DUPAGE COUNTY

Kress Creek

Watershed-Based Plan

Love Blue. Live Green.

DuPage County Stormwater Management

August 2017

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1. Introduction

Since the late 1980s, watershed organizations, tribes and federal, state and local agencies have been using a watershed approach to managing water quality in water bodies such as streams, rivers, lakes, wetlands and oceans. A watershed approach is a flexible framework for managing water resource quality and quantity within specified drainage areas, also known as watersheds. This approach includes stakeholder involvement and management actions supported by sound science and appropriate technology. The watershed planning process works within this framework by using a series of cooperative, iterative steps to characterize existing conditions, identify and prioritize problems, define management objectives, develop protection or remediation strategies and implement and adapt selected actions, as necessary. The outcomes of this process are documented or referenced in a watershed plan.

A watershed plan is a strategy that provides assessment and management information for a geographically defined watershed, including the analyses, actions, participants and resources related to developing and providing a timeframe for implementing the plan. The development of watershed plans requires a certain level of technical expertise and the participation of a variety of people with diverse skills and knowledge.

DuPage County Stormwater Management received a Section 319 grant from the Illinois Environmental Protection Agency (IEPA) to fund the development of five sub-watershed plans, including St. Joseph Creek, Winfield Creek, Klein Creek, Sawmill Creek, and Kress Creek, which is the focus of this document (Figure 1). The purpose of the Kress Creek Watershed Plan is to develop recommendations to improve the quality of Kress Creek and its surrounding areas. Stakeholders input, long-term monitoring and regional, statewide and federal water quality goals drive both the development and eventual implementation of the plan.

Figure 1 Kress Creek

2. Kress Creek Watershed Planning Area

2.1 Planning Area

Kress Creek (IL_GBKB-01) is a portion of HUC# 071200040802 flowing generally north to southeast through the northwest quadrant of DuPage County, Illinois. Kress Creek is a tributary, or sub-watershed, to the West Branch DuPage River (Figure 2). The headwaters of the West Branch DuPage River begin in northern DuPage County and run north to south through the County before converging with the East Branch DuPage River near Bolingbrook, Illinois in Will County to become the DuPage River. The DuPage River eventually meets with the Des Plaines and Kankakee Rivers in Channahon, Illinois to form the Illinois River. Kress Creek, lies mostly within DuPage County with the far west side falling within Kane County. For the purposes of this study, we are focusing on the DuPage County portion as a majority our information and resources are for DuPage County only. Although the concepts and suggestions listed in this study may be applied to the Kane County portion as well. Some information has been provided for Kane County section of the watershed when available.

Kress Creek Watershed

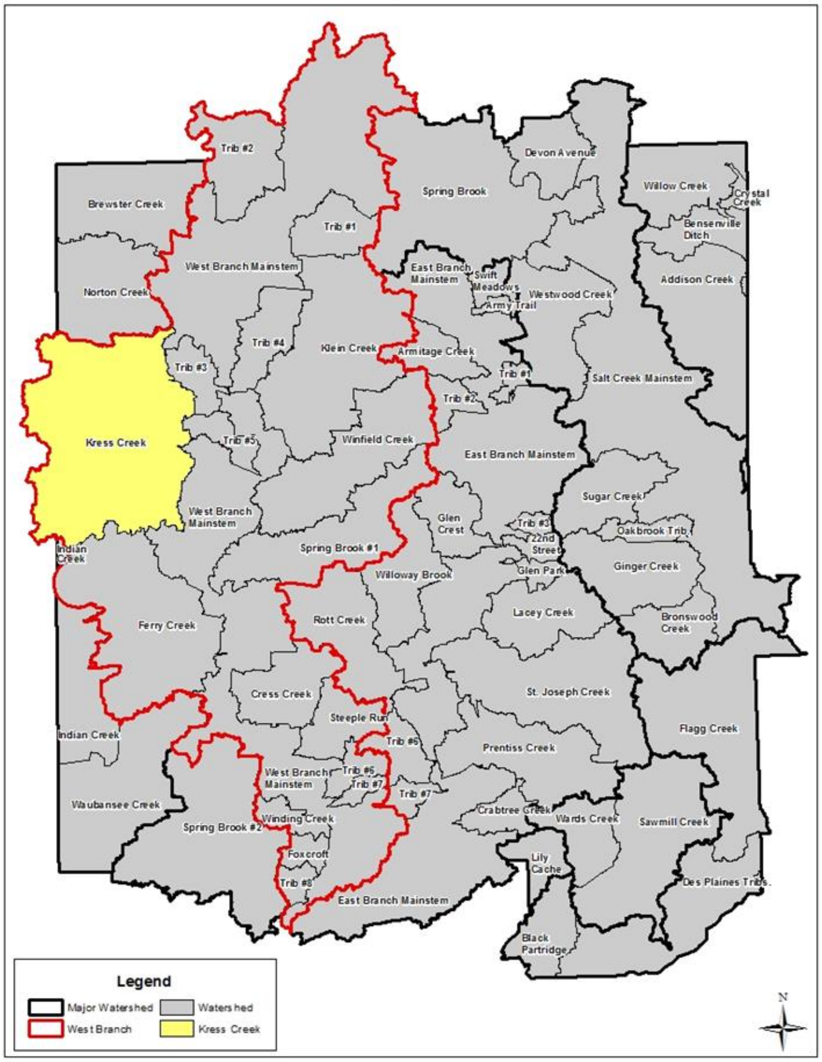


Figure 2 Kress Creek Watershed's location within the West Branch DuPage River Watershed

Four municipalities are located partially within the DuPage County limits of the Kress Creek Watershed (Figure 3). These include St. Charles, West Chicago, Batavia, and unincorporated DuPage County. A majority of the land are (nearly 72%) is within the City of West Chicago.

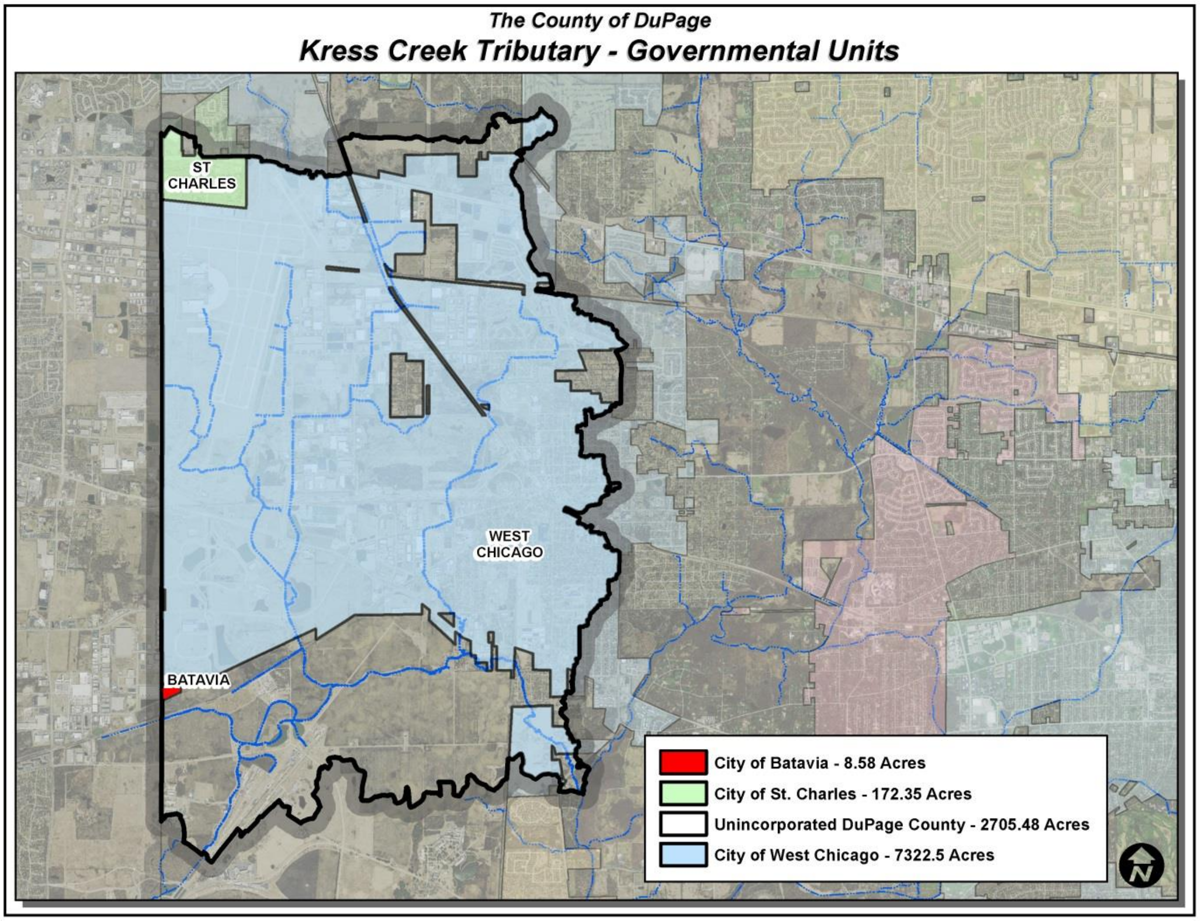


Figure 3 Municipal boundaries within the Kress Creek Watershed.

Kress Creek is a tributary of the West Branch DuPage River with a confluence in the Blackwell North Forest Preserve, which is part of the Forest Preserve District of DuPage County, in an unincorporated part of the county near the City of West Chicago. The Kress Creek drains approximately 15.95 square miles. Kress Creek flows generally from the northwest to the southeast through a small portion of Kane County and western DuPage County (Figure 4). Two southwestern branches of Kress Creek begin in Kane County and flow northeast through Fermi National Laboratory and along the Burlington Northern Railroad. These are open channel systems which are mainly surrounded by farm fields and have a small buffer of vegetation.

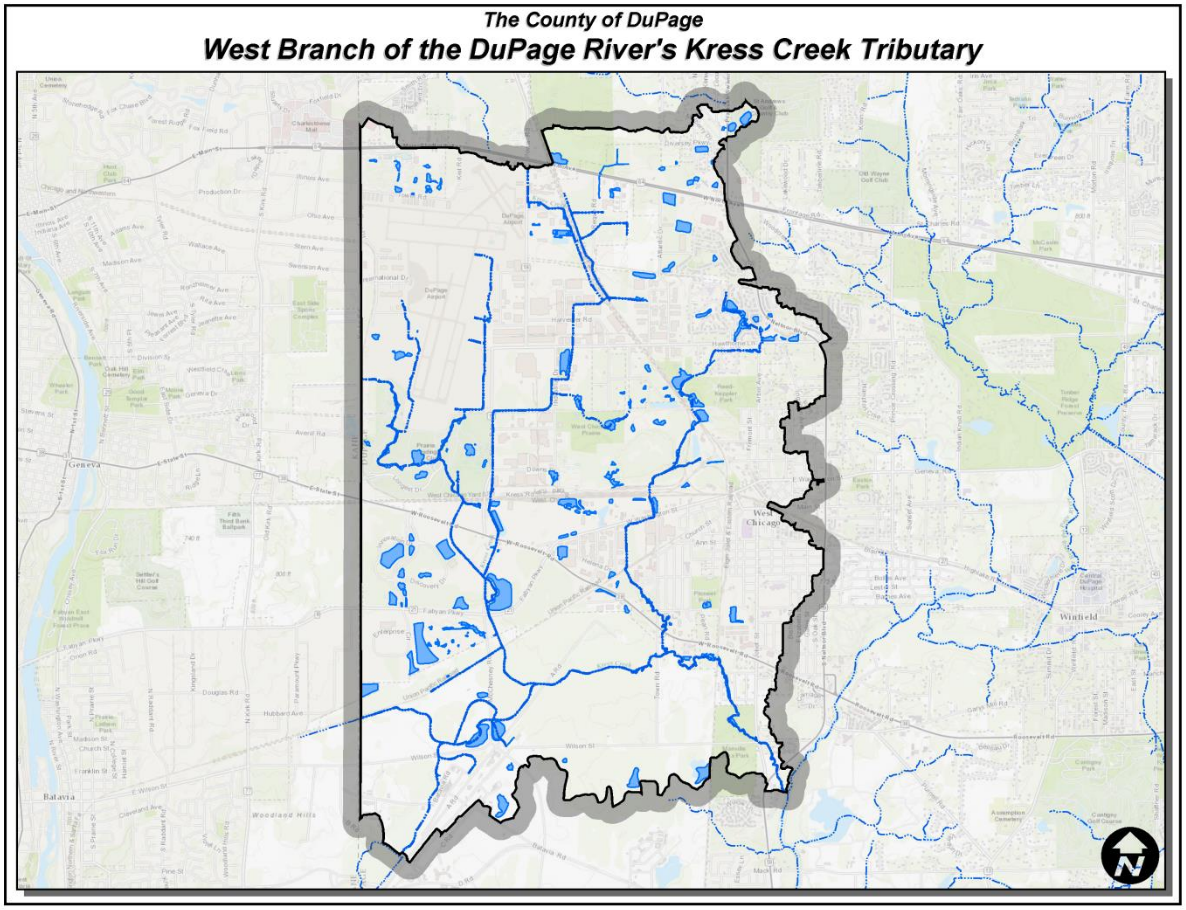


Figure 4 Kress Creek Streams and Ponds

For the purpose of this study, Kress Creek Watershed has been divided into four sub-watersheds, shown in Figure 5. Subdividing the planning area allows for a better description of local conditions, as well as future recommendations. Sub-watershed #1 begins on the Fermi National Accelerator Laboratory property. This subwatershed spans the southern tributaries of the planning area as well as the confluence with the West Branch DuPage River. Subwatershed #2 is composed of the eastern portion of the watershed planning area. This eastern tributary flows north to south through the City of West Chicago. Subwatershed #3 also flows north to south along the western end of the watershed. This subwatershed contains the DuPage Airport and Prairie Landing Golf Course and is generally less densely developed. Subwatershed #4 is in the north central portion of the watershed. It contains much of the industrial zones of the City of West Chicago.

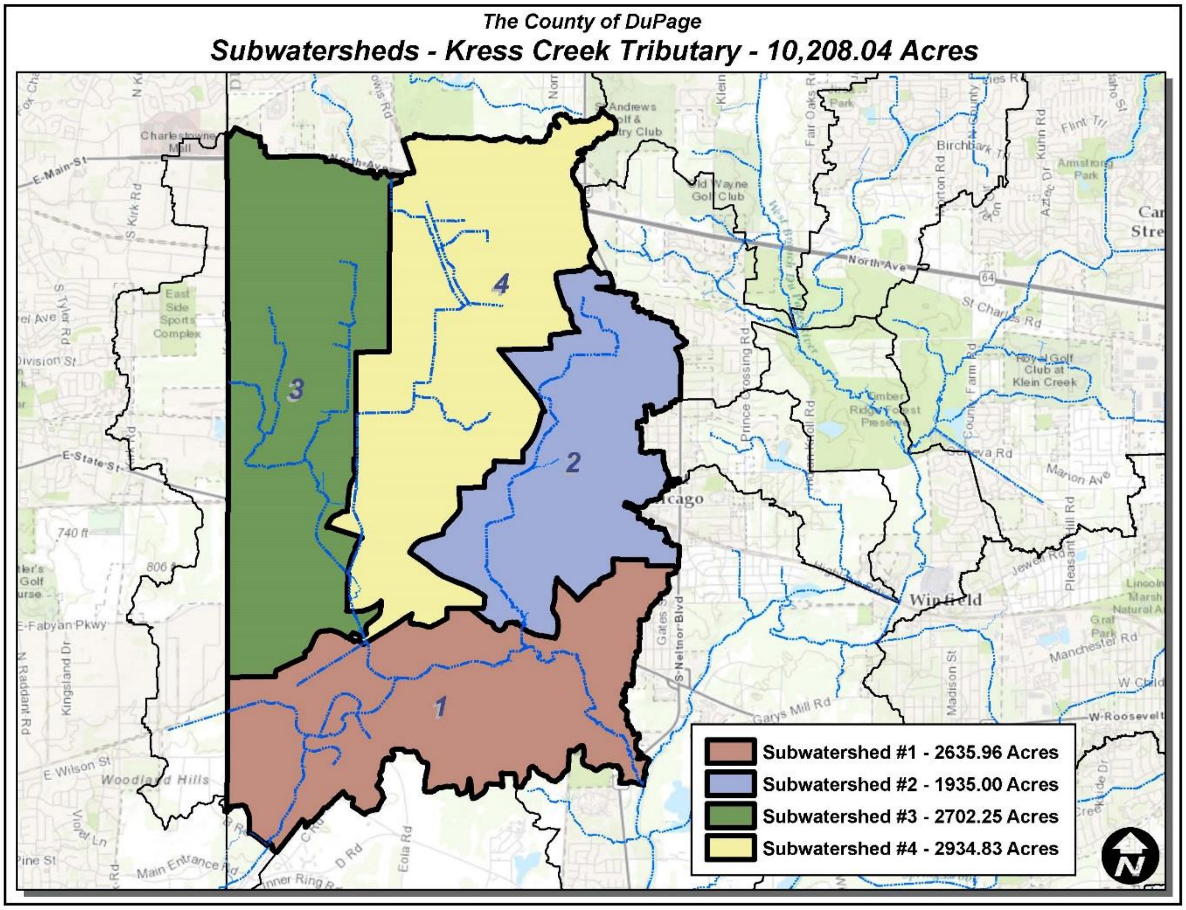


Figure 5 Sub-watersheds in Kress Creek Watershed

2.2 Local Stakeholders

To understand the Kress Creek Watershed better, DuPage County engaged in extensive community outreach. Input collected from local public agencies, non-profits, businesses and residents was integral in developing a detailed and holistic Plan highlighting existing needs and opportunities within the watershed. Further, the engagement during the development of the Plan will lay the groundwork for the later implementation of the Plan.

DuPage County took a multi-tiered approach to outreach, ranging from stakeholder involvement at the technical input through general residential engagement. An intergovernmental, multi-Kress Creek Watershed Steering Committee led the Plan development process and contributed a large amount of technical details within the Plan. Leading the general outreach was DuPage County Stormwater Management's Communications Supervisor, in partnership with several local organizations.

2.2.1 Kress Creek Watershed Steering Committee

Early in the Plan development, DuPage County convened a Kress Creek Watershed Steering Committee. The group consisted of regional organizations, including several County departments, the Forest Preserve District of DuPage County (FPDDC), The Conservation Foundation (TCF), the DuPage River Salt

Creek Workgroup (DRSCW), ComEd, the Illinois Department of Transportation (IDOT) and DuPage Airport Authority as well as municipalities, park districts, school districts, townships and sanitary districts within the watershed. The Steering Committee first assembled on September 18, 2015 to assist with basin assessments and other data required for the water quality assessments, then, later, on a regular basis to provide input on the content of the Plan. This Committee, partially featured in Figure 6, was instrumental in forming the Plan and will be the guiding agencies in implementing projects, programs and policies recommended within the Plan.

Figure 6 West Branch Watershed Workshop attendees learn about the plan.

2.2.2 West Branch Watershed Protection Workgroup

In each of DuPage County's three major watersheds, the Stormwater Management Department, in partnership with The Conservation Foundation, organized groups to improve the health of the watershed. The West Branch Watershed Protection Workgroup consists of local public agencies, organizations, businesses and residents who all have the common goal of improving the West Branch DuPage River by becoming citizen advocates, applying for funding for sustainable projects and maintaining the watershed. Meeting biannually, County staff used the meeting on October 5, 2016 to introduce the Kress Creek Watershed Plan to the group and seek assistance in the water quality assessment. Staff provided subsequent updates via email and during the following March 9, 2017 meeting, both of which were held in the watershed. As environmental champions in the local community, this workgroup will be important to future implementation of the Plan.

2.2.3 Local Community Outreach

Although prominent agencies and environmentally minded individuals may be the easiest targets when developing watershed plans, local residents, business owners and others are the key to identifying both localized water quality issues and solutions. DuPage County has a long-standing history of engaging local communities in the development and, as importantly, implementation of watershed plans and the Kress Creek Plan was no exception. DuPage County made an effort to engage with the broad watershed, as well as residents near the creek, using an interactive and socially driven web application to identify areas of the watershed in need of improvement, as well as potential spots for projects. Figure 7 shows a screenshot of this app.

DuPage County mailed 181 letters with an overview of the Plan, contact information and instructions on using the web application to all single-family homes within the floodplain defined by a 1% chance flood. Further, staff distributed several hundred targeted brochures to 34 local libraries, park districts, government buildings, non-profits and businesses with community boards within the watershed. The “Back to Basics” brochures provided basic – hence the name – information on watersheds, non-point source pollution and best management practices, in addition to a panel detailing the Kress Creek Watershed Plan and web application. Further, DuPage County’s commitment to long-term sustainability within the Watershed will provide an opportunity for additional consultation and consideration of input from all community members.

Figure 7 DuPage County water quality planning app.

Figure 8 DuPage County staff worked a community event to elicit input during the planning process.

2.3 Mission

Throughout the stakeholder engagement process, DuPage County was able to craft the mission of the Plan. This mission statement, defined below, then shaped the recommendations found in the Plan.

Mission Statement: To improve the quality of Kress Creek and the surrounding watershed to meet federal, statewide and regional water quality initiatives. Specifically, proposed recommendations found in the Plan will improve biological oxygen demand (BOD), total phosphorous (TP), total nitrogen (TN) and total suspended solids (TSS), as well as strive to reduce oil and grease.

3. Watershed Resource Inventory

3.1 Demographics

For this study, DuPage County staff evaluated the population density, population growth rate, median age, median income and unemployment for Kress Creek Watershed. Demographic attributes that were evaluated for this study were median age, median income, unemployment, population density, and population growth rate. Evaluating the age of the population can help to determine what kinds of projects to include in a watershed plan. For instance, residents of a neighborhood with an older population may value pedestrian trails around a naturalized stormwater facility rather than a playground with permeable surfaces.

The median age in the Kress Creek watershed ranges from 18-27 years old in the area around the DuPage Tech Park and Fermi Lab to 44-53 years old in the northern and southern tips of the watershed (Figure 9). Around DuPage Airport and downtown West Chicago, the median age is 27-36 years old. In the central part of the watershed on the west side of the City of West Chicago, the median age is 36-44 years old.

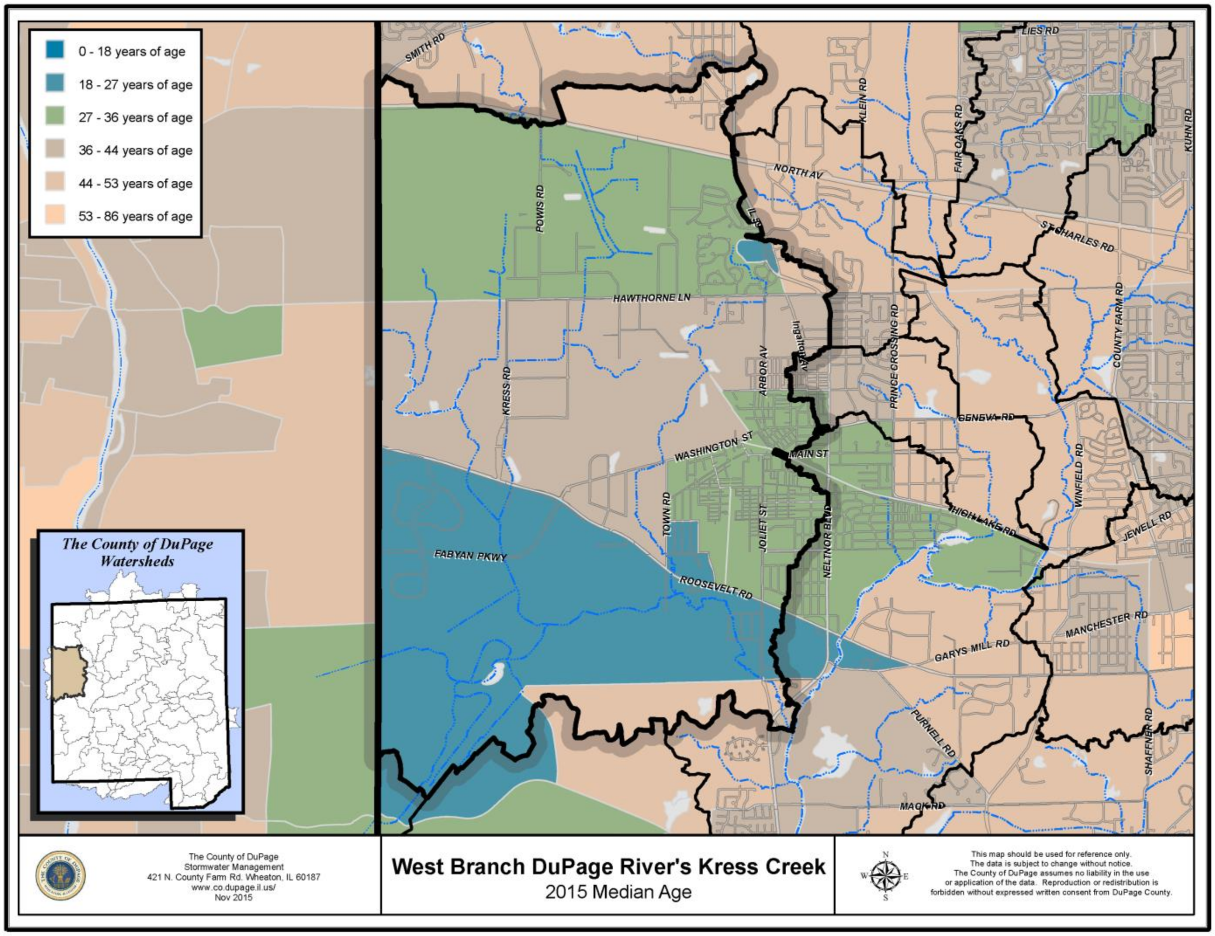


Figure 9 Kress Creek Watershed Median Age

Population density and growth rates are always important statistics to consider for planning purposes. Projects or developments in a high density may require buying out properties or planning for minimally designed features in order to fit within existing developments. Population growth rates can tell you how crowded (or open) a region may be in the future. An area with decreasing populations may not require a large public project for future use. When planning for an area with an increasing population, the design should be able to accommodate a larger than current population. In terms of stormwater quality, increasing populations can tell you that the water quality problems existing now will only be exacerbated by more people in the area.

As shown in Figure 10, population density in the Kress Creek watershed is relatively low for this region. A large portion of the watershed has a population density of only 0-1,000 people per square mile. A small section in the northern end of the watershed and a sliver near downtown West Chicago both have a higher population density of 1,000 to 4,000 people per square mile. The rest of downtown West Chicago has a population density of 4,000 to 22,000 people per square mile. A small area along Ignalton Avenue has a population density of 22,000 to 116,000 people per square mile.

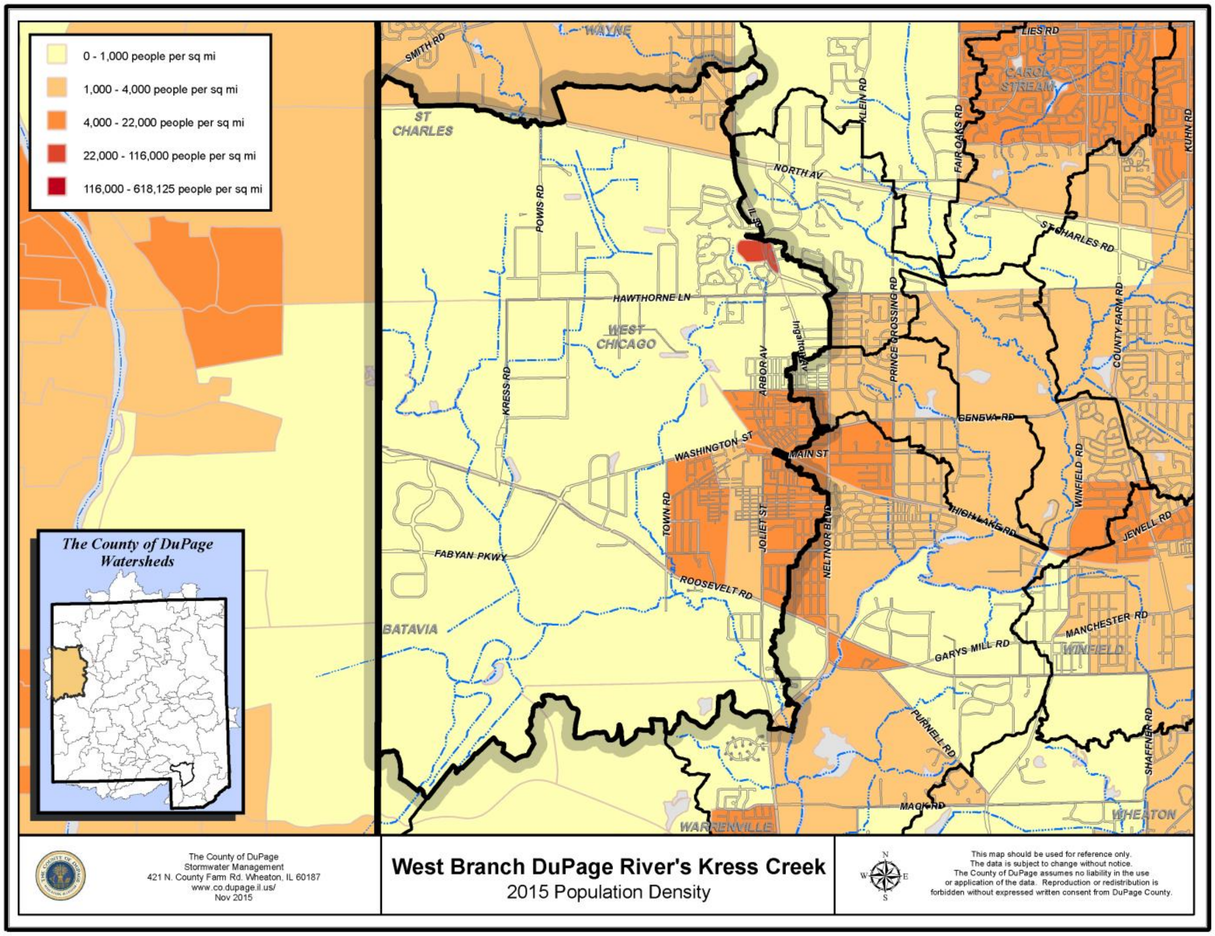


Figure 10 Kress Creek Watershed Population Density

Population growth rates in the Kress Creek watershed are the lowest in the central part of the watershed (Figure 11). Here population growth is slightly decreasing at -1.25% to 0% growth rates. North of this, the population is increasing at 1.25% to 1.9% rates in the northern side of the City of West Chicago. In the far northern tip of the watershed as well as the southern end of the watershed, population is increasing slightly at 0% to 1.25%.

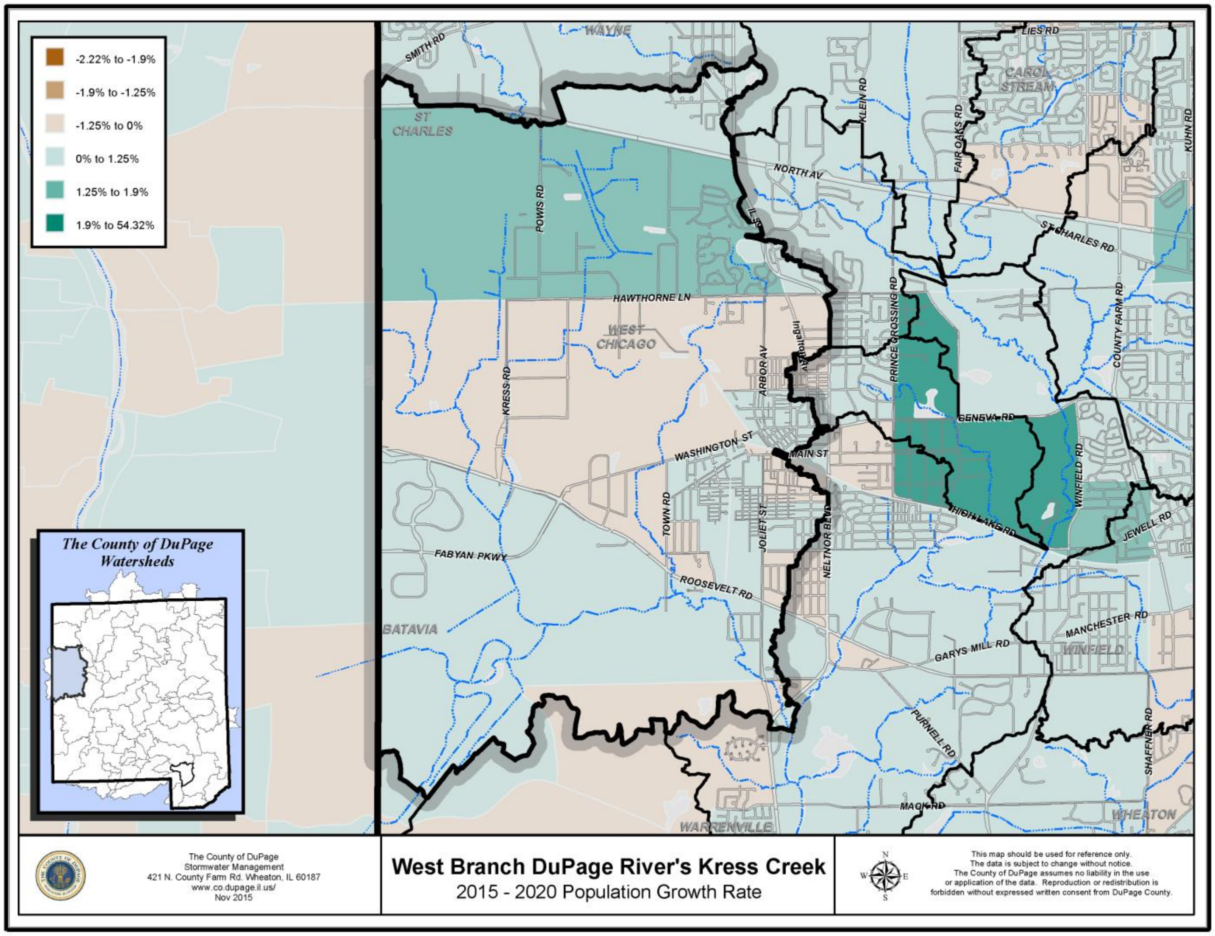


Figure 11 Population Growth Rate

Median income and unemployment rate provide a snapshot of the economic condition of a region (Figures 12 and 13). Although DuPage County in general has a high median income as compared to the rest of the country, there are parts of the County with lower than average incomes. According to the U. S. Census, the median income in Illinois (2010-2014) was $57,166. The median income in the Kress Creek watershed ranges from $43,000 to $73,000 in the south side of the watershed to $104,000 to $201,001 in a small section west of Ignalton Avenue. Most of the watershed has a median income of $73,000 to $104,000 which is above the statewide average.

Unemployment rates in the Kress Creek watershed are from 0% to 4.4% in the northern third of the watershed area. In the south two thirds of the watershed, the unemployment rate is 4.4% to 11%.

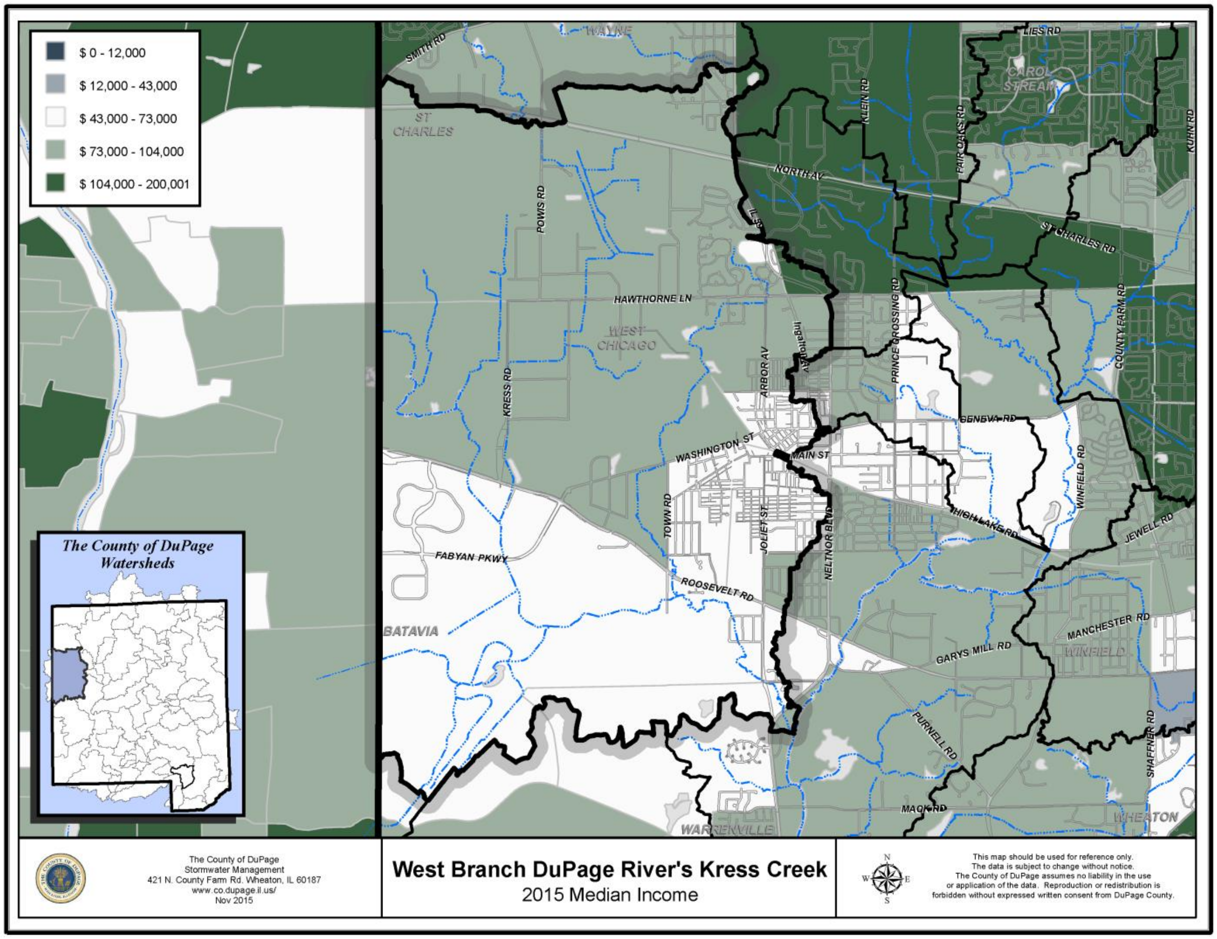


Figure 12 Median Income

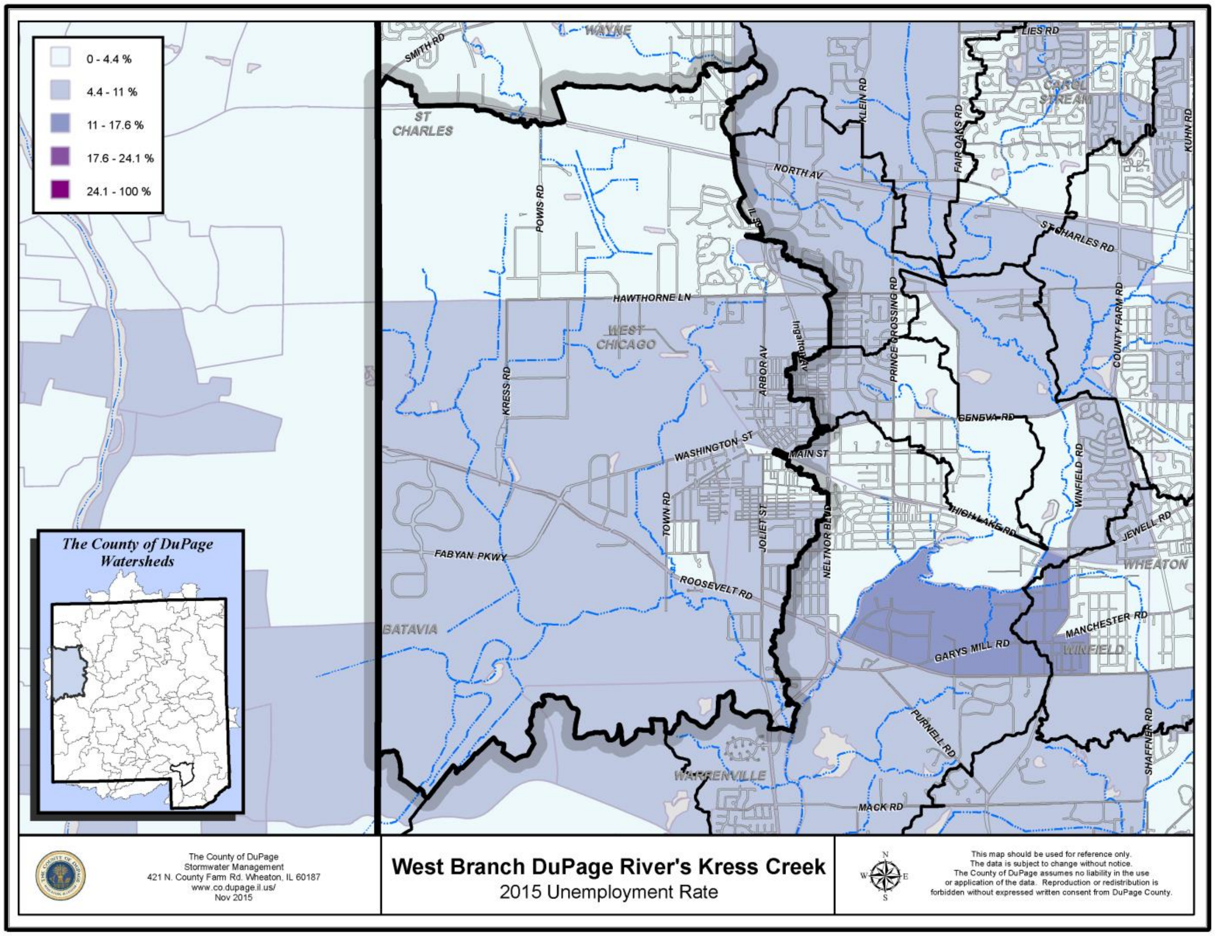


Figure 13 Unemployment Rate

3.2 Local Jurisdictions

As previously mentioned, the majority of the Kress Creek watershed (7322.5 acres) is within the jurisdictional boundaries of the City of West Chicago. The second highest amount of land area in Kress Creek watershed is federally owned Fermi National Accelerator Laboratory, which is considered unincorporated area. There are also scattered unincorporated pockets within Kress Creek Watershed totaling 2705 acres (Table 1). One property within the City of St. Charles (172.35 acres) lies in the northwest corner of the Kress Creek watershed. This property is the Pheasant Run Golf Course and Events Center. There is also a tiny sliver of the City of Batavia (8.85 acres) within the Kress Creek watershed.

Kress Creek Watershed Governmental Units		
Municipalities	**Acreage**	**Percent of Watershed**
Batavia	8	0.08%
St. Charles	172	1.68%
Unincorporated	2705	26.50%

West Chicago	7322	71.73%
Townships	**Acreage**	**Percent of Watershed**
Wayne	3010	29.49%
Winfield	5360	52.51%
County	**Acreage**	**Percent of Watershed**
DuPage	8370	81.99%
Kane	1838	18.01%

Table 1 Kress Creek Governmental Units

In addition to the jurisdictional boundaries, the Watershed flows through property owned by the U.S. Department of Energy (Fermi Lab), the State of Illinois, Forest Preserve District of DuPage County (FPDDC), West Chicago and Bartlett Sanitary Districts, as well as schools and park districts. This requires multi-jurisdictional collaboration to resolve issues within the Watershed, specifically:

- For unincorporated areas within the Watershed, ***DuPage County*** oversees all zoning, drainage, permitting and the Countywide Stormwater Management and Flood Plain Ordinance (Ordinance) enforcement. In addition, DuPage County is responsible for certain roadways within the watershed, as well as stream maintenance.
- ***Municipalities*** are responsible for managing local zoning, drainage, permitting, drinking water, sewer service and Ordinance enforcement. Local municipalities are also responsible for local roadways, which includes road maintenance, snow removal, salt dispersal, litter removal, traffic flow, hydrological conveyance systems and ensuring overall road safety.
- The ***Illinois Department of Transportation*** (IDOT) and local ***Township Authorities*** also oversee some areas of roadway and the associated right of way within the Watershed. Like municipalities, they are responsible for upkeep of roadways under their jurisdiction.
- The ***DuPage County Health Department*** (DCHD) has countywide jurisdiction of private drinking wells and septic systems within unincorporated areas of DuPage County.
- The ***Forest Preserve District of DuPage County*** is responsible for the inspection and maintenance of all drainage ways, including streams and rivers, within their forest preserves.
- ***West Chicago Wastewater Treatment Plant,*** the only wastewater treatment facility in the Watershed, is located along Hawthorne Lane near the headwaters in subwatershed 4. The plant discharges its effluent directly into Kress Creek. As a Publically-Owned Treatment Works (POTW), they hold their own NPDES permit.

3.3 Physical & Natural Features

3.3.1 Climate

The climate of the Kress Creek watershed is typical for northern Illinois. It is characterized by warm summers and cold winters with moderate precipitation year round. The average annual temperature is 49.9 degrees Fahrenheit (Figure 14). In summer, the average temperature is 71.9 degrees Fahrenheit with an average high temperature of 82.9 degrees Fahrenheit. During the winter, the average temperature is 26.1 degrees F with an average low temperature of 18 degrees Fahrenheit.

(http://www.ncdc.noaa.gov/cdo-web/datatools/normals). The growing season in this area lasts from mid-April to mid-October lasting about 165 to 170 days in a normal year.

Average annual precipitation in the nearest NOAA recording station (West Chicago, DuPage Airport) is 36.91 inches. Summer is the wettest season, with an average rainfall of 12.61 inches in the summer months.

SEASON	PRECIP (IN)	MIN TMP (°F)	AVG TMP (°F)	MAX TMP (°F)
Annual	36.91	39.8	49.9	60.1
Winter	4.45	18.0	26.1	34.2
Summer	12.61	60.9	71.9	82.9
Spring	10.29	37.9	49.0	60.0
Autumn	9.56	42.0	52.3	62.6

Figure 14 Climate Data for West Chicago DuPage Airport, IL US (Courtesy of NOAA)

3.3.2 Topography

Kress Creek watershed's topography slopes from high points along the watershed boundaries and slope gently towards Kress Creek itself and towards the confluence with the West Branch DuPage River. The land is highest generally in the northeastern side in DuPage County and the western side within Kane County. Elevations decrease as the land slopes gently towards the West Branch main stem in the southern end of the watershed. Elevations range from a high of 775 feet to a low of 700 feet.

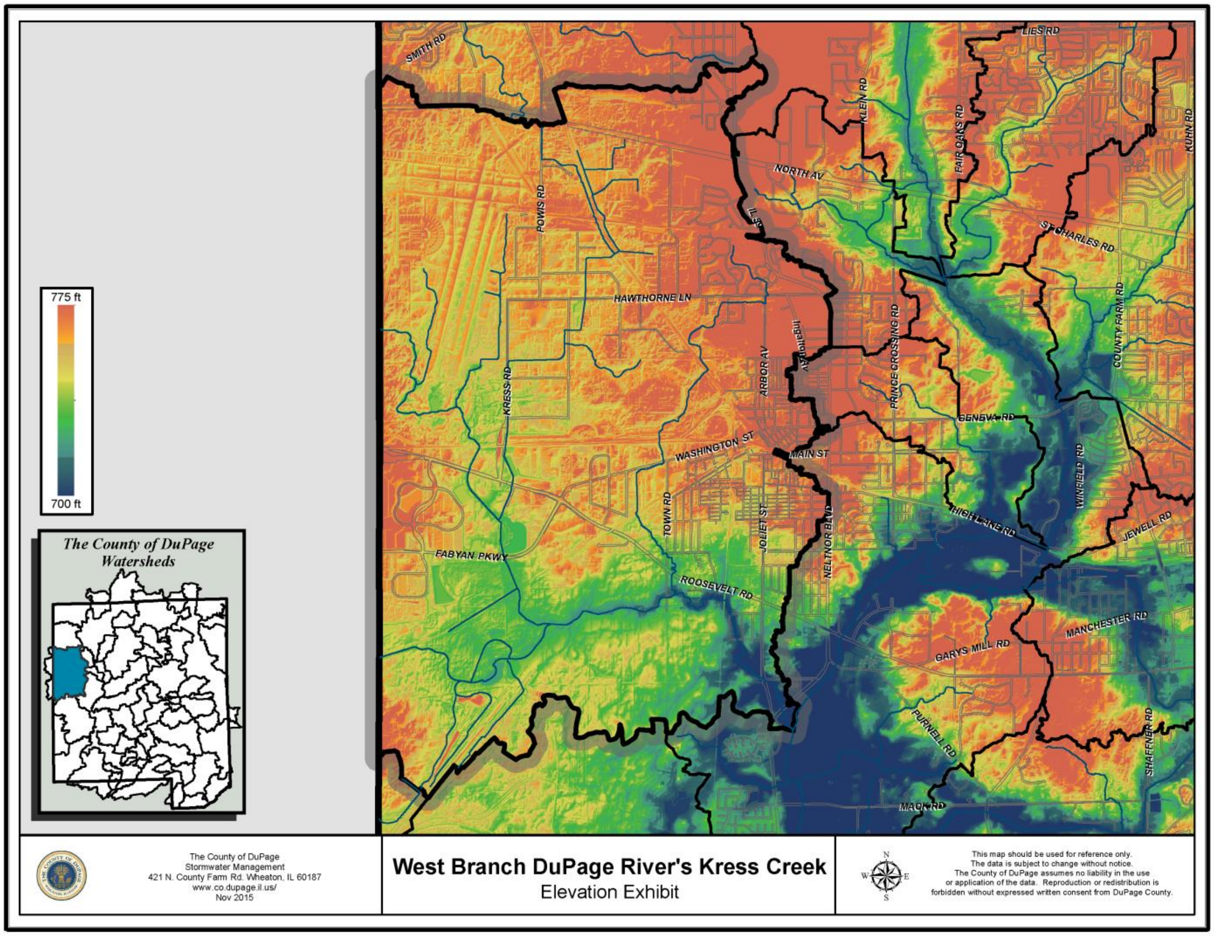


Figure 15 Topography

3.3.3 Geology

The geology of the Kress Creek watershed was heavily influenced by the Wisconsin glaciation as was the rest of DuPage County. As a result, area is covered by less than 25 inches of loess (windblown silt). As shown in Figure 16, the loess coverage is very shallow compared to the rest of the state, which can have up to 300 inches of loess or more. The loess deposits are the parent material for the fertile topsoil that developed over thousands of years by the tallgrass prairies. Following glacial retreat, loess was blown across the landscape and eventually accumulated over glacial till. This till was deposited during the advancing glacial activity, which also caused the formation of moraines which cover the area. (Illinois State Geologic Survey Bulletin 104, plate 1). Till is high in clay and causes much of the poor drainage that occurs throughout the region. (NRCS Soil Survey of DuPage and Parts of Cook Counties, 1979). Loess deposits and underlying till are the parent material for the fertile topsoil that developed over thousands of years by the tallgrass prairies.

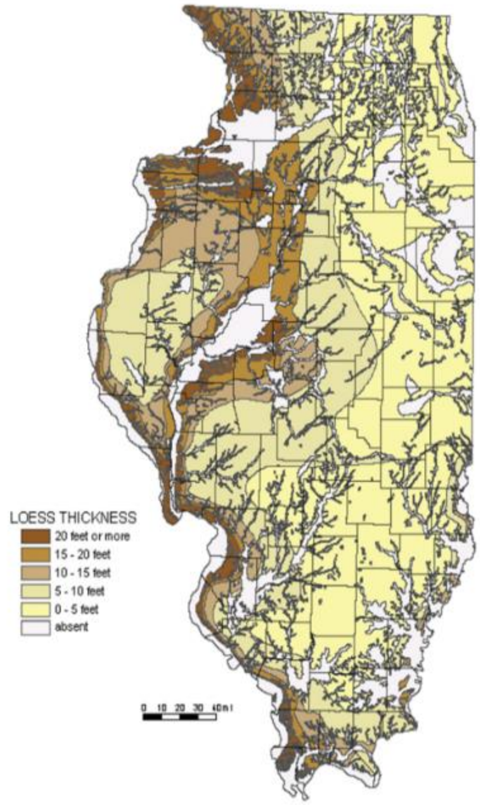


Figure 16 Loess Thickness throughout Illinois (courtesy of USGS)

3.3.4 Soils

It is important to evaluate soils when creating a water quality based watershed plan. The ability of soils to retain water, support vegetation, and provide active exchange sites for absorption of pollutants varies. Information regarding soil thickness, horizon depth, texture, structure, drainage characteristics, erosion potential, and the location of the seasonally high water table should all be considered when planning projects that will impact stormwater. Soils support vegetation, infiltrate stormwater, serve as a base for construction, support wildlife, and serve as stream and lake beds in addition to many other purposes. When identifying potential locations for BMPS, such as rain gardens or infiltration trenches, it is necessary to evaluate soil type to determine if and how well the practice will infiltrate stormwater.

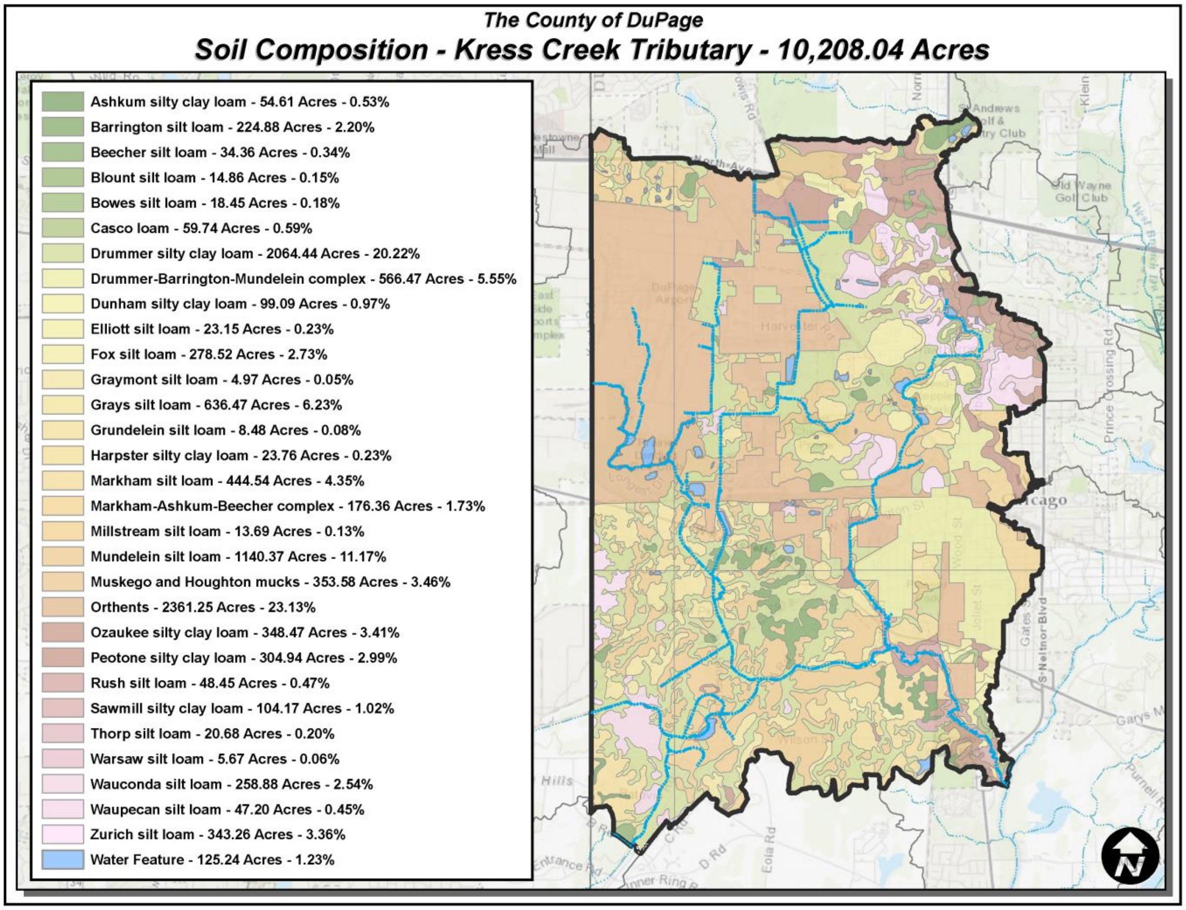


Figure 17 Soil Series Mapped in the Kress Creek Watershed (data provided by Natural Resource Conservation Service, Soil Survey of DuPage County)

Soils formation occurs when a parent material deposited by earth forming geological processes is impacted by climate, organisms over time. (NRCS, Soil Survey of DuPage County, 1997). In this region, the parent material is glacial till and loess. Which was deposited during the Wisconsinan glaciation. The soils in the Kress Creek watershed are mainly silt loam and silty clay loam in texture (Table 2). The soil series which make up the largest percentages of the watershed are the Drummer series, a hydric soil, and orthents. Orthents, or disturbed urban soils are created when development and disturbance occurs to a point where the original soil no longer displays its characteristic properties. Most of the orthents in Kress Creek watershed are in and around the DuPage Airport, which has been highly disturbed in the development of the airfield.

Kress Creek Tributary Soil Series			
Series Name	**Acres**	**% of watershed**	**Texure**
Ashkum	54.61	0.53%	silty clay loam

Barrington	224.88	2.20%	silt loam
Beecher	34.36	0.34%	silt loam
Blount	14.86	0.15%	silt loam
Bowes	18.45	0.18%	silt loam
Casco	59.74	0.59%	loam
Drummer	2064.44	20.22%	silty clay loam
Drummer- Barrington- Mundelein	566.47	5.55%	
Dunham	99.09	0.97%	silty clay loam
Elliott	23.15	0.23%	silt loam
Fox	278.52	2.73%	silt loam
Graymont	4.97	0.05%	silt loam
Grays	636.47	6.23%	silt loam
Grundelein	8.48	0.08%	silt loam
Harpster	23.76	0.23%	silty clay loam
Markham	444.54	4.35%	silt loam
Markham- Ashkum- Beecher	176.36	1.73%	
Millstream	13.69	0.13%	silt loam
Mundelein	1140.37	11.17%	silt loam
Muskego and Houghton mucks	353.58	3.46%	muck
Orthents	2361.25	23.13%	
Ozaukee	348.47	3.41%	silty clay loam
Peotone	304.94	2.99%	silty clay loam
Rush	48.45	0.47%	silt loam
Sawmill	104.17	1.02%	silty clay loam
Thorp	20.68	0.20%	silt loam
Warsaw	5.67	0.06%	silt loam
Wauconda	258.88	2.54%	silt loam
Waupecan	47.2	0.45%	silt loam
Zurich	343.26	3.36%	silt loam
Water Feature	125.24	1.23%	

Table 2 Kress Creek Soil Properties

3.3.4.1. Hydrologic Soil Groups

Hydrologic soil group as defined by the Soil Survey of DuPage County (NRCS 2001) refers to the runoff potential of a soil. This is influenced by depth to the seasonal high water table, infiltration rate, permeability after prolonged wetting, and depth to a very slowly permeable layer. Determination of hydrologic soil group does not consider the slope of a soil surface. The groups are based on unfrozen soils without vegetation. Properties such as soil texture and soil structure affect the hydrologic soil group. There are four hydrologic soil groups: A, B, C, and D.

Hydrologic soil group A consists of soils with low runoff potential when thoroughly wet. Water moves freely through the soil. The texture of these soils is sandy or gravelly with less than 10 percent clay and more than 90 percent sand, although some finer textured soils may be included if they are well aggregated, of low bulk density, or have more than 35 percent rock fragments. (National Engineering Handbook)
Hydrologic soil group B consists of soils with a moderately low runoff potential when thoroughly wet. The texture of these soils is usually loamy sand or sandy loam with between 10 and 20 percent clay and less than 50 to 90 percent sand, although some finer textured soils may be included if they are well aggregated, of low bulk density, or have more than 35 percent rock fragments.
Hydrologic soil group C consists of soils with a moderately high runoff potential when thoroughly wet. The texture of these soils is typically loam, silt loam, sandy clay loam, clay loam, and silty clay loam with between 20 and 40 percent clay and less than 50 percent sand, although some finer textured soils may be included if they are well aggregated, of low bulk density, or have more than 35 percent rock fragments.
Hydrologic soil group D consists of soils with a high runoff potential when thoroughly wet. The texture of these soils is clayey with greater than 40 percent clay and less than 50 percent sand.

Table 3 Hydrologic Soil Groups

3.3.4.2. Hydric Soils

Hydric soils are defined as soils formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. They are also one of the three criteria for determining a regulatory wetland according to the federal criteria. Therefore, we can look at hydric soil maps to give an indication of the extent of wetlands before human alteration of the landscape. Also, hydric soils may not be suitable for infiltration practices as seasonally high water table is too close to the soil surface to allow for proper filtration of pollutants.

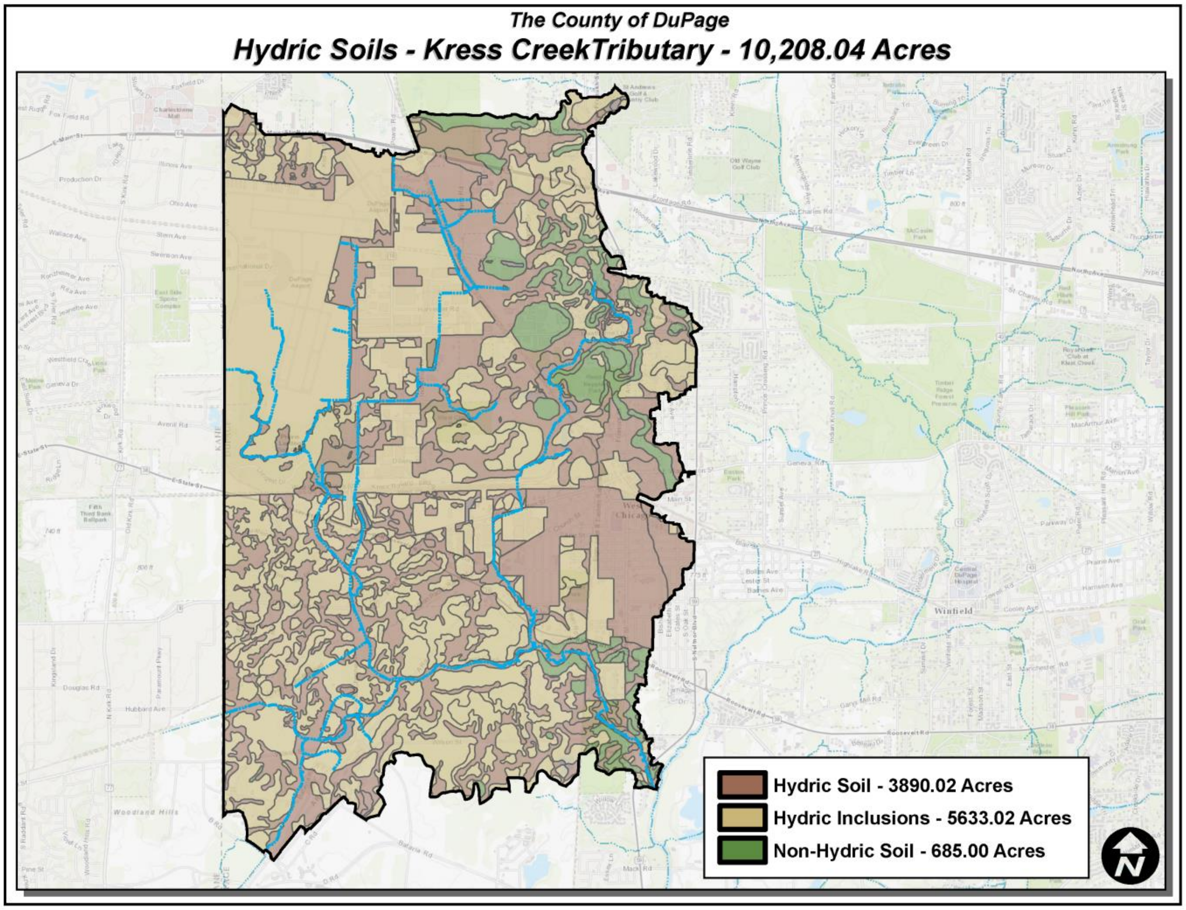


Figure 18 Kress Creek Watershed Hydric Soils

Hydric soils are an indicator of present or historic wetlands. The hydric soil map compared with the current wetland map indicates that wetlands have been drained in the past in this watershed. Some wetlands were drained by the installation of agricultural drain tiles over the past 200 years others were impacted to make way for development. These natural wetlands would have played a huge role in storing and slowly releasing floodwaters, providing essential habitat to wildlife, and filtering stormwater before it entered the stream.

3.3.3.3 Soil Drainage Class

Determining the hydrologic soil group is essential in order to design BMPs and other infiltration practices or projects. For example, soils that are compacted, high in clay or fall in hydrologic soil group C or D may not infiltrate quickly enough to allow the BMP to be functional. On the other hand, soils in hydrologic soil group A or soil with high amounts of sand may infiltrate too quickly for BMPs to be effective. Infiltration that occurs too rapidly may not allow for filtering of pollutants by plant roots and soil before reaching the groundwater, which can lead to a potential contamination of groundwater. Figure 15 shows the soil properties for the Kress Creek Watershed.

Hydrologic soil group classifications may not be accurate in regards to orthents. The disturbance caused by development alters the soil profile from its original state. Therefore, the classification is no longer accurate for the disturbed soil. An onsite investigation by a soil scientist should be conducted in areas mapped as orthents to determine if soil is appropriate for infiltration practices or projects.

Series Name	Hydric	Drainage Class	Hydrologic Soil Group	Runoff Potential	Infiltration Rate	Transmission Rate
Ashkum	Y	Poorly Drained	B	Moderate	Moderate	Moderate
Barrington		Moderately Well Drained	B	Moderate	Moderate	Moderate
Beecher	N	Somewhat Poorly Drained	C	Moderate	Slow	Slow
Blount	N	Somewhat Poorly Drained	C	Moderate	Slow	Slow
Bowes	N	Well Drained	B	Moderate	Moderate	Moderate
Casco	N	Somewhat Excessively Drained	B	Moderate	Moderate	Moderate
Drummer	Y	Poorly Drained	B	Moderate	Moderate	Moderate
Drummer-Barrington-Mundelein	Y		B	Moderate	Moderate	Moderate
Dunham	Y	Poorly Drained	B	Moderate	Moderate	Moderate
Elliott	N	Somewhat Poorly Drained	C	Moderate	Slow	Slow
Fox		Well Drained	B	Moderate	Moderate	Moderate
Graymont		Moderately Well Drained	B	Moderate	Moderate	Moderate
Grays		Moderately Well Drained	B	Moderate	Moderate	Moderate
Grundelein	N	Somewhat Poorly Drained	B	Moderate	Moderate	Moderate
Harpster	Y	Poorly Drained	B	Moderate	Moderate	Moderate
Markham	N	Moderately Well Drained	C	Moderate	Slow	Slow
Markham-Ashkum-Beecher	Y		B	Moderate	Moderate	Moderate
Millstream	N	Somewhat Poorly Drained	B	Moderate	Moderate	Moderate
Mundelein	N	Somewhat Poorly Drained	B	Moderate	Moderate	Moderate
Muskego and Houghton mucks	Y	Very Poorly Drained	A	Low	High	High
Orthents	N	Moderately Well Drained	C	Moderate	Slow	Slow
Ozaukee	N	Moderately Well Drained	C	Moderate	Slow	Slow
Peotone	Y	Very Poorly Drained	B	Moderate	Moderate	Moderate
Rush	N	Well Drained	B	Moderate	Moderate	Moderate
Sawmill	Y	Poorly Drained	B	Moderate	Moderate	Moderate
Thorp	Y	Poorly Drained	C	Moderate	Slow	Slow
Warsaw	N	Well Drained	B	Moderate	Moderate	Moderate
Wauconda	N	Somewhat Poorly Drained	B	Moderate	Moderate	Moderate
Waupecan	N	Well Drained	B	Moderate	Moderate	Moderate
Zurich	N	Moderately Well Drained	B	Moderate	Moderate	Moderate

Water Feature	N/A	N/A	N/A	N/A	N/A	N/A

Table 4 Soil Drainage Class and Properties

3.3.3.4 Highly Erodible Soils

The soil erodibility factor of a soil (K) is a measure of the susceptibility to erosion. This can occur as sheet erosion, a flat rate of erosion over the entire surface, or as rill erosion, or the concentration of erosive flows to a central low point which creates small runnels through the soil. Several factors contribute to the K factor of a soil. These include infiltration rate, water storage capacity, permeability, cohesiveness, structure, and texture. Soil erodibility is one factor used in determining average annual soil loss (A) using the Revised Universal Soil Loss Equation (RUSLE). [1]

Fragment free soil erodibility is the estimated erodibility of the fine earth fraction of a soil. This is for particles less than 2 millimeters in size and does not include coarse fragments. A higher Kf indicates greater susceptibility of a soil to erosion. The fragment free soil erodibility of the Kress Creek watershed is shown in Table 5:

Kress Creek Tributary Soil Series	
Series Name	**Erodibility (Kf)**
Ashkum	0.2
Barrington	0.28
Beecher	0.37
Blount	0.37
Bowes	0.32
Casco	0.37
Drummer	0.24
Drummer- Barrington-Mundelein	0.28
Dunham	0.24
Elliott	0.32
Fox	0.37

[1] RUSLE is calculated as:

$$A=R \times K \times L \times S \times C \times P$$

where:

A= average annual soil loss
R= Rainfall runoff factor
K= soil erodibility
L=slope length factor
S= slope steepness factor
C= cover management factor
P= erosion control practice factor

Graymont	0.28
Grays	0.37
Grundelein	0.32
Harpster	0.24
Markham	0.37
Markham- Ashkum-Beecher	0.37
Millstream	0.32
Mundelein	0.28
Muskego	NA
Orthents	0.32
Ozaukee	0.43
Peotone	0.24
Rush	0.37
Sawmill	0.28
Thorp	0.37
Warsaw	0.43
Wauconda	0.37
Waupecan	0.37
Zurich	0.37
Water Feature	NA

Table 5 Soil Erodibility

3.4 Land Use & Land Cover

Land use in the Kress Creek Watershed is varied as displayed in Figure 19. In the eastern side of the watershed, land use is a typical suburban mix of residential areas with commercial uses along major thoroughfares. In the central part of the watershed, industrial land use is dominant. In the north eastern corner, transportation use is dominant due to the DuPage Airport. Large pockets of open space are present in land holdings owned by the Forest Preserve District of DuPage County and the West Chicago Park District. The southern part of the watershed is institutional land use as Fermi Lab is partially located in this watershed.

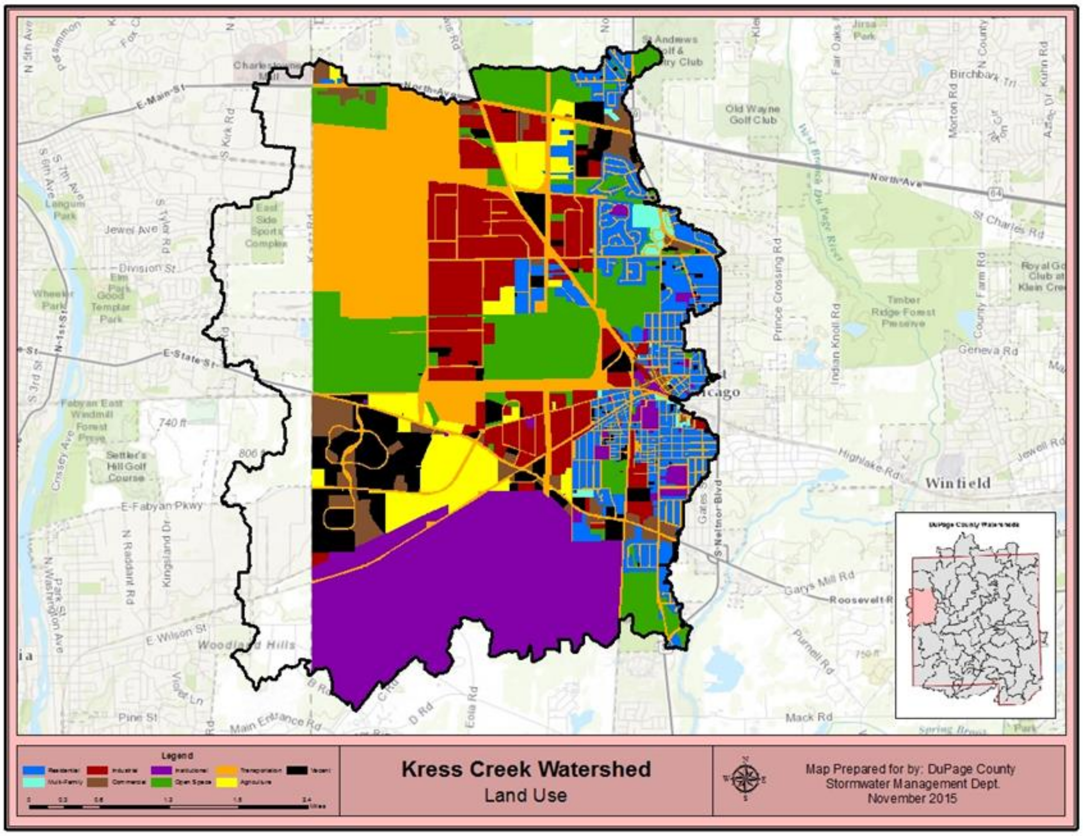


Figure 19 Land Use

3.4.1 Historical Land Cover

Mainly located in northern DuPage County, the Kress Creek watershed is suburban land use. However, given its history as a railroad hub, there are more industrial land uses here than in a typical suburban watershed. The watershed uses consist of residential subdivisions, commercial zones, industrial areas, an airport, park districts, forest preserve open space, and a portion of Fermi National Laboratory. The landscape has been highly altered over time. Like most Midwestern areas, the Kress Creek watershed was a tallgrass prairie before being converted to agricultural use following European settlement of North America. As shown in Figure 20, this area remained highly agricultural through the middle part of the 20th century. The City of West Chicago was located at the convergence of several railroad tracks. Besides the town center, this area was not largely developed. The watershed land use consisted of farms, undeveloped open space, and a few homes.


Figure 20 Kress Creek Watershed in 1956

Over the past 50 years, the Kress Creek watershed has developed into a typical suburban region. The large expanses of farm fields have been replaced with residential subdivisions and light industrial areas. Many of the railroads remain including the UP, EJ&E, and the Burlington Northern lines. One railroad has been decommissioned and converted into a regional bike path by the DuPage County Department of Transportation, the Prairie Path Geneva Spur (Figure 21).

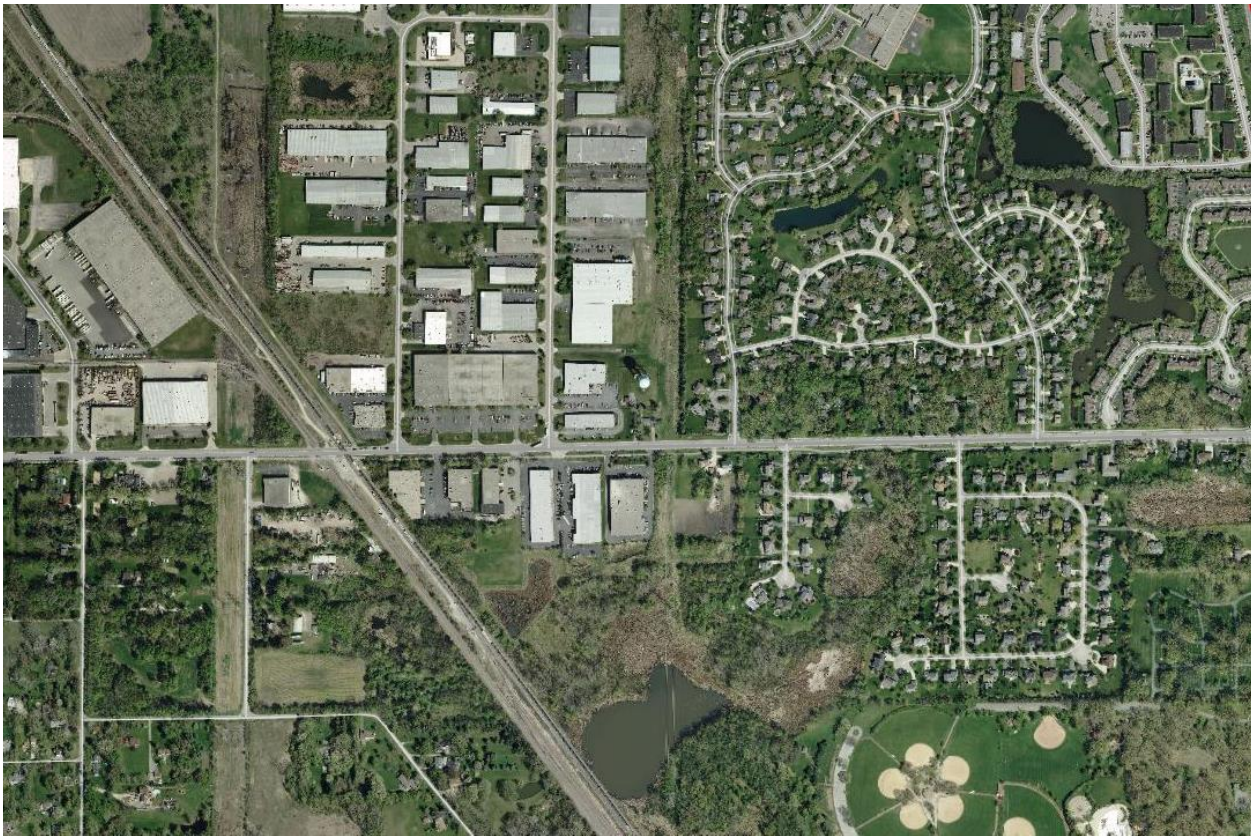


Figure 21 Kress Creek Watershed in 2014

3.4.2 Impervious Surfaces

The eastern half Kress Creek watershed has been significantly developed over the years, impervious cover is fairly high as shown in Figure 22. Impervious cover is any surface in the landscape, including driveways, roads, parking lots, rooftops, and sidewalks, that cannot effectively absorb and infiltrate rainfall. The water that runs off of impervious surfaces is drained through engineered collection systems and discharged into nearby waterbodies. The stormwater carries trash, bacteria, heavy metals, pesticides, oil, sediment, fertilizers, salt, and other pollutants from the urban landscape, degrading the quality of the receiving waters. Higher flows can also cause erosion and flooding in urban streams, damaging habitat, property, and infrastructure. Impervious area makes up nearly 20% of the Kress Creek Watershed. Of this total impervious area, 44% is roadways (Table 6).

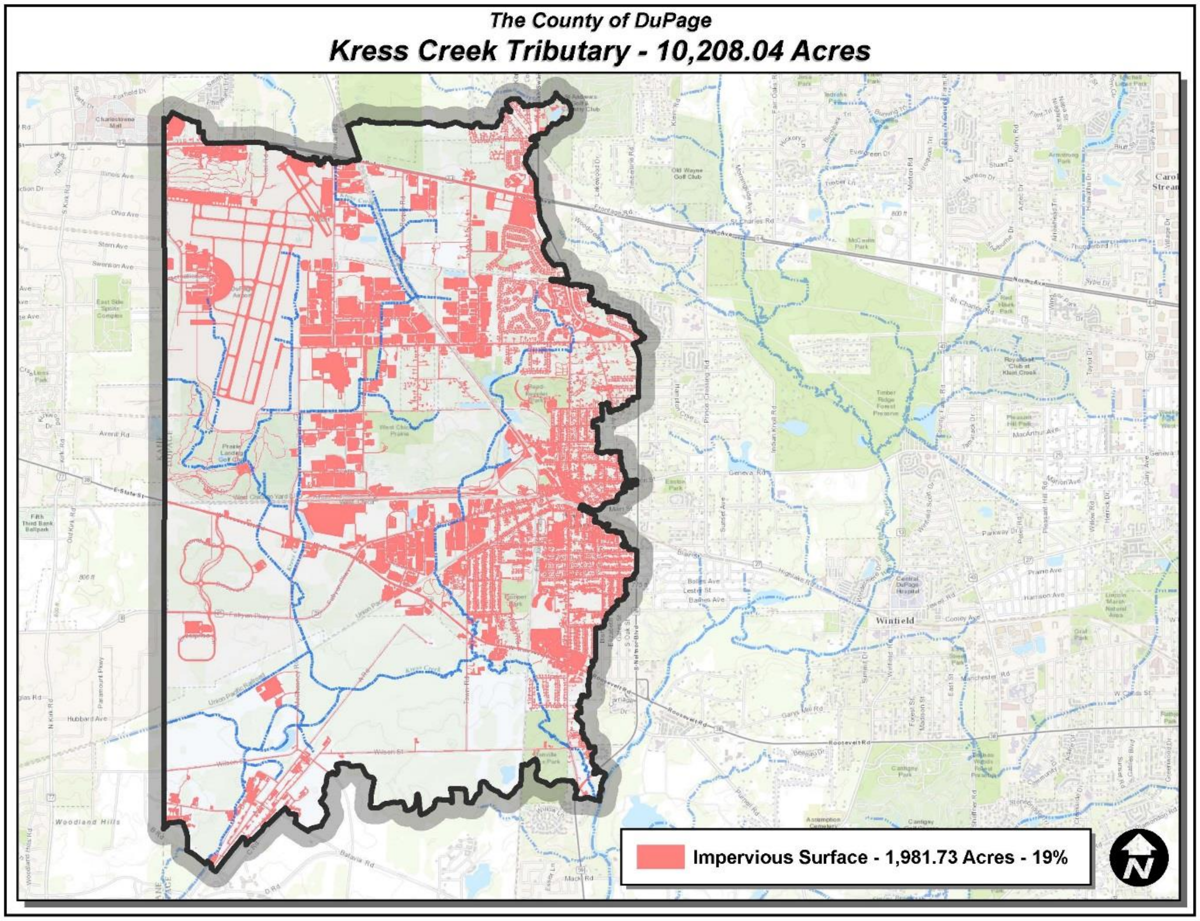


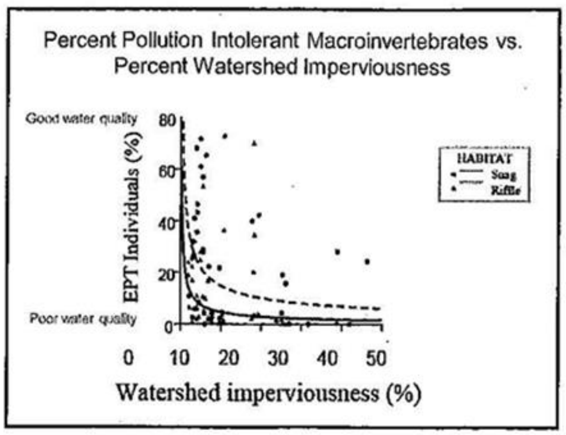
Figure 22 Impervious Area

Entity	Lane Acerage
City of West Chicago	547.60
DuPage County DOT	58.88
Illinois DOT	107.94
Wayne Township	9.66
Winfield Township	70.32
City of Batavia	29.44
City of Geneva	31.70
City of St. Charles	20.59
Total	876.12

Entity	Lane Miles
City of Batavia	8.07
City of Geneva	8.72
City of St. Charles	5.66
City of West Chicago	142.27
DuPage County DOT	12.28
Illinois DOT	33.96
Wayne Township	2.58
Winfield Township	19.34
Total	232.88

Table 6 Roadway Acreage and Lane Miles

A growing body of scientific literature has shown that groundwater recharge, stream base flow, and water quality measurably change and can decrease as impervious cover increases. Studies illustrate a direct relationship between the intensity of development, as indicated by the amount of impervious surface, and the degree of damage to aquatic life in the watershed. Two examples are illustrated below (Figure 27), where the macroinverebrate community is noted to decline as the imperviousness approaches ten percent and fish species are impacted when imperviousness exceeds fifteen percent. In general, stream quality becomes impacted when imperviousness exceeds 10% of the watershed and non-supportive of aquatic life above 25% impervious, as is illustrated in Figure 28.



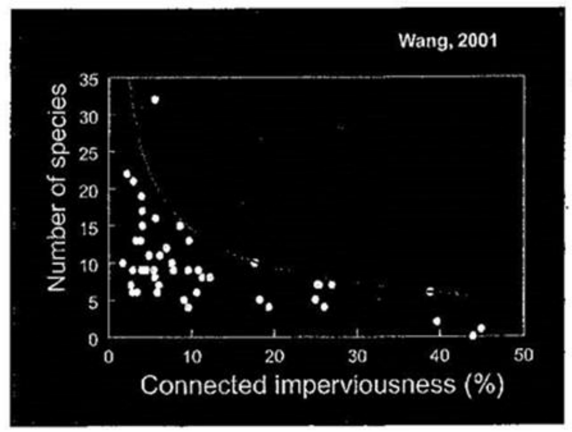


Figure 23 Watershed Imperviousness Relating to Impacts on Aquatic Species. Images taken from Meeting TMDL, LID, and MS4 Permit Requirements: Using WinSLAMM to Assess Quality and Volume Controls (2010)

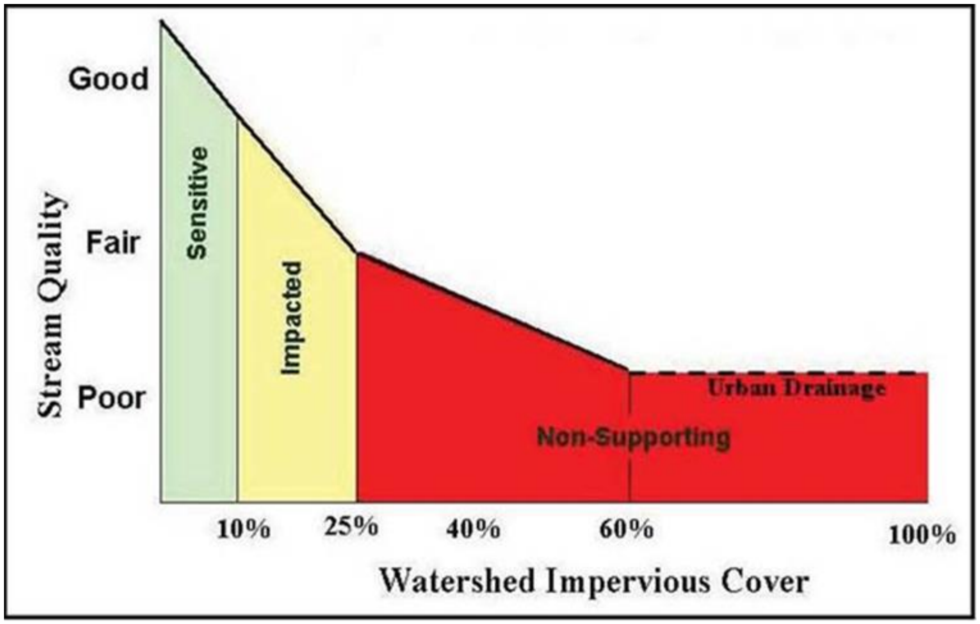


Figure 24 Comparison of stream quality versus impervious cover of a watershed courtesy of Impacts of Impervious Cover on Aquatic Systems: Watershed Protection Research Monograph (2003)

3.4.3 Wetlands

Wetlands provide numerous benefits to the surrounding ecosystem. Wetlands filter nutrients into the soil and help to filter pollutants out of the water. Wetlands also control flooding by absorbing water runoff from storms. One acre of wetlands has the potential to store 1 to 1 ½ million gallons of floodwater. Wetlands also contribute to groundwater supply by filtering stormwater runoff though the system to remove pollutants and returning it to the underground aquifers. Many species of animals and plants depend on wetlands for habitat and nourishment. Wetlands make up only an approximate 5% of land in the continental U.S., but almost 1/3 of plant species can be found in wetlands.

Kress Creek Watershed contains 954.48 acres of wetlands. This makes up about 9% of the land area of the entire watershed. Most of the wetlands in the watershed are located on public land such as the Forest Preserve, Park Districts, or Fermi Lab property.

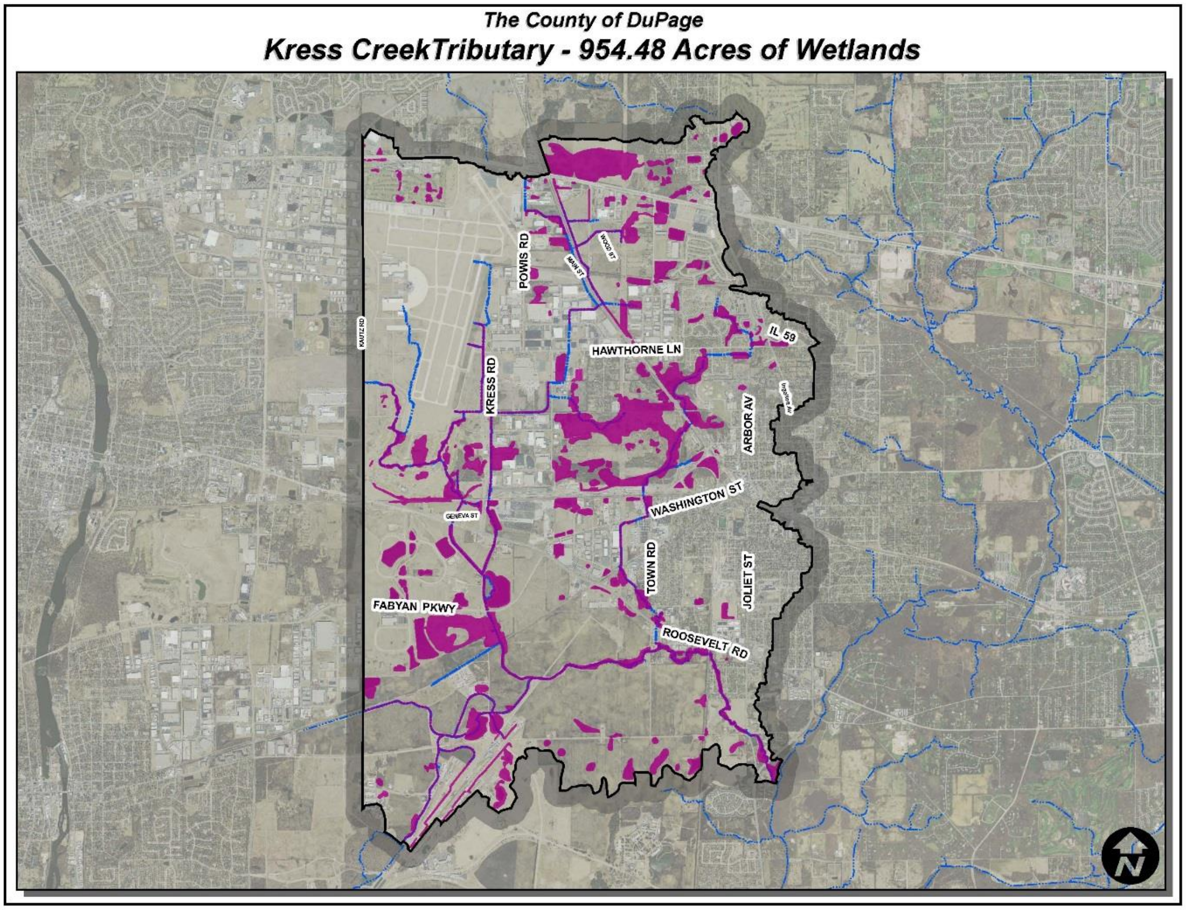


Figure 25 Kress Creek Watershed wetlands.[2]

Of the wetlands that remain in the planning area, there are critical wetlands found in DuPage County Forest Preserves and on private property, an example of which is illustrated in Figure 26. Critical wetlands are those that have been identified by DuPage County as having the highest value by virtue of one or more high-ranking characteristics that result in a uniquely valuable environment. Some of the natural wetlands in the watershed flow directly into Kress Creek, while others are isolated.

[2] DuPage County's Wetland Map was created using the National Wetland Inventory (NWI) standards. Therefore, any Waters of the U.S. are mapped as wetlands, regardless of jurisdictional status. Based on the NWI criteria, excavated ponds, impoundments and detention basins are mapped as wetlands despite not serving the same functions for water quality and aquatic habitat as true wetlands.

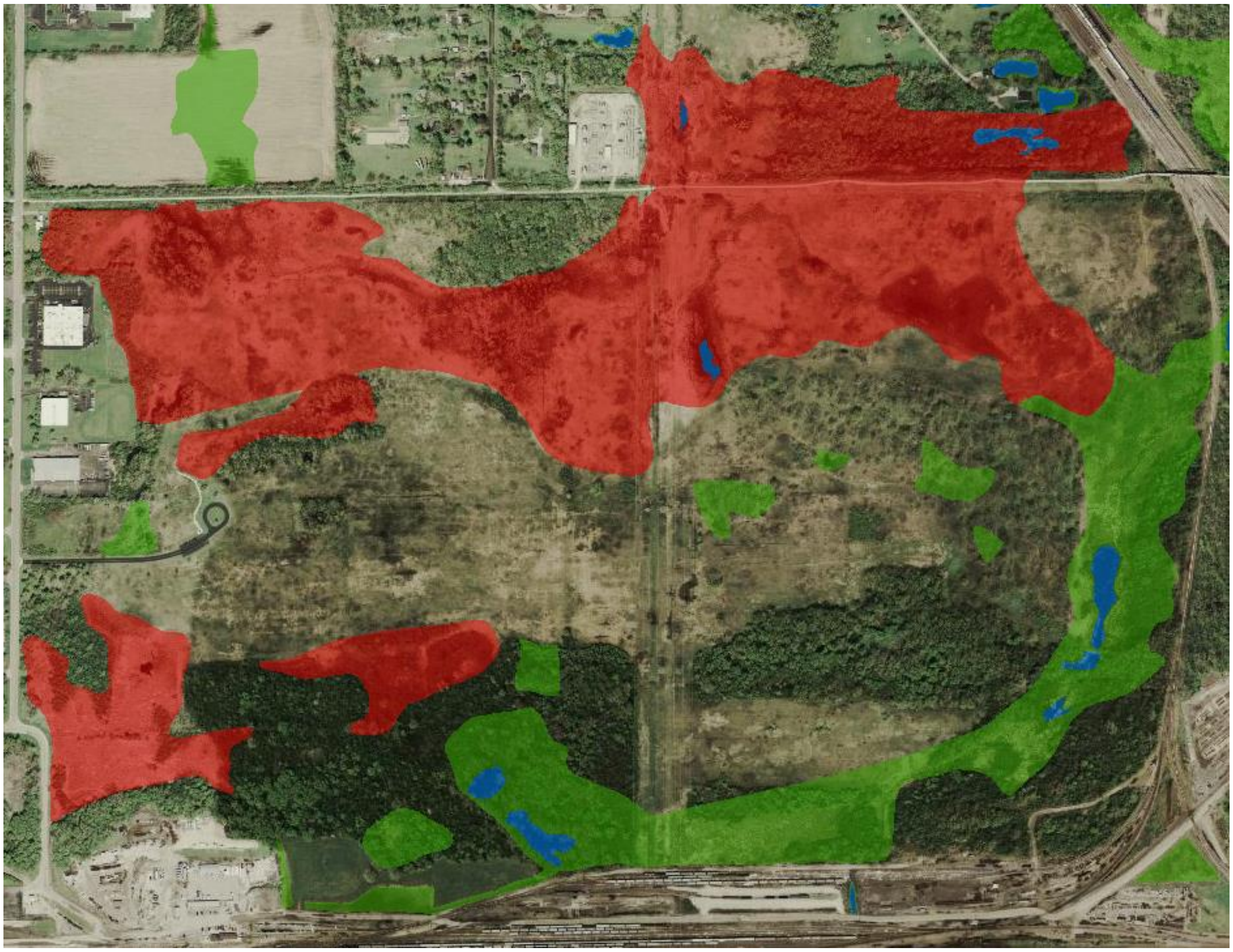


Figure 26 Critical wetlands found in West Chicago Prairie Forest Preserve.

3.4.4 Open Space

Another result of the significant development in the Kress Creek Watershed is a decrease in open space. Despite the open space preserved by the FPDDPC and West Chicago Park District, the watershed has only 828 acres of open space, which is about 8% of the surface area (Figure 27). This does not include Fermi Lab property, which is considered "institutional". On the bright side, public agencies own most of the existing open space, which limits future development and opens opportunity for inter-governmental cooperation on potential projects. Some of the notable open spaces in the planning area include:

- ***West Chicago Prairie Forest Preserve:*** Owned by the FPDDC, West Chicago Prairie Forest Preserve is located in the central part of the Watershed, northwest of the confluence of the Union Pacific and the EJ&E Railway. This 358-acre preserve is also home to the Truitt-Hoff nature Preserve, a state-designated nature preserve.[3] (http://www.dupageforest.org/Conservation/Forest_Preserves/West_Chicago_Prairie.aspx)
- ***Reed Kepler Park:*** Located in West Chicago and owned by the West Chicago Park District (WCPD), Reed Kepler Park is contains a sports and recreation complex, dog park, as well as the 25 acre Dyer Nature Sanctuary and Trail. (http://www.we-goparks.org/parks)

[3] www.dupageforest.com/Conservation/Forest_Preserves/Maple_Grove.aspx

- ***Manville Oaks:*** Also located on WCPD property, Manville Oaks lies partially within the Kress Creek watershed. Kress Creek flows through Manville Oaks just before the confluence with West Branch DuPage River.

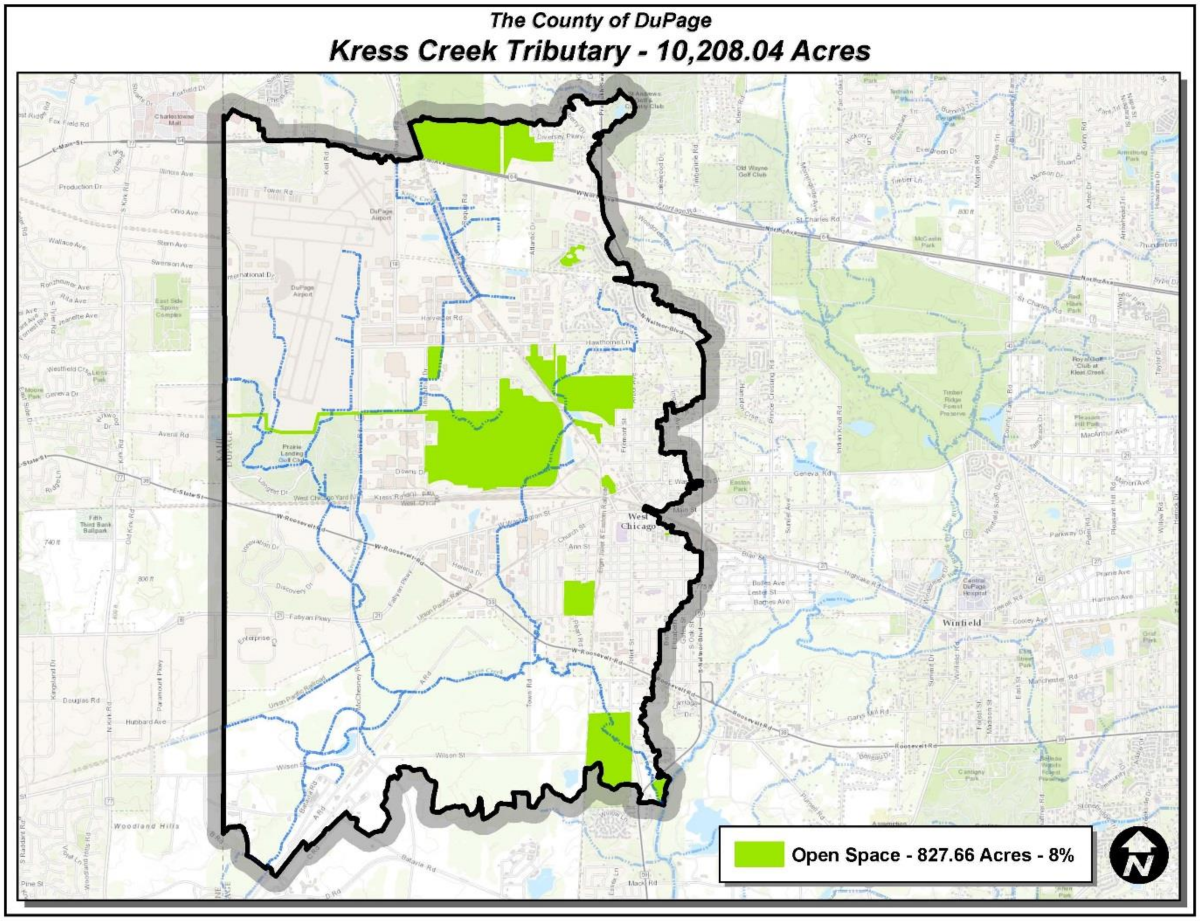


Figure 27 Kress Creek Watershed open space.

3.5 Water Resource Conditions

3.5.1 Watershed Drainage System

Stormwater within the Kress Creek Watershed flows in a general south-east direction beginning near North Avenue flowing south until changing course and flowing east in Fermi Lab property. Kress Creek continues to flow in an easterly direction until reaching the West Branch of the DuPage River.

As previously mentioned, the Kress Creek Watershed is located in the northwestern part of DuPage County and drains stormwater from two counties, two townships and three municipalities. The Watershed boundaries include the northern most part of the watershed is approximately North Ave; the southernmost part of the watershed is through the central part of Fermi Lab; the furthest point east in the watershed is just east of Arbor Avenue and Joliet Streets; and the furthest point west just over the

Kane County border. Eighteen different tributaries run through Kress Watershed which are numbered accordingly. WBKR001, WBKR002, WBKR003, WBKR004, WBKR005, WBKR006, WBKR007, WBKR008, WBKR009, WBKR010, WBKR011, WBKR012, WBKR013, WBKR014, WBKR015, WBKR016, WBKR017, WBKR018. There are also 22 smaller tributaries which are generally labeled WBKR000.

The northernmost headwaters of Kress Creek (WBKR015) begin just south of North Avenue along Powis Road. This tributary then turns east parallel to Powis Court before meeting up with two smaller tributaries and heading southeast along the EJ&E railway. Here WBKR015 meets with WBKR16 and turns west then south crossing Harvester Road then Hawthorne Lane. Kress Creek then heads west crossing Industrial Drive and merging with WBKR014, which flows from West Chicago Prairie Forest Preserve. From here Kress Creek mainstem (WBKR001) begins and flows south.

Meanwhile, the westernmost tributary of Kress Creek begins in Kane County and flows east under Kautz Road into Prairie Landing Golf Course. Another tributary is contained within pipes under DuPage Airport and flows south converging in Prairie Landing as WBKR010. Tributary WBKR011 flows south along the eastern edge of the DuPage Airport and meets with WBKR010 to become WBKR009 on the east side of Prairie Landing before heading south across the UP railway. WBKR continues south and east before converging with Kress Creek mainstem.

Kress Creek mainstem flows generally south crossing Fabyan Parkway. WBKR is a small tributary that runs along the UP railway and flows into Kress Creek at the UP railway crossing. From here, five tributaries from the Fermi Lab property flow northeast into Kress Creek (WBKR003, WBKR004, WBKR005, WBKR006, and WBKR007).

The easternmost tributary (WBKR002) flows in a north to south direction through the City of West Chicago. It meets up with the Kress Creek mainstem south of Roosevelt Road and east of Town Road. Kress Creek then flows southeast under the EJ&E railway, through Manville Oaks Park District, under Joliet Street, and finally crossing under IL Rt. 59 (Neltnor Road) before the confluence with the West Branch DuPage River within the DuPage County Forest Preserve property.

Of the estimated 163,680 linear feet of Kress Creek, approximately 38,122 feet (23%) of the stream length is piped (Figure 28). The piped segments are varied and scattered throughout the streams length. Many of these piped segments are culverts, roads, and railway crossings.

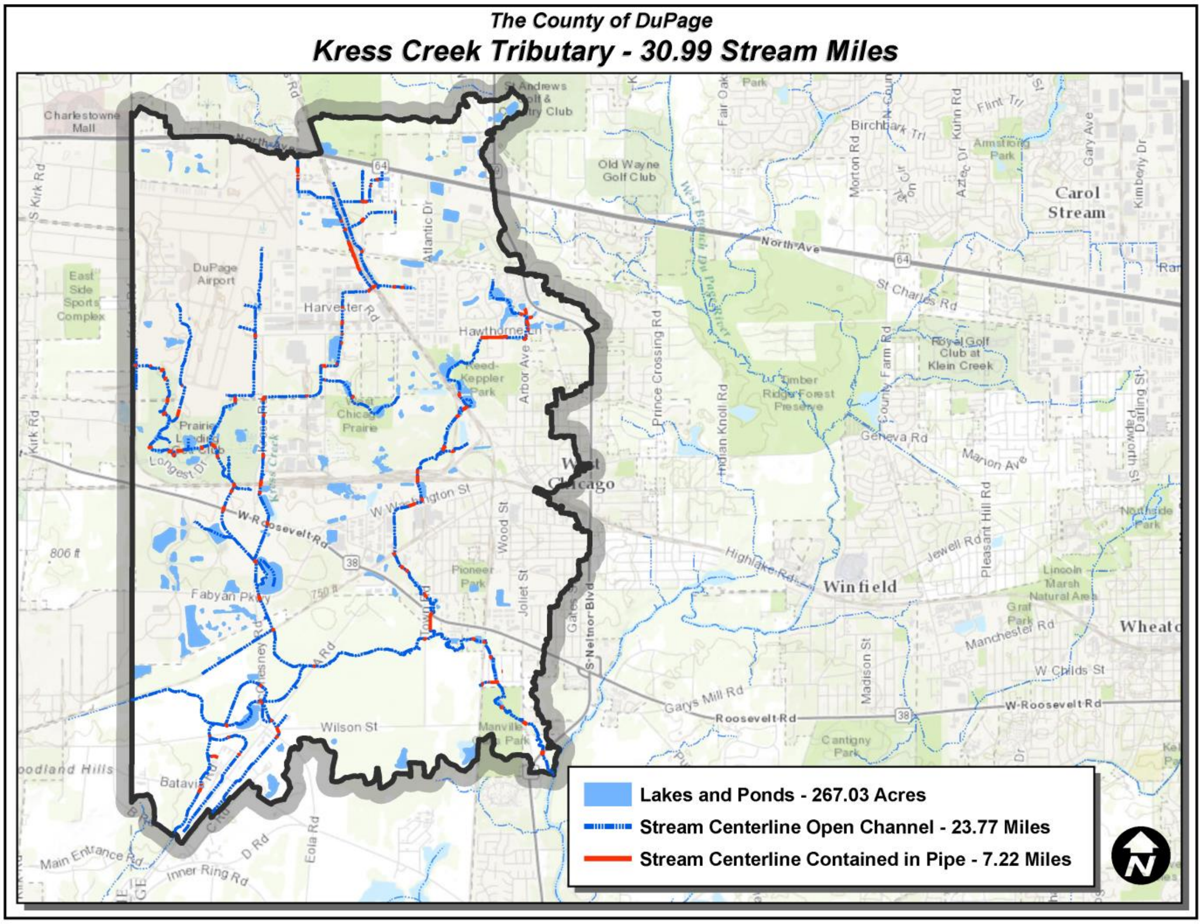


Figure 28 Piped stream segments of Kress Creek

Impoundments such as piped segments of stream, culvert crossings, and dams impact the movement of fish and aquatic life and also decrease dissolved oxygen levels. There are two known dams within Kress Creek. A sheet pile dam is located east of Kress Road just north of the Downs Drive crossing in West Chicago. A labyrinth weir is located north of Fabyan Parkway.

Figure 29 Kress Road sheet pile dam

Figure 30 Fabyan Parkway labyrinth wier

3.5.2 Physical Stream Conditions

During the development of the Plan, DuPage County staff performed stream assessments along Kress Creek and its tributaries, where possible, to identify sediment accumulation, streambank erosion, channelization and riparian buffer. Figure 31 shows the 22 data collection points and 18 reaches, outlined above.

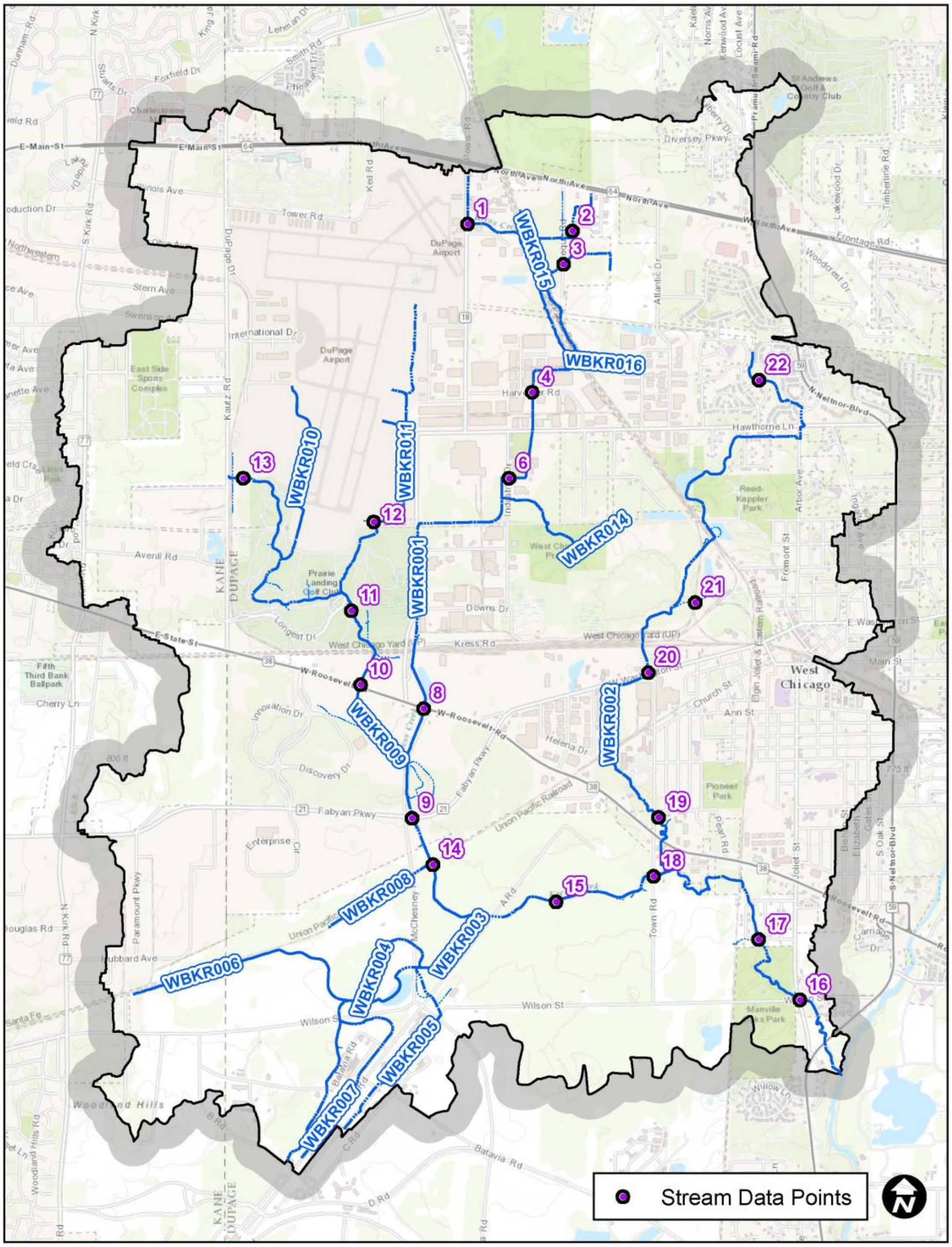


Figure 31 Stream assessment points for Kress Creek.

3.5.2.1 Sediment Accumulation

Sediment transport is an important part of stream and river dynamics, but too much accumulation can deteriorate waterways. In the case of an urban stream like Kress Creek, streambank erosion that leaves soil exposed carries dislodged sediment downstream. Effects of sediment accumulation on a stream include decreased biodiversity, lowered quality of habitat, increased transfer of pollutants and increased biological oxygen demand.

DuPage County staff identified the degree of sediment accumulation at 22 data points by assessing silt deposits in pools, embedded riffles, mid-channel bars and islands, enlargement of point bars and deposition in areas above the streambank. The quality of these stream sections were then ranked on a four-point scale, ranging from no sediment accumulation to high sediment accumulation. As demonstrated in Figure 32, sediment accumulation for Kress Creek is moderate to high in less than half of the assessment points along the stream.

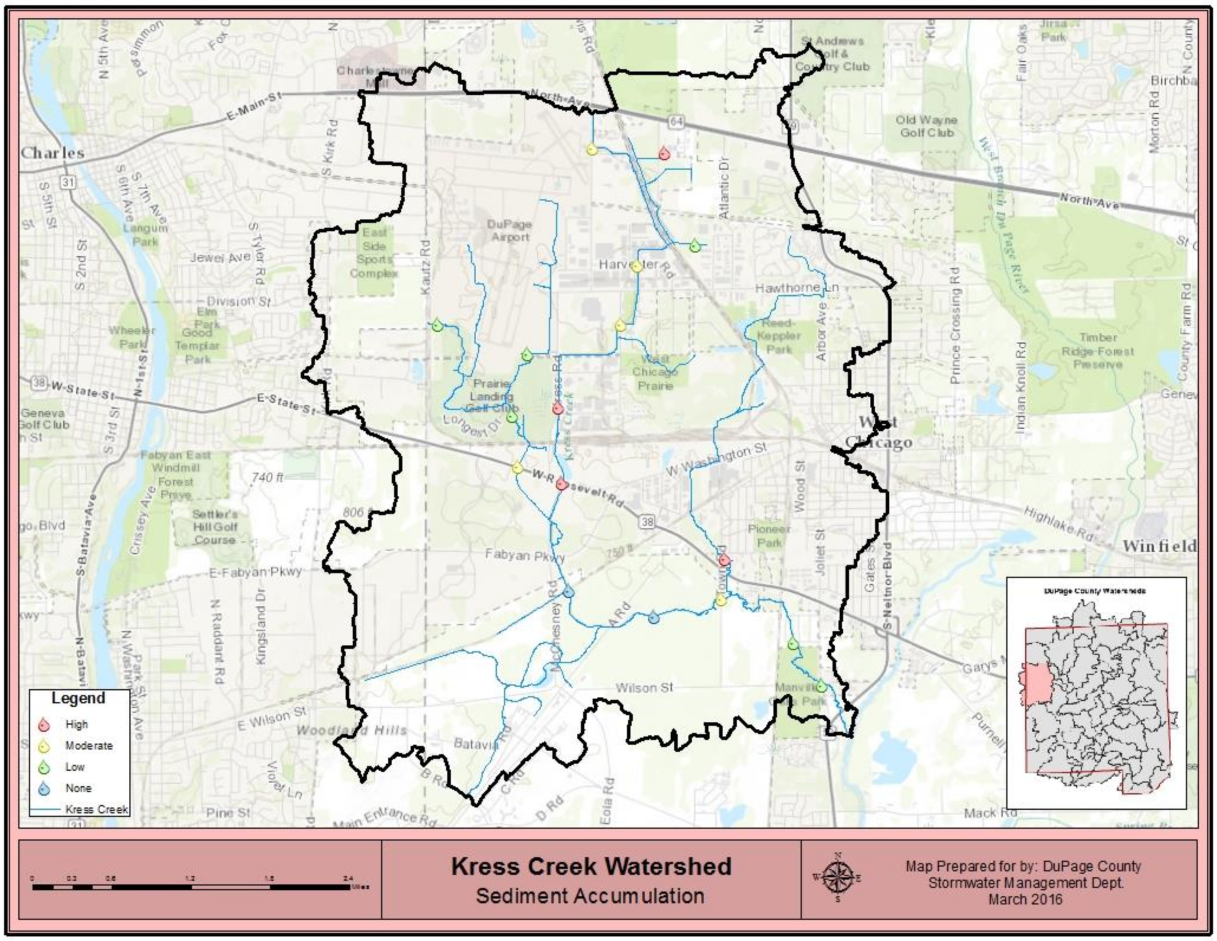


Figure 32 Sediment accumulation based on Kress Creek stream assessments

3.5.2.2 Streambank Erosion

Erosion is a natural process allowing for the continued renewal of rivers, streams and creeks. However, urbanization in a watershed can cause this natural process to accelerate, which can lead to poor water quality, increased flooding or even damage to surrounding properties. A variety of factors affects erosion of streambanks, including soil type, slope, precipitation, vegetation cover and management practices.

Figure 33 Eroded streambanks along Kress Creek

Both sides of stream were evaluated at each of the 22 data points for erosion when assessing streambank erosion on Kress Creek. Shown in Table 7, a total of 10,153 feet of streambank was reviewed for this study. Data points were assessed on a four-point scale ranging from no or minimal evidence of erosion or bank failure to very severe erosion where the bank is unstable and has evident "raw" areas because of extreme erosion. In total, 14% of the streambank assessed exhibited no erosion. Moderate erosion was observed along more than 75% of the banks. Severe erosion was evident along the remaining 10% of the banks. Figure 34 illustrates locations along Kress Creek where erosion was found. Additional areas of erosion were noted during the watershed planning process by stakeholders, municipal representatives, and by reviewing previous studies and are shown later in this document.

Stream or Tributary Name	Reach Code	Stream Length Assessed (ft)	None or Low Erosion (ft/%)		Moderate Erosion (ft/%)		High Erosion (ft/%)	
Kress Creek	1	8193	300	3.66%	6993	85.35%	900	10.98%
Kress Creek	2	825	150	18.18%	525	63.64%	150	18.18%
Kress Creek	9	585	285	48.72%	300	51.28%	0	0%
Kress Creek	11	300	300	100%	0	0%	0	0%
Kress Creek	16	150	150	100.00%	0	0.00%	0	0.00%
Kress Creek	18	300	300	100.00%	0	0.00%	0	0.00%
Totals		**10353**	**1485**	**14.34%**	**7818**	**75.51%**	**1050**	**10.14%**

Table 7 Erosion severities along Kress Creek streambanks

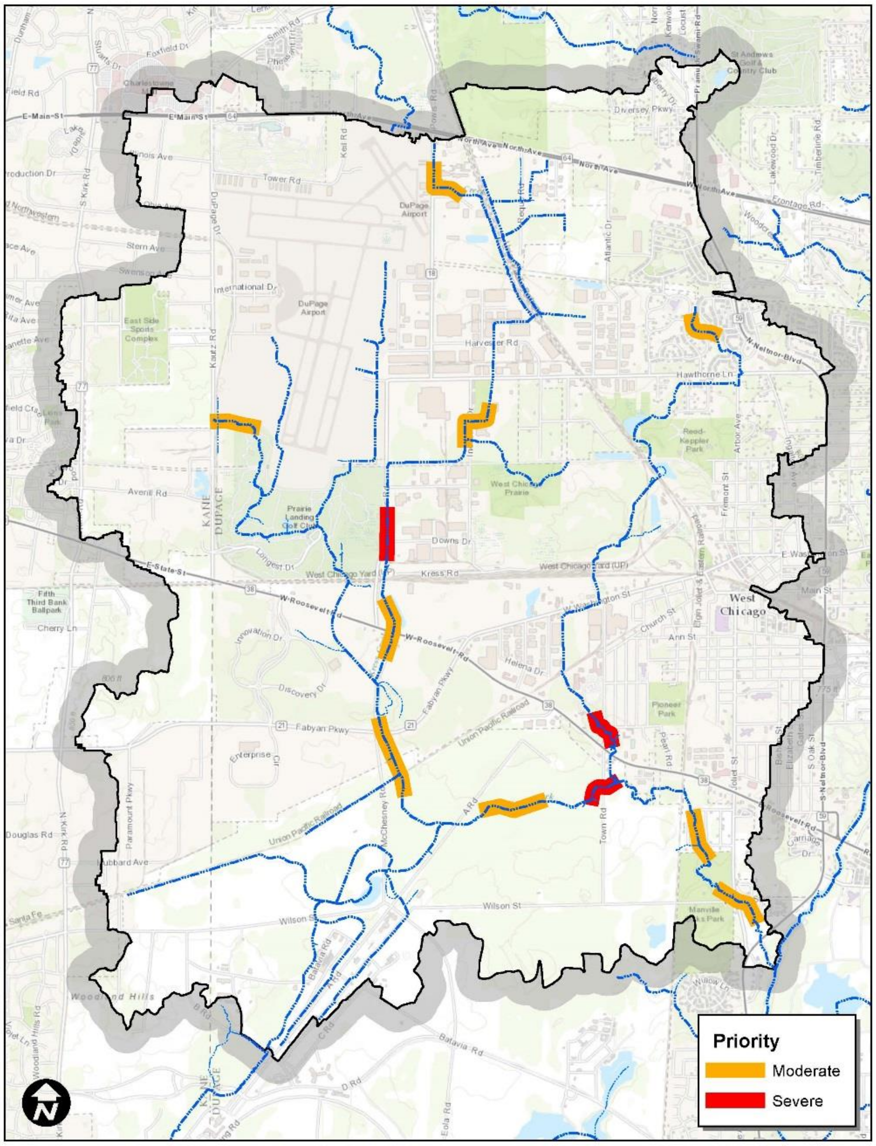


Figure 34 Severe and moderately eroded streambank locations

3.5.2.3 Channelization

Channelization severely degrades water quality of a river or stream. Stream channelization can cause an increase in water velocity, streambank erosion and pollutant dispersion, while also negatively affecting aquatic habitat and, thus, biodiversity. As demonstrated in Table 8, 29% of the assessment locations had none or low evidence of channelization, indicating the presence of a natural meander to the stream. The remaining assessment points (71%) exhibited moderate channelization, which is characterized by a straight channel with some concrete or armor. None of the reaches investigated showed high channelization, which is a straight channel with concrete streambed and banks. In reviewing the stream reference map, many straightened portions of Kress Creek can be seen. These reaches were contained within pipes, as on the DuPage Airport property, or were considered to be moderately channelized due to the lack of hard armoring.

Stream or Tributary Name	Reach Code	Stream Length Assessed (ft)	None or Low Channelization (ft/%)		Moderate Channelization (ft/%)		High Channelization (ft/%)	
Kress Creek	1	8193	1425	17.39%	6768	82.61%	0	0.00%
Kress Creek	2	825	825	100%	0	0%	0	0%
Kress Creek	9	585	285	48.72%	300	51.28%	0	0%
Kress Creek	11	300	0	0%	300	100%	0	0%
Kress Creek	16	150	150	100%	0	0%	0	0%
Kress Creek	18	300	300	100%	0	0%	0	0%
Totals		**10353**	**2985**	**28.83%**	**7368**	**71.17%**	**0**	**0%**

Table 8 Channelization of Kress Creek

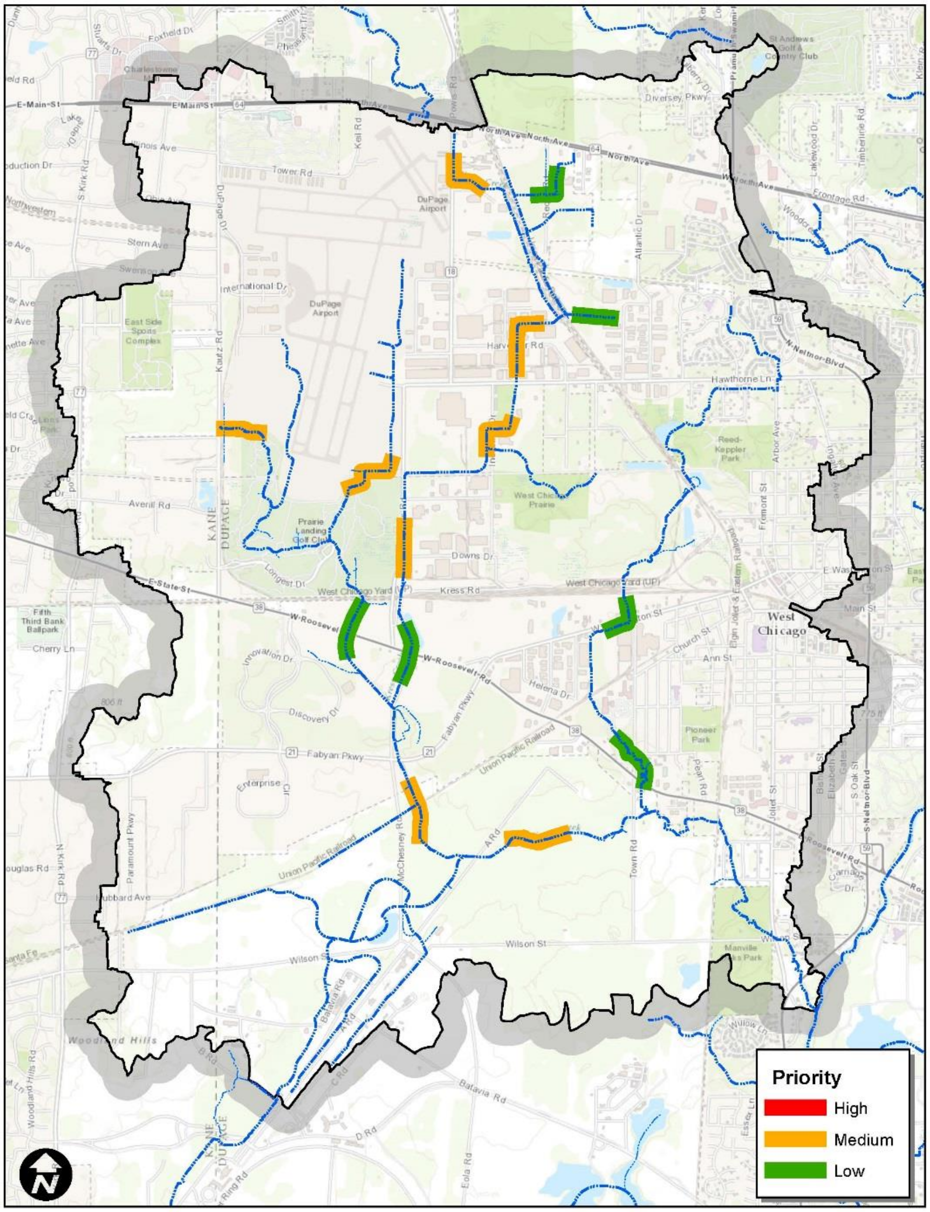


Figure 35 Channelization of Kress Creek at stream assessment data points

3.5.2.4 Riparian Area Condition

DuPage staff rated the riparian area condition of Kress Creek using the results of the evaluations for erosion, channelization and sediment accumulation, summarized in Table 9. At each stream assessment location, the condition of the riparian area was determined for each of the segments. For the purpose of this study, only naturally vegetated buffers were assessed as the DuPage Ordinance has established that mowed turf buffers provide little or no function to the stream system.[4] In fact, these areas of

[4] DuPage County Stormwater and Flood Plain Ordinance, 2013.

maintained turf can actually contribute to water quality issues with pesticides, herbicides and grass clippings running into the adjacent stream.

Stream or Tributary Name	Reach Code	Stream Length Assessed (ft)	Good Condition (ft/%)		Fair Condition (ft/%)		Poor Condition (ft/%)	
Kress Creek	1	8193	1200	14.65%	3744	45.70%	3249	39.66%
Kress Creek	2	825	150	18%	525	64%	150	18%
Kress Creek	9	585	135	23.08%	150	25.64%	300	51%
Kress Creek	11	300	0	0%	0	0%	300	100%
Kress Creek	16	150	150	100%	0	0%	0	0%
Kress Creek	18	300	0	0%	300	100%	0	0%
Totals		**10353**	**1635**	**15.79%**	**4719**	**45.58%**	**3999**	**38.63%**

Table 9 Riparian Condition at stream assessment data points

As shown in Table 9, DuPage staff rated nearly half of the areas as being in fair condition; however, another 39% of the areas were in poor condition. This data indicates that riparian area has been highly altered and degraded from its natural state.

3.5.3 Stormwater Detention Basins

In an attempt to create a comprehensive inventory of detention basins throughout the Kress Creek Watershed, DuPage County staff and partner municipalities identified basins throughout the study area using GIS data, aerial maps and field visits. Following basin identification, DuPage County staff physically assessed each of them, compiling the data into an ArcGIS Collector Application. The basin assessments included type, buffer and erosion. Staff then assessed the overall water quality benefit of each of the 126 basins (Figure 36), rating each good, fair or poor.

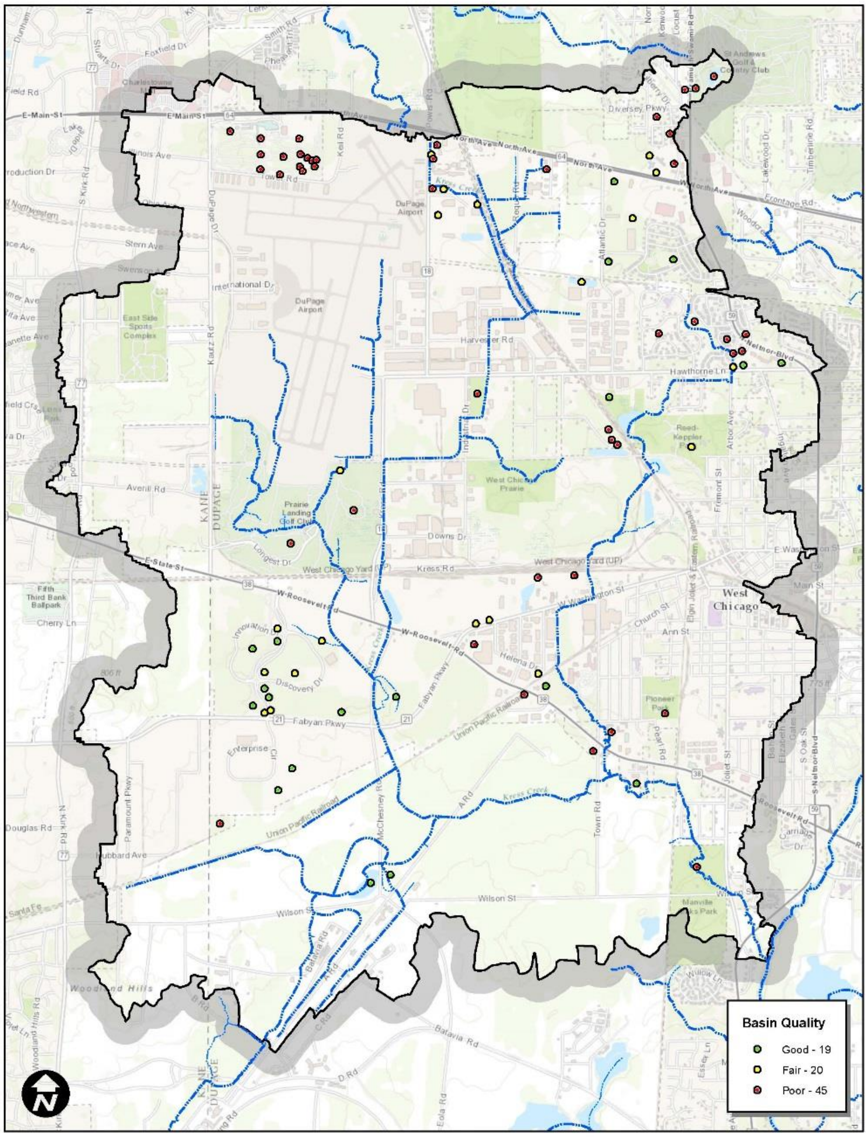


Figure 36 Types of detention basins in Kress Creek Watershed.

The types of basins found in the watershed included dry naturalized, dry turf, wet, wet with extended dry and constructed wetland. When in good condition, these basins play an important role in water quality by retaining stormwater runoff and filtering pollutants before slowly releasing the runoff back into the stream. The indicators DuPage staff used to determine the water quality benefit of the basins included:

- Side slope cover
- Side slope angle
- Native plant buffer
- Waters' edge cover
- Basin bottom cover
- Shoreline erosion
- Safety shelf

- Sediment forebay
- Short circuit
- Inlet/outlet stilling basins
- Connection to other basins
- Basin uses and maintenance
- Retrofit opportunities

In total, staff categorized 72 basins within the watershed as poor, as shown in Table 10. Those basins were then compared to critical areas within the watershed to prioritize opportunities for retrofits.

Political Jurisdiction	# of Basins	Detention Basin Type					Water Quality Benefit		
		Wet	Dry Turf	Dry Naturalized	Wet w/ Extended Dry	Constructed Wetland	Good	Fair	Poor
Batavia	1	1	0	0	0	0	0	0	1
St. Charles	22	20	0	0	2	0	0	0	22
Unincorporated	9	7	0	0	0	2	5	0	4
West Chicago	94	76	5	3	7	3	21	28	45
Total	**126**	**104**	**5**	**3**	**9**	**5**	**26**	**28**	**72**

Table 10 Detention basin assessments in the Kress Creek Watershed.

3.5.4 Groundwater Evaluation

Groundwater is a valuable natural resource. Although much of DuPage County receives drinking water from Lake Michigan, there are approximately Contamination of this groundwater is serious because of the risk to human health and the environment, but also because cleanup of groundwater is very difficult, if not impossible. Even if the source is eliminated, contamination in the groundwater can persist for long periods. According to the Illinois Groundwater Protection Act (IGPA), the ongoing contamination of Illinois' groundwater will adversely affect the health and welfare of its citizens, as well as the economic viability of the state.[5] According to records form the DuPage County Health Department, there are a total of 292 properties that receive drinking water from private or public wells within the Kress Creek Watershed (Figure 37).

[5] http://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1595&

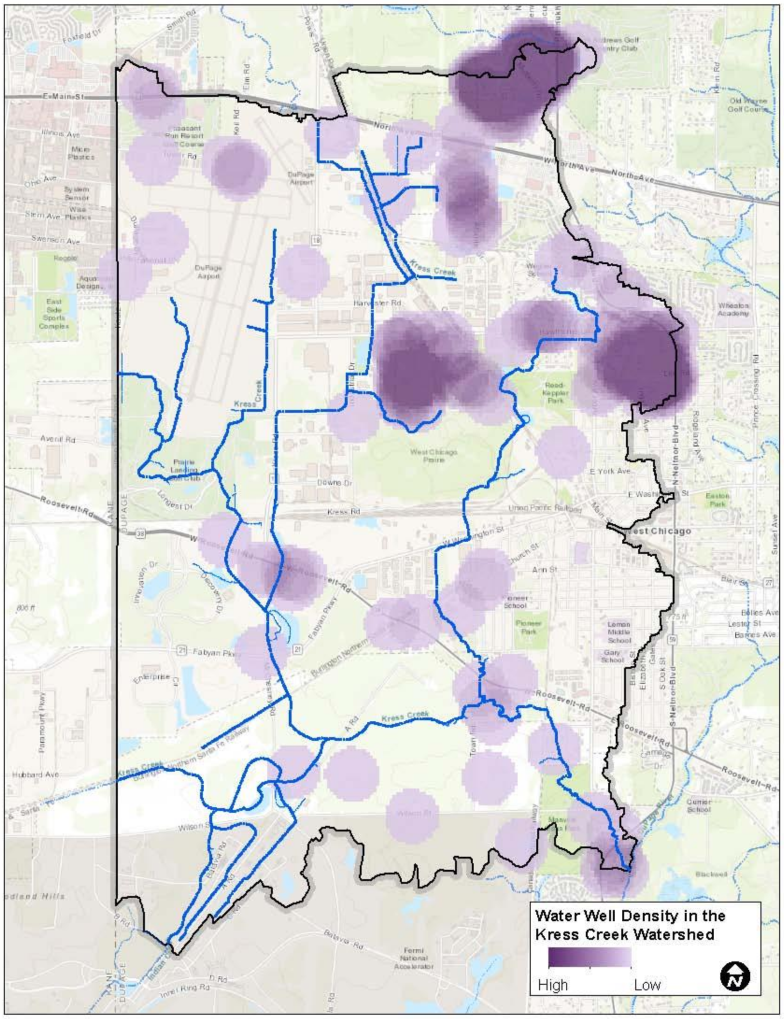


Figure 37 Density of private well water sources in Kress Creek Watershed.[6]

Groundwater also feeds many of the County's natural resources, including wetlands, streams, springs, ponds and a few lakes. As such, DuPage County is located in one of four priority groundwater protection planning regions.[7] The IEPA established the priority areas by reviewing recharge area mapping, groundwater pumping data, population affected, water supply characteristics and solid waste planning efforts, among other factors. For this reason, recharge of aquifers is necessary.

As shown in Figure 38, the principle aquifer under DuPage County is the Silurian-Devonian aquifer. However, many people interact with surficial aquifer systems found in sand and gravel found at or near the surface and alluvium along streams and rivers.[8]

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[6] http://www.rmms.illinois.edu/RMMS-JSAPI/

[7] Illinois Groundwater Protection Program, established under Section 17.2 of the IGPA

[8] https://pubs.usgs.gov/ha/730k/report.pdf

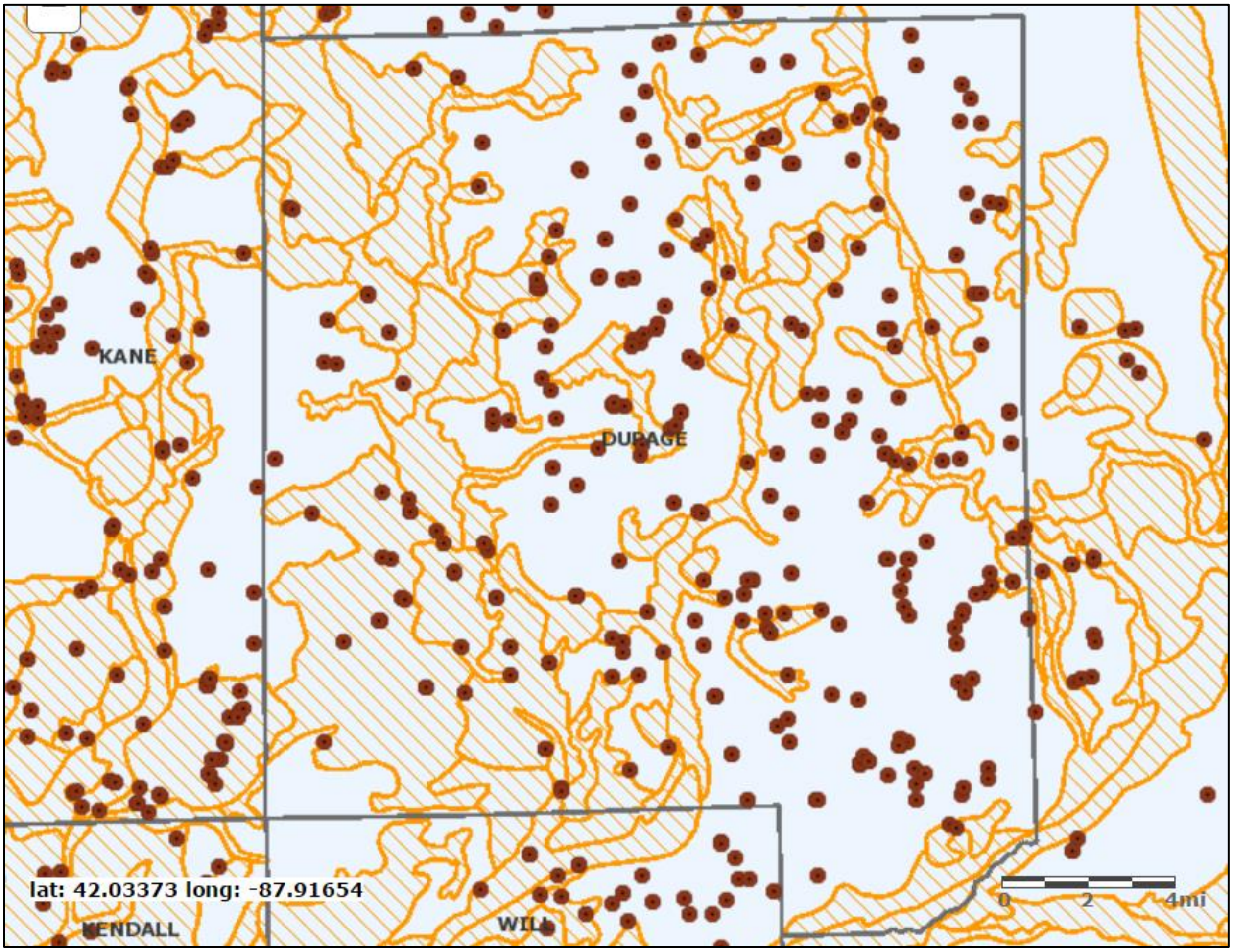

Figure 38 Potential aquifers and community wells in DuPage County.[9]

Under the DuPage County Stormwater Ordinance, development that triggers the need for volume control is also required to treat runoff for pollutants. Infiltration is a commonly used practice as it can provide both volume and pollutant control in one practice. However, the Ordinance recognizes that certain soils may not have pollutant removal capabilities due to high permeability. In order to protect groundwater from inadvertent contamination, the following are prohibited from installing infiltration practices onsite:

- Fueling and maintenance areas
- Areas within 400 feet of a public well
- Sites containing contaminants of concern as identified by the EPA or IEPA
- Development sites with soils in hydrologic soil group A
- Areas with a seasonally high water table within 2 feet of the surface
-

[9] Less than 50 feet deep. http://www.rmms.illinois.edu/RMMS-JSAPI/

3.5.5 Surface Water Quality

3.5.5.1 Designated Uses, Assessment & Impairment Status

Every two years, in accordance with Sections 305(b) and 303(d) of the federal Clean Water Act (CWA), the IEPA reports to the USEPA on the quality of Illinois surface water (i.e. lakes, streams and wetlands) and groundwater resources (Section 305(b)) and provide a list of those waters where their designated uses are deemed 'impaired' (Section 303(d)). There are seven designated uses in Illinois; however, only five of those uses apply within the Kress Creek Watershed. These designated uses are aquatic life, fish consumption, primary contact, secondary contact and aesthetic quality.

Kress Creek was first added to Illinois' §303(d) list in 2012 as assessment unit IL_GBKB-01, which extends approximately 7.91 miles from the bridge crossing at Powis Road downstream until the confluence with West Branch DuPage River. Currently, Kress Creek is listed as not supporting the aquatic life use. Alteration of streamside vegetative cover, dissolved oxygen, and loss of instream cover are recognized as causes of the aquatic life impairment. Channelization and loss of riparian habitat are suspected sources of the noted causes.

Of the five designated uses of Kress Creek, the IEPA's 2016 Illinois Integrated Water Quality Report and Section 303(d) List only evaluated it for aquatic life, assessing it as not supporting (Table 11). The primary reasons for this classification were due to inadequate levels of dissolved oxygen (Table 12).[10] Table 13 summarizes the causes and sources of these impairments, and the next section discusses them in further detail.[11]

Designated Use	Use ID	Assessed in 2016	Use Attainment
Aquatic Life	582	Yes	Not Supporting
Fish Consumption	583	No	N/A
Primary Contact	585	No	N/A
Secondary Contact	586	No	N/A
Aesthetic Quality	590	No	N/A

Table 11 IEPA's Kress Creek 2016 determination of designated uses.

Waterbody	Assessment Unit ID	Size	Causes of Impairment(s)	Sources of Impairment(s)

[10] as identified in the 303(d) list (Appendix A-2) of the 2016 Integrated Report
[11] as identified in Appendix B-2 of the 2016 Integrated Report

Kress Creek	IL_GBKB-01	7.91 miles	Alteration in stream-side or littoral vegetative covers; oxygen, dissolved; and loss of instream cover.	Channelization and loss of riparian habitat.

Table 12 Assessment Information for waterbodies in the Kress Creek Watershed.

Waterbody	Assessment Unit ID	Size	Impaired Designated Use	Causes of Impairment(s)
Kress Creek	IL_GBKB-01	7.91 miles	Aquatic Life	Dissolved Oxygen

Table 13 303(d) Information for waterbodies in the Kress Creek Watershed.

IEPA assesses aquatic life designated uses with four separate categories – streams, freshwater lakes, Lake Michigan and indigenous aquatic life. These categories are labeled "Fully Supporting" or "Not Supporting" when the assessment is completed by using biological, water chemistry and habitat data. The "Fully Supporting" label means the category is in good condition whereas the "Not Supporting" label means the category is in fair or poor condition.

To assess aquatic life uses in streams, the three biological indices used are the fish Index of Biotic Integrity (fIBI), the macroinvertebrate Index of Biotic Integrity (mIBI), and the Macroinvertebrate Biotic Index (MBI). These indices are compiled into decision matrices with water quality data and physical habitat information compiled from the Intensive Basin Survey, Ambient Water Quality Monitoring Network or Facility-Related Stream Survey programs. Once all the available information is included in the decision matrices, IEPA determines if the stream is impaired for aquatic life use and if impaired, to what degree.

3.5.5.2 Other Stream Studies

In October 2009, the IEPA finalized the DuPage River/Salt Creek Watershed TMDL Stage 1 Report (Insert Footnote http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/tmdls/reports/dupage-river-salt-creek/stage1.pdf), which describes the initial stages in development of a Total Maximum Daily Load (TMDL) for 17 impaired waterbodies throughout those watersheds. A TMDL is an estimation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. It assesses contributing point and nonpoint sources to identify pollution reductions necessary for designated use attainment. Pollutant reductions are then allocated to contributing sources, thus triggering the need for pollution control and increased management responsibilities among sources in the watershed.

In response to concerns about the TMDL that was being developed, a local group of communities, Publically Owned Treatment Works (POTWs) and environmental organizations, organizing under the DRSCW, came together to better determine the stressors to the aquatic systems through a long-term water quality monitoring program, and, ultimately, develop and implement viable remediation projects.

The DRSCW began collecting data throughout the West Branch DuPage River watershed in 2006 and established three monitoring stations to collect chemical, biological and habitat information along Kress Creek. As shown in Figure 39, The DRSCW monitoring takes place at three points along Kress Creek: at the southwest corner of the Illinois Prairie Path and Kress Road (WB02), approximately 1,200 feet downstream from the Burlington Northern Railroad crossing (WB01), and at the northwest corner of Joliet Street and Wilson Street (WB03).

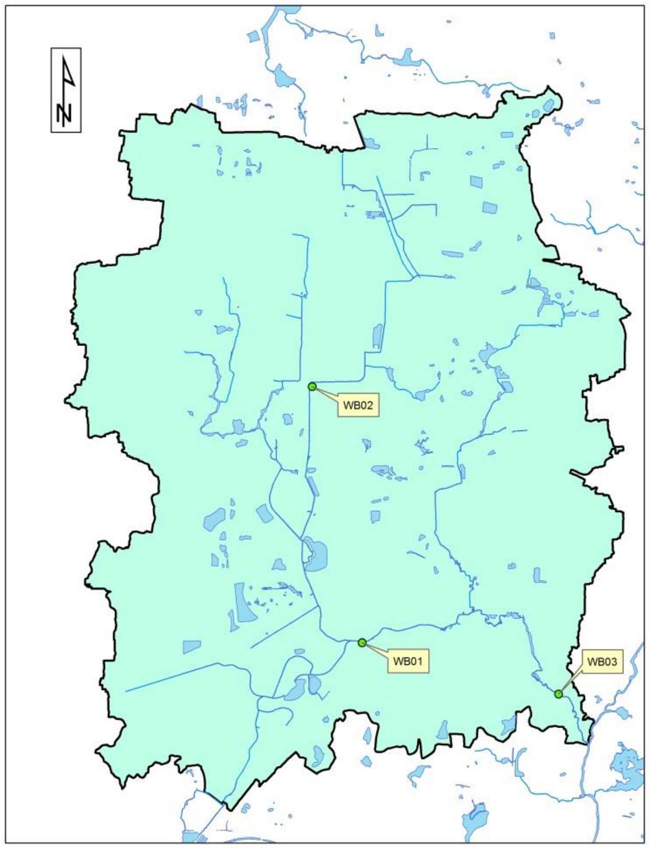

Figure 39 DRSCW monitoring sites along Kress Creek.

At each of these collection points, fIBI (Figure 40) and mIBI (Figure 41) data was collected in 2006, 2009 and 2012. At monitoring station WB02, mIBI indicate severe impairments in stream quality. The fIBI scores at all three locations indicate severe impairments.

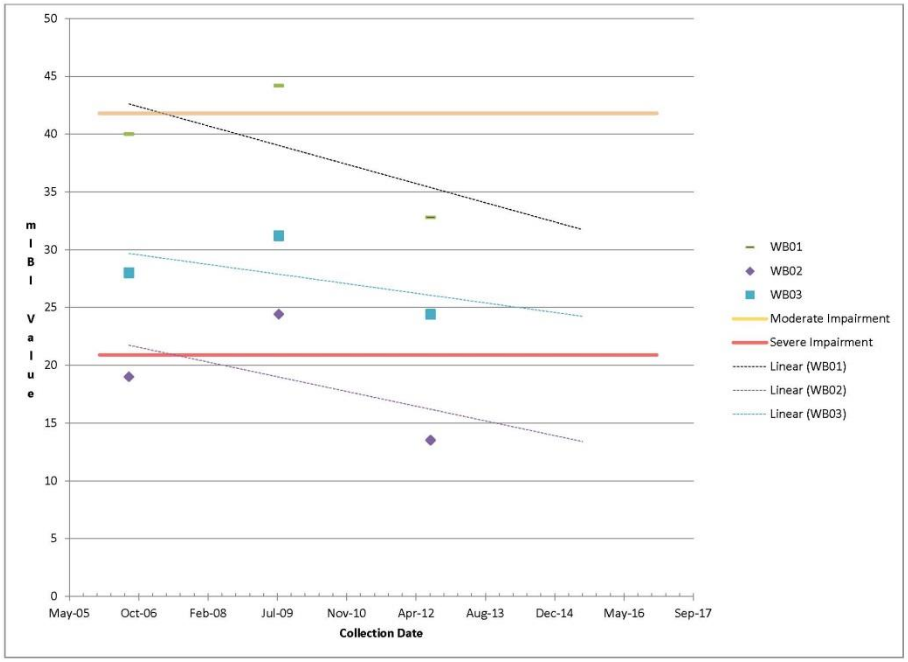

Figure 40 mIBI scores for Kress Creek watershed

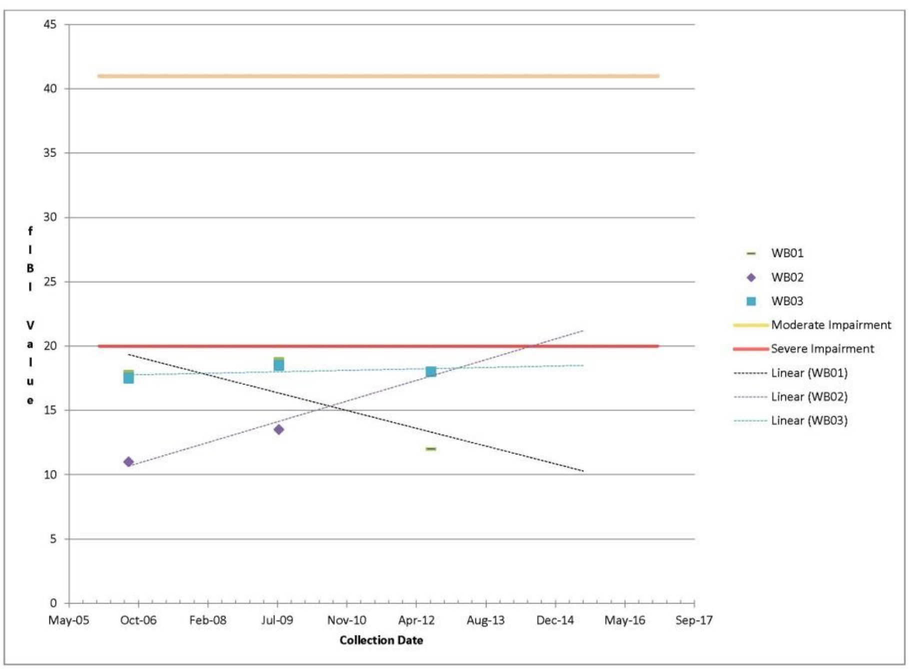

Figure 41 fIBI scores for Kress Creek.

In addition, DRSCW assessed DO levels at each of the monitoring stations. Table 12 provides levels for 2009, 2012, and 2015.

Site	Date	Concentration (mg/L)
WB01	7/1/2009	9.96
	7/14/2009	7.49
	7/17/2009	6.18
	9/29/2009	6.54
	6/4/2012	28.0
	6/18/2012	26.5
	6/25/2012	28.0
	7/17/2012	6.60
	5/28/2015	8.63
	7/1/2015	7.64
	7/31/2015	6.37
	8/19/2015	9.18
WB02	6/22/2009	**4.18**
	7/14/2009	5.72
	9/8/2009	5.49
	10/19/2009	7.30
	6/4/2012	11.8
	6/18/2012	10.9
	6/27/2012	16.7
	8/19/2012	6.99
	5/28/2015	9.30
	6/19/2015	6.54
	7/1/2015	6.60
	7/31/2015	6.06
WB03	6/22/2009	7.27
	7/14/2009	8.82
	8/14/2009	7.47
	10/16/2009	9.55
	11/5/2009	7.85
	6/4/2012	15.9
	6/12/2012	20.5
	6/21/2012	11.2
	6/25/2012	12.9
	6/27/2012	12.6
	7/2/2012	10.3
	6/10/2015	6.60
	6/24/2015	5.91
	7/1/2015	6.91
	7/17/2015	6.57
	7/30/2015	6.87
	8/11/2015	6.91

Table 14 DRSCW's assessment of DO on Kress Creek

To assess existing conditions, the data is interpreted by a statistical analysis to identify which parameters are degrading aquatic life. Bioassessment surveys of Kress Creek were completed in 2009, 2011, and 2015. As shown in Table 15, the monitoring indicates elevated concentrations of nitrogen within the water column, as well as a need to restore the habitat within the stream and riparian corridor to allow for increased assimilative capacity.

Station	Proximate Stressor(s)	Project Description	Project Objective

WB01	Ammonia-nitrogen; Lack of riffles; Poor substrate, channel condition, and riparian corridor	Stormwater treatment; Habitat restoration	Increase assimilative capacity; Reduce organic load; BMPs for PAHs
WB02	Ammonia-nitrogen; Lack of riffles; Poor substrate and channel condition	Stormwater treatment; Habitat restoration	Increase assimilative capacity; Reduce organic load
WB03		Stormwater treatment (retrofit infrastructure)	Increase assimilative capacity; Reduce organic load; BMPs for PAHs

Table 15 DRSCW's bioassessment conclusions.

3.5.6 Citizen Reporter Web Application

The DuPage County Citizen Reporter App was launched in May 2016.[12] The intent of this web-based GIS application is to collect observations from DuPage County citizens on water quality impairments or concerns. These observations can then be used for the purpose of identifying water quality practices or projects for watershed planning efforts. The public can view the observations and "vote" if they agree with the report. Photos and comments can also be attached to these reports.

In an effort to engage the citizens of the Kress Creek Watershed, an informational flyer was sent to each resident or property owner within the floodplain of the Kress Creek Watershed. More than 800 mailings were sent to properties encouraging residents to use the app or contact us by email or phone to share observations on Kress Creek. A total of 2 responses were received as detailed in Table 16.

Type of Impairment	Number of Reports
Stream Blockage	
Sediment	
Streambank Erosion	
Water Quality Issues	1
Illegal Dumping	
Garbage	
Other	1

Table 16 Citizen reports from DuPage County's reporter web application.

3.6 Pollutant Sources

3.6.1 Nonpoint Sources

The primary goal of this watershed plan is to prompt a reduction of designated-use impairments in Kress Creek. Table 17 lists the causes of impairment as determined in the 303(d) list, along with a list of sources of these impairments. Recommendations to reduce the primary nonpoint source pollutants and, thus, improve the quality are described in the next section.

Cause of Impairment 303(d) Aquatic Life	***Source of Impairment 303(d) Aquatic Life***

[12] http://gis.dupageco.org/CitizenReporter/

Impairment	***Impairment***
Alteration in stream-side or littoral vegetative covers	Channelization
Dissolved Oxygen	Loss of Riparian Habitat
Loss of Instream Cover	
Cause of Impairment (Perceived)	***Source of Impairment (Perceived)***
Fecal Coliform	Municipal point source discharges
Mercury	Site clearance (land development or redevelopment)
PCBs	Streambank modifications/destabilization
Phosphorus	Source unknown
Nitrogen	Urban runoff/ storm sewers
Sedimentation/Siltation	Atmospheric Deposition
Loss of Instream Cover	Contaminated Sediments
pH	Habitat Modification
Chloride	Highway/Road/Bridge Runoff (Non-Construction Related)
Temperature	Loss of Wetlands, Drainage & filling
Nitrogen	Industrial Point Source Discharge
Debris/Floatables/Trash	Municipal (Urbanized High Density Area)
Petroleum Hydrocarbons	Herbicide Application
TSS	Pesticide Application
Oil & Grease	Roadway Deicing
	Impoundments (Culvert Crossings/Dams)
	Changes in stream flow due to hydraulic and hydrologic alteration from surrounding development
	Streambank erosion

Table 17 Causes and sources of degraded water quality in the Kress Creek Watershed

3.6.1.1 Nonpoint Source Pollutant Load Modeling

The IEPA and DRSCW assessments indicate pollutants of concern within Kress Creek may include BOD and Total Nitrogen along with physical modifications to stream structure. However, in order to develop a successful plan for reducing pollutants in waterways, it is necessary to evaluate the entire watershed to determine the nonpoint sources that are contributing to these issues. Pollutant load modeling will give a fuller picture of pollutants entering the stream from urban runoff.

The EPA developed a pollutant load estimation model that has been used widely throughout this region for obtaining pollution loads at a watershed scale. This model, the Spreadsheet Tool to Estimate Pollutant Loads (STEPL), estimates background or pollutant loads from existing land uses. STEPL can also determine potential reductions to these pollutant loads through implementation of water quality projects and practices. For the Kress Creek watershed, STEPL was used to generate background nonpoint source loads for TN, TP, TSS and BOD. Although oil and grease is a pollutant of concern, STEPL is not able to estimate pollutant loads for this.

STEPL estimates pollutant loads based on land use information entered into the model. Each sub-watershed is evaluated individually, and then this information can be broadened into the entire watershed. DuPage County land use data – clipped to sub-watershed boundaries – serves as the baseline information for this evaluation. STEPL contains pre-determined pollutant loads determined for specific land uses, and it can be used for agricultural, forest or urban land. As the Kress Creek watershed is in a developed “suburban” area, only urban land uses were used.

Figures 42 through 45 map the background pollutant loads of TN, TP, TSS and BOD for existing land use in the Kress Creek Watershed. As dissolved oxygen levels are related to increased nutrients, pollutant loadings were evaluated for TSS, TP, and TN as well.

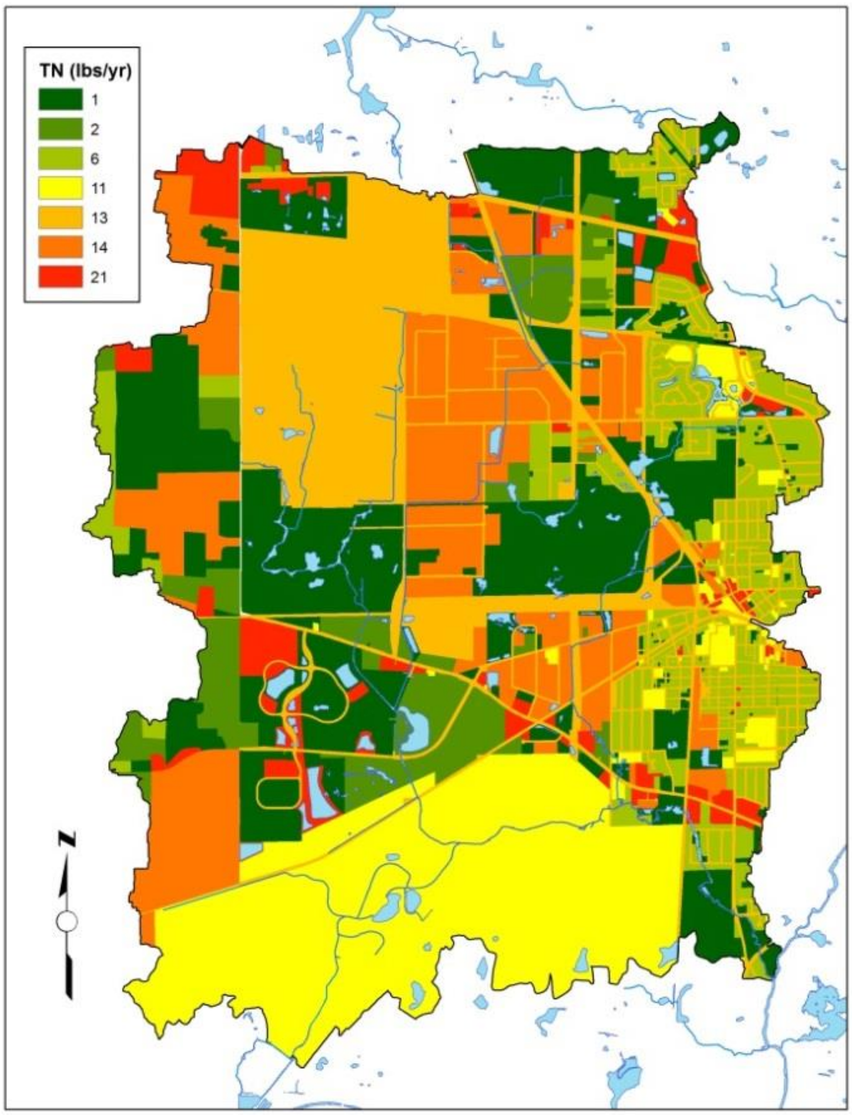

Figure 42 TN concentrations, based on land use, for the Kress Creek Watershed.

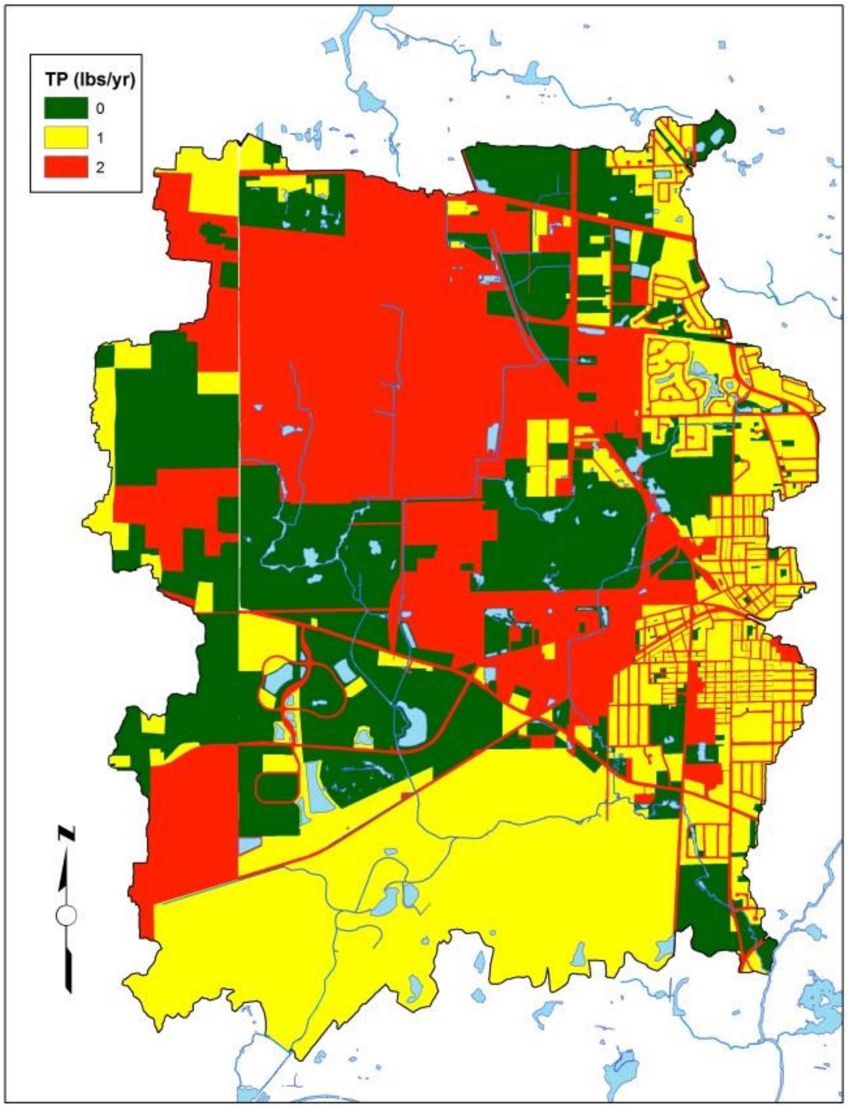

Figure 43 TP concentrations, based on land use, for the Kress Creek Watershed.

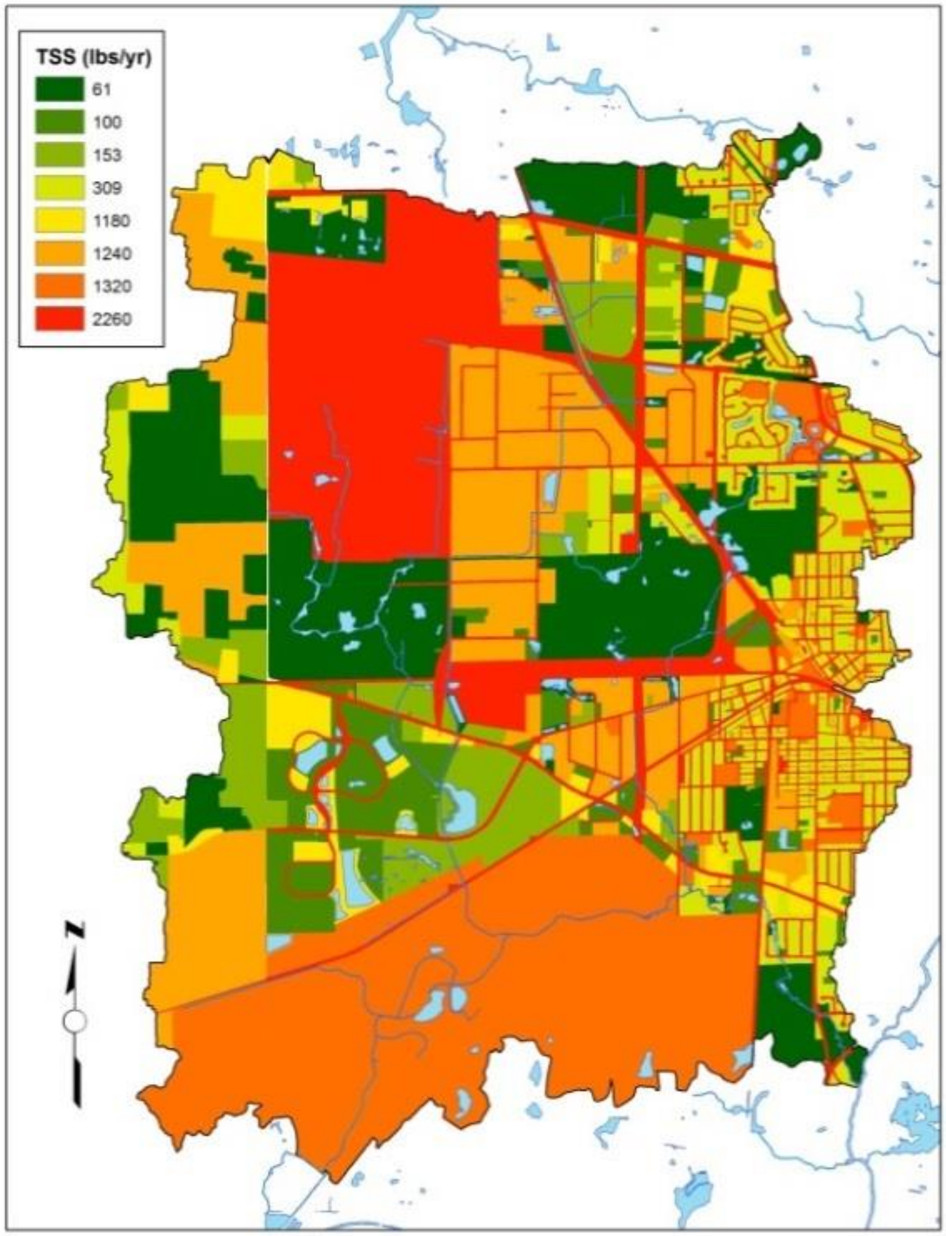

Figure 44 TSS concentrations, based on land use, for the Kress Creek Watershed.

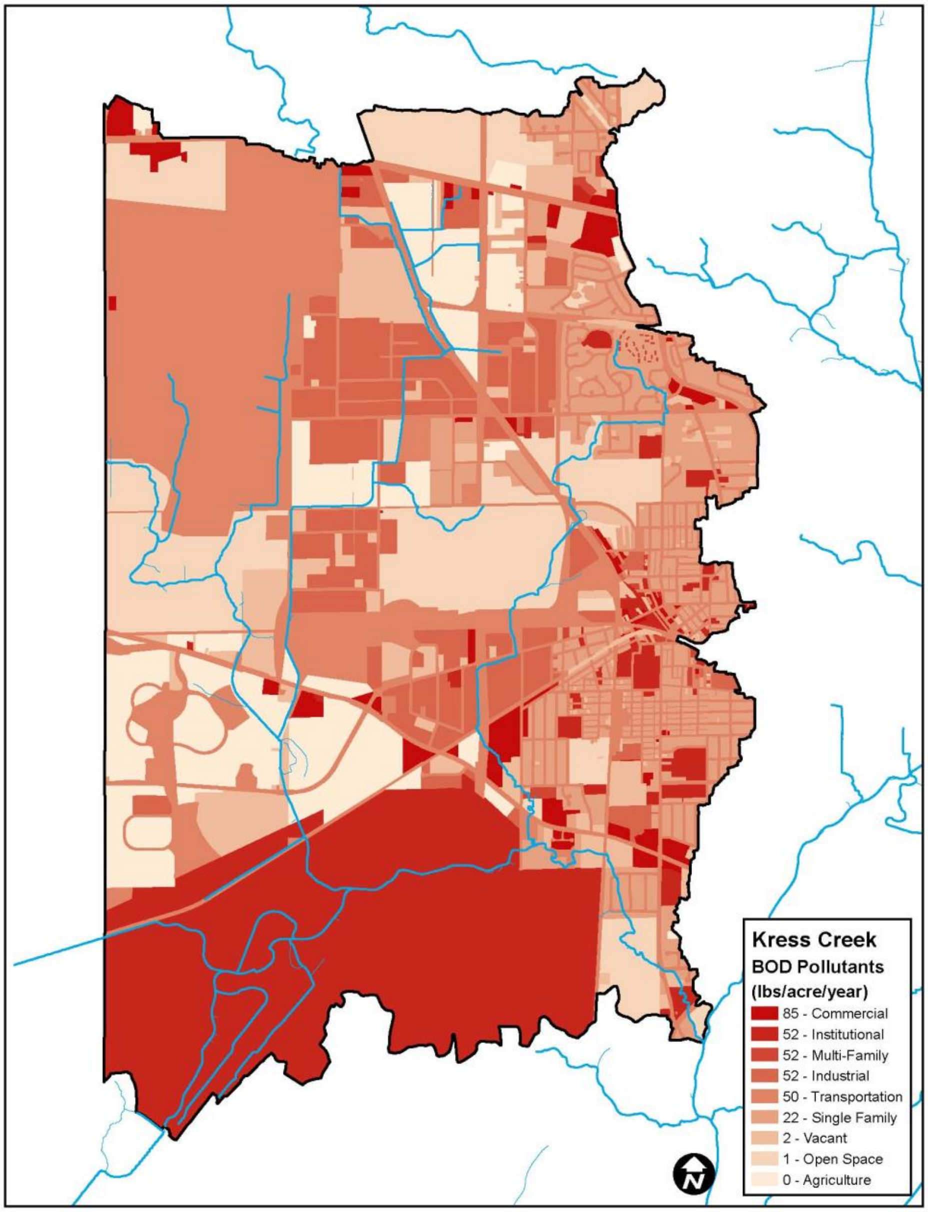

Figure 45 BOD based on land use in the Kress Creek Watershed

As highlighted in tables 17-21, pollutant load estimates show that the most pollutants per acre are originating in sub-watershed #1, which is the southern part of the watershed, including much of Fermi Lab, and subwatershed #4, which encompasses the north-central portion of the watershed, including the industrial area of West Chicago east of the DuPage airport. TSS, TN and TP loads are most concentrated along roadways, industrial areas, institutional and dense residential and commercial areas. Sources contributing to high BOD loads include land uses associated with many buildings, roads, and parking lots such as commercial, institutional, and industrial areas. These land use types typically contain a high ratio of impervious area to less open space.

Subwatershed	Nitrogen Load lb/year	Phosphorus Load lb/year	BOD Load lb/year	TSS Load t/year
W1	11,784	2,001	49,678	266
W2	7,692	1,308	28,609	222
W3	8,904	1,460	26,684	233
W4	11,528	1,834	40,824	299
Total	**39,908**	**6,603**	**145,795**	**1,020**

Figure 46 Pollutant loads by subwatershed

Sub-Watershed	Commercial	Industrial	Institutional	Transportation	Multi-Family	Residential	Agriculture	Vacant	Open Space	Total
1	281	156	9,531	0	580	530	407	298	3	**11,786**
2	611	1565	545	326	1112	1,730	1476	300	26	**7,691**
3	311	558	14	0	2,355	6	4467	467	726	**8,904**
4	542	3893	193	118	2,462	789	1681	946	904	**11,528**
Totals	**1,745**	**6,172**	**10,283**	**444**	**6,509**	**3,055**	**8,031**	**2,011**	**1,659**	**39,909**

Table 18 TN loads by land use (lbs/yr) for each of Kress Creek's sub-watersheds.

Sub-Watershed	Commercial	Industrial	Institutional	Transportation	Multi-Family	Residential	Agriculture	Vacant	Open Space	Total
1	55	24	1622	0	107	98	68	27	0	**2,001**
2	119	241	93	54	204	320	246	27	3	**1,307**
3	61	86	2	0	433	1	744	42	91	**1,460**
4	106	599	33	20	452	146	280	86	113	**1,835**
Totals	**341**	**950**	**1,750**	**74**	**1,196**	**565**	**1338**	**182**	**207**	**6,603**

Table 19 TP loads by land use (lbs/yr) for each of Kress Creek's sub-watersheds.

Sub-Watershed	Commercial	Industrial	Institutional	Transportation	Multi-Family	Residential	Agriculture	Vacant	Open Space	Total
1	4	5	203	0	12	20	14	9	0	**267**
2	9	48	12	8	23	64	49	9	0	**222**
3	5	17	0	0	48	0	149	14	0	**233**
4	8	120	4	3	50	29	56	29	0	**299**

Totals	26	190	219	11	133	113	268	61	0	1,021

Table 20 TSS loads by land use (t/yr) for each of Kress Creek's sub-watersheds.

Sub-Watershed	Commercial	Industrial	Institutional	Transportation	Multi-Family	Residential	Agriculture	Vacant	Open Space	Total
1	1,300	561	41164	0	2,603	2,394	854	794	9	**49,679**
2	2,829	5635	2,352	1,012	4993	7,819	3099	799	71	**28,609**
3	1,437	2009	59	0	10,575	26	9380	1246	1951	**26,683**
4	2,509	14014	835	366	11,054	3,563	3529	2524	2430	**40,824**
Totals	**8,075**	**22,219**	**44,410**	**1,378**	**29,225**	**13,802**	**16862**	**5363**	**4461**	**145,795**

Table 21 BOD loads by land use (lbs/yr) for each of Kress Creek's sub-watersheds.

3.6.1.2 Streambank Erosion Pollutant Load Estimates

DuPage County staff estimated pollutant loads from eroding streambanks by using STEPL. The stream assessment field data (section 3.e.2) was used in the model to calculate pollutant volumes contributed by bank erosion.

	TN (lbs/yr)	TP (lbs/yr)	BOD (lbs/yr)	Sediment (t/yr)
Background Runoff Rates	70697	11863	230358	2311
Streambank Erosion Caused Pollutant Loads	7	3	15	4
Total Background Loads	70704	11866	230374	2315

Table 22 Background and streambank erosion pollutant load estimates.

3.6.1.3 Nonpoint Source Pollutants of Concern

As previously noted, the recommendations found in the Kress Creek Watershed will surround increasing dissolved oxygen which is directly related to TN, TP, TSS and BOD loads. Current loading rates and potential reductions can be modeled throughout the watershed. A description of each of these pollutants of concern follows.

3.6.1.3.1 Total Nitrogen (TN)

Phosphorus and nitrogen are primary nutrients that have the ability to pollute waterways even though they are naturally present in aquatic ecosystems in addition to their presence from anthropogenic sources. Nitrogen compounds are vital for water resources, the atmosphere and in the life processes of all plants and animals. The three forms of N found in water are ammonia (NH_3), nitrites (NO_2) and nitrates (NO_3). Typically, N enters waterways as ammonia from industrial and municipal sewage effluent, septic systems, animal waste and from fertilizers. A common example of ammonia introduction to streams is from an over application of fertilizers; plants and crops only use the amount of N they need and any extra that is applied is wasted and flows into streams after rain events, which is called runoff. In the United States, 89% of TN inputs into the Mississippi River come from agricultural runoff and drainage.[13] These TN loadings contribute to the Gulf of Mexico's "dead zone," which occurs annually due to eutrophication. Eutrophication is an excessive amount of nutrients in a body of water that can cause excessive plant growth, which, in turn, limits the amount of available oxygen for aquatic animals and macroinvertebrates (hypoxia).

Nutrients in stormwater can cause nitrate contamination in groundwater aquifers as well. Nitrates in drinking water are a health concern because excess levels can cause methemoglobinemia, known as "blue baby" disease and may also serve as an indicator for other contaminants. While most of DuPage County's potable water originates from Lake Michigan and/or municipal deep aquifer wells, which are largely immune to nitrate contamination by DuPage County land-use practices, significant residential areas of the County still rely on the shallow aquifer for potable water. Historically, with proper fertilizer application practices, serious nitrate contamination of the shallow aquifer has not been an issue in DuPage.

3.6.1.3.2 Total Phosphorous (TP)

Phosphorus is critical for plant and algal growth, but in excessive amounts, it contributes to increased algae growth that significantly impacts DO and impairs aquatic communities. Phosphorus sources include sewage treatment plants, some industrial discharges, fertilizers from lawns or agricultural fields, waterfowl feces, septic systems and atmospheric deposition. Runoff from urban lawns includes phosphorus, some of which is infiltrated and adsorbed to the surface of sediments that is carried by storm sewers and overland flow into waterways.

Streams are less sensitive than ponds to phosphorus loading because of the continuous movement of the water. The rate at which the water moves and the rate at which organic forms (bacteria, fungi, algae and aquatic plants) can absorb nutrients determines the expressed productivity. In areas where there are dams, water is backed up behind spillways, excessive nutrients can accumulate and nuisance conditions can be created. Excessive algal growth can also reduce the available supply of oxygen on the upstream side of the dam. In aquatic systems, like streams, other factors such as temperature and available light can also influence expressed productivity.

Phosphorus is the nutrient in short supply (limiting nutrient) in most fresh waters, so even slight increases in phosphorus can have a negative cascading effect on water quality like accelerated plant growth, algae blooms, low DO and fish and invertebrate die offs.

Illinois does not currently have a numeric standard for phosphorus in streams; however, the State of Illinois does have a narrative standard that mandates that aquatic communities "shall be free from unnatural algal growth."

3.6.1.3.3 Total Suspended Solids (TSS)

TSS is measured in mg/L as the dry weight after water is filtered and can consist of solids like soil particles, plant matter, sewage, industrial waste and other fine particulate matter. These particles can pose problems for water quality with physical-chemical effects and their effects on aquatic biota (USEPA, 1977; USEPA, 2003). Concentrations of TSS scatter light in the water column (known as

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[13] U.S. Environmental Protection Agency (2007) Hypoxia in the Northern Gulf of Mexico: an update by the EPA Science Advisory Board. EPA-SAB-08-003. Washington (D.C.): U.S. Environmental Protection Agency

turbidity) which may inhibit aquatic organisms from finding food, affect gill function, affect spawning beds, and may even bury aquatic invertebrates and fish larvae. Suspended solids absorb heat from sunlight, which increases water temperature and subsequently decreases levels of DO (warmer water holds less oxygen than cooler water). Photosynthesis also decreases, since less light penetrates the water. As plants and algae produce less oxygen, there is a further drop in DO levels. Organic and inorganic pollutants readily adsorb to soils and other suspended solids and easily transport throughout aquatic systems. This transportation of pollutants increases exposure rates to aquatic organisms.

TSS is used as a water quality indicator and if measurements of 116 mg/L or greater are found in an Illinois stream, that stream is potentially impaired. There are an estimated 1,004 miles of impaired Illinois streams and 117,388 acres of Illinois lakes potentially impaired by TSS.[14]

3.6.1.3.4 Biological Oxygen Demand (BOD)

BOD is measured to determine the amount of dissolved oxygen used in an aquatic ecosystem by microorganisms. Byproducts of plant and animal wastes and domestic and industrial wastewaters are typical sources of compounds that have high levels of BOD. Elements of these wastewaters that contain BOD are feces, urine, detergents, fats, oils and grease, etc. Waters with high levels of BOD may see water quality problems like low levels of dissolved oxygen and fish die-offs.

Prolonged exposure to low dissolved oxygen levels may not directly kill aquatic life but may significantly increase their susceptibility to other environmental stressors and diseases. Dissolved oxygen concentrations affect growth rates, swimming ability, susceptibility to disease and the relative ability to endure other environmental stressors and pollutants. The most critical conditions related to dissolved oxygen deficiency in natural waters occur during summer months when temperatures are high and the solubility of oxygen is at a minimum; however, additional protection is generally provided through criteria for dissolved oxygen in the spring months that correspond to the spawning and nursery season for select aquatic life.

Algae plays a significant role in dissolved oxygen levels in waterbodies. Where both nitrogen and phosphorus are plentiful, algal growth is encouraged causing blooms to occur. When the algae die, the degradation of their biomass consumes oxygen lowering the dissolved oxygen levels in the water column and impacting the health of aquatic life.

3.6.2 Point Sources

Under the Water Quality Act of 1987, the EPA established the NPDES program to limit point source pollution to waterways. In Illinois, the IEPA enforces the NPDES program, which was rolled out in two phases. Published in 1990, Phase 1 regulates discharges from industrial activities, medium and large MS4 communities and construction sites 5 acres or larger. Medium MS4s have a population of 100,000 to 249,999. Large MS4s have a population of 250,000 or greater. In the Kress Creek Watershed, only the DGSD holds an NPDES Phase 1 permit, meaning they must limit discharge of specific pollutants, including BOD, TSS, ammonia nitrogen, fecal coliform and phosphorous.

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[14] IEPA. 2016. Illinois Integrated Water Quality Report And Section 303(d) List. Water Resource Assessment Information and List of Impaired Waters. Illinois Environmental Protection Agency.

Phase 2, which was published in 1999 and went into effect March 2003, expanded the regulations to include discharges from small MS4s and construction sites 1 to 5 acres in size. Small MS4s are those with populations under 100,000, not covered under Phase 1. NPDES Phase 2 requires all small MS4s obtain NPDES permits and implement the six minimum control measures, which are:

1. Public education and outreach on stormwater impacts;
2. Public involvement and participation;
3. Illicit discharge detection and elimination;
4. Construction site stormwater runoff control;
5. Post construction stormwater management in new and re-development; and
6. Pollution prevention/good housekeeping for municipal operations.

All but one DuPage County municipality, as well as all townships and unincorporated areas, are considered small MS4s under NPDES. Currently, each MS4 in the Kress Creek Watershed holds its own NPDES Permit No. ILR40 with the IEPA, and, therefore, is required to define best management practices (BMPs) and goals for each of the minimum control measures, to be reported annually. DuPage County assists other permit holders by providing several of the six minimum control measures on a regional scale.

In addition to the NPDES program, the DuPage County Stormwater Management Plan provides the foundation for future watershed planning efforts, the Ordinance and water quality improvements throughout the County. It was established in recognition of the critical need to limit the reoccurrences of extensive flood damages within the County. Development has historically caused increases in flood risk, flood damage and environmental degradation. The DuPage County Stormwater Management Planning Committee implemented the plan to reverse that trend. It responds to the opportunity inherent in State of Illinois P.A. 85-905, which authorizes regional stormwater management in northeastern Illinois counties. It also recognizes the integrated nature of the watershed system and the need to consider stormwater management planning on a watershed basis. The plan consolidates the stormwater management framework throughout DuPage County into a united, countywide structure; sets minimum countywide standards for floodplain and stormwater management; and provides for countywide coordination for the management of stormwater runoff in both natural and manmade drainage ways and storage.

3.7 Land Management Practices

3.7.1 Conservation Easement Programs

Throughout DuPage County, The Conservation Foundation runs the Natural Areas Assurance Program for Developments, which provides assurance to municipalities, regulators, future occupants and communities that natural areas and open space within a development is protected from further development and those natural resources and functions will be maintained forever.

The Conservation Foundation works with the developer and the regulatory agency to execute a two-step process. The first step is to protect the natural areas and open space within the development with a conservation easement. This restriction is recorded on the deed and takes away the development rights on that portion of the land. The second part of the process is to put in place financial mechanisms to provide adequate funding for the long-term ecological management of the natural areas and open space in accordance to an approved management plan. This funding is often accomplished through annual assessments of property owners with a backup special service area tax in place if necessary. The Natural Areas Assurance Program has resulted in healthy and aesthetically pleasing natural areas that are an amenity to the community and help maintain or even increase property values in both residential and commercial developments.

3.7.2 Local Ordinances

As previously mentioned, DuPage County developed a comprehensive Ordinance to regulate stormwater management activities countywide. Adopted in 1991 and last revised in 2013, the principal purpose of the Ordinance is to promote effective, equitable, acceptable and legal stormwater management measures.

The Ordinance establishes a minimum level of regulatory compliance that a municipality or unincorporated portion of the County must meet. The Ordinance not only outlines countywide stormwater regulations, but also establishes a process that allows communities within DuPage County to enforce these regulations individually while following the same provisions. Pursuant to the authority established in 55 ILCS 5/5-1062, the provisions of the Ordinance may be enforced by a community once they have adopted a stormwater management ordinance consistent with, and at least as stringent as, the County's Ordinance or when they have duly adopted the provisions of the countywide Ordinance.

Several communities have waived their legal authority to enforce the Ordinance, either partially or wholly, within their jurisdiction. In these communities, the County conducts either some (partial waiver communities) or all (non-waiver communities) aspects of the permitting process for development sites subject to the Ordinance requirements. Table 21 shows the waiver status of municipalities within the Kress Creek Watershed. DuPage County staff offers numerous services for the communities, including permit submittal review and post-construction inspections at sites containing wetland, buffer, riparian enhancement and wetland mitigation. As the Ordinance has been adopted into DuPage County's County Code, it serves as the regulatory mechanism for enforcement of these requirements. Development securities can be drawn upon in the event of non-compliance, and legal action through the State's Attorney's Office may also be applied.

Community	Stormwater Ordinance Waiver Status
Batavia	Non Waiver
St. Charles	Opt-Out (Kane County)
West Chicago	Partial Waiver
Unincorporated	Non Waiver

Table 23 Ordinance waiver status of Kress Creek Watershed communities.

3.7.3 Local Planning Documents

Regionally, the Kress Creek Watershed is included within Chicago Wilderness' Green Infrastructure Vision, which guides open space and sustainable development throughout the greater Chicagoland region. The Chicago Metropolitan Agency for Planning (CMAP) is in the process of developing their On To 2050 plan – a follow up to their Go To 2040 plan – that outlines regional initiatives, notably stormwater management, open space and environmental.

With the exception of St. Charles and the Kane County area, the Kress Creek study area falls under the regional jurisdiction of DuPage County's Stormwater Management Plan and Ordinance, both of which guide local development, projects and flood control management within the floodplain. This area is also subject to an ongoing U.S. Army Corps of Engineers (USACOE) study of the entire DuPage River Watershed to identify flood control improvements within it.

Many of the municipalities within the Kress Creek Watershed have developed comprehensive plans. However, as new comprehensive plans can be developed every few years, each municipality should be contacted for the most recent planning information.

4. Watershed Protection Measures

4.1 Best Management Practices & Programs

Used watershed-wide, with a particular focus in critical areas, the following BMPs are recommendations to reduce the key nonpoint source pollutants stressing Kress Creek. Some of these solutions may be implemented at a localized level, such as green retrofits on private property, while others may require DuPage County's involvement, such as a dam removal.

4.1.1 BMP Projects

4.1.1.1 Green Infrastructure

According to the EPA, green infrastructure "reduces and treats stormwater at its source while delivering environmental, social, and economic benefits." Green infrastructure refers to using the existing vegetation and soils on a site to manage water rather than focusing on transporting the water offsite as is common in traditional "gray infrastructure" Examples of green infrastructure generally fall under one of the following three categories, infiltration practices, impervious surface reduction and rainwater harvesting.[15]

4.1.1.1.1 Infiltration Practices

Infiltration practices are designs that enhance the absorption of runoff through a soil matrix. These practices slow and retain stormwater runoff to facilitate pollutant removal. Increasing the time it takes for water to reach a nearby water body in smaller storm events also results in lower storm elevations and overland runoff that can cause localized flooding. Slowing runoff causes excess sediment and debris to drop out and to allow water to seep into the soil. Slowing runoff and allowing for infiltration reduces peak flows thereby reducing streambank erosion to improve water quality. Infiltration practices recommended throughout the Kress Creek Watershed include:

- ***Bioswales*** are vegetated channels that slow and filter pollutants from runoff. Pollutant removal ability increases when swales are planted with native vegetation as opposed to mowed turf grass. Rock check dams can be added to slow the flows through the swale further increasing removal rates. They are commonly found along streets as existing roadside ditches can easily be converted to bioswales. Bioswales are proposed over 2-3% of the Kress Creek drainage area.

[15] https://www.epa.gov/green-infrastructure/what-green-infrastructure

- ***Rain gardens*** and **bioretention facilities** are excavated or natural depressions that collect runoff from surrounding impervious areas and allow it to infiltrate. They are often constructed in residential yards or adjacent to commercial buildings. Bioretention is proposed over 1-5% of the Kress Creek drainage area.
- ***Infiltration trenches*** are excavated trenches filled with rock. Stormwater runoff is directed to these trenches where it is retained within the void space and slowly infiltrates through the soil. One benefit of an infiltration trench is that it is completely underground and can be covered with turf grass, making it blend in with surrounding lawn areas.
- ***Green roofs*** refer to vegetation being planted on the roof of a building. The roof is covered with a waterproof membrane and growing medium which allow for the establishment of vegetation. The system then allows stormwater to be captured, infiltrated, and eventually evapotranspirated back into the atmosphere, thereby reducing runoff and the pollutants that are carried with it.
- ***Tree wells or planter boxes*** are ideal for infiltration in urban landscapes where space is limited. They consist of depressed planting beds that capture and infiltrate runoff from surrounding roads, sidewalks, and parking lots. Tree wells (Filterra or other alternative) are proposed to treat runoff from 1% of Kress Creek Watershed.

Pollutant removal rates of infiltration practices can vary, but overall they are among the most efficient at removing pollutants due to the fact the all of the stormwater in smaller events is captured and infiltrated into the soil, eliminating runoff.

4.1.1.1.2 Impervious Surface Reduction
Converting impervious surface to a surface of permeable soil and vegetation is an excellent way to reduce runoff volume and velocity, as well as treat it. Permeable pavement is a paved surfaces that infiltrates, treats and/or stores rainwater where it falls. Permeable pavement may be constructed from pervious concrete, porous asphalt, interlocking grid pavers or other materials. These pavements are particularly cost effective where land values are high and where flooding or icing is a problem. Permeable pavements reduce runoff and capture TSS, metals and oils. Permeable pavers are proposed for 2.5% of Kress Creek Watershed.

When converting all impervious surfaces is not an option, finding ways to disconnect impervious surfaces from one another can go a long way. Examples include disconnecting gutters from storm sewers, separating sidewalks from streets with parkways and using flat or concave instead of mounded landscape features in between walkways and parking spaces.

4.1.1.1.3 Rainwater Harvesting
The use of rain barrels and cisterns are encouraged in Kress Creek watershed to reduce runoff at the source. Rain barrels are storage containers that are located above ground. They capture runoff from the gutters of a structure and store water so it can be later used to water landscaping and gardens. Cisterns function in the same way as rain barrels, but are usually larger, placed underground and evacuated by pump. Cisterns and rain barrels should be emptied prior to rainfall to reduce runoff volume.

4.1.1.2 Detention Basin Retrofits
Many of the detention basins in Kress Creek Watershed are typical of construction from the last century and do a poor job of removing pollutants from the water before releasing them. Some of the basins may even degrade water quality further. Modifying a detention pond for improved water quality involves

many variables and takes a site-specific design approach. Detention basin retrofits are proposed for 1-5% of Kress Creek Watershed. The following basin retrofits can offer big improvements to water quality in the pond and downstream.

- ***Wetland shelf.*** Doubling as a safety feature, wetland shelves are made from soil and extend into the permanent pool from the traditional bank of a wet detention pond. They are usually constructed no more than 6 inches below the normal water level and planted with wetland vegetation. Wetlands in a detention basin absorb nutrients and protect the shoreline from eroding by buffering wind, waves and ice. Native vegetation can also deter goose populations that prefer turf and water edges.
- ***Forebay.*** A forebay is a smaller, closed basin at the ponds inlet. A forebay acts as a sediment basin and helps to prevent sediment in the detention pond from being re-suspended by high flows. Forebays also extend the life of the pond and makes sediment control easier.
- ***Native vegetation on the slopes***. Native vegetation includes species native to northeastern Illinois. Once established, native vegetation can reduce erosion, eliminate the need for fertilizers, deter geese and filter pollutants from overland flow.
- ***Wetland bottom.*** This retrofit involves building up the bottom of a wet detention basin with soil to just below the water surface. The bottom is then planted with native wetland vegetation. These pond retrofits often feature a meandering low flow channel to handle flows, but allow water to inundate the wetland as needed. Wetland bottom ponds offer one of the highest levels of pollutant control, as well as the elimination of erosion, excessive algae growth and goose populations.
- ***Constructed wetland detention.*** Constructed wetland detention basins pull together the use of native slopes, forebay and wetland bottom into the most effective basin design for filtering pollutants. Mimicking the pollutant removal mechanisms of natural wetlands, these carefully engineered facilities feature varying depths of wetland, permanent pools and vegetation.

http://www.stormwaterok.net/CWP%20Documents/CWP-07%20Natl%20Pollutant%20Removal%20Perform%20Database.pdf

http://www.epa.state.il.us/green-infrastructure/docs/draft-final-report.pdf

http://www.cmap.illinois.gov/documents/10180/12317/BooneDutchCrkWatshdPlan-ExecSumm_FINAL_CMAP-March2016.pdf/7ec35a0f-5fa4-4543
http://it.tetratech-ffx.com/steplweb/default.htm

4.1.1.3 Riparian Buffer Enhancement

Mentioned earlier, areas with existing low quality riparian zones represent potential buffer restoration sites. Riparian and wetland buffer environments should be protected, restored, increased and managed to optimize their benefits to waterways.

Acreage and quality of riparian buffers can be increased by replacing traditional landscapes and impervious surfaces with well-managed native ecosystems. Riparian areas are vital to the health of the stream ecosystem by providing a natural filter for nonpoint source pollutants. Wide floodplains also reduce flood damage by allowing waterways to expand and shift away from buildings and infrastructure. Unlike maintained turf grass, native vegetation is resilient to large flood events and can tolerate periods of high flows and high water, holding in the soil even after a storm event.

Healthy streams need healthy riparian ecosystems to provide the many different types of food for organisms, shade to moderate temperatures and provide opportunities for evapotranspiration and infiltration. Overhanging vegetation and leaves from trees shade waterways and create habitat variety both on the bank and in the water. As the vegetation breaks down, it becomes a part of the water column and food chain.

4.1.1.4 Wetland Restoration

Wetlands and their buffers play an important role in supporting the health and resilience of a watershed. Wetlands act as enormous rain gardens that treat pollutants, reduce runoff and moderate water temperature, among many other benefits. Unlike an open water pond, wetlands store more water in soils and plants release water into the air as vapor, as such, they are said to have more stormwater storage capacity than a traditional basin of equal size. Wetlands and their buffers provide the substrate for a complex web of organic and inorganic processes. The products of these ecosystems, which then flow downstream, are crucial resources for a properly functioning riverine ecosystem and riparian environment. By performing these functions, wetlands improve water quality and biological health of streams and lakes located downstream while helping to protect public safety.

With a goal to improve the current inventory and quality of wetlands and wetland buffers in the Kress Creek Watershed, recommendations include increasing the acreage of new wetland and improving the quality of existing wetland and wetland buffer. Wetlands have an enormous capacity to store excess water from a storm event, enhanced by evapotranspiration and storage in soils. The stored water is slowly released over time through smaller surface outlets or down through the soils to become groundwater, which results in replenished groundwater and cooler in-stream water temperature. Wetlands also filter sediments and nutrients in runoff, provide necessary wildlife habitat and help maintain stable water, temperature and chemistry levels in streams.

4.1.1.5 Hydrodynamic Separators

Hydrodynamic separators – commonly known as oil and grit separators – are manufactured structures designed to reduce the amount of oil, grease, and sediment reaching waterways. They are placed within the storm sewer system, typically within a catch basin, and rely on gravity to capture the pollutants that will settle and float. Pollutant removal effectiveness varies widely among these proprietary devices. Particle size distribution is an important factor to consider when choosing a device. Many pollutants attach to fine particles such as silts, clays and colloids, and these finer particles contribute much of the sediment in DuPage County. Hydrodynamic separators are most effective when they are designed to target and treat runoff from small, frequent rain events. They should be designed to treat a specific storm runoff volume and to prevent resuspension of pollutants in higher events. Devices must be maintained regularly in order to be continuously effective. Hydrodynamic separators are proposed for 1-3% of the Kress Creek Watershed.

4.1.1.6 In-Stream Restoration

Stream restoration projects focus on improving channel sinuosity, installing natural features such as riffles and pools, and replacing mud substrates with cobbles Water quality benefits of stream restoration projects include reducing streambank erosion, trapping suspended sediment, and re-oxygenating the water column. In-channel restoration also provide habitat that supports the propagation of fish and macroinvertebrates.

Streambank stabilization involves using vegetation, soil or materials such as riprap or woody debris to stabilize stream, river or ditch banks in order to protect them from erosion or sloughing. Stream stabilization has numerous benefits including:

- Stabilizes banks and shores, preventing further erosion and degradation;
- Improves water quality by reducing sediment loads in surface waters;
- Helps maintain the capacity of waterways to handle floodwaters, preventing flood damage to utilities, roads, buildings and other facilities;
- Reduces expenses for dredging accumulated sediment from lakes and drainage ditches;
- Enhances habitat for fish and other aquatic species by improving water quality and moderating water temperature; and
- Creates riparian habitat for terrestrial wildlife.

The Stream Assessments conducted by DuPage County staff found a lack of pool and riffle sequences throughout Kress Creek. Future stabilization projects should include stream structure additions, such as pool and riffle sequences, for improved habitat.

4.1.1.7 Dam Modification

Dam modifications or removals are gaining popularity for their cost-effective benefits to streams and rivers. They inherently return the waterway and its ecosystem to its natural flow. The Kress Creek Watershed has two known dams that may be evaluated for modification. These dams create barriers that inhibit fish passage. The dam modification should involve removing or altering the dam, creating in-stream habitat, such as pools and riffles, in place of the dam and installing native vegetation where practical.

4.1.1.8 Streambank Stabilization

Unstable streambanks cause multiple problems for property owners, the health of the creek itself and other waterbodies downstream. Streambank erosion can cause an unstable streambank, leading to lost property or danger to structures and infrastructure. Eroding streambanks is a direct source of pollutants, dumping excess sediment and other pollutants, into the water. Streambank erosion often causes degradation of the stream channel and disconnection of the creek to its floodplain. When the creek becomes low in the landscape, it must contain flows of more volume and velocity within its banks, usually causing further streambank damage and deteriorating conditions.

With cooperation from the property owners, creek banks will be stabilized where needed using bio-engineered practices wherever possible to provide to a more gradual slope to Kress Creek. Vegetation in the floodplain can be converted to native species where practical. Projects to reduce streambank erosion stressors include increasing healthy native wetland, wetland buffer and riparian environments, modification of the channel to support stable banks and a healthy base flow and the reduction of stormwater runoff in the watershed. Replacing invasive species identified along Kress Creek with deep-rooted native vegetation will contribute to the bank stabilization effort. Educational materials will be made available to the property owners as part of a targeted educational campaign to encourage public understanding of the importance of a healthy stream and riparian corridor.

4.1.1.9 Daylighting

Sections of Kress Creek and its tributaries are enclosed in pipes. When a stream is restored to a bed and bank channel, open to the air and sunlight, it is referred to as "daylighting" the stream. In urban areas, it is most common to see the headwaters of streams enclosed in pipe, usually because narrow channels and a smaller tributary make it easier to do so. Although there is no erosion in the pipe to worry about, pipes often cause more problems for water quality and stream health than they solve in convenience.

Headwater streams are an important part of the stream system. [16] Aside from providing nutrient, sediment and flood control, they also support a stable base flow and produce essential food sources for downstream reaches. Enclosing a stream often removes floodplain storage, increases velocity and (indirectly) erosion downstream and eliminates habitat along with many biological processes. Daylighting projects will restore natural streams from piped reaches, allowing headwater streams to re-access the floodplain.

4.1.2 BMP Programs

4.1.3.1 Street Sweeping

Routine street sweeping and catch basin cleaning are particularly important maintenance activities that remove pollutants that accumulate on public roads and in the stormwater conveyance systems before reaching nearby surface waters. Roadway agencies in the watershed have their own street sweeping schedules which can be evaluated for improvements and targeted scheduling to reduce nutrient inputs.

The need for sweeping can vary depending on the volume of traffic, presence of parkway trees and proximity to pedestrian traffic, homes and businesses. Based on data from the Center for Watershed Protection, pollutant removal rates from street sweeping can be improved by implementing vacuum style sweepers rather than mechanical sweepers.[17] Additional information should be obtained from municipalities in regards to street sweeper types, volume of traffic per roadway, as well as proximity to trees and public spaces.

Municipalities and roadway agencies were not surveyed on catch basin cleanout for this plan. Additional studies should evaluate catch basin cleanout frequencies to identify areas for improvement. Pollutant removal rates can be improved by increasing the frequency of cleanouts throughout the watershed as well as by identifying and prioritizing cleanouts in catch basins that have the highest sediment accumulation rates. In addition, agencies can consider sharing services, including street sweepers and catch basin cleanout trucks, to increase sweeping and catch basin cleanout schedules.

4.1.3.2 Stream Maintenance

In DuPage County's Citizen Reporter App, residents reported several areas where debris would inhibit the flow of Kress Creek, ultimately contributing to overbank flooding and erosion. In particular, the culvert under Webster Street in Downers Grove is perpetually blocked by debris filing in after storm events. In addition, DuPage County staff identified the undersized culvert as a blockage for fish passage.

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[16] Ohio EPA epa.ohio.gov/dsw/wqs/headwaters/index

[17] CWP 2008

Stream maintenance programs can occur on several levels ranging DuPage County on-call contracts to remove large obstructions to the annual DuPage River Sweep where volunteers remove trash and debris from waterways countywide.

4.1.3 Watershed-Wide BMP Projects & Programs

Table 22 includes the projects and programs described above on a watershed-wide scale. The next section discusses site-specific projects, but, for the purpose of the Kress Creek Watershed Plan, stakeholders will have discretion of where some of the BMP projects may be installed in the watershed.

Sub-watershed	BMP	Sub-watershed Treated	Nitrogen Reduction (lbs/yr)	Phosphorus Reduction (lbs/yr)	BOD Reduction (lbs/yr)	Sediment Reduction (t/yr)	Estimated Cost
1	Bioretention	5.0%	371.20	80.04	NA	NA	$8,452,382
	Bioswale	3.0%	176.76	39.0195	NA	7.18	$2,668,050
	Filter Strip	5.0%	235.68	45.0225	1241.95	9.71	$8,452,382
	Oil & Grit Separators	3.0%	17.68	3.0015	NA	1.20	$384,000
	Permeable Pavers	2.5%	265.14	45.0225	NA	5.99	$3,173,363
	Dry Wells	2.5%	147.30	25.0125	869.37	5.99	$4,226,191
	Filterra	1.0%	40.07	14.007	NA	2.29	na
	Detention Basin Retrofit	5.0%	117.84	44.022	1564.86	10.37	$3,153,150
Total			**1253.82**	**251.1255**	**2111.32**	**32.35**	**$30,509,519**
2	Bioretention	1.0%	48.46	10.464	NA	NA	$1,690,476
	Bioswale	2.0%	76.92	17.004	NA	4.00	$1,778,700
	Filter Strip	1.0%	30.77	9.0045	248.39	1.94	$1,690,476
	Oil & Grit Separators	1.0%	3.85	0.654	NA	0.33	$128,000
	Permeable Pavers	2.5%	173.07	29.43	NA	5.00	$3,173,363
	Dry Wells	1.0%	38.46	6.54	200.26	2.00	$1,690,476
	Filterra	1.0%	26.15	9.156	NA	1.91	na
	Detention Basin Retrofit	1.0%	15.38	5.7552	180.24	1.73	$630,630
Total			**397.68**	**82.2525**	**448.65**	**15.17**	**$10,151,492**
3	Bioretention	1.0%	56.10	11.68	NA	NA	$942,987
	Bioswale	2.0%	89.04	18.98	NA	4.19	$992,200
	Filter Strip	1.0%	35.62	9.0045	248.39	1.94	$942,987
	Oil & Grit Separators	1.0%	4.45	0.73	NA	0.35	$72,000
	Permeable Pavers	2.5%	200.34	32.85	NA	5.24	$1,770,175
	Dry Wells	0.5%	22.26	3.65	93.39	1.05	$471,493
	Filterra	1.0%	30.27	10.22	NA	2.00	$0
	Detention Basin Retrofit	1.0%	17.81	6.424	168.11	1.82	$630,630

Total			**438.08**	**87.1145**	**341.78**	**14.78**	**$5,191,842**
4	Bioretention	5.0%	363.13	73.36	NA	NA	$10,506,672
	Bioswale	3.0%	172.92	35.763	NA	8.07	$3,316,500
	Filter Strip	5.0%	230.56	45.0225	1241.95	9.71	$10,506,672
	Oil & Grit Separators	3.0%	17.29	2.751	NA	1.35	$480,000
	Permeable Pavers	2.5%	259.38	41.265	NA	6.73	$3,944,625
	Dry Wells	0.5%	28.82	4.585	142.88	1.35	$1,050,667
	Filterra	1.0%	39.20	12.838	NA	2.57	na
	Detention Basin Retrofit	5.0%	115.28	40.348	1285.96	11.66	$3,153,150
Total			**1111.30**	**215.5845**	**1384.83**	**29.77**	**$29,805,136**
Grand Total			**3200.87**	**636.077**	**4286.59**	**92.07**	**$75,657,989**

Table 24 Watershed-wide BMP projects.

4.1.4 Site-Specific BMP Projects

Although each of the BMP projects described above can help to improve levels of oil and grease, TN, TP, TSS and BOD in Kress Creek, some are more critical than others in certain portions of the watershed. Based on land use, sub-watersheds #1 and #4 are the most critical because of high pollutant load runoff land uses. Sub-watershed #2 and #3 are not as critical; however, implementing BMPs there will have a positive effect on the watershed as a whole. As physical stream modifications are the main impairment in the Kress Creek Watershed, in-stream restoration projects to stabilize banks and improve in-stream structure will provide the most benefit.

In addition to proximity to critical areas, DuPage staff assessed BMPs based on their benefit – or how much they may reduce a pollutant of concern – and feasibility. With any government planning effort, public land will not only be the most feasible for projects, but it is generally the largest amount of land in an area. Therefore, for the purpose of this study, projects are recommended in each of the sub-watersheds using this prioritization process of need, benefit and feasibility.

Using this prioritization process and to achieve the goal pollutant load reductions, BMP projects were recommended at both watershed-wide and site-specific levels. Watershed-wide projects are recommended throughout the sub-watersheds with the site at the discretion of the property owner, planner or other implementing entity. Site-specific projects are generally those of highest priority where they are in a polluted catchment area, are on public land and would generate a great benefit. The following sections outline each of these site-specific projects by sub-watershed. Appendices A and B list each project along with estimate load reductions.

4.1.4.1 Sub-Watershed #1

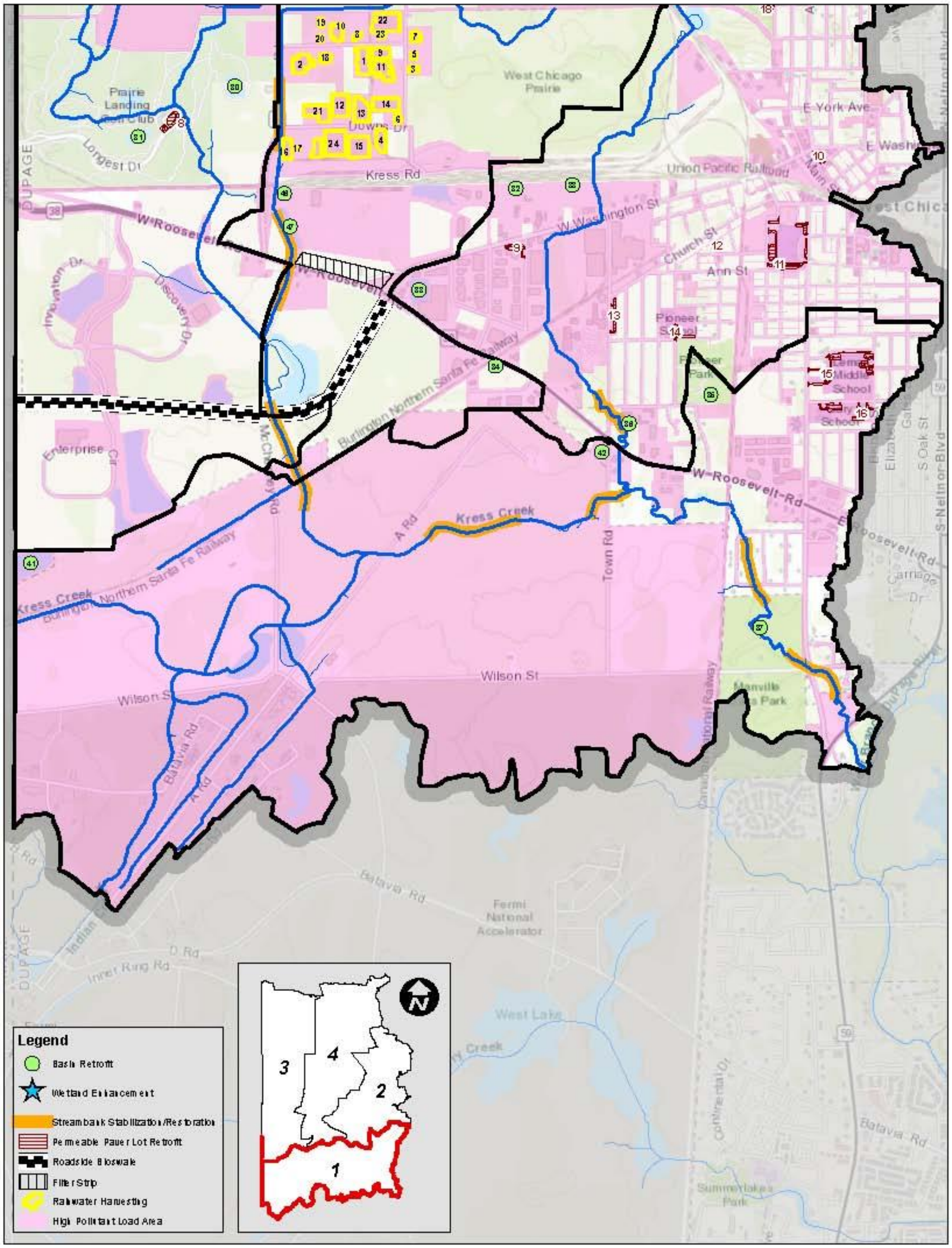

Figure 47 Site-specific BMP projects in Kress Creek sub-watershed #1.

4.1.4.2 Sub-Watershed #2

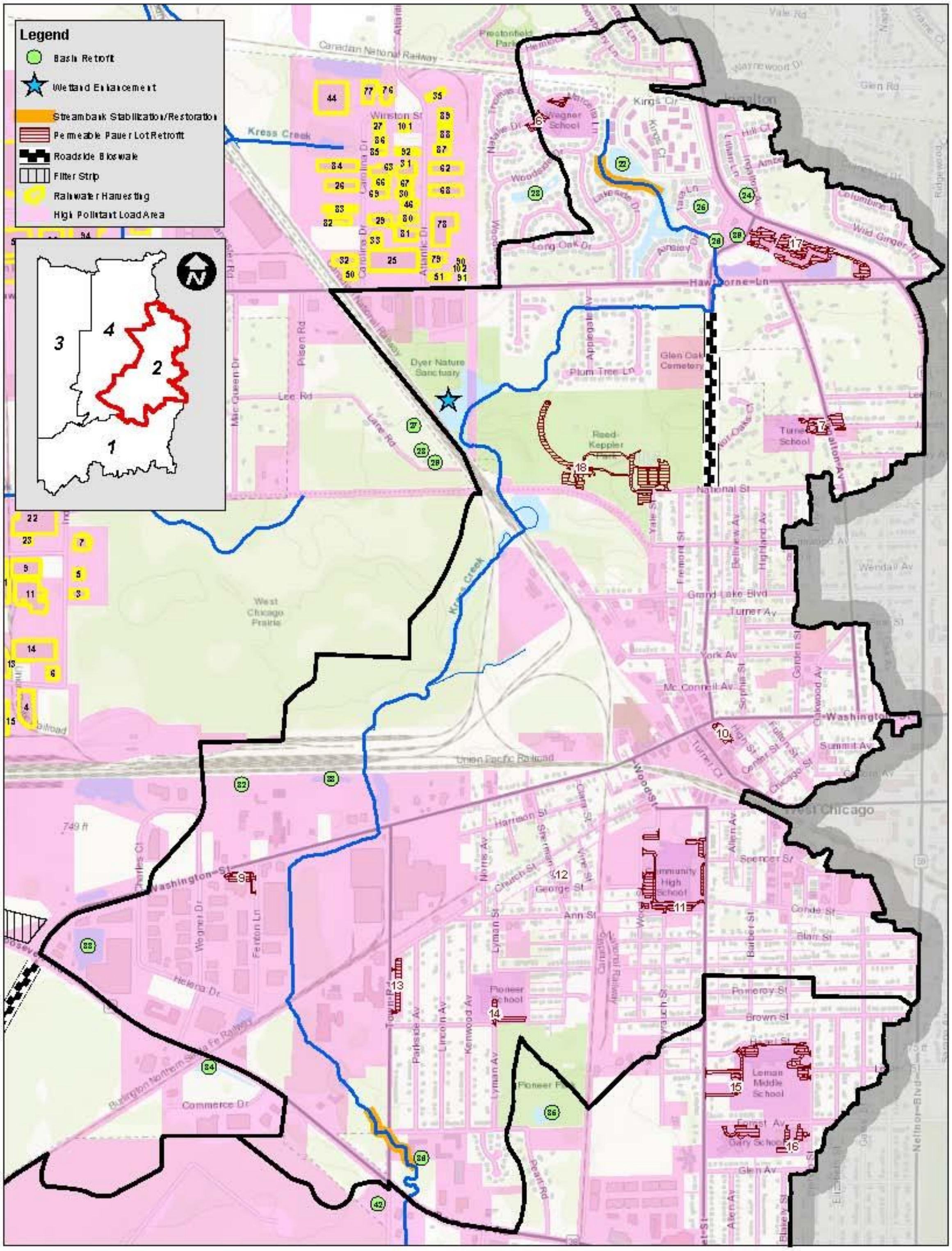

Figure 48 Site-specific BMP projects in Kress Creek sub-watershed #2.

4.1.4.3 Sub-Watershed #3

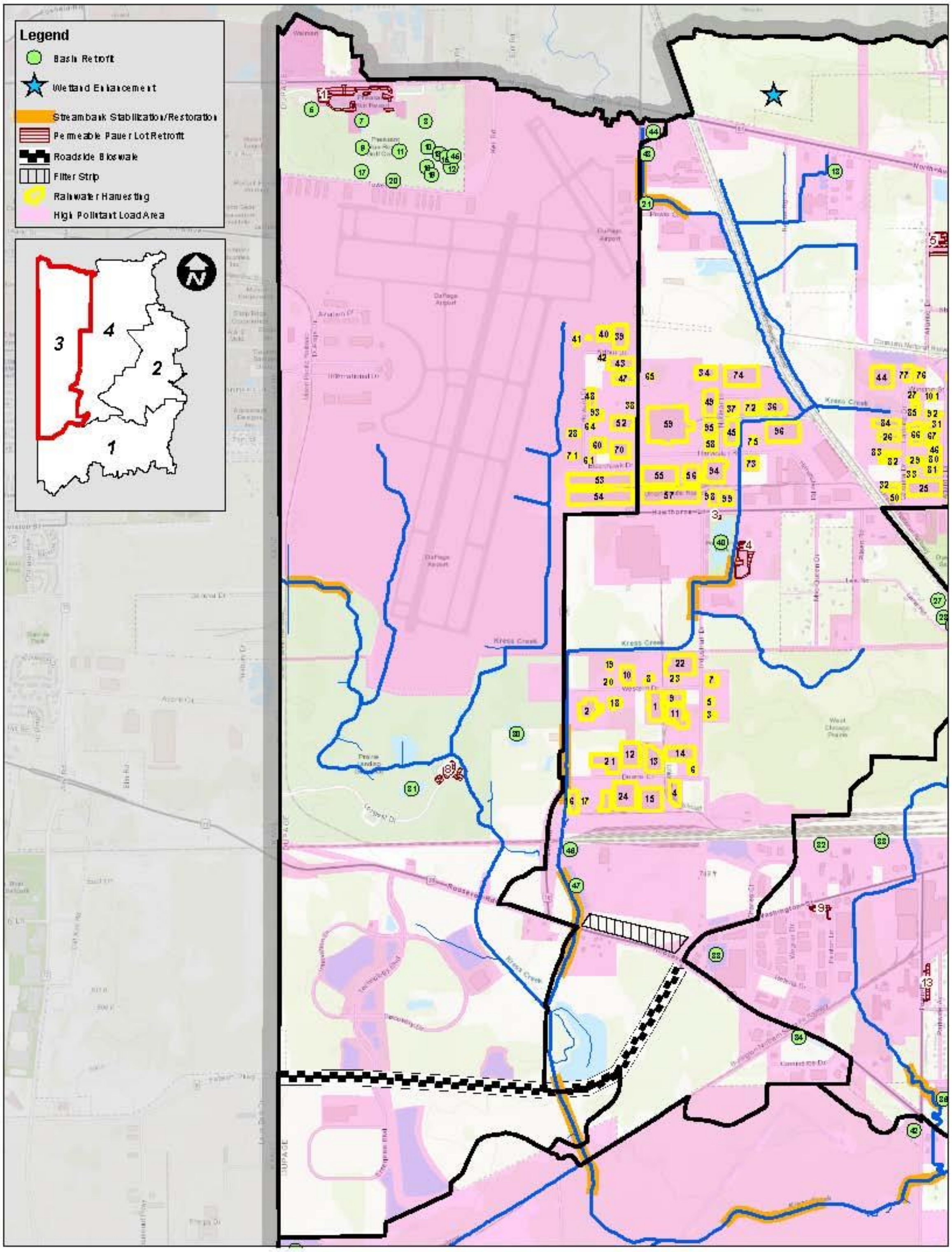

Figure 49 Site-specific projects in Kress Creek sub-watershed #3.

4.1.4.4. Subwatershed #4

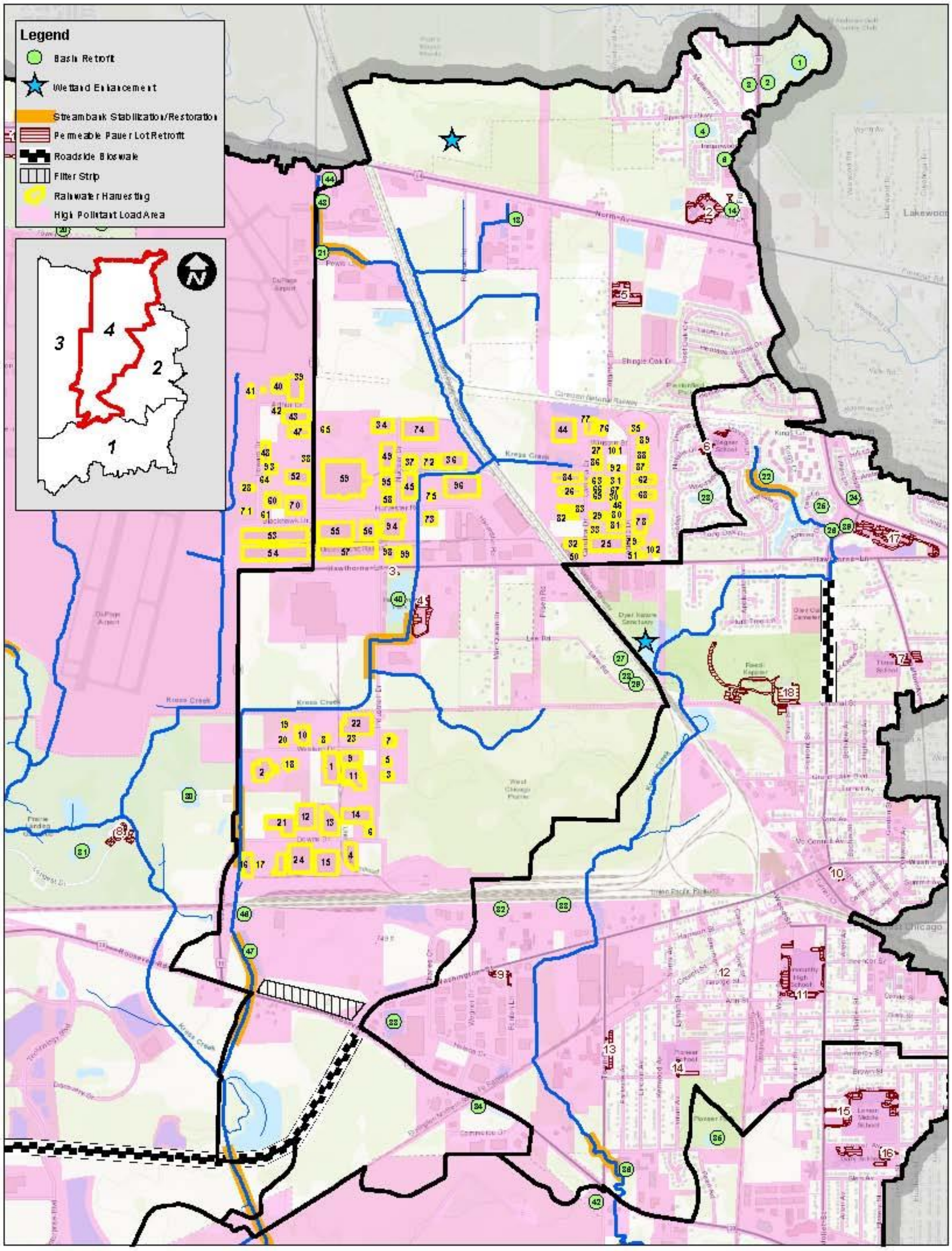

Figure 50 Site specific projects in Kress Creek subwatershed #4

4.2 Planning, Policy & Programming

4.2.1 Open Space Protection

Protecting open spaces and sensitive natural areas within and adjacent to cities can mitigate the water quality and flooding impacts of urban stormwater while providing recreational opportunities for city residents. Natural areas that are particularly important in addressing water quality and flooding include riparian areas, wetlands and steep hillsides.

4.2.2 Align Ordinances with Best Practices

Oftentimes, municipal, homeowner association and other ordinances or codes do not account for green infrastructure projects. For example, many "weedy plant" ordinances restrict the height of plants a homeowner may have on the property, which may inhibit the use of native vegetation or rain gardens.

Working with Geosyntec, DuPage County has already developed a guidance document and checklist for municipalities to self-audit their ordinances.[18] In addition, CMAP offers technical assistance programs that may be of use for communities who wish to audit their ordinances, as it is often a time-consuming endeavor.

4.2.3 Watershed Planning

Continued watershed planning efforts, on both a local and regional level, to identify localized projects, programs and practices to improve the quality of Kress Creek are recommended. To date, DuPage County has studied nearly 60% of the County for flood control improvements, and a long-term goal is to integrate water quality components into each of the plans. Clear, concise and goal-oriented planning ensures long-term viability of projects despite changing political climate, staff turnover and other issues that deter initiatives.

4.3 Public Information, Education & Outreach

To carry out the recommendations within the Plan successfully, DuPage County will need to build on the stakeholder engagement garnered during the Plan development, which staff may accomplish, at least, partially using existing networks and resources. Throughout the years, DuPage County has developed a robust and comprehensive water quality outreach program, from which the Kress Creek Watershed can and does benefit. The County hosts or sponsors 13 annual water quality programs ranging from an Adopt-a-Stream program to technical education for government staff. The County also developed 27 pieces of outreach, primarily targeted at residents, including brochures, public service announcements and a monthly e-newsletter. If not already in use, stakeholders should be using these existing outreach pieces throughout the watershed.

In addition, DuPage County has an array of local partner organizations focused on preserving and enhancing local watersheds. Several of these partners have existing ties within the Kress Creek Watershed, specifically The Conservation Foundation and SCARCE, a local youth education non-profit. The Conservation Foundation has a "Conservation in Our Community" program that targets five communities annually to encourage residents and businesses to use sustainable practices, including native landscaping, water conservation and reducing source of non-point source pollution. Further DuPage County is a funding sponsor of The Conservation Foundation's Conservation@Home and Work,

[18] www.dupageco.org/swm

rain barrel and the annual DuPage River Sweep – all of which aim to improve the integrity of waterways countywide.

SCARCE is a DuPage County partner in educating teachers, students and local organizations about watersheds. DuPage County also developed a Water Quality Flag in partnership with SCARCE that awards institutions for engaging in a series of educational trainings and hands-on activities, as well as installing green infrastructure on site.

Throughout outreach in local communities, residents become more aware of water quality concerns within their watershed. While DuPage County and many stakeholder organizations are active in reaching out to the residents and businesses within the Kress Creek Watershed, additional targeted efforts could be made in the following areas:

- Inform residents, particularly those with property located within in the Kress Creek floodplain, on the techniques to assess and maintain septic systems;
- Educate property owners and landscaping businesses on topics pertaining to lawn care, including fertilizer practices, composing and yard waste disposal;
- Facilitate water conservation and reuse efforts through the education and amendment of municipal codes that would otherwise make such efforts prohibited;
- Establish or expand waste collection events, particularly for household chemical waste and automobile fluids; and
- Develop campaigns to eliminate the discharge of chemicals into the storm sewer system, including oils, paints and waters recently treated with aquatic pesticides.

Table 24 includes recommendation on how to reach target audiences within the Kress Creek Watershed.

Print	Electronic	Workshops
Newsletters	Websites	Presentations
News Releases	Emails	Events
Brochures	Twitter	Field Trips
Fact Sheets	Facebook	Meetings
Direct Mail	PSAs	Conferences
Surveys	Surveys	Open House
		Surveys

Table 25 Tools and mediums for reach target audiences within the Kress Creek Watershed.

4.4 Summary of BMP Projects & Programs

Table 25 provides a comprehensive overview of the BMP projects described previously in this section. Again, these are all measures any stakeholder within the Kress Creek Watershed may utilize to improve the quality of the creek, depending on funding, expertise and other factors.

BMP Type	Scenario	Est. Qty.	Units	N Red. (lb/yr)	P Red. (lb/yr)	BOD Red. (lb/yr)	Sed. Red. (T/yr)	Estimated Cost ($)
Bioretention / Rain Gardens	WW	20.65	ac	839	176	na	na	$21,592,518
Detention Basin Retrofits	WW	19.40	ac	266	97	3199	26	$7,567,560
Detention Basin Retrofits	SS	47.74	ac	1074	393	10,875	134	$18,589,900
Education & Outreach	WW	4	#	na	na	na	na	$20,000

Bioswale	WW	15.92	ac	516	111	na	23	$8,755,450
Bioswale	SS	1.29	ac	104	23	na	6	$709,500
Filter Strip	SS	2	ac	115	19	499	8	$113,670
Filter Strip	WW	20.65	ac	533	109	2,981	23	$21,592,518
Rainwater Harvesting/ Dry Wells	WW	155.69	ac	54	9	246	3	$162,761,582
Tree Well/ Filterra	WW	6.15	ac	136	46	na	9	na
Oil & Grit Separator	WW	133	#	43	7	na	3	$1,064,000
Permeable & Porous Pavements	SS	40.86	ac	292	49	na	10	$32,073,948
Permeable & Porous Pavements	WW	15.37	ac	898	149	na	23	$12,061,525
Streambank Stabilization	WW	16,503	ft	13	5	27	7	$4,125,750
Streambank Stabilization	SS	8,868	ft	7	3	15	4	$2,217,000
Wetland Enhancement	SS	18.44	ac	na	na	na	na	$258,160
Totals				**4,890**	**1,196**	**17,842**	**279**	**$293,503,081**

Table 26 Summary of projects with pollutant load reductions and cost.[19]

4.5 Summary of Pollutant Loads & Potential BMP Pollutant Load Reductions

Table 26 provides potential pollutant load reductions for each of the BMP projects described above. Although all of these projects are recommended for attaining the measure able goals outlined in section 5.3, the totality of these projects exceed the goals.

BMP	TN Reduction (lbs/yr)	TP Reduction (lbs/yr)	BOD Reduction (lbs/yr)	Sediment Reduction (ton/yr)
Site-Specific				
Streambank Stabilization	7	3	15	4
Detention Basin Retrofits	1074	393	10875	134
Bioswales	104	23	na	23
Filter Strips	115	19	499	8
Permeable Pavers	292	49	na	10
Watershed-Wide				
Streambank Stabilization	13	5	27	7
Bioretention	839	176	na	na
Bioswale	516	111	na	23
Dry Wells/ Rainwater Harvesting	54	9	246	3

[19] ac = acre
SS = site specific
WW = watershed-wide
N/A = not applicable
ft = feet

Tree Wells/ Filterra	136	46	na	9
Oil & Grit	43	7	na	3
Permeable Pavers	898	149	na	23
Detention Basin Retrofit	266	97	3199	26
Background Rates	**70704**	**11866**	**230374**	**2315**
Total Reduction	**4,357**	**1,087**	**14,861**	**273**
Percent Reduction	**6%**	**9%**	**6%**	**12%**

Table 27 Watershed-wide and site-specific projects and pollutant load reductions (5-year estimate).

4.6 Funding Opportunities

The projects, programs and other measures recommended in the Kress Creek Watershed Plan are largely dependent on the availability of funding for design, construction and implementation of the recommendations. Although nearly any entity within the watershed could be eligible for funding, much of the financial burden will fall on public entities, such as DuPage County, local municipalities and the FPDDC, as they have the technical expertise to carry out the preferred alternatives, or suite of recommended projects and programs to improve Kress Creek. For others, regional groups, such as CMAP, offer technical assistance grants to assist with plan implementation. Table 27 includes a complete list of funding and technical resources.

Program	Funding Agency	Funding Amount	Eligibility	Activities Funded	Website
Clean Water State Revolving Fund (CWSRF)	U.S. EPA	Loan	Corporations, partnerships, governmental entities, tribal governments, or state infrastructure financing authority	Flood & storm damage reduction, environmental restoration, feasibility analysis, environmental review, permitting, development and design work, construction, etc.	https://www.epa.gov/cwsrf
Section 319(h) Grant Program	IEPA	Up to 60% of project cost	State and local government, watershed organizations, citizen and environmental groups, land conservancies or trusts, public and private profit and non-profit organizations, universities and colleges	Nonpoint source (NPS) pollution control projects; ie., Development of a Watershed Based Plan, Total Maximum Daily Load (TMDL) or Load Reduction Strategy (LRS), Best Management Practice (BMP) implementation, etc.	http://www.epa.illinois.gov/topics/water-quality/watershed-management/nonpoint-sources/grants/index
Local Technical Assistance Program	CMAP	N/A	Chicago-area governments, non-profits, and intergovernmental organizations	Planning activities that coincide with CMAP's "GO TO 2040" initiative	http://www.cmap.illinois.gov/programs-and-resources/lta

Water Quality Improvement Program Grant	DuPage County	Up to 25% reimbursement to project aspects with a water quality benefit	Open to all DuPage County entities	Projects providing a regional water quality benefit, ie., stream bank stabilization, habitat improvements, riparian buffer rehabilitation, etc.	https://www.dupageco.org/EDP/Stormwater_Management/Water_Quality/1312/
Wetland Program Development Grants	U.S. EPA	N/A	States, tribes, local governments, interstate associations, and intertribal consortia	Projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys and studies relating to water pollution	https://www.epa.gov/wetlands/wetland-program-development-grants#past-grants
5 Star Wetland and Urban Waters Restoration Grants	U.S. EPA	$10,000 - $40,000	Non-profit 501(c) organizations, state government agencies, local and municpal governments, Indian tribes and educational institutions	Environmental education and training for students, conservation corps, youth groups, citizen groups, corporations, landowners and government agencies through projects that restore wetlands and streams	https://www.epa.gov/wetlands/5-star-wetland-and-urban-waters-restoration-grants#Applying
Streambank Cleanup and Lakeshore Enhancement (SCALE)	IEPA	Up to $3,500	Groups with established and recurring stream or lakeshore cleanups	Implementation of streambank or lakeshore cleanup events	http://www.epa.illinois.gov/topics/water-quality/surface-water/scale/index
Pre-Disaster Mitigation Grant Program (PDM)	FEMA	N/A	States, U.S. territories, tribes, and local governments	Implementation of a sustained pre-disaster natural hazard mitigation program	https://www.fema.gov/pre-disaster-mitigation-grant-program
Emergency Watershed	USDA	Up to 75% of project cost	Public and private landowners sponsored by a legal subdivision of the	Debris removal, reshaping and protection of eroded banks, correcting drainage facilities, preventing	https://www.nrcs.usda.gov/wps/portal/nrcs/det

Protection Program (EWP)			State, e.g.; city, county, general improvement district, conservatoin district, or tribal organization	erosion, repairing conservation practices	ail/national/programs/landscape/ewpp/?cid=nrcs143_008258
North American Wetlands Conservation Act (Small Grants)	U.S. FWS	Up to $100,000 with at least matching funds from partner	Tribal, State, or local unit of government, non-governmental organization, or an individual	Long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats for the benefits of all wetlands-associated migratory birds	https://www.fws.gov/birds/grants/north-american-wetland-conservation-act/small-grants.php
North American Wetlands Conservation Act (Standard Grants)	U.S. FWS	$100,001-$1,000,000+ with partners matching at a rate of at least two-to-one	Tribal, State, or local unit of government, non-governmental organization, or an individual	Long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats for the benefits of all wetlands-associated migratory birds	https://www.fws.gov/birds/grants/north-american-wetland-conservation-act/standard-grants.php
National Conservation Innovation Grants	USDA - NRCS	Up to $2,000,000	Tribal, State, or local unit of government, non-governmental organization, or an individual	Conservation measures and water management technologies on a watershed-based, regional, multi-state, or nationwide scale	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/
State Conservation Innovation Grants	USDA - NRCS	N/A	Tribal, State, or local unit of government, non-governmental organization, or an individual	Conservation measures and water management technologies in Illinois	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/
Illinois Green Infrastructure Grant for Stormwater Manage	IEPA	N/A	Applicable entrants within a MS4 community	Implementation of green infrastructure BMPs to improve stormwater water quality and remove pollutants	http://www.epa.illinois.gov/topics/grants-loans/water-financial-assistance/igig/index

ment (IGIG)					
Environmental Quality and Incentives Program (EQIP)	USDA - NRCS	Up to $450,000	Landowners with eligible land-types	Implementation and planning of conservation practices that improve natural resources on agricultural land and non-industrial private forestland	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/
Healthy Forests Reserve Program	USDA - NRCS	N/A	Landowner (private or Indian tribes) or landowner approval	Restore, enhance, and protect forestland resources through multi-year easements	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/
Open Space Lands Acquisition and Development Grant / Land and Water Conservation Fund Grant	Illinois DNR	Up to $750,000 for acquisition projects; up to $400,000 for development & renovation	Illinois government agencies	Land acquisition for parks, water frontage, nature study and natural resource preservation	https://www.dnr.illinois.gov/AEG/Pages/OpenSpaceLandsAquisitionDevelopment-Grant.aspx
Sustainable Agricultural Grant Program	Illinois Department of Agriculture	Up to $10,000 for individuals; up to $20,000 for all others	Government, organization, institution, non-profit, or individuals with an understanding of sustainable ag practices	Research, education, and on-farm projects that address a part of the Sustainable Agriculture Act	https://www.agr.state.il.us/C2000/common/SAguidelines.pdf

Table 28 Water quality funding opportunities.

5. Implementation of Watershed Plan

The purpose of a watershed plan is to provide recommendations in the form of policy, programs and projects that may improve the health of the Kress Creek Watershed. In order to elicit a noticeable improvement in the stream, DuPage County will need cooperation of its local partners in implementing the initiatives identified in the plan. Stakeholders include local public agencies, residents, businesses, non-profits, schools and other organizations.

5.1 Implementation Schedule

Table 28 provides general guidance on implementing initiatives found in the Kress Creek Watershed Plan, for both DuPage County and its partners. The implementation schedule follows DuPage County Stormwater Management's process for implementing flood control projects found in watershed plans.

Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Engage stakeholders about the Kress Creek Watershed Plan, notably projects and funding opportunities.	X									
Identify preferred alternatives among the recommended implementations, considering cost and benefit.		X								
Identify appropriate funding opportunities for preferred alternatives.			X	X	X	X	X	X		
Submit grant applications for preferred alternatives.			X	X	X	X	X	X		
Implement preferred alternatives.					X	X	X	X	X	X
Monitor the progress and success of the preferred alternatives, particularly with respect to pollutant load reductions.				X	X	X	X	X	X	X
Evaluate successes and failures, and communicate those to stakeholders.								X	X	X
Update water quality-based watershed plan for new conditions.										X

Table 29 Kress Creek Watershed Plan 10-year implementation schedule.

5.2 Interim Measurable Milestones

Milestones are specific, measureable, achievable, relevant and time-sensitive subtasks needed to achieve an overall goal; in this case, implement a BMP. As outlined in Table 29, these milestones are categorized as short-term (1 to 5 years) or long-term (5 to 10 years). Stakeholders may adjust these milestones to document progress – or lack thereof – to identify progress or areas in need of improvement.

Acres	Indicator	Two-Year Milestone	Five-Year Milestone	Ten-Year Milestone
Improve and protect the ecological integrity of the surface water resources.	Acres of impervious surface reduction	5	10	15
	No. of green infrastructure practices	10	15	20

	Acres of restored wetland	-	2	5
	Acres of new wetland	-	2	5
	No. of detention basin retrofits	2	5	10
	No. of hydrodynamic separators	5	10	15
Build on partnerships with local stakeholders to foster sustainable programs, policy and re-development.	No. of ordinance updates	-	1	2
	No. of plans created and/or updated	5	7	10
	No. of partners carrying out BMP projects	2	4	8
	No. of meetings with stakeholders	6	15	30
	No. of organizations in Steering Committee	4	6	8
Reduce bank erosion and increase daylighting, where possible, to improve and protect in-stream water quality.	Linear feet of daylighting	-	-	100
	Acres of new riparian buffer	2	5	10
	Acres of restored riparian buffer	5	10	15
	Acres of in-stream restoration	2	5	10
	Linear feet streambank stabilization	2,000	6,000	12,000
Raise public awareness on the impacts of land management practices on water quality to prompt behavioral change.	No. of events and presentations	10	20	50
	No. of conservation@home/work properties	5	10	20
	No. of outreach materials distributed	500	1,000	2,000
	No. of Adopt-a-Stream groups	2	4	8
	No. of River Sweep participants	100	200	500
Preserve and connect open space, particularly near waterbodies.	Acres of open space created (i.e. buyouts)	-	5	10
	Acres of floodplain restored and/or protected	-	2	5
	Acres added to conservation easement	-	1	3
	No. of communities who adopt open space plan	-	1	2

Table 30 Milestones for determining success in carrying out Kress Creek Watershed Plan.

5.3 Criteria for Determining Progress

The primary criterion by which progress will be measured within the Kress Creek Watershed Plan is through measuring pollutant load reductions, specifically TN, TP, TSS and BOD. Table 30 summarizes the goal reductions for each of the pollutants of concern, as well as oil and grease over 5 years and 10 years. Ultimately, this pollutant load reduction will result in attainment of aquatic life and other designated uses.

Criteria	Current Load, Score or Rating	Five-Year Target	Ten-Year Target
Nitrogen (Total) Load Reduction	70,704 lb/yr	5% Load Reduction = 707 lb/yr (3535 lb total)	10% Load Reduction = 707 lb/yr (7,070 lb total)
Phosphorus (Total) Load Reduction	11,866 lb/yr	5% Load Reduction = 119 lb/yr (593 lb total)	10% Load Reduction = 119 lb/yr (1,187 lb total)
Sediment Load Reduction (TSS)	2,315 ton/yr	10% Load Reduction = 46 tons/yr (231 ton total)	20% Load Reduction = 46 tons/yr (463 ton total)
BOD Load Reduction	230,374 lb/yr	5% Load Reduction = 2,304 lb/yr (11,519 lb total)	10% Load Reduction = 2,303 lb/yr (23,037 lb total)
fIBI Scores	WB01 - 33	WB01 ->35	WB01 - >38
	WB02- 14	WB02 ->20	WB02- >25
	WB03 -24	WB03- > 28	WB03 - >32
mIBI Scores	WB01- 12	WB01-> 15	WB01 - >20
	WB02 - 14	WB02- >18	WB02- >23
	WB03- 18	WB03->22	WB03- >27

Table 31 Kress Creek Watershed Plan criteria for determining progress.[20]

5.4 Monitoring to Evaluate Effectiveness

In alignment with the previously mentioned criterion, water quality monitoring is the primary tool used to evaluate the effectiveness of Kress Creek Watershed Plan implementation efforts. To ensure accuracy, this requires all BMPS are also tracked throughout the Watershed. Long-term monitoring of these BMPs will be necessary to determine whether Kress Creek is both attaining designated uses and meeting water quality standards. In addition, monitoring provides vital information to update remedial actions as necessary. Several agencies offer various levels of water quality monitoring in the Kress Creek Watershed, including:

[20] Percent reduction matches Illinois Nutrient Reduction Strategy year 2025 goal.

- ***DuPage County:*** The County is responsible for implementing a monitoring and assessment program as part of the NPDES permit. In the upcoming permit cycle. DuPage County supports and contributes to the DuPage River Salt Creek Workgroup ambient monitoring of waterways.
- ***DRSCW:*** Chemical (water column), fish, mussel, macroinvertebrate and habitat monitoring efforts along Kress Creek to track how restoration efforts have improved biological index and habitat scores. Chemical monitoring includes total suspended solids, total nitrogen, total phosphorus, fecal coliform, chlorides, and oil and grease.
- ***IEPA:*** The Surface Water Section of the IEPA monitors the quality of surface waters in Illinois, including Kress Creek. Monitoring efforts include water and sediment chemistry, physical characteristics and stream structure, clarity, macroinvertebrate and fish populations and habitat quality. Surface water monitoring is funded through the USEPA as part of the Clean Water Act to work toward achieving the goal of fishable and swimmable waters throughout the nation.
- ***FPDDC:*** The Forest Preserve District of DuPage County conducts stream monitoring as part of the Office of Natural Resources Aquatics Monitoring & Research Program. This bio-assessment monitoring includes fish, macroinvertebrate and mussel surveys as well as water chemistry analysis using Sondes and surveys of physical stream characteristics such as cross section, pebble counts and longitudinal profiles.
- ***Volunteer Programs:*** The DuPage County Adopt-A-Stream program allows for local businesses, schools, churches, student groups, organizations, watershed associations and volunteer groups to do their part in restoring and maintaining local streams. DuPage County asks groups who wish to Adopt-A-Stream to commit to that section of stream for two years and engage in two stream cleanups each year. Groups may choose to go beyond the minimum requirements by regularly monitoring water quality, recording illicit discharge or engaging in streambank enhancement projects.

Although monitoring during implementation of the Kress Creek Watershed Plan is vital to its success, monitoring of the BMPs will ensure long-term success to the vitality of Kress Creek. In particular, habitat restoration that provides a desirable environment for macroinvertebrates and other stream biota is critical to improving aquatic life and meeting water quality standards. Monitoring both during and after construction will be required for all in-stream and bank stabilization projects. This is critical in assessing whether projects are functioning, as well as determining if future habitat restoration plans need to be adjusted. All such projects will need to be monitored for evidence of erosion and scour and native vegetation success and stabilization for up to 3 to 5 years after implementation.

List of Acronyms

BMP(s): Best Management Practice(s)

BOD: Biological Oxygen Demand

CMAP: Chicago Metropolitan Association of Planning, http://www.cmap.illinois.gov/

DCSM: DuPage County Stormwater Management, http://www.dupageco.org/swm/

DCHD: DuPage County Health Department: http://www.dupagehealth.org/

DCSM Plan: DuPage County Stormwater Management Plan, http://www.dupageco.org/EDP/Stormwater_Management/1163/

DCSMPC: DuPage County Stormwater Management Planning Committee

DRSCW: DuPage River/Salt Creek Workgroup, http://www.drscw.org/

DuDOT: DuPage County Division of Transportation

FPDDC: Forest Preserve District of DuPage County, http://www.dupageforest.org/

GIS: Geographic Information System

GIV: Chicago Wilderness' Green Infrastructure Vision, http://www.cmap.illinois.gov/livability/sustainability/open-space/green-infrastructure-vision

HOA: Homeowners Association

IDNR: Illinois Department of Natural Resources

IDOT: Illinois Department of Transportation, http://www.idot.illinois.gov/

IEPA: Illinois Environmental Protection Agency, http://www.epa.illinois.gov/index

Integrated Report: Illinois Integrated Water Quality Report and Section 303(d) List

ISTHA: Illinois State Toll Highway Authority

MRWQ: Mean Rated Wildlife Quality

MS4(s): Municipal Separate Storm Sewer System(s)

NWI: National Wetland Inventory

NPDES: National Pollutant Discharge Elimination System

NRCS: Natural Resources Conservation Service, http://www.nrcs.usda.gov

Ordinance: DuPage County Countywide Stormwater and Flood Plain Ordinance,

http://www.dupageco.org/EDP/Stormwater_Management/Regulatory_Services/1420/

PAH(s): Polycyclic aromatic hydrocarbon(s)

POTW: Publically Owned Treatment Works

TCF: The Conservation Foundation, http://theconservationfoundation.org/

TKN: Total Kjeldahl Nitrogen

TMDL: Total Maximum Daily Load

TN: Total Nitrogen

TP: Total Phosphorous

TSS: Total Suspended Solids

USACOE: United States Army Corps of Engineers, http://www.usace.army.mil/

USEPA: United States Environmental Protection Agency, http://www.epa.gov/

USGS: United States Geological Survey, http://www.usgs.gov/

APPENDIX A

Kress Creek Watershed										
Total Watershed Area		10208			ac					
Existing N Loading		70697			lb/yr					
Existing P Loading		11863			lb/yr					
Existing BOD Loading		230359			lb/yr					
Existing TSS Loading		2311			t/yr					
							Pollutant Load Removals			
Pond ID	**Current Condition**	**Drainage Area (ac)**	**Location**	**Ownership**	**Proposed Condition**	**Priority**	**N (lb/yr)**	**P (lb/yr)**	**BOD (lb/yr)**	**TSS (t/yr)**
1	wet bottom	18	NE of Diversey Pkwy & I-59	Public	wetland detention	2	24.9	9.2	255.9	3.2
2	wet bottom	27	NE of Diversey Pkwy & I-59	Public	wetland detention	2	37.4	13.8	383.9	4.7
3	wet bottom	online	Wiant Rd & I-59	Private		3				
4	wet bottom	24	East of Norris Ave, South of Diversey Pkwy	Public	wetland detention	2	33.2	12.3	341.2	4.2
5	wet bottom	7	Pheasant Run Resort Golf Grounds	Public	wetland detention	2	9.7	3.6	99.5	1.2
6	wet bottom	2	Indianwood Ln & Cherokee Dr	Private	wetland detention	2	2.8	1.0	28.4	0.4
7	wet bottom	17	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	23.5	8.7	241.7	3.0
8	wet bottom	online	Pheasant Run Resort Golf Grounds	Private		2				
9	wet bottom	20	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	27.7	10.2	284.3	3.5
10	wet bottom	7	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	9.7	3.6	99.5	1.2
11	wet bottom	9	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	12.5	4.6	128.0	1.6
14	wet bottom	13	Teresa Ln & Franciscan Way	Private	wetland detention	3	18.0	6.6	184.8	2.3
17	wet bottom	10	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	13.9	5.1	142.2	1.8
18	wet bottom	356	Reque Rd & North Ave	Private	wetland detention	2	493.1	182.0	5061.2	62.5
20	wet bottom	3	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	4.2	1.5	42.7	0.5
21	wet bottom	2	Powis Rd & Powis Ct	Public	wetland detention	2	2.8	1.0	28.4	0.4
22	wet bottom	online	Kings Cir & Kings Ct	Private		3				
23	wet bottom	online	Natalie Dr & Woodside Dr	Private		3				
24	wet bottom	online	Ingalton Ave & I-59	Private		3				
25	wet bottom	online	Tara Ln & I-59	Private		3				
26	wet bottom	online	Arbor Ave & Ainsley Dr	Private		3				
27	wet bottom	online	Lane Rd & Union Pacific Railroad	Private		3				
28	wet bottom	online	Lane Rd & Union Pacific Railroad	Private		3				
29	wet bottom	online	Lane Rd & Union Pacific Railroad	Private		3				
30	wet bottom	23	Kress Rd & Roosevelt Rd	Public	wetland detention	2	31.9	11.8	327.0	4.0
31	wet bottom	24	Prairie Landing Golf Club, Longest Dr	Public	wetland detention	2	33.2	12.3	341.2	4.2
32	wet bottom	8	Washington St & Wegner Dr	Private	wetland detention	2	11.1	4.1	113.7	1.4
33	wet bottom	28	Roosevelt Rd & Washington St	Private	wetland detention	2	38.8	14.3	398.1	4.9
34	wet bottom	13	Roosevelt Rd & Commerce Dr	Private	wetland detention	2	18.0	6.6	184.8	2.3
35	wet bottom	16	Pioneer Park	Public	wetland detention	2	22.2	8.2	227.5	2.8
36	wet bottom	8	Town Rd & Pearl Rd	Private	wetland detention	2	11.1	4.1	113.7	1.4
37	wet bottom	online	NW of Joliet St & I-59	Public		2				
38	wet bottom	15	Washington St & Town Rd (Parallel to Railroad)	Public	wetland detention	1	20.8	7.7	213.3	2.6
39	wet bottom	6	Arbor Ave & I-59	Private	wetland detention	2	8.3	3.1	85.3	1.1
40	wet bottom	17	Hawthorne Ln & Industrial Dr	Public	wetland detention	2	23.5	8.7	241.7	3.0
41	wet bottom	58	Superior Health Linens	Private	wetland detention	2	80.3	29.7	824.6	10.2
42	dry bottom	4	Roosevelt Rd & Town Rd	Private	native basin	2	15.2	3.2	56.9	0.8
43	dry bottom	2	North Ave & Powis Rd	Private	native basin	2	7.6	1.6	28.4	0.4
44	wet bottom	3	North Ave & Powis Rd	Private	wetland detention	2	4.2	1.5	42.7	0.5
12/45	wet bottom	11	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	15.2	5.6	156.4	1.9
13/15	wet bottom	4	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	5.5	2.0	56.9	0.7
16/19	wet bottom	10	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	13.9	5.1	142.2	1.8
							1074.2	**392.9**	**10875.9**	**134.4**

Rainwater Harvesting										
1		0.293	South Industrial Cluster	Private	Rainwater Harvesting	1	1.0	0.2	4.6	0.1
2		0.258	South Industrial Cluster	Private	Rainwater Harvesting	1	0.9	0.1	4.1	0.1
3		0.048	South Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.8	0.0
4		0.182	South Industrial Cluster	Private	Rainwater Harvesting	1	0.6	0.1	2.9	0.0
5		0.034	South Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
6		0.045	South Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.7	0.0
7		0.079	South Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.0	1.2	0.0
8		0.029	South Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
9		0.167	South Industrial Cluster	Private	Rainwater Harvesting	1	0.6	0.1	2.6	0.0
10		0.164	South Industrial Cluster	Private	Rainwater Harvesting	1	0.6	0.1	2.6	0.0
11		0.277	South Industrial Cluster	Private	Rainwater Harvesting	1	1.0	0.2	4.4	0.1
12		0.333	South Industrial Cluster	Private	Rainwater Harvesting	1	1.2	0.2	5.3	0.1
13		0.297	South Industrial Cluster	Private	Rainwater Harvesting	1	1.0	0.2	4.7	0.1
14		0.292	South Industrial Cluster	Private	Rainwater Harvesting	1	1.0	0.2	4.6	0.1
15		0.386	South Industrial Cluster	Private	Rainwater Harvesting	1	1.3	0.2	6.1	0.1
16		0.151	South Industrial Cluster	Private	Rainwater Harvesting	1	0.5	0.1	2.4	0.0
17		0.006	South Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.1	0.0
18		0.069	South Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	1.1	0.0
19		0.023	South Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.4	0.0
20		0.022	South Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.3	0.0
21		0.319	South Industrial Cluster	Private	Rainwater Harvesting	1	1.1	0.2	5.0	0.1
22		0.425	South Industrial Cluster	Private	Rainwater Harvesting	1	1.5	0.2	6.7	0.1
23		0.018	South Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.3	0.0
24		0.594	South Industrial Cluster	Private	Rainwater Harvesting	1	2.1	0.3	9.4	0.1
25		0.366	North Industrial Cluster	Private	Rainwater Harvesting	1	1.3	0.2	5.8	0.1
26		0.110	North Industrial Cluster	Private	Rainwater Harvesting	1	0.4	0.1	1.7	0.0
27		0.034	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
28		0.045	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.7	0.0
29		0.067	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	1.1	0.0
30		0.036	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.6	0.0
31		0.079	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.0	1.2	0.0
32		0.078	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.0	1.2	0.0
33		0.048	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.8	0.0
34		0.174	North Industrial Cluster	Private	Rainwater Harvesting	1	0.6	0.1	2.8	0.0
35		0.034	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
36		0.238	North Industrial Cluster	Private	Rainwater Harvesting	1	0.8	0.1	3.8	0.0
37		0.098	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.5	0.0
38		0.010	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.2	0.0
39		0.242	North Industrial Cluster	Private	Rainwater Harvesting	1	0.8	0.1	3.8	0.0
40		0.134	North Industrial Cluster	Private	Rainwater Harvesting	1	0.5	0.1	2.1	0.0
41		0.031	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
42		0.005	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.1	0.0
43		0.213	North Industrial Cluster	Private	Rainwater Harvesting	1	0.7	0.1	3.4	0.0
44		0.343	North Industrial Cluster	Private	Rainwater Harvesting	1	1.2	0.2	5.4	0.1
45		0.229	North Industrial Cluster	Private	Rainwater Harvesting	1	0.8	0.1	3.6	0.0
46		0.050	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.8	0.0
47		0.131	North Industrial Cluster	Private	Rainwater Harvesting	1	0.5	0.1	2.1	0.0
48		0.105	North Industrial Cluster	Private	Rainwater Harvesting	1	0.4	0.1	1.7	0.0
49		0.228	North Industrial Cluster	Private	Rainwater Harvesting	1	0.8	0.1	3.6	0.0
50		0.033	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
51		0.038	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.6	0.0
52		0.212	North Industrial Cluster	Private	Rainwater Harvesting	1	0.7	0.1	3.3	0.0

53		0.583	North Industrial Cluster	Private	Rainwater Harvesting	1	2.0	0.3	9.2	0.1
54		0.679	North Industrial Cluster	Private	Rainwater Harvesting	1	2.4	0.4	10.7	0.1
55		0.472	North Industrial Cluster	Private	Rainwater Harvesting	1	1.6	0.3	7.5	0.1
56		0.200	North Industrial Cluster	Private	Rainwater Harvesting	1	0.7	0.1	3.2	0.0
57		0.595	North Industrial Cluster	Private	Rainwater Harvesting	1	2.1	0.3	9.4	0.1
58		0.084	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.0	1.3	0.0
59		1.106	North Industrial Cluster	Private	Rainwater Harvesting	1	3.8	0.6	17.5	0.2
60		0.137	North Industrial Cluster	Private	Rainwater Harvesting	1	0.5	0.1	2.2	0.0
61		0.009	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.1	0.0
62		0.115	North Industrial Cluster	Private	Rainwater Harvesting	1	0.4	0.1	1.8	0.0
63		0.071	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	1.1	0.0
64		0.023	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.4	0.0
65		0.015	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.2	0.0
66		0.027	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.4	0.0
67		0.033	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
68		0.116	North Industrial Cluster	Private	Rainwater Harvesting	1	0.4	0.1	1.8	0.0
69		0.046	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.7	0.0
70		0.219	North Industrial Cluster	Private	Rainwater Harvesting	1	0.8	0.1	3.5	0.0
71		0.022	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.3	0.0
72		0.097	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.5	0.0
73		0.099	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.6	0.0
74		0.495	North Industrial Cluster	Private	Rainwater Harvesting	1	1.7	0.3	7.8	0.1
75		0.031	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
76		0.059	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.9	0.0
77		0.091	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.4	0.0
78		0.231	North Industrial Cluster	Private	Rainwater Harvesting	1	0.8	0.1	3.6	0.0
79		0.060	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	1.0	0.0
80		0.043	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.7	0.0
81		0.100	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.6	0.0
82		0.057	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.9	0.0
83		0.054	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.9	0.0
84		0.149	North Industrial Cluster	Private	Rainwater Harvesting	1	0.5	0.1	2.4	0.0
85		0.027	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.4	0.0
86		0.029	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.5	0.0
87		0.045	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.7	0.0
88		0.060	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.9	0.0
89		0.059	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.9	0.0
90		0.006	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.1	0.0
91		0.005	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.1	0.0
92		0.042	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.7	0.0
93		0.060	North Industrial Cluster	Private	Rainwater Harvesting	1	0.2	0.0	0.9	0.0
94		0.344	North Industrial Cluster	Private	Rainwater Harvesting	1	1.2	0.2	5.4	0.1
95		0.135	North Industrial Cluster	Private	Rainwater Harvesting	1	0.5	0.1	2.1	0.0
96		0.489	North Industrial Cluster	Private	Rainwater Harvesting	1	1.7	0.3	7.7	0.1
97		0.001	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.0	0.0
98		0.098	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.5	0.0
99		0.096	North Industrial Cluster	Private	Rainwater Harvesting	1	0.3	0.1	1.5	0.0
100		0.006	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.1	0.0
101		0.028	North Industrial Cluster	Private	Rainwater Harvesting	1	0.1	0.0	0.4	0.0
102		0.002	North Industrial Cluster	Private	Rainwater Harvesting	1	0.0	0.0	0.0	0.0
							53.9	**9.0**	**245.9**	**3.2**
Permeable Paver Lot Retrofit										
1	Paved Parking Lot	7.5	Pheasant Run Resort	Private	Permeable Pavers	2	46.75	7.8	na	1.5

2	Paved Parking Lot	3.3	North Ave & Teresa Ln	Private	Permeable Pavers	2	20.57	3.5	na	0.7
3	Paved Parking Lot	0.28	Hawthorne Ln & Industrial Dr	Public	Permeable Pavers	1	1.75	0.3	na	0.1
4	Paved Parking Lot	2.3	West Chicago Water Treatment	Public	Permeable Pavers	1	14.34	2.4	na	0.5
5	Paved Parking Lot	3	West Chicago Fire	Public	Permeable Pavers	1	18.70	3.1	na	0.6
6	Paved Parking Lot	1.1	School District 33	Public	Permeable Pavers	1	6.86	1.2	na	0.2
7	Paved Parking Lot	1.9	Turner School	Public	Permeable Pavers	1	11.84	2.0	na	0.4
8	Paved Parking Lot	2	Prairie Landing Golf Club	Public	Permeable Pavers	2	12.47	2.1	na	0.4
9	Paved Parking Lot	1	West Chicago Post Office	Public	Permeable Pavers	1	6.23	1.0	na	0.2
10	Paved Parking Lot	0.7	Washington St & Arbor Ave	Private	Permeable Pavers	2	4.36	0.7	na	0.1
11	Paved Parking Lot	3.9	West Chicago Community High School	Public	Permeable Pavers	1	24.31	4.1	na	0.8
12	Paved Parking Lot	0.22	Trinity Lutheran Church	Private	Permeable Pavers	2	1.37	0.2	na	0.0
13	Paved Parking Lot	1.1	Church St & Town Rd	Private	Permeable Pavers	2	6.86	1.2	na	0.2
14	Paved Parking Lot	0.95	Pioneer School	Public	Permeable Pavers	1	5.92	1.0	na	0.2
15	Paved Parking Lot	3.65	West Chicago & Lemen Middle Schools	Public	Permeable Pavers	1	22.75	3.8	na	0.7
16	Paved Parking Lot	2	Gary Elementary School	Public	Permeable Pavers	1	12.47	2.1	na	0.4
17	Paved Parking Lot	4.9	Hawthorne Ln & IL 59	Private	Permeable Pavers	2	30.54	5.1	na	1.0
18	Paved Parking Lot	7.1	Reed Keppler Park	Public	Permeable Pavers	2	44.25	7.4	na	1.4
							292.33	**49.05**	**na**	**9.56**
							1420	**451**	**11122**	**147**

APPENDIX B

Kress Creek Watershed

Total Watershed Area		10208			ac			
Existing N Loading		70697			lb/yr			
Existing P Loading		11863			lb/yr			
Existing BOD Loading		230359			lb/yr			
Existing TSS Loading		2311			t/yr			

Pond ID	Current Condition	Drainage Area (ac)	Location	Ownership	Proposed Condition	Priority	Size of Pond (acres)	Total cost
1	wet bottom	18	NE of Diversey Pkwy & I-59	Public	wetland detention	2	3.27	$ 1,275,300
2	wet bottom	27	NE of Diversey Pkwy & I-59	Public	wetland detention	2	1.74	$ 678,600
3	wet bottom	online	Wiant Rd & I-59	Private		3	0.24	$ -
4	wet bottom	24	East of Norris Ave, South of Diversey Pkwy	Public	wetland detention	2	2.27	$ 885,300
5	wet bottom	7	Pheasant Run Resort Golf Grounds	Public	wetland detention	2	0.28	$ 109,200
6	wet bottom	2	Indianwood Ln & Cherokee Dr	Private	wetland detention	2	0.22	$ 85,800
7	wet bottom	17	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.83	$ 323,700
8	wet bottom	online	Pheasant Run Resort Golf Grounds	Private		2	0.4	$ -
9	wet bottom	20	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.09	$ 35,100
10	wet bottom	7	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	1.07	$ 417,300
11	wet bottom	9	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.5	$ 195,000
14	wet bottom	13	Teresa Ln & Franciscan Way	Private	wetland detention	3	0.14	$ 54,600
17	wet bottom	10	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.91	$ 354,900
18	wet bottom	356	Reque Rd & North Ave	Private	wetland detention	2	1.28	$ 499,200
20	wet bottom	3	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.1	$ 39,000
21	wet bottom	2	Powis Rd & Powis Ct	Public	wetland detention	2	0.16	$ 62,400
22	wet bottom	online	Kings Cir & Kings Ct	Private		3	2.45	$ -
23	wet bottom	online	Natalie Dr & Woodside Dr	Private		3	1.38	$ -
24	wet bottom	online	Ingalton Ave & I-59	Private		3	0.27	$ -
25	wet bottom	online	Tara Ln & I-59	Private		3	0.84	$ -
26	wet bottom	online	Arbor Ave & Ainsley Dr	Private		3	0.4	$ -
27	wet bottom	online	Lane Rd & Union Pacific Railroad	Private		3	0.23	$ -
28	wet bottom	online	Lane Rd & Union Pacific Railroad	Private		3	0.27	$ -
29	wet bottom	online	Lane Rd & Union Pacific Railroad	Private		3	0.27	$ -
30	wet bottom	23	Kress Rd & Roosevelt Rd	Public	wetland detention	2	2.53	$ 986,700
31	wet bottom	24	Prairie Landing Golf Club, Longest Dr	Public	wetland detention	2	1.84	$ 717,600
32	wet bottom	8	Washington St & Wegner Dr	Private	wetland detention	2	0.41	$ 159,900
33	wet bottom	28	Roosevelt Rd & Washington St	Private	wetland detention	2	3.61	$ 1,407,900
34	wet bottom	13	Roosevelt Rd & Commerce Dr	Private	wetland detention	2	0.72	$ 280,800
35	wet bottom	16	Pioneer Park	Public	wetland detention	2	1.21	$ 471,900
36	wet bottom	8	Town Rd & Pearl Rd	Private	wetland detention	2	0.3	$ 117,000
37	wet bottom	online	NW of Joliet St & I-59	Public		2	0.64	$ -
38	wet bottom	15	Washington St & Town Rd (Parallel to Railroad)	Public	wetland detention	1	0.54	$ 210,600
39	wet bottom	6	Arbor Ave & I-59	Private	wetland detention	2	0.18	$ 70,200
40	wet bottom	17	Hawthorne Ln & Industrial Dr	Public	wetland detention	2	2.66	$ 1,037,400
41	wet bottom	58	Superior Health Linens	Private	wetland detention	2	10.9	$ 4,251,000
42	dry bottom	4	Roosevelt Rd & Town Rd	Private	native basin	2	0.31	$ 99,200
43	dry bottom	2	North Ave & Powis Rd	Private	native basin	2	0.1	$ 32,000
44	wet bottom	3	North Ave & Powis Rd	Private	wetland detention	2	0.38	$ 148,200
12/45	wet bottom	11	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.73	$ 284,700
13/15	wet bottom	4	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.14	$ 54,600

16/19	wet bottom	10	Pheasant Run Resort Golf Grounds	Private	wetland detention	2	0.93	$ 362,700
								$ 15,707,800
Rainwater Harvesting							**Building Footprint (Acres)**	
1		0.293	South Industrial Cluster	Private	Rainwater Harvesting	1	2.93	$ 3,068,213
2		0.258	South Industrial Cluster	Private	Rainwater Harvesting	1	2.58	$ 2,692,959
3		0.048	South Industrial Cluster	Private	Rainwater Harvesting	1	0.48	$ 506,923
4		0.182	South Industrial Cluster	Private	Rainwater Harvesting	1	1.82	$ 1,902,821
5		0.034	South Industrial Cluster	Private	Rainwater Harvesting	1	0.34	$ 355,181
6		0.045	South Industrial Cluster	Private	Rainwater Harvesting	1	0.45	$ 467,083
7		0.079	South Industrial Cluster	Private	Rainwater Harvesting	1	0.79	$ 823,059
8		0.029	South Industrial Cluster	Private	Rainwater Harvesting	1	0.29	$ 299,124
9		0.167	South Industrial Cluster	Private	Rainwater Harvesting	1	1.67	$ 1,742,937
10		0.164	South Industrial Cluster	Private	Rainwater Harvesting	1	1.64	$ 1,718,888
11		0.277	South Industrial Cluster	Private	Rainwater Harvesting	1	2.77	$ 2,892,218
12		0.333	South Industrial Cluster	Private	Rainwater Harvesting	1	3.33	$ 3,480,670
13		0.297	South Industrial Cluster	Private	Rainwater Harvesting	1	2.97	$ 3,101,171
14		0.292	South Industrial Cluster	Private	Rainwater Harvesting	1	2.92	$ 3,050,211
15		0.386	South Industrial Cluster	Private	Rainwater Harvesting	1	3.86	$ 4,036,778
16		0.151	South Industrial Cluster	Private	Rainwater Harvesting	1	1.51	$ 1,580,586
17		0.006	South Industrial Cluster	Private	Rainwater Harvesting	1	0.06	$ 59,060
18		0.069	South Industrial Cluster	Private	Rainwater Harvesting	1	0.69	$ 718,297
19		0.023	South Industrial Cluster	Private	Rainwater Harvesting	1	0.23	$ 239,540
20		0.022	South Industrial Cluster	Private	Rainwater Harvesting	1	0.22	$ 230,017
21		0.319	South Industrial Cluster	Private	Rainwater Harvesting	1	3.19	$ 3,338,834
22		0.425	South Industrial Cluster	Private	Rainwater Harvesting	1	4.25	$ 4,440,872
23		0.018	South Industrial Cluster	Private	Rainwater Harvesting	1	0.18	$ 192,531
24		0.594	South Industrial Cluster	Private	Rainwater Harvesting	1	5.94	$ 6,211,408
25		0.366	North Industrial Cluster	Private	Rainwater Harvesting	1	3.66	$ 3,827,288
26		0.110	North Industrial Cluster	Private	Rainwater Harvesting	1	1.10	$ 1,153,305
27		0.034	North Industrial Cluster	Private	Rainwater Harvesting	1	0.34	$ 355,042
28		0.045	North Industrial Cluster	Private	Rainwater Harvesting	1	0.45	$ 465,585
29		0.067	North Industrial Cluster	Private	Rainwater Harvesting	1	0.67	$ 704,719
30		0.036	North Industrial Cluster	Private	Rainwater Harvesting	1	0.36	$ 379,498
31		0.079	North Industrial Cluster	Private	Rainwater Harvesting	1	0.79	$ 824,315
32		0.078	North Industrial Cluster	Private	Rainwater Harvesting	1	0.78	$ 810,425
33		0.048	North Industrial Cluster	Private	Rainwater Harvesting	1	0.48	$ 500,411
34		0.174	North Industrial Cluster	Private	Rainwater Harvesting	1	1.74	$ 1,823,054
35		0.034	North Industrial Cluster	Private	Rainwater Harvesting	1	0.34	$ 359,150
36		0.238	North Industrial Cluster	Private	Rainwater Harvesting	1	2.38	$ 2,483,109
37		0.098	North Industrial Cluster	Private	Rainwater Harvesting	1	0.98	$ 1,023,620
38		0.010	North Industrial Cluster	Private	Rainwater Harvesting	1	0.10	$ 100,025
39		0.242	North Industrial Cluster	Private	Rainwater Harvesting	1	2.42	$ 2,533,941
40		0.134	North Industrial Cluster	Private	Rainwater Harvesting	1	1.34	$ 1,400,607
41		0.031	North Industrial Cluster	Private	Rainwater Harvesting	1	0.31	$ 323,315
42		0.005	North Industrial Cluster	Private	Rainwater Harvesting	1	0.05	$ 54,920
43		0.213	North Industrial Cluster	Private	Rainwater Harvesting	1	2.13	$ 2,226,543
44		0.343	North Industrial Cluster	Private	Rainwater Harvesting	1	3.43	$ 3,587,761
45		0.229	North Industrial Cluster	Private	Rainwater Harvesting	1	2.29	$ 2,395,912
46		0.050	North Industrial Cluster	Private	Rainwater Harvesting	1	0.50	$ 523,895
47		0.131	North Industrial Cluster	Private	Rainwater Harvesting	1	1.31	$ 1,369,456
48		0.105	North Industrial Cluster	Private	Rainwater Harvesting	1	1.05	$ 1,094,789

49		0.228	North Industrial Cluster	Private	Rainwater Harvesting	1	2.28	$ 2,387,534
50		0.033	North Industrial Cluster	Private	Rainwater Harvesting	1	0.33	$ 342,958
51		0.038	North Industrial Cluster	Private	Rainwater Harvesting	1	0.38	$ 400,568
52		0.212	North Industrial Cluster	Private	Rainwater Harvesting	1	2.12	$ 2,214,743
53		0.583	North Industrial Cluster	Private	Rainwater Harvesting	1	5.83	$ 6,091,185
54		0.679	North Industrial Cluster	Private	Rainwater Harvesting	1	6.79	$ 7,096,357
55		0.472	North Industrial Cluster	Private	Rainwater Harvesting	1	4.72	$ 4,937,635
56		0.200	North Industrial Cluster	Private	Rainwater Harvesting	1	2.00	$ 2,095,583
57		0.595	North Industrial Cluster	Private	Rainwater Harvesting	1	5.95	$ 6,222,780
58		0.084	North Industrial Cluster	Private	Rainwater Harvesting	1	0.84	$ 875,852
59		1.106	North Industrial Cluster	Private	Rainwater Harvesting	1	11.06	$ 11,560,726
60		0.137	North Industrial Cluster	Private	Rainwater Harvesting	1	1.37	$ 1,433,398
61		0.009	North Industrial Cluster	Private	Rainwater Harvesting	1	0.09	$ 89,149
62		0.115	North Industrial Cluster	Private	Rainwater Harvesting	1	1.15	$ 1,201,596
63		0.071	North Industrial Cluster	Private	Rainwater Harvesting	1	0.71	$ 738,091
64		0.023	North Industrial Cluster	Private	Rainwater Harvesting	1	0.23	$ 236,991
65		0.015	North Industrial Cluster	Private	Rainwater Harvesting	1	0.15	$ 157,866
66		0.027	North Industrial Cluster	Private	Rainwater Harvesting	1	0.27	$ 278,193
67		0.033	North Industrial Cluster	Private	Rainwater Harvesting	1	0.33	$ 343,693
68		0.116	North Industrial Cluster	Private	Rainwater Harvesting	1	1.16	$ 1,212,903
69		0.046	North Industrial Cluster	Private	Rainwater Harvesting	1	0.46	$ 475,874
70		0.219	North Industrial Cluster	Private	Rainwater Harvesting	1	2.19	$ 2,293,471
71		0.022	North Industrial Cluster	Private	Rainwater Harvesting	1	0.22	$ 229,754
72		0.097	North Industrial Cluster	Private	Rainwater Harvesting	1	0.97	$ 1,018,782
73		0.099	North Industrial Cluster	Private	Rainwater Harvesting	1	0.99	$ 1,036,759
74		0.495	North Industrial Cluster	Private	Rainwater Harvesting	1	4.95	$ 5,176,475
75		0.031	North Industrial Cluster	Private	Rainwater Harvesting	1	0.31	$ 319,631
76		0.059	North Industrial Cluster	Private	Rainwater Harvesting	1	0.59	$ 614,878
77		0.091	North Industrial Cluster	Private	Rainwater Harvesting	1	0.91	$ 954,751
78		0.231	North Industrial Cluster	Private	Rainwater Harvesting	1	2.31	$ 2,413,900
79		0.060	North Industrial Cluster	Private	Rainwater Harvesting	1	0.60	$ 629,913
80		0.043	North Industrial Cluster	Private	Rainwater Harvesting	1	0.43	$ 447,537
81		0.100	North Industrial Cluster	Private	Rainwater Harvesting	1	1.00	$ 1,040,484
82		0.057	North Industrial Cluster	Private	Rainwater Harvesting	1	0.57	$ 598,926
83		0.054	North Industrial Cluster	Private	Rainwater Harvesting	1	0.54	$ 565,909
84		0.149	North Industrial Cluster	Private	Rainwater Harvesting	1	1.49	$ 1,562,376
85		0.027	North Industrial Cluster	Private	Rainwater Harvesting	1	0.27	$ 277,343
86		0.029	North Industrial Cluster	Private	Rainwater Harvesting	1	0.29	$ 299,462
87		0.045	North Industrial Cluster	Private	Rainwater Harvesting	1	0.45	$ 468,102
88		0.060	North Industrial Cluster	Private	Rainwater Harvesting	1	0.60	$ 623,821
89		0.059	North Industrial Cluster	Private	Rainwater Harvesting	1	0.59	$ 616,612
90		0.006	North Industrial Cluster	Private	Rainwater Harvesting	1	0.06	$ 62,968
91		0.005	North Industrial Cluster	Private	Rainwater Harvesting	1	0.05	$ 47,235
92		0.042	North Industrial Cluster	Private	Rainwater Harvesting	1	0.42	$ 434,719
93		0.060	North Industrial Cluster	Private	Rainwater Harvesting	1	0.60	$ 625,340
94		0.344	North Industrial Cluster	Private	Rainwater Harvesting	1	3.44	$ 3,598,861
95		0.135	North Industrial Cluster	Private	Rainwater Harvesting	1	1.35	$ 1,413,428
96		0.489	North Industrial Cluster	Private	Rainwater Harvesting	1	4.89	$ 5,111,047
97		0.001	North Industrial Cluster	Private	Rainwater Harvesting	1	0.01	$ 13,819
98		0.098	North Industrial Cluster	Private	Rainwater Harvesting	1	0.98	$ 1,024,273
99		0.096	North Industrial Cluster	Private	Rainwater Harvesting	1	0.96	$ 1,003,644

100		0.006	North Industrial Cluster	Private	Rainwater Harvesting	1	0.06	$ 65,193
101		0.028	North Industrial Cluster	Private	Rainwater Harvesting	1	0.28	$ 289,781
102		0.002	North Industrial Cluster	Private	Rainwater Harvesting	1	0.02	$ 18,649
								$ 162,761,582
Permeable Paver Lot Retrofit								
1	Paved Parking Lot	7.5	Pheasant Run Resort	Private	Permeable Pavers	2	5.03	$ 3,948,756
2	Paved Parking Lot	3.3	North Ave & Teresa Ln	Private	Permeable Pavers	2	2.82	$ 2,213,632
3	Paved Parking Lot	0.28	Hawthorne Ln & Industrial Dr	Public	Permeable Pavers	1	0.28	$ 219,762
4	Paved Parking Lot	2.3	West Chicago Water Treatment	Public	Permeable Pavers	1	2.12	$ 1,662,788
5	Paved Parking Lot	3	West Chicago Fire	Public	Permeable Pavers	1	2.14	$ 1,677,216
6	Paved Parking Lot	1.1	School District 33	Public	Permeable Pavers	1	0.85	$ 668,118
7	Paved Parking Lot	1.9	Turner School	Public	Permeable Pavers	1	1.53	$ 1,200,919
8	Paved Parking Lot	2	Prairie Landing Golf Club	Public	Permeable Pavers	2	1.86	$ 1,460,719
9	Paved Parking Lot	1	West Chicago Post Office	Public	Permeable Pavers	1	0.88	$ 688,505
10	Paved Parking Lot	0.7	Washington St & Arbor Ave	Private	Permeable Pavers	2	0.68	$ 534,579
11	Paved Parking Lot	3.9	West Chicago Community High School	Public	Permeable Pavers	1	3.75	$ 2,945,637
12	Paved Parking Lot	0.22	Trinity Lutheran Church	Private	Permeable Pavers	2	0.22	$ 170,106
13	Paved Parking Lot	1.1	Church St & Town Rd	Private	Permeable Pavers	2	1.03	$ 805,000
14	Paved Parking Lot	0.95	Pioneer School	Public	Permeable Pavers	1	0.85	$ 670,109
15	Paved Parking Lot	3.65	West Chicago & Lemen Middle Schools	Public	Permeable Pavers	1	3.55	$ 2,784,417
16	Paved Parking Lot	2	Gary Elementary School	Public	Permeable Pavers	1	1.97	$ 1,544,165
17	Paved Parking Lot	4.9	Hawthorne Ln & IL 59	Private	Permeable Pavers	2	4.63	$ 3,638,263
18	Paved Parking Lot	7.1	Reed Keppler Park	Public	Permeable Pavers	2	6.68	$ 5,241,257
								$ 32,073,948
								$210,543,330