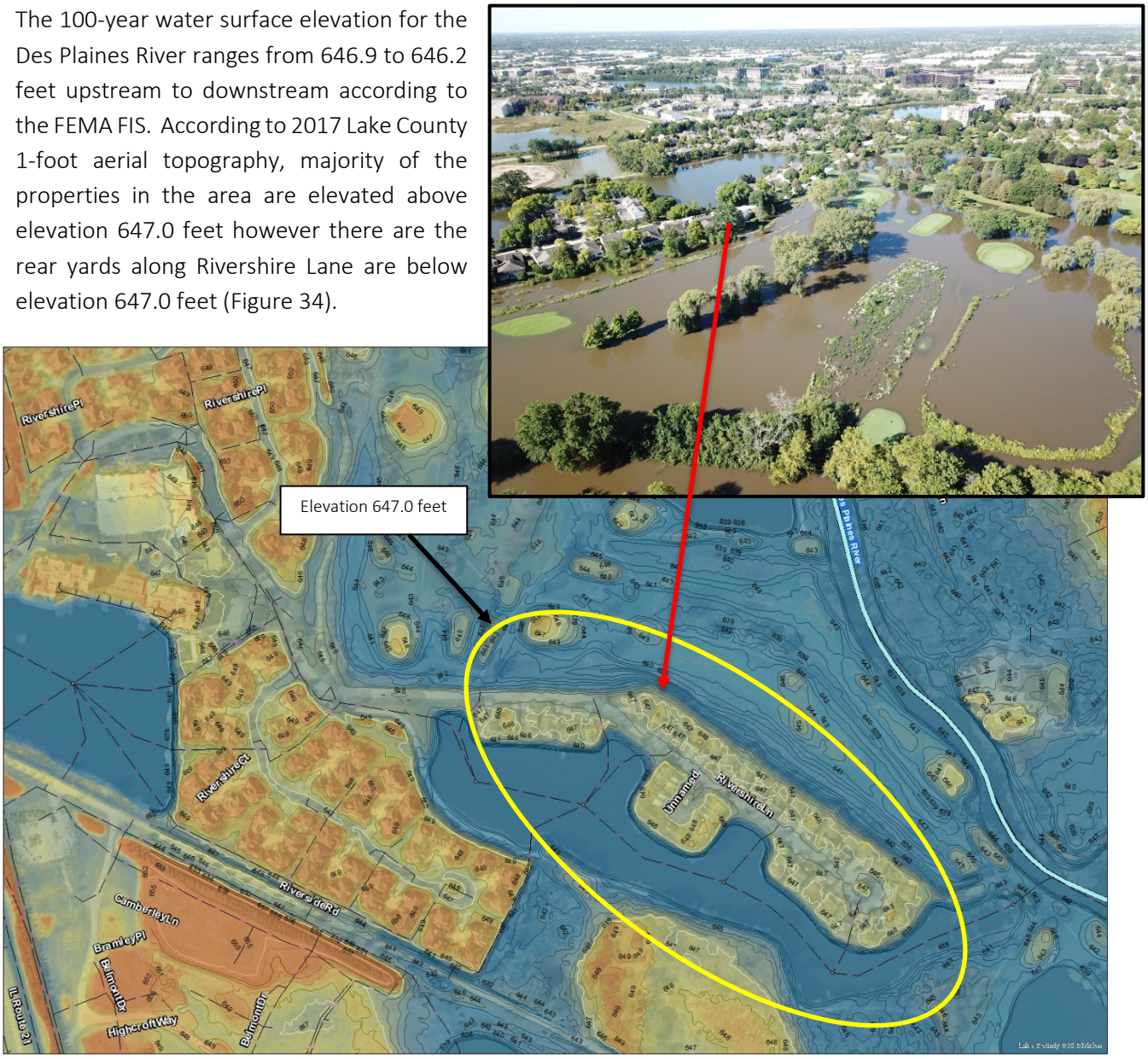

Figure 34. Rivershire Lane and Rivershire Court (2017 Lake County 1-foot Aerial Topography) Aerial Photo September 12-13, 2019 Storm Event

The system of storm sewers and two detention ponds serving this area have been constructed using modern stormwater management practices and function accordingly during localized storm events. As water surface elevations in the Des Plaines River rise, the storm sewer at the southeast detention basin no longer drains by gravity. Once this occurs, flooding throughout the area equalizes to floodplain elevations where elevations rise and fall with the water surface elevation in the Des Plaines River. This is demonstrated in the aerial photo taken following the September 12-13th 2019 storm event (Figure 34). The Lincolnshire Marriott Resort stakeholders are currently engaged in investigating potential stormwater management solutions for the resort. The Village is committed to working with the Lincolnshire Marriott Resort stakeholders to identify a solution that addresses flooding from the Des Plaines River.

CHAPTER 6 SUMMARY OF CAPITAL IMPROVEMT PROJECTS

CBBEL Study Area	Area Description	Problem Description and/or Limitation	Existing Level of Service (Internal Drainage)	Vulnerable Residential Properties (#)		Proposed Improvement					
				10 Year Return Interval Storm	100 Year Return Interval Storm	Project Description	Proposed Level of Service	Vulnerable Residential Properties Benefitted	Vulnerable Residential Properties Remaining (100 Year)	Cost	Cost/Property
Lincolnshire Drive North & South Area 8	• Lincolnshire Drive • Cumberland Dive • Wiltshire Drive	Area is tributary to the Des Plaines River. High flood flows due to large tributary area. Insufficient storm sewer capacity based on current WDO. Overland flow routes are though residential side yards with limited capacity. Insufficient storage within watershed, no available open space for significant new storage. West portion of the watershed is in the floodway and floodplain of the Des Plaines River. These areas are susceptible to overbank flooding from the Des Plaines during events greater than the 10-year, and rear yard berm od overtopped.	< 2 Year	83	109	• Install new main line storm sewer along Lincolnshire Drive south to a proposed pump station. • Install pump station on Village owned property along Londonderry Lane, pupping to Des Plaines River. • New outfall to the Des Plaines River *Project applies to interbasin flow between for vulnerable properties north and south of Oxford Drive.*	10 Year	83	26	$7,500,000	$90,000
	• Oxford Drive • Essex Lane • Yorkshire Drive • Lancaster Lane • Oakwood Lane • Plymouth Court	Area is tributary to the Des Plaines River. High flood flows due to large tributary area. Insufficient storm sewer capacity based on current WDO along Oxford Lane. Overland flow routes are though residential side yards with limited capacity. Insufficient storage within watershed, no available open space for significant new storage. West portion of the watershed is in the floodway and floodplain of the Des Plaines River. These areas are susceptible to overbank flooding from the Des Plaines during events greater than the 10-year, and rear yard berm od overtopped.	< 2 Year	111	174	• Install new main line storm sewer along Oxford Drive west/northwest. • Remove and replace outfall to Des Plaines River in Spring Lake Park parking lot. • Latera at Lancaster Lane • Increase outfall size to the Des Plaines River. • Remove and replace main line between homes at Oakwood and Cedar Lanes. *Project applies to interbasin flow between for vulnerable properties north and south of Oxford Drive.*	10 Year	111	63	$4,300,000	$39,000
Lincolnshire Creek Area 7	• Coventry Lane • Victoria Lane • Kensington Drive • Londonderry Lane	Area is tributary to the Des Plaines River via Lincolnshire Creek. Lincolnshire Creek is contained in a 42-inch storm sewer and routed around Coventry Lane. High flood flows due to large tributary area. Insufficient storm sewer capacity based on current WDO. Overland flow routes are though residential side yards with limited capacity. Insufficient storage within watershed, no available open space for significant new storage. West portion of the watershed is in the floodway and floodplain of the Des Plaines River. These areas are susceptible to overbank flooding from the Des Plaines during events greater than the 10-year, and rear yard berm od overtopped.	2 Year	38	41	• Install new main line storm sewer along Coldstream Circle, Victoria Lane, Kensington Lane and Coventry Lane. • Remove and replace outlet at Des Plaines River	10 Year	38	3	$2,200,000	$57,000

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CBBEL Study Area	Area Description	Problem Description and/or Limitation	Existing Level of Service (Internal Drainage)	Vulnerable Residential Properties (#)		Proposed Improvement					
				10 Year Inundation	100 Year Inundation	Project Description	Proposed Level of Service	Vulnerable Residential Properties Benefitted	Vulnerable Residential Properties Remaining (100 Year)	Cost	Cost/Property
Southeast – Windsor Drive Area 5&6	• Windsor Drive • Wellington Court • Keswick Court • Kent Court • Bristol Court • Dukes Lane • Canterbury Road • Anglican Lane • Nottingham Drive • Woodcreek Drive • Kings Cross Drive	Area is tributary to the West Fork North Branch, Chicago River. High flood flows due to large tributary area. Insufficient storm sewer capacity based on current WDO. Overland flow routes are though residential side yards with limited capacity. Insufficient storage within watershed, no available open space for significant new storage. Poor off-site conveyance on private property from tributary areas outside of the Village limits.	2 Year	101	191	• Install new main line storm sewer along Windsor Drive to Canterbury Road, laterals along Anglican Lane, Kings Cross Drive and Dukes Lane. • New outfall parallel to existing outfall at the West Fork North Branch	10 Year	101	90	$4,300,000	$43,000
Surrey Lane Area 3	• Surrey Lane (East of Riverwoods Road)	Flow between 235 and 237 Surrey Lane, outlet pipe above grade east of Surrey Lane flowing into rear yard detention basin. Drainage from Why	<5Year	10	NA	• Install relief storm sewer around two homes, beginning a Riverwoods Rd south to Surrey Lane. • Remove and replace crossing of Surrey Lan into rear yard detention basin.	10 Year	10	4	$546,100	$55,000

Table 11. Summary of Proposed Capital Improvement Projects

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The summary tables below rank the proposed capital improvements by different categories including cost of the project per property benefitted, number of properties benefitted, the design and permit process complexity, the inundation duration eliminated as a result of the proposed project and the compatibility of the proposed project with other Village planned capital improvements projects. There are four different ranking tables where a score (1-3) has been associated with each category. The ranking tables range from ranking of single categories, combined categories and weighted categories.

					Ranking Basis								
Flood Study Area	Existing Level of Service (Internal Drainage)	Project Description	Proposed Level of Service	Cost	Cost/Property		Vulnerable Residential Properties Benefitted		[1]Design Complexity and Permit Process	[2]Elimnated Roadway Flooding	[3]Project Compatibility with other Village CIP Plans Watermain and/or Pavement Projects	Total Metric Score	Overall Rank
					Score Metric 3 = < $50,000 2 = $50,000 - $75,000 1 = > $75,000		Score Metric 3 = 100+ Homes 2 = 50-100 Homes 1 = < 50 Homes		Score Metric 1 = Most Complex 1 = 2 Years 2 = 1 Year 3 = 6 Months	Score Metric 3 = Longest Existing Condition Flooding to be Eliminated	Score Metric 3 = 2-6 Years Away 2 = 6-10 Years Away 1 = 10+ Years Away	Higher Score = More Favorable Metric	
Lincolnshire Drive South	< 2 Year	Trunk along Lincolnshire Drive south, pump station and new outfall to the Des Plaines River.	10 Year	$7,500,000	$90,000	1	83	2	1	3	3	74	1
Lincolnshire Drive North	< 2 Year	Trunk along Oxford Drive, remove and replace outfall to Des Plaines River at Spring Lake Park, lateral at Lancaster Lane and replace sewer between homes at Oakwood and Cedar Lanes.	10 Year	$4,300,000	$39,000	3	111	3	2	2	3	67	2
Southeast – Windsor Drive	2 Year	Trunk along Windsor Drive to Canterbury Road, laterals along Anglican Lane, Kings Cross Drive, Dukes Lane and new parallel outfall to the West Fork North Branch Chicago River.	10 Year	$4,300,000	$43,000	3	101	3	2	2	2	67	3
Lincolnshire Creek – Coventry Lane	2 Year	Trunk along Coldstream Circle, laterals at Victoria Lane, Kensington Lane, Coventry Lane and replace outlet at Des Plaines River.	10 Year	$2,200,000	$57,000	2	38	1	2	2	1	57	4
Surrey Lane – East of Riverwoods Road	< 5 Year	Relief sewer around homes beginning a Riverwoods Road south to Surrey Lane and replace crossing of Surrey Lane into rear yard detention basin.	10 Year	$546,100	$55,000	2	10	1	3	1	1	40	5

[1]The ranking basis for design complexity and permitting process is based on the approximate duration required to produce engineering plans, submit to the required agencies and obtain the corresponding permit. This is based on the anticipated duration of the longest critical path where a rank of 1 is the longest and 3 is the shortest. Consideration includes construction occurring in the floodway and floodplain or construction at an outfall.

[2]The ranking basis for reduced or eliminated roadway is based on the reduction from existing condition inundation time that the proposed project will reduce roadway inundation provided the downstream receiving River is below the 10-year design storm event. All proposed projects have been designed to keep roadway pavement dry for the 10-year design event. This rank is a reflection of the severity of the existing condition inundation on roadways.

[3]The ranking basis for the proposed project compatibility with other future Village capital improvements projects is a function of how soon a proposed to be impacted roadway by this project is scheduled to be resurfaced by the Village. Other Village capital improvement projects include watermain reconstruction and resurfaced roadways that would be impacted by the proposed project.

Table 12. Ranked by weighted average of all metrics where roadway inundation reduction is weighted at 60% of the total score

Flood Study Area	Existing Level of Service (Internal Drainage)	Project Description	Proposed Level of Service	Cost	Ranking Basis: Cost/Property		Vulnerable Residential Properties Benefitted		[1]Design Complexity and Permit Process	[2]Elimnated Roadway Flooding	[3]Project Compatibility with other Village CIP Plans Watermain and/or Pavement Projects	Total Metric Score	Overall Rank
					Score Metric 3 = < $50,000 2 = $50,000 - $75,000 1 = > $75,000		Score Metric 3 = 100+ Homes 2 = 50-100 Homes 1 = < 50 Homes		Score Metric 1 = Most Complex 1 = 2 Years 2 = 1 Year 3 = 6 Months	Score Metric 3 = Longest Existing Condition Flooding to be Eliminated	Score Metric 3 = 2-6 Years Away 2 = 6-10 Years Away 1 = 10+ Years Away	Higher Score = More Favorable Metric	
Lincolnshire Drive North	< 2 Year	Trunk along Oxford Drive, remove and replace outfall to Des Plaines River at Spring Lake Park, lateral at Lancaster Lane and replace sewer between homes at Oakwood and Cedar Lanes.	10 Year	$4,300,000	$39,000	3	111	3	2	2	3	3	1
Southeast – Windsor Drive	2 Year	Trunk along Windsor Drive to Canterbury Road, laterals along Anglican Lane, Kings Cross Drive, Dukes Lane and new parallel outfall to the West Fork North Branch Chicago River.	10 Year	$4,300,000	$43,000	3	101	3	2	2	2	3	2
Lincolnshire Drive South	< 2 Year	Trunk along Lincolnshire Drive south, pump station and new outfall to the Des Plaines River.	10 Year	$7,500,000	$90,000	1	83	2	1	3	3	2	3
Lincolnshire Creek – Coventry Lane	2 Year	Trunk along Coldstream Circle, laterals at Victoria Lane, Kensington Lane, Coventry Lane and replace outlet at Des Plaines River.	10 Year	$2,200,000	$57,000	2	38	1	2	2	1	1	4
Surrey Lane – East of Riverwoods Road	< 5 Year	Relief sewer around homes beginning a Riverwoods Road south to Surrey Lane and replace crossing of Surrey Lane into rear yard detention basin.	10 Year	$546,100	$55,000	2	10	1	3	1	1	1	5

[1]The ranking basis for design complexity and permitting process is based on the approximate duration required to produce engineering plans, submit to the required agencies and obtain the corresponding permit. This is based on the anticipated duration of the longest critical path where a rank of 1 is the longest and 3 is the shortest. Consideration includes construction occurring in the floodway and floodplain or construction at an outfall.

[2]The ranking basis for reduced or eliminated roadway is based on the reduction from existing condition inundation time that the proposed project will reduce roadway inundation provided the downstream receiving River is below the 10-year design storm event. All proposed projects have been designed to keep roadway pavement dry for the 10-year design event. This rank is a reflection of the severity of the existing condition inundation on roadways.

[3]The ranking basis for the proposed project compatibility with other future Village capital improvements projects is a function of how soon a proposed to be impacted roadway by this project is scheduled to be resurfaced by the Village. Other Village capital improvement projects include watermain reconstruction and resurfaced roadways that would be impacted by the proposed project.

Table 13. Ranked by number of vulnerable residential properties benefited

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Flood Study Area	Existing Level of Service (Internal Drainage)	Project Description	Proposed Level of Service	Cost	Ranking Basis: Cost/Property		Vulnerable Residential Properties Benefitted		[1]Design Complexity and Permit Process	[2]Elimnated Roadway Flooding	[3]Project Compatibility with other Village CIP Plans Watermain and/or Pavement Projects	Total Metric Score	Overall Rank
					Score Metric 3 = < $50,000 2 = $50,000 - $75,000 1 = > $75,000		Score Metric 3 = 100+ Homes 2 = 50-100 Homes 1 = < 50 Homes		Score Metric 1 = Most Complex 1 = 2 Years 2 = 1 Year 3 = 6 Months	Score Metric 3 = Longest Existing Condition Flooding to be Eliminated	Score Metric 3 = 2-6 Years Away 2 = 6-10 Years Away 1 = 10+ Years Away	Higher Score = More Favorable Metric	
Lincolnshire Drive South	< 2 Year	Trunk along Lincolnshire Drive south, pump station and new outfall to the Des Plaines River.	10 Year	$7,500,000	$90,000	1	83	2	1	3	3	14	1
Lincolnshire Drive North	< 2 Year	Trunk along Oxford Drive, remove and replace outfall to Des Plaines River at Spring Lake Park, lateral at Lancaster Lane and replace sewer between homes at Oakwood and Cedar Lanes.	10 Year	$4,300,000	$39,000	3	111	3	2	2	3	13	2
Southeast – Windsor Drive	2 Year	Trunk along Windsor Drive to Canterbury Road, laterals along Anglican Lane, Kings Cross Drive, Dukes Lane and new parallel outfall to the West Fork North Branch Chicago River.	10 Year	$4,300,000	$43,000	3	101	3	2	2	2	13	3
Lincolnshire Creek – Coventry Lane	2 Year	Trunk along Coldstream Circle, laterals at Victoria Lane, Kensington Lane, Coventry Lane and replace outlet at Des Plaines River.	10 Year	$2,200,000	$57,000	2	38	1	2	2	1	9	4
Surrey Lane – East of Riverwoods Road	< 5 Year	Relief sewer around homes beginning a Riverwoods Road south to Surrey Lane and replace crossing of Surrey Lane into rear yard detention basin.	10 Year	$546,100	$55,000	2	10	1	3	1	1	6	5

[1]The ranking basis for design complexity and permitting process is based on the approximate duration required to produce engineering plans, submit to the required agencies and obtain the corresponding permit. This is based on the anticipated duration of the longest critical path where a rank of 1 is the longest and 3 is the shortest. Consideration includes construction occurring in the floodway and floodplain or construction at an outfall.

[2]The ranking basis for reduced or eliminated roadway is based on the reduction from existing condition inundation time that the proposed project will reduce roadway inundation provided the downstream receiving River is below the 10-year design storm event. All proposed projects have been designed to keep roadway pavement dry for the 10-year design event. This rank is a reflection of the severity of the existing condition inundation on roadways.

[3]The ranking basis for the proposed project compatibility with other future Village capital improvements projects is a function of how soon a proposed to be impacted roadway by this project is scheduled to be resurfaced by the Village. Other Village capital improvement projects include watermain reconstruction and resurfaced roadways that would be impacted by the proposed project.

Table 14. Ranked by weighted average of number of vulnerable residential properties benefited (40%) and reduction of roadway inundation (60%)

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Flood Study Area	Existing Level of Service (Internal Drainage)	Project Description	Proposed Level of Service	Cost	Ranking Basis: Cost/Property		Vulnerable Residential Properties Benefitted		[1]Design Complexity and Permit Process	[2]Elimnated Roadway Flooding	[3]Project Compatibility with other Village CIP Plans Watermain and/or Pavement Projects	Total Metric Score	Overall Rank
					Score Metric 3 = < $50,000 2 = $50,000 - $75,000 1 = > $75,000		Score Metric 3 = 100+ Homes 2 = 50-100 Homes 1 = < 50 Homes		Score Metric 1 = Most Complex 1 = 2 Years 2 = 1 Year 3 = 6 Months	Score Metric 3 = Longest Existing Condition Flooding to be Eliminated	Score Metric 3 = 2-6 Years Away 2 = 6-10 Years Away 1 = 10+ Years Away	Higher Score = More Favorable Metric	
Lincolnshire Drive North	< 2 Year	Trunk along Oxford Drive, remove and replace outfall to Des Plaines River at Spring Lake Park, lateral at Lancaster Lane and replace sewer between homes at Oakwood and Cedar Lanes.	10 Year	$4,300,000	$39,000	3	111	3	2	2	3	68	1
Southeast – Windsor Drive	2 Year	Trunk along Windsor Drive to Canterbury Road, laterals along Anglican Lane, Kings Cross Drive, Dukes Lane and new parallel outfall to the West Fork North Branch Chicago River.	10 Year	$4,300,000	$43,000	3	101	3	2	2	2	68	2
Lincolnshire Drive South	< 2 Year	Trunk along Lincolnshire Drive south, pump station and new outfall to the Des Plaines River.	10 Year	$7,500,000	$90,000	1	83	2	1	3	3	48	3
Lincolnshire Creek – Coventry Lane	2 Year	Trunk along Coldstream Circle, laterals at Victoria Lane, Kensington Lane, Coventry Lane and replace outlet at Des Plaines River.	10 Year	$2,200,000	$57,000	2	38	1	2	2	1	47	4
Surrey Lane – East of Riverwoods Road	< 5 Year	Relief sewer around homes beginning a Riverwoods Road south to Surrey Lane and replace crossing of Surrey Lane into rear yard detention basin.	10 Year	$546,100	$55,000	2	10	1	3	1	1	47	5

[1]The ranking basis for design complexity and permitting process is based on the approximate duration required to produce engineering plans, submit to the required agencies and obtain the corresponding permit. This is based on the anticipated duration of the longest critical path where a rank of 1 is the longest and 3 is the shortest. Consideration includes construction occurring in the floodway and floodplain or construction at an outfall.

[2]The ranking basis for reduced or eliminated roadway is based on the reduction from existing condition inundation time that the proposed project will reduce roadway inundation provided the downstream receiving River is below the 10-year design storm event. All proposed projects have been designed to keep roadway pavement dry for the 10-year design event. This rank is a reflection of the severity of the existing condition inundation on roadways.

[3]The ranking basis for the proposed project compatibility with other future Village capital improvements projects is a function of how soon a proposed to be impacted roadway by this project is scheduled to be resurfaced by the Village. Other Village capital improvement projects include watermain reconstruction and resurfaced roadways that would be impacted by the proposed project.

Table 15. Ranked by weighted average of all metrics equally

CHAPTER 7 FUNDING OF CAPITAL PROJECTS

The long-term capital improvement projects require significant capital expenditures. The following funding sources have been used in other communities to fund infrastructure projects.

7.1 PAY-AS-YOU-GO CAPITAL FUNDING

The Village could dedicate a portion of the Capital Planning Budget each year to construct a portion of each selected project. The phasing and portion of the project constructed each year would depend on the budget that can be allocated to the stormwater improvements.

7.2 MUNICIPAL BOND

A municipal bond is a bond issued by a local government or their agencies. The Village could issue bonds to cover all or part of the projects. This would allow a greater portion of the project to be completed in a short period of time while the debt service would extend over several decades.

7.3 SPECIAL SERVICE AREA (SSA)

A Special Service Area (SSA) is a taxing mechanism that can be used to fund a wide range of special or additional services and/or physical improvements in a defined geographic area within the Village. The Village could develop a SSA that places a levy on the properties within each Flood Study Area. The revenues from the SSA could be used to fund drainage projects and repay Municipal Bonds.

7.4 OUTSIDE FUNDING SOURCES

Federal, State and County funding of stormwater projects has been successfully used by communities. However, these outside funding sources are limited and the competition for the resources is fierce. The application process can be rigorous and take months or years to complete. Given the flooding problems and potential improvement projects, the following two outside funding sources have the highest likelihood of success.

7.4.1 FEMA Hazard Mitigation Grant Program (HMGP)

This program provides grants to states and local governments to implement long term hazard mitigation measures after a major disaster declaration. The program will pay for 75% of mitigation projects that meet a minimum benefit/cost ratio of 1.0, in which none of the proposed flood reduction projects would qualify. In the event that a major disaster for the State is declared in the future, it is our recommendation that the Village then apply for this grant. The funding available is only a portion of the total losses for a particular disaster, which makes this a very competitive grant with an application process that can take up to 24 months.

7.4.2 FEMA Pre-Disaster Mitigation Grant Program (PDM)

The goal of this program is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. Mitigation planning is a key process used to break the cycle of disaster damage, reconstruction, and repeated damage. PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis. The program will pay for a percentage of mitigation projects that meet a minimum benefit/cost ratio of 1.0. The competition for this grant is nation-wide and is very competitive.

7.4.3 Flood Mitigation Assistance (FMA)

This nationwide FEMA program provides funds for projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP) on an annual basis. Unlike the HMGP program, this is a nationwide competition that focuses on Repetitive Loss properties as defined under the National Flood Insurance Program (NFIP). These funds are typically allocated to repetitive loss properties and buy-outs.

7.4.4 Lake County Watershed Management Board Grants

The primary role of the Watershed Management Board (WMB) is to oversee the allocation of SMC funding and SMC staff resource allocations for projects across the four watersheds of Lake County. The WMB cost-share grant program is available to help fund drainage improvement and flood reduction projects. Projects submitted are assessed and prioritized based on nine benefit criteria (inter-jurisdictional, flood hazard reduction, structural damage, water quality, natural resources, nuisance flood reduction, multiple use, outside funding utilization, and phosphorous public education component). The program places flood damage reduction as the highest priority and offered approximately $177,000 in assistance in 2018 with a cost share match of 50%.

7.4.5 Lake County Stormwater Infrastructure Repair Fund

Lake County SMC has developed a Stormwater Infrastructure Repair Fund (SIRF) to assist with inter-jurisdictional drainage and flooding problems discovered through community, flood response or flood problem inventory. The program offers $100,000 per year with a minimum 50% cost share requirement. The proposed project must have flood benefits for a 10-year design storm, enhance water quality utilizing best management practices, and alleviate flood damage types with structural flood damage given the highest priority for flood damage type.

7.5 STORMWATER UTILITY FEE

The concept of the stormwater utility fee is to collect from both residents and businesses within the entire Village based on the amount of impervious area on each property. The impervious area is directly related to the amount of stormwater runoff contributing to the storm sewer system. An equivalent residential unit (ERU) is the basis for the amount paid to the utility fee on a monthly basis and can be included on tax bills or water bills. Impervious areas for businesses and industries in the Village should be calculated to determine

the number of ERUs within a specific non-residential parcel. The Stormwater Utility could be used to fund drainage projects and repay Municipal Bonds. The utility fee per ERU would be set based on the cost of the project, length of time for repayment and additional reserves needed for maintenance, etc. Several municipalities have developed stormwater utility fees in the past 10 years. A few of these municipalities include:

- Mundelein → $3 – $12 monthly based on residential acreage (<1 acre – 4 acres).
- Wilmette → $7.38 – $11.63 monthly based on impervious area (< 3,000 ft^2 – > 4,300 ft^2).
- Downers Grove → $10.11 – $20.22 monthly based on residential impervious area (< 2,500 ft^2 – 7,000 ft^2).
- Hoffman Estates → $1.50 – $2.50 monthly based on residential lot size (< 7,500 ft^2 – > 15,000 ft^2).
- Highland Park → $8.50 per equivalent residential unit (ERU), where 1 ERU = 1,000 ft^2 of impervious area on a residential lot.

CHAPTER 8 STORM SEWER SYSTEM FACTS, SPECIFICS AND REALITIES

The final chapter of this Plan for the Village is intended to highlight facts, answer common questions and dispel myths about the Village's storm sewer network. The following statements have been provided to help the general public understand why flooding occurs throughout the Village and understand what the Village is doing to address the issues through the proposed improvements outlined in this Plan.

8.1.1 Will my street continue to flood if the project is constructed?

A large scale capital project will reduce frequency, depth and duration of street flooding. However, given the flat topography of the Village, during the most extreme storm events there will likely still be brief street flooding.

8.1.2 What are the benefits of spending millions of dollars on a capital improvement project?

The benefits of a large-scale capital improvement project include reduction in the frequency, depth and duration of flooding of streets, yards and homes.

8.1.3 Can the Village solve the flooding problems using only green infrastructure, i.e. rain barrels and rain gardens?

While we strongly recommend the implementation of green infrastructure, it will not significantly reduce flooding by itself.

8.1.4 If water comes up through my floor drain during a flood event, how will these capital improvements reduce that risk? Is it valuable to install either an overhead plumbing system or a back-flow preventer?

Yes, we recommend that all residents flood proof their homes to the maximum extent practicable. Flood proofing measurements include the conversion to an overhead plumbing system, and if this is cost prohibitive, then a back-flow valve on the sanitary lateral.

8.1.5 What can I do on my property to help drainage?

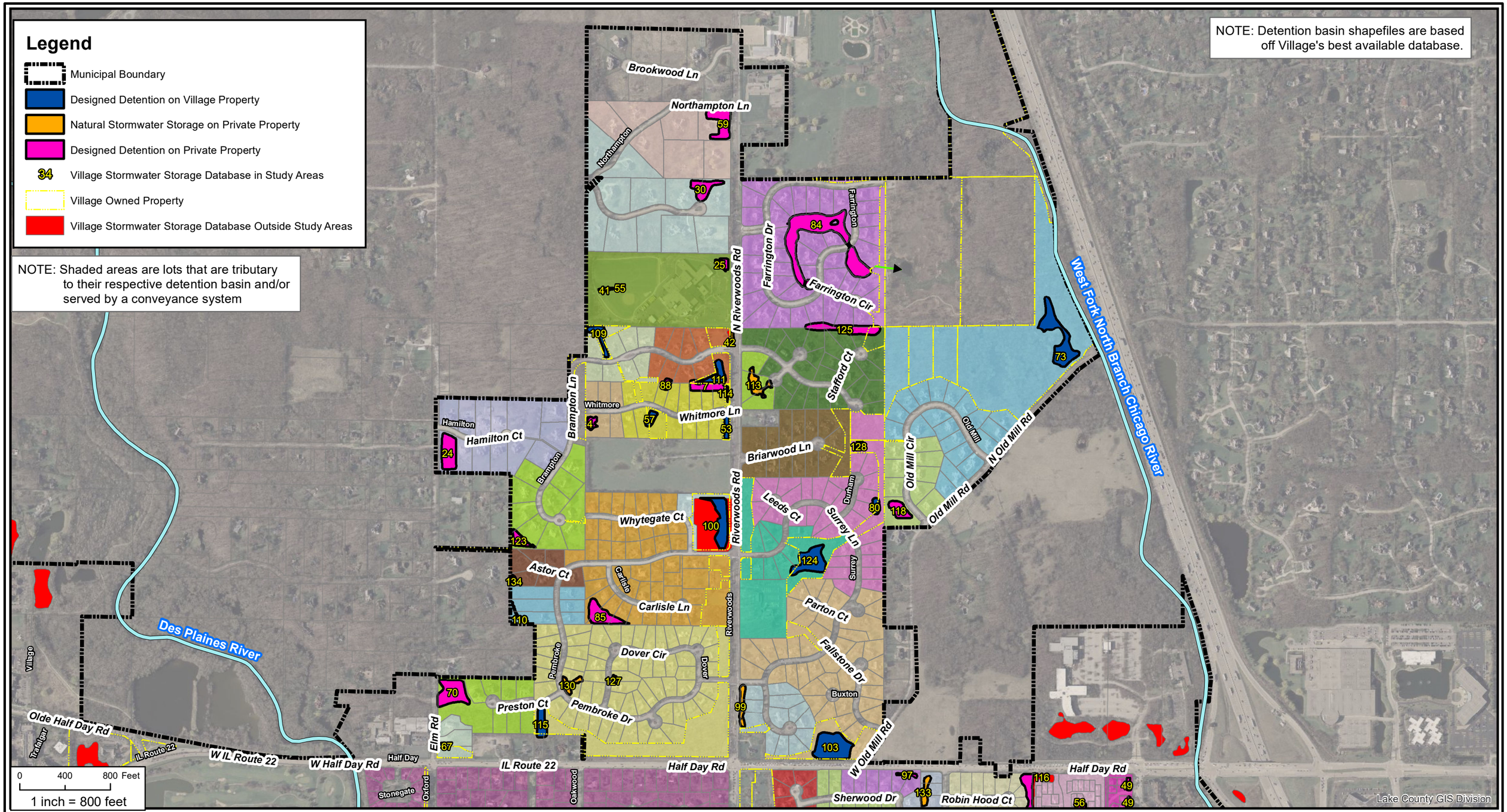
Property owners should direct stormwater runoff away from the structure by extending downspouts and establishing positive drainage away from the structure. If the soil around the foundation of a structure is pitched towards the structure, it's recommended that material is added or removed until the slope moves away from the house (this is known as "grading"). This material should be dense- preferably clay soil. Sump pumps with a battery back-up will also ensure footing and perimeter drains are working properly to direct runoff away from the structure foundations.

APPENDIX 1

DETENTION & STORMWATER MANAGEMENT BASIN

MAINTENANCE IMPROVEMTENTS

EXHIBITS AND COST ESTIMATES



Document Path: C:\Users\dbuckley\Desktop\Lincolnshire\Exhibit XX_Detention Basin Tributary Areas(1).mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT	PROJECT NO.	
Village of Lincolnshire	190059	
TITLE		DATE
Detention Basin Tributary Areas - North		04/14/2020
		EXHIBIT 1

NOTE: Shaded areas are lots that are tributary to their respective detention basin and/or served by a conveyance system

Legend

- Municipal Boundary
- Designed Detention on Village Property
- Natural Stormwater Storage on Private Property
- Designed Detention on Private Property
- 34 Village Stormwater Storage Database in Study Areas
- Village Owned Property
- Village Stormwater Storage Database Outside Study Areas

NOTE: Detention basin shapefiles are based off Village's best available database.

0 295 590 Feet
1 inch = 600 feet

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DSGN.	DRB	CHKD.	DTO

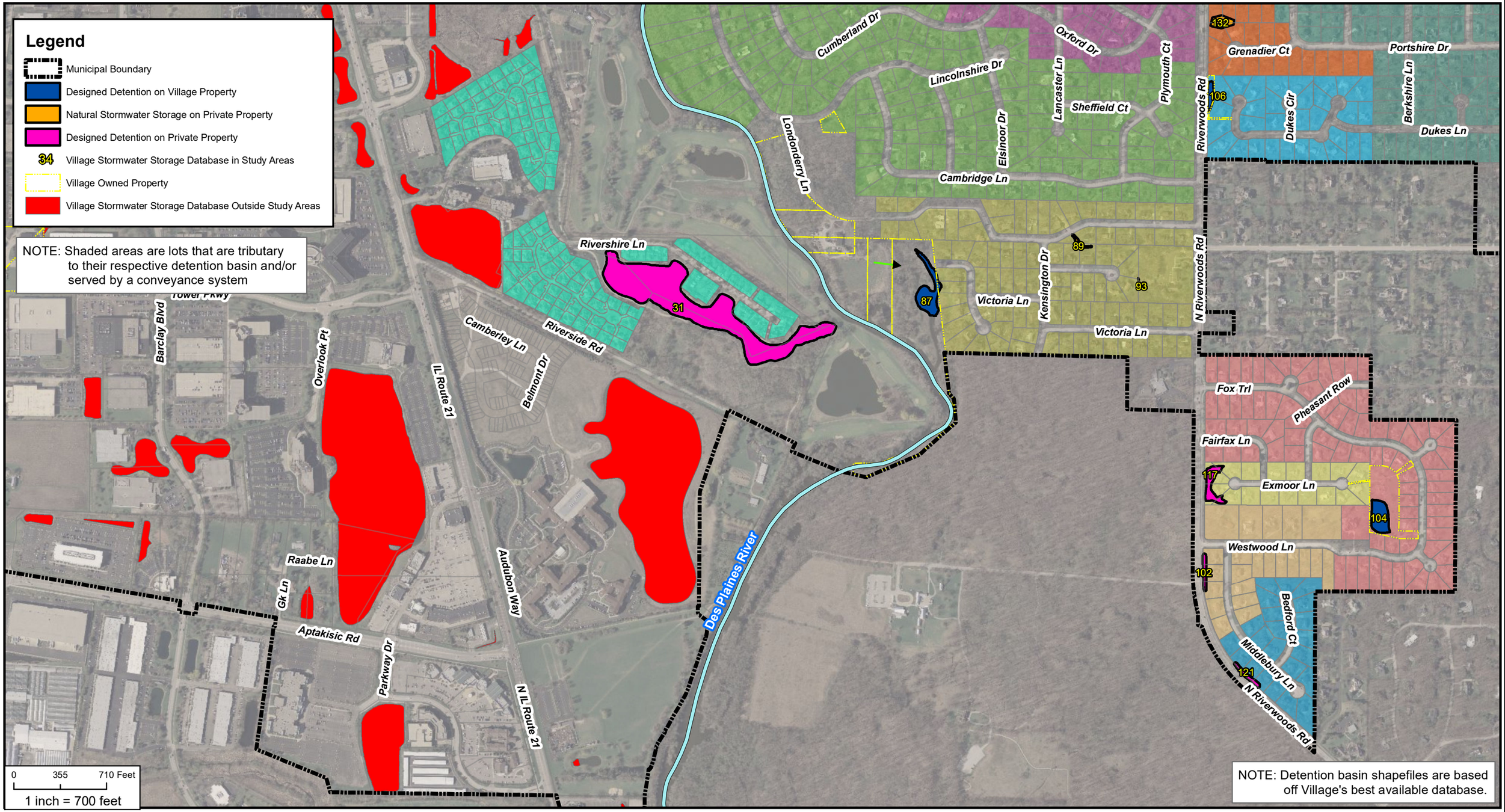
Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT	PROJECT NO.
Village of Lincolnshire	190059

TITLE: Detention Basin Tributary Areas - Central

DATE: 04/14/2020

EXHIBIT 2



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DSGN.	DRB	CHKD.	DTO

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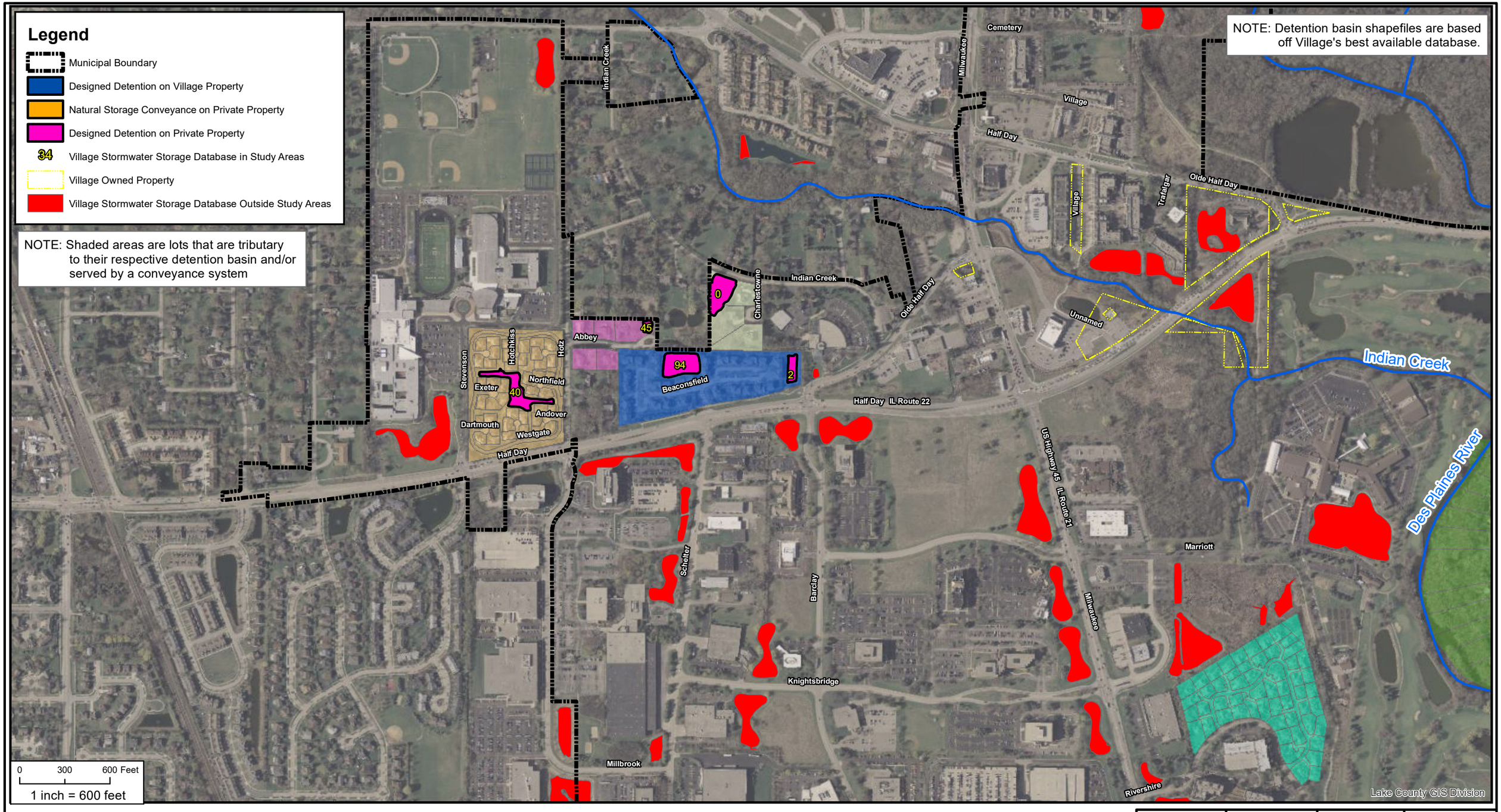
CLIENT	PROJECT NO.
Village of Lincolnshire	190059

TITLE

Detention Basin Tributary Areas - South

DATE 04/14/2020

EXHIBIT 3



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT	PROJECT NO.	
Village of Lincolnshire	190059	N W E S
TITLE		DATE 04/14/2020
Detention Basin Tributary Areas - Northwest		EXHIBIT 4

Summary table of Designed Detention Basins on private property

Subdivision (Plat)	Common Name Location	Designed for Detention	FID (Village Database)	Parcel Ownership	Parcels Served (#)	Surface Area of Basin (ac)	Problem Description	Proposed Improvements	Cost to Improve	Cost to Maintain ($/Year) ($5,000/AC) ($1,500 min)	Total Cost Year 1	5 Year Cost (Maintenance) (3.5% Inflation)	Total Cost Year 5	10 Year Cost (Maintenance) (3.5% Inflation)	Total Cost Year 10	Retrofit Total Cost (1.5 X Total Improvement & Maintenance)
Abbotsford Drive	Abbotsford Drive	Yes	26	Private (Chicago Title Land Trust Co)	15	0.34	• Non reported	• This system of basins will be benefited through the capital improvement project proposed for the southeast. • This will assist with preventing Wood Creek detention system from overflowing into Abbotsford system	Included in CIP southeast	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Abbotsford Drive	Abbotsford Drive	Yes	49	Private (Westminster Woods LLC)		0.27										
Wood Creek Drive	Woodcreek Drive	Yes	11	Private (Woodcreek Courts E P A)	134	0.25	• Non reported	• This system of basins will be benefited through the capital improvement project proposed for the southeast. • A relief sewer will extend north from Canterbury to pick up overflow from Nottingham and drain south.	Included in CIP southeast	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Wood Creek Drive	Woodcreek Drive	Yes	15	Private (Woodcreek Courts E P A)		0.12										
Wood Creek Drive	Woodcreek Drive	Yes	56	Private (Woodcreek Courts E P A)		0.56										
Lincolnshire Forest Development	Wet end of Preston Court	Yes	70	Private (Env. Engineering Solutions LLC)	8	1	• Basin in side yard encroaches into yard • Poorly drained, stagnant, eutrophic conditions	• 1 AC Scenario, Restoration only	$ 63,000	$ 5,000	$ 68,000	$ 29,700	$ 92,700	$ 59,400	$ 122,400	$ 183,600
Meadows of Birch Lake	Farrington Drive	Yes	84	Private (Meadows of Birch Lake HOA)	43	3.7	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Old Mill Woods Subdivision	Old Mill Rd & Old Mill Circle	Yes	118	Private (Old Mill Woods HOA)	9	0.71	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Lincolnshire Woods Unit 3	Stafford Court	Yes	125	Private	26	1.46	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, OCS and restoration	$ 88,000	$ 5,000	$ 93,000	$ 29,700	$ 117,700	$ 59,400	$ 147,400	$ 221,100
Whytegate Subdivision Unit 1&2	Carlisle Lane	Yes	85	Private	46	0.88	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, OCS and restoration	$ 88,000	$ 5,000	$ 93,000	$ 29,700	$ 117,700	$ 59,400	$ 147,400	$ 221,100
Brampton Lane Cul-De-Sac	Brampton Lane Cul-De-Sac (West)	Yes	123	Private	11	0.41	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Rivershire Subdivision	Marriott Residential	Yes	31	Private	147	9.8	• Non reported	• Ongoing maintennace[1]	$ -	$ 10,000	$ 10,000	$ 53,625	$ 53,625	$ 119,000	$ 119,000	$ 178,500
Westgate Subdivision	Northfield, Exeter, Andover	Yes	40	Private	41	0.9	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Beaconsfield	Beaconsfield	Yes	94	Private	29	1.1	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Beaconsfield (East)	East end of Beaconsfield	Yes	2	Private												
Abby	Abby Court	Yes	45	Private	5	0.1	• Non reported	• Ongoing maintenance	$ -	$ 1,500	$ 1,500	$ 8,900	$ 8,900	$ 17,800	$ 17,800	$ 26,700
Charlestowne Ct	Restrictor is north of property	Yes	0	Private	3	0.8	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, OCS and restoration	$ 88,000	$ 5,000	$ 93,000	$ 29,700	$ 117,700	$ 59,400	$ 147,400	$ 221,100
Lincolnshire Woods Unit 1 (SW)	Pembroke Drive & Surrey Court	Yes	99	Private	13	0.65	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Whytegate Subdivision Unit 3 (West)	Whitmore Lane Cul-De-Sac	Yes	4	Private	5	0.25	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Manors of Brampton Woods Unit 2	Hamilton Court	Yes	24	Private	13	1.15	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, restoration only	$ 63,000	$ 5,000	$ 68,000	$ 29,700	$ 92,700	$ 59,400	$ 122,400	$ 183,600
Whytegate Subdivision Unit 2 (West)	Astor Court	Yes	134	Private	6	0.09	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.1AC Scenario no OCS, underdrain system and restoration	$ 23,000	$ 1,500	$ 24,500	$ 8,900	$ 31,900	$ 17,800	$ 40,800	$ 61,200
Atta Woods (Whytegate)	119 Pembroke Drive	Yes	110	Private	6	0.26	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Manchester Woods Subdivision	Exmoor Lane near Riverwoods Road	Yes	117	Private	18	0.29	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Woodgate Subdivision (North)	Middlebury Lane & Westwood Lane	Yes	102	Private	21	0.3	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Woodgate Subdivision (South)	Middlebury Lane & Bedford Court	Yes	121	Private	22	0.38	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Northampton Lane (North)	Northampton Lane & Riverwoods Road	Yes	59	Private	7	1.05	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Brittany Lane	Brittany Lane & Riverwoods Road	Yes	101	Private	6	0.1	• Poorly drained and intermittent ponding	• 0.1AC Scenario no OCS, underdrain system and restoration	$ 23,000	$ 1,500	$ 24,500	$ 8,900	$ 31,900	$ 17,800	$ 40,800	$ 61,200
Devonshire Lane	Devonshire Lane north of Mayfair Lane	Yes	112	Private	10	0.35	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Northampton Lane (South)	Northampton Lane Cul-De-Sac	Yes	30	Private	11	0.73	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Sherwood & Mayfair	Sherwood Drive & Mayfair Lane	Yes	129	Private	14	0.23	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Robin Hood Ct	Robinhood Court Cul-De-Sac	Yes	116	Private	15	0.25	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Sherwood Drive	Rear yard of 12 Sherwood Drive	Yes	97	Private	13	0.3	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Prairie View District School	NE Corner of Prairie View School	Yes	25	Private	1	0.33	• Non reported	• Ongoing maintenance	$ -	$ 2,500	$ 2,500	$ 14,900	$ 14,900	$ 29,800	$ 29,800	$ 44,700
Prairie View District School	NE Corner of Prairie View School	Yes	44	Private												
Prairie View District School	West field of Prairie View School	Yes	41	Private	1	0.2	• Non reported	• Ongoing maintenance	$ -	$ 2,500	$ 2,500	$ 14,900	$ 14,900	$ 29,800	$ 29,800	$ 44,700
Prairie View District School	West field of Prairie View School	Yes	55	Private	1	0.15										
Whytegate Subdivision Unit 3 (East)	Whitmore Lane & Riverwoods Road	Yes	7	Private	18	0.45	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Total for Designed Detention Basins on private property									**$ 1,150,000**	**$ 111,500**	**$ 1,261,500**	**$ 657,025**	**$ 1,807,025**	**$ 1,325,800**	**$ 2,475,800**	**$ 3,713,700**

Summary table of Natural Stormwater Storage Areas on private property

Subdivision (Plat)	Common Name Location	Designed for Detention	FID (Village Database)	Parcel Ownership	Parcels Served (#)	Surface Area of Basin (ac)	Problem Description	Proposed Improvements	Cost to Improve	Cost to Maintain ($/Year) ($5,000/AC) ($1,500 min)	Total Cost Year 1	5 Year Cost (Maintenance) (3.5% Inflation)	Total Cost Year 5	10 Year Cost (Maintenance) (3.5% Inflation)	Total Cost Year 10	Retrofit Total Cost (1.5 X Total Improvement & Maintenance)
Lincolnshire Woods Unit 3 (SW)	317 Brampton Court	No	113	Private	3	0.33	• Basin in rear yard encroaches into yard • Restricted by 4-inch outlet	• 0.5AC Scenario no OCS, underdrain system and restoration	$ 51,000	$ 2,500	$ 53,500	$ 14,900	$ 65,900	$ 29,800	$ 80,800	$ 121,200
Lincolnshire Woods Unit 4 (Pembroke&Preston)	Preston Court and Pembroke Court	No	130	Private	45	0.77	• Basin in side yards encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, restoration only with underdrain	$ 86,000	$ 5,000	$ 91,000	$ 29,700	$ 115,700	$ 59,400	$ 145,400	$ 218,100
Lincolnshire Woods Unit 4 (Dover)	Dover Circle	No	127	Private	15	0.09	• Poorly drained and intermittent ponding	• 0.1AC Scenario no OCS, underdrain system and restoration	$ 23,000	$ 1,500	$ 24,500	$ 8,900	$ 31,900	$ 17,800	$ 40,800	$ 61,200
Rear yard 311 Whitmore Lane	Rear yard 311 Whitmore Lane	No	88	Private	5	0.35	• Basin in rear yard encroaches into yard	• 0.5AC Scenario no OCS, underdrain system and restoration	$ 51,000	$ 2,500	$ 53,500	$ 14,900	$ 65,900	$ 29,800	$ 80,800	$ 121,200
Mayfair Lane	Rear yard of 21 Mayfair Lane	No	105	Private	12	0.13	• Poorly drained and intermittent ponding	• 0.1AC Scenario no OCS, underdrain system and restoration	$ 23,000	$ 1,500	$ 24,500	$ 8,900	$ 31,900	$ 17,800	$ 40,800	$ 61,200
Rear yard at 6 Nottingham Drive	Rear yard at 6 Nottingham Drive	No	108	Private	6	0.75	• Basin in side yards encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, restoration only with underdrain	$ 86,000	$ 5,000	$ 91,000	$ 29,700	$ 115,700	$ 59,400	$ 145,400	$ 218,100
Anglican & Canterbury	Picked up by SE Project	No	120	Private	3	0.44	• Area is conveyance for local and off-site tributary areas	• This will be benefited through the capital improvement project proposed for the southeast.	Included with CIP southeast	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rear Yard of Wellington & Keswick	Rear Yard of Wellington & Keswick	No	119	Private	4	0.5	• Basin in rear yard encroaches into yard	• 0.5AC Scenario no OCS, underdrain system and restoration	$ 51,000	$ 2,500	$ 53,500	$ 14,900	$ 65,900	$ 29,800	$ 80,800	$ 121,200
Londonberry & Kensington	11 Londonberry Lane	No	89	Private	24	0.24	• Channel for conveyance at Lincolnshire Creek	• Relief system draining to Des Plaines River	Included in CIP southwest	$ 2,500	$ 2,500	$ 14,900	$ 14,900	$ 29,800	$ 29,800	$ 44,700
Fox Trail	Coventry Lane	No	93	Private	82	0.32	• Low area in rear yards encroaches • Area is heavily wooded, detritus material	• 0.5AC Scenario no OCS, underdrain system and restoration	$ 51,000	$ 2,500	$ 53,500	$ 14,900	$ 65,900	$ 29,800	$ 80,800	$ 121,200
Buckingham North	Depression NE of Buckingham and Riverwoods	No	131	Private	15	0.25	• Low area in rear yards encroaches • Area is heavily wooded, detritus material	• 0.25AC Scenario no OCS, underdrain system and restoration	$ 32,000	$ 2,500	$ 34,500	$ 14,900	$ 46,900	$ 29,800	$ 61,800	$ 92,700
Buckingham and Grendier	Depression SE of Buckingham and Riverwoods	No	132	Private	22	0.35	• Low area in rear yards encroaches • Area is heavily wooded, detritus material	• 0.5AC Scenario no OCS, underdrain system and restoration	$ 51,000	$ 2,500	$ 53,500	$ 14,900	$ 65,900	$ 29,800	$ 80,800	$ 121,200
Berkshire	Rear yards of Berkshire	No	133	Private	8	0.25	• Low area in rear yards encroaches • Area is heavily wooded, detritus material	• 0.25AC Scenario no OCS, underdrain system and restoration	$ 32,000	$ 2,500	$ 34,500	$ 14,900	$ 46,900	$ 29,800	$ 61,800	$ 92,700
Roadside Ditch at Riverwoods & Brampton	Brampton Lane & Riverwoods Road	No	42	ROW	0	0.09	• Non reported	• Ongoing maintenance	$ -	$ 1,500	$ 1,500	$ 8,900	$ 8,900	$ 17,800	$ 17,800	$ 26,700
Total for Natural Stormwater Storage Areas on private property									**$ 537,000**	**$ 34,500**	**$ 571,500**	**$ 205,300**	**$ 742,300**	**$ 410,600**	**$ 947,600**	**$ 1,421,400**

Summary table of Designed Detention areas on Village property

Subdivision (Plat)	Common Name Location	Designed for Detention	FID (Village Database)	Parcel Ownership	Parcels Served (#)	Surface Area of Basin (ac)	Problem Description	Proposed Improvements	Cost to Improve	Cost to Maintain ($/Year) ($5,000/AC) ($1,500 min)	Total Cost Year 1	5 Year Cost (Maintenance) (3.5% Inflation)	Total Cost Year 5	10 Year Cost (Maintenance) (3.5% Inflation)	Total Cost Year 10	Retrofit Total Cost (1.5 X Total Improvement & Maintenance)
Elm Rd Cul De Sac	Elm Road just north of Half Day Road	Yes	67	Village	4	0.07	• Non reported	• Ongoing maintenance	$ -	$ 1,500	$ 1,500	$ 8,900	$ 8,900	$ 17,800	$ 17,800	$ 26,700
Brampton Woods (West)	Brampton Lane west of Riverwoods Road	Yes	109	Village	10	0.36	• Basin in rear yard encroaches into yard • Outlet pipe blocked with debris, 10-inch	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Brampton Woods (East)	Brampton Lane & Riverwoods Road	Yes	111	Village	10	0.5	• Basin in rear yard encroaches into yard • Outlet pipe blocked with debris	• 0.5AC Scenario OCS and restoration with underdrain	$ 69,000	$ 2,500	$ 71,500	$ 14,900	$ 83,900	$ 29,800	$ 98,800	$ 148,200
Whytegate Subdivision Unit 3 (East)	Brampton Lane & Riverwoods Road along ROW	Yes	114	Village	18	0.06	• Non reported	• Ongoing maintenance	$ -	$ 1,500	$ 1,500	$ 8,900	$ 8,900	$ 17,800	$ 17,800	$ 26,700
Whytegate Subdivision Unit 3 (East)	Whitmore Lane & Riverwoods Road	Yes	53	Village	18	0.21	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Briarwood Lane Cul-De-Sac	Briarwood Lane east	Yes	128	Village	14	0.68	• Basin in rear yard encroaches into yard • Outlet pipe blocked with debris	• 1 AC Scenario, OCS and restoration	$ 88,000	$ 5,000	$ 93,000	$ 29,700	$ 117,700	$ 59,400	$ 147,400	$ 221,100
Lincolnshire Woods Unit 2	Surrey Lane east	Yes	80	Village	32	0.7	• Basin in rear yard encroaches into yard • Outlet pipe blocked with debris	• 1 AC Scenario, OCS and restoration	$ 88,000	$ 5,000	$ 93,000	$ 29,700	$ 117,700	$ 59,400	$ 147,400	$ 221,100
Lincolnshire Woods Unit 2 (SW)	Surrey Lane southwest	Yes	124	Village	12	0.6	• Flow between houses	• Relief sewer around homes, reconstruct inflow pipe	Included in CIP north	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Old Mill Woods Subdivision (East)	Old mill Road near I-94	Yes	73	Village	24	2.15	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Whytegate Subdivision Unit 2 (East)	Whytegate Park	Yes	100	Village	2	0.72	• Non reported	• Ongoing maintenance	$ -	$ 5,000	$ 5,000	$ 29,700	$ 29,700	$ 59,400	$ 59,400	$ 89,100
Lincolnshire Woods Unit 4	Preston Court west	Yes	115	Village	62	1.23	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, Restoration only	$ 63,000	$ 5,000	$ 68,000	$ 29,700	$ 92,700	$ 59,400	$ 122,400	$ 183,600
Lincolnshire Woods Unit 1 & Unit 2 (SE)	Old Mill Park	Yes	103	Village	41	1.00	• Basin fills from backflow from Old Mill Rd system	• 1AC Scenario, restore overflow, back flow preventor	$ 88,000	$ 5,000	$ 93,000	$ 29,700	$ 117,700	$ 59,400	$ 147,400	$ 221,100
Dukes Lane Subdivision	Dukes Lane near Riverwoods Road	Yes	106	Village	11	0.13	• Poorly drained and intermittent ponding	• 0.1AC Scenario no OCS, underdrain system and restoration	$ 23,000	$ 1,500	$ 24,500	$ 8,900	$ 31,900	$ 17,800	$ 40,800	$ 61,200
Whytegate Unit 3 Lot D	Side yard of 310 Whitmore Lane	Yes	57	Village	2	0.25	• Basin in rear yard encroaches into yard • Poorly drained and intermittent ponding	• 0.25AC Scenario, OCS and restoration	$ 50,000	$ 2,000	$ 52,000	$ 11,900	$ 61,900	$ 23,800	$ 73,800	$ 110,700
Bicentennial Park	East end of Exmoor Court	Yes	104	Village	12	0.7	• Basin in side yards encroaches into yard • Poorly drained and intermittent ponding	• 1 AC Scenario, restoration only with underdrain	$ 86,000	$ 5,000	$ 91,000	$ 29,700	$ 115,700	$ 59,400	$ 145,400	$ 218,100
Coldstream Circle	Confluence with Des Plaines River	No	87	Village	48	N/A	• Non reported	• Part of Des Plaines River	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Balzer Park	Low area at southwest portion of park	No	98	Village	0	0.05	• Non reported	• Will be addressed with southeast CIP	Included in CIP southeast	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total for designed detention on Village property									**$ 674,000**	**$ 48,500**	**$ 722,500**	**$ 288,200**	**$ 962,200**	**$ 576,400**	**$ 1,250,400**	**$ 1,875,600**

Total for Designed and Natural Stormwater Storage areas in the Village database	**$ 2,361,000**		**$ 2,555,500**		**$ 3,511,525**		**$ 4,673,800**	**$ 7,010,700**

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		Quantity	Description and assumptions for case and application rate
							1.0 AC area with maintainable outlet control structure
TREE REMOVAL	ACRE	$ 10,000	0.23	$ 2,296		0.23	Perimeter with assumed 10' wide swath - (perimeter = 1000 foot for 1 AC)
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.46	$ 4,591		0.46	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 1000 foot for 1 AC)
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	89	$ 4,444		88.9	Inlet and outlet in an area 20ft X 20ft X 3ft - twice; or allowance for other areas if inlet and outlet not required
DEWATERING	L. SUM	$ 5,000	1	$ 5,000		1	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	1,210	$ 12,100	**$38,191**	1210	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
SEEDING, CLASS 1A	SQ YD	$ 3	1,210	$ 3,630		1210	Seeding applied to 25% of area disturbed for restoration
EROSION CONTROL BLANKET	SQ YD	$ 3	1,210	$ 3,630		1210	Erosion control applied to 25% of area disturbed for restoration
PERIMETER EROSION BARRIER	FOOT	$ 5	500	$ 2,500		500	Assumed at 50% of perimeter
6" UNDERDRAIN	LF	$ 30	0	$ -		0	Includes stone trench's, fabric, cleanouts and junctions (not required for areas = 1 AC scenario)
STORM SEWER, RCP 12"	FOOT	$ 80	40	$ 3,200.00		40	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
STORM SEWER REMOVAL	FOOT	$ 25	40	$ 1,000.00		40	Existing outlet pipe will be removed
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	1	$ 8,000.00	**$17,700**	1	maintainable outlet control structure
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	2	$ 4,000.00		2	Assumed inlet and outlet
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00		10	5 SQ YD / outlet or inlet
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 1,117.83			
MOBILIZATION	L. SUM	+/- 6%	1	$ 3,353.49	**$7,825**		
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 1,676.74			
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 1,676.74			
			SUBTOTAL =	**$ 63,716**			
			CONTINGENCY (25%) =	$ 15,929			
			CONSTRUCTION TOTAL =	**$ 79,700**			
			DESIGN & PERMITTING (10%) =	$ 7,970			
			TOTAL =	**$ 88,000**			

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

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Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		Quantity	Description and assumptions for case and application rate
							1.0 AC area restore only
TREE REMOVAL	ACRE	$ 10,000	0.23	$ 2,296		0.23	Perimeter with assumed 10' wide swath - (perimeter = 1000 foot for 1 AC)
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.46	$ 4,591		0.46	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 1000 foot for 1 AC)
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	89	$ 4,444		88.9	Inlet and outlet in an area 20ft X 20ft X 3ft - twice; or allowance for other areas if inlet and outlet not required
DEWATERING	L. SUM	$ 5,000	1	$ 5,000	**$38,191**	1	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	1,210	$ 12,100		1210	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
SEEDING, CLASS 1A	SQ YD	$ 3	1,210	$ 3,630		1210	Seeding applied to 25% of area disturbed for restoration
EROSION CONTROL BLANKET	SQ YD	$ 3	1,210	$ 3,630		1210	Erosion control applied to 25% of area disturbed for restoration
PERIMETER EROSION BARRIER	FOOT	$ 5	500	$ 2,500		500	Assumed at 50% of perimeter
6" UNDERDRAIN	LF	$ 30	0	$ -		0	Includes stone trench's, fabric, cleanouts and junctions (not required for areas = 1 AC scenario)
STORM SEWER, RCP 12"	FOOT	$ 80	0	$ -		0	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
STORM SEWER REMOVAL	FOOT	$ 25	0	$ -		0	Existing outlet pipe will be removed
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	0	$ -	**$1,500**	0	maintainable outlet control structure
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	0	$ -		0	Assumed inlet and outlet
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00		10	5 SQ YD / outlet or inlet
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 793.83			
MOBILIZATION	L. SUM	+/- 6%	1	$ 2,381.49			
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 1,190.74	**$5,557**		
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 1,190.74			
			SUBTOTAL =	**$ 45,248**			
			CONTINGENCY (25%) =	$ 11,312			
			CONSTRUCTION TOTAL =	**$ 56,600**			
			DESIGN & PERMITTING (10%) =	$ 5,660			
			TOTAL =	**$ 63,000**			

NOTES:
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CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
TREE REMOVAL	ACRE	$ 10,000	0.00	$ -	$24,896
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.23	$ 2,296	
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	15	$ 741	
DEWATERING	L. SUM	$ 5,000	0	$ -	
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	1,210	$ 12,100	
SEEDING, CLASS 1A	SQ YD	$ 3	1,210	$ 3,630	
EROSION CONTROL BLANKET	SQ YD	$ 3	1,210	$ 3,630	
PERIMETER EROSION BARRIER	FOOT	$ 5	500	$ 2,500	
6" UNDERDRAIN	LF	$ 30	0	$ -	$29,700
STORM SEWER, RCP 12"	FOOT	$ 80	40	$ 3,200.00	
STORM SEWER REMOVAL	FOOT	$ 25	40	$ 1,000.00	
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (BACKFLOW)	EACH	$ 20,000	1	$ 20,000.00	
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	2	$ 4,000.00	
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00	
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 1,091.93	$7,643
MOBILIZATION	L. SUM	+/- 6%	1	$ 3,275.79	
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 1,637.89	
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 1,637.89	
			SUBTOTAL =	**$ 62,240**	
			CONTINGENCY (25%) =	$ 15,560	
			CONSTRUCTION TOTAL =	**$ 77,800**	
			DESIGN & PERMITTING (10%) =	$ 7,780	
			TOTAL =	**$ 86,000**	

Quantity	Description and assumptions for case and application rate
	1.0 AC area with minimal restore and back flow preventor
0	Perimeter with assumed 10' wide swath - (perimeter = 1000 foot for 1 AC)
0.23	0.5 Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 500 foot for 1 AC)
14.8	Inlet and outlet in an area 10ft X 10ft X 2ft - twice; or allowance for other areas if inlet and outlet not required
0	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
1210	Fine grading and grading for overflow area, positive drainage, side slopes, etc. (applied at 25% of area)
1210	Seeding applied to 25% of area disturbed for restoration
1210	Erosion control applied to 25% of area disturbed for restoration
500	Assumed at 50% of perimeter
0	Includes stone trench's, fabric, cleanouts and junctions (not required for areas = 1 AC scenario)
40	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
40	Existing outlet pipe will be removed
1	maintainable outlet control structure and backflow
2	Assumed inlet and outlet
10	5 SQ YD / outlet or inlet

Assumption notes
1. No tree removal
2. limitied earth excavatio and sediment removal
3. No dewatering

NOTES:
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Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		Quantity	Description and assumptions for case and application rate **1.0 AC area restore only - with uderdrain**
TREE REMOVAL	ACRE	$ 10,000	0.23	$ 2,296		0.23	Perimeter with assumed 10' wide swath - (perimeter = 1000 foot for 1 AC)
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.46	$ 4,591		0.46	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 1000 foot for 1 AC)
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	89	$ 4,444		88.9	Inlet and outlet in an area 20ft X 20ft X 3ft - twice; or allowance for other areas if inlet and outlet not required
DEWATERING	L. SUM	$ 5,000	1	$ 5,000	**$38,191**	1	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	1,210	$ 12,100		1210	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
SEEDING, CLASS 1A	SQ YD	$ 3	1,210	$ 3,630		1210	Seeding applied to 25% of area disturbed for restoration
EROSION CONTROL BLANKET	SQ YD	$ 3	1,210	$ 3,630		1210	Erosion control applied to 25% of area disturbed for restoration
PERIMETER EROSION BARRIER	FOOT	$ 5	500	$ 2,500		500	Assumed at 50% of perimeter
6" UNDERDRAIN	LF	$ 30	500	$ 15,000.00		500	Includes stone trench's, fabric, cleanouts and junctions (1 AC scenario = 500 ft)
STORM SEWER, RCP 12"	FOOT	$ 80	0	$ -		0	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
STORM SEWER REMOVAL	FOOT	$ 25	0	$ -		0	Existing outlet pipe will be removed
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	0	$ -	**$16,500**	0	maintainable outlet control structure
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	0	$ -		0	Assumed inlet and outlet
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00		10	5 SQ YD / outlet or inlet
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 1,093.83			
MOBILIZATION	L. SUM	+/- 6%	1	$ 3,281.49	**$7,657**		
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 1,640.74			
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 1,640.74			
			SUBTOTAL =	**$ 62,348**			
			CONTINGENCY (25%) =	$ 15,587			
			CONSTRUCTION TOTAL =	**$ 78,000**			
			DESIGN & PERMITTING (10%) =	$ 7,800			
			TOTAL =	**$ 86,000**			

NOTES:
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Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		Quantity	Description and assumptions for case and application rate **0.5 AC area with maintainable outlet control structure**
TREE REMOVAL	ACRE	$ 10,000	0.11	$ 1,148	**$20,114**	0.11	Perimeter with assumed 10' wide swath - (perimeter = 500 foot for 0.5 AC)
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.23	$ 2,296		0.23	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 500 foot for 0.5 AC)
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	15	$ 741		14.8	Inlet and outlet in an area 10ft X 10ft X 2ft - twice; or allowance for other areas if inlet and outlet not required
DEWATERING	L. SUM	$ 5,000	1	$ 5,000		1	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	605	$ 6,050		605	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
SEEDING, CLASS 1A	SQ YD	$ 3	605	$ 1,815		605	Seeding applied to 25% of area disturbed for restoration
EROSION CONTROL BLANKET	SQ YD	$ 3	605	$ 1,815		605	Erosion control applied to 25% of area disturbed for restoration
PERIMETER EROSION BARRIER	FOOT	$ 5	250	$ 1,250		250	Assumed at 50% of perimeter
6" UNDERDRAIN	LF	$ 30	200	$ 6,000.00	**$23,700**	200	Includes stone trench's, fabric, cleanouts and junctions (0.5 AC scenario)
STORM SEWER, RCP 12"	FOOT	$ 80	40	$ 3,200.00		40	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
STORM SEWER REMOVAL	FOOT	$ 25	40	$ 1,000.00		40	Existing outlet pipe will be removed
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	1	$ 8,000.00		1	maintainable outlet control structure
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	2	$ 4,000.00		2	Assumed inlet and outlet
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00		10	5 SQ YD / outlet or inlet
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 876.29	**$6,134**		
MOBILIZATION	L. SUM	+/- 6%	1	$ 2,628.86			
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 1,314.43			
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 1,314.43			
			SUBTOTAL =	**$ 49,948**			
			CONTINGENCY (25%) =	$ 12,487			
			CONSTRUCTION TOTAL =	**$ 62,500**			
			DESIGN & PERMITTING (10%) =	$ 6,250			
			TOTAL =	**$ 69,000**			

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
TREE REMOVAL	ACRE	$ 10,000	0.11	$ 1,148	$15,114
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.23	$ 2,296	
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	15	$ 741	
DEWATERING	L. SUM	$ 5,000	0	$ -	
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	605	$ 6,050	
SEEDING, CLASS 1A	SQ YD	$ 3	605	$ 1,815	
EROSION CONTROL BLANKET	SQ YD	$ 3	605	$ 1,815	
PERIMETER EROSION BARRIER	FOOT	$ 5	250	$ 1,250	
6" UNDERDRAIN	LF	$ 30	500	$ 15,000.00	$16,500
STORM SEWER, RCP 12"	FOOT	$ 80	0	$ -	
STORM SEWER REMOVAL	FOOT	$ 25	0	$ -	
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	0	$ -	
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	0	$ -	
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00	
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 632.29	$4,426
MOBILIZATION	L. SUM	+/- 6%	1	$ 1,896.86	
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 948.43	
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 948.43	
			SUBTOTAL =	**$ 36,040**	
			CONTINGENCY (25%) =	$ 9,010	
			CONSTRUCTION TOTAL =	**$ 45,100**	
			DESIGN & PERMITTING (10%) =	$ 5,000	
			TOTAL =	**$ 51,000**	

Quantity	Description and assumptions for case and application rate
	0.5 AC area with no OCS and 500' of underdrain
0.11	Perimeter with assumed 10' wide swath - (perimeter = 500 foot for 0.5 AC)
0.23	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 500 foot for 0.5 AC)
14.8	Inlet and outlet in an area 10ft X 10ft X 2ft - twice; or allowance for other areas if inlet and outlet not required
0	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
605	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
605	Seeding applied to 25% of area disturbed for restoration
605	Erosion control applied to 25% of area disturbed for restoration
250	Assumed at 50% of perimeter
500	Includes stone trench's, fabric, cleanouts and junctions (0.5 AC scenario)
0	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
0	Existing outlet pipe will be removed
0	maintainable outlet control structure
0	Assumed inlet and outlet
10	5 SQ YD / outlet or inlet

Assumption notes
1. No OCS or sotrm sewer, only underdrain/yard drainage
2. Limitied earth excavatio and sediment removal
3. No dewatering

NOTES:
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2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

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CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		Quantity	Description and assumptions for case and application rate **0.25 AC area with maintainable outlet control structure**
TREE REMOVAL	ACRE	$ 10,000	0.07	$ 689	**$13,397**	0.07	Perimeter with assumed 10' wide swath - (perimeter = 300 foot for 0.25 AC)
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.14	$ 1,377		0.14	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 300 foot for 0.25 AC)
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	15	$ 741		14.8	Inlet and outlet in an area 10ft X 10ft X 2ft - twice; or allowance for other areas if inlet and outlet not required
DEWATERING	L. SUM	$ 5,000	1	$ 5,000		1	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	303	$ 3,025		302.5	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
SEEDING, CLASS 1A	SQ YD	$ 3	303	$ 908		302.5	Seeding applied to 25% of area disturbed for restoration
EROSION CONTROL BLANKET	SQ YD	$ 3	303	$ 908		302.5	Erosion control applied to 25% of area disturbed for restoration
PERIMETER EROSION BARRIER	FOOT	$ 5	150	$ 750		150	Assumed at 50% of perimeter
6" UNDERDRAIN	LF	$ 30	0	$ -	**$17,700**	0	Includes stone trench's, fabric, cleanouts and junctions (0.25 AC scenario)
STORM SEWER, RCP 12"	FOOT	$ 80	40	$ 3,200.00		40	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
STORM SEWER REMOVAL	FOOT	$ 25	40	$ 1,000.00		40	Existing outlet pipe will be removed
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	1	$ 8,000.00		1	maintainable outlet control structure
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	2	$ 4,000.00		2	Assumed inlet and outlet
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00		10	5 SQ YD / outlet or inlet
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 621.94	**$4,354**		
MOBILIZATION	L. SUM	+/- 6%	1	$ 1,865.81			
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 932.91			
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 932.91			
			SUBTOTAL =	**$ 35,450**			
			CONTINGENCY (25%) =	$ 8,863			
			CONSTRUCTION TOTAL =	**$ 44,400**			
			DESIGN & PERMITTING (10%) =	$ 5,000			
			TOTAL =	**$ 50,000**			

NOTES:
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3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

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CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
TREE REMOVAL	ACRE	$ 10,000	0.07	$ 689	$8,397
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.14	$ 1,377	
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	15	$ 741	
DEWATERING	L. SUM	$ 5,000	0	$ -	
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	303	$ 3,025	
SEEDING, CLASS 1A	SQ YD	$ 3	303	$ 908	
EROSION CONTROL BLANKET	SQ YD	$ 3	303	$ 908	
PERIMETER EROSION BARRIER	FOOT	$ 5	150	$ 750	
6" UNDERDRAIN	LF	$ 30	300	$ 9,000.00	$10,500
STORM SEWER, RCP 12"	FOOT	$ 80	0	$ -	
STORM SEWER REMOVAL	FOOT	$ 25	0	$ -	
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	0	$ -	
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	0	$ -	
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00	
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 377.94	$2,646
MOBILIZATION	L. SUM	+/- 6%	1	$ 1,133.81	
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 566.91	
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 566.91	
			SUBTOTAL =	**$ 21,542**	
			CONTINGENCY (25%) =	$ 5,386	
			CONSTRUCTION TOTAL =	**$ 27,000**	
			DESIGN & PERMITTING (10%) =	$ 5,000	
			TOTAL =	**$ 32,000**	

Quantity	Description and assumptions for case and application rate
	0.25 AC area with no OCS and 300' of underdrain
0.07	Perimeter with assumed 10' wide swath - (perimeter = 300 foot for 0.25 AC)
0.14	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 300 foot for 0.25 AC)
14.8	Inlet and outlet in an area 10ft X 10ft X 2ft - twice; or allowance for other areas if inlet and outlet not required
0	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
302.5	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
302.5	Seeding applied to 25% of area disturbed for restoration
302.5	Erosion control applied to 25% of area disturbed for restoration
150	Assumed at 50% of perimeter
300	Includes stone trench's, fabric, cleanouts and junctions (0.25 AC scenario)
0	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
0	Existing outlet pipe will be removed
0	maintainable outlet control structure
0	Assumed inlet and outlet
10	5 SQ YD / outlet or inlet

Assumption notes
1. No OCS or sotrm sewer, only underdrain/yard drainage
2. Limitied earth excavatio and sediment removal
3. No dewatering

NOTES:
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CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 5, 2020

ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		Quantity	Description and assumptions for case and application rate **0.1 AC area with no OCS and 200' of underdrain**
TREE REMOVAL	ACRE	$ 10,000	0.05	$ 459	$4,554	0.05	Perimeter with assumed 10' wide swath - (perimeter = 200 foot for 0.1 AC)
DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000	0.09	$ 918		0.09	Perimeter with assumed 20 ft wide swath. Includes trash, perimeter vegetation, other detritus material (perimeter = 200 foot for 0.1 AC)
EARTH EXCAVATION / SEDIMENT REMOVAL	CU YD	$ 50	15	$ 741		14.8	Inlet and outlet in an area 10ft X 10ft X 2ft - twice; or allowance for other areas if inlet and outlet not required
DEWATERING	L. SUM	$ 5,000	0	$ -		0	Dewatering, pumps, coffer dam, filter bags - only required if maintainable outlet control structure is installed
TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10	121	$ 1,210		121	Fine grading and grading for positive drainage, side slopes, etc. (applied at 25% of area)
SEEDING, CLASS 1A	SQ YD	$ 3	121	$ 363		121	Seeding applied to 25% of area disturbed for restoration
EROSION CONTROL BLANKET	SQ YD	$ 3	121	$ 363		121	Erosion control applied to 25% of area disturbed for restoration
PERIMETER EROSION BARRIER	FOOT	$ 5	100	$ 500		100	Assumed at 50% of perimeter
6" UNDERDRAIN	LF	$ 30	200	$ 6,000.00	$7,500	200	Includes stone trench's, fabric, cleanouts and junctions (0.1 AC scenario)
STORM SEWER, RCP 12"	FOOT	$ 80	0	$ -		0	Assumed outlet pipe will be reconstructed for installation of new outlet control structure and rip-rap
STORM SEWER REMOVAL	FOOT	$ 25	0	$ -		0	Existing outlet pipe will be removed
MANHOLES, 5'-DIAMETER, TYPE A, T1F CL (OUTLET CONTROL)	EACH	$ 8,000	0	$ -		0	maintainable outlet control structure
REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000	0	$ -		0	Assumed inlet and outlet
STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150	10	$ 1,500.00		10	5 SQ YD / outlet or inlet
MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 241.08	$1,688		
MOBILIZATION	L. SUM	+/- 6%	1	$ 723.25			
ACCES / STBILIZES ENTRANCE & TRAFFIC CONTROL	L. SUM	+/- 3%	1	$ 361.62			
CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 361.62			
			SUBTOTAL =	**$ 13,742**			
			CONTINGENCY (25%) =	$ 3,435			
			CONSTRUCTION TOTAL =	**$ 17,200**			
			DESIGN & PERMITTING (10%) =	$ 5,000			
			TOTAL =	**$ 23,000**			

Assumption notes
1. No OCS or sotrm sewer, only underdrain/yard drainage
2. Limitied earth excavatio and sediment removal
3. No dewatering

NOTES:
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APPENDIX 2

STORMWATER MANAGEMENT ON PRIVATE PROPERTY

RESIDENTIAL PROPERTY IMPROVEMENTS

The vast majority of drainage complaints received consisted of yard flooding on private property. Many lots also contain low areas that promote standing water. Accumulating debris and detritus from the vegetation canopy can exacerbate these issues. Given the large number of instances where these drainage problems occur and the fact they are on private property, it is recommended that the Village develop a policy that assigns responsibility of drainage improvements and maintenance of existing yard drainage to the individual property owner. This would be consistent with Illinois Drainage Law and policies adopted by other communities.

An inventory of all reported yard drainage problems collected by the both the Village and the flood questionnaire distributed for this Plan is shown on the existing condition exhibits throughout the appendices for each sturdy area. Clusters of blue highlighted properties indicate the potential for yard flooding issues that may involve multiple properties. It is acknowledged that the drainage problems may be complex and may involve several properties. This Appendix is intended to provide examples of what other communities have done in the past and the policy or programs they have adopted regarding yard drainage. This information is intended to assist the Village in the decision-making process as to how to handle drainage issue on private property.

Village guidance could be provided to assist property owners as follows:

- Develop a web page and handout that clearly defines the Village policy on private property drainage issues that includes references to Illinois drainage law, development regulations, etc. See Village of Niles example.
- Allocate a limited amount of staff time to developing recommendations for drainage improvements on private property. This would include contacting multiple property owners where the drainage improvement involves more than one property.
- Provide a list of standard design details and typical cost estimates for green infrastructure and other yard drainage improvement practices such as:
    - Rain gardens and native vegetation
    - Underdrains
    - Yard inlets
- Provide a list of recommended landscaping or sewer companies that have successfully completed drainage projects within the Village or surrounding communities.
- Establish a cost share program for private property drainage improvements similar to the Village of Wilmette, Stormwater Incentive Program or the Village of Roselle, Flooding Assistance Program.
    - https://www.wilmette.com/village-services/stormwater-improvement-project/stormwater-incentive-program/
- The Village may enroll in the Center for Neighborhood Technology (CNT) Rain Ready program. This program can assist property owners reduce their risk of flooding, become more climate resilient, and create healthy buildings and green neighborhoods.

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CALC'D BY: JAL
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Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: May 11, 2020

SCENARIO 1 - 300 feet of 6" w cleanouts – tie into existing catch basin. Clean 500 feet line in rear yard sewer.

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
EARTHWORK	TREE REMOVAL	ACRE	$ 10,000.00	0.20	$ 2,000.00	$7,600
	DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000.00	0.20	$ 2,000.00	
	DEWATERING	L. SUM	$ 1,000.00	1	$ 1,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 5.00	100	$ 500.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	100	$ 300.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	100	$ 300.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	300	$ 1,500.00	
DRAINAGE	6" UNDERDRAIN (PERFORATED PVC-SDR 26)	FOOT	$ 30.00	300	$ 9,000.00	$13,750
	CLEANOUT	EACH	$ 500.00	3	$ 1,500.00	
	CORE CONNECTION INTO EXISTING STRUCTURE	EACH	$ 750.00	1	$ 750.00	
	CLEAN/JET EXISTING STORM SEWER	FOOT	$ 5.00	500	$ 2,500.00	
MISC.	MISCELLANEOUS SESC MEASURES	L. SUM		1	$ 1,000.00	$2,000
	MOBILIZATION	L. SUM		1	$ -	
	ACCESS / STABILIZED CONSTRUCTION ENTRANCE & TRAFFIC CONTROL	L. SUM		1	$ -	
	CONSTRUCTION LAYOUT	L. SUM		1	$ 1,000.00	

SUBTOTAL =	**$ 23,350.00**
CONTINGENCY (25%) =	$ 5,837.50
CONSTRUCTION TOTAL =	**$ 29,187.50**
DESIGN & PERMITTING (10%) =	$ 2,918.75
TOTAL COST OF IMPROVEMENTS =	**$ 32,106.25**
TOTAL COST per 3 PROPERTIES =	**$ 10,702**

NOTES:
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3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

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Village of Lincolnshire
Village-wide Stormwater Study
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Date: May 11, 2020

SCENARIO 2 - 500 feet of 6" w cleanouts – tie into existing catch basin. Clean line into detention pond.

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
EARTHWORK	TREE REMOVAL	ACRE	$ 10,000.00	0.30	$ 3,000.00	$11,700
	DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000.00	0.30	$ 3,000.00	
	DEWATERING	L. SUM	$ 1,000.00	1	$ 1,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 5.00	200	$ 1,000.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	200	$ 600.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	200	$ 600.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	500	$ 2,500.00	
DRAINAGE	6" UNDERDRAIN (PERFORATED PVC-SDR 26)	FOOT	$ 30.00	500	$ 15,000.00	$18,750
	CLEANOUT	EACH	$ 500.00	5	$ 2,500.00	
	CORE CONNECTION INTO EXISTING STRUCTURE	EACH	$ 750.00	1	$ 750.00	
	CLEAN/JET EXISTING STORM SEWER	FOOT	$ 5.00	100	$ 500.00	
MISC.	MISCELLANEOUS SESC MEASURES	L. SUM		1	$ 1,000.00	$2,000
	MOBILIZATION	L. SUM		1	$ -	
	ACCESS / STABILIZED CONSTRUCTION ENTRANCE & TRAFFIC CONTROL	L. SUM		1	$ -	
	CONSTRUCTION LAYOUT	L. SUM		1	$ 1,000.00	

SUBTOTAL =	**$**	**32,450.00**
CONTINGENCY (25%) =	$	8,112.50
CONSTRUCTION TOTAL =	**$**	**40,562.50**
DESIGN & PERMITTING (10%) =	$	4,056.25
TOTAL COST OF IMPROVEMENTS =	**$**	**44,618.75**
TOTAL COST per 3 PROPERTIES =	**$**	**14,873**

NOTES:
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3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
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Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: May 11, 2020

SCENARIO 3 - 150 feet of 6" w cleanouts to the street, 200 feet of RCP under street, connection to existing manhole.

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
EARTHWORK	TREE REMOVAL	ACRE	$ 10,000.00	0.10	$ 1,000.00	$3,300
	DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000.00	0.10	$ 1,000.00	
	DEWATERING	L. SUM	$ 2,500.00	0	$ -	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 5.00	50	$ 250.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	50	$ 150.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	50	$ 150.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	150	$ 750.00	
DRAINAGE	TRENCH BACKFILL	CU YD	$ 50.00	75	$ 3,750.00	$40,375
	6" UNDERDRAIN (PERFORATED PVC-SDR 26)	FOOT	$ 30.00	150	$ 4,500.00	
	CLEANOUT	EACH	$ 500.00	2	$ 1,000.00	
	CORE CONNECTION INTO EXISTING STRUCTURE	EACH	$ 750.00	1	$ 750.00	
	STORM SEWER, RCP 12"	FOOT	$ 80.00	200	$ 16,000.00	
	CATCH BASIN, 4'-DIAMETER, TYPE A, TYPE 1 FRAME CLOSED LID	EACH	$ 5,000.00	1	$ 5,000.00	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 75.00	125	$ 9,375.00	
MISC.	MISCELLANEOUS SESC MEASURES	L. SUM		1	$ 1,000.00	$2,000
	MOBILIZATION	L. SUM		1		
	ACCESS / STABILIZED CONSTRUCTION ENTRANCE & TRAFFIC CONTROL	L. SUM		1		
	CONSTRUCTION LAYOUT	L. SUM		1	$ 1,000.00	

SUBTOTAL =	**$**	**45,675.00**
CONTINGENCY (25%) =	$	11,418.75
CONSTRUCTION TOTAL =	**$**	**57,093.75**
DESIGN & PERMITTING (10%) =	$	5,709.38
TOTAL COST OF IMPROVEMENTS =	**$**	**62,803.13**
TOTAL COST per 3 PROPERTIES =	**$**	**20,934**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: May 11, 2020

SCENARIO 4 - 450 feet of 6" w cleanouts to the street, connection to existing manhole in street.

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
EARTHWORK	TREE REMOVAL	ACRE	$ 10,000.00	0.30	$ 3,000.00	$10,900
	DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000.00	0.30	$ 3,000.00	
	DEWATERING	L. SUM	$ 1,000.00	1	$ 1,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 5.00	150	$ 750.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	150	$ 450.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	150	$ 450.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	450	$ 2,250.00	
DRAINAGE	TRENCH BACKFILL	CU YD	$ 50.00	15	$ 750.00	$17,250
	6" UNDERDRAIN (PERFORATED PVC-SDR 26)	FOOT	$ 30.00	450	$ 13,500.00	
	CLEANOUT	EACH	$ 500.00	3	$ 1,500.00	
	CORE CONNECTION INTO EXISTING STRUCTURE	EACH	$ 750.00	1	$ 750.00	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 75.00	10	$ 750.00	
MISC.	MISCELLANEOUS SESC MEASURES	L. SUM		1	$ 1,000.00	$2,000
	MOBILIZATION	L. SUM		1	$ -	
	ACCESS / STABILIZED CONSTRUCTION ENTRANCE & TRAFFIC CONTROL	L. SUM		1	$ -	
	CONSTRUCTION LAYOUT	L. SUM		1	$ 1,000.00	

SUBTOTAL =	**$ 30,150.00**
CONTINGENCY (25%) =	$ 7,537.50
CONSTRUCTION TOTAL =	**$ 37,687.50**
DESIGN & PERMITTING (10%) =	$ 3,768.75
TOTAL COST OF IMPROVEMENTS =	**$ 41,456.25**
TOTAL COST per 3 PROPERTIES =	**$ 13,819**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: May 14, 2020

SCENARIO 5 - 450' 12" RCP w/ MH for each home, 150' 12" to the street, connection to existing manhole in street.

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
EARTHWORK	TREE REMOVAL	ACRE	$ 10,000.00	0.30	$ 3,000.00	$10,900
	DEBRIS CLEARING / SITE CLEARING	ACRE	$ 10,000.00	0.30	$ 3,000.00	
	DEWATERING	L. SUM	$ 1,000.00	1	$ 1,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 5.00	150	$ 750.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	150	$ 450.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	150	$ 450.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	450	$ 2,250.00	
DRAINAGE	TRENCH BACKFILL	CU YD	$ 50.00	100	$ 5,000.00	$88,125
	STORM SEWER, RCP 12"	FOOT	$ 80.00	600	$ 48,000.00	
	CATCH BASIN, 4'-DIAMETER, TYPE A, TYPE 1 FRAME CLOSED LID	EACH	$ 5,000.00	5	$ 25,000.00	
	CORE CONNECTION INTO EXISTING STRUCTURE	EACH	$ 750.00	1	$ 750.00	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 75.00	125	$ 9,375.00	
MISC.	MISCELLANEOUS SESC MEASURES	L. SUM		1	$ 2,500.00	$5,000
	MOBILIZATION	L. SUM		1	$ -	
	ACCESS / STABILIZED CONSTRUCTION ENTRANCE & TRAFFIC CONTROL	L. SUM		1	$ -	
	CONSTRUCTION LAYOUT	L. SUM		1	$ 2,500.00	

SUBTOTAL =	**$ 104,025.00**
CONTINGENCY (25%) =	$ 26,006.25
CONSTRUCTION TOTAL =	**$ 130,031.25**
DESIGN & PERMITTING (10%) =	$ 13,003.13
TOTAL COST OF IMPROVEMENTS =	**$ 143,034.38**
TOTAL COST per 3 PROPERTIES =	**$ 47,678**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

Village of Roselle

Tradition Meets Tomorrow

YARD FLOODING ASSISTANCE PROGRAM

Approved March 28, 2016

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PROGRAM INTRODUCTION

The Village of Roselle developed this cost share program to assist property owners that have experienced yard flooding problems.

Positive yard drainage involves properly sloped grades to convey stormwater runoff to lower ground or to a yard storm sewer system. Some of our subdivisions were developed with storm sewers in yards within drainage easements, others were not and relied on properly pitched slopes.

Over the years, ground settling, filling, landscaping, fences and sheds may have adversely impacted the ability for water to properly drain in these areas. In addition, yard areas that once were able to absorb the water, may not continue to do so due to increases in impervious areas and the resultant runoff from private property improvements such as building additions, patios, pool decks, sidewalks and accessory buildings.

Participation in this program is based on a first come first serve basis and is subject to available funding.

PROGRAM DESCRIPTION

Eligible Projects

The following criteria shall be met for projects to be eligible for participation in this Yard Flooding Assistance Program:

- The project shall benefit at least two single family residential and single family attached residential homes, located within the corporate limits of the Village of Roselle; and
- The project shall address standing water issues with a documented duration of 72 hours or more; and

Eligible Subsidy

The Village may cost share up to 50% of eligible improvements but no more than a maximum reimbursement (per project) amount of $3,000. The percentage of cost sharing shall be determined by the number of proposed projects, the number of properties that will benefit from a proposed project, the factors set forth in the "Eligible Improvements" section of this memo, and available funding. The program is discretionary and the Village will have no duty or obligation to provide reimbursements until it has executed a reimbursement agreement with the Owner(s).

Eligible Improvements

Option 1: Re-grading yard(s) to reestablish proper pitch.

The preferred improvement is one that minimizes future maintenance requirements. Re-grading the yard(s) by utilizing a combination of filling low areas with soil or removing high points along the drainage profile where appropriate requires less future maintenance than other improvements such as the installation of storm sewers.

Option 2: Private gravity storm sewer installation.

In cases where re-grading is not a practical alternative, installation of a storm sewer (drain) to drain a low area may be the appropriate option. This option also requires that a receiving storm sewer be available in the vicinity of the problem area. This might be an existing yard storm sewer system in close proximity to the problem area or a storm sewer system in the street in front of the subject property that can be accessed by extending a storm sewer/drain to the front along a side property line. A gravity system is one that maintains a positive pitch and drains via gravity to the receiving storm sewer system without the aid of a sump pump.

Option 3: Pumped storm sewer installation.

In cases where the receiving storm sewer is too shallow to receive gravity flow, a pumped system utilizing a sump pump may be an appropriate option. This option involves providing an electrical feed to serve the pump.

Option 4: Installation of a rain garden.

A rain garden is a specially planted depressional area that allows stormwater runoff to be absorbed by the soils by amending the soil to be more permeable and to utilize planting materials

(typically native plants) that have the ability to absorb moisture through their roots and return the moisture to the atmosphere through the plants natural transpiration process. The effectiveness of rain gardens is highly dependent upon proper design and typically takes several seasons for plant materials to mature to an effective moisture transpiration system.

Eligible Costs

Eligible costs are as follows:

- Cost of digging, hauling and disposal of excavated materials to remove high points in the yard that interferes with proper drainage.
- Cost for the purchase and spreading of fill material to fill low points in the yard that hold water.
- Costs for the purchase and installation of gravity storm sewers and yard drainage inlets.
- Cost to install a sump pit and pump (including electrical work) to collect and pump storm water that collects in low areas that cannot be re-graded or served by a gravity sewer.
- Costs to purchase and install discharge piping from sump pump.
- Costs to install a rain garden including excavation, soil amendment and plant materials.
- Cost of topsoil and grass seeding to restore disturbed grass/lawns.
- Project professional design and oversight costs.
- Applicable permit fees.
-

Non-Eligible Costs include the following:

- Costs to remove manmade objects that interfere with proper drainage such as fences, sheds, landscape walls, etc.
- Use of materials not meeting the requirements of Village Codes.
- Planting or replacement of new landscaping (bushes, trees, sod, fences, walls, etc.).
- New electrical panels and/or upgrading the house electrical supply. (the cost to run electric to a yard sump pump is eligible as stated under eligible costs, provided there is existing capacity in the electrical service/panel to accommodate the pump)
- Legal and title expenses that may be required by a project.

General Requirements

1. All work performed under this program shall meet all applicable requirements of the Building Codes of the Village of Roselle including, but not limited to, the Illinois Plumbing Code, National Electric Code and the International Building Code.
2. Any/all pumps associated with Option 3 shall be connected to a dedicated electrical circuit.
3. All work shall performed by licensed and bonded contractors.
4. Reimbursement through this Program is limited to one time per address.
5. All work and reimbursement shall be approved in conformance with the Village's written Program Application/Participation Agreement.

HOMEOWNER(S) TO DESIGN, INSTALL, OWN AND MAINTAIN SYSTEM-NO WARRANY OF GUARANTEE

The Village's agreement to cost share as set forth in this policy is not and shall not constitute a warranty, promise or guarantee by the Village that the drainage systems described herein will fully or partially mitigate the problem. It is merely a policy by which the Village may cost share in the worthy improvements in the hopes that those improvements may provide overland drainage relief to eligible homeowners. Each eligible homeowner, in conjunction with any advisor the homeowner trusts, must reach an independent judgment as whether or not to install overland drainage improvements and not rely on the Village's cost sharing agreement as a basis for concluding that the chosen system will be effective.

Village of Roselle
Yard Flooding Assistance Program
Instructions on How to Apply

1. Contact the Public Works Department at 630-671-2360 to schedule a preliminary inspection to ensure the property is eligible. Village Staff will consult with the property owner(s) to identify the history of flooding/drainage problems and evaluate options for mitigating the potential for flooding.

2. After being deemed eligible, solicit proposal(s) from contractor(s). Request that the selected contactor prepare detailed drawings of proposed improvements and provide a written proposal that provides a detailed description of the scope of work. Also, complete the following forms: a) *General Information Form* and b) *Participation Agreement*

   Submit drawings, proposals and required forms to the Public Works Department at:
   474 Congress Circle North
   Roselle, Illinois 60172

3. Drawings will be reviewed by the Village and will either be approved as noted or returned for revisions. When drawings receive approval, apply for applicable sewer installation, grading and electrical permits with the Village of Roselle Community Development Department.

4. Contractors will need to contact the Community Development Department to schedule normal inspections during the course of work and at completion for a final inspection.

5. After the work has been inspected and approved, the homeowner will need to pay the full amount to the contractor(s) and then submit the following to the Public Works Department for reimbursement:
   a. Completed "Request for Reimbursement Form"
   b. Copy of a paid & itemized invoice from the contractors that performed the work.
   c. Copy of the cancelled check (both sides), and/or credit card receipt, that the homeowner paid all contractor(s).

6. Homeowner will receive the Village's reimbursement check approximately three weeks after all of the required paperwork is submitted, and approved, by the Public Works Department.

7. NO WARRANTY OR GUARANTEE: THE VILLAGE'S AGREEMENT TO COST SHARE AS SET FORTH IN THIS POLICY IS NOT AND SHALL NOT CONSTITUTE A WARRANTY, PROMISE OR GUARANTEE BY THE VILLAGE THAT THE SYSTEM DESIGNED BY THE HOMEOWNER OR THE HOMEOWNER'S DESIGN PROFESSIONAL WILL COMPLETELY SOLVE THE BACKYARD FLOODING ISSUE. THE VILLAGE WILL STRIVE TO PROVIDE SOUND DRAINAGE ADVICE DURING THE PROCESS BUT ULTIMATELY THE HOMEOWNER(S) AND THEIR CONTRACTORS ARE RESPONSIBLE FOR THE PROPER PERFORMANCE OF THE CHOSEN SYSTEM. IT IS MERELY AN AGREEMENT BY THE VILLAGE TO SHARE THE COST OF INSTALLING THE CHOSEN SYSTEM IN THE HOPES THAT THE SYSTEM WILL PROVIDE THE DESIRED RELIEF TO THE BACKYARD FLOODING

ISSUE. EACH ELIGIBLE HOMEOWNER, IN CONJUNCTION WITH ANY ADVISOR THE HOMEOWNER TRUSTS, MUST REACH AN INDEPENDENT JUDGMENT AS WHETHER OR NOT TO INSTALL THE CHOSEN SYSTEM AND NOT RELY ON THE VILLAGE'S COST SHARING AGREEMENT AS A BASIS FOR CONCLUDING THAT THE CHOSEN SYSTEM WILL BE EFFECTIVE.

DRAINAGE COMPLAINTS

YARD NUISANCE FLOODING

REAR YARD SEWERS

INTRODUCTION

This white paper reviews current practices in the Village of Niles (Village) and surrounding communities with regard to private property drainage issues. There is a need to formalize the Village policy with regard to rear yard non-structural flooding (nuisance flooding). For the purpose of this paper any reference to rear yards will include side yards as applicable. A formal policy will provide Village staff with guidance on how to assist residents as well as assign responsibility for resolving problems. The following white paper outlines the issues and challenges related to rear yard flooding.

GOALS AND OBJECTIVES

The Yard Nuisance Drainage Policy is needed to provide a consistent approach to how the Village addresses nuisance flooding on private property. The goal is for the Village to develop consistent policies and procedures for conducting inspections and maintenance relating to stormwater concerns raised by property owners.

Throughout the process, Village staff shall be guided by the Code of Ordinances.

BACKGROUND INFORMATION

The Northwest Municipal Conference (NWMC) recently performed two surveys to determine how Communities in the area address these common problems. 25 Communities responded to a survey regarding rear yard flooding which resulted in the following statistics:

- 6 of 25 (24%) communities provide financial assistance to residents to design or construct improvements related to nuisance flooding. Conversely 76% of communities provide no assistance other than code review and general recommendations.
- 11 of 25 (44%) assist residents with providing information about design engineers, landscapers, or plumbers qualified to prepare a design solution. 8 of 25 Communities provide preapproved standard details for typical solutions.
- 15 of 25 (60%) allow staff to perform simple topographic survey to diagnose problems.

Twenty two (22) Communities responded to the drainage complaint survey which resulted in the following statistics:

- 10 communities specifically indicated these issues are handled by public works/engineering, 10 communities referred to a “Village“ response, and 2 communities had no identified procedure.
- 19 Communities indicate they required permits for landscaping of which 13 indicated they only required permits for “major” landscaping.

In summary, the majority of communities respond to nuisance flooding drainage complaints, require permits for grading, and do not provide financial assistance to homeowners to resolve private

property nuisance flooding. These practices are consistent with Niles informal procedures.

The discussion at the August 12, 2016 Stormwater Commission indicated that nuisance flooding is a low priority stormwater issue. Nuisance flooding was deemed a low priority stormwater problem due to the other significant problems in town. As such, the Village does not provide financial assistance to help property owners with nuisance flooding at this time. The Commission felt it was a good idea to provide some assistance to homeowners through engineering standard details and basic consultation. The Commission indicated that the in-house staff could be supplemented with consultants when the workload required extra manpower. Design and implementation of private property nuisance flooding solutions remains a property owner responsibility. The Commission also felt that code violators must be held responsible for correcting recent violations as a separate issue.

The Village of Niles Flood Control Assistance Program (FCAP) addresses structural flooding issues in the Village. As of 6/16/16, total payouts for the programs are $1,558,000 for flood control reimbursement. For fiscal year 2018, $50,000 is budgeted which will be used to serve approximately twelve homes. Approximately 478 homes have been served to date via FCAP. The FCAP currently serves residents through Sewer Back Flow Protection and Overland Flood Protection. The program does not address nuisance yard flooding.

The Village of Niles consists of many residential areas that were developed without drainage easements. Despite the lack of easements many areas in town have areas of rear yard surface drainage. The Village topography is generally flat with areas of low overland slope. All these factors combine to create areas of poor drainage and nuisance yard flooding.

Rear-yard drainage is not specifically addressed within the Village of Niles Code of Ordinances. There are miscellaneous drainage provisions addressed in the code including:

ARTICLE II

- ***Sec. 102-42. - Obstructing drainage.***

No person shall willfully or maliciously stop or obstruct the passage of natural drainage of the water of any street or public sewer, culvert, water pipe or hydrant.

- ***Sec. 102-59. - Connecting downspouts to sewers.***

(a) No building or structure erected in the village shall be built or constructed in such a manner that the downspouts of the building or structure are connected to the sewers servicing such building or structure.

(b) It shall be unlawful for any person to connect the downspouts of any building or structure to the sewer servicing such building or structure.

(c)All downspouts shall be directed towards the front and/or the rear yards of the building property unless directed otherwise by the department of code enforcement.

(d) *All discharge shall be located as not to damage or create a nuisance to the property.*

- ***Sec. 102-65. - Same—Connection of footing drains; discharge.***(*a)Footing drains shall be connected to sump pumps and splashed out to rear yard for further discharge into storm sewer or drainage ditches wherever possible. No footing drain or drainage tile shall be connected to the sanitary or combined sewer system.*

(*b)No concentrated discharge from footing drains shall be made which adversely impacts any adjacent property.*

(c) Discharge shall occur within six to ten feet of the building to allow the ground water to be absorbed into the majority of the front or rear yard prior to being collected into a catch basin.

- ***Sec. 102-101. - Maintenance.***

Maintenance of stormwater management facilities located on private property shall be the responsibility of the owner of that property

ARTICLE XI. – GRADES

- ***Sec. 18-375. - Grading requirements.***(*a)A grading plan is required for all land improvements. This would consist of existing and proposed contours for grading and drainage facilities within 100 feet of the site in all directions in USGS datum. All existing and proposed conditions must also be shown. Grading plans and erosion control plans shall be on separate sheets.*

(b)No proposed grade shall impede or divert the flow of water through any property unless by proper investigation it can be shown to the satisfaction of the Director of Public Services that the grade will not adversely impact any adjoining property owner and will contribute to an improvement in the overall drainage system.

- **Sec. 18-376. - General lot grade maximums.**

No lot shall be graded in such a manner as to raise the grade of such lot to any point higher than a continuous grade level between the grade of the lots on either side abutting such lot.

VILLAGE OF NILES *2017*

DRAINAGE COMPLAINTS

YARD NUISANCE FLOODING

REAR YARD SEWERS

Public Service's records indicate 60 drainage complaints have been received in the past two years (2014-2016) for an average of 30 complaints per year. The average complaint takes 3-4 hours of staff time to resolve.

Private property drainage complaints generally fall into one of three categories:

I. Complaint regarding neighbor performing work which affects drainage
II. Request for assistance regarding drainage problem
III. Request for maintenance of rear yard sewer

CATEGORY 1: CODE ENFORCEMENT

The most common complaints received are:

- Neighbor's downspout or sump pump is creating a nuisance.
- Neighbor has graded land to block drainage path.

Regarding sump pump discharge the code is fairly clear and these complaints are handled by the Community Development Department.

Drainage complaints with regard to alterations of grade are more difficult to address. Rear yard drainage-ways often do not contain drainage easements. Complaints are routinely made about past work that cannot be documented. Claims of grade change are hard to substantiate years after the work was complete. Further complicating the matter is that differential lot settlement over time can contribute to nuisance flooding. Often multiple properties are affected by blocked rear yard drainage paths, and multiple properties would require regrading to solve one localized issue. As properties turn over and are redeveloped the history of grade changes cannot be determined. Due to the complications in resolving Yard Drainage problem, Village staff will limit their involvement in yard drainage problems to enforceable code violations only.

The following course of action is recommended for resolving code enforcement drainage complaints:

1. Village staff to meet with homeowner or discuss issue over the phone.
2. Village staff to investigate nature of concern and determine validity.
3. Village to present findings to home owner using standardized form.
4. If a code violation is present and unable to be resolved between neighbors then the Village will step in as code enforcement entity.*

* The most effective way to resolve nuisance drainage problems is for neighbors to work together. Residents must take this first step to attempt to address the concern with their immediate neighbors, particularly when the solution is fairly simple in nature. If the Village proceeds directly to writing a code violation then the drainage issue becomes much more difficult and time consuming to resolve.

The following tools are available for the Village staff to investigate concerns:

a. Cook County Contour maps
b. Overland flow path maps
c. Sewer maps
d. Inundation maps
e. Historic call records
f. Historic subdivision maps (limited coverage)
g. Rear yard overland flow maps (to be developed)

In the past the Village has provided information in the Village newsletter regarding rear yard drainage. Updated information should be provided in the newsletter, as well as informational fliers to provide to help with code enforcement.

CATEGORY 2 REQUESTS FOR VILLAGE ASSISTANCE PRIVATE PROPERTY NUISANCE FLOODING

The following course of action is recommended for resolving nuisance flooding drainage assistance requests:

1. Staff investigates property using existing records (overland flow path maps, contour maps, Inundation maps, historic drawings, sewer atlases, etc…). Staff performs a site visit and meets with resident as necessary. Staff provides summary of findings to resident including nature of drainage problem and possible solutions. Staff will respond to requests for assistance when nuisance water remains for 48 hours or longer after a rain event. Nuisance water that remains less than 48 hours is considered extremely minor and is not addressed by the Village staff. During periods of heavy work load or heavy call volume this process can be delegated by staff to a consultant engineer using the Overland Flood Assistance on-call engineer contract. Staff will develop a standardized check sheet to make the communication with residents more efficient and consistent.
2. The resident is ultimately responsible for designing, permitting, constructing, and maintaining improvements to their property to improve drainage. Staff will prequalify consulting engineers or non-profit organizations and contractors to perform this work, and this list will be provided upon request.

3. Staff will develop standard details to assist homeowners with visualizing what potential options exist including: 1) Passive drains 2) Rain gardens 3) Dry well/french drains 4) Permeable pavements 5) Storm sewer connection 6) Temporary provisions for pumping out yard.

FUNDING

No new capital funds are proposed to be directed toward these issues. Any additional funding for investigation, design, or construction to improve private property drainage will be borne by the private property owner.

Outside consulting assistance, when required, will draw on previously budgeted items for Overland Flood Assistance if the funding is available.

CATEGORY 3 REQUESTS FOR VILLAGE ASSISTANCE REAR YARD SEWERS

A review of the Code of Ordinances indicates that sewers on private property are the responsibility of the owner of the property

- **Sec. 102-101. - Maintenance.**

Maintenance of stormwater management facilities located on private property shall be the responsibility of the owner of that property.

(Ord. No. 2011-18, § 1, 3-22-11)

A legal review of the above language was performed and the language found in Section 102-101 is sufficient to divest the Village from Maintenance of storm sewers that are serving the private owners regardless of past practices or which entity originally installed the sewer.

A best practice would be to publish notice of the code and policy in the Village newsletter to further establish the standard. Future work performed on private property should be invoiced to the homeowner to further establish responsibility and ownership.

Future permitted private sewers should be placed in easements with the maintenance responsibility clearly spelled out in the easement language.

The stormwater commission recommended that Village Public works staff avoid working on private property for legal, liability, and insurance reason. Exceptions to this policy could only be made in the case of emergencies to avoid damage to physical property.

OTHER OPPORTUNITIES AND CONSIDERATIONS

There are other opportunities for the Village to consider regarding providing service, expanding regulation, and balancing work load.

a. Expanded regulatory program for rear yard drainage.

   Beyond regulating the blocking of drainage paths, additional regulations and requirements are necessary for areas identified as prone to overland flooding. The Village of Niles engineering staff mapped all areas of rear yard drainage so additional care can be taken when reviewing permits in those areas, however sufficient code protections do not exist. Village staff will recommend revision to the code to improve performance of private yard overland flood routes.

b. Lower level of service – 72 hours of persistent nuisance water

   The Village will respond to complaints involving standing water persisting more than 48 hours. All cases of structure flooding will continue to be addressed as part of the flood control assistance program.

c. Mediation

   Currently stormwater commission recommendations neighbors to work together to develop a solution based on the problem as diagnosed. The recommendation of the stormwater commission is for Village Staff to limit involvement in back yard drainage problems to enforceable code violations only.

d. Rain Ready Home

   This program was reviewed by the Stormwater commission and was not recommended to be pursued.

VILLAGE OF NILES *2017*

DRAINAGE COMPLAINTS

YARD NUISANCE FLOODING

REAR YARD SEWERS

DEFINITIONS

Community Development Department

The Community Development Department for the Village of Niles. The Department that is generally responsible for Building and Property Standards within the Village of Niles.

Flood Control Assistance Program

As part of the Stomwater Relief Program the Village Budgets annually to provide direct assistance to residents for Sewer Backflow Protection and Overland Flood Protection. https://www.vniles.com/493/Flood-Control-Assistance

Niles, Illinois - Code of Ordinances

Codified and not yet codified ordinances enacted by the Village Board of Trustees.

Nuisance Flooding

Non-structural flooding which results in standing water typically over 1" in depth that persists for 48 hours after a qualifying rainfall event. Qualifying rainfall event shall be based on a range of storms including Bulletin 70 depth and duration definitions for a 1-year to 10-yr storm event.

Public Services

The Department of Public Services for the Village of Niles. The Department that is generally responsible for maintenance and upkeep of Village of Niles property and infrastructure.

Right-of-way

Land dedicated for use as a public roadway, parkway, sidewalk, or Village utility within the incorporated limits of the Village of Niles.

Structural flooding

Flooding of occupied building structures. Structural flooding is currently addressed by the Flood control Assistance Program to include Sewer Backflow Protection and Overland Flood Protection.

Urban Flooding

Non Riverine flooding of urban areas due to overland flow, undersized infrastructure, and general poor surface drainage.

REFERENCES .

The following communities have policies and level of service similar to or less than Niles for addressing rear yard flooding.

Barrington
Carpentersville
Evanston
Grayslake
Hanover Park
Highland Park
Hoffman Estates

Lake Forest – Flier provided in appendix
Lake Zurich
Libertyville
Lincolnshire
Morton Grove
Park Ridge
Rolling Meadows
Schaumburg
Streamwood
Wheeling
Wilmette
Winnetka

The following examples are for programs some from regional communities that are generally more extensive than Niles:

DesPlaines
http://www.desplaines.org/civicax/filebank/blobdload.aspx?blobid=24262

Downers Grove:
http://www.downers.us/res/stormwater-management/lpda-amp-flood-plain

Glenview:
http://www.glenview.il.us/Documents/Overhead%20sewer%20forms/Local%20Drainage%20Inspectin%20Program%20Flyer%20-%201-31-17.pdf

Lombard
http://www.villageoflombard.org/DocumentCenter/Home/View/949

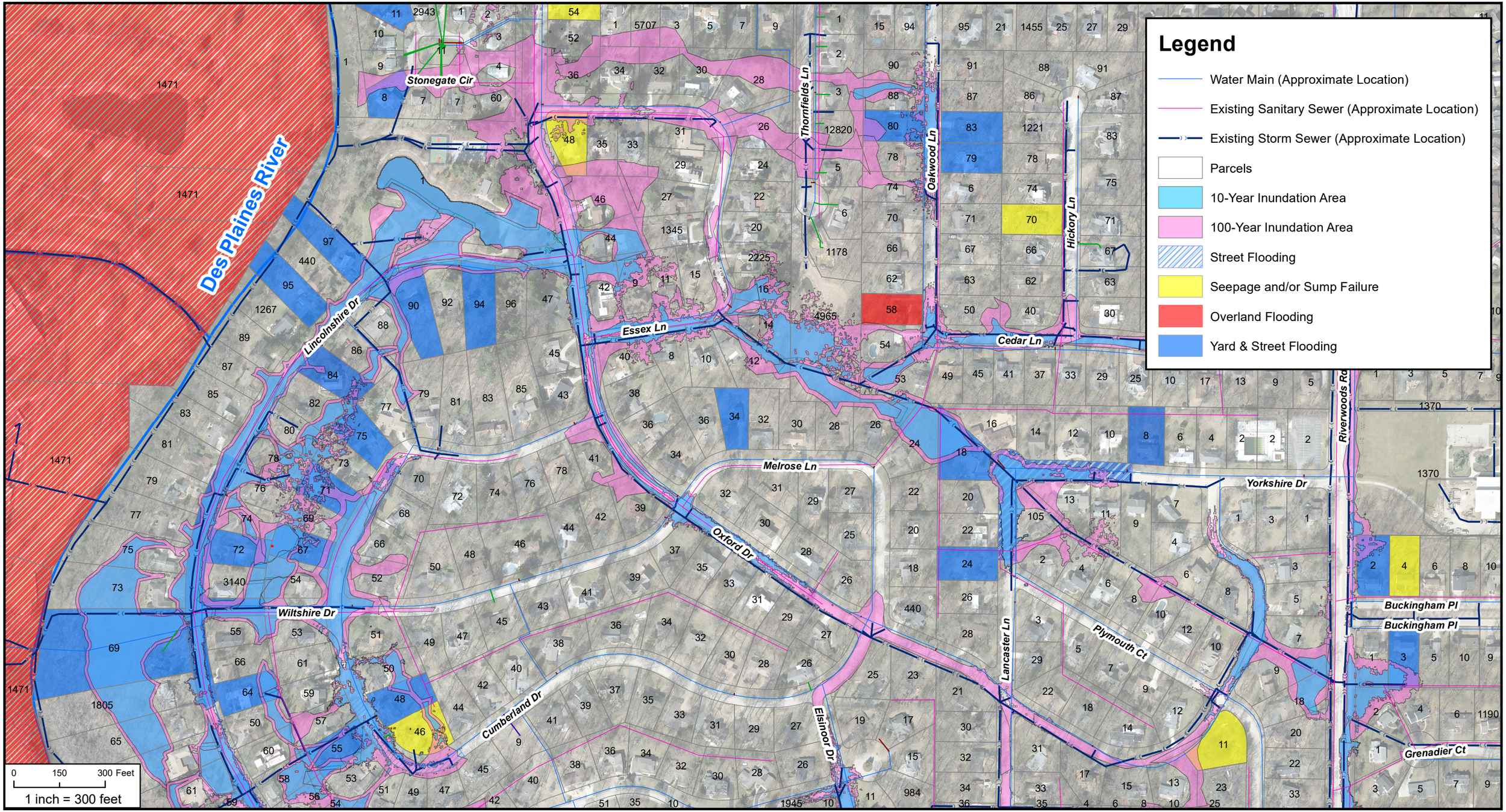
Skokie
https://www.egovlink.com/public_documents300/skokie/published_documents/Public%20Works%20Department/yarddrainageprogram.pdf

Non-Profit Center for Neighborhood Technology
http://rainready.org/

APPENDIX 3

LINCOLNSHIRE DRIVE (NORTH)

EXHIBITS AND COST ESTIMATES



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

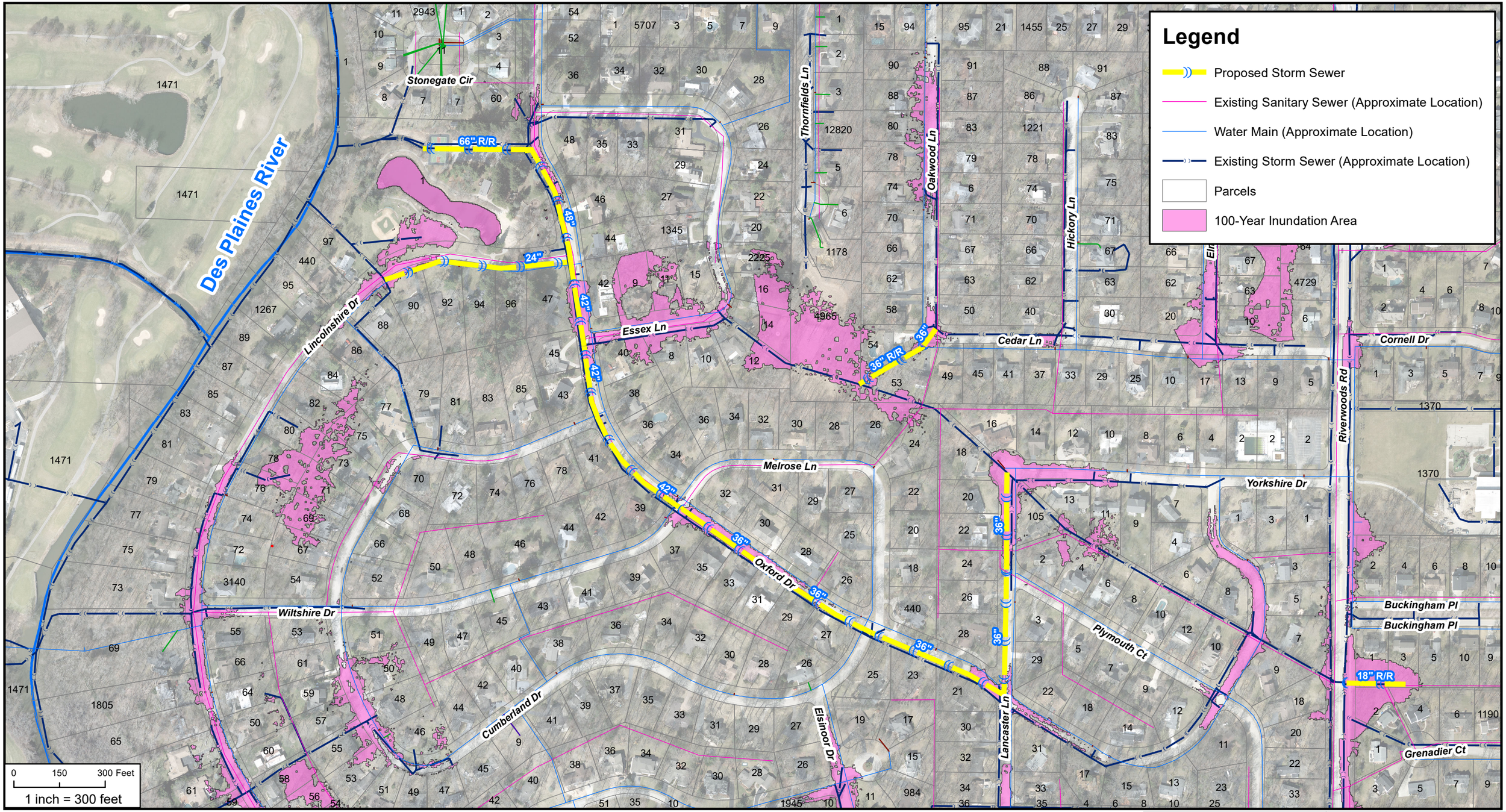
CLIENT: Village of Lincolnshire

PROJECT NO.: 190059

TITLE: Lincolnshire Drive (North)
Existing Condition Inundation Areas and Drainage Responses

DATE: 2/11/2020

EXHIBIT 5



Document Path: N:\Lincolnshire\190059\GIS\Exhibits\Exhibits for Report\Proposed Lincolshire Drive North.mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

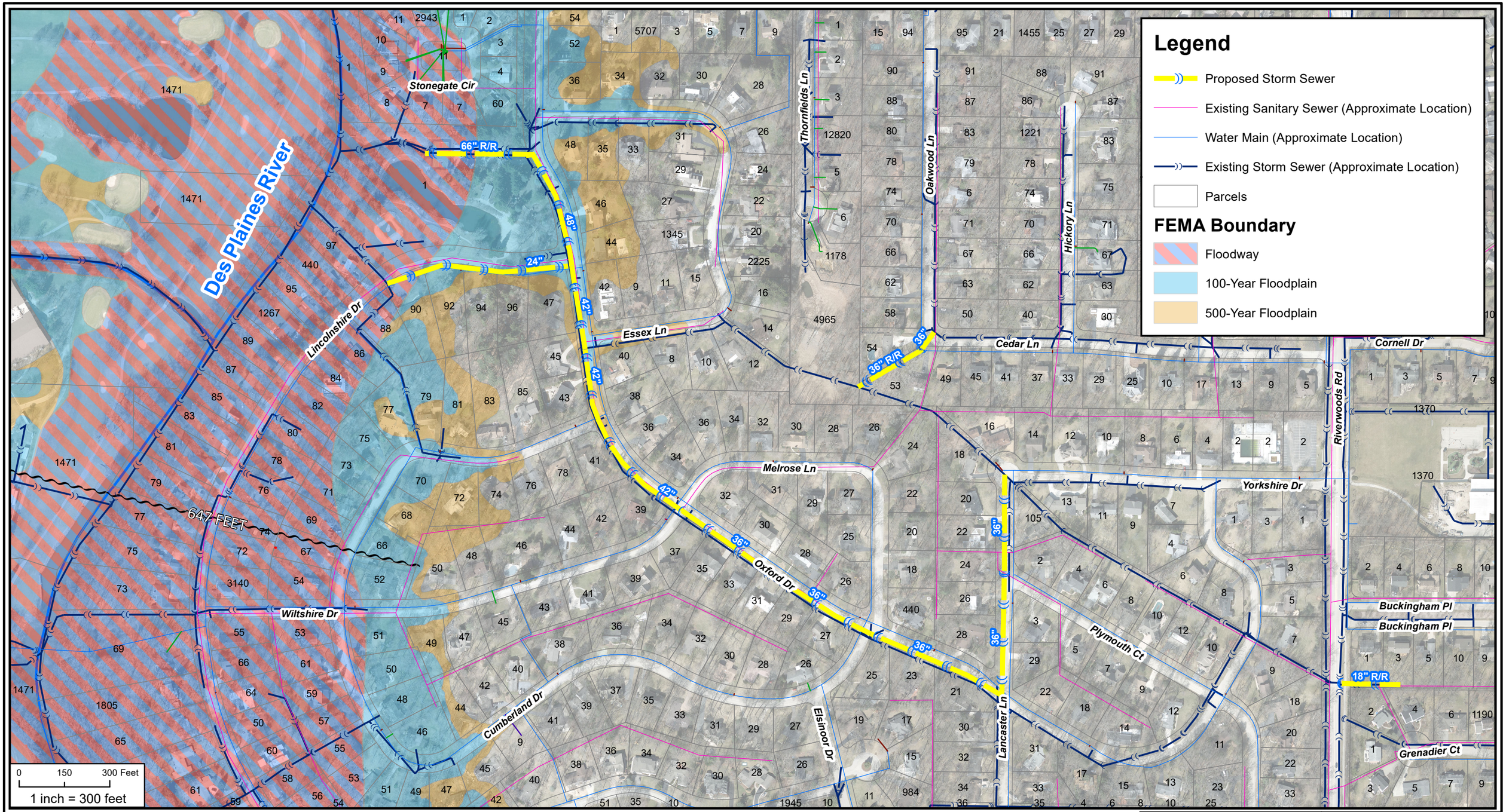
CLIENT Village of Lincolnshire

PROJECT NO. 190059

TITLE Lincolnshire Drive (North)
Proposed Condition (10-Year level of Service)

DATE 2/11/2020

EXHIBIT 6



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT	PROJECT NO.	
Village of Lincolnshire	190059	

TITLE

Lincolnshire Drive (North)
Proposed Condition (10-Year Level of Service) FEMA

DATE 2/11/2020

EXHIBIT 7

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: February 11, 2020

WEST SIDE - LINCOLNSHIRE DRIVE (NORTH)
10-Year Protection

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
SITE PREPARATION	TREE REMOVAL	L. SUM	$ 25,000.00	1	$ 25,000.00	$69,025.00
	TREE TRIMMING	L. SUM	$ 10,000.00	1	$ 10,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10.00	900	$ 9,000.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	900	$ 2,700.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	900	$ 2,700.00	
	FENCE REMOVAL AND REPLACEMENT	FOOT	$ 75.00	175	$ 13,125.00	
	TEMPORARY CONSTRUCTION FENCE	FOOT	$ 8.00	500	$ 4,000.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	500	$ 2,500.00	
STORM SEWER	EARTH EXCAVATION (SWALE GRADING)	CU YD	$ 50.00	0	$ -	$1,590,025.00
	TRENCH BACKFILL, SPECIAL	CU YD	$ 45.00	4,860	$ 218,700.00	
	STORM SEWER, RCP 12" (LATERALS)	FOOT	$ 70.00	230	$ 16,100.00	
	STORM SEWER, RCP 12"	FOOT	$ 80.00	0	$ -	
	STORM SEWER, RCP 15"	FOOT	$ 90.00	0	$ -	
	STORM SEWER, RCP 18"	FOOT	$ 100.00	140	$ 14,000.00	
	STORM SEWER, RCP 21"	FOOT	$ 110.00	0	$ -	
	STORM SEWER, RCP 24"	FOOT	$ 120.00	630	$ 75,600.00	
	STORM SEWER, RCP 27"	FOOT	$ 130.00	0	$ -	
	STORM SEWER, RCP 30"	FOOT	$ 150.00	0	$ -	
	STORM SEWER, RCP 36"	FOOT	$ 175.00	2,600	$ 455,000.00	
	STORM SEWER, RCP 42"	FOOT	$ 200.00	975	$ 195,000.00	
	STORM SEWER, RCP 48"	FOOT	$ 220.00	350	$ 77,000.00	
	STORM SEWER, RCP 54"	FOOT	$ 270.00	0	$ -	
	STORM SEWER, RCP 60"	FOOT	$ 350.00	0	$ -	
	STORM SEWER, RCP 66"	FOOT	$ 400.00	335	$ 134,000.00	
	STORM SEWER, RCP 72"	FOOT	$ 450.00	0	$ -	
	STORM SEWER REMOVAL	FOOT	$ 25.00	785	$ 19,625.00	
	DRAINAGE STRUCTURE REMOVAL	EACH	$ 500.00	9	$ 4,500.00	
	HEADWALL REMOVAL	EACH	$ 5,000.00	1	$ 5,000.00	
	INLET, TYPE A, HIGH CAPACITY FRAME AND GRATE	EACH	$ 1,500.00	40	$ 60,000.00	
	MANHOLES, 4'-DIAMETER, TYPE A, T1F CL	EACH	$ 4,500.00	3	$ 13,500.00	
	MANHOLES, 5'-DIAMETER, TYPE A, T1F CL	EACH	$ 6,500.00	3	$ 19,500.00	
	MANHOLES, 6'-DIAMETER, TYPE A, T1F CL	EACH	$ 7,500.00	6	$ 45,000.00	
	MANHOLES, 7'-DIAMETER, TYPE A, T1F CL	EACH	$ 8,500.00	1	$ 8,500.00	
	MANHOLES, 8'-DIAMETER, TYPE A, T1F CL	EACH	$ 9,000.00	1	$ 9,000.00	
	JUNCTION CHAMBER	EACH	$ 50,000.00	4	$ 200,000.00	
	OVERFLOW STRUCTURE	EACH	$ 100,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 24" W/ GRATE	EACH	$ 2,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 30" W/ GRATE	EACH	$ 3,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 36" W/ GRATE	EACH	$ 5,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 48" W/ GRATE	EACH	$ 6,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 60" W/ GRATE	EACH	$ 7,500.00	0	$ -	
	HEADWALL, 36"	EACH	$ 20,000.00	1	$ 20,000.00	
	STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150.00	0	$ -	
	TIDEFLEX, 12"	EACH	$ 5,000.00	0	$ -	
	TIDEFLEX, 36"	EACH	$ 15,000.00	0	$ -	
PUMP HOUSE	CAST IN PLACE CONCRETE WET WELL STRUCTURE	L. SUM	$ 500,000.00	0	$ -	$0.00
	CAST IN PLACE CONCRETE DISCHARGE STRUCTURE	L. SUM	$ 125,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING FOUNDATION	L. SUM	$ 25,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING	L. SUM	$ 750,000.00	0	$ -	
	CONDUCTORS AND CABLES	L. SUM	$ 15,000.00	0	$ -	
	GROUNDING SYSTEM	L. SUM	$ 10,000.00	0	$ -	
	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	L. SUM	$ 15,000.00	0	$ -	
	ELECTRICAL SERVICE AND DISTRIBUTION	L. SUM	$ 10,000.00	0	$ -	
	EARTH EXCAVATION	L. SUM	$ 100,000.00	0	$ -	
	DEWATERING	L. SUM	$ 100,000.00	0	$ -	
	WOOD COMPOSITE FENCES AND GATES	FOOT	$ 100.00	0	$ -	
	MAIN PUMPS AND ACCESSORIES	EACH	$ 100,000.00	0	$ -	
	HMA DRIVEWAY INSTALLATION (INCLUDING FURNISHED EXCAVATION)	L. SUM	$ 30,000.00	0	$ -	
PAVEMENT	HOT-MIX ASPHALT SURFACE REMOVAL, 2"	SQ YD	$ 3.50	12,100	$ 42,350.00	$582,540.00
	PAVEMENT REMOVAL	SQ YD	$ 15.00	1,000	$ 15,000.00	
	AGGREGATE SUBGRADE IMPROVEMENT	CU YD	$ 50.00	20	$ 1,000.00	
	REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL	CU YD	$ 50.00	20	$ 1,000.00	
	GEOTECHNICAL FABRIC FOR GROUND STABILIZATION	SQ YD	$ 3.00	1,000	$ 3,000.00	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 2"	TON	$ 90.00	120	$ 10,800.00	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1.5"	TON	$ 90.00	1,020	$ 91,800.00	
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0 N50, 4"	TON	$ 85.00	230	$ 19,550.00	
	LEVELING BINDER (MACHINE METHOD), N50, 0.75"	TON	$ 95.00	510	$ 48,450.00	
	AGGREGATE BASE COURSE, TYPE B, 12"	SQ YD	$ 15.00	1,000	$ 15,000.00	
	BITUMINOUS MATERIALS (TACK COAT)	POUND	$ 1.00	990	$ 990.00	
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL AND REPLACEMENT	FOOT	$ 30.00	1,320	$ 39,600.00	
	DRIVEWAY REMOVAL AND REPLACEMENT	SQ YD	$ 100.00	210	$ 21,000.00	
	PATH REPLACEMENT (LIMESTONE/HMA/PCC)	SQ YD	$ 20.00	0	$ -	
	TEMPORARY CLASS D PATCHES, 6"	SQ YD	$ 45.00	400	$ 18,000.00	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 60.00	4,250	$ 255,000.00	
UTILITY	RELOCATE / ADJUST WATER MAIN	FOOT	$ 275.00	300	$ 82,500.00	$203,500.00
	REMOVE AND REPLACE SANITARY SEWER	FOOT	$ 150.00	300	$ 45,000.00	
	ADJUST WATER SERVICES	EACH	$ 2,500.00	19	$ 47,500.00	
	ADJUST SANITARY SERVICES	EACH	$ 1,500.00	19	$ 28,500.00	
	NEW PARALLEL 8" WATER MAIN (INCLUDES HYDRANTS & VAULTS)	FOOT	$ 350.00	0	$ -	
	NEW WATER SERVICE WITH B-BOX	EACH	$ 2,750.00	0	$ -	
	NEW SANITARY SERVICE WITH CLEANOUT	EACH	$ 2,000.00	0	$ -	
	NEW PARALLEL SANITARY SEWER	FOOT	$ 110.00	0	$ -	
MISC.	BASKETBALL COURT REPLACEMENT	L. SUM	$ 25,000.00	1	$ 25,000.00	$500,000.00
	MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 75,000.00	
	MOBILIZATION	L. SUM	+/- 6%	1	$ 200,000.00	
	TRAFFIC CONTROL AND PROTECTION	L. SUM	+/- 3%	1	$ 100,000.00	
	CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 100,000.00	

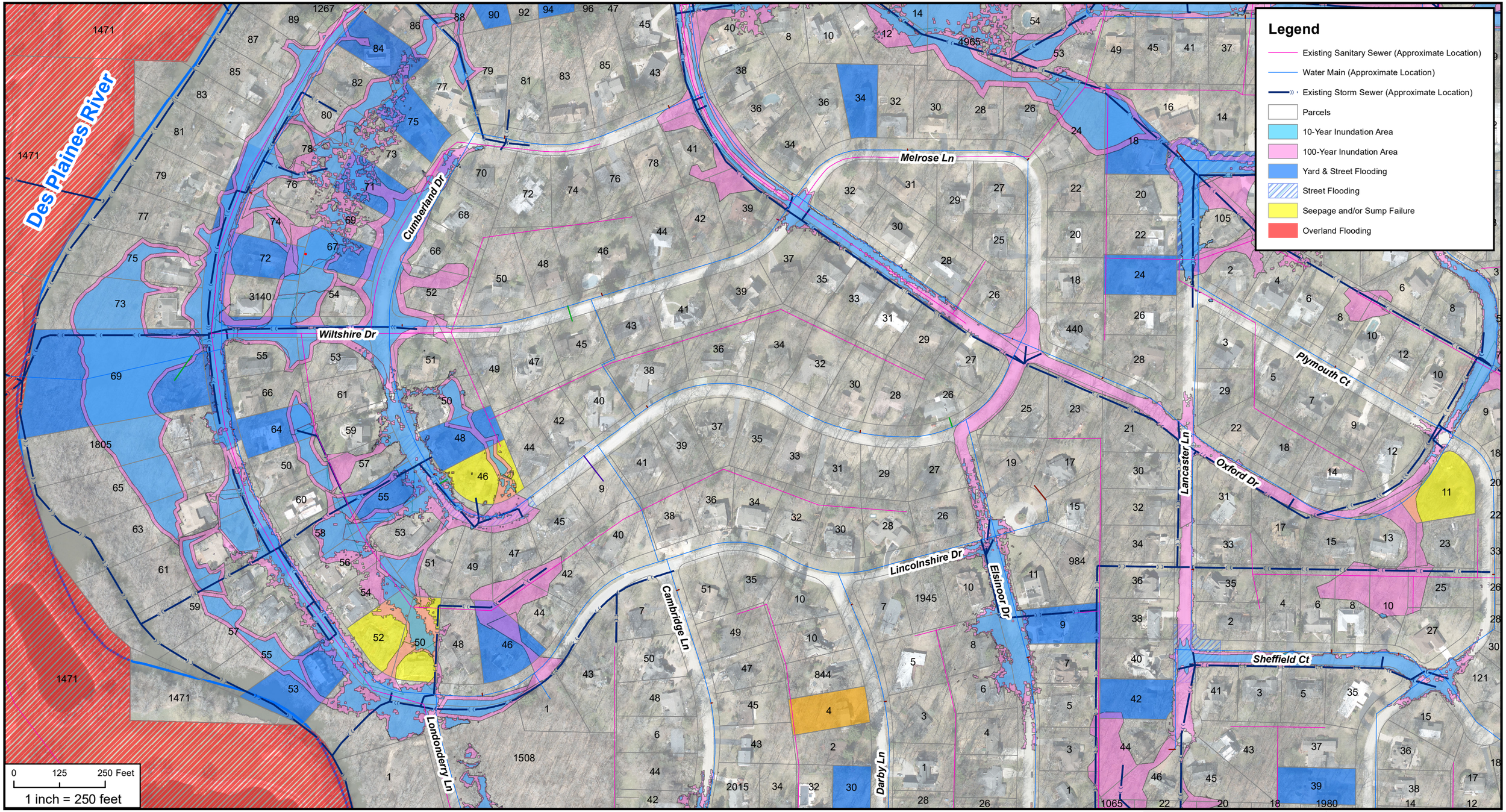
SUBTOTAL =	**$ 2,945,090.00**
CONTINGENCY (25%) =	$ 736,272.50
CONSTRUCTION TOTAL =	**$ 3,681,362.50**
DESIGN ENGINEERING (7.5%) =	$ 276,102.19
CONSTRUCTION ENGINEERING (7.5%) =	$ 276,102.19
PERMITTING (0.5%) =	$ 18,406.81
TOTAL COST OF IMPROVEMENTS =	**$ 4,251,973.69**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

APPENDIX 4

LINCOLNSHIRE DRIVE (SOUTH)

EXHIBITS AND COST ESTIMATES



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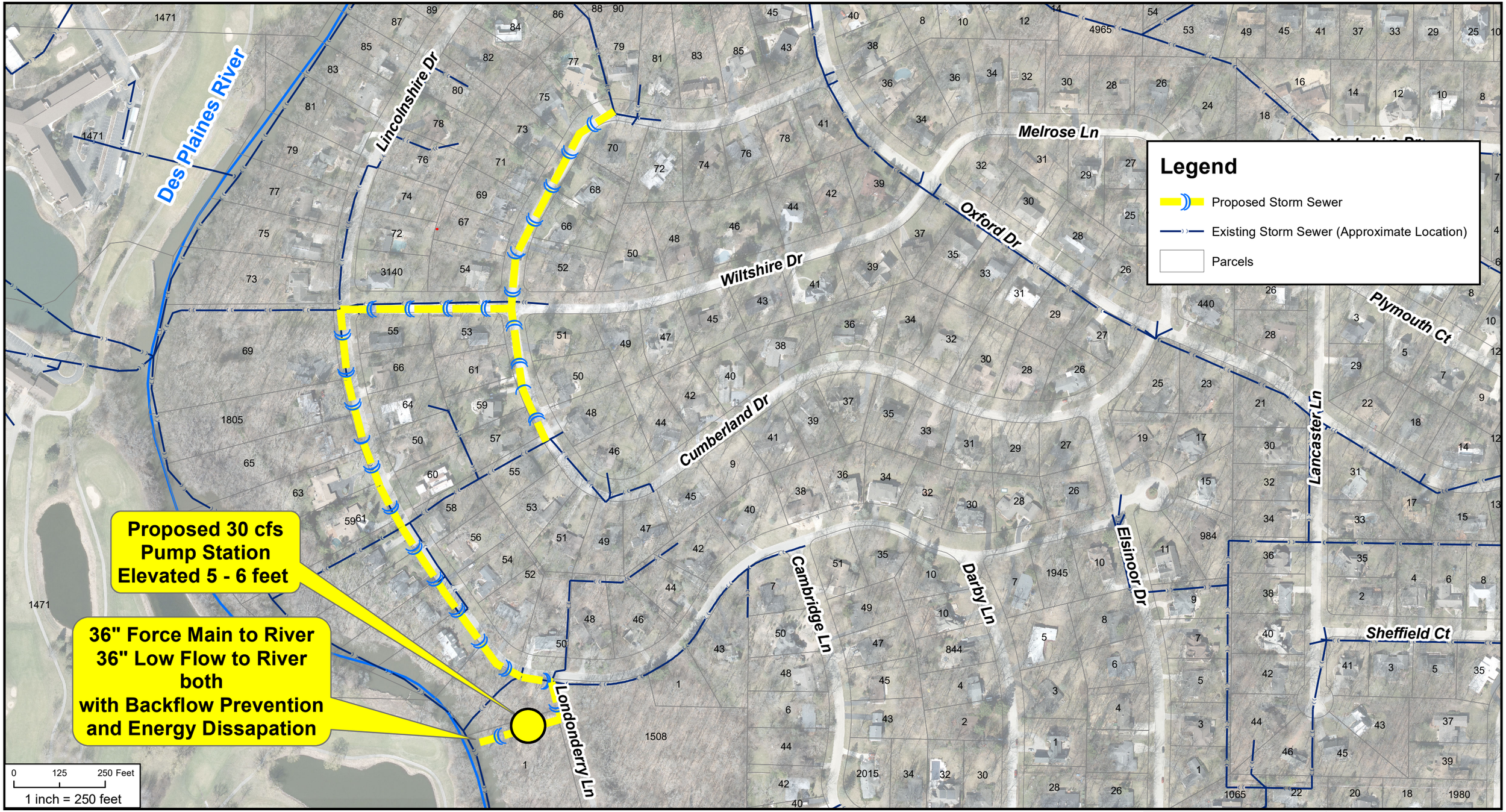
DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT: Village of Lincolnshire	PROJECT NO. 190059	N W E S
TITLE: Lincolshire Drive (South) Existing Condition Inundation Areas and Drainage Responses		DATE 2/11/2020
		EXHIBIT 8



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

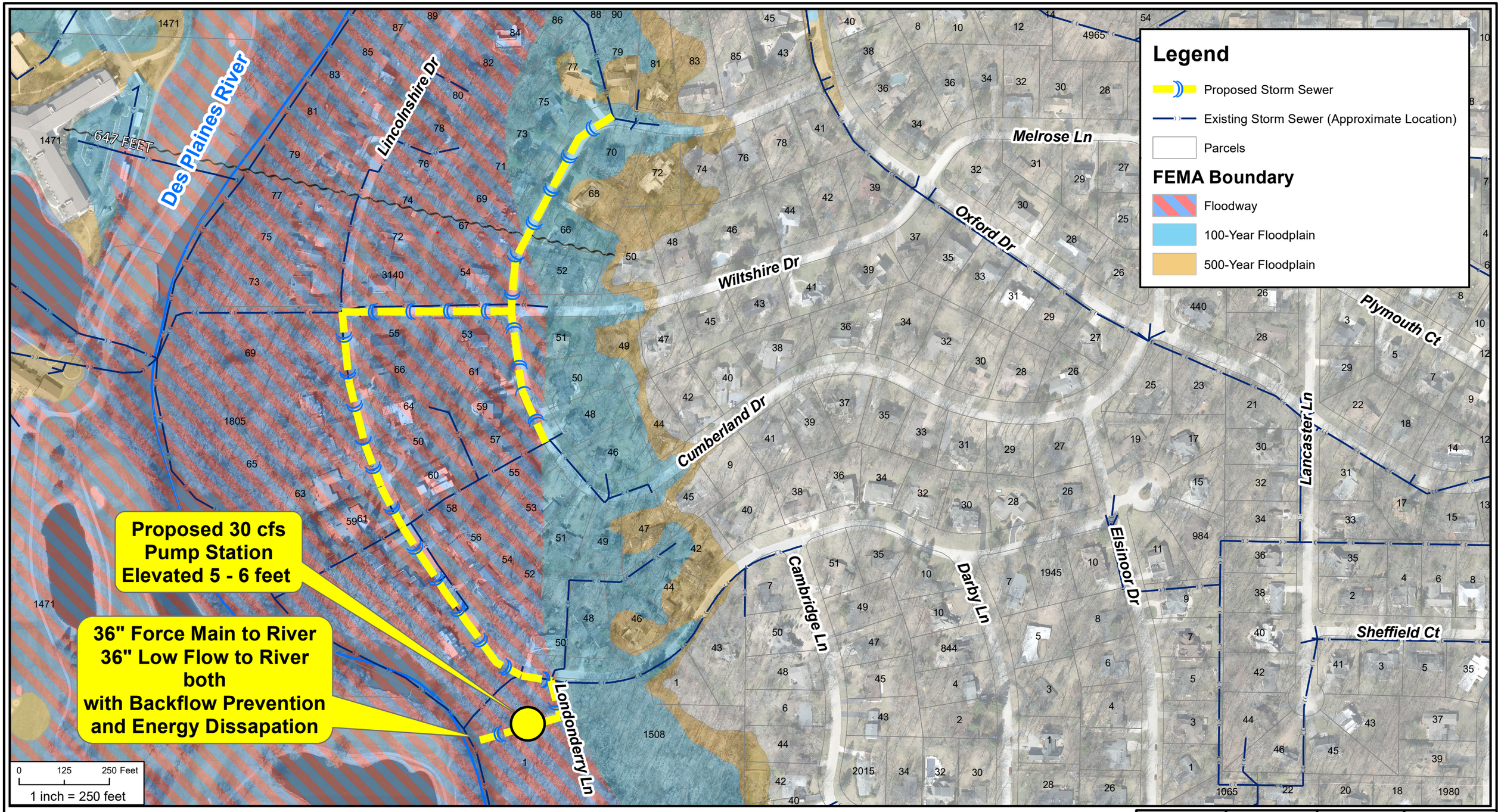
CLIENT	PROJECT NO.
Village of Lincolnshire	190059

TITLE

Lincolnshire Drive (South)
Proposed Condition (10-Year Level of Service)

DATE 2/20/2020

EXHIBIT 9



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
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(847) 823-0500 / FAX (847) 823-0520

CLIENT	PROJECT NO.	
Village of Lincolnshire	190059	

TITLE

Lincolnshire Drive (South)
Proposed Condition (10-Year level of Service) FEMA

DATE 2/20/2020

EXHIBIT 10

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: February 11, 2020
Revised: February 24, 2020

WEST SIDE - LINCOLNSHIRE DRIVE AND CUMBERLAND DRIVE
10-Year Protection

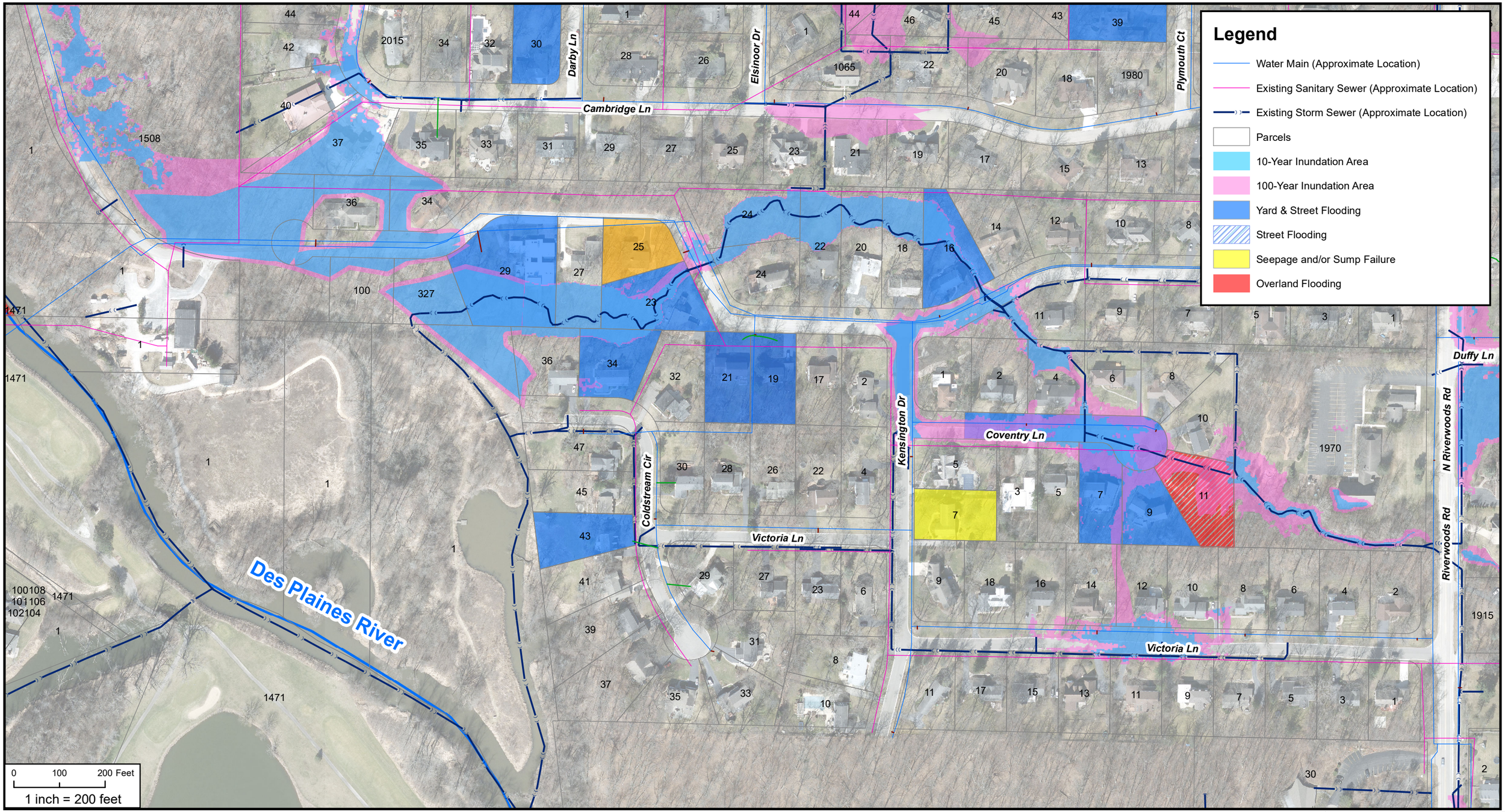
				STORMWATER			VILLAGE-BUILT		
	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST		QUANTITY	TOTAL COST	
SITE PREPARATION	TREE REMOVAL	L. SUM	$ 5,000.00	1	$ 5,000.00	$40,400.00	0	$ -	$0.00
	TREE TRIMMING	L. SUM	$ 10,000.00	1	$ 10,000.00		0	$ -	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10.00	1,100	$ 11,000.00		0	$ -	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	1,100	$ 3,300.00		0	$ -	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	1,100	$ 3,300.00		0	$ -	
	FENCE REMOVAL AND REPLACEMENT	FOOT	$ 75.00	0	$ -		0	$ -	
	TEMPORARY CONSTRUCTION FENCE	FOOT	$ 8.00	600	$ 4,800.00		0	$ -	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	600	$ 3,000.00		0	$ -	
STORM SEWER	EARTH EXCAVATION (SWALE GRADING)	CU YD	$ 50.00	0	$ -	$1,320,575.00	0	$ -	$114,750.00
	TRENCH BACKFILL, SPECIAL	CU YD	$ 45.00	2,770	$ 124,650.00		530	$ 23,850.00	
	STORM SEWER, RCP 12" (LATERALS)	FOOT	$ 70.00	155	$ 10,850.00		20	$ 1,400.00	
	STORM SEWER, RCP 12"	FOOT	$ 80.00	0	$ -		0	$ -	
	STORM SEWER, RCP 15"	FOOT	$ 90.00	0	$ -		0	$ -	
	STORM SEWER, RCP 18"	FOOT	$ 100.00	0	$ -		700	$ 70,000.00	
	STORM SEWER, RCP 21"	FOOT	$ 110.00	0	$ -		0	$ -	
	STORM SEWER, RCP 24"	FOOT	$ 120.00	410	$ 49,200.00		0	$ -	
	STORM SEWER, RCP 27"	FOOT	$ 130.00	0	$ -		0	$ -	
	STORM SEWER, RCP 30"	FOOT	$ 150.00	0	$ -		0	$ -	
	STORM SEWER, RCP 36"	FOOT	$ 175.00	890	$ 155,750.00		0	$ -	
	STORM SEWER, RCP 42"	FOOT	$ 200.00	500	$ 100,000.00		0	$ -	
	STORM SEWER, RCP 48"	FOOT	$ 220.00	250	$ 55,000.00		0	$ -	
	STORM SEWER, RCP 54"	FOOT	$ 270.00	0	$ -		0	$ -	
	STORM SEWER, RCP 60"	FOOT	$ 350.00	115	$ 40,250.00		0	$ -	
	STORM SEWER, RCP 66"	FOOT	$ 400.00	0	$ -		0	$ -	
	STORM SEWER, RCP 72"	FOOT	$ 450.00	0	$ -		0	$ -	
	STORM SEWER, 48"x76" RCEP	FOOT	$ 500.00	630	$ 315,000.00				
	STORM SEWER REMOVAL	FOOT	$ 25.00	575	$ 14,375.00		0	$ -	
	DRAINAGE STRUCTURE REMOVAL	EACH	$ 500.00	9	$ 4,500.00		0	$ -	
	HEADWALL REMOVAL	EACH	$ 5,000.00	0	$ -		0	$ -	
	INLET, TYPE A, HIGH CAPACITY FRAME AND GRATE	EACH	$ 1,500.00	28	$ 42,000.00		4	$ 6,000.00	
	MANHOLES, 4'-DIAMETER, TYPE A, T1F CL	EACH	$ 4,500.00	1	$ 4,500.00		3	$ 13,500.00	
	MANHOLES, 5'-DIAMETER, TYPE A, T1F CL	EACH	$ 6,500.00	2	$ 13,000.00		0	$ -	
	MANHOLES, 6'-DIAMETER, TYPE A, T1F CL	EACH	$ 7,500.00	4	$ 30,000.00		0	$ -	
	MANHOLES, 7'-DIAMETER, TYPE A, T1F CL	EACH	$ 8,500.00	3	$ 25,500.00		0	$ -	
	MANHOLES, 8'-DIAMETER, TYPE A, T1F CL	EACH	$ 9,000.00	2	$ 18,000.00		0	$ -	
	MANHOLES, 9'-DIAMETER, TYPE A, T1F CL	EACH	$ 12,500.00	2	$ 25,000.00				
	JUNCTION CHAMBER	EACH	$ 50,000.00	1	$ 50,000.00		0	$ -	
	OVERFLOW STRUCTURE	EACH	$ 100,000.00	2	$ 200,000.00		0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000.00	0	$ -		0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 24" W/ GRATE	EACH	$ 2,500.00	0	$ -		0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 30" W/ GRATE	EACH	$ 3,500.00	0	$ -		0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 36" W/ GRATE	EACH	$ 5,000.00	2	$ 10,000.00		0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 48" W/ GRATE	EACH	$ 6,000.00	0	$ -		0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 60" W/ GRATE	EACH	$ 7,500.00	0	$ -		0	$ -	
	HEADWALL, 36"	EACH	$ 20,000.00	0	$ -		0	$ -	
	STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150.00	20	$ 3,000.00		0	$ -	
	TIDEFLEX, 12"	EACH	$ 5,000.00	0	$ -		0	$ -	
	TIDEFLEX, 36"	EACH	$ 15,000.00	2	$ 30,000.00		0	$ -	
PUMP HOUSE	CAST IN PLACE CONCRETE WET WELL STRUCTURE	L. SUM	$ 500,000.00	1	$ 500,000.00	$2,030,000.00	0	$ -	$0.00
	CAST IN PLACE CONCRETE DISCHARGE STRUCTURE	L. SUM	$ 125,000.00	1	$ 125,000.00		0	$ -	
	PREFABRICATED CONTROL BUILDING FOUNDATION	L. SUM	$ 25,000.00	1	$ 25,000.00		0	$ -	
	PREFABRICATED CONTROL BUILDING	L. SUM	$ 750,000.00	1	$ 750,000.00		0	$ -	
	CONDUCTORS AND CABLES	L. SUM	$ 15,000.00	1	$ 15,000.00		0	$ -	
	GROUNDING SYSTEM	L. SUM	$ 10,000.00	1	$ 10,000.00		0	$ -	
	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	L. SUM	$ 15,000.00	1	$ 15,000.00		0	$ -	
	ELECTRICAL SERVICE AND DISTRIBUTION	L. SUM	$ 10,000.00	1	$ 10,000.00		0	$ -	
	EARTH EXCAVATION	L. SUM	$ 100,000.00	1	$ 100,000.00		0	$ -	
	DEWATERING	L. SUM	$ 100,000.00	1	$ 100,000.00		0	$ -	
	WOOD COMPOSITE FENCES AND GATES	FOOT	$ 100.00	500	$ 50,000.00		0	$ -	
	MAIN PUMPS AND ACCESSORIES	EACH	$ 100,000.00	3	$ 300,000.00		0	$ -	
	HMA DRIVEWAY INSTALLATION (INCLUDING FURNISHED EXCAVATION)	L. SUM	$ 30,000.00	1	$ 30,000.00		0	$ -	
PAVEMENT	HOT-MIX ASPHALT SURFACE REMOVAL, 2"	SQ YD	$ 3.50	4,600	$ 16,100.00	$399,730.00	2,000	$ 7,000.00	$66,500.00
	PAVEMENT REMOVAL	SQ YD	$ 15.00	1,800	$ 27,000.00		0	$ -	
	AGGREGATE SUBGRADE IMPROVEMENT	CU YD	$ 50.00	30	$ 1,500.00		0	$ -	
	REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL	CU YD	$ 50.00	30	$ 1,500.00		0	$ -	
	GEOTECHNICAL FABRIC FOR GROUND STABILIZATION	SQ YD	$ 3.00	1,800	$ 5,400.00		0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 2"	TON	$ 90.00	210	$ 18,900.00		0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1.5"	TON	$ 90.00	390	$ 35,100.00		170	$ 15,300.00	
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0 N50, 4"	TON	$ 85.00	410	$ 34,850.00		0	$ -	
	LEVELING BINDER (MACHINE METHOD), N50, 0.75"	TON	$ 95.00	200	$ 19,000.00		90	$ 8,550.00	
	AGGREGATE BASE COURSE, TYPE B, 12"	SQ YD	$ 15.00	1,800	$ 27,000.00		0	$ -	
	BITUMINOUS MATERIALS (TACK COAT)	POUND	$ 1.00	480	$ 480.00		150	$ 150.00	
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL AND REPLACEMENT	FOOT	$ 30.00	720	$ 21,600.00		30	$ 900.00	
	DRIVEWAY REMOVAL AND REPLACEMENT	SQ YD	$ 100.00	170	$ 17,000.00		40	$ 4,000.00	
	PATH REPLACEMENT (LIMESTONE/HMA/PCC)	SQ YD	$ 20.00	0	$ -		0	$ -	
	TEMPORARY CLASS D PATCHES, 6"	SQ YD	$ 45.00	700	$ 31,500.00		0	$ -	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 60.00	2,380	$ 142,800.00		510	$ 30,600.00	
UTILITY	RELOCATE / ADJUST WATER MAIN	FOOT	$ 275.00	150	$ 41,250.00	$470,200.00	0	$ -	$12,000.00
	REMOVE AND REPLACE SANITARY SEWER	FOOT	$ 150.00	150	$ 22,500.00		0	$ -	
	ADJUST WATER SERVICES	EACH	$ 2,500.00	10	$ 25,000.00		3	$ 7,500.00	
	ADJUST SANITARY SERVICES	EACH	$ 1,500.00	10	$ 15,000.00		3	$ 4,500.00	
	NEW PARALLEL 8" WATER MAIN (INCLUDES HYDRANTS & VAULTS)	FOOT	$ 350.00	745	$ 260,750.00		0	$ -	
	NEW WATER SERVICE WITH B-BOX	EACH	$ 2,750.00	5	$ 13,750.00		0	$ -	
	NEW SANITARY SERVICE WITH CLEANOUT	EACH	$ 2,000.00	5	$ 10,000.00		0	$ -	
	NEW PARALLEL SANITARY SEWER	FOOT	$ 110.00	745	$ 81,950.00		0	$ -	
MISC.	BASKETBALL COURT REPLACEMENT	L. SUM	$ 25,000.00	0	$ -	$890,000.00	0	$ -	$47,500.00
	MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 130,000.00		1	$ 7,500.00	
	MOBILIZATION	L. SUM	+/- 6%	1	$ 380,000.00		1	$ 20,000.00	
	TRAFFIC CONTROL AND PROTECTION	L. SUM	+/- 3%	1	$ 190,000.00		1	$ 10,000.00	
	CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 190,000.00		1	$ 10,000.00	
				SUBTOTAL =	**$ 5,150,905.00**			**$ 240,750.00**	
				CONTINGENCY (25%) =	$ 1,287,726.25			$ 60,187.50	
				CONSTRUCTION TOTAL =	**$ 6,438,631.25**			**$ 300,937.50**	
				DESIGN ENGINEERING (7.5%) =	$ 482,897.34			$ 22,570.31	
				CONSTRUCTION ENGINEERING (7.5%) =	$ 482,897.34			$ 22,570.31	
				PERMITTING (1.5%) =	$ 96,579.47			$ -	
				TOTAL COST OF IMPROVEMENTS =	**$ 7,501,005.41**			**$ 346,078.13**	

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

APPENDIX 5

LINCOLNSHIRE CREEK – COVENTRY LANE

EXHIBITS AND COST ESTIMATES



Document Path: N:\Lincolnshire\190059\GIS\Exhibits\Exhibits for Report\Existing Lincolnshire Drive South.mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

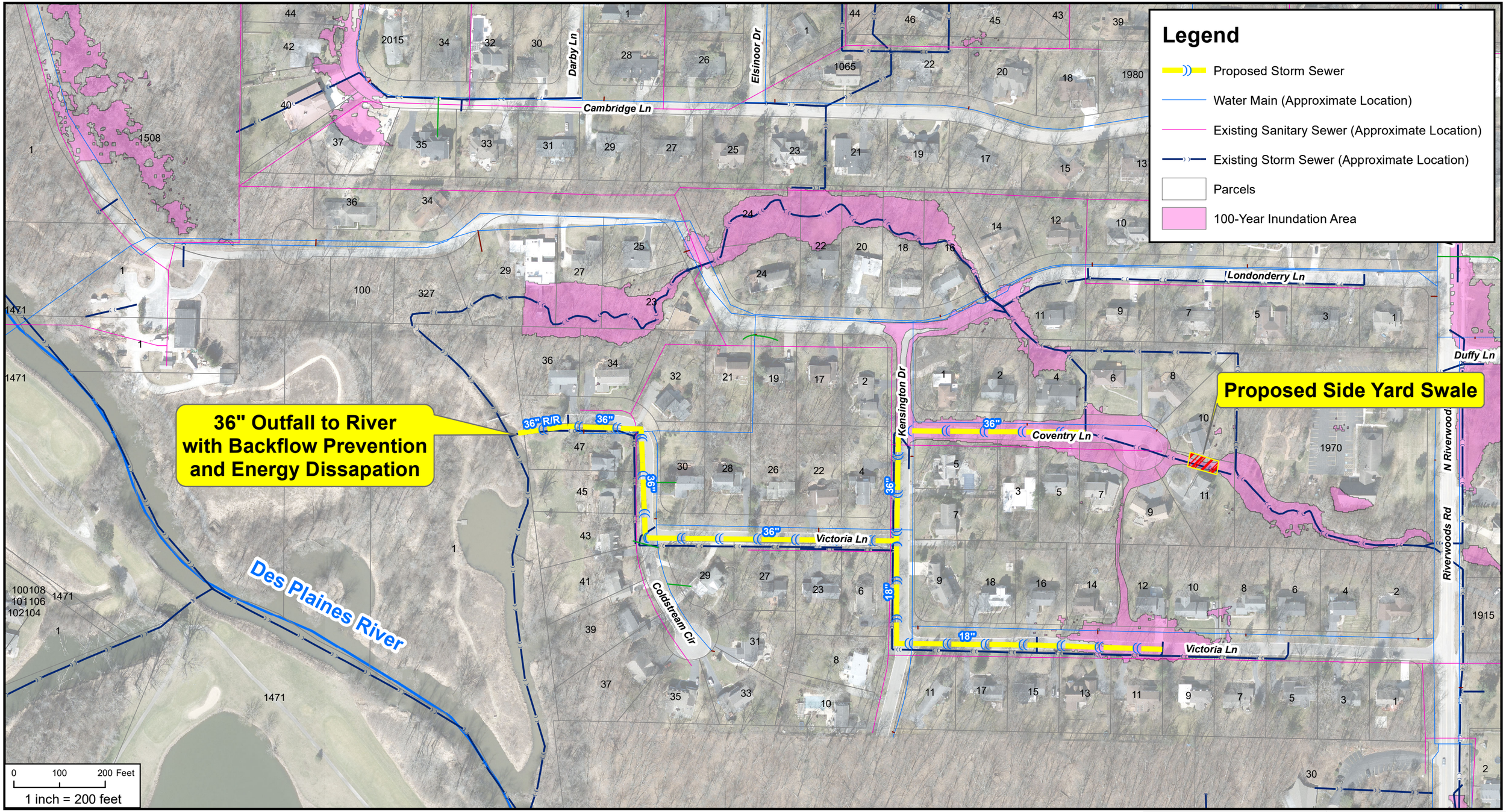
CLIENT: Village of Lincolnshire

PROJECT NO.: 190059

TITLE: Lincolnshire Creek - Coventry Lane
Existing Condition Inundation Areas and Drainage Responses

DATE: 2/11/2020

EXHIBIT 11



Document Path: N:\Lincolnshire\190059\GIS\Exhibits\Exhibits for Report\Proposed Lincolnshire Drive South.mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

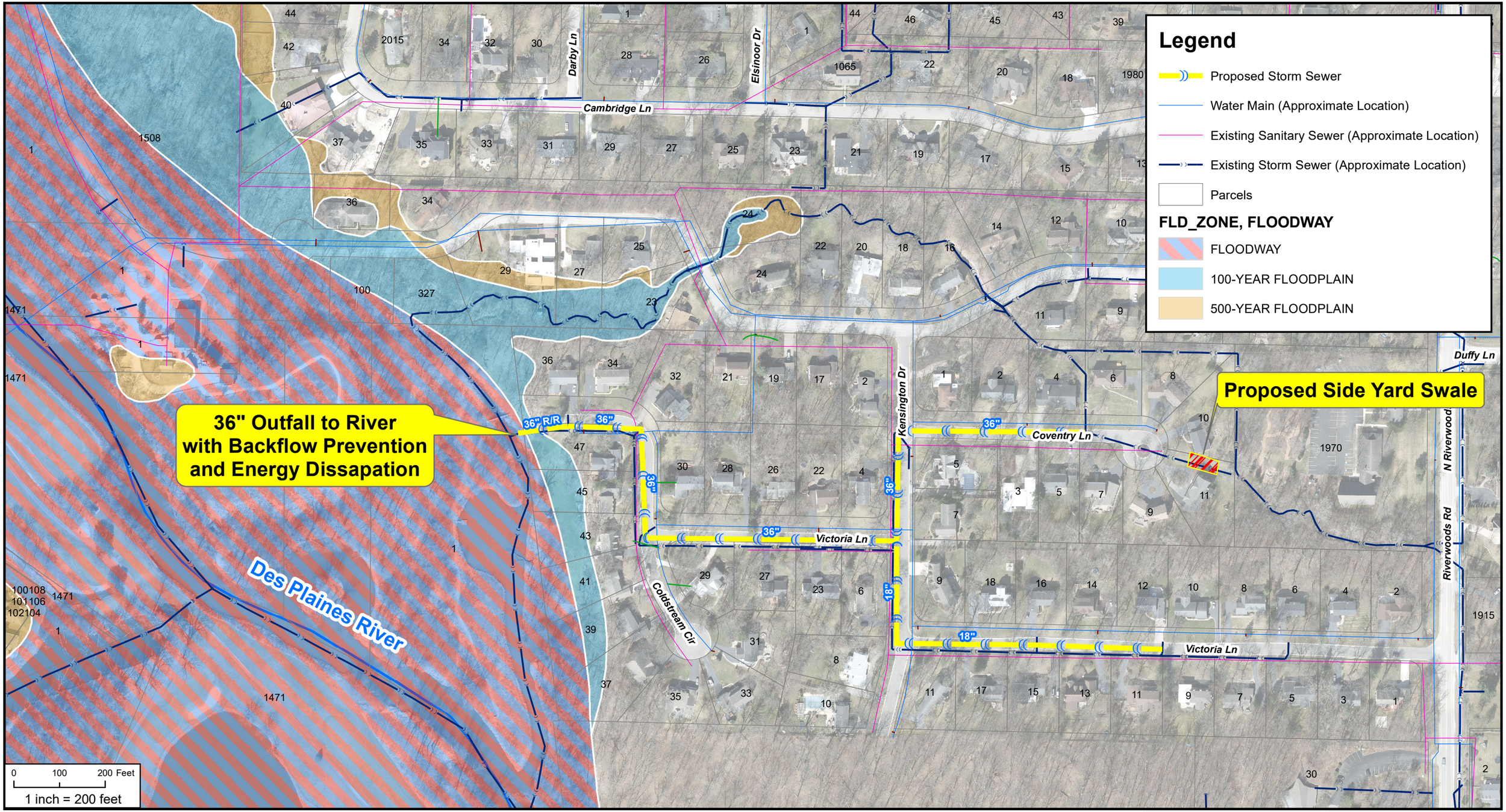
CLIENT: Village of Lincolnshire

PROJECT NO.: 190059

TITLE: Lincolnshire Creek - Coventry Lane
Proposed Condition (10-Year Level of Service)

DATE: 5/1/2020

EXHIBIT 12



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT	PROJECT NO.
Village of Lincolnshire	190059

TITLE
Lincolnshire Creek - Coventry Lane
Proposed Condition (10-Year Level of Service) FEMA

DATE 5/1/2020

EXHIBIT 13

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: February 11, 2020
Revised: April 30, 2020

SOUTHWEST SIDE - LINCOLNSHIRE DRIVE (SOUTH): COVENTRY
10-Year Protection

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
SITE PREPARATION	TREE REMOVAL	L. SUM	$ 10,000.00	1	$ 10,000.00	$39,300.00
	TREE TRIMMING	L. SUM	$ 10,000.00	1	$ 10,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10.00	800	$ 8,000.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	800	$ 2,400.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	800	$ 2,400.00	
	FENCE REMOVAL AND REPLACEMENT	FOOT	$ 75.00	0	$ -	
	TEMPORARY CONSTRUCTION FENCE	FOOT	$ 8.00	500	$ 4,000.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	500	$ 2,500.00	
STORM SEWER	EARTH EXCAVATION (SWALE GRADING)	CU YD	$ 50.00	200	$ 10,000.00	$695,100.00
	TRENCH BACKFILL, SPECIAL	CU YD	$ 45.00	2,290	$ 103,050.00	
	STORM SEWER, RCP 12" (LATERALS)	FOOT	$ 70.00	165	$ 11,550.00	
	STORM SEWER, RCP 12"	FOOT	$ 80.00	0		
	STORM SEWER, RCP 15"	FOOT	$ 90.00	0		
	STORM SEWER, RCP 18"	FOOT	$ 100.00	850	$ 85,000.00	
	STORM SEWER, RCP 21"	FOOT	$ 110.00	0	$ -	
	STORM SEWER, RCP 24"	FOOT	$ 120.00	0	$ -	
	STORM SEWER, RCP 27"	FOOT	$ 130.00	0	$ -	
	STORM SEWER, RCP 30"	FOOT	$ 150.00	0	$ -	
	STORM SEWER, RCP 36"	FOOT	$ 175.00	1,800	$ 315,000.00	
	STORM SEWER, RCP 42"	FOOT	$ 200.00	0	$ -	
	STORM SEWER, RCP 48"	FOOT	$ 220.00	0	$ -	
	STORM SEWER, RCP 54"	FOOT	$ 270.00	0	$ -	
	STORM SEWER, RCP 60"	FOOT	$ 350.00	0	$ -	
	STORM SEWER, RCP 66"	FOOT	$ 400.00	0	$ -	
	STORM SEWER, RCP 72"	FOOT	$ 450.00	0	$ -	
	STORM SEWER, 48"x76" RCEP	FOOT	$ 500.00	0	$ -	
	STORM SEWER REMOVAL	FOOT	$ 25.00	100	$ 2,500.00	
	DRAINAGE STRUCTURE REMOVAL	EACH	$ 500.00	3	$ 1,500.00	
	HEADWALL REMOVAL	EACH	$ 5,000.00	3	$ 15,000.00	
	INLET, TYPE A, HIGH CAPACITY FRAME AND GRATE	EACH	$ 1,500.00	28	$ 42,000.00	
	MANHOLES, 4'-DIAMETER, TYPE A, T1F CL	EACH	$ 4,500.00	4	$ 18,000.00	
	MANHOLES, 5'-DIAMETER, TYPE A, T1F CL	EACH	$ 6,500.00	5	$ 32,500.00	
	MANHOLES, 6'-DIAMETER, TYPE A, T1F CL	EACH	$ 7,500.00	5	$ 37,500.00	
	MANHOLES, 7'-DIAMETER, TYPE A, T1F CL	EACH	$ 8,500.00	0	$ -	
	MANHOLES, 8'-DIAMETER, TYPE A, T1F CL	EACH	$ 9,000.00	0	$ -	
	MANHOLES, 9'-DIAMETER, TYPE A, T1F CL	EACH	$ 12,500.00	0	$ -	
	JUNCTION CHAMBER	EACH	$ 50,000.00	0	$ -	
	OVERFLOW STRUCTURE	EACH	$ 100,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 24" W/ GRATE	EACH	$ 2,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 30" W/ GRATE	EACH	$ 3,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 36" W/ GRATE	EACH	$ 5,000.00	1	$ 5,000.00	
	REINFORCED CONCRETE FLARED END SECTIONS, 48" W/ GRATE	EACH	$ 6,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 60" W/ GRATE	EACH	$ 7,500.00	0	$ -	
	HEADWALL, 36"	EACH	$ 20,000.00	0	$ -	
	STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150.00	10	$ 1,500.00	
	TIDEFLEX, 12"	EACH	$ 5,000.00	0	$ -	
	TIDEFLEX, 36"	EACH	$ 15,000.00	1	$ 15,000.00	
PUMP HOUSE	CAST IN PLACE CONCRETE WET WELL STRUCTURE	L. SUM	$ 500,000.00	0	$ -	$0.00
	CAST IN PLACE CONCRETE DISCHARGE STRUCTURE	L. SUM	$ 125,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING FOUNDATION	L. SUM	$ 25,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING	L. SUM	$ 750,000.00	0	$ -	
	CONDUCTORS AND CABLES	L. SUM	$ 15,000.00	0	$ -	
	GROUNDING SYSTEM	L. SUM	$ 10,000.00	0	$ -	
	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	L. SUM	$ 15,000.00	0	$ -	
	ELECTRICAL SERVICE AND DISTRIBUTION	L. SUM	$ 10,000.00	0	$ -	
	EARTH EXCAVATION	L. SUM	$ 100,000.00	0	$ -	
	DEWATERING	L. SUM	$ 100,000.00	0	$ -	
	WOOD COMPOSITE FENCES AND GATES	FOOT	$ 100.00	0	$ -	
	MAIN PUMPS AND ACCESSORIES	EACH	$ 100,000.00	0	$ -	
	HMA DRIVEWAY INSTALLATION (INCLUDING FURNISHED EXCAVATION)	L. SUM	$ 30,000.00	0	$ -	
PAVEMENT	HOT-MIX ASPHALT SURFACE REMOVAL, 2"	SQ YD	$ 3.50	7,200	$ 25,200.00	$290,690.00
	PAVEMENT REMOVAL	SQ YD	$ 15.00	0	$ -	
	AGGREGATE SUBGRADE IMPROVEMENT	CU YD	$ 50.00	0	$ -	
	REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL	CU YD	$ 50.00	0	$ -	
	GEOTECHNICAL FABRIC FOR GROUND STABILIZATION	SQ YD	$ 3.00	0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 2"	TON	$ 90.00	0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1.5"	TON	$ 90.00	610	$ 54,900.00	
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0 N50, 4"	TON	$ 85.00	0	$ -	
	LEVELING BINDER (MACHINE METHOD), N50, 0.75"	TON	$ 95.00	310	$ 29,450.00	
	AGGREGATE BASE COURSE, TYPE B, 12"	SQ YD	$ 15.00	0	$ -	
	BITUMINOUS MATERIALS (TACK COAT)	POUND	$ 1.00	540	$ 540.00	
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL AND REPLACEMENT	FOOT	$ 30.00	1,060	$ 31,800.00	
	DRIVEWAY REMOVAL AND REPLACEMENT	SQ YD	$ 100.00	190	$ 19,000.00	
	PATH REPLACEMENT (LIMESTONE/HMA/PCC)	SQ YD	$ 20.00	100	$ 2,000.00	
	TEMPORARY CLASS D PATCHES, 6"	SQ YD	$ 45.00	0	$ -	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 60.00	2,130	$ 127,800.00	
UTILITY	RELOCATE / ADJUST WATER MAIN	FOOT	$ 275.00	250	$ 68,750.00	$174,250.00
	REMOVE AND REPLACE SANITARY SEWER	FOOT	$ 150.00	250	$ 37,500.00	
	ADJUST WATER SERVICES	EACH	$ 2,500.00	17	$ 42,500.00	
	ADJUST SANITARY SERVICES	EACH	$ 1,500.00	17	$ 25,500.00	
	NEW PARALLEL 8" WATER MAIN (INCLUDES HYDRANTS & VAULTS)	FOOT	$ 350.00	0	$ -	
	NEW WATER SERVICE WITH B-BOX	EACH	$ 2,750.00	0	$ -	
	NEW SANITARY SERVICE WITH CLEANOUT	EACH	$ 2,000.00	0	$ -	
	NEW PARALLEL SANITARY SEWER	FOOT	$ 110.00	0	$ -	
MISC.	BASKETBALL COURT REPLACEMENT	L. SUM	$ 25,000.00	0	$ -	$300,000.00
	MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 50,000.00	
	MOBILIZATION	L. SUM	+/- 6%	1	$ 125,000.00	
	TRAFFIC CONTROL AND PROTECTION	L. SUM	+/- 3%	1	$ 62,500.00	
	CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 62,500.00	

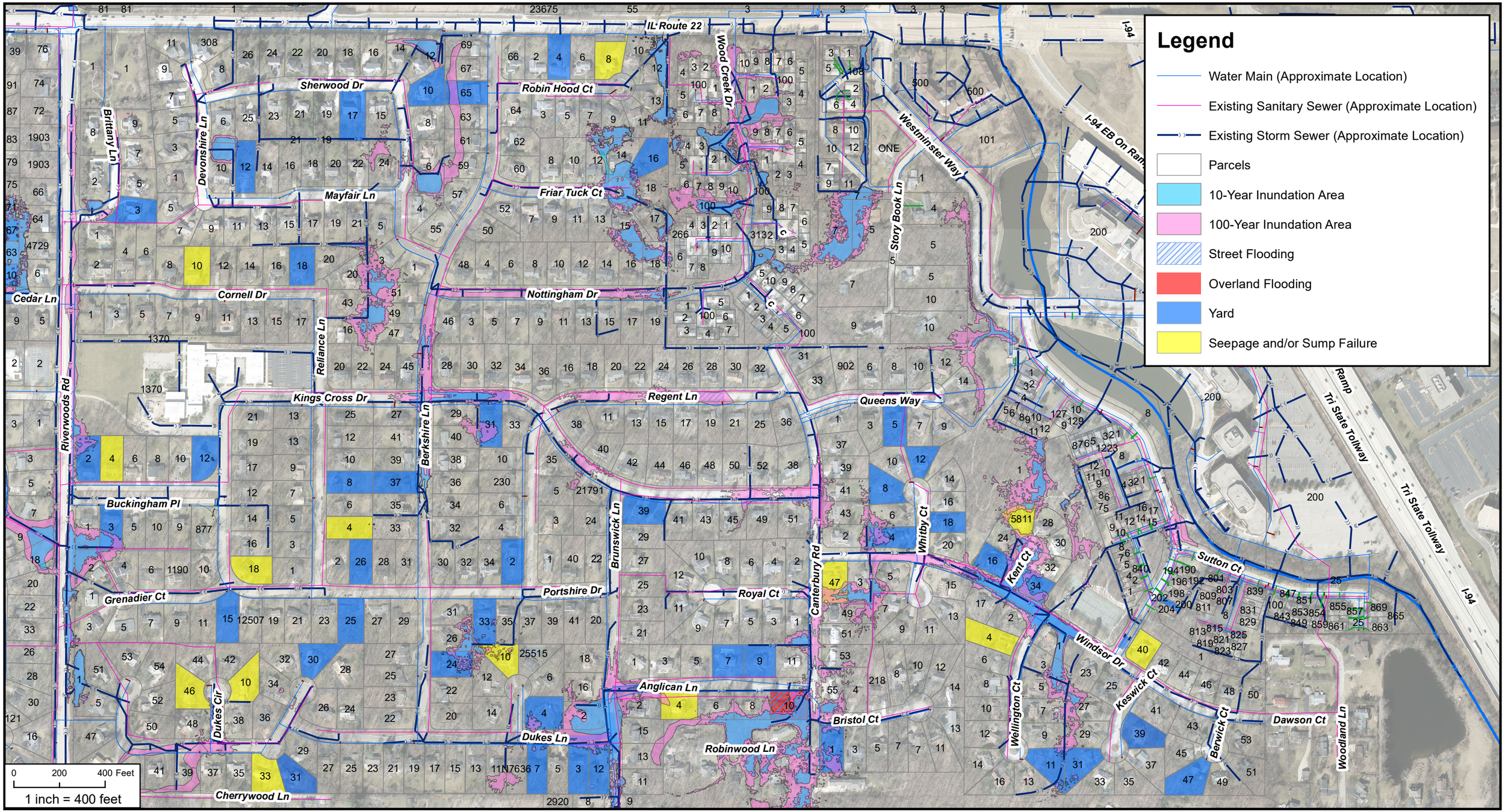
SUBTOTAL =	**$ 1,499,340.00**
CONTINGENCY (25%) =	$ 374,835.00
CONSTRUCTION TOTAL =	**$ 1,874,175.00**
DESIGN ENGINEERING (7.5%) =	$ 140,563.13
CONSTRUCTION ENGINEERING (7.5%) =	$ 140,563.13
PERMITTING (0.5%) =	$ 9,370.88
TOTAL COST OF IMPROVEMENTS =	**$ 2,164,672.13**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.

APPENDIX 6

SOUTHEAST (WINDSOR DRIVE)

EXHIBITS AND COST ESTIMATES



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

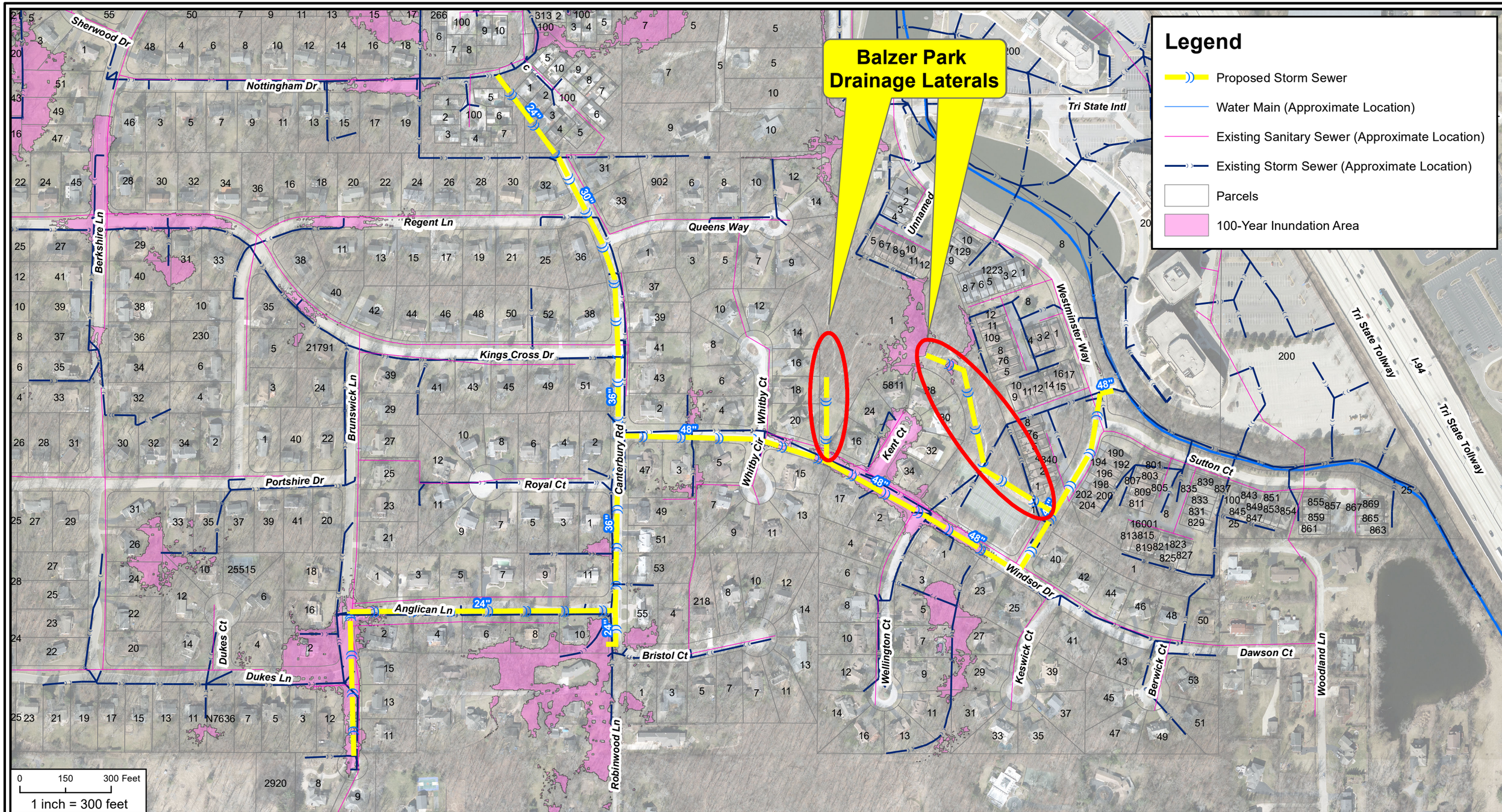
CLIENT Village of Lincolnshire

PROJECT NO. 190059

TITLE Southeast - Windsor Drive
Existing Condition Inundation Areas and Drainage Responses

DATE 2/11/2020

EXHIBIT 14

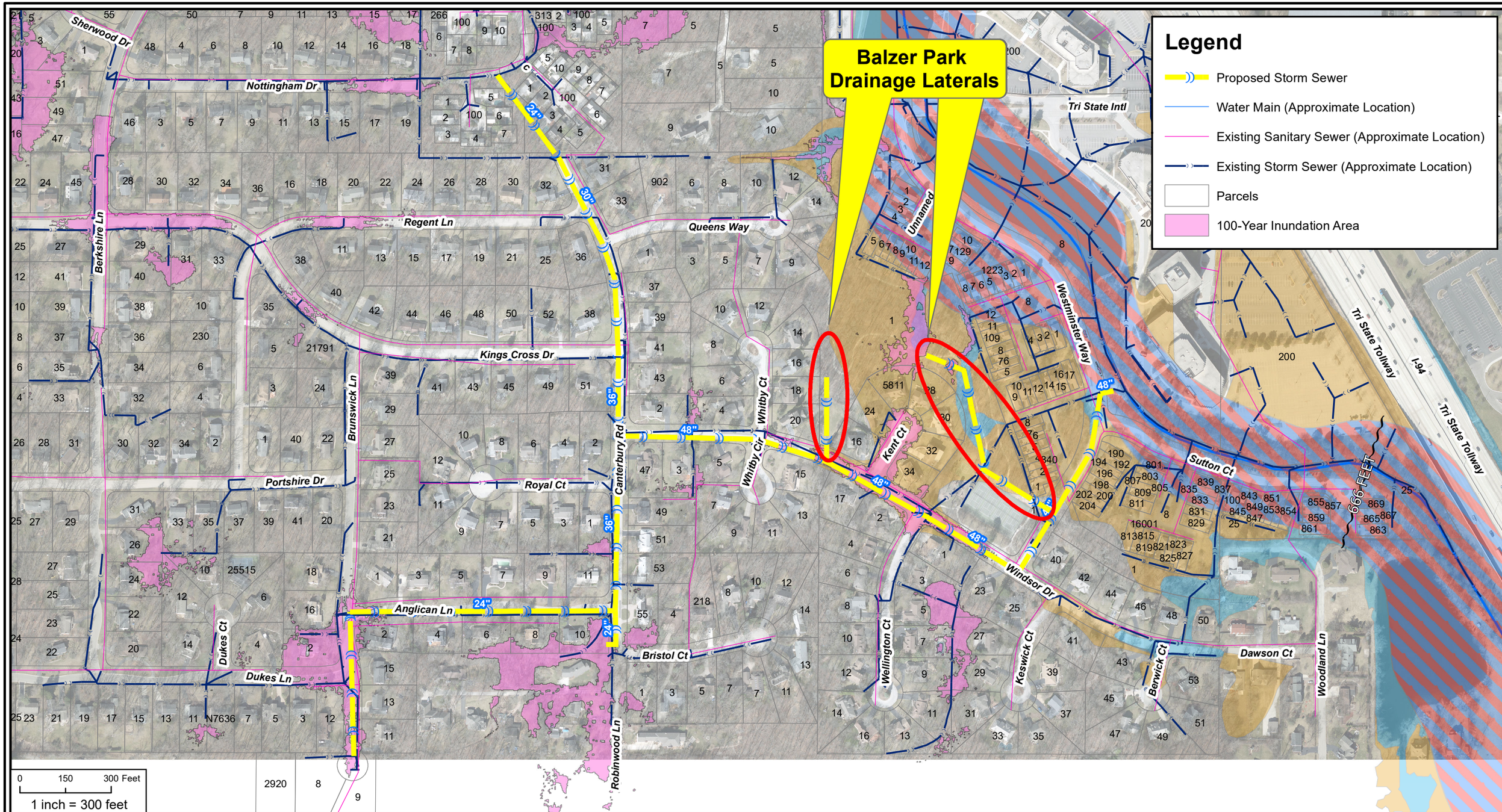


Document Path: N:\Lincolnshire\190059\GIS\Exhibits\Exhibits for Report\Proposed Windsor and Wellington.mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT	Village of Lincolnshire
PROJECT NO.	190059
TITLE	Southeast - Windsor Drive Proposed Condition (10-Year Level of Service)
DATE	2/11/2020
	EXHIBIT 15



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DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT: Village of Lincolnshire	PROJECT NO. 190059	N W E S
TITLE: Southeast - Windsor Drive Proposed Condition (10-Year Level of Service) FEMA		DATE 2/11/2020
		EXHIBIT 16

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: February 11, 2020

EAST SIDE
10-Year Protection

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
SITE PREPARATION	TREE REMOVAL	L. SUM	$ 25,000.00	1	$ 25,000.00	$68,650.00
	TREE TRIMMING	L. SUM	$ 10,000.00	1	$ 10,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10.00	1,300	$ 13,000.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	1,300	$ 3,900.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	1,300	$ 3,900.00	
	FENCE REMOVAL AND REPLACEMENT	FOOT	$ 75.00	50	$ 3,750.00	
	TEMPORARY CONSTRUCTION FENCE	FOOT	$ 8.00	700	$ 5,600.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	700	$ 3,500.00	
STORM SEWER	EARTH EXCAVATION (SWALE GRADING)	CU YD	$ 50.00	0	$ -	$1,481,475.00
	TRENCH BACKFILL, SPECIAL	CU YD	$ 45.00	4,950	$ 222,750.00	
	STORM SEWER, RCP 12" (LATERALS)	FOOT	$ 70.00	420	$ 29,400.00	
	STORM SEWER, RCP 12"	FOOT	$ 80.00	0	$ -	
	STORM SEWER, RCP 15"	FOOT	$ 90.00	0	$ -	
	STORM SEWER, RCP 18"	FOOT	$ 100.00	0	$ -	
	STORM SEWER, RCP 21"	FOOT	$ 110.00	0	$ -	
	STORM SEWER, RCP 24"	FOOT	$ 120.00	1,940	$ 232,800.00	
	STORM SEWER, RCP 27"	FOOT	$ 130.00	0	$ -	
	STORM SEWER, RCP 30"	FOOT	$ 150.00	700	$ 105,000.00	
	STORM SEWER, RCP 36"	FOOT	$ 175.00	915	$ 160,125.00	
	STORM SEWER, RCP 42"	FOOT	$ 200.00	0	$ -	
	STORM SEWER, RCP 48"	FOOT	$ 220.00	2,070	$ 455,400.00	
	STORM SEWER, RCP 54"	FOOT	$ 270.00	0	$ -	
	STORM SEWER, RCP 60"	FOOT	$ 350.00	0	$ -	
	STORM SEWER, RCP 66"	FOOT	$ 400.00	0	$ -	
	STORM SEWER, RCP 72"	FOOT	$ 450.00	0	$ -	
	STORM SEWER REMOVAL	FOOT	$ 25.00	0	$ -	
	DRAINAGE STRUCTURE REMOVAL	EACH	$ 500.00	0	$ -	
	HEADWALL REMOVAL	EACH	$ 5,000.00	0	$ -	
	INLET, TYPE A, HIGH CAPACITY FRAME AND GRATE	EACH	$ 1,500.00	72	$ 108,000.00	
	MANHOLES, 4'-DIAMETER, TYPE A, T1F CL	EACH	$ 4,500.00	6	$ 27,000.00	
	MANHOLES, 5'-DIAMETER, TYPE A, T1F CL	EACH	$ 6,500.00	2	$ 13,000.00	
	MANHOLES, 6'-DIAMETER, TYPE A, T1F CL	EACH	$ 7,500.00	8	$ 60,000.00	
	MANHOLES, 7'-DIAMETER, TYPE A, T1F CL	EACH	$ 8,500.00	5	$ 42,500.00	
	MANHOLES, 8'-DIAMETER, TYPE A, T1F CL	EACH	$ 9,000.00	2	$ 18,000.00	
	JUNCTION CHAMBER	EACH	$ 50,000.00	0	$ -	
	OVERFLOW STRUCTURE	EACH	$ 100,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 24" W/ GRATE	EACH	$ 2,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 30" W/ GRATE	EACH	$ 3,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 36" W/ GRATE	EACH	$ 5,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 48" W/ GRATE	EACH	$ 6,000.00	1	$ 6,000.00	
	REINFORCED CONCRETE FLARED END SECTIONS, 60" W/ GRATE	EACH	$ 7,500.00	0	$ -	
	HEADWALL, 36"	EACH	$ 20,000.00	0	$ -	
	STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150.00	10	$ 1,500.00	
	TIDEFLEX, 12"	EACH	$ 5,000.00	0	$ -	
	TIDEFLEX, 36"	EACH	$ 15,000.00	0	$ -	
PUMP HOUSE	CAST IN PLACE CONCRETE WET WELL STRUCTURE	L. SUM	$ 500,000.00	0	$ -	$0.00
	CAST IN PLACE CONCRETE DISCHARGE STRUCTURE	L. SUM	$ 125,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING FOUNDATION	L. SUM	$ 25,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING	L. SUM	$ 750,000.00	0	$ -	
	CONDUCTORS AND CABLES	L. SUM	$ 15,000.00	0	$ -	
	GROUNDING SYSTEM	L. SUM	$ 10,000.00	0	$ -	
	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	L. SUM	$ 15,000.00	0	$ -	
	ELECTRICAL SERVICE AND DISTRIBUTION	L. SUM	$ 10,000.00	0	$ -	
	EARTH EXCAVATION	L. SUM	$ 100,000.00	0	$ -	
	DEWATERING	L. SUM	$ 100,000.00	0	$ -	
	WOOD COMPOSITE FENCES AND GATES	FOOT	$ 100.00	0	$ -	
	MAIN PUMPS AND ACCESSORIES	EACH	$ 100,000.00	0	$ -	
	HMA DRIVEWAY INSTALLATION (INCLUDING FURNISHED EXCAVATION)	L. SUM	$ 30,000.00	0	$ -	
PAVEMENT	HOT-MIX ASPHALT SURFACE REMOVAL, 2"	SQ YD	$ 3.50	14,200	$ 49,700.00	$584,770.00
	PAVEMENT REMOVAL	SQ YD	$ 15.00	0	$ -	
	AGGREGATE SUBGRADE IMPROVEMENT	CU YD	$ 50.00	0	$ -	
	REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL	CU YD	$ 50.00	0	$ -	
	GEOTECHNICAL FABRIC FOR GROUND STABILIZATION	SQ YD	$ 3.00	0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 2"	TON	$ 90.00	0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1.5"	TON	$ 90.00	1,200	$ 108,000.00	
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0 N50, 4"	TON	$ 85.00	0	$ -	
	LEVELING BINDER (MACHINE METHOD), N50, 0.75"	TON	$ 95.00	600	$ 57,000.00	
	AGGREGATE BASE COURSE, TYPE B, 12"	SQ YD	$ 15.00	0	$ -	
	BITUMINOUS MATERIALS (TACK COAT)	POUND	$ 1.00	1,070	$ 1,070.00	
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL AND REPLACEMENT	FOOT	$ 30.00	2,580	$ 77,400.00	
	DRIVEWAY REMOVAL AND REPLACEMENT	SQ YD	$ 100.00	170	$ 17,000.00	
	PATH REPLACEMENT (LIMESTONE/HMA/PCC)	SQ YD	$ 20.00	200	$ 4,000.00	
	TEMPORARY CLASS D PATCHES, 6"	SQ YD	$ 45.00	0	$ -	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 60.00	4,510	$ 270,600.00	
UTILITY	RELOCATE / ADJUST WATER MAIN	FOOT	$ 275.00	600	$ 165,000.00	$315,000.00
	REMOVE AND REPLACE SANITARY SEWER	FOOT	$ 150.00	600	$ 90,000.00	
	ADJUST WATER SERVICES	EACH	$ 2,500.00	15	$ 37,500.00	
	ADJUST SANITARY SERVICES	EACH	$ 1,500.00	15	$ 22,500.00	
	NEW PARALLEL 8" WATER MAIN (INCLUDES HYDRANTS & VAULTS)	FOOT	$ 350.00	0	$ -	
	NEW WATER SERVICE WITH B-BOX	EACH	$ 2,750.00	0	$ -	
	NEW SANITARY SERVICE WITH CLEANOUT	EACH	$ 2,000.00	0	$ -	
	NEW PARALLEL SANITARY SEWER	FOOT	$ 110.00	0	$ -	
MISC.	BASKETBALL COURT REPLACEMENT	L. SUM	$ 25,000.00	0	$ -	$525,000.00
	BALZER PARK DRAINAGE LATERAL	L. SUM	$ 50,000.00	1	$ 50,000.00	
	MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 75,000.00	
	MOBILIZATION	L. SUM	+/- 6%	1	$ 200,000.00	
	TRAFFIC CONTROL AND PROTECTION	L. SUM	+/- 3%	1	$ 100,000.00	
	CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 100,000.00	

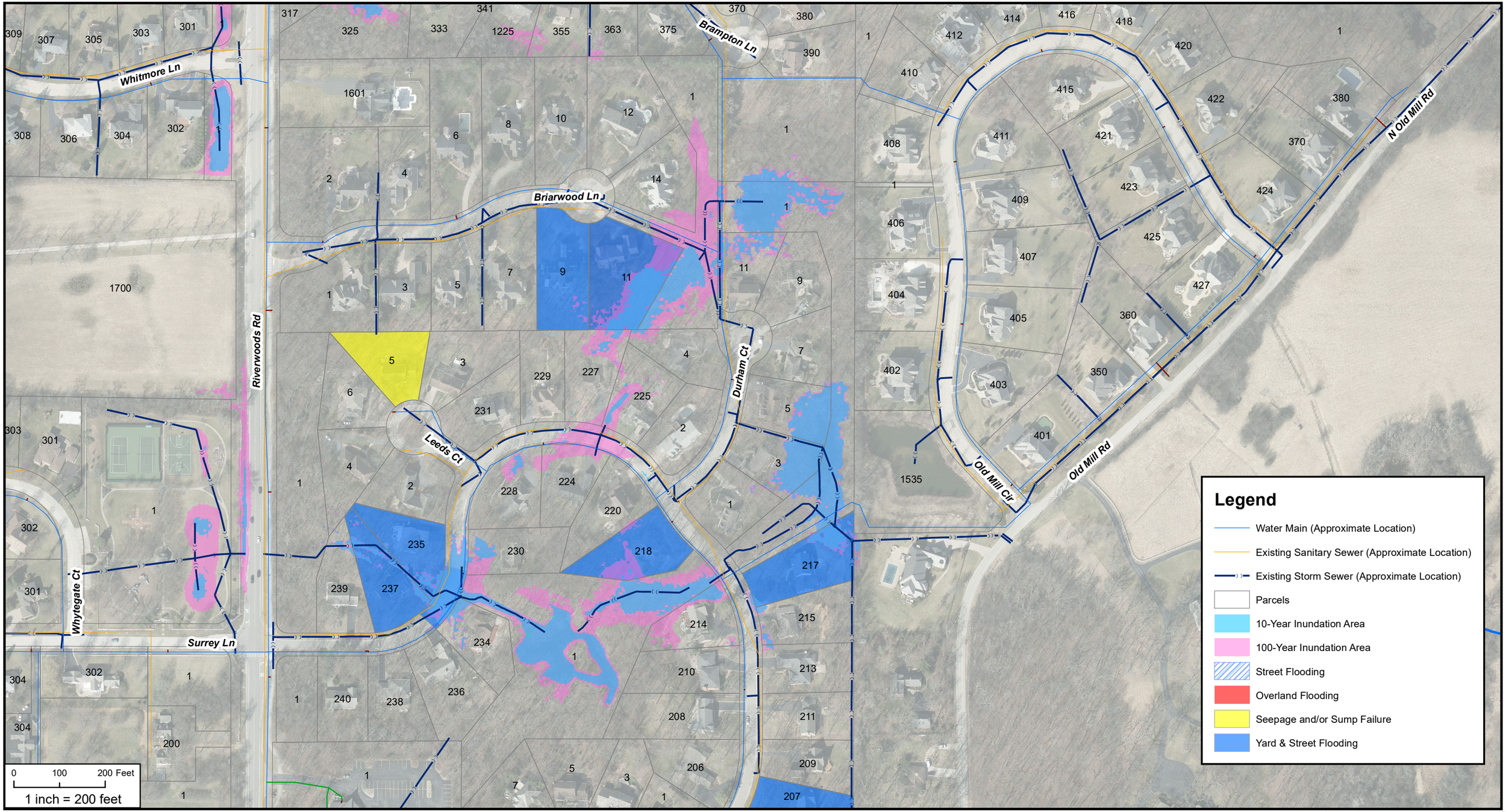
SUBTOTAL =	**$ 2,974,895.00**
CONTINGENCY (25%) =	$ 743,723.75
CONSTRUCTION TOTAL =	**$ 3,718,618.75**
DESIGN ENGINEERING (7.5%) =	$ 278,896.41
CONSTRUCTION ENGINEERING (7.5%) =	$ 278,896.41
PERMITTING (0.5%) =	$ 18,593.09
TOTAL COST OF IMPROVEMENTS =	**$ 4,295,004.66**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.
6. THIS ESTIMATE ASSUMES THE STORM SEWER THROUGH THE PARK OFF WINDSOR CAN BE OPEN-CUT.

APPENDIX 7

SURREY LANE (EAST OF RIVERWOODS ROAD)

EXHIBITS AND COST ESTIMATES



Document Path: N:\Lincolnshire\190059\GIS\Exhibits\Exhibits for Report\Existing Surrey Lane.mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

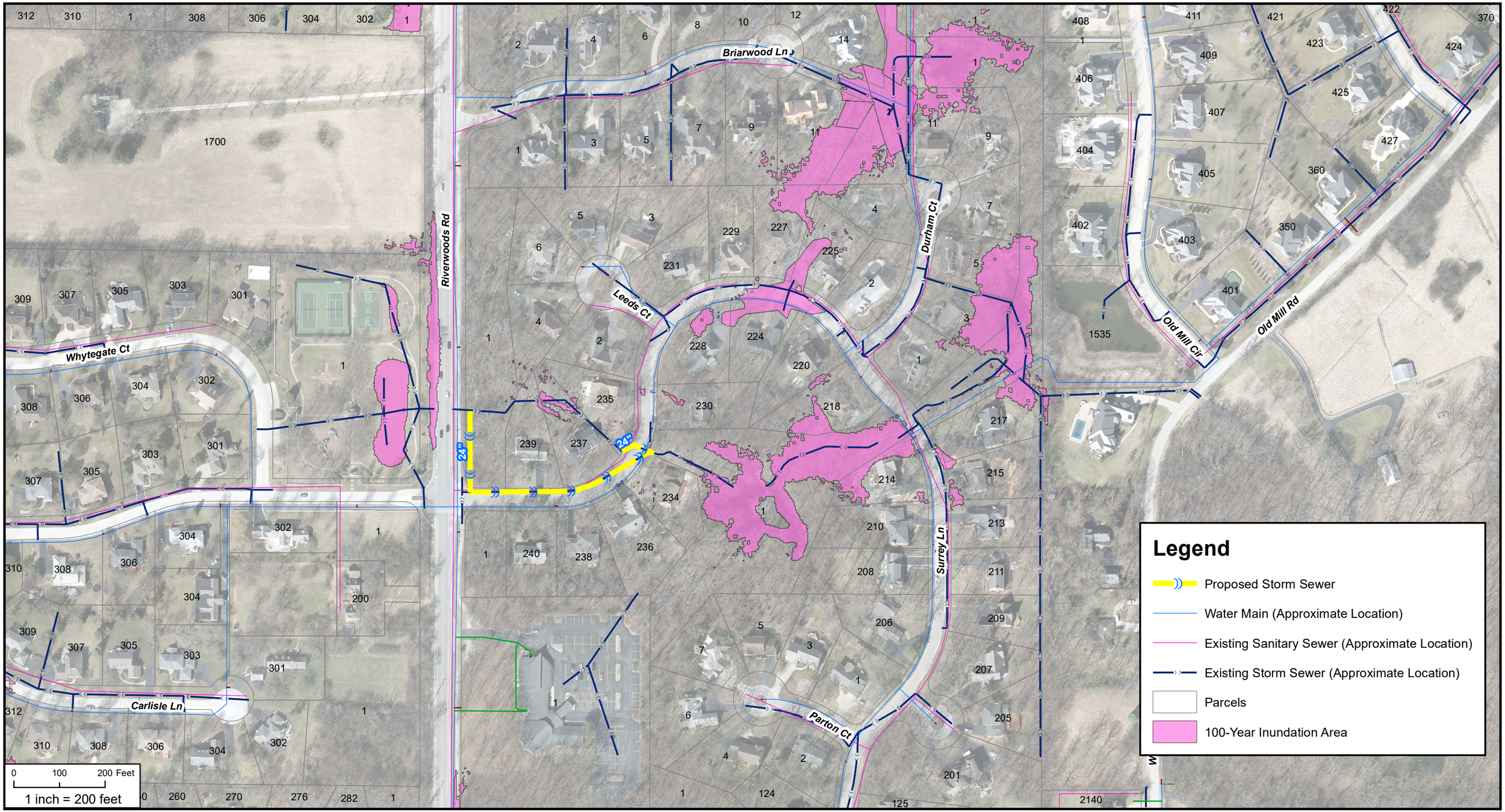
CLIENT: Village of Lincolnshire

PROJECT NO.: 190059

TITLE: Surrey Lane - East of Riverwoods Road
Existing Condition Inundation Areas and Drainage Responses

DATE: 2/11/2020

EXHIBIT 17



Document Path: N:\Lincolnshire\190059\GIS\Exhibits\Exhibits for Report\Proposed Surrey Lane.mxd

DSGN.	DRB	CHKD.	DTO

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, IL 60018
(847) 823-0500 / FAX (847) 823-0520

CLIENT Village of Lincolnshire

PROJECT NO. 190059

TITLE Surrey Lane - East Riverwoods Road
Proposed Condition (10-Year level of Service)

DATE 5/1/2020

EXHIBIT 18

Christopher B. Burke Engineering, Ltd.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018

CALC'D BY: JAL
CHECKED BY: JMD

Village of Lincolnshire
Village-wide Stormwater Study
(CBBEL Project No.: 19-0059)

Date: April 14, 2020
Revised: May 1, 2020

SURREY LANE AT RIVERWOODS ROAD
10-Year Protection

	ITEM	UNIT	UNIT COST	QUANTITY	TOTAL COST	
SITE PREPARATION	TREE REMOVAL	L. SUM	$ 5,000.00	1	$ 5,000.00	$31,400.00
	TREE TRIMMING	L. SUM	$ 10,000.00	1	$ 10,000.00	
	TOPSOIL FURNISH AND PLACE, 6"	SQ YD	$ 10.00	700	$ 7,000.00	
	SEEDING, CLASS 1A	SQ YD	$ 3.00	700	$ 2,100.00	
	EROSION CONTROL BLANKET	SQ YD	$ 3.00	700	$ 2,100.00	
	FENCE REMOVAL AND REPLACEMENT	FOOT	$ 75.00	0	$ -	
	TEMPORARY CONSTRUCTION FENCE	FOOT	$ 8.00	400	$ 3,200.00	
	PERIMETER EROSION BARRIER	FOOT	$ 5.00	400	$ 2,000.00	
STORM SEWER	EARTH EXCAVATION (SWALE GRADING)	CU YD	$ 50.00	0	$ -	$190,550.00
	TRENCH BACKFILL, SPECIAL	CU YD	$ 45.00	350	$ 15,750.00	
	STORM SEWER, RCP 12" (LATERALS)	FOOT	$ 70.00	65	$ 4,550.00	
	STORM SEWER, RCP 12"	FOOT	$ 80.00	0	$ -	
	STORM SEWER, RCP 15"	FOOT	$ 90.00	0	$ -	
	STORM SEWER, RCP 18"	FOOT	$ 100.00	0	$ -	
	STORM SEWER, RCP 21"	FOOT	$ 110.00	0	$ -	
	STORM SEWER, RCP 24"	FOOT	$ 120.00	750	$ 90,000.00	
	STORM SEWER, RCP 27"	FOOT	$ 130.00	0	$ -	
	STORM SEWER, RCP 30"	FOOT	$ 150.00	0	$ -	
	STORM SEWER, RCP 36"	FOOT	$ 175.00	0	$ -	
	STORM SEWER, RCP 42"	FOOT	$ 200.00	0	$ -	
	STORM SEWER, RCP 48"	FOOT	$ 220.00	0	$ -	
	STORM SEWER, RCP 54"	FOOT	$ 270.00	0	$ -	
	STORM SEWER, RCP 60"	FOOT	$ 350.00	0	$ -	
	STORM SEWER, RCP 66"	FOOT	$ 400.00	0	$ -	
	STORM SEWER, RCP 72"	FOOT	$ 450.00	0	$ -	
	STORM SEWER, 48"x76" RCEP	FOOT	$ 500.00	0	$ -	
	STORM SEWER REMOVAL	FOOT	$ 25.00	450	$ 11,250.00	
	DRAINAGE STRUCTURE REMOVAL	EACH	$ 500.00	7	$ 3,500.00	
	HEADWALL REMOVAL	EACH	$ 5,000.00	0	$ -	
	INLET, TYPE A, HIGH CAPACITY FRAME AND GRATE	EACH	$ 1,500.00	12	$ 18,000.00	
	MANHOLES, 4'-DIAMETER, TYPE A, T1F CL	EACH	$ 4,500.00	5	$ 22,500.00	
	MANHOLES, 5'-DIAMETER, TYPE A, T1F CL	EACH	$ 6,500.00	2	$ 13,000.00	
	MANHOLES, 6'-DIAMETER, TYPE A, T1F CL	EACH	$ 7,500.00	0	$ -	
	MANHOLES, 7'-DIAMETER, TYPE A, T1F CL	EACH	$ 8,500.00	0	$ -	
	MANHOLES, 8'-DIAMETER, TYPE A, T1F CL	EACH	$ 9,000.00	0	$ -	
	MANHOLES, 9'-DIAMETER, TYPE A, T1F CL	EACH	$ 12,500.00	0	$ -	
	JUNCTION CHAMBER	EACH	$ 50,000.00	0	$ -	
	OVERFLOW STRUCTURE	EACH	$ 100,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 12" W/ GRATE	EACH	$ 2,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 24" W/ GRATE	EACH	$ 2,500.00	3	$ 7,500.00	
	REINFORCED CONCRETE FLARED END SECTIONS, 30" W/ GRATE	EACH	$ 3,500.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 36" W/ GRATE	EACH	$ 5,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 48" W/ GRATE	EACH	$ 6,000.00	0	$ -	
	REINFORCED CONCRETE FLARED END SECTIONS, 60" W/ GRATE	EACH	$ 7,500.00	0	$ -	
	HEADWALL, 36"	EACH	$ 20,000.00	0	$ -	
	STONE RIPRAP AND FILTER FABRIC	SQ YD	$ 150.00	30	$ 4,500.00	
	TIDEFLEX, 12"	EACH	$ 5,000.00	0	$ -	
	TIDEFLEX, 36"	EACH	$ 15,000.00	0	$ -	
PUMP HOUSE	CAST IN PLACE CONCRETE WET WELL STRUCTURE	L. SUM	$ 500,000.00	0	$ -	$0.00
	CAST IN PLACE CONCRETE DISCHARGE STRUCTURE	L. SUM	$ 125,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING FOUNDATION	L. SUM	$ 25,000.00	0	$ -	
	PREFABRICATED CONTROL BUILDING	L. SUM	$ 750,000.00	0	$ -	
	CONDUCTORS AND CABLES	L. SUM	$ 15,000.00	0	$ -	
	GROUNDING SYSTEM	L. SUM	$ 10,000.00	0	$ -	
	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	L. SUM	$ 15,000.00	0	$ -	
	ELECTRICAL SERVICE AND DISTRIBUTION	L. SUM	$ 10,000.00	0	$ -	
	EARTH EXCAVATION	L. SUM	$ 100,000.00	0	$ -	
	DEWATERING	L. SUM	$ 100,000.00	0	$ -	
	WOOD COMPOSITE FENCES AND GATES	FOOT	$ 100.00	0	$ -	
	MAIN PUMPS AND ACCESSORIES	EACH	$ 100,000.00	0	$ -	
	HMA DRIVEWAY INSTALLATION (INCLUDING FURNISHED EXCAVATION)	L. SUM	$ 30,000.00	0	$ -	
PAVEMENT	HOT-MIX ASPHALT SURFACE REMOVAL, 2"	SQ YD	$ 3.50	1,300	$ 4,550.00	$53,050.00
	PAVEMENT REMOVAL	SQ YD	$ 15.00	0	$ -	
	AGGREGATE SUBGRADE IMPROVEMENT	CU YD	$ 50.00	0	$ -	
	REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL	CU YD	$ 50.00	0	$ -	
	GEOTECHNICAL FABRIC FOR GROUND STABILIZATION	SQ YD	$ 3.00	0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 2"	TON	$ 90.00	0	$ -	
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1.5"	TON	$ 90.00	110	$ 9,900.00	
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0 N50, 4"	TON	$ 85.00	0	$ -	
	LEVELING BINDER (MACHINE METHOD), N50, 0.75"	TON	$ 95.00	60	$ 5,700.00	
	AGGREGATE BASE COURSE, TYPE B, 12"	SQ YD	$ 15.00	0	$ -	
	BITUMINOUS MATERIALS (TACK COAT)	POUND	$ 1.00	100	$ 100.00	
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL AND REPLACEMENT	FOOT	$ 30.00	260	$ 7,800.00	
	DRIVEWAY REMOVAL AND REPLACEMENT	SQ YD	$ 100.00	40	$ 4,000.00	
	PATH REPLACEMENT (LIMESTONE/HMA/PCC)	SQ YD	$ 20.00	0	$ -	
	TEMPORARY CLASS D PATCHES, 6"	SQ YD	$ 45.00	0	$ -	
	CLASS D PATCHES, 6" (SPECIAL)	SQ YD	$ 60.00	350	$ 21,000.00	
UTILITY	RELOCATE / ADJUST WATER MAIN	FOOT	$ 275.00	50	$ 13,750.00	$33,250.00
	REMOVE AND REPLACE SANITARY SEWER	FOOT	$ 150.00	50	$ 7,500.00	
	ADJUST WATER SERVICES	EACH	$ 2,500.00	3	$ 7,500.00	
	ADJUST SANITARY SERVICES	EACH	$ 1,500.00	3	$ 4,500.00	
	NEW PARALLEL 8" WATER MAIN (INCLUDES HYDRANTS & VAULTS)	FOOT	$ 350.00	0	$ -	
	NEW WATER SERVICE WITH B-BOX	EACH	$ 2,750.00	0	$ -	
	NEW SANITARY SERVICE WITH CLEANOUT	EACH	$ 2,000.00	0	$ -	
	NEW PARALLEL SANITARY SEWER	FOOT	$ 110.00	0	$ -	
MISC.	BASKETBALL COURT REPLACEMENT	L. SUM	$ 25,000.00	0	$ -	$70,000.00
	MISCELLANEOUS SESC MEASURES	L. SUM	+/- 2%	1	$ 10,000.00	
	MOBILIZATION	L. SUM	+/- 6%	1	$ 30,000.00	
	TRAFFIC CONTROL AND PROTECTION	L. SUM	+/- 3%	1	$ 15,000.00	
	CONSTRUCTION LAYOUT	L. SUM	+/- 3%	1	$ 15,000.00	

SUBTOTAL =	**$ 378,250.00**
CONTINGENCY (25%) =	$ 94,562.50
CONSTRUCTION TOTAL =	**$ 472,812.50**
DESIGN ENGINEERING (7.5%) =	$ 35,460.94
CONSTRUCTION ENGINEERING (7.5%) =	$ 35,460.94
PERMITTING (0.5%) =	$ 2,364.06
TOTAL COST OF IMPROVEMENTS =	**$ 546,098.44**

NOTES:
1. THIS ESTIMATE DOES NOT INCLUDE ROW ACQUISITION, TEMPORARY OR CONSTRUCTION EASEMENTS, OR RELOCATING ANY EXISTING UTILITES.
2. THIS ESTIMATE ASSUMES 2020 CONSTRUCTION COSTS.
3. THIS ESTIMATE ASSUMES ALL EXCAVATED MATERIAL TO BE HAULED-OFF MEETS CCDD REQUIREMENTS.
4. THIS ESTIMATE DOES NOT INCLUDE ANY BUILDING DEMOLITION.
5. AT THE TIME THIS ESTIMATE WAS PREPARED, CBBEL DID NOT HAVE ACCESS TO THE VILLAGE WATER MAIN ATLAS.