Jelkes Creek- Fox River Watershed Action Plan

December 2012

"The mission of the Jelkes Creek-Fox River Action Group is to improve water quality through outreach and best management practices including but not limited to, green infrastructure practices and restoration of riparian areas"

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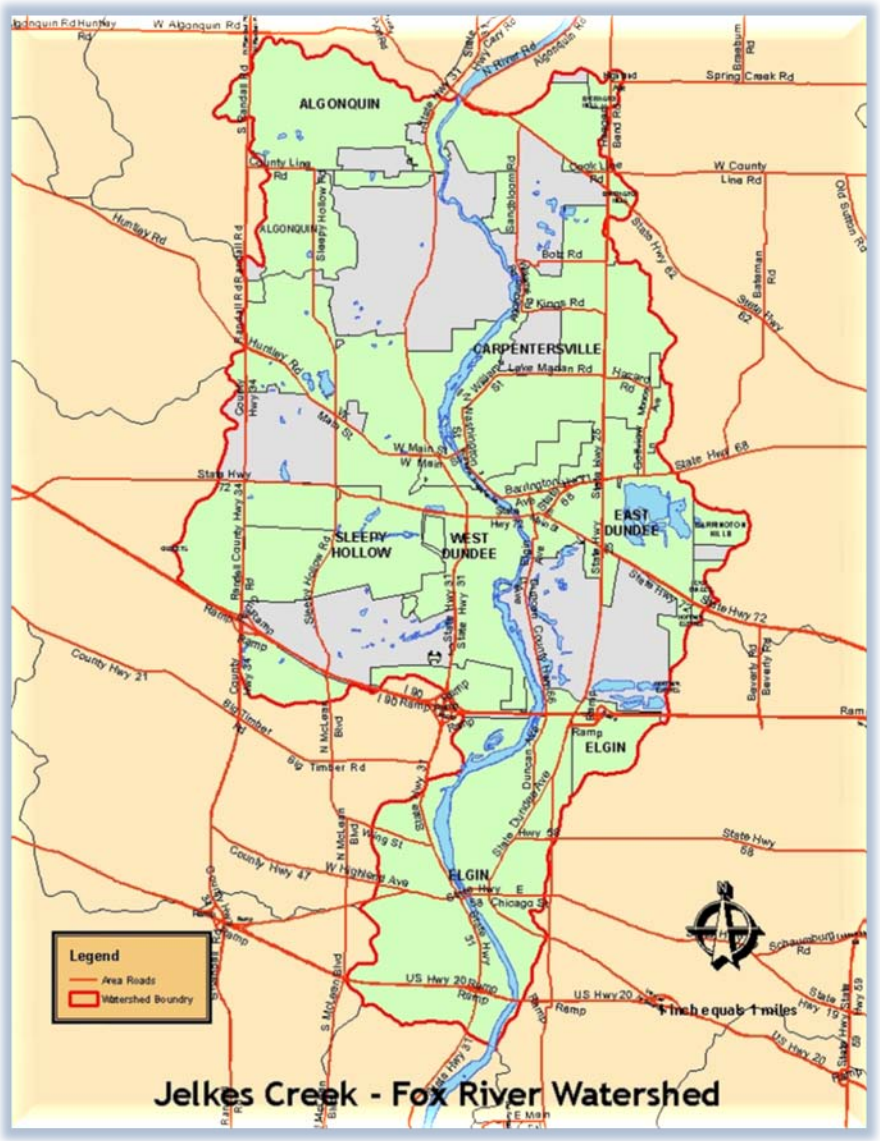
Jelkes Creek-Fox River Watershed Action Plan



December 2012

Prepared by:

Kane-DuPage SWCD

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The following individuals contributed their technical expertise or provided input at two or more meetings during the planning process.

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1. Introduction

In 2010 the Kane-DuPage Soil and Water Conservation District (KDSWCD) was awarded an Illinois Environmental Protection Agency (Illinois EPA) Section 319 (h) of the Clean Water Act to fund the development of the Jelkes Creek-Fox River Watershed Plan and Non-Point Source Pollution Education Initiative. Since watershed plans had been completed for adjacent watersheds; this would encourage a contiguous effort toward promoting water quality in Northern Illinois. The grant encompassed a two and a half year schedule that included the gathering of local residents and stakeholders to attend monthly meetings and guide the planning efforts. In addition, experts and specialists with the knowledge and expertise to compile develop, and implement Watershed Plans were assembled.

The main objectives of this project were to:

- Create a living watershed plan backed by local stakeholders.
- Educate the public within the watershed and surrounding watersheds.
- Form a coalition of people to drive the initiative forward.

1.1 Watershed Plan Purpose

The overall purpose of a Jelkes Creek-Fox River Watershed Plan and Nonpoint Source Education Initiative is to create a watershed plan, educate the public about water quality, and identify the impacts of nonpoint source pollution. Nonpoint source pollution comes from many diffuse sources unlike point source pollution which comes from sources such as industrial and sewage treatment plants and can be traced back to its origin. This living document will be used for decision making and prioritizing projects within the watershed. The plan will help to connect the watershed plans already created for the surrounding areas, ultimately improving the water quality of the Fox River.

1.2 Watershed Plan Components

In order for a watershed plan to meet the criteria set forth by Section 319 of the Clean Water Act for non-point source management, the United States Environmental Protection Agency (USEPA) has identified nine minimum components that a watershed-based plan should incorporate:

1. Identify causes and sources of pollution that will need to be controlled to achieve pollutant load reductions estimated in the watershed plan.
2. Estimate pollutant reduction loads expected from following implementation of management measures described in #3 below.
3. Provide a description of the nonpoint source management measures that will need to be implemented to achieve load reductions estimated under #2 above and an identification of the critical areas where measures need to be implemented.
4. Estimate the amount of technical assistance associated, costs, potential funding sources, and parties that will be relied upon for plan implementation.
5. Develop a public information/education component designed to change social behavior.
6. Develop a plan implementation schedule.
7. Develop a description of interim, measurable milestones.
8. Identify indicators that can be used to determine whether pollutant loading reductions are being achieved over time.
9. Develop a monitoring component to evaluate the effectiveness of the implementation efforts over time.

The Jelkes Creek-Fox River Watershed Plan addresses the nine minimum elements through five sections that compose the body of the plan. The watershed characterization, impairments and potential sources of impairment, existing watershed conditions, and pollutant loads are summarized in Section 2 of the plan. Section 3 of the plan reviews local ordinances, specifically examining stormwater management, natural area standards, landscaping standards, impervious area reduction, and conservation design. As a result policy and program recommendations were made concluding Section 3. In Section 4 of the plan, sixteen projects have been highlighted in detail and have been categorized under urban stormwater infrastructure retrofits stream channel and riparian corridor restoration. This section also includes agricultural best management practices, estimated load reductions, and potential funding sources. The watershed plan also includes an appendix of all 114 projects submitted to the planning committee for inclusion into the plan. The last section of the plan identifies an implementation schedule and milestones, monitoring plan, and achievement of needed load reductions.

1.3 Watershed Overview

The Jelkes Creek-Fox River watershed is located in northeastern Kane County including small sections of McHenry and Cook Counties (Figure 1-1). The main stem of the Fox River runs through the central portion of the watershed with its largest tributary being Jelkes Creek.

Figure 1.1
Location of Jelkes Creek-Fox River Watershed within Fox River Watershed

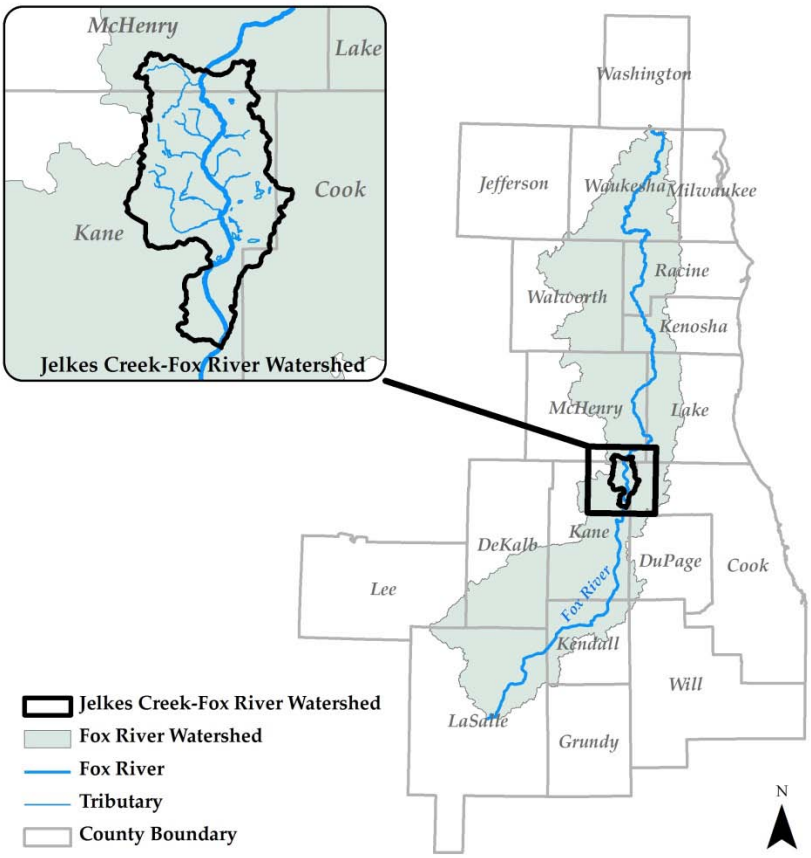

Table 1-1. Watershed Overview

Size of Watershed	40 square miles
Largest Tributary	Jelkes Creek (also referred to as Jelke Creek)
Units of Government	Algonquin, Barrington Hills, Carpentersville, East Dundee, Elgin, Kane County, Sleepy Hollow, and West Dundee
Other Major Tributaries	Ratt Creek, Dixie Creek, Sleepy Creek, Fourwinds Way (Shaw) Creek, Carpenter Creek, MacIntosh (No Name) Creek, Selmartin Creek
Agricultural land use	2,221 acres
Residential land use	11,350 acres
Open space	3,543 acres
Wetland (Entire Watershed)	11%
Pre-settlement Vegetation	50% Forest
Dominant soil type	Silt loam (59)

1.4 Watershed Goals

During the watershed planning process, stakeholders were asked to express concerns they had relating to water quality and quantity, development, natural areas, habitat, flooding, and stream health amongst many. Participants then took their concerns and developed them into goals they would like to see addressed as the Plan is implemented. The goals listed below were developed 6 months into the planning process. As the Plan is implemented, the goals of the Watershed Coalition may change. The goals as developed in the planning process are listed below.

1. Improve water quality.
2. Reduce nutrient loading.
3. Physical and habitat alterations (complete removal, repair, and/or augment dams within the watershed).
4. Educate the public about impairments to the watershed and personal accountability.
5. Incorporate best management practices (BMPs) into land use planning.
6. Maintain and preserve existing aquatic and terrestrial ecosystems.
7. Preserve natural aspects of geology in the watershed.

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2. Watershed Assessment

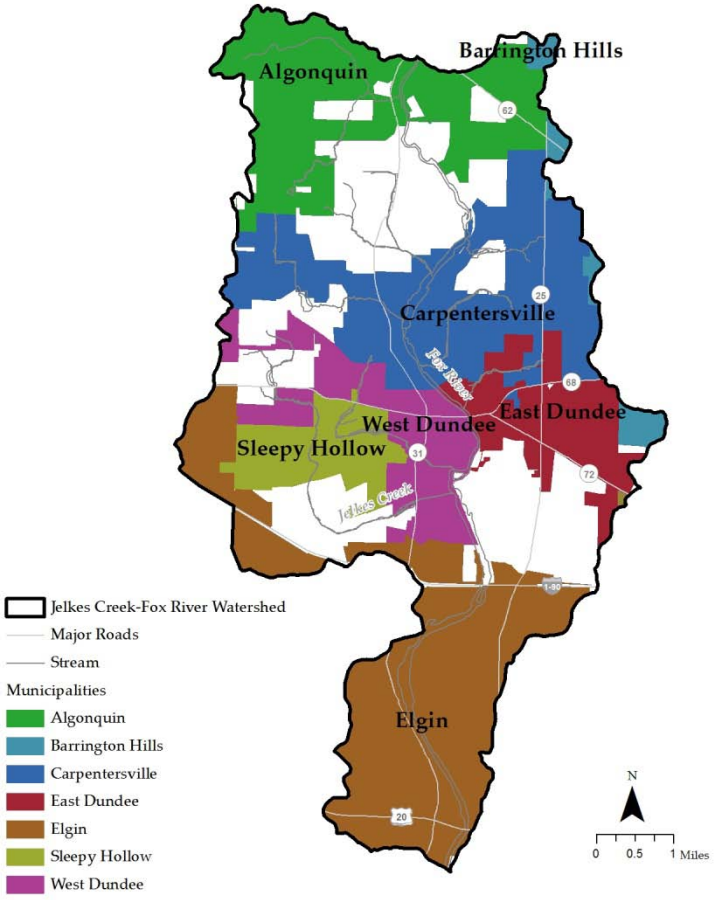
Collecting and analyzing existing information for the Jelkes Creek-Fox River watershed is an important element in reducing uncertainty in the recommendations provided in this watershed plan. Much of the existing information is summarized in the following section to provide a detailed "existing conditions" watershed characterization. The information collected and summarized below includes existing land use, demographics, physical traits (e.g., soils, wetlands, etc.), and in-stream assessments (e.g., aquatic biology, etc.). This information serves as the basis for the recommendations included in the remaining sections of the plan.

2.1 Watershed Characterization

The Jelkes Creek-Fox River watershed (Figure 2-1) is located mostly in northern Kane County, but also covers small sections of McHenry and Cook counties. The Hydrologic Unit Code (HUC) 12 watershed (071200070102) drains approximately 40 square miles of land tributary to the Fox River and ultimately the Illinois River, with approximately 87 percent (35 square miles) of the watershed located within Kane County.[1]

Figure 2-1

Municipal Boundaries within Jelkes Creek - Fox River Watershed



[1] The Hydrologic Unit system is a standardized watershed classification system developed by USGS in the mid-1970s. Hydrologic units are watershed boundaries organized in a nested hierarchy by size. http://nwis.waterdata.usgs.gov/tutorial/huc_def.html

Approximately 91 percent (36 square miles) of the Jelkes Creek-Fox River watershed was incorporated as of 2000, with portions of 11 different municipalities located within the watershed. Municipalities with greater than one-half square mile located within the watershed are displayed in Figure 2-1 and Table 2-1. Municipalities comprising significant portions (i.e., greater than 5 square miles) of the incorporated area within the watershed include Algonquin, Carpentersville, and Elgin.

Table 2-1. Municipalities with greater than One-Half Square Mile within Jelkes Creek-Fox River Watershed

Municipality	Acres	Percent of Watershed
Algonquin	3,649	14%
Barrington Hills	426	2%
Carpentersville	4,463	17%
East Dundee	1,806	7%
Elgin	5,647	22%
Sleepy Hollow	1,296	5%
West Dundee	2,056	8%

Although the subject watershed is referred to herein as the "Jelkes Creek-Fox River" watershed, the watershed is comprised of the drainage areas of several other tributaries to the Fox River. These tributaries include Ratt Creek, Dixie Creek (Figure 2-2), Sleepy Creek, Four Winds Way (Shaw) Creek (Figure 2-3), Carpenter Creek, MacIntosh (No Name) Creek, Selmartin Creek, and several other locally-named and unnamed tributaries. The stream network of the Jelkes Creek-Fox River watershed is shown in Figure 2-4. (It should also be noted that several of the watershed stakeholders have indicated that the historic name of Jelkes Creek is actually Jelke Creek—i.e. without an "s." Jelkes Creek is primarily used throughout out this plan with a few exceptions as can be seen in Section 4 of this plan.)

Figure 2-2. Dixie Creek (*Source:* Dundee Township and Living Waters Consultants)

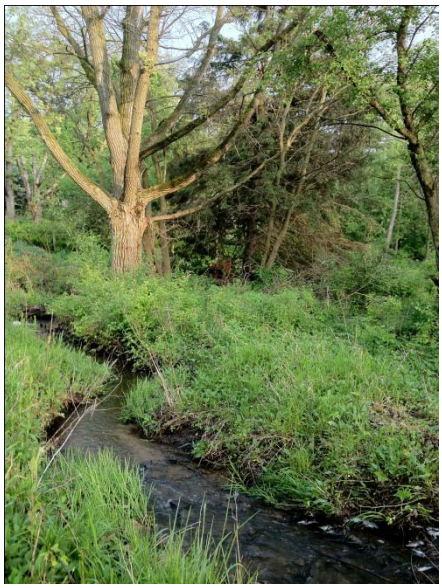
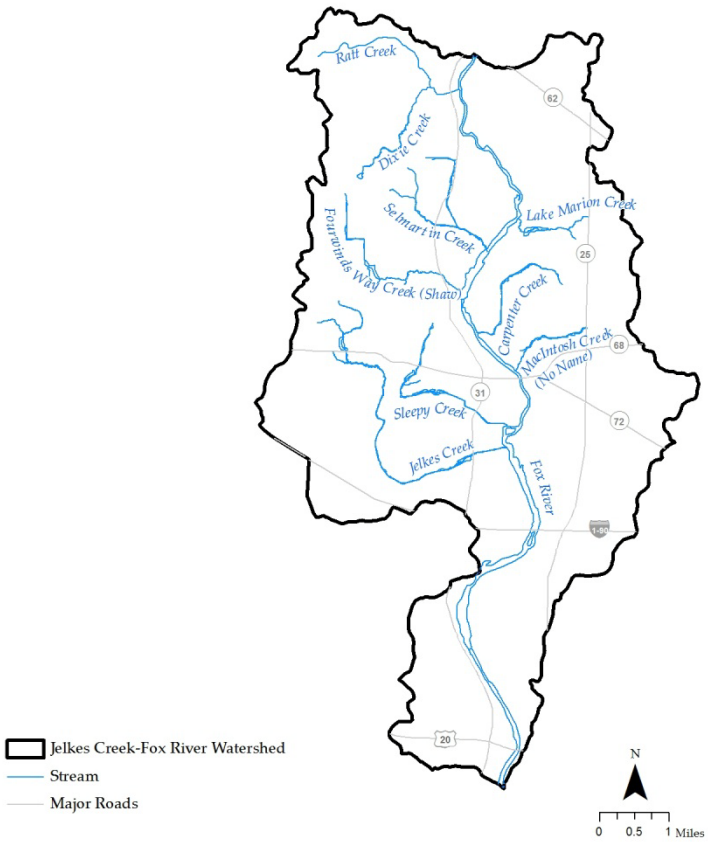


Figure 2-3. Four Winds Way (Shaw) Creek

Figure 2-4

Tributaries within the Jelkes Creek - Fox River Watershed



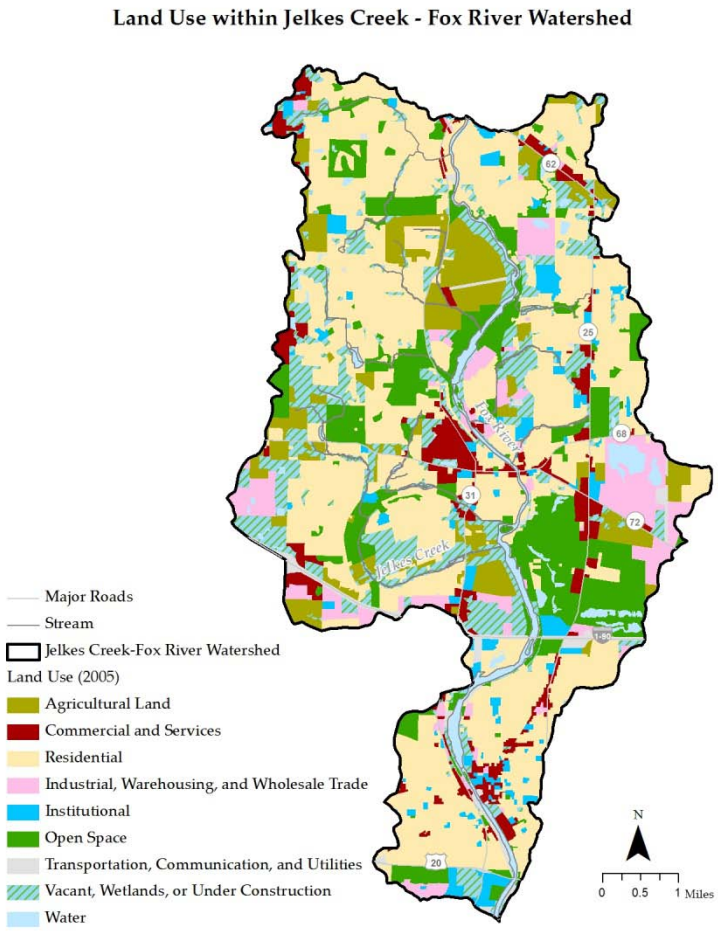
2.1.1 LAND USE

Land use within the Jelkes Creek-Fox River watershed in 2005 was mostly comprised of urban land (62 percent).[2] The remaining land is primarily comprised of open space (14 percent), agricultural land (9 percent), and vacant land (9 percent).

In the Jelkes Creek-Fox River watershed residential use made up the majority of the urban uses in 2005. Residential use comprised 44 percent of the watershed, whereas the remaining urban uses accounted for only 18 percent of the watershed. Figure 2-5 and Table 2-2 provide a "snapshot" of land use within the watershed based on the most recent publicly available information. This same information was also incorporated into the watershed plan development process, such as developing pollutant load estimates (Section 2.4).

[2] Urban uses include the following land use types: Residential; Commercial and Services; Institutional; Industrial, Warehousing, and Wholesale Trade; and Transportation, Communication and Utilities.

Figure 2-5.



Source: 2005 CMAP

Table 2-2. Land Use within Jelkes Creek-Fox River Watershed (2005)

Land Use	Acres	Percent of Subwatershed
Agricultural	2,221	9%
Commercial and Services	1,406	6%
Residential	11,350	44%
Industrial, Warehousing, and Wholesale Trade	1,549	6%
Institutional	932	4%
Open Space	3,543	14%
Transportation, Communication, and Utilities	455	2%
Vacant	2,371	9%
Wetlands Greater than 2.5 Acres	401	2%
Under Construction	329	1%
Water	994	4%
Totals	**25,551**	**100%**

Source: 2005 CMAP

2.1.2 DEMOGRAPHICS[3]

Understanding the demographics of the municipalities located within the Jelkes Creek-Fox River watershed can provide valuable insight into the watershed planning and implementation process. The demographic data can be used to evaluate population trends and understand the composition of the citizenry of the watershed. The total population information presented in the Table 2-3 shows that most of the communities within the watershed experienced significant population growth between 2000 and 2010, with West Dundee having the highest percentage increase and Elgin having the greatest absolute increase (13,700).[4]

Table 2-3. Population of Municipalities within Jelkes Creek-Fox River Watershed

	Total Population		
Municipality	**2000**	**2010**	**%Change**
Algonquin	23,276	30,046	29%
Barrington Hills	3,915	4,209	8%
Carpentersville	30,586	37,691	23%
East Dundee	2,955	2,860	-3%
Elgin	94,487	108,188	15%
Sleepy Hollow	3,553	3,304	-7%
West Dundee	5,428	7,331	35%
Kane County[5]	404,119	515,269	28%
McHenry County	260,077	308,760	19%

Source: U.S. Census Bureau

Demographic data provides insight into the diversity of the watershed stakeholders which may influence the implementation strategy for specific elements of the watershed plan (Table 2-4). For example, in select areas, public education and outreach efforts may be more effective if educational brochures on non-point source pollution prevention measures are printed in both in English and Spanish.

Table 2-4. Demographics of Municipalities within Jelkes Creek-Fox River Watershed (2010)

	Percentage of Population						
Hispanic or Latino and Race	**Algonquin**	**Barrington Hills**	**Carpentersville**	**East Dundee**	**Elgin**	**Sleepy Hollow**	**West Dundee**
Hispanic or Latino (of any race)	6.8	2.7	50.1	7.9	43.6	6.3	10.2
Not Hispanic or Latino--One race							
White	82.7	89.1	36.6	86.4	42.6	89.3	79.4
Black or African American	1.7	0.8	6.4	2	6.9	1.5	1.8
American Indian and Alaska Native	0.1	0	0.1	0.1	0.1	0.1	0.1
Asian	7.2	6.5	5.4	2.7	5.2	1.8	7.1
Native Hawaiian and Other Pacific Islander	0	0	0	0	0	0	0
Some Other Race	0.1	0	0.1	0	0.1	0.1	0.1
Not Hispanic or Latino--Two or More Races	1.3	0.9	1.3	0.9	1.4	1	1.2

Source: U.S. Census Bureau

[3] The demographic data presented in this section are for the entirety of the municipalities located within the Jelkes Creek-Fox River watershed. The data have not been analyzed based on the fractional portion of each municipality located within the watershed.
[4] http://factfinder2.census.gov/
[5] Data for Kane and McHenry Counties includes incorporated and unincorporated areas.

Other demographic data, which is not shown in Table 2-4, such as age distribution and household units and occupancy, assists in understanding the audience and in developing a strategy that is tailored to the population within the watershed.

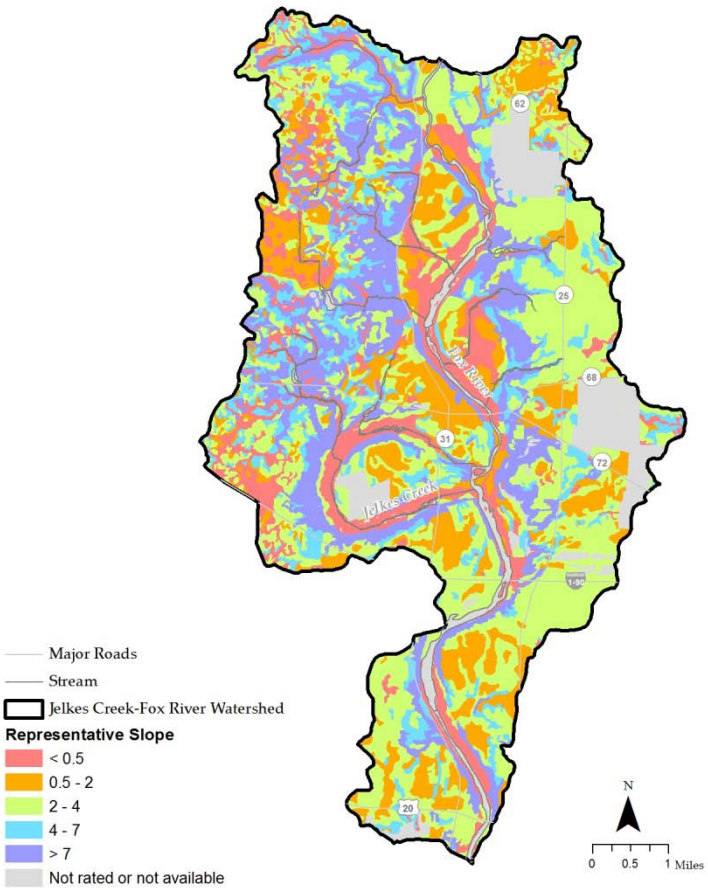
2.1.3 TOPOGRAPHY

There is approximately 30 feet of grade change along the approximately 14 miles of the main stem of the Fox River in the study area. This change equates to an average stream gradient of approximately 2.1 feet per mile. The main stem of Jelkes Creek has a total length of approximately 4.3 miles from its headwaters downstream to the Fox River. The change in elevation over the distance of the main stem of Jelkes Creek is approximately 188 feet, which equates to an average stream gradient of approximately 35 feet per mile. In general, the tributaries within this watershed consist of a relatively flat headwater area before transitioning down the bluff slopes into the Fox River valley.

The Jelkes Creek-Fox River watershed is relatively flat on upper watershed areas while steeper (i.e. greater than four percent slope) slopes are concentrated along bluffs that flank the Fox River and Jelkes Creek (Figure 2-6).

Figure 2-6

Ground Surface Slope within Jelkes Creek - Fox River Watershed

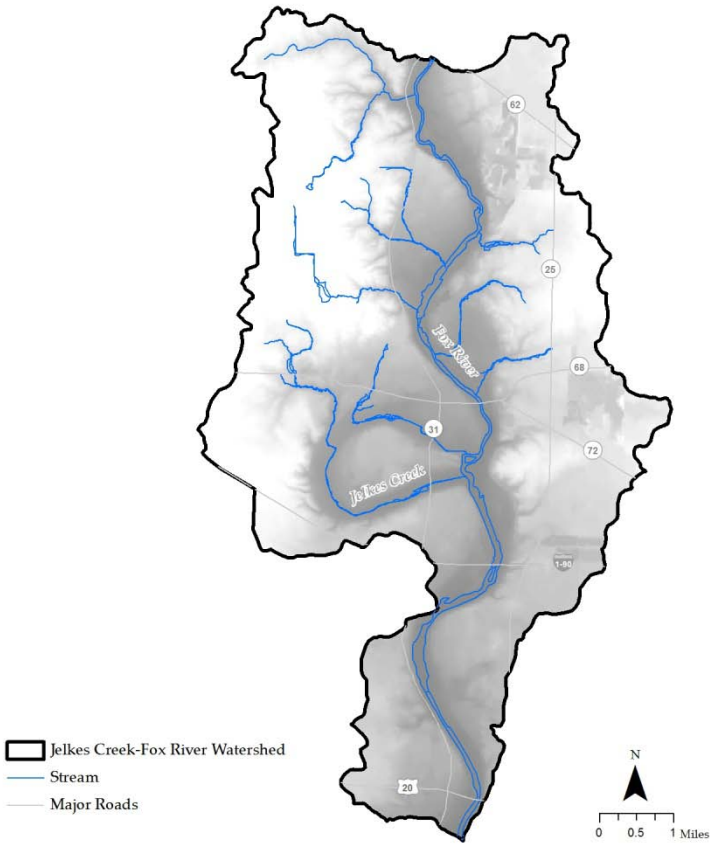


Source: USDA NRCS Kane and McHenry County Soil Surveys (2002).

Figure 2-7 displays the Digital Elevation Model (DEM) of the Jelkes Creek-Fox River Watershed. As can be seen in this figure, Jelkes Creek flows along a historical oxbow of the Fox River. At one time, the Fox River flowed along what is now a major reach of Jelkes Creek. As the oxbow closed due to normal geomorphic evolution, the Fox River straightened and the oxbow was abandoned by the Fox River. Qualitative comparison of Figures 2-5 and 2-7 indicates a mixture of land uses at various elevations in the watershed.

Figure 2-7

Digital Elevation Model within Jelkes Creek - Fox River Watershed



Source: ISGS 2003

2.1.4 SOIL CHARACTERISTICS

Evaluating the soil characteristics within the watershed is an important part in developing an understanding of the watershed. Information related to hydrology, potential sources of pollutants, and past watershed conditions can be garnered from soil characteristics. A summary of select characteristics of the five most prevalent soil types in the watershed are presented in Table 2-5. Further descriptions of soil characteristics within the watershed are presented in the following sections.

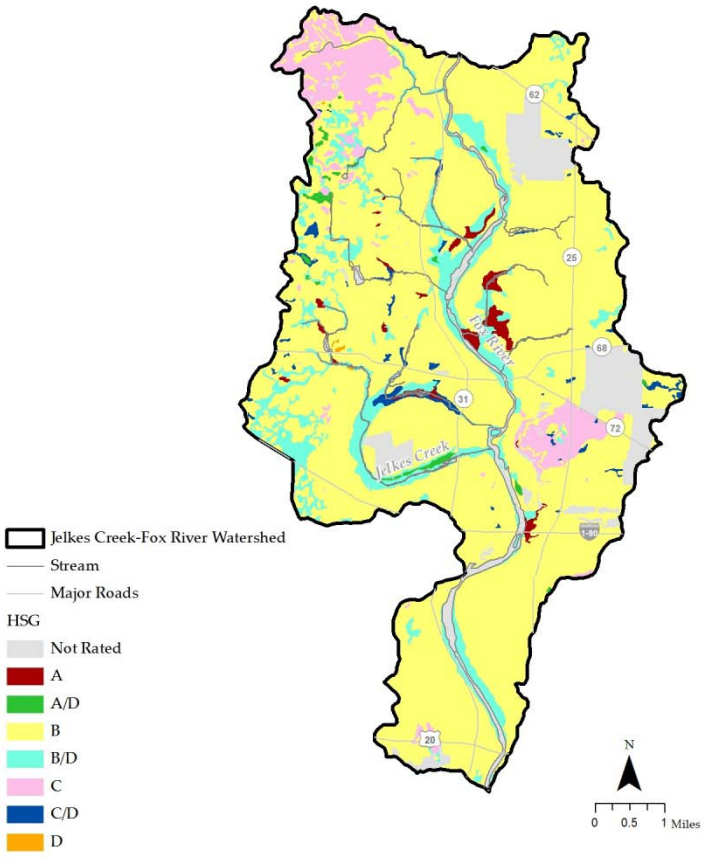
2.1.4.1 Hydrologic Soils Groups and Saturated Hydraulic Conductivity

The majority of soils within the Jelkes Creek-Fox River watershed are classified as either silt loam (59 percent) or loam (23 percent). Silt clay loam, silt clay, and muck make up the remaining balance of the watershed soils. Soils within the watershed are predominately (80 percent) classified within Hydrologic Soil Group (HSG) B (Figure 2-6). HSGs are based on estimates of the runoff potential of soils

characterized as A, B, C, or D. The "A" soils have the lowest runoff potential and highest infiltration, while "D" soils are poorly drained and tend to have high runoff potential.

Figure 2-8

Hydrologic Soil Groups within Jelkes Creek - Fox River Watershed



Source: USDA NRCS Kane and McHenry County Soil Surveys (2002).

Related to the HSGs is the saturated hydraulic conductivity of the soils. Saturated hydraulic conductivity refers to the ease with which pores in a saturated soil transmit water.[6] Saturated hydraulic conductivity is an important consideration in designing stormwater Best Management Practices as well as in the design of soil drainage systems and septic tank absorption fields. Soils within the Jelkes Creek watershed are predominately (47 percent) estimated to have very high saturated hydraulic conductivity values between 10 and 340 micrometers per second, or 1 to 48 inches per hour. Portions of the watershed with moderate saturated hydraulic conductivity values are generally located within the areas with HSG C soils.

From Figure 2-8, it can be seen that soils with low to moderately low runoff potential and unimpeded transmission of water through the soil (HSG B) are generally distributed throughout Jelkes Creek-Fox River watershed, whereas soils with moderately high to high runoff potential and restricted water transmission through the soil (HSGs C and D) are generally found grouped in the northwestern portion of the watershed and east of the Jelkes Creek Fox River confluence.

[6] NRCS Soil Data Viewer Version 5.1.000.0012.

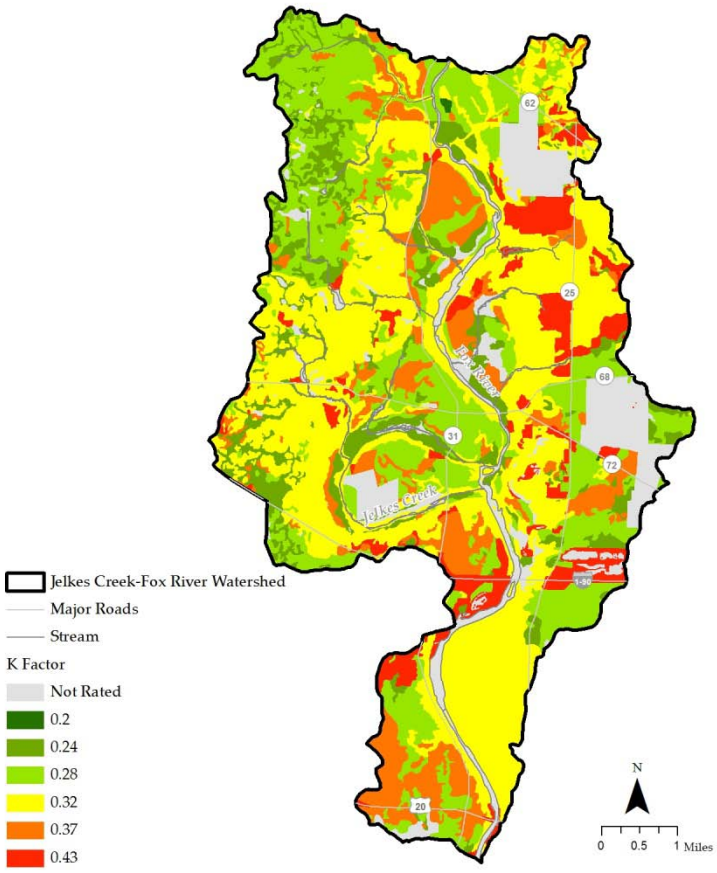
2.1.4.2 Erodibility

The susceptibility of soil to erosion by water is one factor used in predicting soil loss caused by sheet and rill erosion. The Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) are commonly used to predict the average annual rate of soil loss by sheet and rill erosion. The USLE and RUSLE are also commonly used in the identification of highly erodible lands and in the planning and design of soil conservation practices and stormwater Best Management Practices. The K Factor in these equations represents the susceptibility of a soil to sheet and rill erosion by water and is based on soil characteristics such as percentage of silt, sand, and organic matter and saturated hydraulic conductivity.[7] The K Factor values range from 0.02 to 0.69 with higher values representing increased susceptibility of the soil to sheet and rill erosion by water.

Approximately 71 percent of the soils within the Jelkes Creek-Fox River watershed are estimated to have K Factor values within the range of 0.24 up to and including 0.32, which is in the middle of the overall range of K Factor values. As can be seen in Figure 2-9 many of the soils within the watershed with relatively higher susceptibility to erosion (i.e. K factor values greater than 0.32) are generally dispersed across the watershed.

Figure 2-9

Soil Erodibility (K Factor) within Jelkes Creek - Fox River Watershed



Source: USDA NRCS Kane and McHenry County Soil Surveys (2002).

[7] NRCS Soil Data Viewer Version 5.1.000.0012

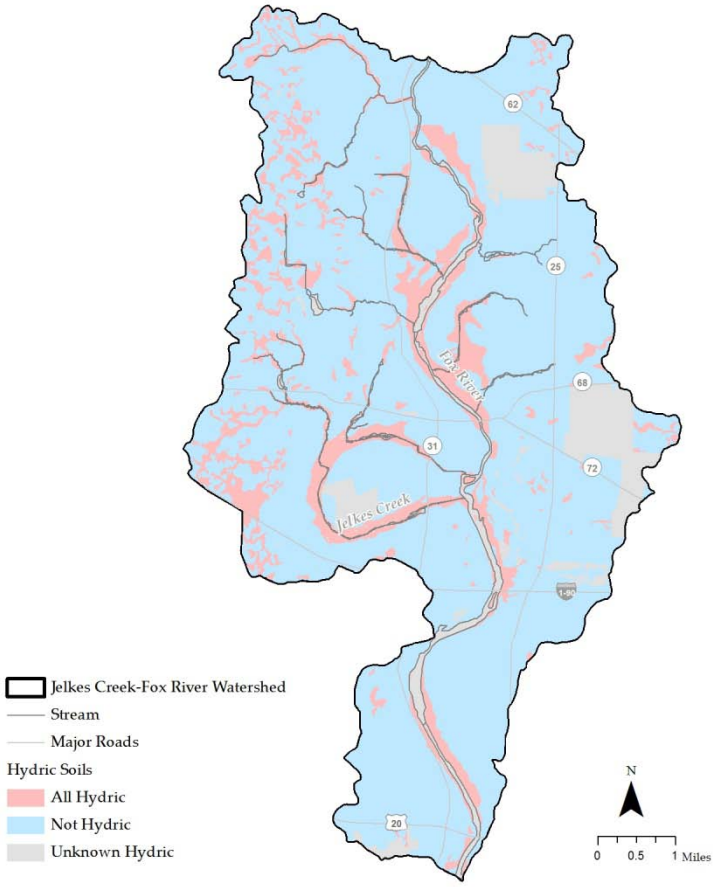
2.1.4.3 Hydric Soils

Hydric soils are defined as soils "that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part."[8] Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. As such, the presence of hydric soils is used as one of the key indicators to the existence or historical presence of wetlands. Hydric soils within the Jelkes Creek watershed are shown in Figure 2- 10.

Approximately 13 percent of the soils within the Jelkes Creek-Fox River watershed are rated as "All Hydric"[9]

Figure 2-10

Hydric Soils within Jelkes Creek-Fox River Watershed



Source: USDA NRCS Cook, Kane, and McHenry Counties Soil Surveys (2002).

[8] http://soils.usda.gov/use/hydric/intro.html

[9] The hydric rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. "All hydric" means that all components listed for a given map unit are rated as being hydric, while "not hydric" means that all components are rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made.

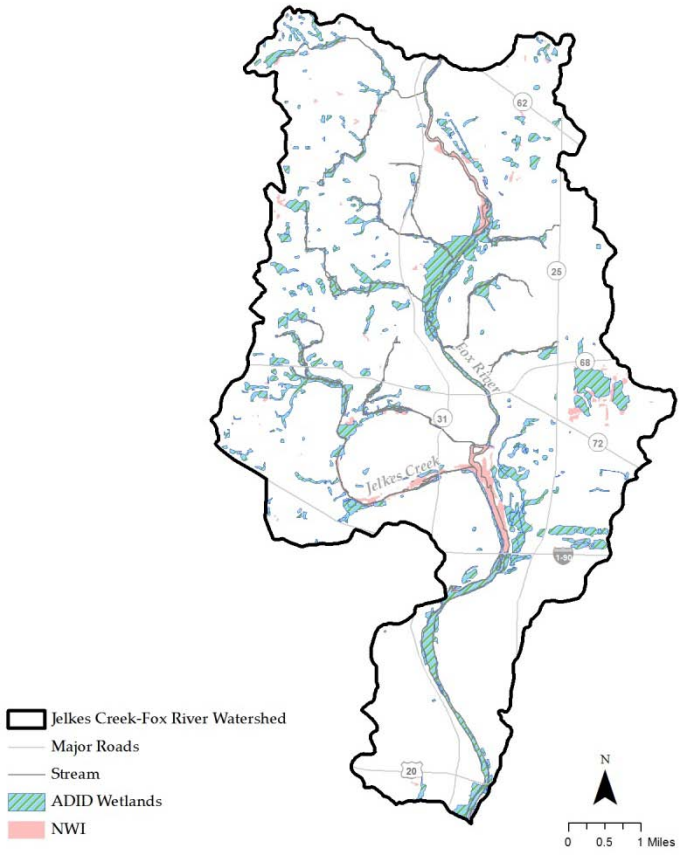
2.1.5 WETLANDS AND FLOODPLAINS

2.1.5.1 Wetlands

Wetland information for the Jelkes Creek-Fox River watershed is available from a combination of three sources. These sources include the National Wetland Inventory (NWI) and separate Advanced Identification (ADID) studies performed in McHenry and Kane Counties in 1997 and 2004, respectively. According to the Kane County ADID report: "ADID studies are part of a U.S. Environmental Protection Agency program to provide improved awareness of the locations, functions and values of wetlands and other waters of the United States. The primary purpose is to identify wetlands and streams unsuitable for dredging and filling because they are of particularly high quality."[10]

The NWI and ADID wetland data for the Jelkes Creek-Fox River watershed are presented in Figure 2-11. (Please note that in those locations where wetlands were identified in both the NWI and ADID datasets, only the ADID wetland is shown.) Approximately 11 percent of the Jelkes Creek-Fox River watershed was identified as wetland. From Figure 2-11 it can be seen that much of the wetland area is concentrated along the main stem of Fox River and along Jelkes Creek; however, numerous isolated wetlands are also located in the upper portions of the watershed.

Figure 2-11
Wetlands within the Jelkes Creek - Fox River Watershed



Source: USFWS National Wetland Inventory and Kane and McHenry Counties ADID Studies

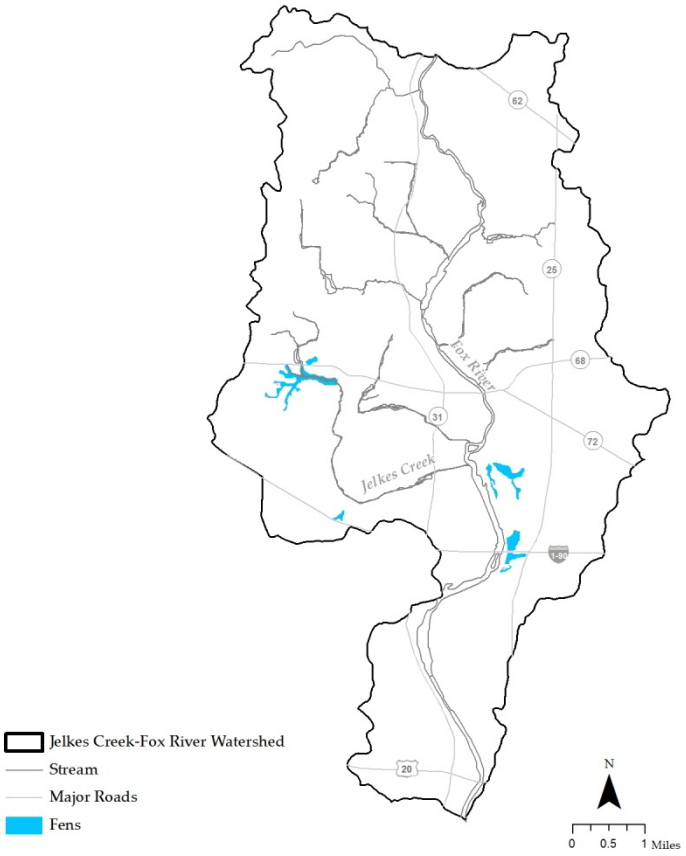
[10] "Advanced Identification (ADID) Study Kane County, Illinois." August 2004. Prepared by Northeastern Illinois Planning Commission; U.S. Fish and Wildlife Service Chicago Illinois Field Office; U.S. Environmental Protection Agency, Region 5; and Kane County Department of Environmental Management. Available at: http://www.co.kane.il.us/kcstorm/adid/ADIDreport.pdf

2.1.5.2 Fens

The Illinois Department of Natural Resources (IDNR) defines fens as "…a type of wet meadow fed by an alkaline water source such as a calcareous spring or seep. The deposition of calcium or magnesium in the soil results in an elevated soil pH, and gives rise to a variety of unique plants adapted to surviving these conditions."[11,12]

The extent of fens within the Kane County portion of the Jelkes Creek-Fox River watershed identified as part of the Kane County ADID effort are presented in Figure 2-12 Comparison of Figures 2-11 and 2-12 indicates that fens comprise a relatively small fraction of the identified wetlands within the watershed, indicative of the rare status of fens within the watershed. It should be noted that not all fens within the watershed are necessarily represented in Figure 2-12. Fens were not categorically identified as part of the McHenry County ADID study. Also, other fens are known to exist in Kane County, such as those within the Fox River Shores Forest Preserve, which were not identified through the ADID study.[13]

Figure 2-12
Kane County Fens within Jelkes Creek - Fox River Watershed



Source: Kane County ADID Study, 2004.

[11] Illinois Department of Natural Resources. 2000. *A Field Guide to the Wetlands of Illinois, 2nd Edition.*

[12] The definition of a fen provided in the document "Kane County Fen Identification And Recharge Area Mapping Project Final Report" prepared in September 2004 by Christopher B. Burke Engineering West, Ltd. for the Kane County Department of Environmental Management is as follows: *"A fen is a wetland dominated by calciphilic hydrophytes growing on organic or mineral soils with high organic contents that are alluvial or colluvial in nature and are dominated at the surface by sapric or muck materials or have a mucky mineral surface and have groundwater conditions that are neutral or calcareous with the dominance of base cations and anions including bicarbonate and/or sulfate."*

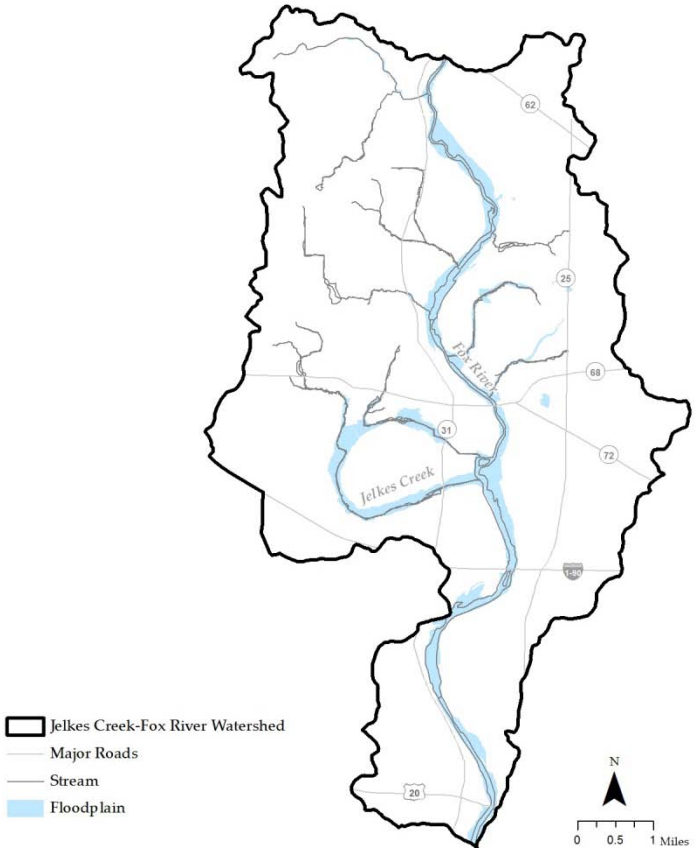
[13] http://kaneforest.com/ForestPreserveView.aspx?ID=22

In the early 2000's, as a result of the ADID study and the Kane County Board's concern "…that fen resources, though rare in the County, were not afforded an appropriate level of protection [under the Kane County Stormwater Ordinance] because of their unique conditions and the need to maintain a local recharge area."[14] As such, the Board identified protection of fen recharge areas as a significant concern. In 2004, the Kane County Department of Environmental Management undertook a project to verify the presence of the fens identified through the ADID process and to then identify, through the use of mapping and evaluation of surface and ground water data, the potential recharge area for each fen. Maps showing the recharge areas for the fens located within the Jelkes Creek-Fox River watershed were not readily transferrable into this plan, but can be found through Kane County's web site.[15]

2.1.5.3 Floodplains

Digital representation ("Q3 Data") of the 100-year floodplain within the watershed from the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs) is presented in Figure 2-13. Additional regulatory floodplain information is available on digital FIRMs for many of the tributary streams and creeks. These maps can be obtained at the FEMA Map Service Center.[16]

Figure 2-13
Floodplains within Jelkes Creek - Fox River Watershed



Source: Q3 Data.

[14] "Kane County Fen Identification And Recharge Area Mapping Project Final Report." September 2004. prepared by Christopher B. Burke Engineering West, Ltd. for the Kane County Department of Environmental Management. Available at: http://www.co.kane.il.us/kcstorm/fen/final_report.pdf

[15] Maps showing the fen recharge areas within the watershed can be found at: http://www.co.kane.il.us/kcstorm/fen/quad.htm.

[16] https://msc.fema.gov

Floodplains in the Jelkes Creek-Fox River watershed are predominantly confined to a narrow area along the Fox River. A comparison between figure 2-6 and 2-13 shows that this is largely a factor of the steeper slopes located along the river. Photographs of flooding within the watershed are provided in Figures 2-14 and 2-15. The photographs were taken along the Fox River in September 2007.[17]

Figure 2-14. Flooding in September 2007 along the Fox River just south of East Dundee (*Source*: National Weather Service, Chicago, IL Weather Forecast Office)

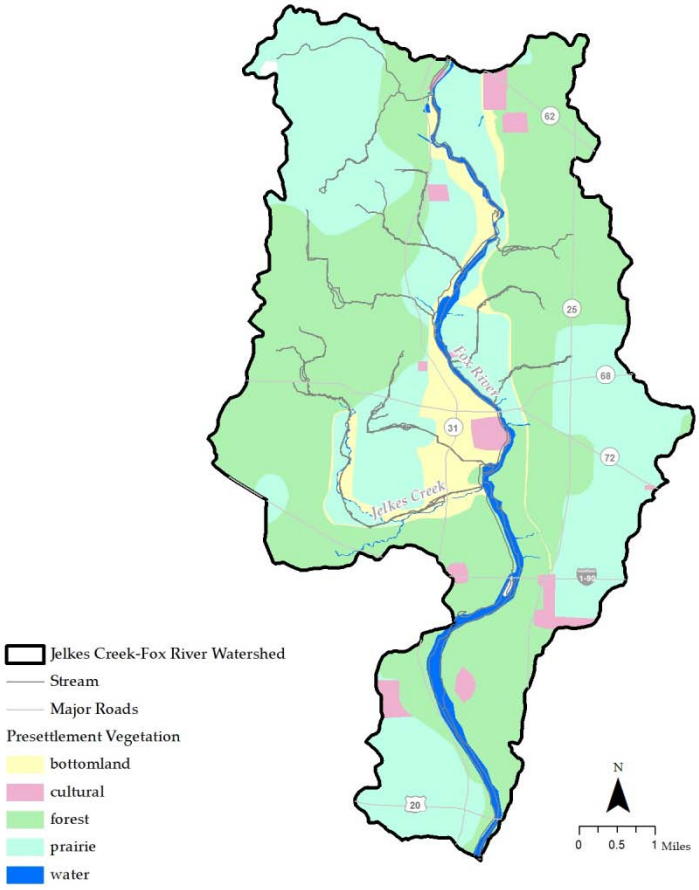
Figure 2-15. Flooding in September 2007 along the Fox River just south of Algonquin (*Source*: National Weather Service, Chicago, IL Weather Forecast Office)

2.1.6 PRE-SETTLEMENT VEGETATION

Understanding the vegetation of the watershed prior to settlement is critical in the implementation of restoration and management projects within the watershed. The information presented in Figure 2-16 represents the vegetation present in the early stages of Euro-American settlement. This information was gleaned from historical documents, such as Public Land Survey records. The majority of pre-settlement vegetation within the Jelkes Creek-Fox River watershed was forest (50%) and prairie (37%) (Table 2-5). The Fox River primarily flowed through prairie land in the northern portion of the watershed while transitioning into forest land in the southern portion.

[17] National Weather Service Chicago, Illinois Weather Forecast Office. *Fox River Flood - September 2007 Survey Report*. Prepared by Bill Wilson. September 15, 2007. Available at: http://www.crh.noaa.gov/lot/?n=foxriver2007

Figure 2-16
Presettlement Vegetation in Jelkes Creek-Fox River Watershed



Source: Illinois Natural History Survey

Table 2-5. Pre-Settlement Vegetation within Jelkes Creek-Fox River Watershed

Pre-settlement Vegetation[18]	Acres	Percent of Watershed
Bottomland	1628	6%
Cultural	677	3%
Forest	12892	50%
Prairie	9532	37%
Water	779	3%

[18] The Illinois Natural History Survey provides the following definitions:

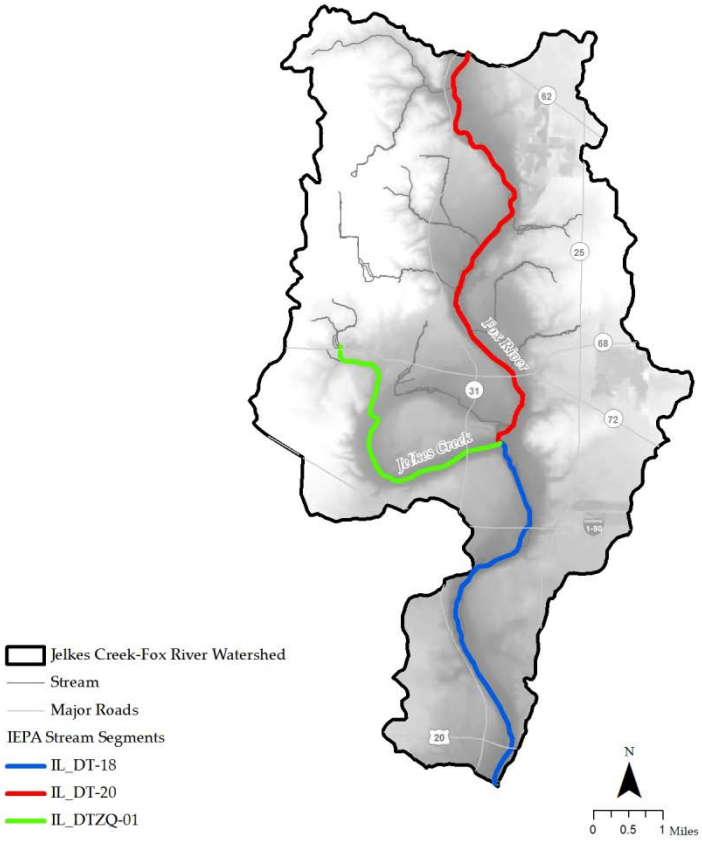
- Bottomland: A lowland with timber, usually highly fertile, along a stream; an alluvial plain.
- Cultural: A piece of land with houses, barns, etc. on which crops or animals were raised or grazed.
- Forest: A thick growth of trees, etc. covering a large tract of land.
- Prairie: A large area of level or rolling grassland, generally treeless.
- Water: A lake, low land, pond, river, wide river, or spring.

2.2 Impairments and Potential Sources of Impairment

The IEPA's *Illinois Integrated Water Quality Report and Section 303(d) List-2010*[19] ("2010 Integrated Report") indicates that portions of the Fox River (IL_DT-18 and IL_DT-20) within the Jelkes Creek-Fox River watershed are impaired for the designated uses of aquatic life and fish consumption. The 2010 Integrated Report further indicates that Jelkes Creek (IL_DTZQ-01) was not assessed. The assessments provided in the 2010 Integrated Report are based on stream segments defined by the IEPA, which are presented in Figure 2-17.

Figure 2-17

IEPA Stream Segments within the Jelkes Creek - Fox River Watershed



Source: IEPA

According to the 2010 Integrated Report, the potential causes of impairment for aquatic life use in segment IL_DT-18 of the Fox River are alterations in stream-side covers, hexachlorobenzene, other flow regime alterations, dissolved oxygen, sedimentation/siltation and total suspended solids (TSS). The potential causes of impairment for fish consumption in segment IL_DT-18 are mercury and polychlorinated biphenyls (PCB). For segment IL_DT-20, the potential causes of impairment for aquatic life use are alterations in stream-side covers, other flow regime alterations, and low dissolved oxygen. The potential cause of impairment for fish consumption in segment IL_DT-20 is PCBs.

The 2010 Integrated Report further indicates that the potential sources of impairment for segment IL_DT-18 include streambank modifications/destabilization, contaminated sediments, impacts from hydrostructure flow regulation/modification, municipal point source discharges, combined sewer overflows, urban runoff/storm sewers, atmospheric deposition—toxics, and unknown sources. For segment IL_DT-20, the potential sources of impairment include habitat modification—other than hydromodification, impacts from hydrostructure flow regulation/modification, and unknown sources.

2.3 Select Past and On-Going In-Stream Assessments

Information related to several select past and on-going in-stream assessments related to the Jelkes Creek-Fox River watershed is provided in the following sections. It should be noted that an in-depth analysis (i.e. data compilation and separate analysis) of the all the in-stream data (physical, chemical and biological) available for the Jelkes Creek-Fox River watershed was not performed as part of the watershed planning effort. However, the information provided in the following sections and in the cited references has been used to make better-informed recommendations included within this plan and should be further referenced during the implementation of watershed improvement and protection efforts.

2.3.1 AQUATIC BIOLOGY

The purpose of evaluating aquatic biology assessments was to gain an understanding of the condition of the aquatic life within the watershed. Biological data are also used by the IEPA to assess streams for impairment for aquatic life use. The aquatic biology assessments discussed in this section were primarily focused on fish communities, although a limited amount of macroinvertabrate information is also presented.

Figure 2-18. Fish Survey

The Fish Index of Biotic Integrity (IBI) is used to measure the health of the fish community as compared to reference streams of similar size and geographic region. IBI values are calculated based on ten metrics derived from fish community samples and the range of IBI value is 0 to 60, with higher values representing higher biotic integrity and stream quality. The IEPA uses IBI values of 41 or less to make preliminary assessment conclusions that stream segments are impaired for aquatic life use.

Fox River

Notable assessments of the fish community throughout the entire Fox River have been conducted separately by the IDNR and the Max McGraw Wildlife Foundation.[20,21] Both assessments included sampling locations along the nearly 14 miles of the Fox River located within the Jelkes Creek-Fox River watershed.

For the IDNR assessment, one of the sampling stations (Station DT-28) was located at the Voyagers Landing Forest Preserve where Interstate 90 passes over the Fox River. The other sampling location

[20] "Fish Assemblages and Stream Condition in the Fox River Basin: Spatial and Temporal Trends, 1996-2007." April 2009. Stephen M. Pescitelli and Robert C. Rung. IDNR Division of Fisheries. Available at: http://www.ifishillinois.org/science/streams/2007%20Fox%20Survey%20Final%20Report.pdf

[21] "Fox River Fish Passage Feasibility Study." April 2003. Victor J. Santucci, Jr. and Stephen R. Gephard, Max McGraw Wildlife Foundation. Available at: http://www.co.kane.il.us/kcstorm/final.pdf

(Station DT-06) is located at the extreme upper boundary of the Jelkes Creek-Fox River watershed, just downstream of the Algonquin Dam (Figure 2-17).[22] The IDNR assessment report included IBI values for samples collected in 2002 and 2007 at Station DT-06 and in 2007 at Station DT-28. The IBI values are presented in Table 2-6.

Table 2-6. IBI Values from IDNR Assessment of Fox River

Station (Location)	IBI Values	
	2002	2007
DT-06 (at Interstate 90)	36	41
DT-28	n/a	39

Comparison of the IBI values in Table 2-6 to IEPA's criteria for making the preliminary assessment conclusions that stream segments are impaired for aquatic life use (i.e. IBI values of 41 or less) shows that these IBI values are at or just below the IEPA's criteria for impaired.

The assessment conducted by the Max McGraw Wildlife Foundation was a comprehensive two-year assessment of approximately 100 miles of the Fox River and 15 of the dams on the river in Illinois (Figure 2-19). In addition to the fish community, the study included the evaluation of the effects of dams on the invertebrate community, aquatic habitat and water quality. The assessment included sampling stations directly above and below each of the dams and several sampling stations in the dam impoundments and free-flowing reaches between the dams. In regards to fish, general findings of the assessment were that "the distribution of fish species among station types during summer indicated that most fishes favored free-flowing portions of river over impounded areas created by dams. Further, [the investigators] found higher quality fish communities in the free-flowing river."[23]

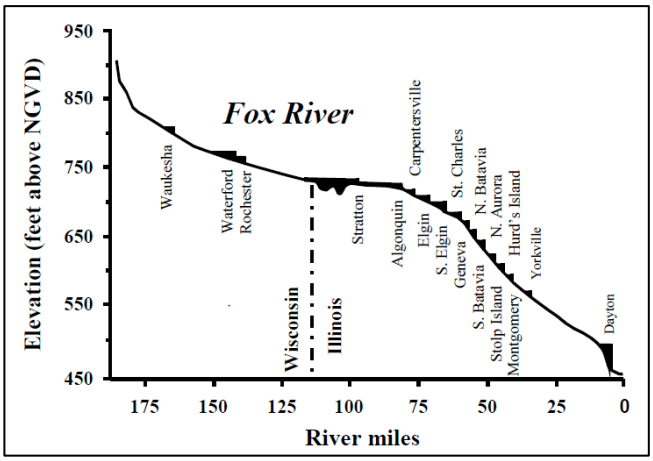


Figure 2-19. Fox River profile and dams in Wisconsin and Illinois (*Source*: Fox River Fish Passage Feasibility Study; modified from Knapp 1988).

Two of the dams included in the McGraw assessment are located entirely within the Jelkes Creek-Fox River watershed. These are the Elgin and Carpentersville Dams as shown in Figure 2-20. A third dam located at the upper boundary of the Jelkes Creek-Fox River watershed, the Algonquin Dam, was also

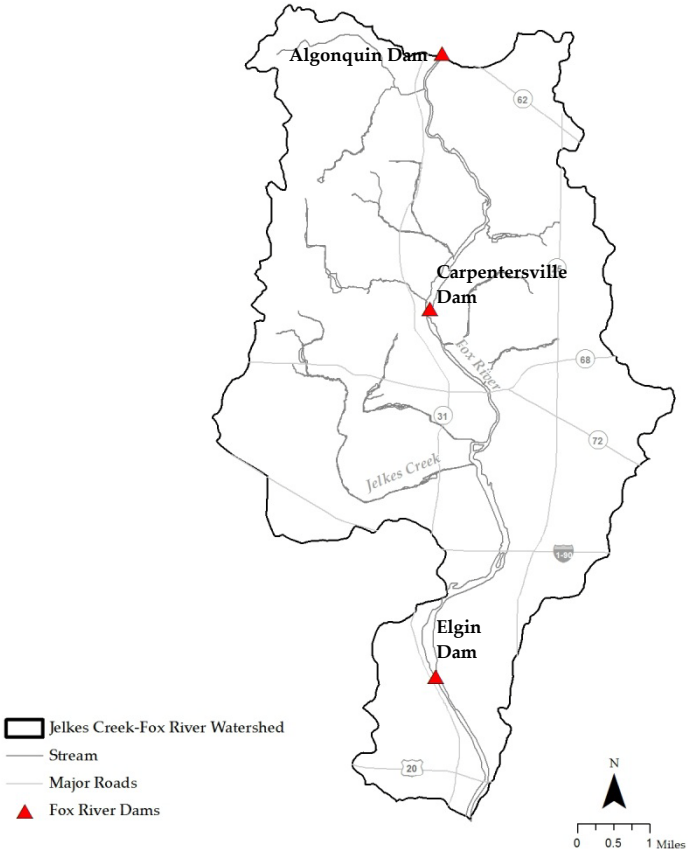
[22] Exact location of Station DT-06 (i.e. downstream of Algonquin Dam) confirmed through personal communication with Robert Rung of IDNR. September 2012.

[23] "Fox River Fish Passage Feasibility Study." April 2003. Victor J. Santucci, Jr. and Stephen R. Gephard, Max McGraw Wildlife Foundation. Available at: http://www.co.kane.il.us/kcstorm/final.pdf

included in the assessment. IBI values estimated from fish samples collected in 2000 at these three dams are presented in Table 2-7.

Figure 2-20

Fox River Dams within Jelkes Creek - Fox River Watershed



Source: IDNR, 2003

Table 2-7. IBI Values from McGraw Assessment of Fox River

Station	Habitat[24]	IBI Value
Algonquin Mid Upper	MD IMP	24
Algonquin Mid Lower	MD IMP	30
Algonquin Above Dam	US IMP	28
Algonquin Below Dam	DS FF	48
Carpentersville Above Dam	US IMP	34
Carpentersville Below Dam	DS FF	48
Elgin Mid Upper	MD FF	48
Elgin Mid Lower	MD IMP	36
Elgin Above Dam	US IMP	28
Elgin Below Dam	DS FF	40

[24] Habitat types as defined in the McGraw assessment are: DS FF = directly below dam; US IMP = directly above dam; MD IMP = impounded river reaches; and MD FF = free-flowing river reaches.

Review of the IBI values in Table 2-7 indicates that the findings for the fish community within proximity to the three dams are consistent with the findings of the overall assessment in that the IBI values are higher in the free-flowing reaches of the river as opposed to the impounded reaches.

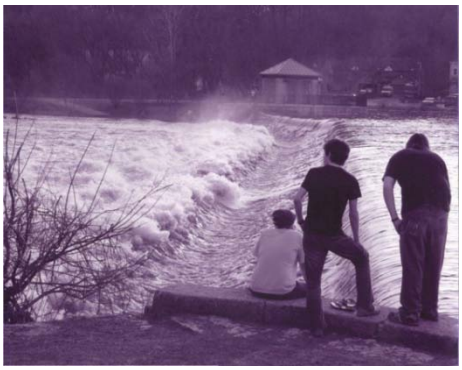


Figure 2-21. Carpentersville Dam (*Source:* Friends of the Fox River 2007 Photo Contest—Photo taken by Paul McFadden)

The McGraw assessment also included sampling and evaluation of the macroinvertebrate community in relation to the dams. As previously stated, macroinvertebrate (aquatic insects, worms, clams, snails, and crustaceans) data is utilized by the IEPA in its assessments of streams for impairment of aquatic life use. The IEPA uses macroinvertebrate indices, specifically the new macroinvertebrate Index of Biotic Integrity (mIBI) and the Macroinvertebrate Biotic Index (MBI). Macroinvertebrate data collected during the McGraw assessment was presented by calculated MBI values rather than mIBI values. As a result, the following discussion is limited to MBI values. Although the IEPA uses a detailed decision table for assessing whether given stream segments are impaired for aquatic life, the IEPA uses MBI values of 5.9 or greater to make preliminary assessment conclusions that stream segments are impaired for aquatic life use.

A general finding presented in the McGraw assessment report with respect to macroinvertebrates was that "free-flowing reaches supported higher quality macroinvertebrate communities than impounded waters above the dams."[25] MBI values for the estimated from macroinvertebrate samples collected in 2000 at these three dams are presented in Table 2-8.

Table 2-8. MBI Values from McGraw Assessment

Station	Habitat[26]	MBI Value
Algonquin Mid Upper	MD IMP	6.0
Algonquin Mid Lower	MD IMP	6.2
Algonquin Above Dam	US IMP	7.6
Algonquin Below Dam	DS FF	5.8
Carpentersville Above Dam	US IMP	6.7
Carpentersville Below Dam	DS FF	5.4
Elgin Mid Upper	MD FF	6.4
Elgin Mid Lower	MD IMP	7.9
Elgin Above Dam	US IMP	7.5
Elgin Below Dam	DS FF	7.5

Similar to fish, the MBI values for the three the Jelkes Creek-Fox River watershed dams generally support the findings of the overall assessment in that the MBI values are generally lower in the free-flowing reaches of the river as opposed to the impounded reaches. Additionally, comparison of the MBI values

[25] "Fox River Fish Passage Feasibility Study." April 2003. Victor J. Santucci, Jr. and Stephen R. Gephard, Max McGraw Wildlife Foundation. Available at: http://www.co.kane.il.us/kcstorm/final.pdf

[26] Habitat types as defined in the McGraw assessment are: DS FF = directly below dam; US IMP = directly above dam; MD IMP = impounded river reaches; and MD FF = free-flowing river reaches.

in Table 2-6 to IEPA's criteria for making the preliminary assessment conclusions that stream segments are impaired for aquatic life use (i.e. MBI values of 5.9 or greater) shows that these MBI values are generally above the IEPA's criteria with the exception of at two locations.

Jelkes Creek

In conjunction with the development of this watershed plan, the IDNR Division of Fisheries conducted a fish community assessment on June 30, 2011 at three locations on the main stem of Jelkes Creek. The three sampling stations were located: immediately downstream of the Route 31 bridge (Station 1); above Lake Beatrice, near Frontenac Drive (Station 2); and upstream of Sleepy Hollow Road in the Carrington Reserve subdivision (Station 3). The IBI values estimated from this assessment are presented in Table 2-9.

Table 2-9. IBI Values from 2011 IDNR Assessment of Jelkes Creek

Station (Location)	IBI Value
Station 1 (downstream of Route 31)	30
Station 2 (above Lake Beatrice)	25
Station 3 (upstream of Sleepy Hollow Road)	29

As can be seen from a review of Table 2-9, a relatively narrow range of IBI values were estimated from this assessment. Although the IBI value for Station 2 is lower than the other stations, IBI calculation guidance material indicates that differences in IBI values of 10 points or less are not biologically meaningful.[27] It should also be noted that each of the values are below the IEPA's criteria (IBI values of 41 or less) for making the preliminary assessment that stream segments are impaired for aquatic life use.

2.3.2 Water Quality Assessments

In addition to water quality data collected analyzed by the IEPA as part of the Ambient Water Quality Monitoring Network and the Intensive River Basin Surveys (every five years), water quality data for the Fox River is collected and analyzed by the Fox River Study Group (FRSG). The FRSG formed in 2001 in response to proposed Total Maximum Daily Load (TMDL) study on the Fox River.[28,29] The stated mission of the FRSG "is to bring together a diverse coalition of stakeholders to work together to preserve and/or enhance water quality in the Fox River watershed."[30]

Since the formation of the FRSG, the group has voluntarily collected an extensive amount of additional water data for the Fox River from seven (7) additional sampling locations, including one at the upper boundary of the Jelkes Creek-Fox River watershed, at the Algonquin Dam. The group has also developed a comprehensive database that includes data collect by IEPA, the FRSG, and others. Additionally, as of the time of this writing, the Illinois State Water Survey (ISWS), working with the FRSG, was in the process of completing a calibrated water quality model for the Fox River watershed.

Although the efforts of the FRSG are being conducted on scale larger than the Jelkes Creek-Fox River watershed, the information being collect, evaluated, and generated (i.e. the water quality model) by this group and the ISWS is an invaluable resources to those working to help protect and restore the Jelkes Creek-Fox River watershed.

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[27] "Draft Manual for Calculating Index of Biotic Integrity Scores for Streams In Illinois." 2004. R. Smogor, Illinois Environmental Protection Agency, Bureau of Water.

[28] http://www.foxriverstudygroup.org/about.htm

[29] The U.S. Environmental Protection Agency defines a TMDL as "…a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant." http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/overviewoftmdl.cfm

[30] http://www.foxriverstudygroup.org/index.htm

2.4 Existing Watershed Conditions Pollutant Loads

A critical step in providing recommendations within this plan is the identification of the different pollutant sources within the watershed and the relative magnitude of pollutant loads from those sources.

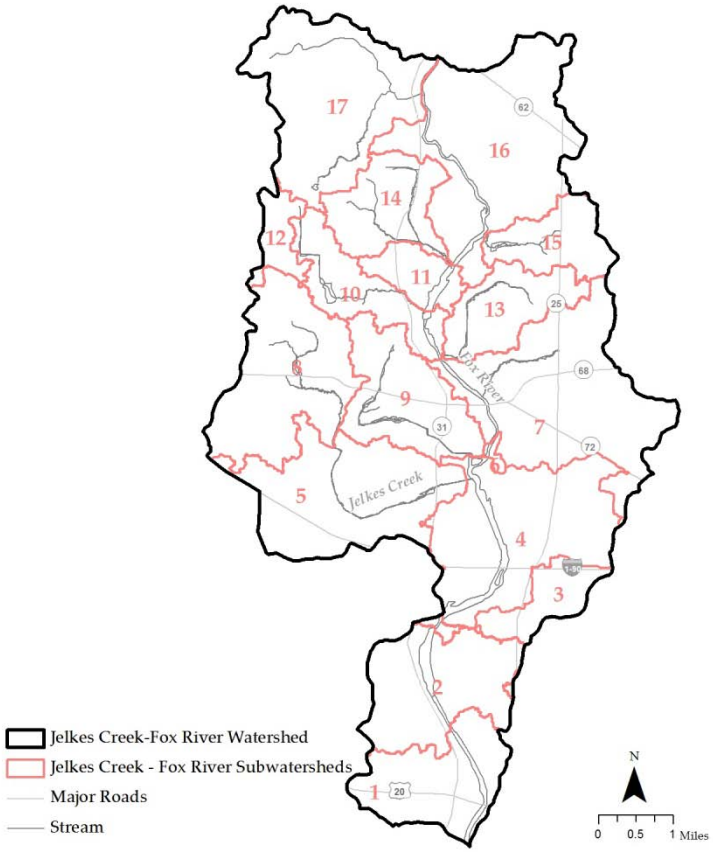
2.4.1 NON-POINT SOURCE POLLUTANT LOADS

For non-point source pollution, an effective method to estimate pollutant loads at the watershed scale is to use variable watershed characteristics that can affect pollutant load contributions, such as land use, soils, etc. The USEPA's planning level tool, Spreadsheet Tool to Estimate Pollutant Loads (STEPL), was used to develop "existing conditions" non-point source pollutant load estimates for total nitrogen, total phosphorus, and sediment within the Jelkes Creek-Fox River watershed.

One of the primary inputs to STEPL is land use information. The land use data used the Jelkes Creek-Fox River watershed analysis was largely based on CMAP's land use inventory for 2005. STEPL allows for a detailed breakdown of the broader urban land use category into categories such as commercial, single-family residential, etc. to developed more refined pollutant load estimates based on variable pollutant concentrations in stormwater runoff from these land uses.

In an effort to further refine the pollutant load estimates for the watershed, the pollutant load estimates were developed at the subwatershed level using delineated watershed boundaries, which separates the Jelkes Creek-Fox River watershed into 17 subwatersheds (Figure 2-22).

Figure 2-22
Subwatersheds within Jelkes Creek - Fox River Watershed



Estimating the pollutant loads at the subwatershed level, as well as at the watershed level, provides the opportunity to evaluate subwatersheds on a relative pollutant load contribution basis and to better target the recommendations included in this plan and in future planning efforts. For simplification purposes, the pollutant loading estimates provided in this section are presented for the entire watershed; however, figures and table presenting the results at the subwatershed-scale are provided in Appendix A.

The "existing conditions" non-point source pollutant load estimates for nitrogen, phosphorus, biological oxygen demand (BOD), and sediment are shown in Table 2-10. These results indicate that based on existing watershed conditions, urban land is the largest non-point source of nitrogen and BOD loads within the Jelkes Creek - Fox River watershed (approximately 63 and 80 percent, respectively). Nearly half of the phosphorus load is cropland (approximately 49 percent) and half is urban land (approximately 48 percent). Likewise, urban land and cropland contribute nearly equal amounts of the sediment load (approximately 47 and 52 percent, respectively).

Table 2-10. Non-Point Source Pollutant Load Estimates

Sources	Nitrogen Load (lb/yr)	Phosphorus Load (lb/yr)	BOD (lb/yr)	Sediment Load (t/yr)
Urban	89,934	10,338	281,379	3,226
Cropland	51,096	10,655	67,277	3,349
Forest	1,368	607	3,194	57
Total	**142,398**	**21,600**	**351,850**	**6,632**

The information provided in the previous paragraphs primarily focused on the results of the STEPL analysis, and further details regarding data sources and assumptions are provided in Appendix A. However, several issues regarding the project-specific use and capabilities of STEPL are worth noting.

- STEPL was not used to analyze pollutant loads from streambank erosion at the watershed scale; pollutant load reduction estimates for streambank erosion at specific locations are provided in Section 4.4
- STEPL does not account for drain tile contributions of pollutants.
- Pollutants from construction sites were not included in the analysis. Pollutant loads from construction sites can be highly variable and should be analyzed on a site-by-site basis and should be addressed through IEPA's NPDES program for construction activities.
- It is important to recognize that STEPL is not an in-stream response model and only estimates watershed pollutant loading based on coarse data, such as event mean concentrations.
- STEPL is not calibrated. Additional monitoring data and a more sophisticated watershed loading model would be required to develop a calibrated model for the Jelkes Creek-Fox River watershed.

Nonetheless, STEPL serves as a useful planning-level tool for estimating relative contributions of different pollutant sources within the watershed. STEPL also allows for the estimation of pollutant load reductions from the implementation of many of the projects recommended in Section 4.

2.4.1.1 Other Non-Point Source Pollutant Studies

A separate erosion and sedimentation study was conducted in 2011 and 2012 by the USDA Natural Resources Conservation Service (NRCS) with assistance from the Kane-DuPage Soil and Water Conservation District. A Rapid Assessment, Point Method (RAP-M)

Figure 2-23. Gully erosion in the Jelkes Creek-Fox River watershed.

was conducted to statistically estimate erosion and sediment rates. The RAP-M approach consists of both a desktop analysis and field data collection to determine erosion and sedimentation for from gully, streambank, and sheet/rill erosion. Results from the study indicate sedimentation loads from the Jelkes Creek-Fox River watershed as approximately 23,750 tons per year as compared to the STEPL model. The report from the RAP-M indicates that "roughly 57% of the sediment comes from sheet and rill erosion. Gully erosion (channel) contributes about 20% and about 23% from streambank erosion (channel)." A complete copy of the report for the RAP-M study is included in Appendix B. It should be noted here that the results for sediment loads from the STEP-L analysis discussed in the previous section and those for the RAP-M study are not directly comparable. While both methods produce planning-level sediment load estimates, the methods are based on different and calculation methods and different degrees of detail for input parameters.

2.4.2 POINT SOURCE POLLUTANT LOAD ESTIMATE

Although this plan primarily focuses on non-point source pollution, the combined amount of treated wastewater, and associated pollutant loads—specifically, nitrogen and phosphorus—discharged to the main stem of the Fox River within the watershed require evaluation. Five major (i.e. discharge greater than one million gallons per day) wastewater treatment plants (WWTP) a located in the Jelkes Creek-Fox River watershed (Figure 2-24).

The nutrient pollutant load estimates for the WWTPs located within the watershed were estimated through use of the 2008 through 2010 flow data available from the US EPA's Discharge Monitoring Report Pollutant Loading Tool[31] and effluent concentration estimates for plants where data were not available (i.e. all plants except Algonquin STP and East Dundee WWTP). For the Algonquin STP and East Dundee WWTP, the nutrient concentrations and annual pollutant loads were obtained from US EPA's Discharge Monitoring Report Pollutant Loading Tool. The effluent concentration estimates, 4 mg/L for total phosphorus and 20 mg/L for total nitrogen, for the remaining WWTPs are based on the project team's experience with similar treatment systems and are within ranges of values supported by literature for these types of systems.[32] The existing conditions WWTP nutrient load estimates are provided in Table 2-11.

[31] http://cfpub.epa.gov/dmr/

[32] Asano, Takashi, Franklin Burton, Harold Leverenz, Ryujiro Tsuchihashi, and George Tchobanoglous. 2007. *Wastewater Reuse: Issues, Technologies, and Applications*. Metcalf and Eddy. Table 3-14.

Figure 2-24

Wastewater Treatment Facilities Within Jelkes Creek - Fox River Watershed

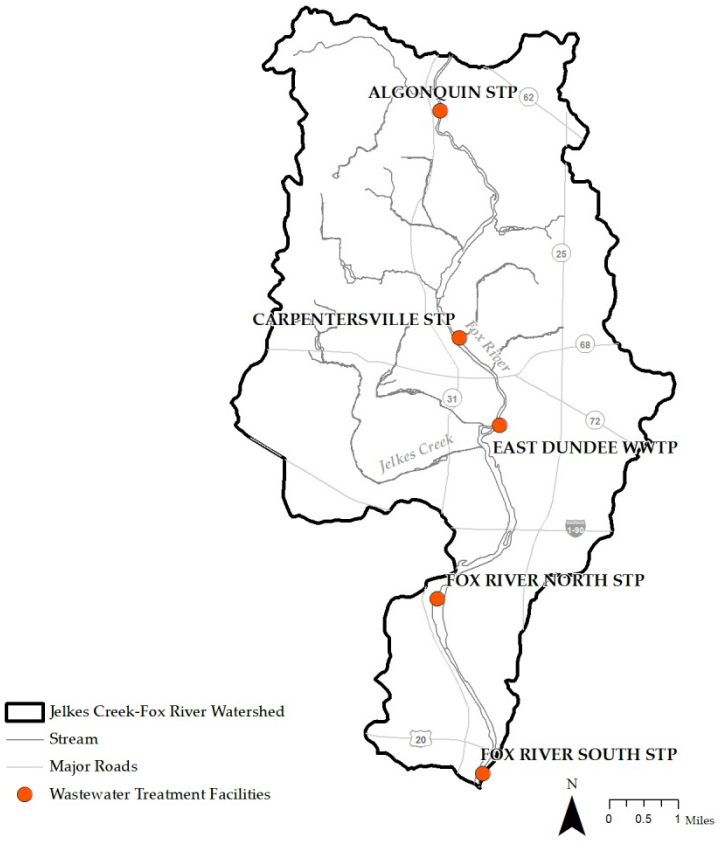


Table 2-11. Existing conditions WWTP nutrient load estimates

POTW	Average Daily Flow (MGD)	Estimated Average Concentration (mg/L)		Average Annual Pollutant Loads (lb/yr)	
		TP	TN	TP	TN
Algonquin STP	3.29	0.92[1/]	19.86[1/]	9,026[1/]	199,552[1/]
Carpentersville STP	2.75	4.0[2/]	20[2/]	33,560	167,800
East Dundee WWTP	1.11	1.19[1/]	2.36[1/]	4,070[1/]	7,793[1/]
Fox River WRD South STP	18.48	4.0[2/]	20[2/]	225,200	1,126,010
Fox River WRD North STP	5.81	4.0[2/]	20[2/]	70,810	354,060

Notes: 1/ Data obtained from US EPA's Discharge Monitoring Report Pollutant Loading Tool.
2/ Estimated average concentrations.

2.5 Summary of Watershed Improvements and Restoration Efforts Needed

The primary purpose of collecting and analyzing existing Jelkes Creek-Fox River watershed information is to identify and recommend opportunities for improving water quality and restoring the streams within the watershed. A summary of the opportunities identified during the watershed assessment is presented below. Recommended actions needed to improve and restore stream conditions within the watershed are provided in the remaining sections of this plan.

- As noted in Section 2.2, some of the potential causes of impairment for aquatic life use in the Fox River within watershed, as identified by the IEPA, are considered *non-pollutant causes*.[33] Two of these non-pollutant causes are other flow regime alterations and low dissolved oxygen, both of which can be associated, though not necessarily exclusively, to dams. The findings of McGraw Assessment presented in Section 2.3.1. demonstrate that the three dams that span the Fox River within the watershed have a detrimental effect on fish and macroinvertebrate communities.

  On-line impoundments also exist on some of the tributaries within the watershed (e.g., Lake Beatrice on Jelkes Creek and Lake Braewood on Dixie Creek). Although no or limited data exist for the determination of the effects of these impoundments on aquatic biology, the effects are expected to include barriers to fish passage, disruption of in-stream sediment transport processes, accumulation of sediment and associated pollutants in the impoundments, changes in water temperature, and highly variable dissolved oxygen levels creating adverse conditions for aquatic organisms adapted to flowing conditions.

  Projects should be identified and implemented to mitigate the unfavorable effects of the dam structures and on-line impoundments.

- The non-point source pollutant loading analyses presented in Section 2.4.1. indicate that several sources exist for the potential causes of impairment of sedimentation/siltation and total suspended solids as identified by the IEPA. Included among these sources are gully and streambank erosion. Although an exhaustive inventory of all of the stream channels within the watershed was not conducted, the RAP-M study performed by the USDA NRCS provided valuable insight into the relative contributions of gully and streambank erosion (approximately 4,750 and 5,450 tons per year, respectively). Streambank erosion was also a prevalent problem identified by watershed stakeholders during the watershed planning process. Projects that remedy the impacts of erosion and sedimentation should be implemented within the watershed.

- Approximately 62 percent of the watershed area was comprised of urban land based on 2005 land use data. The results of the STEPL analysis presented in Section 2.4.1, indicate that this urban land contributes the majority of the non-point source nitrogen and BOD loads (89,934 and 281, 379 pounds per year, respectively). The results also indicate that approximately half of the non-point source phosphorus and sediment loads within the watershed are from urban land (10,655 pounds per year and 3,349 tons per year, respectively).

  Ample opportunity for water quality improvements through implementation of stormwater management retrofits and improved development practices exist in urban areas throughout the watershed. The predominant stormwater management approach within the watershed apparently focused on discharge rate control (i.e. detention) with minimal attention given to water quality treatment. In developed portions of the watershed, stormwater management retrofit projects should be undertaken. These retrofits could be undertaken as stand-alone

[33] http://www.epa.state.il.us/water/tmdl/303-appendix/2010/122011-iwq-report-surface-water-303-list.pdf

projects, where funding allows, or implemented during infrastructure rehabilitation projects (e.g., roadway improvement projects). Municipal policies should also support implementation of stormwater management practices that provide water quality benefits.

- Numerous stream corridor impacts were identified by watershed stakeholders during the watershed planning process. In addition to the dams, on-line impoundments and eroding streambanks noted above, these impacts include stream channelization, impacted buffers, and degraded in-stream habitat characteristics (e.g., areas with excessive sediment deposition). Stream corridor restoration projects that remedy these impacts and improve the physical, chemical, and biological conditions of the streams should be implemented within the watershed.
- Comparison of the hydric soils and wetland data indicates that much of the wetland area within the watershed has been lost (approximately 2000 acres). Protection of the remaining wetlands, including fens, within the watershed should be considered a watershed priority. Wetland restoration should also be incorporated into municipal planning and policies and as part of natural area and stream corridor restoration projects, as appropriate.
- Approximately nine (9) percent of the watershed area remains as agricultural land, and this land is estimated to contribute significant amounts nitrogen (51,096 pounds per year), phosphorus (10,655 pounds per year), BOD (67,277 pounds per year), and sediment (3,349 tons per year) to the Jelkes Creek-Fox River watershed. Based on USDA NCRS input and data from the Illinois Department of Agriculture (Section 4.4), much of the agricultural land within the watershed is managed using practices (e.g., no-till, reduced till, etc.) intended to reduce non-point sources of pollutants. However, opportunities to further reduce loads from agricultural land should be evaluated and implemented within the watershed.
- Wastewater treatment plants within the watershed appear to have high operating standards. However, due to the volume of the discharges to the Fox River within the watershed (collectively, an average daily flow of approximately 31 million gallons per day), these discharges are estimated to contribute a significant amount of nutrients to the Fox River. Specifically, the nutrient loads from these sources are estimated to be approximately 342,500 and 1.85 million pounds per year of total phosphorus and total nitrogen, respectively. In addition, to the evaluation and implementation of additional nutrient removal processes, opportunities for wastewater reclamation and reuse should be investigated within the watershed.
- Although physical, chemical, and biological data exist for the Fox River, limited information is available for the tributaries within the watershed. Additional in-stream data should be collected to assess in-stream conditions more accurately. These efforts will allow decision-makers to determine long-term trends and improve characterization of different sources of pollutants in the watershed. The information will also facilitate a more refined identification of needed actions to improve and restore stream conditions within the watershed and prioritization of those actions.

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3. Vision and Policy

Local governments have a "vision" of how they aspire to grow, shape community character, and protect natural resources within their current or eventual borders, as expressed through their comprehensive plans and ordinances. While in many cases these expressions of policy are effective in protecting natural resources and promoting quality of life in the watershed, in other cases improvements are needed.

To help focus the efforts of local governments and stakeholders on those improvements that would be the most important to make, this plan establishes recommendations for policy and regulatory priorities for the watershed. The recommendations are meant to improve stream habitat, stabilize hydrologic conditions, and decrease pollutant loading. But they also have multiple other benefits, including flood prevention, cost savings, promoting additional recreation opportunities, and improving quality of life. It is envisioned that most of the recommendations within this section of the plan would be implemented by revising local plans and ordinances or establishing new programs, supported by additional studies if needed.

Figure 3-1. Rain Barrel (*Source*: Mary Ochenschlager)

Local government vision and policy initiatives can be lumped into the following categories:

- *Plans*: Local plans establish the framework and policy basis for actions by local governments. Land use and comprehensive plans can establish a strong policy basis for water and natural resource protection. Plans can, and should, specifically address priorities for water quality and stream habitat as well as related objectives such as flood prevention, water supply, open space, sustainable development, green infrastructure, and urban form.
- *Ordinances*: The *Kane County Stormwater Ordinance* governs the bulk of the watershed. It establishes minimum standards that municipalities must comply with for stormwater runoff, soil erosion and sediment control, floodplain management, and stream and wetland protection. However, municipalities in the watershed are free to establish additional requirements beyond the countywide ordinance. In addition to stormwater ordinances, local subdivision, landscaping, and zoning codes also have, or could have, a significant bearing on watershed protection objectives.
- *Programs*: Broadly, programs are suites of non-regulatory actions of local government that can be implemented to improve water quality, hydrology, and stream use impairments. Local programs might involve public education, infrastructure investment, incentives for landowners (e.g., for rain barrels or natural landscaping), or a variety of other activities.

3.1 Review of Local Ordinances

To ascertain how well local policies are protecting the Jelkes Creek-Fox River watershed, this section reviews existing municipal and county ordinances. Ordinances provide local governments with the legal framework necessary for the achievement of water and natural resources goals for their respective communities, as land development that occurs under these ordinances can directly or indirectly affect the quality of Jelkes Creek and the Fox River. With assistance from municipal staff, a review of relevant municipal and county stormwater, subdivision, zoning, landscaping, and related development ordinances was performed as part of the watershed planning process.

To facilitate this review, a 75-question checklist was developed. The checklist is very similar to checklist that was applied in several other watersheds. It is based on a combination of local, regional, and national ordinances and resources, including:

- Northeastern Illinois Planning Commission (NIPC) *Facility Planning Area Nonpoint Source Management* checklist
- Conservation-based provisions of local municipal ordinances, countywide stormwater ordinances, and other municipal or county conservation design ordinances
- NIPC/Chicago Metropolitan Agency for Planning (CMAP) *Ecological Planning and Design Directory*[1]
- *Blackberry Creek Watershed: Zoning Code Analysis and Ordinance Language Recommendation* report[2]
- USEPA *Water Quality Scorecard*[3]
- Center for Watershed Protection, *Better Site Design (Code and Ordinance Worksheet and related publications)*[4]

The ordinance review considered the following five major topical areas.

- Comprehensive Stormwater Standards
  - Stormwater drainage and detention
  - Soil erosion and sediment control
  - Floodplain management
  - Stream and wetland protection
- Natural Area Standards
- Landscaping Standards
- Impervious Area Reduction: Street and Parking Requirement
- Conservation Design: Zoning/Subdivision Standards

The review was performed for the following communities, as well as for the countywide *Kane County Stormwater Ordinance*.

- Algonquin
- Barrington Hills
- Carpentersville
- East Dundee
- Elgin
- Kane County
- Sleepy Hollow
- West Dundee

A compilation of the highlights and summary of the results is presented in Appendix C. An overview of the findings and recommendations follows.

[1] http://www.chicagowilderness.org/sustainable/directory_documents.php
[2] Kane County, 2004, http://www.co.kane.il.us/kcstorm/blackberry/zoning/FinalReport.pdf
[3] http://www.epa.gov/smartgrowth/pdf/2009_1208_wq_scorecard.pdf
[4] http://www.northinlet.sc.edu/training/media/resources/Better%20Site%20Design%20SW%20Code%20 Ordinance%20Worksheet.pdf

3.1.1 COMPREHENSIVE STORMWATER STANDARDS

The bulk of the watershed is in Kane County and is subject to the comprehensive stormwater provisions of the *Kane County Stormwater Ordinance.* The countywide ordinance was reviewed first. It is well-written and comprehensive in its scope. It focuses on the prevention of increased flood damages associated with stormwater quantity and floodplain development. The ordinance also addresses, to some degree, water quality, natural hydrology, and aquatic resources of streams and wetlands. All watershed communities in Kane County are required to have adopted stormwater standards that are at least equivalent to the countywide ordinance. Small portions of the watershed are in McHenry and Cook Counties and could be subject to provisions of relevant countywide ordinances.

Survey Results -- Stormwater: The countywide ordinance and all of the municipal ordinances embrace protection of water quality and hydrology in their purpose statements. However, the ordinances are split over the level of encouragement or requirement for runoff BMPs. The majority of ordinances are strong in the following categories:

- Limiting discharge rates from the 2-year through 100-year storms;
- Encouraging or requiring stormwater runoff BMPs and designs such as bio-swales, filter strips, permeable paving, and green roofs;
- Providing detention credit for practices such as permeable paving that store runoff in sub-surface void spaces of stone sub-bases;
- Limiting on-stream detention; and
- Requiring maintenance plans for detention facilities.

Areas where significant improvements could be achieved in most ordinances include:

- Requiring "naturalized" wet-bottom or wetland detention basins;
- Prohibiting detention in the floodway;
- Prohibiting the discharge of undetained stormwater into wetlands; and
- Including numerical water quality performance criteria;
- Specifying performance standards for maintenance of detention facilities.

Survey Results – Soil Erosion and Sediment Control: Most of the ordinances have relatively strong purpose statements for minimizing erosion. The majority of communities have adopted NIPC-based model ordinance language for site planning principles for sediment and erosion control. Most of the ordinances require routine maintenance and inspection and include a range of penalties for non-compliance. Five of the eight communities – Barrington Hills, Carpentersville, East Dundee, Elgin, and West Dundee -- require inspection at critical points in the development process by appropriately trained personnel.

Figure 3-2. Soil Erosion and Sediment Control Practice: Rock and Straw Wattle Check Dams

Survey Results – Floodplain Management: All ordinances include strong purpose statements addressing water quality and aquatic habitat. However, most of the ordinances do not discourage stream channel modifications and require mitigation for unavoidable water quality or habitat impacts. Nor do they limit appropriate uses of the floodway to the NIPC-recommended list (e.g., they allow uses such as parking lots).

Survey Results – Stream and Wetland Protection: The Countywide ordinance and community ordinances include provisions for the protection and mitigation of isolated wetlands, buffers, and high quality aquatic resources (based on FQI). But the ordinances vary in their approach to other aspects of stream protection. Five of the communities – including Carpentersville, East Dundee, Sleepy Hollow, West Dundee, and Kane County -- have adopted standards regarding stream protection, generally consistent with provisions of the NIPC *Model Stream and Wetland Protection Ordinance*. Most of the ordinances have some basic provisions for pretreatment of stormwater prior to discharge into a wetland. Only West Dundee specifically encourages the restoration of degraded stream and wetland habitats.

Stormwater Ordinance Recommendations: All communities should strive to adopt comprehensive standards for the protection of water resources and related aquatic resources. In particular, ordinances should go beyond a core emphasis on stormwater rate and quantity to also emphasize holistic protection of water quality, natural hydrology, and aquatic habitat. These items can be addressed through an integrated approach to stormwater drainage and detention, soil erosion and sediment control, floodplain management, and stream and wetland protection.

While Kane County has been a regional leader in encouraging holistic stormwater management, there are several areas of potential ordinance improvement that could benefit watershed protection objectives. One suggestion is to adopt relevant provisions of the following NIPC model ordinances, as some watershed communities have already done. While these model ordinances are somewhat dated, they still contain some regionally progressive provisions. These ordinances, which are listed below, can be found on the CMAP website.[5]

- *Model Stormwater Drainage and Detention Ordinance*
- *Model Soil Erosion and Sediment Control Ordinance*, 1991.
- *Model Floodplain Ordinance for Communities within Northeastern Illinois*, 1996.
- *Model Stream and Wetland Protection Ordinance*, 1988.

Communities also can acquire copies of ordinances from their neighboring municipalities. Alternatively, Kane County may wish to consider the provisions of the countywide stormwater ordinances of DuPage, Lake, and/or McHenry Counties. All of these countywide ordinances, to varying degrees, incorporate provisions addressing water quality, hydrology, and aquatic habitat.

3.1.2 NATURAL AREA STANDARDS

This section focuses on protection, restoration, and management of natural areas. These recommendations address *remnant* landscapes as well as *restored/created* natural areas. Many of the municipal stormwater ordinances already address, to varying degrees, protection of streams, lakes, and wetlands and establishment of appropriate buffers. However, the stormwater ordinances do not specifically address associated upland natural areas – such as prairies, savannas, woodlands, steep slopes, sensitive recharge areas, and hydric soils – that buffer aquatic systems and provide critical landscape linkages for aquatic life and wildlife.

Survey Results: The majority of the ordinances do not include provisions requiring the protection and management of natural areas, apart from streams and wetlands. The principal exceptions are Algonquin, Carpentersville, and Elgin. Algonquin has the most comprehensive natural area protections through its Conservation Design Standards and Procedures. The conservation design provisions are triggered on development sites that contain significant natural resources.

[5] http://www.cmap.illinois.gov/wastewater-committee/about-fpa-requests.

In addition, a number of communities have requirements for the long-term management of open space that is created through the development process. Approximately half or more of the communities have provisions for conservation easements (or similar legal instruments), secure and permanent funding for long-term maintenance and management, requirements for back-up Special Service Areas (SSAs), and requirements for long-term management/stewardship plans for open spaces and natural areas.

Figure 3-3. Snuffy's Prairie (*Source*: Dundee Township Open Space)

Natural Area Protection Recommendations: All communities are encouraged to identify and inventory their natural resources and open spaces, including the various features referenced above. This can lead to the mapping of a community-wide (or watershed-wide) "green infrastructure" network that identifies aquatic and upland resources to be protected, along with appropriate buffers. This could be accomplished, for example, via a series of "natural area overlay districts." Identified natural areas could be protected via strict development prohibitions or through flexible zoning that allows for clustering around sensitive natural areas. Specific standards should address natural area identification, allowable uses and cover within the natural area, buffer transitions, and other design elements. These regulatory protections could be supplemented by the acquisition programs of park and forest preserve districts.

In addition, preparation of short- and long-term management plans should be required for designated natural areas. Further, vegetative performance criteria, qualified ownership and management entities, conservation easement provisions, and revenue sources for management activities should be clearly spelled out in ordinances. Watershed communities should consider the progressive conservation design ordinance provisions of the Village of Algonquin and McHenry County.[6,7] This subject is further addressed below under "Conservation Design Standards."

3.1.3 LANDSCAPING STANDARDS

Natural, or native, landscaping can greatly benefit the preservation of water quality and natural hydrology.[8] Natural landscaping can be encouraged and/or required, where appropriate, in common areas in lieu of conventional turf grass landscapes. It also can be specifically targeted to BMP applications, such as bio-infiltration swales, rain gardens, filter strips, and naturalized detention basins.

[6] http://www.algonquin.org/egov/docs/1317742754_727294.pdf

[7] http://www.co.mchenry.il.us/departments/planninganddevelopment/Documents/Ordinances/Conservation%20Design%20Addendum.pdf .

[8] Native landscaping is the use of plants and plant communities that are indigenous to a particular region.

Figure 3-4. Native Landscaping (*Source*: City of Aurora)

Unfortunately, some landscaping ordinances may (unintentionally) discourage the use of natural landscaping via "weed" prohibition language. Some ordinances also require the physical separation of pervious and impervious surfaces on site, thereby effectively preventing runoff from impervious surfaces flowing onto pervious areas. A common example is the requirement to install raised landscape islands (vs. recessed islands) in parking lots.

Survey Results: Half of the watershed communities – Barrington Hills, Carpentersville, Kane County, and West Dundee -- actively encourage the use of native vegetation for common areas in new developments. Algonquin encourages or requires natural landscaping for conservation developments. Algonquin (in conservation developments), East Dundee, and West Dundee have requirements for the long-term oversight, management, and funding of created natural landscapes. Half of the communities – including Algonquin, Barrington Hills, Carpentersville, and Elgin -- have tree protection requirements, and nearly all require planting of street trees. While the majority of communities have requirements for pervious landscaped areas associated with parking lots, only West Dundee encourages the use of recessed landscape islands for stormwater filtering and infiltration.

Landscaping Recommendations: Landscaping ordinances should encourage the use of deep-rooted natural landscaping, where appropriate, in lieu of conventional, shallow-rooted turf grass landscaping. In particular, it is recommended that natural landscaping be required in detention basins and natural area buffers and encouraged in common areas and open spaces such as in conservation developments. Further, ordinances should include specific provisions for the maintenance of natural landscapes, including performance criteria. As a starting point, communities interested in upgrading their natural landscaping requirements should consider the natural landscape maintenance provisions of the previously cited Algonquin and McHenry County conservation design ordinances. A more detailed reference for natural landscape design and maintenance criteria is *Natural Landscaping for Local Officials: Design and Management Guidelines*.[9]

Landscaping ordinances also should encourage and/or require the integration of pervious, landscaped areas with the impervious areas of the site to facilitate the routing of runoff across and through landscaped areas. Language to specifically allow or require integration of bio-infiltration into parking lot islands and street-side landscape strips is recommended. Unfortunately, there are relatively few local ordinances that address this topic effectively. A suggested reference for ordinance approaches is the NIPC *Conservation Design Resource Manual*.[10]

Tree protection language is recommended to provide protection of desirable (e.g., native) trees and shrubs. Flexibility should be provided to allow removal of trees where appropriate for proper forest/natural area management, along with the inclusion of replacement criteria for the unavoidable

[9] NIPC. 2004. *Natural Landscaping for Local Officials: Design and Management Guidelines*
http://www.chicagowilderness.org/sustainable/naturallandscaping/installation_maintenance_guide.pdf
[10] NIPC. 2003. *Conservation Design Resource Manual.*
http://www.chicagowilderness.org/sustainable/conservationdesign/Manual/Conservation_Design_Resource_Manual.pdf .

removal of desirable species. There are a number of good local tree protection ordinances to model, including those referenced above.

3.1.4 IMPERVIOUS AREA REDUCTION: STREET AND PARKING REQUIREMENTS

A substantial portion of the impervious surface area in watershed communities is associated with streets and highways. Limiting the amount of impervious cover to that which is necessary is a key to reducing stormwater runoff, lowering installation and replacement costs, and encouraging ecologically sensitive design.

Figure 3-5. Permeable Pavers

Similarly, parking facilities often create large impervious surfaces that result in an increase in stormwater runoff and related water quality impacts. Reduced parking area and alternative porous paving materials can help to reduce impervious surfaces and facilitate infiltration and groundwater recharge.

Survey Results: Most of the watershed communities have taken a traditional approach to the planning and sizing of streets and parking lots. Some more specific findings are highlighted below.

Kane County and Barrington Hills have provisions for narrow streets, and Algonquin encourages reduced widths in conservation designs. Other community requirements generally range from 28 to 36 feet (measured at back of curb) for residential neighborhoods. Parking standards – stall size and number of spaces -- vary significantly among communities. Permeable paving is encouraged in half of the communities – Carpentersville, Elgin, Kane County, and West Dundee. Elgin and West Dundee allow for shared parking to reduce new parking requirements. West Dundee also has flexible parking provisions to exempt developers from requirements in downtown districts (public parking is provided instead).

Impervious Area Reduction Recommendations: It is recommended that communities evaluate their ordinances and consider revised design standards for narrower street widths, along with allowances for street designs that utilize naturalized stormwater infiltration and conveyance systems. Also, since stream crossings can cause significant stream impacts, recommended standards related to limiting the number of crossings and the design of crossings should be considered.

The topic of reducing street widths will likely generate substantial interest from various constituents, including fire departments and public works officials. This conversation should be informed by the successful efforts of communities (regionally and nationally) to make practical reductions in street widths. Two insightful references for narrower streets are:

- *Skinny Streets and Green Neighborhoods: Design for Environment and Community*,[11] *and*
- *Skinny Streets and Fire Trucks*.[12]

Parking standards should be updated to allow for shared parking, parking credit programs (i.e., purchasing credits for public parking in lieu of creating private spaces), and preferred parking for compact cars and non-motorized vehicles. Parking stall dimensions should also be reevaluated, along with consideration of reducing required stall length to account for vehicle overhang onto landscape

[11] Girling, C. and Kellet, R. 2005. *Skinny Streets and Green Neighborhoods: Design for Environment and Community*. Washington, DC: Island Press.

[12] Ewing, Reid et al; "*Skinny Streets and Fire Trucks*"; Urban Land Institute, August 2007.

islands or perimeter landscaping. Specific language to allow, encourage, or require permeable paving technology, such as interlocking concrete pavers, porous asphalt, and porous concrete, should be considered for parking lots, driveways, and streets.

With the exceptions noted above, there are relatively few local ordinances that address this topic effectively. A suggested reference for ordinance approaches is the NIPC *Conservation Design Resource Manual*.[13]

3.1.5 CONSERVATION DESIGN: ZONING/SUBDIVISION STANDARDS

Some of the approaches and standards discussed above may be inconsistent with existing zoning and subdivision codes. Therefore, greater flexibility is needed in existing codes to allow, encourage, and/or require conservation-based site designs. This can provide a number of benefits, including allowing additional space for the incorporation BMPs; reducing mass grading; allowing shorter street networks; and protecting natural areas and open space without reducing the number of lots.

Figure 3-6. Naturalized Basin at Kimball Farms, Carpentersville (*Source*: Dave Poweleit)

Conservation design provides an effective framework for preserving sensitive natural areas, including stream corridors and wetlands. Conservation design would ideally incorporate a site design process that:

- Identifies sensitive natural resources and conservation areas;
- Locates buildable areas to minimize impacts on natural areas and to take advantage of open space and scenic views;
- Designs the street network to minimize encroachment in sensitive natural areas; and
- Establishes lot lines and lot sizes following a cluster development approach.

It worth noting here that the aforementioned 75-question checklist used to review of existing ordinances included several items consistent with some of the principles of the urban design concepts of Traditional Neighborhood Design and New Urbanism—i.e. cluster development, compact/contiguous development, and downtown redevelopment.[14,15] Other principles of these concepts are presented in Section 3.2.2.

Survey Results: As noted above, Algonquin requires conservation design for sites containing sensitive natural resources and designates conservation design as an allowable form of development for nearly all development and redevelopment.

Most other communities allow for flexible subdivision designs via "planned development" provisions. Nearly all of the communities indicated their development process requires some level of protection of

[13] NIPC. 2003. *Conservation Design Resource Manual.* http://www.chicagowilderness.org/sustainable/conservationdesign/Manual/Conservation_Design_Resource_Manual.pdf .
[14] http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-tnd.html
[15] http://www.cnu.org/

natural drainage patterns and natural resources. This can be accomplished through lot clustering and similar techniques.

Conservation Design Recommendations: Conservation design should be encouraged or required in community zoning and/or subdivision codes, particularly in communities where development is projected in areas that contain significant natural resources. Communities should also consider offering density bonuses to encourage conservation design elements that exceed minimum ordinance requirements.

Communities choosing to embrace conservation design should evaluate existing ordinances, particularly the previously cited Algonquin and McHenry County ordinances. These ordinances mandate conservation design on sites that contain significant natural resources via specific trigger mechanisms. They allow conservation design by right on other sites.

The previously referenced NIPC *Conservation Design Resource Manual* also should be evaluated for ordinance suggestions.

3.1.6 LOCAL ORDINANCE REVIEW: CONCLUSIONS AND RECOMMENDATIONS

Overall, there is a substantial degree of variability in the requirements of the various ordinances. A number of the individual municipal and county (unincorporated) ordinances exceed the minimum requirements of the countywide *Kane County Stormwater Ordinance* in their protection of water quality, hydrology, and aquatic resources. Several communities have embraced relatively advanced standards with respect to watershed protection priorities and sustainability, while several communities have relatively traditional requirements. As a consequence, significant gaps exist in the protection of water quality and wetland resources.

With regard to subdivision, zoning, and landscaping ordinances, there also is a high degree of variability in provisions that are relevant to watershed protection. In nearly every ordinance category that was reviewed, there were generally at least one or two communities with advanced standards that could be used as models for other communities that desire to upgrade their own standards. Overall, though, the subdivision and zoning codes do not recognize flexible and innovative design practices such as natural landscaping, bio-infiltration, and permeable paving (generally referred to as "green infrastructure" or "low impact development"). It may be possible to utilize such approaches, but developers will generally need to proceed with variances or go through planned development procedures.

Communities that desire to change their ordinances to reflect the concerns noted above should consider several options. First, they are encouraged to consider relevant elements of the ordinances of their neighboring watershed communities and amend their ordinances to better support the protection of Jelkes Creek and the Fox River. The ordinance checklist itself, as well as the supporting documents listed earlier in the chapter (such as the NIPC model ordinances), also should be utilized in identifying important ordinance provisions in a comprehensive fashion.

While numerous specific recommendations for ordinance improvements have been made above, it is understood that such changes may be a challenge in many communities because of limited staffing and resources. There also may be concerns that ordinance improvements may be a deterrent to development in challenging economic times. However, there are significant arguments in support of ordinance updates, beyond the obvious watershed protection benefits. Some of these are highlighted below.

- Most existing municipal codes are relatively prescriptive, encouraging or requiring traditional "gray infrastructure" design approaches. By providing greater ordinance flexibility and removing existing *barriers* to preferred "green infrastructure" designs, developers are more likely to willingly implement innovative designs. These creative designs, that also promote more

livable/sustainable communities, may have significant marketing advantages over conventional development.

- Municipalities can readily provide *incentives* for innovation and sustainability to encourage developer acceptance of new approaches. For example, stormwater detention credits can be applied to stormwater storage under permeable paving and density bonuses can be offered for creative conservation designs.
- Communities can educate landowners and developers regarding the *cost-effectiveness* of watershed-friendly development and redevelopment. For example, recent experience suggests that green infrastructure designs like permeable paving often have longer lives than traditional designs and, hence, lower life-cycle costs. Similarly, clustered conservation design subdivisions have been shown to have significantly lower infrastructure costs than conventional subdivisions.
- A strong case can be made that preservation of natural resources through green infrastructure designs, conservation development, and open space and greenway preservation, can enhance community character and quality of life. This, in turn, can attract desirable businesses and sustainable residential development.
- Municipalities can be role models for developers. Currently, there are funding programs, like the Illinois EPA Green Infrastructure Grants Program and Section 319 Nonpoint Source grants, that can enable municipalities to implement green infrastructure designs for new or retrofitted infrastructure and facilities.
- Help in updating ordinances is available from multiple sources. In addition to the specific references cited above, municipalities can seek assistance from CMAP and other local and regional resource organizations.
- If ordinance changes are done cooperatively with other communities on a watershed or countywide scale, a "level playing field" is preserved from the perspective of developers. Specifically, it may be appropriate for Jelkes Creek watershed communities to coordinate with other Kane County communities to discuss possible water quality, hydrology, and aquatic habitat protection improvements to the countywide *Kane County Stormwater Ordinance*. Similarly, communities on the Kane-Cook or Kane-McHenry borders could evaluate the protective provisions of the countywide stormwater ordinances in the neighboring county and consider corresponding updates to their municipal ordinance.
- Finally, ordinance-related recommendations provided in this plan are consistent with the emerging nonpoint source pollutant control and NPDES policies from the U.S. EPA, as well as Illinois EPA.[16] Implementation of these recommendations by the Jelkes Creek watershed communities will allow the communities to be proactive in their implementation of these policies by taking action now.

[16] A compendium of resources from the USEPA for the implementation of green infrastructure at the municipal level is provided at: http://cfpub.epa.gov/npdes/greeninfrastructure/munichandbook.cfm

3.2 Priority Planning and Policy Recommendations

The review above noted many examples of effective local ordinances, as well as some areas where improvements are warranted. In the following sections, special priorities for local planning and policy are identified.

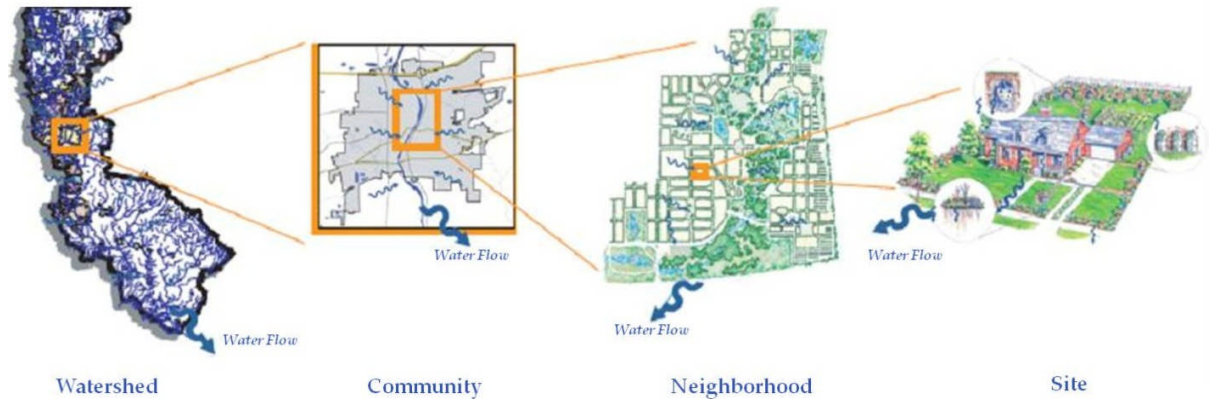
3.2.1 GREEN INFRASTRUCTURE NETWORK MAPPING

Green infrastructure network mapping is important to provide local stakeholders with a vision for green infrastructure within the watershed that is not limited by artificial political boundaries and that could provide an opportunity integrate the individual planning efforts of each municipality with their neighbors and regional entities such as the Forest Preserve District of Kane County.

A more detailed, data-intensive green infrastructure mapping process has been initiated by Kane County. It is anticipated that the county green infrastructure map will include upland natural resources (e.g., prairies and woodlands), state-designated natural areas and Nature Preserves, private conservation easements, greenways, and other resource areas that are important to watershed protection. This mapping and associated green infrastructure plan will be a valuable resource for the Jelkes Creek-Fox River watershed municipalities and stakeholders. This green infrastructure mapping can be viewed as a localized version of the regional *Green Infrastructure Vision* adopted by the 250 member Chicago Wilderness consortium.[17]

With regard to green infrastructure implementation, the watershed stakeholders are encouraged to consider a holistic strategy of implementing opportunities at multiple spatial scales, ranging from watershed to community, to neighborhood, to individual sites and lots (Figure 3-7).

Figure 3-7. Green Infrastructure Spatial Scales



At the *watershed scale*, green infrastructure protection could be achieved primarily through the efforts of large land management agencies, particularly the Forest Preserve District of Kane County and the Dundee Township Open Space District, to acquire and restore critical land holdings and establish interconnected greenways and trails. This could be supplemented by the efforts of The Conservation Foundation to protect conservation easements on small private land holdings.

At the *community scale*, municipalities are encouraged to incorporate green infrastructure principles into their plans, land use maps, ordinances, and acquisition programs. This could provide protection for local sensitive natural areas by directing development to less sensitive areas. Communities, particularly park districts, also could establish important greenway connections and trails to the larger protected sites.

[17] http://www.chicagowilderness.org/GIV.php

While the watershed-level green infrastructure map is a good starting point, individual municipalities are encouraged to tailor the plan to their own circumstances and opportunities. In particular, communities are encouraged to engage local stakeholders, including municipal department representatives, park districts or departments, local residents and conservation organizations, to develop refinements through a workshop process.

At the *neighborhood scale*, conservation design should be used to preserve and restore isolated wetlands, headwater streams, and woodlands. Trails and greenways can also be established to provide important local connections to regional and community-level facilities. Long-term protection and stewardship of neighborhood open spaces could be ensured through conservation easements with The Conservation Foundation or other natural resource organizations.

At the *site scale*, best management practices can be implemented in parks, school grounds, businesses and residential lots to provide important water quality and habitat functions. These could be implemented on newly developed sites, or retrofitted into existing sites. Practices such as rain gardens, bio-swales, permeable paving, and green roofs, when considered cumulatively, can have remarkable benefits to downstream water bodies.

In summary, it is recommended that green infrastructure implementation in the Jelkes Creek watershed include an array of integrated protection and restoration strategies. These would include land acquisition, ecological restoration, greenway and trail connections, private conservation easements, protective land use planning and zoning, conservation development, BMP retrofits, and farmland preservation. There are already several excellent examples of green infrastructure implementation in the watershed that can serve as role models for future actions. Several are highlighted below.

- *Stormwater Retrofits*—Given the built-out condition of portions of the watershed, green infrastructure implementation in these areas is expected to be largely accomplished through the implementation of interconnected stormwater management retrofit projects. These types of projects would be implemented at the neighborhood and site-level scale and would include practices that provide water quality benefits and stormwater runoff volume reductions. Example retrofit projects include rain gardens, vegetated swales, and wetland detention basins. One notable example is the retrofitting of stormwater infiltration and filtering practices at Jelke Creek Bird Sanctuary. This project included wetland restoration, earthwork re-grading to store 100% of the runoff in the 100-year storm event on-site, bioswales, terraced wetlands, native plant seeding, sediment forebays, reuse of sand and gravel for infiltration zones, rock check dams, and conversion of disturbed mined areas into restored wetlands.

- *Conservation Development*— Conservation design principles are recommended in those areas slated for future development. These site developments would protect natural areas, create greenway and trail connections, and utilize stormwater management practices that provide water quality and runoff volume reduction benefits. It is expected that many platted, unbuilt (or partially built) developments exist within the watershed communities that incorporate conventional designs. These developments may provide opportunities to re-plat these projects with more compact and/or conservation designs. Interested developers could take advantage of this flexibility to achieve potential cost-savings and marketing advantages while also enhancing sustainability in the community. An outstanding local example of conservation development policy is the ordinance adopted by the Village of Algonquin.

- *Natural Area Restoration*—Portions of the mapped green infrastructure network are already, or are expected to be, protected open space areas, such as the 250+-acre Jelke Creek Bird Sanctuary (Figure 3-8). It is recommended that these natural areas will continue to be enhanced through on-going and future natural area restoration and management efforts. The Dundee Township Open Space District has undertaken ecological restoration of hundreds of acres prairies, savannas, wetlands, and stream corridors.

Figure 3-8. Jelke Creek Bird Sanctuary. (*Source*: Dundee Township Open Space)

- *Trail and Greenway Connections* – The Fox River Trail is a regionally significant trail-greenway that connects the various communities in Kane County as well as linking to McHenry, DuPage, and Kendall counties at a regional level. In this watershed, the trail runs primarily along the east side of the Fox River through East Dundee, Carpentersville, and Algonquin. There is a significant opportunity to provide future links that connect Jelkes Creek-Fox River watershed residents and resources to this regional resource.

The challenge with establishing the green infrastructure network will be translating the mapped network into an actual network of protected and ultimately restored land while still preserving development potential in the watershed. While the Forest Preserve District and Dundee Township may be the most visible implementers of the green infrastructure network, protecting the bulk of the identified network will require the collaborative and creative efforts of municipalities, park districts, land trusts, and private residents.

Local governments and open space protection organizations are encouraged to adopt the Jelkes Creek green infrastructure network map (and the future Kane County green infrastructure map) as part of their comprehensive plan updates, as well as implement the various green infrastructure policies and programs recommended in this chapter. In addition, local policies should address protection of woodlands, prairies, isolated wetlands, headwater streams, and other important natural areas that may lie outside the mapped watershed-scale network. Further, it would be helpful for watershed communities and open space entities to identify and implement regional green infrastructure connections into adjacent watersheds following the recommendations of the Chicago Wilderness Green Infrastructure Vision and CMAP's GIV 2.0.

3.2.2 LIVABLE COMMUNITIES

One important aspect to protecting Jelkes Creek-Fox River watershed is to identify and implement more sustainable land use planning. Under a "livable communities" approach to local planning, many regional municipalities are encouraging development to be designed so that it is walkable and planned in such a way that residents can readily use public transit for many trips if they choose to do so. This means that more development would be located near transit and somewhat more compact than in the past. Furthermore, municipalities can also encourage redevelopment on underutilized sites, although this must be balanced with the need to protect community character. Although specific density requirements (i.e. dwelling units per acre) are not being presented here, the benefit to the Jelkes Creek-Fox River watershed is that the amount of land developed per new household would be reduced, meaning that stormwater runoff would also be reduced. Under this assumption, it is assumed that the land that is not developed will be used for parks, farming, or otherwise conserved. Besides its broad benefits, the livable communities approach may also bring cost savings for municipalities. In the long run, developing in new

areas is more costly than compact development. Promoting livable communities also is the central theme of the recently adopted CMAP *GO TO 2040* Plan. The information presented here is also consistent with many of the principles of the urban design concepts of Traditional Neighborhood Design and New Urbanism.

Several of the local municipal land use plans recognize the importance of a mix of land uses, particularly the preservation of density and redevelopment in downtown areas and several of the plans go a step further and embrace various forms of compact, contiguous development, as important themes of their plans. In many cases, though, ordinances have not been updated to reflect these plans' visions of future growth and design. A number of areas have been identified where zoning, subdivision, and landscape ordinances could be improved to better reflect the comprehensive plan, helping implement the livable communities approach and likely reduce the infrastructure costs of future land development. Municipalities should be encouraged to make these recommended improvements to their comprehensive plans and implementing ordinance improvements, specifically to encourage and require compact/contiguous development and impervious area reduction strategies.

3.2.3 GREEN INFRASTRUCTURE FOR SITE DESIGN AND STORMWATER MANAGEMENT

Green infrastructure at the site or neighborhood scale is any site design or stormwater management technique that has the primary goal of preserving, restoring, or mimicking natural hydrology and water quality. These techniques target infiltrating and retaining more runoff on-site and improving the quality of the runoff that does leave the site. Green infrastructure practices typically provide infiltration and water quality improvement unit processes, in addition to the detention facilities already required.[18] According to case studies in the Midwest, the use of green infrastructure can reduce site development and long-term maintenance costs by reducing or eliminating the need for gray infrastructure.[19] This is not always the case however, as savings depend on site conditions and the specific green infrastructure techniques used. In general, the use of green infrastructure offers the possibility of saving developers and municipalities money.[20]

Figure 3-9. Bioretention in Office Parking Lot

The general recommendation is for local governments within the watershed to require the wider use of green infrastructure practices in new development and redevelopment in their jurisdictions. In particular, is it recommended that at a basic level, local governments should embrace green infrastructure alternatives to conventional designs. At a more advanced level, they should also specify performance standards for green infrastructure practices.

[18] Examples are the infiltration trench, infiltration basin, porous pavement, bioretention (bio-swales, rain gardens, etc.), green roof system (soil substrate), wet or dry swales, and a number of other practices.

[19] Conservation Research Institute. 2005. *Changing Cost Perceptions: An Analysis of Conservation Development.* http://www.nipc.org/environment/sustainable/conservationdesign/cost_analysis/

[20] The Center for Neighborhood Technology has developed a useful online calculator that estimates the costs associated with using conventional and green infrastructure techniques for a chosen soil type, lot size and slope, etc. Costs and cost savings are divided helpfully into private (developers and building owners) and public (mainly municipalities).

Municipal ordinances can embrace green infrastructure alternatives to conventional gray infrastructure designs. Specifically zoning, subdivision, and landscaping ordinances should explicitly allow, encourage and/or require green infrastructure designs. For example, permeable paving standards could be explicitly specified as a preferred option in the subdivision ordinance. Recessed landscape islands that accommodate bio-retention should be specified as a preferred alternative to raised landscape islands. And conservation design, with provisions for lot clustering, natural landscaping, and density bonuses should be allowed by-right for residential development. These provisions can provide developers the assurances, incentives, and predictability to attempt creative designs that can provide cost savings and lead to potential marketing advantages over conventional projects.

3.2.4 INCENTIVES FOR EFFECTIVE STORMWATER MANAGEMENT

Incentives for using green infrastructure practices should be included in local stormwater management programs. Under current stormwater ordinances, many kinds of gray infrastructure are still required even if alternative green infrastructure is used on-site. For example, storm sewers may be required even if a parallel bio-swale system is installed, reducing the potential green infrastructure cost savings for developers. Similarly, many green infrastructure practices are able to retain runoff on-site, at least temporarily. These practices, such as the storage provided in the gravel base layer under a permeable parking lot, should reduce the detention required under current ordinances. Therefore, elimination of redundant stormwater controls incentivizes green infrastructure practices by allowing reduction of the size and length of storm sewers and the size of detention. It would be incumbent upon the design and municipal engineers to verify through design and analysis that the proposed green infrastructure practices provide a true site runoff rate and volume reduction. Further, the parties should agree to a long-term maintenance regimen to ensure that green infrastructure practices continue to function as designed over time.

Figure 3-10. Wetland Detention Basin

Conservation design approaches that emphasize the use of a range of green infrastructure practices are sometimes incentivized with density bonuses, allowing the developer more lots or square footage of commercial development as a trade-off for advanced designs that exceed minimum standards. The Algonquin conservation design ordinance is a good example for providing such incentives. A similar incentive is to offer expedited permit review and approval for projects that incorporate green infrastructure approaches. Another form of incentive is to provide a reduction in municipal stormwater maintenance fees if a project incorporates BMPs that demonstrably reduce stormwater runoff volume. This could apply in communities that employ stormwater utilities or other fee systems for maintenance and management.

Municipalities and the County are encouraged to revise their ordinances or develop programs to permit appropriate cost savings for projects that incorporate green infrastructure. In particular, the following incentives are recommended:

a. Detention volume reduction credits;
b. Reduced storm sewer requirements;
c. Density bonuses; and
d. Reduced stormwater maintenance and/or utility fees.

3.2.5 STORMWATER INFRASTRUCTURE AND NATURAL LANDSCAPE MAINTENANCE AND OWNERSHIP

Effective operation and performance of stormwater BMPs and other green infrastructure investments requires appropriate long-term inspection, maintenance, and management. Some examples of maintenance needs include controlling debris, erosion, and sediment buildup in detention basins or sweeping/vacuuming permeable paving. Natural landscaping requires its own set of inspection and maintenance provisions, as well as objective performance criteria to ensure their long-term functionality and avoid nuisance complaints.

Figure 3-11. Prescribed Burn in Wetland (*Source*: David Poweleit)

Ordinance provisions generally require the identification of a management entity and the preparation of a maintenance plan, although the details generally are not specified. In some communities, stormwater infrastructure (e.g., regional detention basins and storm sewers) is owned and maintained by local governments, most commonly by municipalities but sometimes by park districts. General revenue is typically used for maintenance. In most newer communities, stormwater management practices, such as detention basins and buffer areas, remain on private property and are subject to private maintenance. For instance, detention basins are typically maintained by homeowners or property owners associations. Some jurisdictions require a Special Service Area (SSA) as a backup to fund maintenance if it is not performed by the owners association. Without clear maintenance performance criteria, as well as regular inspections by municipal staff, privately maintained stormwater infrastructure may be in worse condition overall than publicly maintained infrastructure. Further, owners associations and residents may be unaware that the detention pond and other stormwater and green infrastructure elements are even their responsibility.

Similar provisions apply to installed natural landscaping, whether it is part of a detention basin or other BMP or used more broadly in the common areas of a conservation development. In addition to the basic maintenance, ownership, and funding considerations discussed above, it is important to establish clear performance criteria for the design, installation, and long-term maintenance of natural landscapes. Further, it may be desirable to require developers and homeowners associations to contract with reputable natural landscape contractors to install and maintain natural landscapes.[21]

Watershed municipalities are encouraged to revise their ordinances to require more explicit requirements for maintenance of stormwater facilities, natural landscaping, and related green infrastructure. In particular, more specific standards should be developed for maintenance frequency, performance criteria, and ownership. Municipalities should also consider dedication of stormwater management infrastructure to the municipality, as with roads and sidewalks. Alternatively, municipalities may wish to investigate creation of a stormwater utility fee[22] to defray the costs of ongoing maintenance and inspections.

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[21] A recommended source of guidance on this topic is Natural Landscaping for Local Officials: Design and Management Guidelines, (Northeastern Illinois Planning Commission, 2004, http://www.chicagowilderness.org/sustainable/naturallandscaping/installation_maintenance_guide.pdf)

[22] The stormwater utility fee is typically charged to property owners in proportion to the amount of runoff from their property (typically proxied by the amount of impervious surface on site). It replaces the general revenues that currently support local government stormwater programs with an enterprise fund, and can be designed to be revenue neutral – in other words, the general fund revenues budgeted for stormwater management could be reduced by the amount in the enterprise fund. The amount of the fee must

3.3 Program Recommendations

The program recommendations are suites of non-regulatory actions of local government that can be implemented to reduce water quality, hydrology, and stream use impairments. Local programs might involve public education, infrastructure investment, incentives for landowners (e.g., for rain barrels or natural landscaping), and other programs.

3.3.1 STREAM AND NATURAL AREA MAINTENANCE AND RESTORATION

The condition of many natural areas in the Jelkes Creek-Fox River watershed, including the creek corridor, wetlands, and upland woods and prairies, reflects many years of degradation caused by altered hydrology, draining, channelization, and invasive species. In addition, reaches of stream channels within the watershed are in need of debris and trash removal that contributes to overbank flooding and streambank erosion. While debris removal is often necessary, some amount of large woody debris is important, since it provides fish habitat and substrate for the aquatic insects that break down organic debris in the stream.

Figure 3-12. In-Channel Debris Accumulation

The recommendation for the Jelkes Creek-Fox River watershed is that communities should work cooperatively with park districts, the Forest Preserve District, Dundee Township, Kane County, school districts and private land owners in the long-term ecological management of stream corridors, wetlands, and upland natural areas. In particular, watershed communities should work cooperatively with the Kane County Department of Facilities, Development, and Environmental Resources to implement a regular stream maintenance program that balances improved conveyance with habitat considerations. This effort should entail the enlistment of ecologists, biologists and engineers from organizations operating within the watershed in providing on-going input into the stream maintenance program activities.[23] This input should include evaluations of maintenance needs and the methods employed for the maintenance activities. An example of the latter is that the implementation of appropriate soil erosion and sediment control measures should be a critical consideration for stream maintenance activities.

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bear a reasonable relationship to the cost of service, so the charge for a stormwater fee depends on the need for stormwater infrastructure maintenance. It is arguably more equitable than funding stormwater programs out of general revenue since those who "use" the service more (i.e., place more demands on the stormwater management system) will pay more. While a cost of service study would need to be undertaken, the probable amount of the fee would be on the order of approximately $5.00 per month per single family residence equivalent, based on the fees charged in parts of Indiana and downstate Illinois. The stormwater utility can also fund other activities recommended in the Hickory Creek plan. First, it can be used to incentivize the use of green infrastructure. Under a "feebate" provision, property owners who install green infrastructure practices would have their stormwater fee reduced by a certain amount. Second, the fee can be used to help cover the match for certain grant programs to undertake projects, such as detention basin retrofits or stream bank restoration, to improve the creek.

[23] An example of a stream maintenance program that claims to address both conveyance and habitat concerns is provided at: http://www.scwa.ca.gov/stream-maintenance-program/

3.3.2 INTEGRATION OF GREEN INFRASTRUCTURE INTO INFRASTRUCTURE REHABILITATION

As noted previously, much of the watershed is already developed and there will be substantial demands for the rehabilitation and replacement of public infrastructure and facilities over time. These infrastructure needs should be routinely evaluated for opportunities to replace traditional gray infrastructure with green infrastructure that can help to solve existing stormwater quantity and quality problems. The following are a subset of example opportunities for when green infrastructure could be integrated into infrastructure rehabilitation projects:

- During roadway resurfacing or sidewalk/curb work, it might be relatively inexpensive to install improved catch basins.
- Work on roads with open drainage or room in the right-of-way also present opportunities to direct runoff into small wetland treatment areas or rain gardens and bio-swales.
- Parking lot resurfacing or reconstruction may provide an opportunity to direct runoff to pervious areas, particularly filter strips and bio-infiltration areas rather than into the storm sewer system.
- Permeable paving should be investigated as an option to conventional paving where pavement is being replaced in parking lots and local roads.
- Opportunities may exist for improving the water quality treatment function of existing detention basins (i.e. outlet reconfiguration, concrete channel removal, etc.) during stormwater infrastructure maintenance or improvement projects.

Figure 3-13. Arterial Roadway with Vegetated Swale and Porous Pavement Sidewalk (*Source*: San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook)

Public facilities, particularly police and fire stations, libraries, and public works facilities, are opportunities to incorporate green infrastructure alternatives that are highly visible to the public. Communities that embrace green infrastructure for retrofit and replacement projects, as well as public facilities like police and fire stations, will serve as role models for the type of development they want to see in their communities. At the same time these projects may create a unique sense of place that could provide the community with a marketing advantage in attracting desirable development as the current recession eases. Lastly, the communities will realize cost-savings due to longer life cycles of green technology.[24] It is recommended that communities institute a policy as part of the formal capital improvement program to incorporate green infrastructure designs.

The detailed project recommendations included in this plan are only *examples* of projects that should be implemented within the watershed. Ample opportunity for improvements in water quality through the implementation of stormwater retrofits was observed throughout the watershed during the reconnaissance effort. Therefore, watershed communities should implement the example and other similar projects over a reasonable schedule and fully integrate green infrastructure concepts into their existing infrastructure rehabilitation and replacement programs. To facilitate the implementation of this recommendation, watershed communities are encouraged to collaborate on the development of a

[24] A useful resource for the incorporation of green infrastructure into rehabilitation and expansion project is provided at the Low Impact Development Center's web site at http://www.lowimpactdevelopment.org/greenstreets/index.htm

consistent and structured mechanism to guide this process. The mechanism could be at least partially based on the Illinois Department of Transportation's *Illinois – Livable and Sustainable Transportation (I-LAST) Rating System and Guide*.[25] Sections of this document particularly pertinent to the recommendation presented here are the categories for "Reduce Impervious Area" (W-1), "Stormwater Treatment" (W-2), and "Construction Practices to Protect Water Quality" (W-3).[26]

3.3.3 CHLORIDE REDUCTION PROGRAM

The Illinois EPA has not identified chloride as a potential cause of impairment for aquatic life in any of the stream segments within the Jelkes Creek-Fox River watershed. However, chloride has been identified as a potential cause of impairment for aquatic life in numerous stream segments within northeastern Illinois. Additionally, the presence of chloride within surface water and groundwater can have deleterious effect on natural areas, such as fens. As such, it is recommended that the Jelkes Creek-Fox River watershed municipalities and stakeholders take a proactive approach in reducing chloride loads within the watershed.

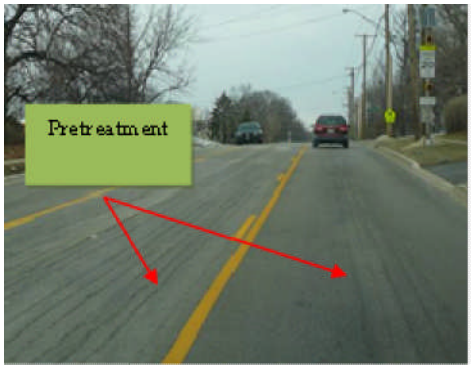

Figure 3-14. Pretreatment on Roadway

The reasonable expectation is that a significant portion of chloride loading to streams is from roadway, parking lot, and sidewalk deicing activities. The removal of chloride from stormwater runoff through implementation of typical stormwater BMPs presents a challenge in that the effectiveness of most BMPs for chloride removal is limited. As a result, the preferred approach for addressing chloride loading within the watershed is through source reduction. The recommendation to address chloride in the Jelkes Creek-Fox River watershed is separated into two components to target chloride loadings from roadway deicing activities and from commercial and residential sources.

The first component of the recommendation is for watershed communities to evaluate and implement alternative roadway snow and ice management methods. This may include the use of alternative products that have lower, or no, chloride content to supplement road salt usage, such as beet juice. Alternative approaches of snow and ice management should also be included, such as pretreatment of road surfaces with liquid anti-icing products in advance of winter storm events. Admittedly, public safety is of the utmost importance in the evaluation of alternative snow and ice management methods. Therefore, the watershed municipalities should carefully evaluate the effectiveness of alternative products and approaches.

Figure 3-15. Signage near Salt Creek, DuPage County

The second component of the recommended chloride reduction program is targeted at snow and ice removal activities performed in commercial and multi-family residential areas. No data are available on the amount of chloride-based deicing compounds currently being used on these properties throughout the watershed. However, is expected that the primary product being used for deicing activities on these properties is rock salt. The specific recommendation is that the watershed communities collaboratively develop an education and outreach program targeted at commercial applicators of deicing products within the watershed.

[25] http://www.dot.state.il.us/green/documents/I-LASTGuidebook.pdf
[26] *Ibid.*

Elements of the program should be to: 1) determine the products and typical application rates and approaches currently being used and 2) identify and disseminate information on alternative products and approaches that reduce chloride loading within the watershed, but are effective for snow and ice removal. Other entities that perform a large amount of snow and ice removal activities, such as park districts, should also be included in this effort.

This recommendation could be facilitated by the establishment of an informal partnership with the DuPage River Salt Creek Workgroup, which has been developing and implementing a chloride reduction program for several years in those watersheds.[27]

3.4 Education and Information for the Jelkes Creek-Fox River Watershed

Community support is vital to the success of any watershed plan. In order to build support, community members must understand that they are an important part of the watershed and that their actions affect the natural resources around them. In particular, the general public is largely unaware of the impact that their daily activities have on non-point source water pollution. According to the United States Environmental Protection Agency Environmental Education increases public awareness and knowledge about environmental issues or problems. In doing so, it provides the public with the necessary skills to make informed decisions and take responsible action.[28]

A plan to address education and outreach should strive to help the public gain an understanding of issues within their watershed and the motivation to initiate behavioral change that will result in the protection of water quality. This section provides recommendations for education and information efforts that will address the concerns of the stakeholders in the Jelkes Creek- Fox River Watershed. As implementation of the plan progresses, the focus of educational efforts may change. The members of the Jelkes Creek-Fox River Watershed Coalition should consider appointing an education chair to refine and implement the education and outreach campaign for the watershed.

There are a few general guidelines to keep in mind when delivering any type of education in the Jelkes Creek-Fox River Watershed.

- Limit message to a few key points.
- Tailor message to the audience you intend to reach, meet them at their level of understanding.
- Keep in mind that there is a large bi-lingual population within the watershed. Materials should be developed in both English and Spanish.
- Coordinate efforts with partner organizations.
- All information should promote the Jelkes-Creek Fox River watershed and provide contact information and ways to get involved.

[27] http://www.drscw.org/winter.html
[28] http://www.epa.gov/enviroed/

3.4.1 SUMMARY OF EXISTING PROGRAMS

An online Jelkes Creek-Fox River Watershed Education survey was administered to gauge stakeholders' knowledge of existing education programs within the watershed and to gain an understanding of the education programs the group would like pursue. All stakeholders that have been involved with the planning process were invited to take the survey. Thirty-eight people responded. Of the respondents, 86% said that they were not aware of existing education and information efforts related to water quality/watershed issues within the watershed. See Appendix D for complete survey results.

Due to limited time and resources, the Watershed Coalition cannot achieve the goals of an education and outreach campaign alone. A number of agencies and organizations already offer quality public education opportunities within Jelkes Creek-Fox River Watershed. The members of the Watershed Coalition should enlist these organizations to support and enhance their efforts.

Chicago Metropolitan Agency for Planning (CMAP)

The Chicago Metropolitan Agency for Planning (CMAP) is the official regional planning organization for the northeastern Illinois counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will. CMAP developed and now guides the implementation of GO TO 2040, metropolitan Chicago's first comprehensive regional plan in more than 100 years.[29] To address anticipated population growth of more than 2 million new residents, GO TO 2040 establishes coordinated strategies that help the region's 284 communities address transportation, housing, economic development, open space, the environment, and other quality-of-life issues. CMAP provides a variety of educational resources as well as technical and financial assistance opportunities, including the following:

Water 2050 Implementation[30]

Communities exploring ways to conserve water will benefit from a suite of measures that include public outreach, regulations, and tools that assist utilities in identifying areas for increased efficiencies. CMAP compiled a list of resources that address the above measures.

- Bill inserts
- Model ordinance
- Watersense partnerships
- Presentations

CMAP's Water 2050 Implementation Programs are intended for public water suppliers and municipalities that are interested in pursuing system efficiency and targeted conservation. This initiative includes a variety of programs and informational webpages featuring water efficiency and conservation strategies including:

- Water Conservation/Efficiency Planning[31]
- Ordinance Review/Update[32]
- Water Financing[33]
- Lawn to Lake[34]

[29] www.cmap.illinois.gov/2040
[30] http://www.cmap.illinois.gov/water-2050
[31] http://www.cmap.illinois.gov/water-conservation-efficiency-planning
[32] http://www.cmap.illinois.gov/ordinance-review-and-updates
[33] http://www.cmap.illinois.gov/water-2050/water-financing
[34] http://www.cmap.illinois.gov/lawn-to-lake

Illinois Volunteer Lake Monitoring Program (VLMP)

CMAP serves as the Volunteer Lake Monitoring Program coordinator for the counties of Cook, DuPage, Kane, Kendall, McHenry, and Will; the Lake County Health Department coordinates the program in Lake County. This program brings together citizens, state agency staff, and regional and local governmental staff to monitor and investigate the quality of Illinois's lakes. Staff provides volunteer training, technical assistance, educational materials, data management, and assistance in newsletter and report preparation.

Figure 3-16. Residents can participate in CMAP's Lake Monitoring Program (*Source*: Holly Hudson, CMAP)

Volunteers measure water transparency (clarity) in a lake of their choosing using a simple device called a Secchi disk (an 8-inch diameter plate painted black and white in opposite quadrants, attached to a calibrated rope or tape measure). The Secchi measurements are used to document changes in water transparency during the monitoring season as well as from year to year (Secchi transparency is affected by the color of the water and the amount of suspended sediment and algae in the lake). Volunteers also record water color, aquatic plant growth, and several other factors relating to lake, weather, and watershed conditions at the time of monitoring. Additionally, volunteers are asked to keep watch for several types of aquatic invasive species and to report potential sightings. Monitoring typically is done twice a month from May through October at three in-lake locations. Depending on available resources, a subset of volunteers also may have the opportunity to collect water samples that are analyzed at an Illinois EPA laboratory. Water chemistry data provides important information on suspended material in the lake (sediment, algae, etc.) as well as levels of nutrients (phosphorus, nitrogen) that can promote nuisance aquatic plant and algae growth. All monitoring equipment, data forms, instructional materials (including a comprehensive Training Manual), and other supplies are provided to the volunteers. Volunteers need only have a boat and anchor to participate.[35]

Local Technical Assistance Program[36]

CMAP's Local Technical Assistance (LTA) program, funded by a U.S. Department of Housing and Urban Development (HUD) Sustainable Communities Regional Planning grant, provides technical assistance to communities across the Chicago metropolitan region to undertake planning projects that advance the principles of GO TO 2040. Subsequent to the first call for projects in spring 2011, CMAP has worked with more than 70 local governments, nonprofits, and intergovernmental organizations to address local issues at the intersection of transportation, land use, and housing, including the natural environment, economic growth, and community development. In response to the LTA Year Two call for projects, CMAP received over 100 proposals from more than 80 applicants.

Additionally in association with the LTA program, CMAP can offer planning commissioner workshops that discuss the role of local planning commission members in the community, the planning process, the

[35] Contact Northeastern Illinois VLMP Coordinator Holly Hudson (hhudson@cmap.illinois.gov or 312-386-8700) for more information.

[36] For the most recent update on project status, as well as links to several projects that are underway, see http://www.cmap.illinois.gov/lta. A video overview of the LTA program also is available. For additional information about the LTA program, contact Pete Saunders (psaunders@cmap.illinois.gov or 312-386-8654).

legal basis for planning, the development of comprehensive plans and zoning ordinances, and other planning topics.

Future Leaders in Planning

Future Leaders in Planning (FLIP) is a leadership development opportunity where high school students can contribute to a better future for our region. Sophomores, juniors, and seniors participating in this program will learn more about the northeastern region and share their thoughts with other teens from Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will counties. Participants will also meet and interact with selected regional leaders who make key planning decisions in our communities. Applications are due each September.[37]

Local Ordinances and Toolkits

CMAP's Local Ordinances and Toolkits Program strives to develop resources that help municipalities develop policies that support the goals of GO TO 2040. Each year, CMAP staff will work with municipal officials and experts to deliver a series of guides that describe the process of implementing a specific municipal policy, from study to approval. In conjunction with the LTA program, the agency also expects to provide staff support to several municipalities implementing these policies in the coming years. Resources developed so far include:

- Model Water Conservation Ordinance[38]
- Parking Strategies to Support Livable Communities[39]
- ADA Transition Plans for Your Community[40]

Data

Land Use: CMAP maintains a database of observed land use in a form suitable for analysis using Geographic Information Systems (GIS). The Land Use Inventory is updated every five years and is used to support regional planning and policy evaluations as well as local technical planning assistance activities.[41]

Green Infrastructure: Since GO TO 2040 was adopted, CMAP has partnered with Chicago Wilderness to enhance our information on the core conservation lands in the region and how to link them together in a regional green infrastructure network. New data are now available, along with a set of GIS tools, for conservation partners in the region to help identify portions of the green infrastructure network on which they wish to concentrate their efforts.[42]

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[37] For more information, see http://www.cmap.illinois.gov/flip-future-leaders-in-planning or contact Ricardo Lopez (rlopez@cmap.illinois.gov or 312-386-8766).

[38] http://www.cmap.illinois.gov/moving-forward-in-detail/-/asset_publisher/Q4En/content/model-water-conservation-ordinance?isMovingForward=1

[39] http://www.cmap.illinois.gov/moving-forward-in-detail/-/asset_publisher/Q4En/content/parking-strategies-to-support-livable-communities?isMovingForward=1

[40] http://www.cmap.illinois.gov/ada-transition-plans

[41] Contact David Clark (dcclark@cmap.illinois.gov or 312-386-8682) for more information about the Land Use Inventory data.

[42] Contact Jesse Elam (jelam@cmap.illinois.gov or 312-386-8688) for more information regarding the green infrastructure network data.

Dundee Township

Since establishing an open space plan in 1996, over 800 acres of wetlands, dry hill prairie, forest, fen and farmland has been purchased by or donated to Dundee Township. Open space sites within the Jelkes Creek-Fox River Watershed include the Jelkes Creek Bird Sanctuary and Dixie Fromm Briggs sites. The Township is committed to designing and maintaining these sites in ways that keep the maximum possible amount of rain falling on the site in place.

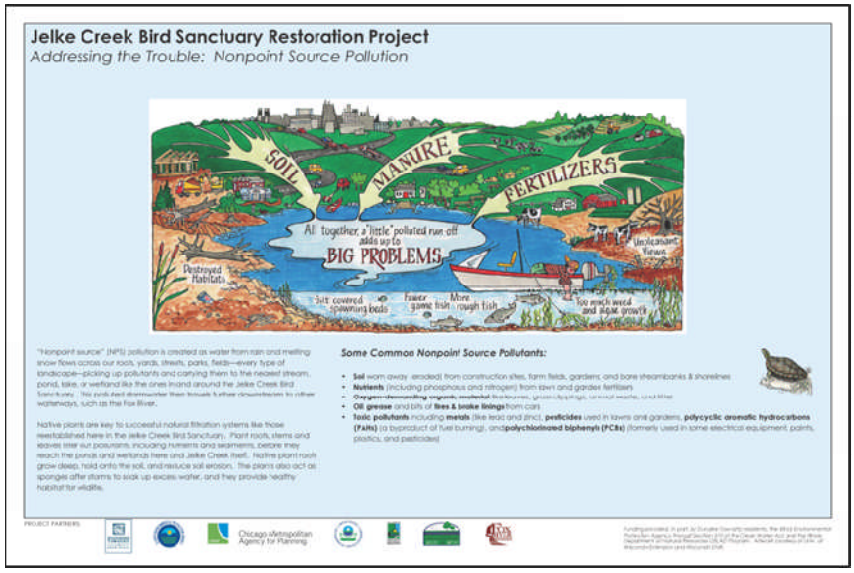


Figure 3-17. Signage at Dundee Township open space sites provides information for the public

Educational signage at township open space sites helps to explain and encourage best management practices. The township also offers volunteer stewardship opportunities to help maintain their sites. For more information on Dundee Township open space areas and activities the Dundee Township website should be visited.[43]

Forest Preserve District of Kane County

The Forest Preserve District of Kane County (FPDKC) was organized in 1925 by public referendum. The District currently owns and operates 93 forest preserves comprising 20,000 acres of land. The mission of the District is to acquire, hold and maintain lands for the preservation of natural or historic resources and habitats, flora or fauna, and to restore, restock, protect and preserve such lands for the education, recreation and pleasure of all its citizens.

To that end, the Forest Preserve District of Kane County has a comprehensive natural areas management program and an active environmental program. Land management is carried out by the Department of Natural Resources with the assistance of an active volunteer network. The Department of Community Affairs and Environmental Education provides education for the public through nature programs and interpretation of natural and cultural history.

The District operates the Creek Bend Nature Center at LeRoy Oakes Forest Preserve in St. Charles. The center showcases the ecology of Kane County, featuring interactive exhibits and displays for all ages to enjoy.[44]

The Forest Preserve District of Kane County offers the following educational opportunities:

- Nature Programs - offered at Creek Bend and at preserves throughout the county. General public programs for families, adults and children are advertised on the District's website, in its quarterly publication The Tree Line, and in local media.

[43] http://www.dundeetownship.org/index.php.
[44] For hours of operation and general information about the Nature Center, visit www.kaneforest.com.

- Youth Education - the naturalist staff conducts school field trips for public, private and home schools in Kane County. Teachers may schedule field trips by e-mailing programs@kaneforest.com. The naturalists also provide guided hikes and outreach programs for scouts and community groups.

The Forest Preserve District of Kane County is committed to both restoration and education. Citizens of all ages are encouraged to learn about the rich natural history of the county and to become involved in stewardship of its natural resources.

Friends of the Fox River

Incorporated in 1990, the Friends of the Fox River (FOFR) is a non-profit organization dedicated to developing a watershed of caretakers in the Fox River Valley. The mission of the Friends of the Fox River is to preserve, restore and protect the Fox River Watershed's resources by connecting people with nature through education, research, restoration and advocacy.

FOFR provides resources to enlist homeowners, municipalities, businesses & youth in watershed protection activities.

The group operates out of the Schweitzer Environmental Center which sits on 40 acres of woods, wetland & field in West Dundee. The facility offers displays & events for the public as well as meeting space for private parties.

Figure 3-18. FOFR offers equipment, training and support for river monitoring.

FOFR education initiatives include:

- Continuing Education and Community Outreach - FOFR sponsors special events and trainings on stream ecology and speaks at public hearings on issues that potentially impact the quality of the Fox River or its tributaries. Experts available to speak on watershed issues include a hydrologic engineer, biologist, water treatment superintendent, and naturalist.
- Fox Rescue - Spring and Fall Fox Rescue cleanup events are held each year that remove tons of trash from the Fox River and its tributaries.
- Fox River Watershed Monitoring Network - provides equipment, instruction, and support including a stream monitoring guide specific to the watershed for citizens, teachers, and youth group leaders to monitor the health of the Fox River and its tributaries. They collect physical, chemical and biological data used to assess water quality trends.
- Fox Map - enables 3rd grade through college level students to collect quality data using GPS/GIS technologies. This allows the students to investigate the relationship between land and water quality.
- Outreach services - assists teachers with curriculum development and provides school visits to deliver various presentations on international & local water quality, and host school visits to area streams. Workshops on *The River Des Renard & The Fox River Guardian,* a water quality curriculum designed for middle school use, are also offered to teachers and youth group leaders. All services are free.
- Information - brochures videos and posters such as *Welcome to your Watershed, Five Ways You Can Help Protect Water Quality in the Fox River,* and the *Legend of the Fox Video* provide readily available information on a variety of watershed topics.

More information can be found at the FOFR website.[45]

Fox River Ecosystem Partnership

The Fox River Ecosystem Partnership (FREP) was formed in 1996 after the Illinois Department of Natural Resources (IDNR) designated a core of high-quality ecological resources in the northern-most watershed as "Resource Rich Area". Portions of eleven counties, including Lake, McHenry, Kane, Kendall and LaSalle, form the Fox River watershed, which is home to 11% of the state's population. The watershed contains many high quality natural areas, and suburban areas with some of the highest growth rates in the state. The Partnership is a not-for profit organization made up of a diverse group, made up of landowners, businesses, non-profit organizations, agencies and governments within the Fox River Watershed region.

Education by the partnership occurs through:

- Meetings and Noon Networks - general meetings, held every other month, and include a short presentation about a particular watershed protection activity or program. Noon Networks are lunchtime gatherings in which a guest speaker is invited to present information about a particular watershed protection or restoration project.

Figure 3-19. Programs such as FREP's Noon Networks highlight watershed activities. (*Source:* Becky Hoag)

- Rain Garden Initiative - FREP was awarded a Kane County Riverboat Fund Grant in 2009 to launch a *The Kane County Rain Garden Initiative*. FREP has partnered with Kane-DuPage Soil & Water Conservation District, University of Illinois Extension, and the Fox Valley Park District on projects in Kane County, including the creation of demonstration rain gardens, development of school curriculum geared towards middle school students, and the design of website to highlight programs, events and rain gardens in the County.
- Summits and Seminars - FREP sponsors day long summits to educate stakeholders on current issues facing the Fox River.
- A Citizens Guide to Preserving the Fox River - developed in conjunction with the Conservation Foundation, this guide and website provide information about what people are doing to help preserve and protect the beautiful Fox, and what actions citizens can take to help.
- Conversations about Conservation with Legislators- annual event to discuss environmental issues with our legislators. State legislators representing the Fox Watershed are invited to participate, with one asked to serve as keynote speaker. Jack Darin of Sierra Club provides an overview of environmental issues and legislative activities. The event is held at various locations in the watershed, to help reach new legislators and constituents.

Information about FREP as well as active watershed plans and groups can be found at the FREP website.[46]

[45] www.friendsofthefoxriver.org
[46] http://www.foxriverecosystem.org/index.htm.

Fox River Study Group

As discussed in Section 2 of this plan, the Fox River Study Group (FRSG) is a diverse coalition of stakeholders working together to assess water quality in the Fox River Watershed. Participants include Friends of the Fox River, Sierra Club, Fox River Water Reclamation District (Elgin), Fox Metro Water Reclamation District (Aurora), Fox River Ecosystem Partnership, Illinois EPA, and Blackberry Creek Watershed Plan Implementation Council as well as representatives from Algonquin, Aurora, Batavia, Crystal Lake, Elgin, Geneva, Island Lake, Kane County, Lake in the Hills, St. Charles and Yorkville.

The FRSG began meeting in the summer of 2001 to plan how to prepare for the upcoming Total Maximum Daily Load (TMDL) study on the river. The 303(d) listing was updated in 2002, and now includes the entire length of the Fox River from the Wisconsin state line to the river's mouth at Ottawa with the most numerous causes listed as flow alteration, habitat alteration, low dissolved oxygen, nutrients, organic enrichment, PCBs, siltation or suspended solids.

The mission of the Fox River Study Group is to bring together a diverse coalition of stakeholders to work together to preserve and/or enhance water quality in the Fox River watershed. The activities of the FRSG include:

- Water Quality Monitoring - FRSG participates in water quality monitoring efforts in the Fox River watershed.
- Fox River Watershed Computer Model - FRSG has worked to develop a computer model of the Fox River watershed. The group will maintain the computer model as a management tool to: promote efficient use of taxpayer and private money on watershed projects, assess the effect of various development options throughout the watershed, educate stakeholders, evaluate management priorities, identify sensitive regions within the watershed, and develop continuing monitoring programs.

For more information on the FRSG visit the FRSG website.[47]

Kane County

The Kane County Planning Cooperative supported by the Kane County Development Department, Kane County Health Department, and the Division of Transportation with support from the Chicago Metropolitan Agency for Planning (CMAP) was formed in 2012 with the Kane County Board adoption of the County's comprehensive plan (2040 Plan) to facilitate the implementation strategy of the 2040 Plan. This countywide partnership is open to all agencies/organizations involved in planning, such as elected officials, planning commission members, appointed officials, and staff. The Kane County Planning Cooperative will be a resource for all local planning efforts by providing a local forum for information and discussion on critical planning issues and emerging trends. The primary goal is to fill the gaps for addressing current critical topics common to many Kane County's municipal and other partners by providing a local forum for education, communication, problem solving and by integrating health, transportation, and land use planning. The partnership also provides direct technical assistance and information for local units of government in order to make Kane County and its partners more competitive for public and private funds.

The Kane County Planning Cooperative can provide support by:

- Strengthening community participation and collaboration as one of the main goals of the cooperative.

[47] http://foxriverstudygroup.org.

- Providing an existing forum for education, information sharing, and receiving feedback on critical issues in the watershed.
- Providing technical and planning assistance from Kane County staff.

The Kane County, Division of Environmental Resources provides educational and public involvement tools that municipalities can use to meet the Public Education and Involvement measures for NPDES Phase II. These tools are provided through:

- Stream Drain Stenciling Kits – available on an as-needed basis, for community stream drain stenciling.
- Brochures - Kane County distributed two brochures, "Kane County Wants You to be a Clean Water Champion" and "Top Ten Things Streamside and Shoreline Property Owners can do to Protect Kane County Waters".

Kane County Farm Bureau

Kane County Farm Bureau (KCFB) is a not-for-profit membership association serving members, local agricultural producers and Kane County communities since 1912. The association's mission is to enhance the quality of life for member families, promote all aspects of agriculture and advocate good stewardship of our land and resources.

Association places emphasis on the teaching of teachers so they can in turn, teach students. Programs and activities for education, outreach and advocacy for agriculture, conservation and natural resource issues include:

- Classroom Presentations - utilize Ag Mags, mAgic kits and Ag in the Classroom materials to provide lessons including how farmers interact with and care for the environment.
- Summer Ag Institutes and Tours for Teachers - introduce and encourage agriculture and natural resource curriculum. A secondary class is also given each summer, on timely and in-depth topics, including renewable eneregy and world food and water supplies.
- Teacher Workshop Presentations - given each year by Ag Literacy Coordinator that focus on Earth Day, understanding water and the issues of concern today, or connecting core curriculum to agriculture and the environment.

Figure 3-20. KCFB offers teacher in-services on a variety of topics. (*Source: KCFB)*

- Ag Days Expo - held annually in March provides education on agriculture and natural resources to fourth grade students.
- Private Well Water Testing - offered to members in conjunction with Kane-DuPage Soil and Water Conservation District. This program offers peace of mind to the many rural residents of the county who get their drinking water from private wells and provides valuable information to help keep water safe for consumption.
- Recycling – KCFB sponsors year round collections for items including cell phones, pill bottles, egg cartons and greeting cards. Items are recycled through finding secondary uses by entities including crisis shelters, a local poultry farm, and the University of Illinois Extension.

For more information on the KCFB visit the KCFB website.[48]

Max McGraw Wildlife Foundation

The Max McGraw Wildlife Foundation is a private foundation located in Dundee. Recognizing the preservation and enjoyment of the earth and its wildlife heritage improves the quality of life for all the world's inhabitants, the Max McGraw Wildlife Foundation is actively creating solutions through programs of management, education, research and communications that strongly enhance the conservation of fish, game, wildlife and their habitats.

The foundation engages in charitable, scientific and educational activities which tend to promote the well-being of mankind, including the conservation of natural resources of fish, game and wildlife to the end that such resources of this character as the nation now possess may be conserved and expanded in the public interest.

As this is a private foundation, education programs are done through reservation only. Education opportunities include:

- Service Projects - local groups such as scouts and church organizations help with restoration on 1200 acres of foundation property.
- School Programs - resources provided to help local schools to meet the curriculum standards. Onsite programs such as water quality and touring of the fisheries department are a few of the many programs offered.

Soil and Water Conservation Districts

Soil & Water Conservation Districts (SWCDs), legally established in 1937 under the Illinois Soil and Water Conservation District Act (Chapter 70, Par 405/1 est.seq.), are local units of government. The Act gives SWCD's the responsibility to provide and assist in delivering programs that prevent soil erosion and conserve natural resources. The Kane-DuPage , McHenry-Lake and North Cook SWCD offices service the Jelkes-Creek Fox River Watershed.

Collectively these districts work to plan the Northeastern Illinois Envirothon. Envirothon is a competition which gives high school students the opportunity to learn about the environment and the role of individuals in natural resource management. At the completion of the year-long learning process, the Envirothon conducts a series of competitions where students are tested on five subjects: soil, aquatics, wildlife, forestry and a current environmental issue which changes each year.

While they do work collaboratively on many projects, each district operates individually and offers unique education opportunities.

[48] http://www.kanecountyfarmbureau.com/

Kane-DuPage SWCD

The Kane County SWCD was formed in 1944 and later combined with DuPage County. The mission of the Kane-DuPage SWCD (KDSWCD) is to serve their constituency by protecting the natural resources that are essential for life. They do this by offering technical assistance, educational resources, financial support, and by partnering with others to assure that the most practical, proven, and progressive conservation practices can be accessed and implemented by the people of our District.

Figure 3-21. The KDSWCD offers hand-on outreach programs to local schools.

The KDSWCD offers a variety of educational opportunities to the public including:

- Outreach Programs - hands-on presentations are given to K-12 classrooms, home schools and scout groups. Programs are interdisciplinary, aligned to the state learning standards, and can be designed to meet the needs of classroom curriculum. Possible topics include, but are not limited to Wonderful Water, H2O on the Go, Who Dirtied the Water, and Groundwater: Our Hidden Treasure.
- Technical Presentations - employees are available to provide technical presentations to companies, individuals and organizations on soil erosion sediment control issues.
- Teacher Training - District staff partners with other local agencies to offer workshops on such nationally recognized curricula as Project WET (Water Education for Teachers), Project Learning Tree (PLT) and Growing Up Wild.
- Storm Drain Stenciling - kits, including stencils, door hangers, and brochures are made available to schools, scouts, and community groups. Groups can use these materials to paint the highly visible message, "Dump no Waste, Drains to Stream" next to storm drains to help alert the community to the fate of stormwater.
- *ForeverGreen* - published twice a year, the KDSWCD newsletter reaches out to homeowners, businesses, and governmental agencies, offering a broad variety of informational topics.
- Private Well Water Testing Program - offered in conjunction with Kane County Farm Bureau, this program offers test kits for sale over a two week period in February. Well water can be tested for nitrate, metal and volatile organic chemical. Results are sent directly to participants and are confidential.
- Soil Erosion Sediment Control Seminars - each year the KDSWCD offers full or half day seminars to inform municipal staff, contractors, designers, consultants, and landowners about current soil erosion sediment control practices and issues.

More information is available at the KDSWCD website.[49]

McHenry Lake County SWCD

The McHenry County SWCD was formed in 1947. On November 8, 2011, the McHenry County SWCD and the Lake County SWCD merged and were renamed the McHenry-Lake County Soil and Water Conservation.

The McHenry-Lake County SWCD provides education through:

[49] www.kanedupageswcd.org

- *The Greatest Show "of" Earth* (hands-on education trailer) - geared to 3rd-5th graders, this trailer brings the wonders of soils and its properties directly to schools. Inside the students delve into microscopic views of soils and critters, view real soil profiles, learn the power of erosion and sedimentation, discover the power of soil decomposers, and learn to read a soils map. Outside the trailer they will see soil erosion and sedimentation demonstrations and take soil samples within the school yard.
- Outreach Programs - through the use hands-on activities and models, students learn about topics such as watersheds and erosion.

Visit for the McHenry-Lake County SWCD website for more information.[50]

The Conservation Foundation

The Conservation Foundation (TCF) is a not-for-profit land and watershed protection organization. Their mission is to preserve and restore natural areas and open space, protect rivers and watersheds, and promote stewardship of our environment. The Conservation Foundation is a recognized expert and reasoned voice on conservation issues, and with the help of its members and donors, provides the leadership required to achieve this vision. Educational opportunities offered by TCF include:

Figure 3-22. The *Conservation @Home* program encourages the use of conservation landscaping (*Source:* David Poweleit)

- *Conservation@Home* - numerous locations in Kane County have been certified with the TCF's Conservation@ Home designation. Staff members conduct certifications and promote native and water-conserving landscaping to homeowners, businesses and developers. TCF provides information and resources, including brochures and newsletters, for planting and maintaining certified properties, and distributes an informational/promotional DVD to local cable TV networks and libraries. The Home program also promotes the use of rainwater through presentations on rain gardens and selling rain barrels.
- Presentations to Home Owners Associations (HOA) - TCF, along with ecological management consultants, have made presentations to groups of HOAs in Kane County about how to manage their natural areas and convert conventional common area/detention pond landscaping to native vegetation.
- Workshops and Seminars - TCF regularly hosts workshops that are open to municipalities throughout the county relating to stormwater management practices and water quality. Examples include: Illicit Discharge Detection and Elimination, Effective Use of Chlorides, Stream Restoration BMPs, Stormwater BMPs, Construction BMP/Erosion Control Training, Good Housekeeping/Pollution Prevention Training. In addition, TCF frequently coordinates educational seminars on sustainability and land use, as well as open space and watershed protection.
- Mighty Acorns - TCF is working with Elgin's Sustainability Commission and Hawthorne Hill Nature Center to establish a Mighty Acorns program on the Hawthorne Hill site. The Mighty Acorns program introduces 4th through 6th grade students to nature and conservation

[50] www.mchenryswcd.org

stewardship. The program fulfills state requirements for school science curriculum. The students will receive classroom instruction as well as participate in restoration activities at Hawthorne Hill. This is a model that can be implemented at sites within the Jelkes Creek watershed.

- Speakers Bureau - TCF has a Speakers Bureau and staff is frequently invited to speak about watershed protection activities. Topics include watershed status and issues, storm water management and detention ponds, riparian restoration, citizen programs such as the River Sweep and storm drain stenciling, rain gardens, environmentally friendly practices, Conservation @ Home, and use of native landscaping. Audiences include service clubs such as Rotary, and Kiwanis, garden clubs, homeowner associations, churches, retirement communities, and school ecology clubs.

For more information please visit the TCF website.[51]

3.4.2 MESSAGES FOR AN EDUCATION AND INFORMATION CAMPAIGN

When educating the public, it is important to consider the message that the Watershed Coalition wants to convey. Well-crafted education pieces will provide the public with concise information focusing on a central issue facing the watershed. Once the issue is determined, the Watershed Coalition should stress a few main ideas the public needs to know in order to take action or change their behavior.

As part of the education survey, stakeholders were asked to rank the threats to the watershed are most important to address through education efforts. The responses of those who responded to the survey the ranking of the concerns are provided in Table 3-1.

Figure 3-23. Accumulated sediment and debris at storm drain inlet marked "Dump No Waste; Drains to River."

Table 3-1. Ranking Stakeholder Concerns

Ranking	Concern
1-Tie	Runoff from streets and parking lots
1-Tie	Sediment laden runoff from construction activities
2	Streambank erosion
3	Physical habitat alterations
4	Lack of green infrastructure/appropriate ordinances
5	Nutrient loading from agricultural land
6	Fertilizers and pesticides from residential and commercial area

The issues above can be used as a starting point to tailor the message of education and information efforts for the watershed with top priorities being addressed first. The audience that receiving the message should also be kept in mind. For instance, a simple message for homeowners to address runoff from streets and parking lots would be to keep their cars tuned up so that they do not leak oil. If municipal/ elected officials are the target, information could address how retrofit Best Management practices can address runoff.

[51] www.theconservationfoundation.org

Target Audience

There are a number of different audiences within the Jelkes-Creek Fox River Watershed that should be targeted through education and information efforts. These audiences will receive information differently and through different mechanisms. The education survey asked stakeholders which audiences were most in need of education about watershed issues. Forty-seven percent of the people who responded chose homeowners as the audience to target followed by municipal and elected officials, businesses and youth in schools, scouts and youth groups.

Figure 3-24. Community events reach a diverse audience. (*Source:* Dundee Township)

Homeowners

Homeowners are usually unaware of what a watershed is let alone the impact they have on non-point source pollution within the watershed. In order to gain support and effect change within the watershed it will be essential to raise awareness in this audience.

Regardless of the message they want to deliver, the Watershed Coalition should look to partner agencies for existing information to reach homeowners. Many of these organizations and agencies have already created brochures, newsletter articles and Public Service Announcements to reach this group. The Watershed Coalition may be able to utilize existing education and simply incorporate their specific message. Information in Spanish should also be sought out to reach the large bi-lingual population. Below is a table (Table 3-2) listing the top strategies stakeholders choose to reach homeowners along with agencies and organization that can assist the watershed group.

Table 3-2. Strategies for Reaching Homeowners

Activity	Program/Information Provided	Agency/ Organization
Speakers at Neighborhood/ Homeowners Association Meetings	Conservation practices such as rain gardens and streambank stabilization	KDSWCD
	Stream ecology, water quality	FOFR
	Conservation@Home, ecological management, detention ponds, stormwater management, citizen programs, use of native landscaping	TCF
	Presentations available upon request	FPDKC
Informational Brochures	Nonpoint Source Outreach Toolbox- searchable database of topics such as lawn care, motor vehicle care and stormwater awareness http://cfpub.epa.gov/npstbx/index.html	USEPA
	Living on the Fox River http://www.kanedupageswcd.org/pdfs/Brochures/Riverfront.pdf *Rain Gardens* (poster) http://foxriverecosystem.org/pdfs/RainGardens/raingardenposter.pdf	FREP
	Welcome to your Watershed http://www.friendsofthefoxriver.org/media/docs/welcometoyourwatershed.pdf *Five Ways You Can Help Protect Water Quality in the Fox River* http://www.friendsofthefoxriver.org/media/docs/five-ways-you-can-help.pdf	FOFR

Table 3-2. Strategies for Reaching Homeowners (continued)

Activity	Program/Information Provided	Agency/ Organization
Informational Brochures	*Kane County Wants You to be a Clean Water Champion: Top Ten Things Streamside and Shoreline Property Owners can do to Protect Kane County Waters* http://www.co.kane.il.us/kcstorm/education/public/streamsideGPublicH.pdf	Kane County
	Native landscaping, rain gardens, butterfly gardens, invasive species management, landscape designers, ecological management companies	TCF
	Bill inserts on water conservation topics http://www.cmap.illinois.gov/water-2050/bill-inserts	CMAP
Information/ articles in community newsletter and newspapers	Articles related to stormwater pollution and prevention http://cleanwatermn.org/MS4-Toolkit/Public-Education-and-Outreach/Newsletter-articles.aspx	Minnesota Water
	Monthly column "The Nature of Things" by Valerie Blaine in the Daily Herald	FPDKC
	Native landscaping, environmentally friendly yard practices, using rain as a resource	TCF
Public Service Announcements on television and radio	Examples of PSAs for radio and TV http://cfpub.epa.gov/npstbx/index.html	USEPA
	Marketing department provides for forest preserves	FPDKC
	Native landscaping, environmentally-friendly yard practices, using rain as a resource	TCF

Municipal/Elected Officials

The second target audience the stakeholders want to focus on is municipal and elected officials. Contact with this group will be essential for the adoption of conservation ordinances and implementation of project recommendations as the watershed plan moves forward. As such it will be imperative that officials are aware of concerns and have the facts to make informed decisions. The Watershed Coalition should maintain an up-to-date database of municipal and elected officials so that they can be in constant contact with this group.

Figure 3-25. Workshops can be held to reach municipal officials

An information packet should be created for the Watershed Coalition to use any time they would like to meet with an official. This will help the Watershed Coalition target their message and will give the municipal official valuable information to refer to later. The packet could contain appropriate fact sheets, brochures any recent press releases, and a list planning team members.

Table 3-3 below list the ways the stakeholders prefer to reach municipal/elected officials and the organizations that can provide support.

Table 3-3. Strategies for Reaching Municipal/Elected Officials

Activity	Program/Information Provided	Agency/Organization
Presentations to boards	Stream ecology, water quality http://www.friendsofthefoxriver.org/	FOFR
	Native landscaping practices for municipal buildings, stormwater management, *Conservation@Home*, citizen programs such as river cleanups and storm drain stenciling	TCF
	NPDES Requirements Soil Erosion Sediment Control	KDSWCD
	Presentations available upon request	FPDKC
Workshops or symposiums	Effective use of chlorides, stream restoration BMPs , stormwater BMPs, construction BMPs/erosion control, good housekeeping/pollution prevention, illicit discharge detection and elimination	TCF
	Annual Conversations About Conservation with our Legislators	FREP
	A Healthy communities workshop series Offers workshops, forums and events throughout the year	Kane County Kane County Planning Cooperative
	NPDES Requirements Soil Erosion Sediment Control Regulations and BMPs	KDSWCD
White papers/brochures	Nonpoint source outreach toolbox- searchable database of topics such as lawn care, motor vehicle care and stormwater awareness- http://cfpub.epa.gov/npstbx/index.html	USEPA
	Brochures available on website http://www.friendsofthefoxriver.org/	FOFR
	Illicit discharge detection and elimination, coal tar sealants, effective use of chlorides, *Conservation@Home*, environmentally-friendly landscaping practices	TCF

Businesses

While local business may be the most difficult audience to reach, they can be important partners within the watershed. Stakeholders taking the education survey identified one-on-one meetings as the number one way to reach out to businesses. It will be the responsibility of the members of the Watershed Coalition to hold these meetings. Similar to outreach to municipal and elected officials, an informational packet should be created for this group. While the partnering agencies listed may not be available to meet one-on one with businesses, they can provide support materials and may help with crafting a message.

Table 3-4 below highlights the top ways to reach businesses according to the education survey along with agencies that may provide support. In addition the Watershed Coalition should consider creating a recognition program to recognize businesses in the watershed who take measures to prevent non-point source pollution. This would be a fairly easy program to implement and it would provide a public relations benefit both the Watershed Coalition and the business.

Table 3-4. Strategies for Reaching Businesses

Activity	Program/Information Provided	Agency/Organization
Workshops or symposiums	*Conservation@Work*, environmentally-friendly landscaping practices, effective use of chlorides	TCF
	Annual Conversations About Conservation with our Legislators	FREP
	A Healthy communities workshop series	Kane County
	Offers workshops, forums and events throughout the year	Kane County Planning Cooperative
	NPDES Requirements Soil Erosion Sediment Control Regulations and BMPs	KDSWCD
White papers/brochures	Nonpoint source outreach toolbox-searchable database of topics such as lawn care, motor vehicle care and stormwater awareness- http://cfpub.epa.gov/npstbx/index.html	USEPA
	Environmentally-friendly landscaping practices, effective use of chlorides, coal tar sealants, rainwater harvesting	TCF
	Brochures available on website	FOFR

Youth

Reaching youth through schools, scout groups, clubs and organizations is important because they are typically concerned about the environment and often bring what they learn home to their caretakers. There is a great deal of education geared towards youth already taking place within the watershed. The Watershed Coalition should work raise awareness of and support these programs.

Table 3-5 below lists the strategies for reaching youth as identified in the education survey along with the agencies and organizations that provide support.

Figure 3-26. Students participate in streambank restoration project

Table 3-5. Strategies for Reaching Youth

Activity	Program/Information Provided	Agency/Organization
Support school field trips to local natural areas	Illinois Biodiversity Field Trip Grant offers $500 per teacher to take nature related field trips http://www.dnr.state.il.us/education/entice/forms/ibftgapp06.pdf	Illinois Department of Natural Resources
	Field trip opportunities available upon request; email programs@kaneforest.com	Forest Preserve District of Kane County
	Field trip opportunities including fisheries tour	Max McGraw Wildlife Foundation
	Mighty Acorns	TCF
Involve students, clubs and organizations in watershed service projects	Storm drain stenciling	KDSWCD, Kane County
	Water quality monitoring River clean-ups	FOFR
	River clean-ups, storm drain stenciling, Mighty Acorns	TCF
	Natural area restoration	Max McGraw Wildlife Foundation
	Available upon request; contact the Volunteer Coordinator at volunteer@kaneforest.com	FPDKC
Curriculum support to schools	Local agencies have educators who can help teachers integrate watershed issues into their curriculum	KDSWCD, FOFR, TCF, Max McGraw Wildlife Foundation, KCFB, MLCSWCD, and FPDKC
Support outreach education/visiting speakers	*Wonderful Water, H2O on the Go, Who Dirtied the Water, and Groundwater: Our Hidden Treasure*	KDSWCD
	The Greatest Show of Earth, Hand-on watershed and erosion presentations	MLCSWCD
	FoxMap, presentations on local and international water quality issues	FOFR
	Ag in the Classroom, mAgic kits	KCFB
	Mighty Acorns	TCF
	Water quality	Max McGraw Wildlife Foundation
	Available upon request; programs@kaneforest.com	FPDKC

Education and Information for General Audiences

In addition to the ideas listed above, the education survey generated recommendations for education and information that will serve multiple audiences.

Website and Social Media

It will be essential for the watershed group to keep the website up-to date.[52] On the webpage current and prospective members will be able to view the plan, learn about activities taking place in the watershed and find out about past and future meetings.

In addition, a few responses from the education survey mentioned using social medial like Twitter and Facebook. This can be used as yet another way to reach out to new audiences and a way to share information on upcoming programs.

Provide a Field Experience

The best way to get people aware and excited about a resource is to give them the chance to experience. A number of the agencies/organizations listed in this section provide opportunities plan public events such as canoe trips, stream clean-ups and river monitoring. The watershed group can ask these agencies to hold such activities within the Jelkes-Creek Fox River Watershed. Further support for these activities can be provided by passing the information along to their mailing list.

Figure 3-27. Fishing is an important recreational activity in the watershed (*Source:* Bill Englund)

Community Events

Sponsoring a watershed wide community event is an excellent way to get raise awareness of watershed issues in all age groups and audiences. Municipal and elected officials can be invited to attend and partnership/sponsorship can be requested from local businesses. Planning for public events can be time and money intensive especially for a volunteer group. The Watershed Coalition should look for community events going on within the watershed and request a table. Simple display materials can be developed and members will have an opportunity to meet and distribute information to a broad group of people.

[52] Currently at http://www.kanedupageswcd.org/jelkes-creek.htm

4. Representative Project Recommendations

Figure 4-1. Naturalized Basin, Kimball Farms, Carpentersville (*Source:* David Poweleit)

As part of the watershed planning process, watershed stakeholders, including municipal representatives, were asked to submit to the Kane-DuPage Soil and Water Conservation District (KDSWCD) details on potential projects that could be implemented to improve water quality within the Jelkes Creek—Fox River watershed. The response to this request was impressive and as a result numerous opportunities were identified to implement projects throughout the watershed with the goal of improving water quality within the Jelkes Creek-Fox River watershed plan. In fact, the Villages of Algonquin and Carpentersville hired a consultant, Applied Ecological Services, to assist in the identification of water quality improvement projects within the portions of the watershed located in those municipalities. Copies of the two reports resulting from this effort are provided as part of Appendix E.[1] An extensive list of the projects identified during the watershed planning process for the entire study area is included in Appendix E.

Following the identification of potential projects throughout the watershed, a subset of projects were selected through consultation with the watershed stakeholders to serve as *representative* project recommendations for improving water quality within the Jelkes Creek-Fox River watershed. Identified projects other than those highlighted in this section are further discussed in Section 4.6.

Three broad categories of representative projects are included in this section:

- Retrofits to existing stormwater management infrastructure to address pollutant loading and increased runoff volume in developed areas;
- Stream channel and stream corridor restoration projects to stabilize eroding streambanks, restore the riparian corridor, improve water quality, and improve habitat for aquatic life; and
- Improved management practices on farmland to reduce nutrient and sediment runoff.

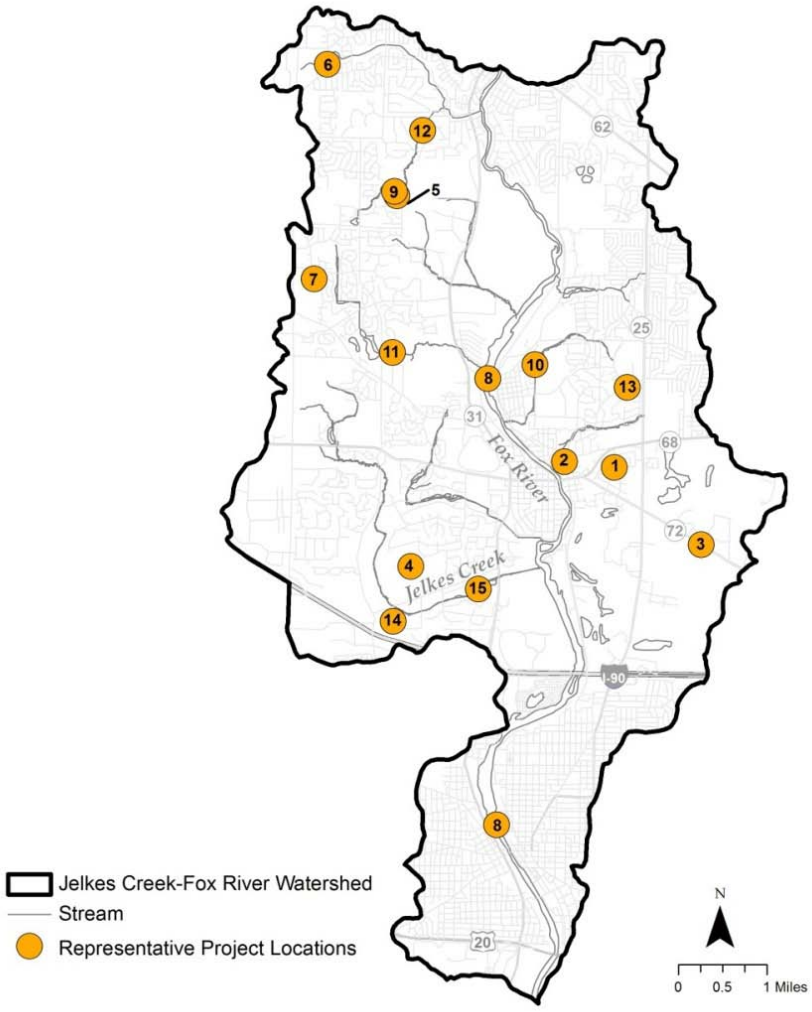
These projects should be seen as *examples* that stakeholders could utilize to conceptualize other similar projects within the watershed. The expectation is that any future identified projects which provide the water quality benefits similar to those included in Appendix E, would also be eligible for funding from the appropriate funding sources presented in Section 5.3 (e.g., the Illinois Environmental Protection Agency's 319 Program or the Illinois Green Infrastructure Grant Program for Stormwater Management).

The recommended projects discussed in this section were developed in consultation with the watershed stakeholders and potential project implementers. They were selected based on their representation of a range of potential projects that could be implemented to improve water quality within the watershed. As can be seen in the following sections, many of the recommended projects are located on public properties, and a public entity, such as a village or township, is identified as the project lead or champion. Projects on public properties generally have a higher likelihood of being implemented within a relatively short timeframe (i.e. five years). However, some of the projects that could be implemented are on private lands. This is in part because many types of projects (such as detention retrofits) are typically located on

[1] The reports prepared for the Villages of Algonquin and Carpentersville provide detailed information for each of the identified projects, including project descriptions, expected water quality benefits, relative prioritization, potential source of technical assistance and cost estimates.

private lands. Additionally, many of the projects are located in areas where, with proper signage, the general public can learn about the benefits of the projects. The locations of the representative projects included in this section are presented in Figure 4-2.

Figure 4-2.
Representative Project Locations



The number of projects described below within each of the watershed communities varies. These results should not be interpreted to mean that other project opportunities of similar character and benefit do not exist within these or other watershed communities (please see Appendix E for the list of projects identified). The compiled list is presented as a cross section of representative projects, it is not meant to be an exhaustive list.

The estimated project costs provided in this section are planning-level cost estimates only and do not necessarily account for all potential cost variables (including but not limited to a defined scope of work, excavation, access, utility conflicts, soil disposal, or other cost variables.). Project implementers will need to develop detailed cost estimates prior to undertaking any of the projects.

4.1 Urban Stormwater Infrastructure Retrofits

Figure 4-3. Raingarden (*Source:* David Poweleit)

Approximately 62 percent of the watershed that has already been developed is classified as "Urban" land. In the developed portion of the watershed, stormwater is generally routed directly from impervious surfaces to stormwater collection and conveyance systems with minimal water quality treatment or stormwater volume reductions. In more recently-developed portions of the watershed, stormwater detention has been incorporated into the sites. Consistent with current stormwater regulations, the primary goal of providing detention is to reduce the discharge rate of stormwater to decrease downstream flooding. However, the outflow volume from most detention basins remains higher than the pre-developed condition. The increased volume, coupled with the elevated flows from the basin during an extended drawdown period, is a major cause of increased stream bank erosion in urban streams. Additionally, the use of traditional detention basins does not address the environmental impacts (i.e. increased pollutant concentrations and runoff volume) of increased imperviousness. The urban retrofit projects are intended to provide examples of projects that should be implemented in urban areas to allow for improved pollutant removal or stormwater volume reductions.

Many of the project recommendations included here, and in the project list included in Appendix E, center on retrofit opportunities within the watershed. It is important to reiterate that incorporating best management practices (BMPs) into new construction is much more cost-effective and efficient than retrofitting existing systems. Site stormwater BMPs should be incorporated at the time of initial design and built during initial construction. This approach offers the most options from the palette of BMPs, providing the engineer more flexibility and more cost-effective solutions. However, current ordinances do not mandate the use of stormwater BMPs to specifically address the pollutants of concern in Jelkes Creek and the Fox River. For this reason, the short-term implementation plan focuses on retrofit opportunities within the watershed. The Vision and Policy section of this plan outlines opportunities to address policies that influence new development and redevelopment.

A variety of urban BMPs could be used throughout the watershed, many of which could provide multiple benefits. This plan proposes the installation of detention basin retrofits, bioretention, and vegetated swales as the primary retrofit practices.[2] Three objectives guided the identification of urban retrofit projects included in this plan:

- Manage stormwater at the source;
- Use plants and soil to absorb, slow, filter, and cleanse runoff; and
- Recommend stormwater facilities that are simple, cost-effective, and enhance community aesthetics.

[2] Stormwater BMPs are routinely grouped into categories based upon their unit processes. However, there is no set standard for grouping BMPs, nor should they be isolated into any single category when their use is evaluated. Individuals evaluating the use and applicability of BMPs should tailor the design to blend the benefits of various BMPs. For example, a vegetated swale (which provides settling and filtration of suspended solids by flowing through the surface vegetation) could be modified to include amended soil in the bottom of the swale along with check dams to improve infiltration and filtration through the soil media (which is a process more commonly associated with bioretention).

4.1.1 BIORETENTION

Bioretention areas, or rain gardens, are landscaped shallow depressions that store and filter stormwater runoff. These facilities normally consist of a ponding area, mulch layer, amended soils, and plantings. For areas with low permeability soils or steep slopes, bioretention areas can be designed with amended soils and an optional underdrain system that routes the treated runoff to the storm drain system rather than depending entirely on infiltration.

Bioretention areas function as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. Bioretention areas have a wide range of applications and can be easily incorporated into existing residential, commercial, and industrial areas. These facilities can also be used within roadway right-of-ways. Runoff from the site is typically conveyed in shallow engineered open conveyances, shallow pipes, curb cuts, or other innovative drainage structures. Where underlying soils have limited infiltration capacity, an underdrain should be included. Additional volume losses may be realized if the perforated pipe is placed above the bottom of the gravel drainage layer.

4.1.1.1 Lions Park Bioretention, East Dundee—Project Site No. 1

Lions Park is a turf grass recreational area that contains a ball field, parking lot, turf grass, and shallow depressional storage. Currently stormwater runoff is collected by perimeter curbs and gutters and is directed into curb inlets, where it is conveyed into the storm drain system. As depicted below (Figure 4-4), the presence of open space affords a bioretention retrofit opportunity. Runoff from the east is currently piped and discharged to the southeast park area. Surface runoff is also discharged from the north parking lot and ball field to the south along the east property boundary. Runoff ponding currently occurs in the southeast portion of Lions Park. With minor grading, a proposed outlet structure (depicted) could be installed to allow increased ponding and infiltration, while providing a controlled overflow route for larger storm events. Turf grasses could be converted to deep-rooted native plantings tolerant of occasional inundation. This would increase underlying soil and plant absorption of runoff resulting in a reduction in annual runoff volume. Additionally, existing soils could be excavated, amended, and/or replaced with aggregate materials to install a storage layer below the topsoil. This could substantially increase water retention capacity below the ground surface to improve infiltration. A vegetated swale could be installed along the east margin of Lions Park to facilitate the conveyance, storage, and infiltration of runoff from the north to the southeast bioretention area. The proposed project would consist of constructing an approximately 30,000 square foot bioretention cell and installing curb cuts. (Drywells and infiltration trenches may also be required.) The bioretention cell would service approximately 0.35 acres of tributary area, including not only vegetated open space but also the north parking lot. The estimated construction costs with engineering design and permitting fees range from $30,000 to $45,000 depending on the extent of soil amendments, infrastructure modification, and other factors. The Village of East Dundee would be the lead agency for this project.

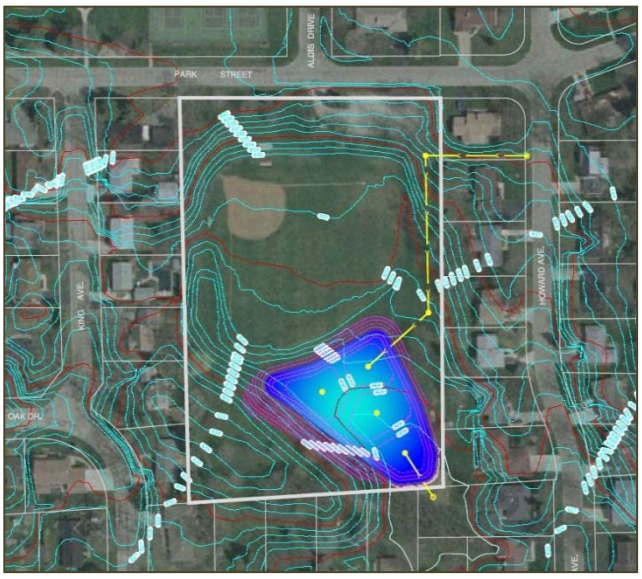


Figure 4-4. Potential bioretention project location in Lions Park, East Dundee.

4.1.1.2 Train Depot Rain Garden, Village of East Dundee—Project Site No. 2

The Village of East Dundee is undergoing a downtown revitalization planning effort. This affords a unique opportunity to retrofit the existing train depot area (Figure 4-5). Currently runoff from the rooftop is either piped to the street curb and gutter drainage system or discharged across turf grass into a curb and gutter drainage system along side streets. A rain garden could be constructed within open space adjacent to the train depot. Runoff from paved surfaces at this visitor's attraction, as well as runoff from the rooftop would be diverted into an aesthetically attractive rain garden containing deep-rooted native plants. Water would enter the rain garden from rooftop downspouts directed underground into the rain garden. The surrounding turf grass open space could be gently graded to divert runoff into the rain garden. An underdrain system could be installed and connected to the existing catch basin.

Figure 4-5. Potential location of rain garden at Train Depot in East Dundee. This rain garden would treat and store runoff from the rooftop and adjacent paved areas.

The proposed project consists of constructing an approximately 2,000 square foot rain garden / bioretention cell, extending gutter downspouts to divert them toward the rain garden, and installing an underdrain system with a raised outlet structure. Other potential retrofits include the use of roof runoff collection systems, such as cisterns. The bioretention cell would service approximately 0.25 acres of tributary area, which primarily consists of the train depot rooftop and adjacent park area. The location would offer a unique opportunity to educate downtown visitors and residents about stormwater BMPs that improve environmental quality within an urbanized area. The estimated construction costs with engineering design and permitting fees range from $10,000 to $18,000. The project lead would be the Village of East Dundee.

4.1.2 VEGETATED SWALE (CONVEYANCE) RETROFITS

Vegetated swales are shallow, open conveyance channels with low-lying vegetation covering the side slopes and bottom that collect and slowly convey runoff through the vegetated bottom to downstream discharge points. Swales remove stormwater pollutants by filtering flows through vegetation (usually grasses) and by allowing suspended pollutants to settle due to the shallow flow depths and slow velocities in the swale. Biochemical processes also provide treatment of dissolved constituents. Vegetated swales can also provide effective volume reduction through infiltration and evapotranspiration processes. An effective vegetated swale achieves uniform sheet flow through a densely vegetated area for a period of at least 10 minutes. The vegetation in the swale can vary depending on its location within a development project, is the choice of the designer, and is based upon the relevant functional criteria for the project. When appropriate, swales that are integrated within a project may use turf or other more intensive landscaping, while swales that are located on the project perimeter, within a park, or close to an open space area are encouraged to be planted with a more naturalistic plant palette.

Swales have a wide range of applications and can be used in residential, commercial, and industrial areas as well as treatment for linear projects such as roadways. A vegetated swale can be designed either on-line or off-line. On-line vegetated swales are used for conveying high flows as well as providing treatment of the water quality design flow rate, and can replace curbs, gutters, and storm drain systems. Off-line swales are the preferred practice, but in densely developed areas off-line swales may not always be feasible. In this case, limiting drainage areas and periodically providing outlets along the length of the swale to prevent the accumulation of excessive flows from inputs along the swale can improve the performance of on-line swales. Check dams are also recommended where longitudinal slopes exceed six percent. Check dams enhance sediment removal by causing stormwater to pond, allowing coarse sediment to settle out.

4.1.2.1 Illinois Route 72 Median Vegetated Swale, Village of East Dundee—Project Site No. 3

The Illinois Route 72 highway through East Dundee receives over 50,000 motorists per day. The median of the highway is currently turf grass (Figure 4-6). The vegetation has become degraded by road salts, heavy metals, and impacts from other pollutants. There is an opportunity to convert the median of Route 72 between Christina Drive and Commonwealth Drive in East Dundee, a 4,000 linear foot length of roadway, into an established vegetated swale with deep-rooted native plantings. This BMP would allow runoff to infiltrate through vegetation and underlying soils prior to discharge to downstream areas. As an option, rock checks could be added to attenuate flow velocities and promote infiltration during modest rainfall events. Alternatively, underlying soils could be excavated and coarse aggregate materials installed below topsoil to allow for increase subsurface storage of road runoff to improve infiltration. Plantings tolerant of expected road salt loadings would be selected. Due to the extremely high level of motorist traffic, project signage has the potential to educate thousands of passersby daily.

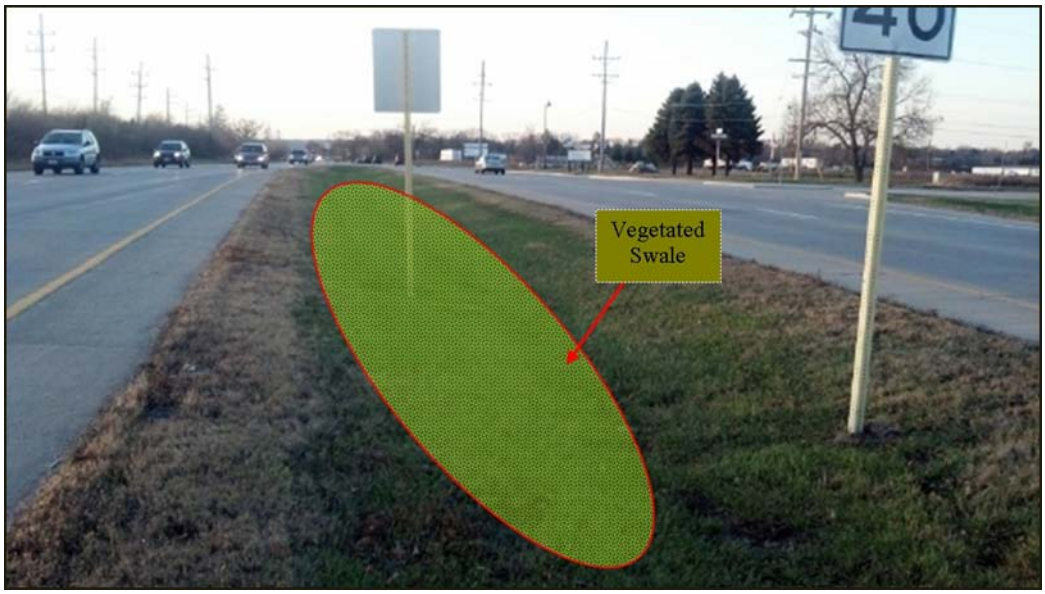


Figure 4-6. Potential location of Illinois Route 72 Median Vegetated Swale, Village of East Dundee.

The total length of vegetated swale along Rt. 72 between Christina Drive and Commonwealth Drive is approximately 4,000 linear feet. The vegetated swale surface area would be approximately 1.3 acres in size. Six (6) small rock checks would be constructed to improve flow attenuation and infiltration. The swale has an estimated tributary area of at least 5 acres of roadway surfaces plus median green space. The estimated construction costs with design fees range from $18,000 to $25,000. Costs would increase if additional rock checks are included or underlying soils are amended. Since this would be proposed to be constructed within existing highway right of way, both the Illinois Department of Transportation (IDOT) and the Village of East Dundee would co-lead implementation of this project.

4.1.2.1 Jelke Creek Bird Sanctuary Swale / Gully Stabilization, Dundee Township—Project Site No. 4

The Jelke Creek Bird Sanctuary is the location of a 150-acre restoration project completed by Dundee Township in 2009. The Project Site is located near Jelke Creek, north of Boncosky Road and east of Sleepy Hollow Road. Although restoration measures throughout the project site have been successful, a few areas have been identified that would benefit from installation of vegetated swales with gully stabilization and rock checks (Figure 4-7).

Figure 4-7. Although wattles were installed along a steep slope area, undercutting has continued to occur. It is recommended that rock checks be installed along existing gullies. In addition, a small berm could be constructed upstream of the gullies to store runoff and provide a potential mesic prairie / wetland restoration area. This would reduce runoff discharged to downstream areas and reduce potential gully erosion.

The eroding hillside area has a vertical drop of approximately 20 feet, with a slope approaching 7% or more. The drainage area flowing to the hillside is approximately 3 acres in area. Wattles were previously installed

along the eroding hillside area; however, due to the volume of runoff, wattles were undermined. Therefore, rock checks are recommended for long-term stabilization (Figure 4-8). In addition, a small two-foot tall berm with a rock-lined overflow spillway should be constructed upstream of the gullies and parallel to the topographic contours of the hillslope area. This would attenuate peak runoff flows prior to discharge down the hillslope area. The storage area would provide for a potential mesic prairie / wetland restoration area. This would increase infiltration of runoff, and reduce the volume runoff discharged to downstream areas and reduce potential gully erosion.

Figure 4-8. An example of rock checks previously installed elsewhere at the Jelke Bird Sanctuary along with a vegetated swale stabilized by native plantings. This approach could be used to stabilize eroding gullies and hillslopes in other portions of the project site.

It is estimated that the cost to install 20 small rock checks along three side-by-side eroding gullies each 150 feet long, to install a single vegetated swale, to construct a berm to create approximately 0.5 acres of a mesic\wetland area upstream of the gullies, and to construct a rock-lined overflow spillway would cost between $38,000 and $48,000.

4.1.3 DETENTION BASIN RETROFITS

A myriad of detention basins have been constructed throughout the watershed, particularly in the central and northern portions of the watershed that were developed more recently. Both dry and wet detention facilities are common. Dry basins were typically vegetated with turf grass and designed to drain completely after storm events. Dry basins also commonly have low flow channels that route flows from basin inlets to the basin outlet with little or no water quality treatment. A common dry detention basin retrofit to enhance water quality is to modify the design to incorporate sections of wetland vegetation. Wetland type detention basins typically include components such as an inlet with energy dissipation structures, a sediment forebay to settle out coarse solids and to facilitate maintenance, perimeter areas with shallow sections (0 to 2 feet deep) planted with wetland vegetation, deeper areas or micro pools (3 to 5 feet deep), and a two stage outlet structure to improve water quality treatment. Meandering swales can also be incorporated into the basins to increase the residence time during low flow conditions.

Figure 4-9. Traditional Wet Detention Basin with Canada Geese and Bank Erosion (*Source:* David Poweleit)

The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of wetland basin designs. Detention basin wetlands are generally designed as plug flow systems in which the water already present in

the permanent pool is displaced by incoming flows with minimal mixing and no short circuiting. Plug flow describes the hypothetical condition of stormwater moving through the wetland in such a way that older slugs of water (meaning discreet volumes of water that have been in the wetland a longer duration) are displaced by incoming slugs of water. This concept assumes there is little or no mixing of slugs in the direction of flow. Short circuiting occurs when quiescent areas or dead zones develop in the wetland where pockets of water remain stagnant, causing other volumes to bypass using shorter flow paths through the basin (e.g., incoming stormwater slugs bypass these dead zones).

Enhancements that maximize residence time, aid in trapping and uptake of pollutants or assist with volume reduction are the main categories of enhancements available for wetland basins. Water quality benefits can be improved with a larger permanent pool, shallower depths, and denser vegetation. Wetland vegetation with known pollutant uptake potential may also enhance wetland performance. Outlet controls may be used to seasonally change wet pool depths and flow rates through the system to increase residence time. Extended detention flow control may also be integrated into the design to improve peak flow reductions.

4.1.3.1 White Chapel Detention Basin Retrofit, Algonquin —Project Site No. 5

The White Chapel Detention basin is a 1.7-acre area that contains a degraded wetland bottom with side slopes planted in turf grass (Figure 4-10). Soils in the vicinity are relatively permeable. Unique habitats such as a fen occur to the north, adjacent to the basin. However, due in part to the presence of turf grass the side slopes do not adequately allow runoff to infiltrate into the permeable soils. As a result, runoff is more quickly discharged into the bottom of the basin where it collects. The degraded bottom is filled with invasive species that impede flow and interfere with infiltration. After leaving the central wetland, runoff is discharged north into the fen and then into Dixie Creek. The facility receives urban runoff from the adjacent subdivision area. The basin is currently maintained by the Village of Algonquin. It is recommended to convert side slopes from turf grass to native plantings and to re-establish the wetland bottom with desirable species of wetland plants and wet mesic prairie. This would allow more runoff to be intercepted, infiltrated, and stored within the detention basin facility. Moreover, polluted runoff would be more effectively filtered before it leaves the basin. The inlet area should be excavated to provide a sediment forebay micropool. The proposed basin retrofit would improve water quality and serve to protect the quality of downstream waters including the fen. The estimated design and construction costs range from $18,000 to $25,000. The Village of Algonquin would serve as the lead agency for the project.

Figure 4-10. White Chapel Detention Basin Retrofit, Algonquin

4.1.3.2 High Hill Detention Basin Retrofit Basin, Algonquin—Project Site No. 6

The High Hill Detention Basin is a 2.75-acre dry bottom detention basin (Figure 4-11). As such, it provides minimal water quality benefits that could otherwise occur by storing and treating runoff over long periods of time. The basin is planted in turf grass, which is undesirable from a water quality perspective. Turf grass has a shallow root system, requires frequent mowing which results in grass clippings, and potentially involves chemical applications to maintain appearance. This detention facility is located adjacent to the headwaters of Ratt Creek. The detention basin is maintained by a private homeowners association (HOA). It is possible that this basin could be acquired by the Village of Algonquin. In the past, the Village has acquired and assumed maintenance for several other storage basins in the municipality. The Village has taken a proactive leadership role in converting traditional basins into naturalized areas which can improve water quality and adjacent habitat.

Figure 4-11. High Hill Detention Basin Retrofit Basin, Algonquin (Source: Village of Algonquin report prepared by AES)

There are several water quality improvements that should be made to this basin. The recommended retrofit includes construction of a sediment forebay pocket to filter and detain pollutants such as sediment at the upstream inlet area. Other pockets of the basin should be altered through shallow excavation to create wetland pools as well as to maximize the length of the water flow path through the basin. A meandering swale could be constructed through the facility to carry low flows through a sinuous, maximum flow path length. A blend of native wetland and prairie communities would be established within the basin. This would provide an improvement to the water quality performance of the basin as well as providing habitat within the watershed. The estimated project costs with engineering design and permitting ranges from $30,000 to $40,000 owing in part to the recommended earthwork modifications. The private HOA could be a project lead. Alternatively, the Village of Algonquin may acquire this parcel in the future. If that occurs, the Village would be the lead implementer.

4.1.3.3 Kimball Farms Detention Basin # 1 Retrofit, Carpentersville—Project Site No. 7

The Kimball Farms Detention Basin # 1 is an 8-acre basin located south of Grandview Drive, east of Randall Road. This is currently a conventional wet bottom basin with turf grass side slopes. This is one of several detention basins within the large Kimball Farms subdivision. Basin # 1 consists of one large and one small basin (Figure 4-12). For low flow, the two basins are connected via an underground storm sewer pipe. During significant floods, the overflow is conveyed between the basins through a 500-foot long turf grass swale to the south (Figure 4-13). Within the basins, the turf side slopes do not adequately stabilize the steep basin side slopes adjacent to the open water. This along with a large wind fetch owing to the east basin's configuration has contributed to moderate shoreline erosion along approximately 30% of the basin shoreline. The detention basin is owned by a private homeowners association (HOA), but the HOA has expressed interest in retrofitting the basin.

Figure 4-12. Kimball Farms Detention Basin # 1 contains a large east basin and a small west basin that are separated by an overland flow swale to the south. The east basin also contains a substantial area of shoreline that is eroding.

The proposed retrofit includes constructing a rock-lined sediment forebay at the primary storm sewer inlets. The rock would be installed and built up over existing pond bottom grades. The top of rock would be flush with the normal water elevation. This configuration would create an isolated pool to trap inflowing sediment and facilitate sediment removal. The basin side slopes could be converted from turf grass into deep-rooted native vegetation. Moderately eroding shorelines could be stabilized with coir logs along with minor bank re-shaping. Native vegetation would be installed to provide a deep root structure to stabilize the shoreline and minimize future erosion. The vegetated swale that interconnects the two basins could be retrofitted by installing native plant materials (Figure 4-10). This swale could also be further retrofitted by installing an aggregate subgrade. This would improve subsurface storage and infiltration of runoff along the swale, storing and filtering runoff from adjacent rooftops, and side yards. The basin serves as runoff control for approximately 40 acres of drainage area. The estimated project costs including engineering design and permitting are estimated at $80,000 to $110,000 for 4 acres of native plant seeding, 900 linear feet of coir log installation, and construction of a 500-foot long bioswale connecting the two basins. The private HOA would be the project lead.

Figure 4-13. The existing 500-foot long swale between the two basins could be retrofitted by installing native plants and/or constructing an aggregate underdrain storage system. This would absorb and infiltrate polluted runoff from adjacent rooftops and side yards. (*Source*: Village of Carpentersville report prepared by AES)

4.2 Stream Channel and Riparian Corridor Restoration

Based on the findings of the watershed assessment and potential projects submitted by watershed stakeholders during the development of this plan, numerous opportunities were identified for stream channel and riparian corridor restoration projects.

4.2.1 DAM MODIFICATION

Dams can significantly alter the physical, chemical and biological characteristics of a stream. The effects of dams on the stream corridor often include barriers to fish passage, disruption of in-stream sediment transport processes, accumulation of sediment and associated pollutants (e.g., various metals, phosphorus, etc.) in the dam impoundments, changes in water temperature, and highly variable dissolved oxygen levels creating adverse conditions for aquatic organisms adapted to flowing conditions. Additionally, the original use of the dam may no longer be necessary; however, the current owners retain the responsibility for maintenance of the structures and the associated liability. Dams can also present a safety hazard to recreational users of the stream, including paddlers.

Dam modification projects are often complicated, long-term projects that require extensive collaboration between the landowner, permitting agencies, the general public, and other stakeholders. This collaboration is necessary to balance project goals and project costs. As such, it is not the intent of this plan to suggest specific project details for dam modification projects, but rather is to provide an overarching recommendation for the modification of dams to improve and restore Jelkes Creek and the Fox River.

Several dam modification options exist and should be considered during the project planning process. These options include ramping, or bridging, the dam; complete dam removal; partial removal or breaching; or a combination of these options. Considerations for dam modification projects include management of the accumulated sediment behind the dam, fish passage and other habitat improvement opportunities, effects on downstream flooding, riparian corridor restoration, and improvements for recreational use.

Although funding assistance may not be readily available for the dam owners to perform regular dam maintenance activities, several of the potential funding sources identified in Section 5.3., such as ILLINOIS EPA Section 319 funds, can be used for projects that provide water quality and habitat benefits.

4.2.1.1 City of Elgin and/or Village of Carpentersville Dam Modification Study—Project Site No. 8

Currently, there are no plans to remove existing major dams on the Fox River. As noted in Section 2, two such dams are located entirely within the Jelkes Creek-Fox River watershed. These are the Elgin and Carpentersville Dams. A third dam, the Algonquin Dam, is located at the upper boundary of the watershed. It is recommended that a study be initiated to evaluate the extent to which these types of dams be considered for modification to the extent practicable to improve water quality along the Fox River.

Both the Elgin Dam (Figure 4-14) and the Carpentersville Dam (Figure 4-15) span the entire width of the Fox River. The impoundment

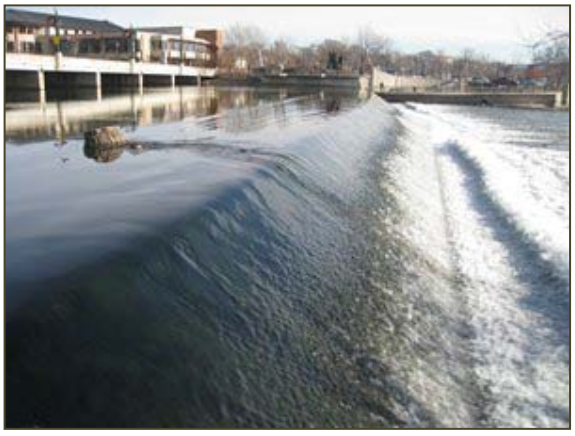


Figure 4-14. Elgin Dam across the Fox River.

upstream of each dam continues for hundreds of feet, altering water quality and ecological conditions. Fish passage is

impeded. The recommendation for this site is that a dam modification project be evaluated and undertaken to restore the natural functions of this section of the Fox River, including fish

passage, sediment transport, and water quality improvements. The planning for the project will require detailed evaluation of the methods (i.e. ramping, partial removal, or complete removal), or combination of methods, necessary to meet the goals and objectives of project stakeholders, most importantly those of the City of Elgin and the Village of Carpentersville. An important consideration for the project should be the management of the sediment within the dam impoundment.

Figure 4-15. Carpentersville dam across the Fox River. (*Source:* Jim Cudney)

The determination of costs associated with this project will require a detailed understanding of project conditions and constraints and an evaluation of the options for dam modification. For reference, planning level cost estimates for modifications to a similar size dam in DuPage County are $800,000 to $1,000,000 for ramping the dam and $300,000 to $600,000 for partial dam removal, including design and permitting costs for both project options.[3] As reference for a project that combined dam modification approaches, the 2005-2006 South Batavia Dam Removal Project in Kane County included the complete removal of one concrete spillway and the lowering of another spillway for sediment management purposes. The cost for this project was approximately $1,200,000 for construction and $250,000 for design and permitting.[4]

The recommendation presented here is that a Dam Modification Study be conducted for at least two dams for a cost ranging between $80,000 and $100,000. Given the inherent complexities associated with a project of the nature and scale, the realistic expectation is that the preliminary planning and evaluation for this project could occur within the timeframe of this short-term implementation plan (i.e. five years) and that the implementation of the project would occur within approximately five to 10 years. The planning stage for this project would likely be initiated through the development and facilitation of a project-specific stakeholder group comprised of residents and technical resource agencies.

[3] DuPage River Salt Creek Workgroup. 2009. *Stream Dissolved Oxygen Improvement Feasibility Study for Salt Creek*. Prepared by HDR Engineering, Inc., Huff and Huff, Inc. and Inter-Fluve, Inc. Cost estimates from Graue Mill Dam.

[4] Personal communication with Drew Ullberg, Kane County Forest Preserve District.

4.2.2 STREAM CHANNEL PROTECTION

As noted in Section 2.4.1.1, the Rapid Assessment, Point Method (RAP-M) study conducted by the USDA NRCS and the KDSWCD indicated that approximately

23 percent of the sediment loads in the Jelkes Creek-Fox River watershed are due to stream bank erosion. As such, many of the potential projects submitted by the watershed stakeholders are aimed at addressing stream bank erosion. The following project recommendations are presented as a limited subset of examples of improvements that could occur at sites across the watershed requiring stream channel protection.

Figure 4-16. Carpenter Creek Stream Stabilization

Channel erosion included portions of the stream channels with variable degrees of stream bank erosion, ranging from moderate to severe. Channel downcutting is also occurring in many degraded areas. These eroding streams can be a significant source of sediment as well as sediment-bound nutrients. Eroding stream banks and downcutting channels can also detrimentally affect property and infrastructure. Remedial actions to address channel stability concerns require a detailed understanding of the processes causing the channel instability. For example, an exposed stream bank may be the result of bank erosion by stream flows or may be caused by downcutting of the stream channel and subsequent slumping of the stream bank. Remedial actions need to account for the severity of the channel instability. Moderate cases of stream bank instability may be addressed through relatively simple methods, including minor grading and establishment of deep-rooted vegetation as opposed to mowed turf grass. Areas with severe erosion will typically require more involved evaluation and remedies.

4.2.2.1 Dixie Creek Reach # 3 Stabilization, Algonquin—Project Site No. 9

Evidence of severe stream bank erosion was observed along a 1,500 linear foot area known as Dixie Creek Reach #3, between Wynnefield Road and Nottinghill Court, in the Village of Algonquin. Examples of severe erosion include 8-ft tall banks with 1:1 (H:V) or steeper slopes that are unvegetated. As a result of the erosion, sediment plume flow downstream during flood events. Debris jams occur within the stream channel due to the loss of soils supporting streamside vegetation (Figure 4-17). Erosion also occurs directly upstream of a segment of Dixie Creek within the Dixie Briggs-Fromm Preserve restored by Dundee Township in 2008 (Figures 4-18 and 4-19).

Figure 4-17. Side slopes of Dixie Creek Reach # 3 have subsided, and washed out streamside vegetation often accumulates in debris jams within the channel. (*Source*: Village of Algonquin report prepared by AES)

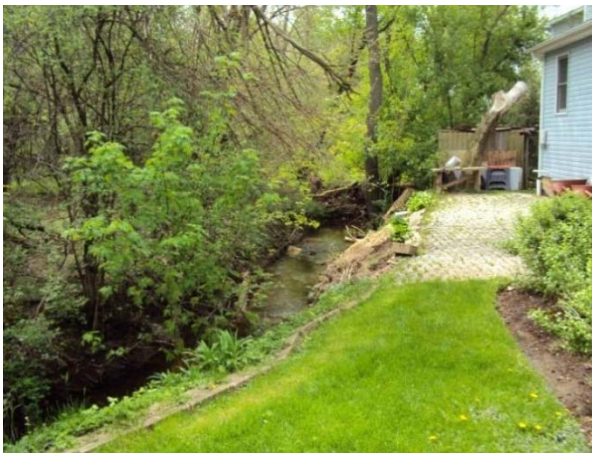
Recommendations include stabilization and restoration practices used at the nearby downstream Dixie Creek Restoration Project completed by Dundee Township in 2008 at the Dixie Briggs-Fromm Preserve. For instance, grade control with riffle structures can be used to restore downcutting channels. Riffles not only increases dissolved oxygen levels, but also reduce adjacent bank erosion. Bank stabilization can occur with a combination of bank re-grading, vegetated geogrid (where necessary), native plantings, rock toe, tree rootballs, and/or other measures as depicted in the photos below. We would caution against extensive use of coir logs in moderate or severely eroded areas due to the temporary nature of this treatment practice, and the magnitude of erosive forces occurring along the stream channel.

Figures 4-18 and 4-19. Example stream restoration at Dixie Briggs-Fromm Preserve just downstream of Dixie Creek Reach #3. Before (left) and after (right) photos illustrate the implementation of stabilization and restoration practices such as rock riffle structures, selected placement of large woody debris, rock toe, tree rootballs, vegetated geogrid lifts along the bank, and native plantings to implement stream stabilization. These types of practices are also recommended for consideration for severely eroding areas of Dixie Creek Reach 3, immediately upstream of this depicted site (*Source*: Living Waters Consultants).

For planning purposes, it is estimated that at 1,500 long reach of Dixie Creek Reach 3 could be stabilized for between $325,000 and $375,000 depending on the types of practices used. It is expected that the Village of Algonquin would lead this project.

4.2.2.2 Carpenter Creek Reach # 2, Carpentersville—Project Site No. 10

Evidence of severe stream bank erosion was observed along Carpenter Creek Reach 2, east of Sedgwick Street, in the Village of Carpentersville (Figures 4-20 and 4-21). The stream reach is over 1,800 linear feet long, and it contains highly eroded banks typically 5 feet in height. Lateral channel migration has been rapid, and has threatened adjacent residential structures. The Village of Carpentersville strongly desires to improve and stabilize the stream banks along Carpenter Creek including possible channel relocation in areas adjacent to existing residential structures. This will not only improve stream bank stability and protection of residential structures, it will enhance water quality in the watershed by reducing the sediment load as indicated in the RAP-M study. In addition, the Village also desires to improve the channel conveyance and floodplain storage along a portion of this reach to potentially remove multiple structures from floodplain to provide multiple benefits from the projects' implementation. The Village is currently completing its Phase I study for Carpenter Creek. The minimum recommendation for this project is to stabilize the stream channel to halt continued severe bank erosion in order to protect adjacent structures. In addition, a nearby dry-bottom detention basin should be retrofitted by installing native vegetation.



Figures 4-20 and 4-21. Severe lateral bank migration (left) illustrates a layer of cobble materials deposited after the bank has retreated. Photo at right depicts encroachment and impacts to adjacent residential structures in Carpenter Creek Reach # 2. (*Source*: Village of Carpentersville report prepared by AES)

Given the presence of residential structures adjacent to eroding areas, bioengineering (re-grading, plantings, erosion blanket) alone will likely not be adequate to address stream bank erosion without some form of structural support. Stream stabilization may not only require rock riffle structures (elevations of riffles should be carefully evaluated to prevent flood impacts), but also rock toe, vegetated geogrid, and/or other measures especially where the stream has encroached adjacent built structures. The Village of Carpentersville is considering shifting the entire migrating stream channel away from existing residential structures. In the event that a detailed study has not yet been prepared for the channel relocation project, another option instead of channel relocation may be that consideration be given to over-excavate the inside bank (opposite the residential structures) to construct a two-stage floodplain channel (Figure 4-22). This would better protect structures as well as provide increased flood storage. As a complementary element, wetland filtration areas could be constructed within the two-stage channel. The excavated channel should be vegetated with native plantings. This approach would increase runoff storage and improve filtration of pollutants. It is also recommended that biotechnical slope stabilization measures be considered for implementation along with rock riffle grade control structures where practicable.

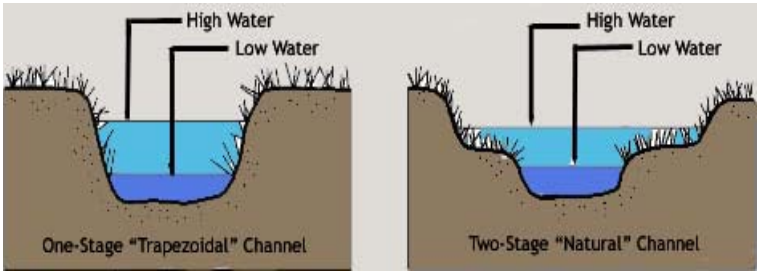


Figure 4-22. Example conversion of a trapezoidal stream channel into a two-stage floodplain channel. This condition alleviates erosive forces on the outside bank. (*Source*: OSU.)

Due in part to access limitations and the presence of existing structures, as well as a potential goal to construct a two-stage stream channel for water quality improvement, the cost per linear foot for stream stabilization in this reach is higher than average. The estimate costs for implementation of stream stabilization would be approximately $550,000 to $700,000, including design, permitting, and construction oversight. The Village of Carpentersville would be the lead for this project.

4.2.2.3 Shaw Creek (Four Winds Way) Stabilization, Dundee Township—Project Site No. 11

Severe stream erosion and aggradation also occurs over much of Shaw Creek (Four Winds Way Creek). Part of Shaw Creek is located between Sleepy Hollow Road and Raceway Woods (Figures 4-23 and 4-24). This 1,800 linear foot stream corridor is primarily owned by Dundee Township but two private landowners also own a portion of the stream channel. The stream channel is fed from discharge of a reservoir located west of Sleepy Hollow Road. The channel slope of Shaw Creek is relatively steep for northeastern Illinois, at approximately 2%. Therefore, the site is highly susceptible to erosion. Erosion along this stream corridor is so severe that past attempts to stabilize the channel have washed out, such as during the 2008 flood events. Channel downcutting is also extensive.

Figure 4-23. Channel downcutting and bank widening at Shaw Creek. Downcutting or vertical lowering of the stream channel is detrimental because it not only can increase bank heights and render them more unstable, but is can also contribute to undermining of the over-steepened bank, increasing erosion.

Figure 4-24. Severe aggradation on Shaw Creek is evidenced by large accumulations of unvegetated bedload material deposits from upstream eroded banks. Aggradation is an unbalanced condition. It can contribute to re-routing of the stream channel, increasing bank erosion in newly-formed channel areas.

Recommendations for Shaw Creek include at a minimum, installation of at least 25 grade structures to reduce channel downcutting and allow a stable channel elevation to become established. Banks could be re-graded where practicable to enhance stabilization of the riparian corridor. Two downstream culverts below a private gravel road near the downstream end of the project site should be replaced since at present, the undersized culverts contribute to road overtopping during flood events. Overtopping of the road is harmful because of the increased erosion at the roadway and the deposition of this material in the channel.

Figure 4-25. An example of riffle restoration which could be used to enhance and improve eroded areas along Shaw Creek. Riffle structures can increase dissolved oxygen levels, protect bank stability, and allow for balanced sediment transport through the stream corridor.

It is projected that stream stabilization costs including engineering for Shaw Creek could range from $290,000 to $360,000 for installation of 25 grade control structures, selected installation of rock toe, bank re-grading, and replacement of the two downstream culvert structures. Dundee Township would be the lead for this project.

4.2.3 STREAM AND/OR WETLAND RESTORATION

Based on the findings of the watershed assessment and input from watershed stakeholders several opportunities for stream and wetland restoration were identified within the watershed. It should be noted here that in addition to grant funding opportunities, wetland mitigation funds from regulated wetland impacts in other portions of the watershed may be a viable funding source for these projects.

4.2.3.1 Ratt Creek Reach # 5 / Fields Property, Algonquin—Project Site No. 12

The Village of Algonquin has identified a potential land acquisition at the Fields Property along Ratt Creek Reach # 5 (Note: Ratt Creek identified by Algonquin in this vicinity is the same channel referred to as Dixie Creek elsewhere in this report). If this were acquired, it would allow for an extensive stream and wetland restoration opportunity. Dixie Creek flows through municipal or township-owned parcels over much of its course, except for the section on the Fields property. The Fields property contains approximately 2,000 linear feet of Dixie Creek. The Ratt Creek Tributary is immediately north (downstream) of this project site. The uplands could be planted in mesic prairie and include walking paths and educational signs for the public. There are several seeps and springs that originate from the east hillside of the property. Invasive brush and vegetation could be removed from these areas and along Dixie Creek. These areas would be restored with native vegetation to increase stormwater infiltration into the permeable hillside soils. Runoff storage could also be increased at the Fields property by installing a series of naturalized wetland filtration basins. These basins would store runoff before it drains to Dixie Creek. If each of these project elements could be implemented, it is possible Lake Braewood, an upstream on-line impoundment on Dixie Creek could become modified. Lake Braewood is becoming filled with sediment from historical upstream erosion. Under the proposed project, Lake Braewood could potentially be modified to have a meandering flow path and be restored with native vegetation. In combination, these restoration measures could substantially improve water quality within Dixie Creek.

Figure 4-26. The Fields Property potential land acquisition along Dixie Creek in the Village of Algonquin (note: the channel depicted as Ratt Creek is identified as Dixie Creek in this Plan). Restoration could include stream stabilization, wetland filtration basins, and possible modification of upstream (south) Lake Braewood, an online impoundment structure. (Source: Village of Algonquin report prepared by AES)

The proposed project recommendation is to establish four (4) acres of wetland filtration areas along the Fields Property. The eroding portions of the stream channel should be restored using riffles, pools, bank re-grading, and other restoration measures to stabilize 2,000 feet of eroding stream channel. Under this scenario, it is possible that consideration could be given to modify Lake Braewood to improve water quality through the corridor. The estimated costs for this project are $450,000 to $580,000. This cost estimate assumes 2,000 feet of stream stabilization and 4 acres of wetland filtrations basins, and water quality enhancement at Lake Braewood

4.2.3.2 Macintosh Creek Headwaters Wetland Restoration, Carpentersville—Project Site No. 13

Macintosh Creek Headwaters wetland restoration consists of a 4-acre area between LW Besinger Drive and Ravine Road in Village of East Dundee and Carpentersville. The site currently consists of a turf grass area to the north, and a degraded woodland to the south. Two headwater tributary channels enter the site from the north via culverts and they flow south under Ravine Road. The site receives large quantities of polluted runoff from several acres of Meadowdale Mall to the north. The conveyance of uncontrolled, polluted runoff from the north contributes to erosion of headwater channels within the project area. The major element of the proposed project recommendation is to construct wetland storage. The project would include removing degraded trees, excavation, removal of soils, and installation of outlet control structures. These measures would provide 16 to 25 acre-feet of runoff storage, wetland restoration, and preservation of selected trees as island riparian buffer features.

Figure 4-27. The Macintosh Creek Headwaters project would provide between 16 and 25 acre-feet of storage within restored wetlands. Runoff is currently discharged to the site from Meadowdale Mall to the north. (Source: Village of Carpentersville report prepared by AES)

The estimated costs to construct at least 16 acre-feet of runoff storage within restored wetlands are projected at $375,000 to $475,000 for engineering, permitting, and construction.

4.2.3.3 Tributary to Jelke Creek Restoration, Dundee Township—Project Site No. 14

An approximately 500-foot reach of an unnamed tributary to Jelke Creek flows through the north portion of a 23-acre parcel owned by Dundee Township (Nollman Parcel). The parcel is located between I-90 to the south and Boncosky Road to the north. A portion of the runoff feeding the tributary originates from Interstate 90. The tributary flows across private land in a northerly direction, upstream (west) of the project site, toward Boncosky Road. At Boncosky Road, the tributary has been channelized to flow directly eastward, along the south side of the road. As a result of past channelization, runoff from Boncosky Road is virtually directly discharged into the tributary channel. Upstream (south) of the project site, runoff from I-90 has caused severe gully erosion. This gully erosion has contributed to polluted runoff flowing through the tributary channel into Jelke Creek. Jelke Creek is located immediately downstream of the project site. (According to Illinois State Tollway Authority officials, options are being considered to alleviate gully erosion at I-90.[5])

Figure 4-28. The 23-acre Nollman Parcel project area could include remeandering a tributary to Jelke Creek, as well as up to 2 or more acres of wetland restoration. In addition, upland (south) sheet erosion areas could be stabilized by replacing invasive shrubs with desirable, ground-stabilizing vegetation.

Based on site evaluation, the following are recommended. The channelized tributary stream along Boncosky Road should be re-meandered. The north portion of the Project Site contains an extensive, flat-sloped meadow that is currently tiled. By remeandering the stream through the meadow, this would allow polluted runoff from Boncosky Road to be filtered through an extensive restored wetland/mesic prairie complex. Soils in the meadow exhibit hydric characteristics. If drain tiles are cut and the stream is re-routed through the meadow area, potentially two or more acres of wetland restoration could occur adjacent to the restored channel. As a result, polluted runoff from upstream areas could be filtered through a restored stream and wetland restoration complex. In addition, upland sheet erosion areas

[5] Personal communication with Bryan Wagner, Illinois State Tollway Authority.

infested with buckthorn vegetation, such as in the central and south portions of the project site, could be stabilized by removing invasive shrubs and establishing desirable, ground-stabilizing vegetation.

The proposed project recommendation involves the restoration of this reach of the stream channel. The project would include improving the riparian zone through invasive species removal and planting of native vegetation, including trees, and installing in-stream structures, such as pool/riffle complexes. The estimated cost for this project ranges from $425,000 to $525,000. This cost estimate assumes 575 feet of stream restoration, 2 acres of wetland restoration, and 15 acres of riparian buffer restoration / invasive species control. Dundee Township would be expected to take the lead on this project.

4.2.3.4 Lake Beatrice Study—Project Site No. 15

Lake Beatrice is approximately a five-acre online reservoir impoundment located along approximately 4,000 linear feet of Jelke Creek west of Rt. 31, in Sleepy Hollow. The project site is owned by a variety of land owners including: private property owners, governmental agencies (such as Kane County that owns part of the inundated area), and the Frontenac Home Owners Association (FHOA). Many of the private land owners have a goal of dredging of the lake to remove sediment deposition. The land owners along Lake Beatrice were provided with a number of opportunities to be educated regarding the fact that sedimentation is a well-documented, natural process for an online impoundment structure such as this facility located on Jelke Creek. However, dredging has not been recognized as a sustainable BMP. As such, it is recommended that a study occur to assess whether sustainable BMPs could be implemented along Lake Beatrice that would meet with acceptance by the land owners. To the extent practicable, goals should include to restore the natural functions of this section of Jelke Creek, including fish passage, sediment transport, and water quality improvements. Potential BMPs that could be considered include installation of a sediment forebay to trap inflowing sediment at the upstream end of the reservoir. Shorelines of the existing reservoir could be re-shaped and stabilized with native plantings. A stream bypass channel could be considered that would allow most of the inflowing sediment to bypass the reservoir. Sources of sediment to construct the stream bypass channel could include borrowing material from the existing reservoir bottom which would benefit the land owners. Some of the deposited spoils could also be used to construct side-channel wetland filtration areas. Dam modification could be considered. Whether or not any of these measures could be adapted or modified for acceptance by the land owners would be the subject of the recommended Study for Lake Beatrice.

Given the inherent complexities associated with a project of this nature and scale, including that there are multiple land owners, the realistic expectation is that the preliminary planning and evaluation for this project would occur within the timeframe of this short-term implementation plan (i.e. five years) and that the implementation of the project would occur within approximately five to 10 years. The planning stage for this project would likely be initiated through the development and facilitation of a project-specific stakeholder group comprised of residents, technical resource agencies, and/or others. In order to conduct a basic Concept Plan level Study, it is suggested that a budget of $18,000 be allocated. (It is suggested that an engineering and construction budget that would allow the BMPs described above to be implemented could range between $475,000 and $680,000 depending on the BMPs selected.)

4.3 Wastewater Reclamation and Reuse – Project No. 16

Based on the pollutant loading analyses conducted, it is apparent that a major source of pollutant loading occurs from wastewater treatment plant discharge at point sources. A listing of wastewater treatment plants (WWTP) is included in Section 2.4.2. Traditional approaches to wastewater management, regardless of the level of treatment restrictions, ultimately include discharge of the resulting treated water and associated pollutants into the Fox River. It is suggested that a Study be initiated to evaluate the potential opportunities and benefits of partial or full wastewater reclamation

and reuse approach for one or more point source discharge locations within the watershed. Wastewater reclamation and reuse systems (WRRS) differ from conventional WWTP in several respects. While traditional WWTPs discharge to streams, WRRS systems have no discharge of wastewater to a receiving stream. Traditional WWTP sewage treatment may occur for one or two days. But in a WRRS system, the treatment time is 36 days. In WRRS wastewater is treated over a longer time period to high quality standards. After disinfection, the treated water is spray-irrigated onto land areas that meet Illinois EPA permit requirements for land application. Irrigation only occurs during the vegetative growing season. The irrigation occurs at a slow, controlled rate. Most of the irrigated water becomes directly evaporated or is evapo-transpired through plants to the atmosphere. The treated water becomes a resource that maintains green open space, restored natural areas, cropland, parks, golf courses and/or other suitable areas. In the process, discharge of pollutants to the Fox River is reduced. Treated water is stored in a large storage reservoir during the non-irrigation (dormant) season. WRRS systems improve the protection of water quality for streams, rivers, and other waterways. Through the WRRS, recycled water more closely mimics the natural hydrological process of our waterways.

Table 4-1. Comparison of Traditional Wastewater Treatment and WRRS Treatment

Description	Traditional Wastewater Treatment	WRRS Treatment
Duration of Treatment	2 Days or Less	36 Days
Energy Efficiency (Aeration)	Lower	Higher
Effluent Discharge	To Stream Channel	None to Stream Channel
Use of Treated Water for Irrigation	None. Pollutants Discharged to Stream.	Water Reused to Irrigate Crops, Natural Areas, or Other Vegetation in Growing Season
Duration of Winter Storage of Treated Water	0 Days	150 Days
Sludge Generation	High. Relies on Sludge for Treatment	Low/None
Sludge Hauling Costs/ Land Application of Sludge	High	Low/None

(Source: Living Waters Consultants, 2012)

It is recommended that a Wastewater Reclamation and Reuse Study be initiated to evaluate the potential for retrofitting one or more point sources discharges into a partial or full WRRS facility. It is projected that the cost for a Wastewater Reclamation and Reuse Study including cost projections for three different facility options would range between $35,000 and $45,000.

4.4 Agricultural Best Management Practices

Approximately 10 percent of the watershed area remains as agricultural land, and this land is estimated to be a significant contributor of nutrients and sediment to the Jelkes Creek-Fox River watershed. Therefore, practices that reduce pollutant contributions from agricultural areas are an important element to improving water quality within the Jelkes Creek-Fox River watershed. Under the Mississippi River Basin Healthy Watersheds Initiative, USDA NRCS recommends a three-pronged approach of addressing pollutant loading from agricultural land that involves avoiding, controlling, and trapping ("ACT") pollutants.[6] The avoidance component is accomplished through activities such as crop rotation and nutrient management practices, while the control component consists of practices such as conservation tillage practices and drainage water management.

Figure 4-29. Corn planted in soybean residue through the soil conservation practice of "no-till." (*Source*: USDA NRCS)

An understanding of the tillage practices likely being already used on agricultural land within the watershed can be gleaned from the Illinois Department of Agriculture Soil Conservation Transect Survey for Kane County. This survey is typically conducted by KDSWCD and NRCS staff on a two-year cycle. The latest survey conducted in Kane County was conducted in 2009 and the results are provided below in Table 4.2.

Table 4-2. 2009 Results of Soil Conservation Transect Survey for Kane County

Tillage System (Percent of Residue Remaining)	Percentage of Fields with Indicated Tillage System by Crop Type	
	Corn	Soybean
Conventional (0 to 15% residue)	4	1
Reduced (16 to 30% residue)	40	7
Mulch Till (over 30% residue)	52	51
No-Till (over 30% residue)	3	41

The survey results indicate that a significant portion of the agricultural land within Kane County, and presumably within the Jelkes Creek-Fox River watershed, is managed using some level of soil conservation tillage practices for both corn and soybean. Specifically, 95 percent of corn fields and 98 percent of soybean fields are managed using soil conservation tillage practices. As a result, it is a general recommendation of this plan that the use of these practices be continued in the watershed because of their water quality benefits, as well as expanded to include practices that have not yet been used in the Jelkes Creek-Fox River watershed, such as drainage water management.

The third component, "trapping," is accomplished through the implementation of practices that remove pollutants from runoff. One such practice is provided in the project recommendation provided below; denitrifying bioreactors.

[6] http://www.epa.gov/owow_keep/msbasin/pdf/meetings/meeting18/01_ann_mills.pdf

4.4.1 DENITRIFYING BIOREACTORS—PROJECT SITE NO. 17

Local NRCS and KDSWCD staff has indicated that drain tile location information for the watershed is not readily available, but that the presence of drain tile is expected to be prevalent throughout the agricultural portions of the watershed.[7] Discharges from drain tiles can be a significant source of nitrogen.[8] Denitrifying bioreactors have been shown to reduce nitrogen levels in discharges from drain tiles.[9] The bioreactors consist of constructing a trench to receive flows from a drain tile. The trench is filled with a carbon source, such as wood chips, which microorganisms (i.e., bacteria) then use to chemically reduce nitrates in the drain tile flows to nitrogen gas through denitrification. Typically, approximately 10 feet of trench, two to three feet wide, is constructed per acre of drainage area, at a cost of approximately $400 per acre drained.[10] The benefit of this practice is that it provides water quality improvement, but does not take agricultural land out of production.

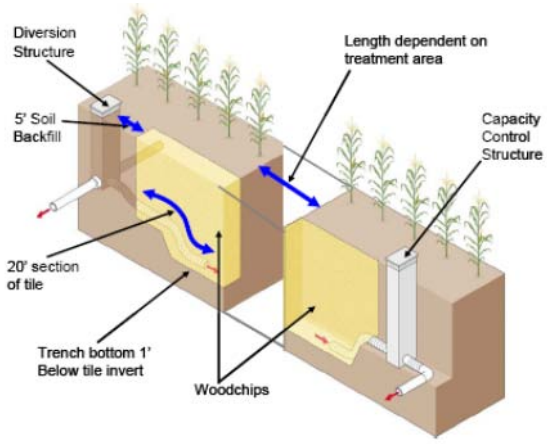


Figure 4-30. Denitrifying Bioreactor Diagram (*Source*: Richard Cooke, University of Illinois Urbana-Champaign)

The use of bioreactors in northeastern Illinois has been limited. As a result, the proposed project is for the implementation of bioreactors at select demonstration sites within the watershed. Under this recommendation, local NRCS and/or KDSWCD staff would take the lead in identifying project sites and willing landowners to implement the project for a cumulative drainage area of 50 acres. The estimated cost for this project is $20,000 to $22,000.

4.4.2 CONSTRUCTED WETLANDS—PROJECT SITE NO. 18

Constructed wetlands are manmade systems that mimic the water quality improvement processes of naturally occurring wetlands. Surface flow wetlands are effective in removing phosphorus, nitrogen, and total suspended solids.[11,12] As water flows through the wetland, the velocity of the water decreases, allowing suspended solids to settle out. The microbial community that thrives in the soil of many wetlands transforms or removes pollutants, such as phosphorous and nitrogen[13]. Phosphorous retention occurs through sorption, precipitation, and sedimentation. Nitrogen (in nitrate form) is removed primarily through anaerobic denitrification.

Constructed wetlands that are properly sited and designed are effective in improving the water quality discharged from agricultural land uses. The wetland system can be designed to receive tile drainage,

[7] Personal communication with Tom Ryterske, Retired from USDA NRCS District Conservationist for Kane and DuPage Counties

[8] P. Kalita, A. Algoazany, J. Mitchell, R. Cooke, and M. Hirschi. 2006. *Subsurface Water Quality from a Flat Tile-Drained Watershed in Illinois, USA.* Agriculture, Ecosystems and Environment 115:183–193.

[9] D. Jaynes, T. Kaspar, T. Moorman, and T. Parkins. 2008. *In Situ Bioreactors and Deep Drain-Pipe Installation to Reduce Nitrate Losses in Artificially Drained Fields*. J. Environ. Qual. 37: 429-436.

[10] http://www.admcoalition.com/Woodbio.pdf

[11] Reddy, K. R., R. H. Kadlec, E. Flag, and P. M. Gale. 1999. Phosphorous retention in streams and wetlands: A review. *Crit. Rev. Environ. Sci. Tech.* 29: 83-146.

[12] Reddy, K. R., R. G. Wetzel, and R. H. Kadlec. 2005. Biogeochemistry of phosphorous in wetlands. *Phosphorous: Agriculture and the Environment*, 263-316. Agronomy Monograph No. 46. Madison, Wisc.: ASA-CSSA-SSSA.

[13].USEPA, 2004. Constructed Treatment Wetlands, EPA: 843-F-03-013

surface drainage, or a combination of the two. The use of constructed wetlands is common in several Midwestern states such as Iowa, Missouri, and Minnesota. The knowledge gained through the research conducted in these states can be referenced to guide the implementation of an effective program in the Jelkes Creek-Fox River watershed. Despite the convergence of high nutrient loads from agricultural land uses and favorable landscape conditions in Illinois, the use of constructed wetlands as a BMP in Illinois is not yet common.

Constructed wetlands should be located along primary drainage ways, downstream of a significant tributary area. Several factors need to be considered in designing a constructed wetland, such as tributary area, topography, soils, and anticipated pollutant loads. Proper placement is a critical step in BMP performance. Literature on nitrogen removal in constructed wetlands for agricultural drainage is readily available and is continually growing. The same level of analysis is not currently available on the effectiveness of phosphorous removal in constructed wetlands. Based on the Iowa guidance, the area of a constructed wetland should range from 0.5 percent to 2 percent of the tributary area, with a recommended target of one percent.[14,15] A study conducted in Illinois that evaluated both nitrogen and phosphorous removal provided wetland areas that ranged from 3 to 7 percent of the watershed area[16]. The proposed project for the Jelkes Creek-Fox River watershed is to treat 100 acres of agricultural land with constructed wetlands. With a target ratio of two percent, approximately two (2) acres of constructed wetlands would be created at locations throughout the watershed. Local NRCS staff is expected to take the lead in identifying project sites and willing landowners to implement this project. The estimated cost for this project is $20,000 to $30,000.

4.5 Estimated Load Reductions for Representative Project Recommendations

Pollutant load reductions estimates for the implementation of the projects recommended in this section were calculated with watershed model STEPL by using literature estimates of pollutant removal efficiencies, unless otherwise noted in Table 4-3. A summary of the pollutant load reduction estimates organized by the Illinois EPA BMP categories (i.e. Urban, Hydrologic, Agriculture, Livestock, and Other) is also presented in Table 4.4. The reader should recognize the use of pollutant removal efficiencies, or percent removal, to estimate pollutant load reductions has several shortcomings.[17] As a result, the estimates derived from the analyses described above do not represent absolute expected results from the implementation of projects recommended in this plan, and are only planning-level estimates.

Figure 4-31. Muddy water entering a creek.

[14] http://www.iowaagriculture.gov/waterResources/CREP.asp

[15] http://www.iowaagriculture.gov/waterResources/pdf/LandownerGuide.pdf

[16] Kovacic, D. A., Twait, R. M., Wallance, M. P., Bowling, J. M. 2006. Use of created wetlands to improve water quality in the Midwest – Lake Bloomington case study, Ecological Engineering 28(2006) 258-270.

[17] As Jones et al. writes, "[p]ercent removal is primarily a function of influent quality. In almost all cases, higher influent pollutant concentrations into functioning BMPs result in reporting of higher pollutant removals than those with cleaner influent. In other words, use of percent removal may be more reflective of how 'dirty' the influent water is than how well the BMP is actually performing." Jones, J.E., J. Clary, E. Strecker, and M. Quigley. 2008, "15 Reasons You Should Think Twice Before Using Percent Removal to Assess BMP Performance," *Stormwater*, January-February 2008.

Table 4-3. Estimated Pollutant Load Reductions

Proj. No.	Illinois EPA Category	BMP Code	Units	Quantity	Project Name	Nitrogen Reduction (lb/yr)	Phosphorus Reduction (lb/yr)	Sediment Reduction (t/yr)	BOD Reduction (lb/yr)	Estimated Project Cost	Project Lead
1	Urban	812	Ac.	0.69	Lions Park - Bioretetention[18]	1.8	0.3	0.1	ND	$30,000 - $45,000	Village of East Dundee
2	Urban	13	No.	1	Train Depot - Rain Garden	1.3	0.2	0.1	ND	$10,000 - $18,000	Village of East Dundee
3	Urban	814	Ac.	1.3	Route 72 Median - Vegetated Swale	9.9	3.2	5.4	ND	$18,000 - $25,000	Village of East Dundee
4	Urban	410	No.	20	Jelke Bird Sanctuary - Swale / Gully Stabilization[19]	43	13.8	11	86	$38,000 - $48,000	Dundee Township
5	Urban	800	No.	1	White Chapel Detention - Retrofit[20]	2.9	0.4	0.1	12	$18,000 - $25,000	Village of Algonquin
6	Urban	800	No.	1	High Hill Detention - Retrofit[21]	21	6.0	4.9	203	$30,000 - $40,000	Village of Algonquin
7	Urban	800	No.	1	Kimball Farms Detention Basin # 1 - Retrofit	16	2.3	1.5	62	$80,000 - $110,000	Village of Carpentersville
8	Hydrologic	16	No.	2	Elgin or Carpentersville Dam Modification - Study	ND	ND	ND	ND	$80,000 - $100,000	City of Elgin/Village of Carpentersville
9	Hydrologic	580	Ft.	1500	Dixie Creek Reach # 3 - Restoration[22]	216	69	54	432	$325,000 - $375,000	Village of Algonquin
10	Hydrologic	580	Ft.	1800	Carpenter Creek Reach # 2 - Stabilization and Runoff Storage	432	138	108	864	$550,000 - $700,000	Village of Carpentersville
11	Hydrologic	580	Ft.	1800	Shaw Creek (Four Winds Way Creek) - Stabilization	346	111	86	691	$290,000 - $360,000	Dundee Township
12	Hydrologic	580	Ft.	2000	Dixie Creek / Fields Property - Restoration	306	98	77	612	$450,000 - $580,000	Village of Algonquin
13	Hydrologic	657	Ac.	4	Macintosh Creek Headwaters - Runoff Storage	71	10	7.9	580	$375,000 - $475,000	Village of Carpentersville
14	Hydrologic	9	Ft.	575	Tributary to Jelke Creek - Restoration	80	26	20	159	$425,000 - $525,000	Dundee Township
15	Hydrologic	16	No.	1	Lake Beatrice (Jelke Creek) - Study	ND	ND	ND	ND	$18,000	Lake Beatrice Residents
16	Other	3	No.	1	Wastewater Reclamation and Reuse - Study	ND	ND	ND	ND	$35,000 - $45,000	WWTPs
17	Agriculture	--	Ft.	500	Agricultural Bioreactors[23]	633	n/a	n/a	n/a	$20,000 - $22,000	NRCS
18	Agriculture	--	Ac.	2	Agricultural Constructed Wetlands[24]	1224	227	65	ND	$20,000 - $30,000	NRCS
					Total	**3404**	**705**	**441**	**3701**		

ND =not determined or insufficient data; n/a = not primary intended project benefit[25]

[18] Sediment reduction estimates for the proposed bioretention retrofit projects were developed using the median removal efficiency reported in the CWP's National Pollutant Removal Performance Database, v3. 2007.

[19] Load reduction estimate accounts for both gully stabilization and wetland creation.

[20] Load reduction estimates for the proposed detention basin retrofit projects that focus on establishing vegetation on the basin side slopes were developed assuming that the newly established vegetation would act as a filter strip.

[21] Load reduction estimates for the proposed dry bottom detention basin retrofit projects were developed assuming that the existing dry basins do not provide treatment of the water quality volume due to the presence of existing low flow paths within the basins.

[22] Load reduction estimates developed for stream bank stabilization projects assumed uniform bank height and lateral recession rate ("Severe; 0.3 to 0.5 feet per year) over the length of the project area. Channel downcutting is also not accounted for in these estimates. These estimates should be further refined at the time of the project design and for any applicable grant applications.

[23] Pollutant load reductions estimate based on information reported in references identified in Section 4.4.1.

[24] Pollutant load reductions for nutrients estimated based on information reported in the references identified in Section 4.4.2. Sediment reduction estimates are based on CWP's National Pollutant Removal Performance Database, v3. 2007.

[25] The primary water quality benefit of the bioreactors recommended in this plan is the removal of nitrate.

Table 4-4. Estimated Pollutant Load Reductions by Illinois EPA BMP Category[26]

Illinois EPA BMP Category	Nitrogen Reduction (lb/yr)	Phosphorus Reduction (lb/yr)	Sediment Reduction (t/yr)	BOD Reduction (lb/yr)
Urban	95.9	26.2	23.1	363
Hydrologic	1451	452	352.9	3338
Agriculture	1857	227	65	--
Total	**3404**	**705**	**441**	**3701**

4.6 Additional Projects Submitted by Watershed Stakeholders

As previously noted the, watershed stakeholders provided an impressive list of the potential water quality improvement projects for inclusion in this plan and the list of these projects is included Appendix E. It is worth repeating here that the projects described in the preceding pages of this section were selected for inclusion in the body of this plan to serve as *representative* project recommendations. These projects should be seen as *examples* that stakeholders could utilize to conceptualize other similar projects within the watershed. It should be noted that the project list included in Appendix E is also not a comprehensive list of all opportunities for water quality improvement within the Jelkes Creek-Fox River watershed. It is expected that as the watershed stakeholders implement this plan and as more data and resources become available, water quality improvement projects other than those included herein will be identified.

[26] Estimates are not included for Projects No. 8, 15, 16, and 17 as indicated in Table 4-3.

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5. Plan Implementation and Monitoring

5.1 Implementation Schedule and Milestones

While developing a watershed plan is a critical step in the watershed management process, the effectiveness of the plan for improving water quality in the Jelkes Creek-Fox River watershed will be minimal if the recommendations included in the plan are not implemented in a meaningful way. This section is intended to provide an implementation schedule and measureable milestones for the plan recommendations. The overall implementation timeframe for many of the recommendations in this plan is five years, with the expectation that the watershed plan would be revisited in 2017.

5.1.1 Policy and Programmatic Recommendations

The policy and programmatic recommendations included in this plan are multi-faceted, and each of the communities and organizations within the watershed will need to contribute to implementation. For the recommendations related to municipal ordinances, the expectation is that staff and elected officials from each community would establish an appropriate course of action for their community to integrate the policy recommendations by 2017. Completion of these efforts within the suggested timeframe would be aided by continued collaboration between the watershed communities through the Jelkes Creek-Fox River Watershed Action Group. The Chicago Metropolitan Planning Agency (CMAP) may also be of assistance on this effort through its Local Technical Assistance Program.[1]

Collaboration between watershed communities and organizations will also facilitate implementation of the program recommendations presented in Section 3. Additionally, the implementation of the education-related programs recommended in Section 3.4 will be greatly assisted by working with existing environmental educators already working within the watershed, such as the Kane-DuPage Soil Water Conservation District and the Friends of the Fox River. The expectation, again, is that many of the recommended programs should be implemented by 2017. Program recommendations such as those related to the stream and natural area maintenance (Section 3.3.2) are expected to be on-going programs.

5.1.2 Project Recommendations

As noted in Section 4, the watershed stakeholders provided assistance in the identification of numerous opportunities to implement projects throughout the watershed with the goal of improving water quality within the Jelkes Creek-Fox River watershed. The projects presented in Section 4 provide a set of tangible, representative projects that should be implemented within the recommended five-year timeframe, with a few exceptions as noted below.

- Urban Stormwater Infrastructure Retrofits—implement two to three projects (Projects No. 1 through 7, or similar projects) per year by 2017.
- Stream Channel and Riparian Corridor Restoration
  - Dam Modifications—begin Dam Modification Study (Project No. 8) by 2014.
  - Stream Channel Protection—implement three to four projects (Project No. 9 through 11, or similar projects) by 2017.
  - Stream and Wetland Restoration— begin planning phases for Projects No. 12 through 15 (or similar projects) by 2014; implement two to three project by 2017.
- Wastewater Reclamation and Reuse – conduct Wastewater Reclamation and Reuse Study (Project no. 16) by 2015.
- Agricultural Best Management Practices

[1] http://www.cmap.illinois.gov/lta

- Constructed Wetlands—implement constructed wetland pilot project by 2014.
- Bioreactors—implement bioreactor pilot projects for treatment of approximately 25 acres by 2014 and projects for the remaining 25 acres by 2016.

This information is presented in Table 5-1 below.

Table 5-1. Implementation Schedule and Milestones for Project Recommendations

Illinois EPA Category	Project No.	Project Name	Project Lead	Implementation Schedule and Milestones
Urban	1	Lions Park - Bioretetention	Village of East Dundee	Implement each of these projects by 2017; Implement 2 to 3 of these projects, or similar projects, per year
	2	Train Depot - Rain Garden	Village of East Dundee	
	3	Route 72 Median - Vegetated Swale	Village of East Dundee	
	4	Jelke Bird Sanctuary - Swale / Gully Stabilization	Dundee Township	
	5	White Chapel Detention - Retrofit	Village of Algonquin	
	6	High Hill Detention - Retrofit	Village of Algonquin	
	7	Kimball Farms Detention Basin # 1 - Retrofit	Village of Carpentersville	
Hydrologic	8	Elgin or Carpentersville Dam Modification - Study	City of Elgin/Village of Carpentersville	Begin Study by 2014
	9	Dixie Creek Reach # 3 - Restoration	Village of Algonquin	Implement each of these projects by 2017
	10	Carpenter Creek Reach # 2 - Stabilization and Runoff Storage	Village of Carpentersville	
	11	Shaw Creek (Four Winds Way Creek) - Stabilization	Dundee Township	
	12	Dixie Creek / Fields Property - Restoration	Village of Algonquin	Begin planning phase for projects by 2014; Implement two to three projects by 2017
	13	Macintosh Creek Headwaters - Runoff Storage	Village of Carpentersville	
	14	Tributary to Jelke Creek - Restoration	Dundee Township	
	15	Lake Beatrice (Jelke Creek) - Study	Lake Beatrice Residents	
Other	16	Wastewater Reclamation and Reuse - Study	WWTPs	Conduct Study by 2015
Agriculture	17	Agricultural Bioreactors	NRCS	Implement pilot project by 2014
	18	Agricultural Constructed Wetlands	NRCS	Implement treatment for 25 acres by 2014; Remaining 25 acres by 2016

As previously stated, the recommendations of the watershed plan, including the project recommendations, should be revisited in 2017. As more data and other information are gathered and analyzed for the watershed, the identification and prioritization of projects to be implemented should become more refined and targeted for the improvement of water quality within the Jelkes Creek-Fox River watershed.

5.2 Monitoring

With a few exceptions, the physical, chemical, and biological data currently available for the Jelkes Creek-Fox River watershed are limited to the Fox River. Information for the tributaries within the watershed, including Jelkes Creek, is generally limited or non-existent. As such, to make more informed decisions and measure the effectiveness of the implementation of this plan, additional monitoring is required. This monitoring will also allow decision-makers within the watershed to determine long-term trends and to improve characterization of different sources of pollutants in the watershed.

5.2.1 Habitat and Biological Assessments

As stated in Section 2.2, the Illinois EPA has identified flow regime alterations, sedimentation/siltation and alterations in stream-side covers as potential causes of impairment to the Fox River. Additionally, based on the findings of the watershed assessment and input from the watershed stakeholders, alteration (e.g., dams, etc.) and degradation (e.g., stream bank erosion, channel downcutting, etc.) of the tributaries within the watershed are prevalent throughout the watershed. Many of the projects recommended in this plan are targeted to address these issues.

Figure 5-1. 2011 Fish Survey in Jelkes Creek

In order to better understand the stream channel restoration needs and the effectiveness of projects to be implemented under this plan, a formalized program for conducting periodic habitat and biological assessments is recommended. These assessments should be based on standardized data collection and evaluation protocols, such as the Qualitative Habitat Evaluation Index, the Macroinvertebrate Index of Biological Integrity (mIBI), and the Fish Index of Biological Integrity (fIBI). The use of these protocols will allow for a *quantitative* comparison of stream reaches within the watershed and to reference streams, and will also allow for a clearer understanding of project effectiveness and watershed improvements.

The Jelkes Creek-Fox River Watershed Action Group should work with resource agencies and local organizations, such as the Illinois Department of Natural Resources (IDNR), to develop an appropriate strategy for conducting the habitat and biological assessments. Elements of the strategy should include the appropriate locations and frequency of assessments, funding needs, and available resources (i.e., staff, volunteers, equipment, etc.). It is recommended that fish assessments be performed in large part by the IDNR, potentially with assistance from watershed stakeholders. It is also recommended that trained volunteers assist with the collection of macroinvertebrates, but that macroinvertebrate identification be conducted by a professional aquatic biologist. The expectation is that more accurate and detailed information will aid in evaluation of the samples and related decision making.

5.2.2 Water Quality Monitoring

The collection and analysis of water quality data throughout the watershed (as opposed to just the Fox River) will also aid in the development of a better understanding the streams within the watershed and the effectiveness of projects to be implemented under this plan. A geographically and temporally strategic water quality monitoring program will also allow for a refinement in the identification of pollutant sources within the watershed.

The Jelkes Creek-Fox River Watershed Action Group should work with resource agencies and local organizations, such as the Illinois EPA, Fox River Study Group and Illinois State Water Survey, to develop a strategic water quality monitoring program. Again, this strategy needs to include the appropriate locations and frequency of the monitoring, funding needs, and available resources (i.e., staff, volunteers, equipment, etc.). A potential opportunity for developing and implementing this strategy is collaboration with municipalities and wastewater treatment plants within the watershed for the use of existing staff and equipment to collect and analyze water quality samples.

5.2.3 Site- or Project-Specific Monitoring

The monitoring recommended in the preceding sections is primarily focused on collecting in-stream data that is intended to allow for more informed decision making by the watershed stakeholders. The monitoring recommendations do not specifically include site- or project-specific monitoring recommendations. However, additional monitoring efforts at this scale would allow for the evaluation of the effectiveness of implemented projects toward meeting project and watershed goals. The appropriate monitoring approach for a given project, or project category (e.g. bioretention retrofits), should be determined on a case-by-case basis and should be implemented when feasible based on funding and other available resources (e.g., field personnel or volunteers).

5.3 Potential Funding Sources

The following table (Table 5-2) provides an extensive list of potential funding sources for projects to be undertaken in the watershed. Select organizations and agencies that can be of technical assistance during the implementation of these projects are provided in Table 5.3.

Table 5-2. Selected Funding Sources for Potential Projects Identified in this Plan.

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Programs or Policy						
Local Technical Assistance Program	Chicago Metropolitan Agency for Planning	Grants, Staff Assistance	Varies	Counties, municipalities, and nongovernmental organizations	Provides staff assistance and small grants for a wide range of projects to implement recommendations of the CMAP's GO TO 2040 comprehensive regional plan.	http://www.cmap.illinois.gov/lta
Water Quality						
Capitalization Grants for Clean Water State Revolving Funds	US EPA/Office of Wastewater Management	Loan revolving fund	No limit on wastewater funds Drinking water up to 25% of available funds	Local government, Individuals Citizen groups Not-for-profit groups	Wastewater treatment Nonpoint source pollution control; Watershed management; Restoration & protection of groundwater, wetlands/riparian zones, and habitat	http://water.epa.gov/grants_funding/eparecovery/index.cfm
Conservations Practice Program	Kane-DuPage Soil and Water Conservation Practices	Grant	Varies	Local government, individuals, citizen groups, not-for-profit	Rain gardens, grass waterways, terraces, and well sealing	www.kanedupageswcd.org/
Non-point Source Management Program (319 grants)	Illinois EPA	Matching Grant (60% funded)	No set limit on awards	Local government Businesses Individuals Citizen & environment groups	Controlling or eliminating non-point pollution sources Stream bank restoration Pesticide and fertilizer control	http://www.epa.state.il.us/water/financial-assistance/non-point.html
Illinois Green Infrastructure Grant Program for Stormwater Management	Illinois EPA	Matching Grant Minimum Local Match CSO: 15% Retention and Infiltration: 25% Green Infrastructure Small Projects: 25%	Up to: CSO: $3M or 85% of project costs Retention and Infiltration: $750,000 or 75% of project costs Green Infrastructure Small Projects: $75,000 or 75% of project costs	Any entity that has legal status to accept funds from the state of Illinois, including state and local governmental units, nonprofit organizations, citizen and environmental groups, individuals and businesses	Green infrastructure best management practices (BMPs) for stormwater management to protect or improve water quality	http://www.epa.state.il.us/water/financial-assistance/igig.html

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Sustainable Agriculture Grant Program	Illinois Department of Agriculture	Matching Grant (60% funded)		Organizations, governmental units, educational institutions, non-profit groups, individuals	Practices are aimed at maintaining producers' profitability while conserving soil, protecting water resources and controlling pests through means that are not harmful to natural systems, farmers or consumers	http://www.agr.state.il.us/Environment/conserv/index.html
Streambank Stabilization and Restoration Program	Illinois Department of Agriculture	Matching grant (amount funded not specified)		Landowners, Citizen groups, Not-for-profit groups	Naturalized streambank stabilization in rural and urban communities, work with SWCD	http://www.agr.state.il.us/Environment/conserv/index.html
Conservation Innovation Grants	Natural Resources Conservation Service	Matching grant (50 % funded)	Up to $75,000 under State Component	Landowners, Organizations	Agricultural-related projects targeting innovative on-the-ground conservation, including pilot projects and field demonstrations	http://www.il.nrcs.usda.gov/programs/cig/
Habitat						
Partners for Fish and Wildlife Habitat Restoration Program	Department of Interior, US Fish and Wildlife Service	Cost-share (50% funded)	up to $25,000	Private landowners	Voluntary restoration or improvements of native habitats for fish and wildlife Restoration of former wetlands, native prairie stream and riparian areas and other habitats.	http://www.fws.gov/policy/640fw1.html
Bring back the Natives Grant Program	National Fish and Wildlife Foundation	Matching Grant (33% funded)	Varies with project ($50,000-$75,000)	Not-for-profit groups, Universities Local governments	Restoration of damaged or degraded riverine habitats and native aquatic species through watershed restoration and improved land management.	http://www.nfwf.org/AM/Template.cfm?Section=charter_programs_list&CONTENTID=18473&TEMPLATE=/CM/ContentDisplay.cfm
Wildlife Habitat Incentives Program	US Department of Agriculture	Grant, Matching Grant (at least 75% funded)		Private landowners, Not-for-profit groups; 10-acre minimum on agricultural ground	Establishment and improvement of fish and wildlife habitat on private land	http://www.nrcs.usda.gov/programs/whip/

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
Native Plant Conservation Initiative	National Fish and Wildlife Foundation	Matching Grant (50% funded)	$10,000-$50,000	Community and watershed groups Nonprofit groups Educ. institutions Conservation districts Local governments	"On-the-Ground" projects that involve local communities and citizen volunteers in the restoration of native plant communities.	http://www.nfwf.org/AM/Template.cfm?Section=GrantPrograms
Wetlands						
Wetlands Program Development Grants	US EPA	Matching Grant (75% funded)	No set limit on awards	Not-for-profit groups Local government	Developing a comprehensive monitoring and assessment program; Improving the effectiveness of compensatory mitigation; Refining the protection of vulnerable wetlands and aquatic resources	http://www.epa.gov/owow/wetlands/grantguidelines
Northeastern Illinois Wetlands Conservation Account	US Fish and Wildlife Service/The Conservation Fund	Grant/Matching Grant (50% match strongly suggested)	Average of ~$38,000	A partnership of: Governmental agencies Not-for-profit conservation groups Private landowners	Restoration of former wetlands; Enhancement and preservation of existing wetlands; Creation of new wetlands Wetlands education and stewardship	http://www.conservationfund.org/node/133
Small Grants Program	North American Wetlands Conservation Council	Matching Grant	Up to $75,000	A partnership of: Governmental agencies Not-for-profit conservation groups Private landowners	Long-term acquisition, restoration, enhancement of natural wetlands	http://www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm
Wetland Restoration Fund	Openlands	Grant	$5,000-$100,000	Local government Not-for-profit groups Citizen groups Other organizations	Wetlands and other aquatic ecosystem restorations within the six-county Chicago region on land under conservation easement or owned by a government agency	
Five Star Restoration Program	National Fish and Wildlife Foundation	Matching Grant (50% funded)	One-year projects: $10,000-$25,000 Two-year projects: $10,000 -$40,000	Any public or private entity that can receive grants	Seeks to develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local	http://www.nfwf.org/AM/Template.cfm?Section=Charter_Programs_List&Template=/TaggedPage/TaggedPageDisplay.cfm&TPLID=60&ContentI

Program	Funding Agency	Type	Funding Amount	Eligibility	Activities Funded	Website
					partnerships for wetland and riparian habitat restoration	D=24301
Private						
Tellabs	Tellabs Foundation	Grant	At least $10,000	Not-for-profit groups	Environmental protection and improvement programs; Organizations which protect the environment	http://www.tellabs.com/about/foundation.shtml
GVF Core Program	Grand Victoria Foundation	Grant/Matching Grant	Varies with scope of project, size of organization, other funding	Not-for-profit groups	Preservation and restoration of natural lands and waterways	www.grandvictoriafdn.org
Walmart Local Giving Program	Walmart and The Walmart Foundation	Grant	Between $250 and $5000	501(c)(3) or other similar designation, K-12 schools, recognized government entity (i.e. state, county, city, etc.); church or other faith-based organization with a proposed project that benefits the community at large.	Education and environmental sustainability efforts.	http://foundation.walmart.com/apply-for-grants/local-giving

Table 5-3. Selected Public and Nonprofit Technical Assistance Resources by Project Category

Water Quality	Habitat	Wetlands
Illinois Environmental Protection Agency	Openlands	Ducks Unlimited
Kane-DuPage Soil and Water Conservation District	US Fish and Wildlife	Wetlands Initiative
Natural Resources Conservation Service	Natural Land Institute	The Conservation Fund
Center for Neighborhood Technology	The Nature Conservancy	US Army Corps of Engineers
The Conservation Foundation	Isaak Walton League	Kane County Stormwater Management
Fox River Ecosystem Partnership	Fox River Ecosystem Partnership	
Kane County Stormwater Management	The Conservation Foundation	
Fox River Study Group		

Appendix A: Supporting Documentation for Pollutant Load Estimates

Spreadsheet for Estimating Pollutant Loads (STEPL) Considerations and Limitations

STEPL is a useful tool in estimating pollutant loads for the purpose of developing the Jelkes Creek-Fox River Watershed plan. A few considerations and limitation for the use of this tool are noted here. STEPL is a relatively simple planning tool to estimate relative pollutant contributions. STEPL is not an in-stream response model and is an un-calibrated tool that only estimates watershed pollutant loading based on coarse data, such as event mean concentrations. Other considerations and limitations include:

- Annual nutrient loading based on the runoff volume and runoff pollutant concentrations based on land use.
- Annual sediment load is largely calculated based on the Universal Soil Loss Equation (USLE) and the sediment delivery ratio.
- Utilizes one event mean concentration to represent pollutant concentration for all storm events.
- Only estimates pollutant loads generated during storm events and is based on average rainfall amount.
- The spreadsheet tool developed for Jelkes Creek and Fox River does not account for stream channel erosion as a pollutant source.
- USLE input parameters based on averages for entire subwatershed.
- Does not account for drain tiles as a source.
- Does not account construction sites a pollutant sources.

STEPL Data Input Sources

Existing Conditions

The existing conditions land use data used in STEPL was CMAP's 2005 land use inventory updated by CMAP. Hydrologic soil group and soil erodibility data were taken from the USDA NRCS Soil Survey and the NRCS Soil Data Viewer GIS tool. Average subwatershed conditions were determined for each subwatershed for soils and topographic-related input requirements. Event mean concentrations for pollutants in stormwater runoff were taken from the 1993 Lake County Stormwater Management Commission/NIPC document titled "Unit Area Pollutant Load Estimates for Lake County, Illinois Lake Michigan Watershed," if available.

Pollutant Load Estimates from STEPL at Subwatershed Level

Existing Conditions

The existing conditions non-point source pollutant load estimates for nitrogen, phosphorus, biological oxygen demand (BOD), and sediment are presented at the subwatershed level in Table A-1 and Figures A-1 through A-4. It should be noted that the pollutant load estimates presented in Table A-1 and Figures A-1 through A-4 have been normalized by subwatershed area to allow for relative contribution comparison between subwatersheds.

Table A-1: Existing Conditions Non-Point Source Pollutant Load Estimates

Subwatershed	Nitrogen Load Estimate (lb/ac/yr)	Phosphorus Load Estimate (lb/ac/yr)	BOD Load Estimate (lb/ac/yr)	Sediment Load Estimate (ton/ac/yr)
W1	5.91	0.73	18.57	0.24
W2	6.11	0.72	18.68	0.20
W3	5.46	0.72	17.23	0.25
W4	4.78	0.88	10.31	0.29
W5	5.06	0.67	12.79	0.21
W6	2.11	0.33	7.32	0.11
W7	6.22	0.91	16.37	0.31
W8	7.77	1.76	16.83	0.59
W9	5.07	0.53	13.82	0.16
W10	2.91	0.39	8.42	0.09
W11	5.04	0.74	10.24	0.20
W12	6.43	1.13	14.98	0.37
W13	4.77	0.71	12.63	0.22
W14	12.16	2.46	20.79	0.77
W15	3.82	0.51	11.42	0.13
W16	4.49	0.48	9.71	0.10
W17	4.64	0.60	11.88	0.15

Figure A-1.

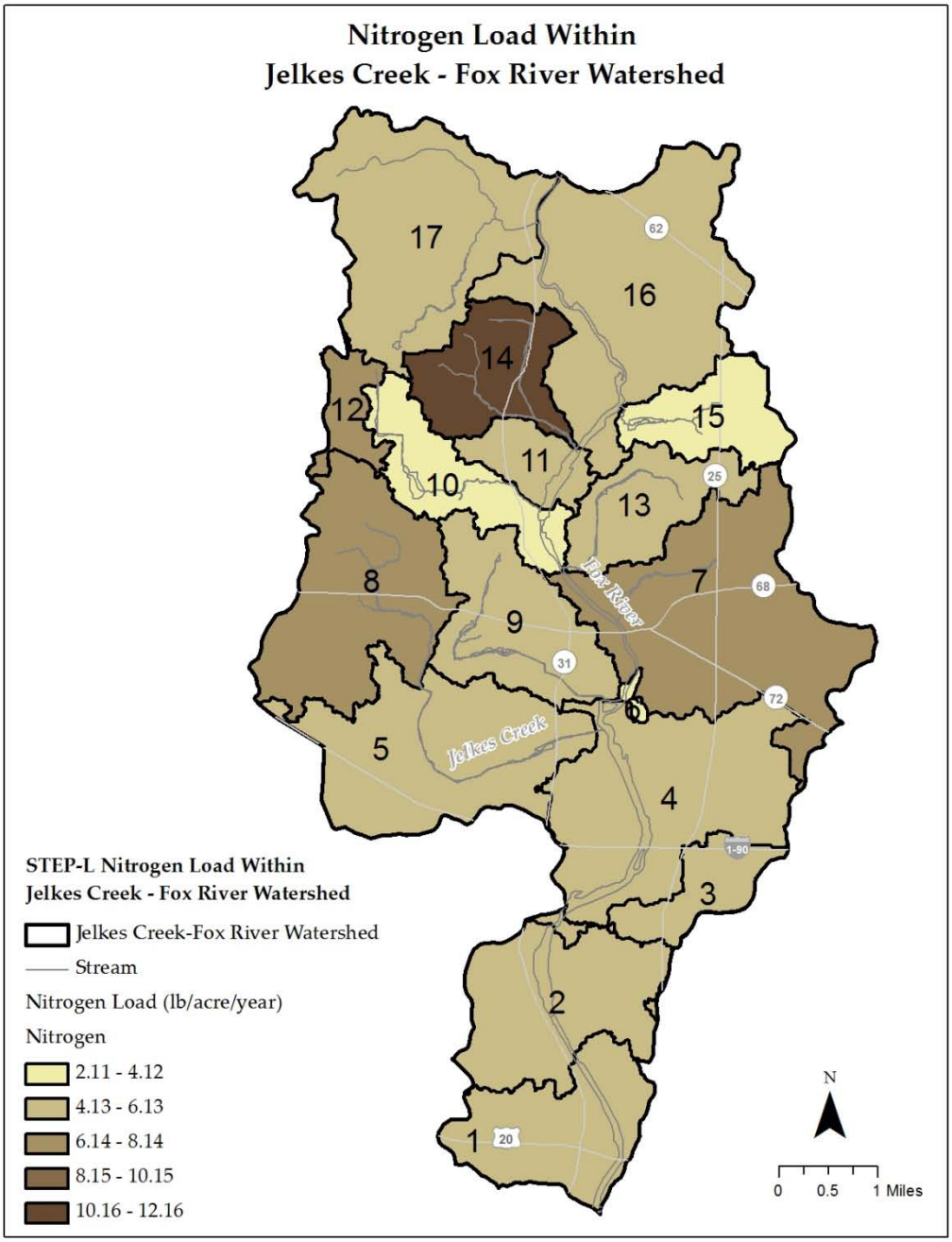

Nitrogen Load Within
Jelkes Creek - Fox River Watershed
17
16
14
12
15
11
10
13
8
7
9
6
5
4
3
2
1
62
25
68
31
72
20
1-90
Fox River
Jelkes Creek
STEP-L Nitrogen Load Within
Jelkes Creek - Fox River Watershed
Jelkes Creek-Fox River Watershed
Stream
Nitrogen Load (lb/acre/year)
Nitrogen
2.11 - 4.12
4.13 - 6.13
6.14 - 8.14
8.15 - 10.15
10.16 - 12.16
N
0 0.5 1 Miles

Figure A-2.

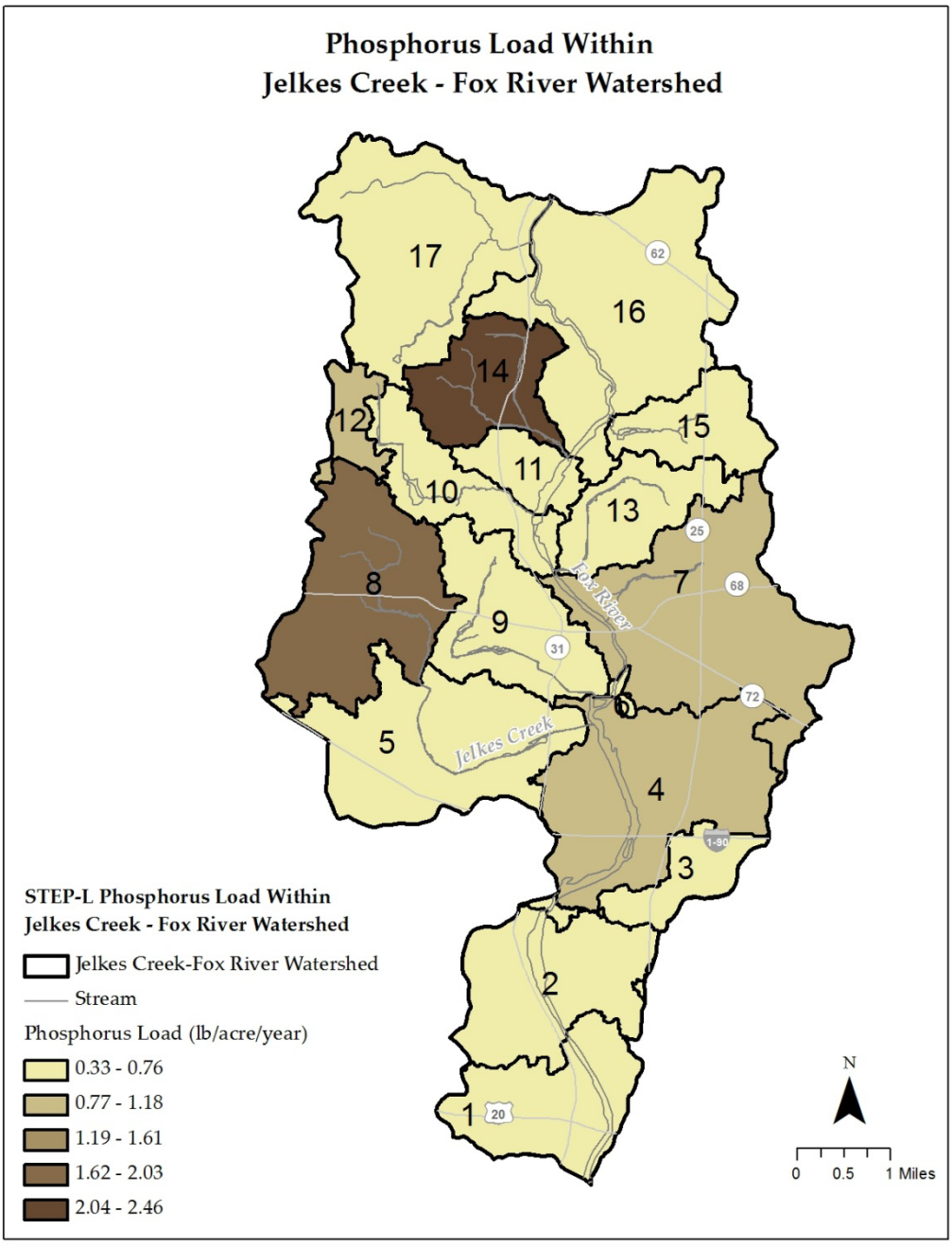

Phosphorus Load Within
Jelkes Creek - Fox River Watershed
17
16
14
12
15
11
10
13
8
7
9
6
5
4
3
2
1
62
25
68
31
72
20
I-90
Fox River
Jelkes Creek
STEP-L Phosphorus Load Within
Jelkes Creek - Fox River Watershed
Jelkes Creek-Fox River Watershed
Stream
Phosphorus Load (lb/acre/year)
0.33 - 0.76
0.77 - 1.18
1.19 - 1.61
1.62 - 2.03
2.04 - 2.46
N
0 0.5 1 Miles

Figure A-3.

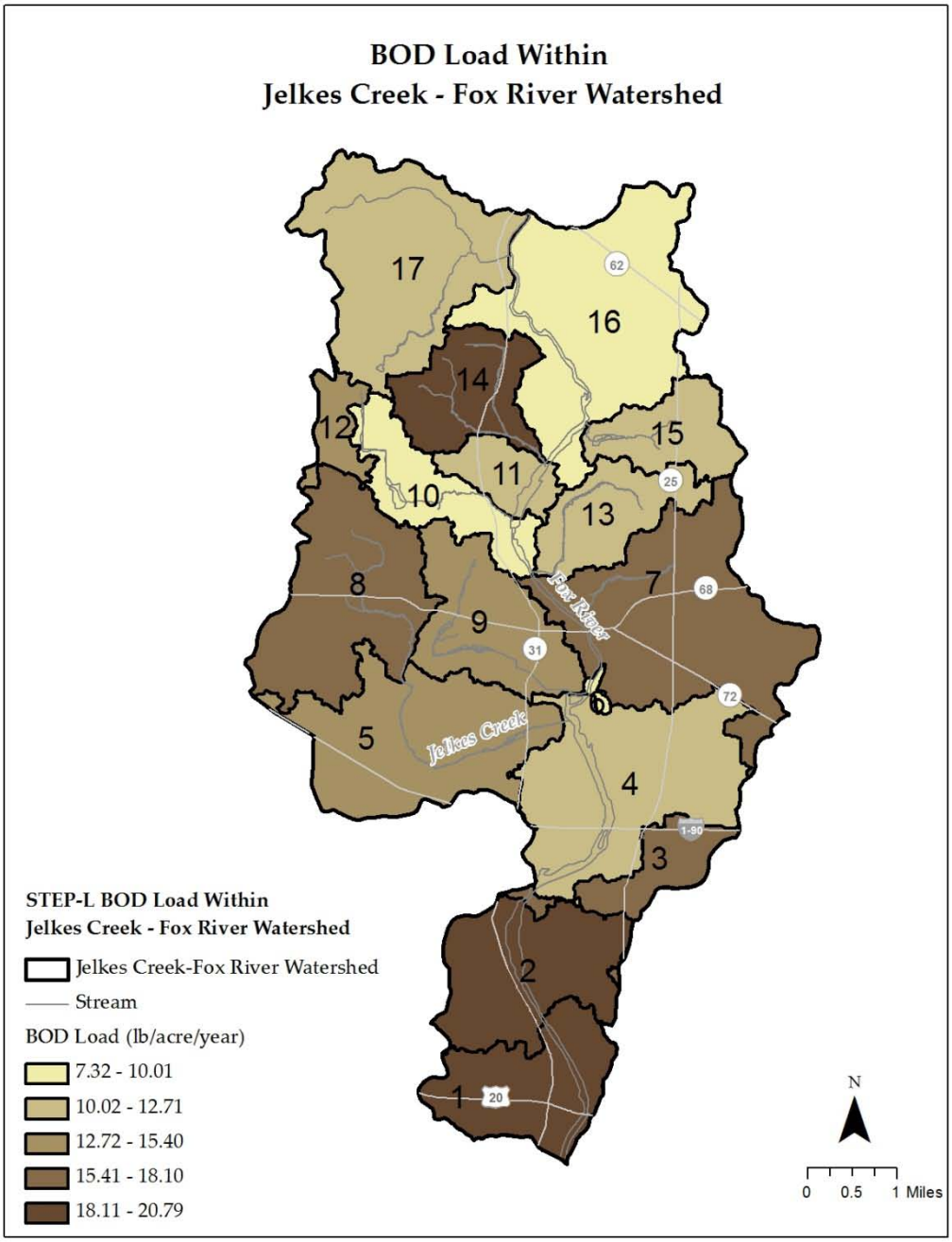
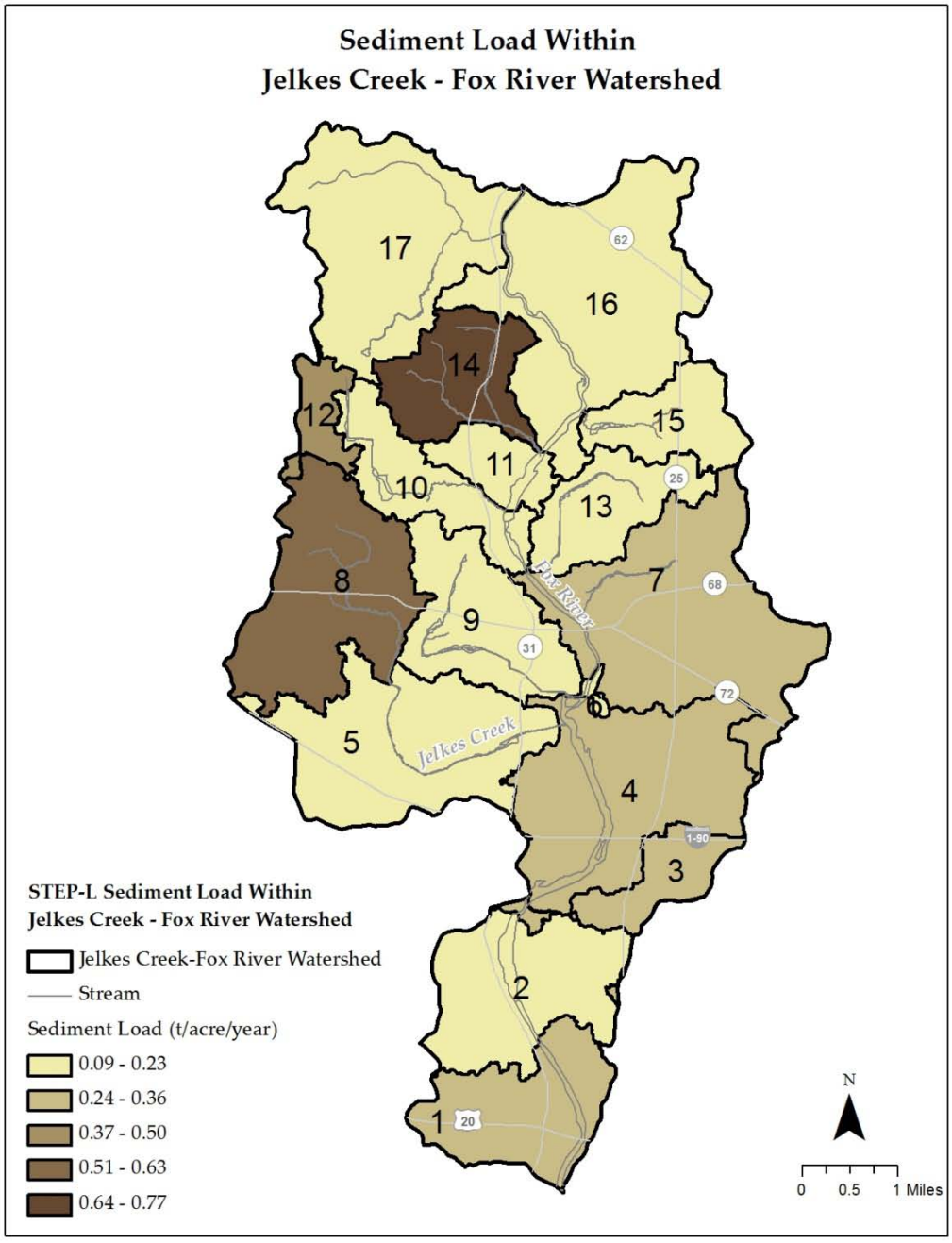

BOD Load Within
Jelkes Creek - Fox River Watershed
17
16
14
12
15
11
10
13
8
7
9
6
5
4
3
2
1
62
25
68
31
72
1-90
20
Fox River
Jelkes Creek
STEP-L BOD Load Within
Jelkes Creek - Fox River Watershed
Jelkes Creek-Fox River Watershed
Stream
BOD Load (lb/acre/year)
7.32 - 10.01
10.02 - 12.71
12.72 - 15.40
15.41 - 18.10
18.11 - 20.79
N
0 0.5 1 Miles

Figure A-4.


Sediment Load Within
Jelkes Creek - Fox River Watershed
17
16
14
12
15
11
10
13
8
7
9
6
5
4
3
2
1
Jelkes Creek
Fox River
62
25
68
31
72
1-90
20
STEP-L Sediment Load Within
Jelkes Creek - Fox River Watershed
Jelkes Creek-Fox River Watershed
Stream
Sediment Load (t/acre/year)
0.09 - 0.23
0.24 - 0.36
0.37 - 0.50
0.51 - 0.63
0.64 - 0.77
N
0 0.5 1 Miles

Appendix B: Jelkes Creek Area Investigation Report, Conducted by Roger D. Windhorn of the USDA Natural Resources Conservation Service. Prepared July 2012.

July 2012
R.D. Windhorn

JELKES CREEK AREA

INVESTIGATION CONDUCTED

HUC 071200070102

An erosion and sedimentation inventory was conducted for the Jelkes Creek study area located in Kane County. The watershed totals approximately 26,200 acres or about 40.9 square miles. Sediment Delivery Rates (SDR) for each type of erosion occurring within the watershed were also calculated. The main goal was to estimate **total** erosion in the area and sediment load in selected subwatersheds.

The majority of the watershed lies within the Great Lake Section of the Central Lowland Province physiographic area. Within the Great Lake Section, it is specifically located within the Wheaton Morainal Country. This area is rolling and contains many closely spaced Wisconsin-aged glacial moraines. In most areas, a thin layer of Peoria Loess overlies glacial till of the Haeger Member of the Lamont Formation. Along the Fox River and adjoining terraces, sand and gravel deposits of the Batavia Member of the Henry Formation are present. The loess or silty layer ranges from one to two feet in thickness to less than one foot in some areas, especially on sloping landscapes. It can be totally absent on the eroded side slopes. The Haeger Member is a grayish to brownish till that is calcareous and contains lenses of gravel and coarse sand. In a few areas adjacent to the Fox River valley, the gravelly and sandy layers of the Batavia Member are prominent and may be greater than 40 feet in thickness. The main Fox River channel cuts through deposits of Cahokia Alluvium which is underlain by either glacial till or sand and gravel deposits. Overall thickness of the unconsolidated material over the bedrock varies, but in general the bedrock is not exposed anywhere within this area.

Landscape features called *moraines*, which are curved ridges deposited by a glacier, lie along the eastern and western sides of the watershed. The east side is bordered by the West Chicago Moraine and the western side by the smaller, Barlina Moraine. Slopes on moraines generally are short, relatively steep, and somewhat disconnected. Many of the smaller tributary streams of the Fox River originate on these moraines. A series of curved moraines indicate different advances and retreats of glaciers in an area. Sometimes the intervening areas between these curved ridges offered no outlet for the water produced by the melting ice. When that happened, small lakes were formed that contained silt and clay lacustrine deposits. These small flat to depressional areas can be found within the watershed. These silty and clayey deposits collectively are called the Equality Formation deposits.

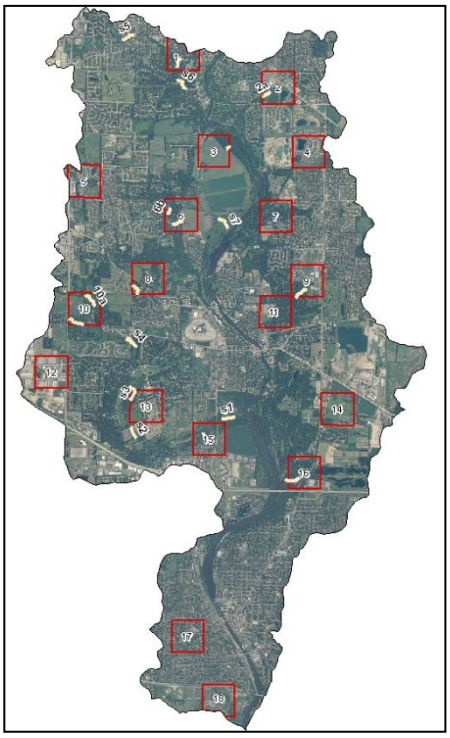
On the steeper upland slopes, the glacial till can be exposed on the surface, where the loess has been removed by erosion. The location of these surficial deposits has a significant effect on erosion and sedimentation that occurs within the watershed. The surface texture of the soils in greater than 70% of the watershed is a silt loam, reflecting the characteristics of the loess cover that blankets nearly the entire region. This material is quite erosive and is easily removed if exposed to running water. The alluvium in the streambanks can contain a variety of materials with many different textures and grain size content. This is especially noticeable where the stream is running through coarser, sandier deposits. Stability of the streambanks is greatly dependent on the shear strength of the material, and on a watershed scale, it is difficult to make “general” statements about overall conditions. Site specific determinations are essential for future streambank stabilization activities. Overall total relief in the watershed is estimated to be 250 feet or so, with a high along the top of the moraine in the northwest part of the watershed at about 950 feet to a low about 700 feet, near the exit of the Fox River from the watershed.

PROCEDURE

The entire watershed was divided into "pieces" to analyze. To do this, three Geomorphic Units (GU) were set up. These Geomorphic Units are simply landscape units that are similar in geology, slope, soil, etc. and

in anticipated response to erosion. These units are: **GU1**, Major floodplain (sinks); **GU2**, Upland flats and depressions with slopes generally 2% or less; **GU3**, Upland, gently sloping areas, with slopes generally 2% to >5%. Each GU produces differing sediment amounts depending on dominant erosion within it. Some, as in GU1, serve more as sediment "sinks" or deposition areas than they do as "sources" or eroding areas. Within GU2, there are a few areas that literally produce no sediment that will impact a surface water body. Generally they are flat or even depressional areas of less than 2 percent slope. They are not impacted directly by run-on water and are more than 1300 feet from a concentrated flow area (waterway, ditch, gully). These areas have a very low priority for watershed land treatment, in regards to affecting water quality at the outlet.

At least five different types of erosion can produce sediment: *sheet, rill, ephemeral, gully, and streambank*. In the Jelkes Creek area (Fox River) watershed, *sheet and rill erosion* values were computed from data gathered during the Erosion and Sediment Inventory. In NRCS, we use a process referred to as the Rapid Assessment, Point Method (RAP-M) to statistically estimate erosion and sedimentation rates within any given watershed by sampling a portion and then expanding this data to fit the entire watershed. A Random-Stratified Sampling procedure was used to select areas to be sampled. These units are 160 acres in size and are selected throughout the watershed, with an attempt to characterize all different land uses that are present. Inventory data collected in the field from these sites included all information necessary to compute sheet, rill and ephemeral erosion losses. Eighteen sample units were set up for this watershed. Using this data, an **average annual** soil loss rate for each type of major land use within the watershed was determined. If the total number of acres for each land use is multiplied times this rate, a gross amount of sheet and rill erosion occurring within the watershed can be estimated. From these same 160-acre sample units, gully reaches were also selected, again using a random procedure.



Ephemeral or "annual gully" erosion was evaluated in the field during the inventory. It was decided that ephemeral erosion was not a significant factor in this landscape because of the low acreage of agricultural fields which tend to produce most of this erosion. ***Because of this, ephemeral erosion totals are not included.***

Gully erosion was measured in the field within the above mentioned sample units. A selected number of "concentrated flow areas" were identified on the sample map. These represent areas which could be actual gullies. In-field measurements were made on both the left and right banks in regard to severity of erosion *or* it was noted that they were non-eroding units. An erosion rate, called a "Lateral Recession Rate," was applied to channels that were indeed eroding. These values were summarized and combined to produce an **annual** rate of erosion in tons or pounds of soil material removed per linear foot of gully. The estimated feet of gullies per sample unit was obtained by measurement from 7.5 minute quadrangle maps, with in-field checking and verification. This value was then expanded to fit the remainder of the watershed.

Streambank erosion was calculated in a manner very similar to the method used for the gullies. Selected segments of the main creek and the major named tributaries were walked. The *rate* of streambank erosion was calculated exactly as it was done for the gullies, using slightly different qualitative parameters and then summarized. Using the measured rates of streambank erosion and the map measured miles of streams that are currently eroding, an estimate of the *average annual* quantity of erosion taking place was obtained.

In a dynamic environment that is constantly adjusting to man-made and geologic conditions, gullies and streams are in a perpetual state of shifting between downcutting and deposition. During field measurements, an attempt was made to verify the overall general percentage of gullies and streambanks eroding or changes in these percentages based on landforms, soils, etc. If this field-verified value was significantly different from that percentage arrived at from the sample inventory, then a slight adjustment was made in the overall rate of gully erosion to account for this.

ACREAGE

Acreage totals for all the selected land use categories were estimated from the 160-acre sample units. Land use categories of **cropland**, **woodland, urban land and water** were selected to evaluate. *Cropland* was sampled in enough detail to allow a separation of several slope classes. Those classes are "A" slope (0-2%), "B" slope (2-5%) and "C+" slope (5%+). *Woodland* was not separated into slope classes and consists of slopes ranging from 0% to >20%. *Urban Land* also was not separated into slope classes and includes relatively new subdivisions and those that have been established for many years. It also includes areas of >85% asphalt, concrete, roofs, etc. that are common in dense urban areas. *Water* was the final category selected and consists of upland perennial water, lakes in gravel pits, and the main surface water of the Fox River. Although the acreage figures are not firmly established in the watershed, they were estimated from randomly selected sample units and will be accurate for our watershed survey. *All land use totals contain other categories that could be delineated at a different map scale.* Total acreage in the Jelkes Creek Area is listed as 26,200 acres. Cropland was broken down as 2100 acres of A slope, 2000 acres of B slope and 670 acres of C or greater slope for a total of 4770 acres. Urban land of all slopes is listed as 15,300 acres. Woodland of all slopes is listed as 5000 acres and water as 1130 acres. As mentioned above, these are numbers derived from the sample units and will serve as definitive for our study.

SHEET AND RILL EROSION in Jelkes Creek Area

Sheet and rill erosion occurs on all land whether it is cultivated or not. It is a very natural, unending process. It is more of a concern when it is accelerated by man's activities. In the Jelkes Creek area, sheet and rill erosion was estimated, on a per acre basis, for all the dominant land uses. For cropland, evaluations were made for the "A" slope (0 to 2%), "B" slope areas (2 to 5%) and for the "C" and greater slopes. (5%+) The difference between these slope groups can become quite significant from an erosion standpoint. Many different levels of land treatment are necessary to reduce the annual soil loss rate to an acceptable value. The average rate of soil loss for **A slope cropland** is about 3.2 T/A/year. This rate represents close to a "base level" of erosion for nearly level slopes. If the land is to remain in row-crop agriculture for economic reasons, then a certain amount of erosion needs to be "accepted," at least for erosion and sedimentation plans. The average rate of soil loss for **B slope cropland** is about 5.8 T/A/year. For **C+ slope cropland,** soil loss averages about 14.8 T/A/year. In recent years, landowners and operators have been interested in changing their farming practices to reduce erosion. Often times these changes included less tillage and leaving more residue on the surface

Several other land use categories were also set up and evaluated. Areas of woodland which included some brushy and grassy areas were all grouped together, regardless of slope, and have a soil loss rate of 0.1 T/A/year. **Residential or "urbanized" areas** of the watershed that included both the older subdivisions and relatively flat "new" subdivisions had a soil loss rate of only 0.45 T/A/year. However, areas that are being converted from an agricultural or wooded state to one of high-density urban use on sloping parts of the watershed, can have excessive amounts of sheet and rill erosion. Because these areas are currently of small extent in this watershed, they were not evaluated separately. For this watershed, no estimate was made on total acres of land converted each year from agriculture to urban. The "conversion process" of

stripping the land of all vegetation and topsoil and then applying general land grading to construct facilities makes the land extremely vulnerable to excessive erosion.



Total sheet and rill erosion from **cropland** is estimated to be **28,200 tons per year**. This figures out to be about 5.9 T/A/year for all cropland. Most of the soils in this watershed have tolerable soil loss (T) values of 4 or 5 T/A/year. This means that if erosion rates are at or below the "T" value, long-term cropland sustainability is likely. Total **woodland** areas in the watershed produce about **500 tons per year**. Older **residential and urban areas** or areas that are under development on relatively flat slopes generally produce about **6,900 tons of erosion per year for the entire watershed**. Areas currently under development on sloping land were not sampled individually for this inventory. **Total sheet and rill erosion** in the Jelkes Creek area is estimated to be **35,600 tons per year**. This is roughly 1.4 T/A/year for each acre of land in the entire watershed.

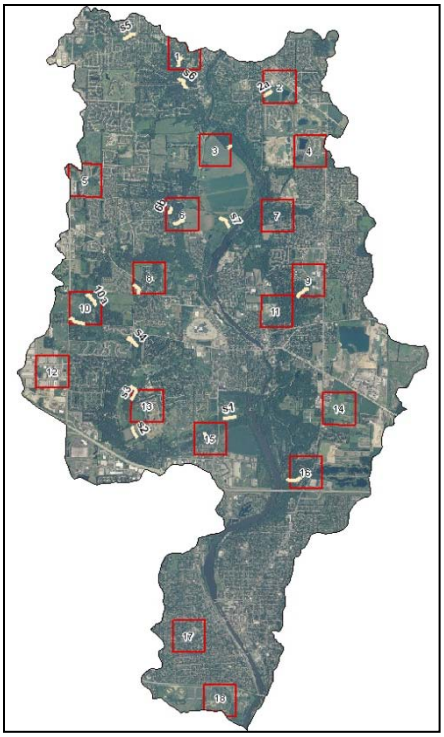
EPHEMERAL EROSION in Jelkes Creek Area

Ephemeral erosion occurs when tiny rills coalesce into small channels that tend to "funnel" water in a concentrated flow. These ephemeral or "annual" gullies are usually destroyed each year as the tillage for the year is completed or other land disturbance takes place. However, if the rate of erosion is great enough, the small channels will enlarge, even in a year's time, to concentrated flow areas that are too large to be crossed with normal tillage or construction implements. These can then become perennial gullies. These ephemerals generally begin to form where relatively flat or gently sloping soils "break" into steeper areas. Often times, they form on the edge of cultivated fields where the perennial vegetation is no longer in place to hold the soil during the high water flow times or in areas where the vegetation has been cleared as a precursor to urbanization.

In the past couple years, more emphasis has been placed on attempting to measure the amounts of erosion from these gullies, especially in agricultural areas. Studies have indicated that in some states, these contribute as much erosion, and thus sediment, as does sheet and rill erosion. After in-field evaluation, it was decided that ephemeral erosion was ***not a significant factor*** in this flatter landscape due to the relative abundance of stabilized urban environments. ***Because of this, ephemeral erosion totals are not included.***

GULLY EROSION in Jelkes Creek Area

Gully erosion was estimated in the entire watershed by selecting random "reaches," evaluating these and then expanding this data to fit the remainder of the watershed.



The premise for this is that if enough segments are randomly sampled, areas that are only slightly eroding as well as those that are more severely eroding will be selected to evaluate. This percentage can then be used throughout the watershed with statistical validity. The "qualitative assessment" used to assign Lateral Recession Rates is one that bases observed physical features of the gullies with actual measured amounts from many Midwestern watersheds. In the Jelkes Creek area, some of the "gullies" or "concentrated flow areas" marked on the sample map are actually more stabilized flow areas. Rates of gully erosion were quite variable and ranged from 1 pound per linear foot to 420 pounds per linear foot! This is quite a significant and somewhat unexpected range. The very low numbers indicate a stable flow area while the larger rates are indicative of severe down cutting along a very active gully. Rates of 420 pounds suggest that 4.5 cubic feet of soil are being washed away from every foot of active gully on an **annual basis**. The gullies that are active and inventoried contained some knickpoints or small overfalls in the base of the channel. This does indicate recent downcutting and also indicates a difference in soil

material. In areas where loess overlies glacial till or glacial outwash, a series of these knickpoints can be traced up the gullies. In regard to sediment production, each type of material produces different rates. The loess is most susceptible and will readily collapse into the gully and move off-site. The glacial till has more strength and is more difficult to erode, but can be eroded over time. Glacial till generally contains the large stones and much of the sand and gravel that is observed in the streambed farther downstream. It was determined in this watershed that the majority of the gully erosion is occurring in GU3, which is the most sloping area known as the Fox River Bluffs. A measured acreage of about 12,500 acres encompasses the area most susceptible to gully erosion. A *total number* of gullies occurring in this portion was estimated from map measurement in the designated 160-acre samples units. The *total length* of gullies was then established. Applying the same *rate* as was determined from in-field measurements, an estimate of tonnage of erosion was made. In the Jelkes Creek area, about **6,930 tons** of soil is eroded each year that can be attributed to **gullies.** Most of this comes from the gullies that lie immediately adjacent to the Fox River, along the main channel of the river itself, or along the lower reaches of the main tributaries.

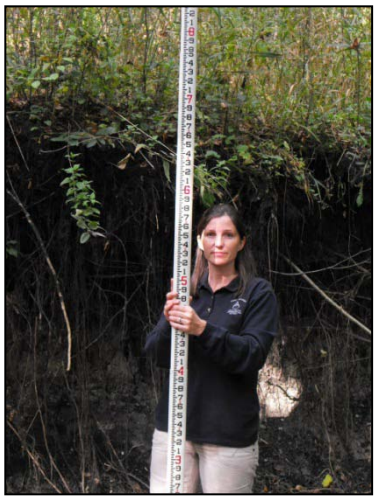
STREAMBANK EROSION AND SEDIMENTATION in Jelkes Creek Area

Streambank erosion in any watershed is a rather complex and detailed process. As streams meander across their valley or floodplain, "new" sediment is being continually added into the system as the streams cut into their banks. However, sediment is also being deposited in perhaps other portions of the streams as energy levels rise and fall. If the net effect remains somewhat constant over a period of years, the streams are considered "stable" and the changes are considered to be part of a "dynamic equilibrium" condition that exists within the watershed. If, however, this ongoing process is skewed one way or the other and either severe downcutting and bank caving predominates or extreme rates of sedimentation within the streams are occurring, then they are considered to be "unstable". In truth, many streams experience all of this variation if all stream reaches from headwaters to mouth are considered. To determine the magnitude of the dominant process occurring, the streams themselves must be walked and evaluated. In most cases, no other "measured" streambank data has been gathered in the past. These **estimates** become the base for determining present sediment yield and future projections that would be modified by treatment measures in the watershed.

The field data collected by NRCS/SWCD personnel conducting the Streambank Inventory contained estimates of Lateral Recession Rates (erosion rates) that ranged from "slight" (0.03 of a foot per year) up to "very severe" (3.5 feet per year) of actual *annual bank recession*. Illinois State Water Survey (ISWS) data from similar watersheds has shown that on some eroding sites, rates of lateral recession have been as high as 5 to 10 feet per year. It is assumed that on most stream reaches in Illinois the "slightly" and "moderately" eroding areas probably contribute very small amounts of sediment to the overall average annual yield.

Total mileage of streams in the watershed was taken from published hydrology data or map-measured from 7.5-minute quadrangle maps. The Jelkes Creek area contains approximately **14.6 miles** of named and unnamed *perennial* streams. Most of this mileage is on the west side of the Fox River. On the east side, few streams are present, and those that are, appear to be relatively short or have been buried into storm sewer pipes and outlet directly to the Fox River. The large number of active and old gravel pits on the east side also seems to have "eliminated" some of the free-slowing streams that might have existed earlier. **Note:** The Fox River is NOT included within this streambank erosion study.

In this inventory using NRCS methods of "visual assessment," an overall rate of **average annual** streambank erosion was calculated for some of the major stream channels. (NRCS, RAP-M Rapid Assessment, Point Method, Erosion and Sediment Inventory Procedure, 2001) An average annual rate of erosion for all the *perennial* tributaries is estimated to be about **156** pounds of sediment per linear foot of streambank. Of the streams sampled the range of erosion was from 1 pound per linear foot to a high of 565 pounds per linear foot! As with the gullies, this broad range is somewhat unexpected. The high rate of 565 pounds indicates that **6.3** cubic feet of streambank material is



being eroded from each linear foot, on an *average annual basis*. This rate is quite severe and will or has already created bank stability problems affecting the surrounding area. **Total streambank erosion** in the Jelkes Creek area is estimated to be **6,000 tons**, which is considered to be an **average annual rate.**

SEDIMENT DELIVERY RATES (SDR)

Only a portion of the sediment produced reaches a concentrated water source. The stream system itself transports only a portion of what actually enters it. To account for this, Sediment Delivery Rates (SDR) are used. These factors are similar to the "Blue Book" value of a used car - for a car, you start out with a base value and then add or subtract from that, depending on the options and mileage on the car. For this watershed, you start out with a "standard" value and then adjust this number up or down based on landscape characteristics. The Jelkes Creek area watershed is a “youthful” watershed, geologically, with short, steep slopes along the major drains and on the face of the glacial moraines. Longer and more gentle slopes are found in the upper reaches of the watershed. Broad flat to depressional areas are also present. Stream dissection and downcutting is evident in a few areas, primarily along the lower end of the major tributaries. In short, some of the sediment moves just to the base of the slopes while other sediment may move entirely through the watershed.

SDR's vary for each type of erosion, as would be expected. Sheet and rill erosion and the sediment it produces varies dramatically across this watershed. In the sloping area surrounding the main stream channel and the other major tributaries, sheet and rill erosion ***potential*** is greatest. The land is more sloping and the slopes are often short and “choppy”. Conversely, in the areas of the watershed where the slopes are longer and more gradual or the land is nearly level, the soils do not have high erosion potential. Along the path to a concentrated water flow area, many options are available for the sediment. Small sinks or traps are found within this watershed. These include potholes, small ponds, detention facilities, small lakes, wetlands, and even the flat parts of upland fields. In many cases, the floodplains can serve a very natural and useful purpose by also keeping sediment from entering the streams. Some of these "local" sinks effectively capture nearly 100% of the sediment produced above them in their subwatershed.

SEDIMENT DELIVERY RATES in Jelkes Creek Area

Sediment Delivery Rates (SDR) are used to predict the quantity of sediment that is moved or "available for transport". For example, sediment is produced on a sloping, cultivated field each year as the farmer chisel plows the field. The sediment moves down the slope and some of it becomes immobilized as it imbeds itself within the grass or is deposited where there is a change in slope. Some of it, however, is in a position near a waterway, or ditch, or shallow field channel that makes it available to move farther with the next storm event. SDR's are developed for each type of erosion and often several are developed for sheet and rill erosion, based on where the slopes are within the watershed.

Sheet and rill erosion has the most complicated Sediment Delivery Rate, because it involves sheet or laminar flow, as opposed to channel flow. Some of the factors involved in determining this are land slope, distance from a concentrated flow area, slope configuration, NRCS runoff curve number (Engineering Field Handbook, Chapter 2, "Estimating Runoff"), and a surface roughness coefficient. Usually a "base rate" is determined for the conditions in the watershed or subwatershed, and then adjustments are made to that rate based on subsidiary conditions. A strong attempt is made to apply these criteria in a uniform and consistent manner throughout. Since sheet and rill erosion from ***cropland*** areas can be so variable, no single value of SDR seemed to suffice. For cropland areas, three different SDR's were used, determined by differences in slope and distance to outlets. Sediment movement can be rapid in the sloping parts but appear to be more disjointed in the flatter parts. ***Woodland*** is a land use primarily along the main stream tributaries. It is comprised of areas that are relatively undisturbed and those that have been altered somewhat either by removing vegetation or by light construction activities. Although the slope range was fairly significant, soil loss was relatively consistent due to the rather dense

wooded and understory vegetation. Because of that, only one SDR was used for all. In some cases, selective clearing can help reduce the SDR for these areas. Finally, ***urban areas*** had a separate SDR applied because the close-cut lawns and landscaping in the yards causes transport factors to be significantly different than cultivated fields. Runoff from impervious areas, such as driveways and dense roof top concentrations, are considered inclusions within the urban category. Steeply sloping areas currently being "developed" that have been stripped of vegetation and/or have been altered due to earth moving activities would have different SDR's also. As mentioned earlier, these areas did not make up enough of the 160-acre sample units to be statistically valid throughout the watershed. The five different SDR's used in this watershed for sheet and rill erosion ranged from 0.18 to 0.60.

Gully and streambank erosion are both considered to be a form of channel erosion. Channels generally have larger SDR's because often times the erosion-produced sediment comes from the channel bottom and sides themselves, therefore naturally being more directly tied to delivery into the stream system.

Gullies serve as almost the "perfect funnel" to move sediment directly into the entire stream system. Gullies that lie immediately adjacent to the main channel may have SDR's of 0.90 to 1.0 while gullies that occur in the extreme upper reaches of a watershed may have a range of 0.50 to 0.70. In this watershed, one SDR of 0.70 was used for all the gullies.

Streambanks have an SDR of 0.90 to 1.0. Literally everything that is eroded from the streambanks falls in the stream and is immediately available for transport. This is one of the reasons that even though the quantities of sediment produced by streams is not as great when compared to some of the other sources, it is literally 100% "delivered". Sheet and rill produces large quantities of sediment, but only a fraction of it actually enters the system. Therefore, it is often times more important to treat the streambank areas because the sediment is much more "concentrated" and can often be considered a "point" source of pollution.

SEDIMENT TRANSPORT for Jelkes Creek Area

Sediment Transport is the final step in our erosion/sediment cycle. Sediment Transport Factors (STF) attempt to rate the overall effectiveness of the *entire stream system* in moving sediment through. Sediment transport is based on drainage density, drainage texture, relief/length ratios, valley slope of 3rd order streams (Strahler Stream Order Classification Method, 1952), size of the watershed, type of sediment that is predominant, percent of the watershed "controlled" by natural or man-made "sinks", stage of stream system development, etc.

Stream systems that are relatively small, have high gradients, and have small tributaries that reach to the highest segments of the uplands move sediment through completely and rapidly. Watersheds that are quite large with numerous locations for sediment to drop out, have low stream gradients, and have numerous undrained upland areas are much less efficient in moving the total sediment load. Excessive erosion and its accompanying sedimentation can lead to filling in of ponds and lakes as well as contributing to excessive siltation in small streams.

For small watersheds such as this one, sediment transport is better handled as a component of the Sediment Delivery Rate, for each particular type of erosion-produced sediment.

SUMMARY OF EROSION AND SEDIMENTATION IN JELKES CREEK AREA

In the Jelkes Creek area, an estimated **48,530 tons of erosion** occurs on an annual basis from the major types of soil erosion. If this number is divided by the number of acres in the watershed, an erosion rate of about 1.9 tons per acre per year is obtained, when ALL sources of erosion are considered. Approximately **23,750 tons of suspended sediment** is produced. This gives an overall rate of 0.9 tons per acre per year or 580 tons of *suspended sediment* per square mile of watershed when the entire watershed is considered. At 60 pounds per cubic foot, this calculates to be **18.1 acre-feet of sediment.**

Roughly 57% of the sediment comes from sheet and rill erosion. Gully erosion (channel) contributes about 20% and about 23% from streambank erosion (channel). A couple of discussion points should be mentioned here. Within the 57% figure above, sheet and rill from C/C+ slopes contributes nearly half of the total. Sloping cultivated or disturbed areas in general are always high producer of erosion and sediment within a watershed. Often times, as is the case here, these areas make up a small percentage of the land but contributed significantly to erosion and sediment problems within the watershed. There is at least some potential reduction in sediment possible by implementing land treatment alternatives on this land. The flatter A and B slopes have both lower erosion rates and also much lower sediment delivery rates. These lower numbers do not offer great potential for future reduction in sedimentation.

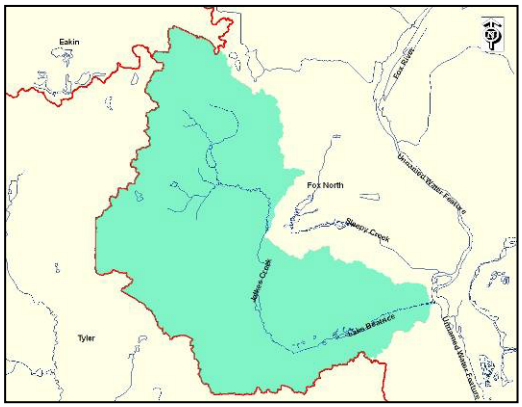
Bedload material is very seldom measured as an output at the point of delivery, because of the cost and extensive sampling equipment that is necessary to complete this job. U.S. Geological Survey gauge stations do not routinely sample or measure this material. General estimates can be made, based on suspended sediment quantities. In Illinois, estimates of 5 to 20 percent of this total can be used. In this case, using NRCS methods, roughly **2,375 tons** can be added to the total suspended load. This would bring the **total sediment load delivered to 26,125 tons, on an average annual basis**. **NOTE:** Caution must be taken when using "average" values. If the range includes sediment quantities delivered in a very wet year and a very dry year, an average value somewhere in between will fail to capture the significance of these wide climatic variations. On the other hand, for general planning purposes, perhaps an average value that

can be considered relatively consistent from year to year is more appropriate. This estimated amount of sediment delivered is based on watershed-derived erosion and doesn't represent a *measured* amount at the outlet end. In most cases, bedload type, composition, and grain size coming from the streambanks and streambeds, is used extensively in channel design and channel geomorphology studies but is not routinely reported.

WATERSHED SUMMARY FOR *JELKES CREEK*

Most of the RAP-M watershed studies deal with predicting erosion and sedimentation within a single watershed. The end product is an erosion summary, but also an estimate of total sedimentation in the watershed and a total actually delivered to the outlet end. Sometimes the outlet end is a lake, larger stream system, or even a named river system. This Hydrologic Unit, called here Jelkes Creek *Area (Fox River)*, does not fit that situation. There is not one "collecting" stream that serves as a unified outlet of sediment into the Fox River. Because of that, the named stream of Jelkes Creek was selected as a smaller subwatershed that could be evaluated in this manner.

Jelkes Creek subwatershed is approximately 4,326 acres in size. It outlets directly into the Fox River. To complete our assessment, the same procedure is used that was incorporated for the entire area. Only sample units within the subwatershed were used. Adjustments for gully and stream totals were also made. Land use categories were the same. There are approximately 2,293 acres of urban land, 1,211 acres of woodland, 260 acres of water, and 562 acres of cropland. Of the cropland, 247 acres are A slope, 236 acres are B slope, and only 79 acres are C slope or greater. If the same erosion rates are assumed and used, then **3,328** tons of erosion occur from **sheet and rill erosion on cropland** each year. **Urban land** would contribute 1**,032 tons** and **woodland another 121 tons** of sheet and rill erosion, for a **total of 4,481 tons**. The adjusted rate of erosion for the **gullies** would be 176 pounds per foot, giving an additional **1,394 tons** based on the partitioning of the GU 3 for the subwatershed. A new erosion rate for stream reaches



would be 125 pounds per linear foot for a total **streambank erosion of 1,750 tons. Total erosion** from all sources in our Jelkes Creek subwatershed would be **7,625 tons**.

Sediment Delivery Rates would be applied exactly as they were for the larger watershed and would yield the following sediment totals: 142 tons A slope cropland, 438 tons B slope cropland, 701 tons C slope cropland, 361 tons from urban land, and 54 tons from woodland, for a total sheet and rill derived sediment total of 1696 tons. An additional 976 tons from the gullies and an additional 1575 tons from the streams gives a **grand total of suspended sediment of 4,247 tons**. A bedload estimate of 10% gives about 425 tons and a complete **sediment load delivered to the Fox River of about 4,672 tons** which is roughly 3.6 acre-feet per year. These total erosion and sediment values can be used in the planning process to assign priorities for land use treatment, identify areas of concern, project where problems may be occurring in the future, and sometimes simply to eliminate perceived problem areas!

GEOMORPHIC SUMMMARY

Assessing the overall "dynamic equilibrium" stage in a watershed is most difficult indeed! In other words, is the stream system still degrading or has the sediment production in the watershed reached a peak and now will begin to decline?! Several geomorphologists years ago developed a landscape model called the Channel Evolution Model (CEM). It was intended to determine the relative differences between gullies/streambanks that were progressing from a "stable" condition, Stage 1, through a series of "unstable" steps to a new, but geologically and physically lower "stable" elevation called Stage 5. This process can take decades or several millennium. The Jelkes Creek (Fox River) watershed is undergoing incision or downcutting in some of its larger tributaries and in the upper, morainal part. (Stage 2) As long as downcutting is occurring, continual amounts of sediment will be produced. This rate of sediment production will only begin

to decrease when the streams reach a condition of bed stability that will allow, in turn, the streambanks to stabilize. (Stage 4) Watershed efforts can assist this progression, but total watershed stability is a long way in the future!

Erosion and Sediment Totals for Jelkes Creek

	Erosion (tons)	SDR	Sediment Produced (tons)
Sheet/Rill			
Cropland			
A	790	0.18	142
B	1,369	0.32	438
C/C+	1,169	0.60	701
Woodland	121	0.45	54
Urban	1,032	0.35	361
Subtotal	**4,481**	**-----**	**1,696**
Gully			
	1,394	0.70	976
Streambank	1,750	0.90	1,575
TOTAL	**7,625**	**-----**	**4,247suspended**

Estimated Bedload Content (10%) - 425 tons

TOTAL SEDIMENT **4,672 tons**

@60 pcf 3.6 ac-ft

CONSIDERATIONS FOR EROSION AND SEDIMENT CONTROL

1. Concentrate any land treatment alternatives on the sloping (>5%) areas that lie immediately adjacent to the channels and streams themselves for the most effective land treatment control. In other words, the "flat" land doesn't really produce much sediment so don't spend unproductive time and effort here.

2. If needed, select a "pilot" subwatershed and concentrate land treatment or structural control efforts here. From this base a better estimate as to effectiveness of these controls could be made for the remainder of the entire watershed. These smaller subwatersheds also give the local people a better visual example of how their control methods will work.

3. Select highly visible or locally known eroding sites for demonstration areas, particularly if streambank stabilization is included as part of the project. Easier to point at these to show how effective local efforts have been.

4. If small structural measures are used in the watershed, it is important to remember that they generally will "control" the **sediment** produced from **all types of erosion** above them in their own subwatershed. This is an important point from a watershed management perspective: structures control sediment more so than erosion. If a structure is placed in a drainageway and surface water runs into or through it, a sediment reduction will occur due to the trapping efficiency of the water pool. The surface water might be carrying sediment derived from sheet, rill, ephemeral, and gully erosion but much of the suspended and nearly all the bedload is trapped, regardless of the source.

5. Streambank stabilization projects "attack" localized sediment production directly. However, streambank projects don't deal with reducing sediment that is already in the stream system from other upland sources.

6. In areas where significant land use change is anticipated, monitoring of increased erosion and sediment rates is recommended. Even relatively small areas can significantly increase the sediment load on the stream system or subsystem.

7. Structural means of sediment control have been effective on smaller watersheds, utilizing measures that we already have experience with. Streambank stabilization projects on the most severely eroding sites are encouraged. These not only reduce sediment load at the site, but tend to cause a "ripple effect" on downstream streambank and streambed stabilization.

8. Need to recognize the differences between sediment sources and their effective means of control. Sheet and rill erosion and the sediment it appears to produce always seems significant but remember that many acres of land need to be treated before sediment control efforts will begin to pay off at the lower end of the watershed. If soil loss rates on much of this land is already low, chances of reducing soil loss further that will significantly reduce sedimentation in the watershed are very poor. With channel erosion, especially streambank erosion, stabilization projects have an almost immediate effect on sediment production and movement within the stream. I suggest that more than just "totals" are evaluated within a watershed when considering treatment – look also at feasibility of solutions, cost:return benefits of solutions, and ease with which the solutions can be blended into an overall sediment reduction plan for the watershed.

9. All totals for erosion and sedimentation in this report are given in "average annual" figures. There are some inherent dangers in this because in some years, the amount projected will vary significantly from that amount actually produced. It is very difficult to measure or estimate streambank erosion when it is occurring at its highest rate during extreme storm conditions. Because of this, we try to estimate "what happened" by looking at "what now." Obviously, discrepancies can arise. Our procedure is considered more appropriate for "planning purposes" than for site-specific "engineering purposes." It also helps to explain variations in our estimates from those made by other folks. It there a right or wrong answer? – probably, but very elusive. Use ALL totals as first-order estimates – NOT an absolute number!

Erosion and Sediment Totals for Jelkes Creek *Area*

	Erosion (tons)	SDR	Sediment Produced (tons)
Sheet/Rill			
Cropland			
A	6,700	0.18	1,200
B	11,600	0.32	3,710
C/C+	9,900	0.60	5,950
Woodland	500	0.45	225
Urban	6,900	0.35	2,400
Subtotal	**35,600**	**-----**	**13,500 (57%)**
Gully			
	6,930	0.70	4,850 **(20%)**
Streambank	6,000	0.90	5,400 **(23%)**
TOTAL	**48,530**	**-----**	**23,750 suspended**

Estimated Bedload Content (10%) - 2,375 tons

TOTAL SEDIMENT **26,125 tons**

@60 pcf 19.9 ac-ft

Appendix C: Jelkes Creek-Fox River Ordinance Checklist Highlights/Summary of Results

The checklist responses provided by the communities are tabulated below. Communities that meet a higher standard for individual checklist items are listed by name, or abbreviation, and highlighted in yellow.

Comprehensive Stormwater Standards

Stormwater Drainage and Detention

Does the stormwater management ordinance:

▪ Include control of runoff *rate*, *volume*, and *quality* in the purpose statement?
Yes __X___ No _____

▪ Encourage the use of permeable paving, green roofs, and similar practices that reduce the quantity of runoff that must be handled with innovative or conventional drainage practices?
Yes __X___ No _____

▪ Encourage/require the use of natural drainage practices (e.g., swales, filter strips, bio-infiltration devices, and natural depressions over storm sewers) to minimize runoff volumes and enhance pollutant filtering?
Requires _____ Encourages__X____ Neither_____

▪ Provide detention credit for practices, such as permeable paving or bio-infiltration, that provide temporary storage of runoff in the sub-surface void spaces of stone or gravel?
Yes __X___ No _____

▪ Require that peak post-development discharge from events less than or equal to the two-year, 24-hour event be limited to 0.04 cfs per acre of watershed? (The Kane County Stormwater Ordinance effectively achieves a 2-year control similar to this by virtue of its 0.1 cfs/acre requirement for the 100-year event.)
Yes __X___ No _____ Other_____

▪ Require detention design standards that maximize water quality mitigation benefits, with a requirement for "naturalized" wet bottom and/or wetland basins over dry basins?
Yes _____ No _____

▪ Require conformance to numerical water quality performance standards (such as percent removal of sediment or phosphorus)?
Yes _____ No _____ Comment_____

▪ Prohibit detention in the floodway?
Yes _____ No _____Algonquin, East Dundee

▪ Prohibit on-stream detention, unless it provides a regional stormwater storage benefit (e.g., for upstream properties and/or multiple sites) and is accompanied by other upstream water quality BMPs, such as bio-infiltration?
Yes __X___ No _____

▪ Prohibit the direct discharge of undetained stormwater into wetlands?
Yes _____ No _____

▪ Require formal maintenance plans and contracts for the long-term maintenance and vegetative management of all new detention facilities?
Yes _____ No _____Carpentersville, East Dundee, Kane, Sleepy Hollow, West Dundee, Barrington Hills

Soil Erosion and Sediment Control

Does the soil erosion and sediment control ordinance:

▪ Include a comprehensive purpose statement which limits sediment delivery, as close as practicable, to pre-disturbance levels and minimizes effects on water quality, flooding, and nuisances?
Yes _____ No _____Kane, Sleepy Hollow, Barrington Hills

▪ Include a *comprehensive* set of principles that minimize sediment transport from the site for all storms up to the ten-year frequency event? (These principles should include provisions to minimize the area disturbed and the time of disturbance; follow natural contours; avoid sensitive areas; require that sediment control measures be in place as part of land development process before significant grading or disturbance is allowed; and require the early implementation of soil stabilization measures on disturbed areas.)
Yes _____ No _____Carpentersville, East Dundee, Kane, Sleepy Hollow, Barrington Hills

▪ Require ordinance applicability for any land disturbing activity in excess of 5,000 square feet?
Yes __X___ No _____ Other (Describe) _____

Require ordinance applicability for any land disturbing activity in excess of 500 square feet if adjacent to stream, lake, or wetland?
Yes _____ No _____ Other (Describe) _____Elgin, Kane

▪ Include explicit site *design* requirements for sediment control measures, conveyance channels, soil stabilization, construction adjacent to water bodies, construction entrances, etc.?
Yes _____ No _____ Comment_____Carpentersville, East Dundee

▪ Adopt by reference the "Illinois Urban Manual" published by the Natural Resources Conservation Service and the Illinois Environmental Protection Agency (1995, updated 2010) and the "Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" published in 1988 (the Greenbook)? (These references provide additional design standards and guidelines beyond the specific standards spelled out in the ordinance.)
Yes __X___ No _____

▪ Require routine maintenance of all erosion and sediment control practices?
Yes __X___ No _____

▪ Require inspection by appropriately trained personnel of construction sites at critical points in the development process to ensure that measures are being correctly installed and maintained? Yes _____ No _____Carpentersville, East Dundee, Elgin, West Dundee, Barrington Hills

▪ Provide effective enforcement mechanisms including performance bonds, stop-work orders, and penalties, as appropriate?
Yes __X___ No _____ Comment_____

Floodplain Management

Does the floodplain management ordinance:

▪ Include protection of hydrologic functions, water quality, aquatic habitat, recreation, and aesthetics in the purposes for the ordinance?
Yes __X___ No _____

▪ Restrict modifications in the floodway to the following appropriate uses: public flood control projects, public recreation and open space uses, water dependent activities, and crossing roadways and bridges? (The ordinance would thereby prohibit new treatment plants and pumping facilities; detached garages, sheds, and other non-habitable structures; parking lots and aircraft parking aprons; and roadways which run longitudinally along a watercourse.)
Yes _____ No _____ Comment_____East Dundee, West Dundee, Barrington Hills

▪ Discourage stream channel modification and require mitigation of unavoidable adverse water quality and aquatic habitat impacts? (This would be done in cooperation with the Army Corps of Engineers for federally jurisdictional waterways.)
Yes _____ No _____East Dundee, Sleepy Hollow, West Dundee

▪ Require effective soil erosion and sediment control measures for ALL disturbances in the floodway?
Yes _____ No _____Carpentersville, East Dundee, Elgin, Kane, Sleepy Hollow, West Dundee, Barrington Hills

Stream and Wetland Protection

Does the applicable stream and wetland protection ordinance:

▪ Include a comprehensive purpose statement which addresses the protection of hydrologic and hydraulic, water quality, habitat, aesthetic, and social and economic values and functions of wetlands?
Yes __X___ No _____

▪ Protect the beneficial functions of streams, lakes, and wetlands from damaging modifications, including filling, draining, excavating, damming, impoundment, and vegetation removal? (This could be done through some combination of avoidance and mitigation requirements, similar to Army Corps of Engineer requirements for federally jurisdictional waters.)
Yes _____ No _____Carpentersville, East Dundee, Kane, Sleepy Hollow, West Dundee

▪ Prohibit the modification of high quality, irreplaceable wetlands, lakes, and stream corridors?
Yes __X___ No _____ (The Kane County Stormwater Ordinance places severe restrictions on wetlands with an FQI greater than 25.)

▪ Discourage the modification of wetlands for stormwater management purposes unless the wetland is severely degraded and nonpoint source BMPs are implemented on the adjacent development?
Yes _____ No _____Algonquin, Carpentersville, East Dundee, Sleepy Hollow, West Dundee

▪ Designate a minimum 100 foot setback zone from the edge of identified wetlands and water bodies in which development is limited to the following types of activities: minor improvements like walkways and signs, maintenance of highways and utilities, and park and recreational area development?
Yes _____ No _____ Other (if not 100 feet) _____

▪ Establish a minimum 25-foot wide protected native vegetation buffer strip along the edge of identified wetlands and water bodies? (The Kane County Stormwater Ordinance buffer requirements range from 15-50 feet.)
Yes _____ No _____ Other (if not 25 feet) _____Algonquin, West Dundee

▪ Prohibit watercourse relocation or modification except to remedy existing erosion problems, restore natural habitat conditions, or to accommodate necessary utility crossings; and require mitigation of unavoidable adverse water quality and aquatic habitat impacts?
Yes _____ No _____Kane, Sleepy Hollow, West Dundee

▪ Encourage the restoration of stream and wetland habitat, hydrology, and morphology on development sites that contain degraded aquatic systems? (This could be accomplished through a streamlined permitting process and/or other development incentives.)
Yes _____ No _____ West Dundee

Natural Area and Open Space Standards

Does the applicable ordinance require:

Protection of remnant natural areas, including steep slopes, prairies, woodlands, and savannas (in addition to regulated wetlands and floodplains)?
Yes _____ No _____ Comment_____Algonquin, Carpentersville, Elgin

Setting aside onsite open space for residential development, generally conforming to the following guidelines: estate residential: 60%; moderate residential: 45%; urban residential: 30%? (Common open space is preferable, but deed-restricted open space also is acceptable.)
Yes _____ No _____ Other_____

Restoration of protected natural areas to reduce invasive species and enhance biodiversity?
Yes _____ No _____Carpentersville

Identification of an open space ownership entity, with a preference for a qualified public or private land conservation organization?
Yes _____ No _____ Comment_____Elgin (?), Kane

Dedication of natural open space via a binding conservation easement or similar binding legal instrument that ensures protection in perpetuity?
Yes _____ No _____ Comment_____Algonquin, Carpentersville, Elgin, Kane

Secure and permanent funding arrangements for the long-term management and maintenance of open space, natural areas, and stormwater facilities once responsibilities are turned over to a conservation entity or the homeowners/property owners association? (Said funding arrangements shall be noted and made part of the Covenants and Restrictions.)
Yes _____ No _____Carpentersville, East Dundee, Kane, Sleepy Hollow, West Dundee

Establishment of a back-up special service area (SSA) in order to provide funds necessary to support the maintenance of open space and stormwater management areas (in the event that the responsible land owner/manager does not meet the required maintenance standards)?
Yes _____ No _____ Other arrangement_____Carpentersville, East Dundee, Elgin (stormwater only), Kane, Sleepy Hollow, West Dundee

Long-term management/stewardship plans for all common open space areas, natural areas, and stormwater facilities?
Yes _____ No _____Carpentersville, East Dundee, Kane, Sleepy Hollow

Meeting measurable performance criteria for managed natural areas, including ground coverage, species diversity, and control of invasive species?
Yes _____ No _____Carpentersville

Landscaping Standards

Does the applicable ordinance:

Include "noxious weed" provisions that might intentionally, or unintentionally, preclude natural landscaping because of vegetation height standards or similar restrictive provisions?
Yes _____ No _____ West Dundee

Encourage/require the use of native plant materials for the default landscaping of common areas, stormwater facilities, common open space areas, and the buffers of streams, lakes, wetlands and other natural areas?
Encourage _____ Carpentersville, West Dundee, Barrington Hills Require _____Kane Neither _____

Specify a minimum percentage of pervious landscaping for parking lots?
Yes _____ No _____ If yes, specify percent _____Carpentersville (10%), East Dundee (1 island/10 stalls), West Dundee (no spec)

Encourage/require the use of recessed landscape islands (vs. raised islands) to facilitate the infiltration and filtering of parking lot runoff?
Encourage _____ West Dundee Require _____ Neither _____

Require provisions for long-term oversight, management, funding, and performance criteria for common areas and natural landscapes (as referenced above in greater detail)?
Yes _____ No _____ Comment_____East Dundee, West Dundee

Require planting street trees? Yes _____ No _____Algonquin, Carpentersville, East Dundee, Elgin, Kane, West Dundee

If yes, how many trees?
Residential: Per 100 feet of roadway _____ Per lot _____ Other_____
Commercial: Per 100 feet of roadway _____ Per lot _____ Other_____
Industrial: Per 100 feet of roadway _____ Per lot _____ Other_____

Require protection of native/desirable trees (i.e., a tree protection ordinance)?
Yes _____ No _____Carpentersville, Elgin, Barrington Hills

Require replacement of any trees that are unavoidably impacted by construction activities?
Yes _____ No _____Algonquin, Carpentersville, East Dundee

Require payment into a tree replacement fund or "mitigation bank" when removed trees cannot be replaced/mitigated on site?
Yes _____ No _____Algonquin

Impervious Area Reduction: Street and Parking Requirements

Does the applicable ordinance:

Encourage/require residential street widths that are narrower than suburban norms (i.e., encourage streets to be no wider than is necessary to move traffic effectively, to slow traffic and create safer conditions, and to safely accommodate pedestrians and bicyclists)? (As an example, the *Better Site Design* manual recommends 18' – 22' pavement width for streets with < 500 average daily trips.)
Encourage ____Kane, Barrington Hills Require _____ Neither _____

Encourage/require shared driveways, reduced driveway widths, and two-track driveways for single-family developments?
Encourage _____Kane, Barrington Hills Require _____ Neither _____

Require parking stalls to be less than or equal to 9 x 18 feet?
Yes _____ No _____ Comment/Other_____East Dundee, Sleepy Hollow

Allow for reduction in parking stall size to account for vehicle overhang onto landscaped islands or perimeter landscaping? (E.g., such flexibility might allow for an 18-foot deep stall to be reduced to 16 or 16.5 feet deep.)
Yes _____ No _____ Comment_____Elgin, Sleepy Hollow

Promote use of pervious materials for paved areas, including alleys, streets, sidewalks, crosswalks, driveways, and parking lots?

Yes _____ No _____ If yes, specify which:_____Carpentersville, Elgin, Kane, West Dundee

Provide flexibility regarding alternative, reduced parking requirements (e.g., shared parking, off-site parking) and discourage over-parking of developments?
Yes _____ No _____ Comment_____Elgin, West Dundee

Require a parking ratio for a professional office building that is 3 spaces, or less, per 1,000 square feet?
Yes _____ No _____ Comment_____ Sleepy Hollow, West Dundee

Require a parking ratio for retail that is 4.5 spaces, or less, per 1,000 square feet?
Yes _____ No _____ Comment_____Elgin

Require a parking ratio for a single family home that is 2 spaces, or less?
Yes _____ No _____ Comment_____East Dundee, Kane, West Dundee

Establish parking requirements as a maximum or a minimum?
Maximum _____ Minimum _____

Provide flexibility in downtown areas to permit developers to make payments in lieu of providing parking on-site, with the revenues to be used for a structured parking facility?
Yes _____ No _____ Comment_____ West Dundee (*public parking lots provided by Village, no parking required by developers)*

Vary parking requirements by zone to reflect places where more trips are on foot or by transit? (E.g., can the provision of bicycle parking substitute for some automobile parking?)
Yes _____ No _____ Comment_____East Dundee, Elgin

Discourage cul-de-sacs?
Yes _____ No _____Carpentersville, East Dundee, West Dundee

Require subdivisions to achieve a certain score on an index for internal street connectivity?
Yes _____ No _____ Comment_____

Conservation Design Standards (Flexible Zoning/Subdivision Codes)

Does the applicable ordinance:

Require a site analysis map that includes a natural resources inventory at the Concept Plan stage or prior to the Preliminary Plan stage?
Yes _____ No _____Algonquin, Carpentersville, East Dundee, Sleepy Hollow, West Dundee, Barrington Hills

Require that the proposed development be designed to preserve natural drainage patterns, use and preserve native vegetation, stabilize soils during construction, and protect, enhance, and maintain natural resources (such as remnant woodlands, prairies, and steep slopes)?

Yes _____ No _____Algonquin, Carpentersville, East Dundee, Elgin, Kane, Sleepy Hollow, Barrington Hills

Encourage/require clustering of residential lots around sensitive natural areas, thereby creating a protected common open space area?
Encourage _____Carpentersville, Kane, West Dundee Require _____Algonquin Neither _____

Require a minimum area of protected naturalized open space in new residential developments?
Yes _____ No _____ If yes, specify minimum percentage _____ West Dundee (30%)

Provide density bonuses for conservation developments that exceed minimum standards (such as additional open space, providing for regional trails and greenways, or incorporating environmentally sensitive design features beyond what is required by the Ordinance)?
Yes _____ No _____ Algonquin, East Dundee, Sleepy Hollow, West Dundee

Require the street network to minimize encroachment in sensitive natural resources and take advantage of open space vistas, while providing an interconnection of internal streets and street connections to adjoining land parcels to create opportunities for future connectivity?
Yes _____ No _____ West Dundee

Allow conservation design as a "by-right" form of development?
Yes _____ No _____ Algonquin

Does the zoning map indicate areas where conservation development is required?
Yes _____ No _____ Comment_____

Reinvestment and Compact/Contiguous Development (Zoning Code)

Is there a downtown overlay district or another mechanism to encourage mixed-use development in neighborhood centers?
Yes _____ No _____ Comment_____Algonquin, East Dundee, Elgin, West Dundee

Are there reduced impact fees or other incentives to encourage infill development?
Yes _____ No _____ Comment_____Kane, West Dundee

Notes:

Some communities (e.g., West Dundee) indicated for several items "No ordinance but implemented during plan review process". These answers were recorded as "no" in this summary.

Appendix D: Jelkes Creek-Fox River Watershed Plan Education Survey Results Summary

Total responses: 38

1.) Are you aware of any existing information & education programs currently being offered related to water quality/watershed issues?

Response	Percent	Count
Yes	13.9%	5
No	86.1%	31

If yes please list programs and who they are offered by

- Kane-DuPage SWCD- Living near a basin in the Jelkes Creek-Fox River Watershed Illinois EPA & NIPC- Determining your lake's watershed
- Jelkes Creek Watershed
- Friends of the Fox River- outreach & monitoring network support kdswcd
- FREP and you will do a Jelke Creek presentation
- For children? Adults?
- Flint Creek Waterhsed
-

2.) From the list below, which threats are most important to address through education efforts in the Watershed? Rank from 1 to 9, 1 being the most important, 9 being the least.

	1	2	3	4	5	6	7	8	9	Average
Runoff from streets and parking lots (such as salt and petroleum products)	21.1% (8)	18.4% (7)	21.1% (8)	13.2% (5)	10.5% (4)	5.3% (2)	2.6% (1)	5.3% (2)	2.6% (1)	3.42
Streambank erosion	18.4% (7)	21.1% (8)	31.6% (12)	7.9% (3)	10.5% (4)	5.3% (2)	2.6% (1)	2.6% (1)	0.0% (0)	3.11
Lack of green infrastructure/appropriate ordinances	10.5% (4)	2.6% (1)	13.2% (5)	13.2% (5)	26.3% (10)	13.2% (5)	7.9% (3)	2.6% (1)	10.5% (4)	4.89
Nutrient loading from agricultural land	5.3% (2)	7.9% (3)	2.6% (1)	5.3% (2)	18.4% (7)	23.7% (9)	18.4% (7)	13.2% (5)	5.3% (2)	5.66
Physical habitat alterations	7.9% (3)	13.2% (5)	15.8% (6)	21.1% (8)	5.3% (2)	18.4% (7)	5.3% (2)	10.5% (4)	2.6% (1)	4.47
Sediment laden runoff from construction activities	21.1% (8)	13.2% (5)	7.9% (3)	13.2% (5)	7.9% (3)	5.3% (2)	13.2% (5)	15.8% (6)	2.6% (1)	4.37
Fertilizers and pesticides from residential and commercial areas	10.5% (4)	21.1%	2.6% (1)	7.9% (3)	13.2% (5)	13.2% (5)	26.3% (10)	5.3% (2)	0.0% (0)	4.63
Individuals dumping waste into storm drains	5.3% (2)	2.6% (1)	2.6% (1)	18.4% (7)	5.3% (2)	13.2% (5)	10.5% (4)	34.2% (13)	7.9% (3)	6.16
Animal waste	0.0% (0)	0.0% (0)	2.6% (1)	0.0% (0)	2.6% (1)	2.6% (1)	13.2% (5)	10.5% (4)	68.4% (26)	8.29

3.) Which audience is most in need of education about issues affecting the watershed? Rank from 1 to 4, 1 being the most important and 4 being the least.

	1	2	3	4	Rating Average	Response Count
Youth education (schools, scouts, youth groups)	5.4% (2)	10.8% (4)	21.6% (8)	62.2% (23)	3.41	37
Homeowners	47.4% (18)	28.9% (11)	23.7% (9)	0.0% (0)	1.76	38
Municipal and elected officials	42.1% (16)	44.7% (17)	10.5% (4)	2.6% (1)	1.74	38
Businesses	5.3% (2)	15.8% (6)	44.7% (17)	34.2% (13)	3.08	38

4.) How can the watershed group and its partners involve more youth in watershed issues? Pick the top 5 methods.

	Response Percent	Response Count
Support school field trips to local natural areas	81.6%	31
Involve clubs and organizations in watershed projects (clean-ups, storm-drain stenciling, restoration)	81.6%	31
Plan a watershed-wide public event	55.3%	21
Work to make watershed education part of the curriculum	52.6%	20
Support outreach education/visiting speakers	47.4%	18
Provide after school activities related to the watershed	44.7%	17
Offer service learning opportunities	36.8%	14
Present teacher inservices on watershed related curricula	34.2%	13
Offer Citizen science/water quality monitoring opportunities	26.3%	10
Other o Offer scholarship for college, based on top watershed projects led/participated in by HS students o Support scouting programs related to watershed issues o Speakers to school meetings to educate the entire surrounding area who have no idea of this tragic problem! o Social Media (Facebook, Twitter, a blog)		4

5.) Which of the following would be the best way to reach homeowners with information about watershed issues? Please pick the top 5 choices.

	Response Percent	Response Count
Speakers at neighborhood/homeowners association meetings	*78.9%*	*30*
Informational brochures	68.4%	26
Information in community letters	65.8%	25
Articles in the newspaper	63.2%	24
Information on the website	55.3%	21
Public Service Announcements on television and radio	55.3%	21
Tables at public events	31.6%	12
Weekend workshops	18.4%	7
Other o Neighborhood watershed project on a localized level o have the schools appoint teachers ,parents to inform info. Get the kids involved(clubs) they care and will do a good job ! Posters road signs Instead of pushing high test scores pass out t shirts to those students who truly care The squeaky wheel gets results!!! o Relay information through social media o Social media (Facebook) o Conservation @ Home program		5

6.) Which of the following is the most effective way to reach municipal officials/legislators? Please pick your top 2.

	Response Percent	Response Count
Presentations to boards	*92.1%*	*35*
One on one meetings	55.3%	21
Providing invitations to public events	23.7%	9
White papers/brochures	7.9%	3
Workshop or symposium	15.8%	6
Other o Through the Kane County Planning Cooperative (events or newsletters)		1

7.) Which of the following is the most effective way to reach businesses in the watershed? Please pick your top 2.

	Response Percent	Response Count
One on one meetings	*78.9%*	*30*
Providing partnership/sponsorship opportunities for public events	73.7%	28
White papers/brochures	15.8%	6
Workshop or symposium	23.7%	9
Other o I wish us all the best in solving this problem!		1

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Appendix E: Additional Projects Submitted by Watershed Stakeholders

As part of the watershed planning process, watershed stakeholders, including municipal representatives, were asked to submit to the Kane-DuPage Soil and Water Conservation District (KDSWCD) details on potential projects that could be implemented to improve water quality within the Jelkes Creek—Fox River watershed. The response to this request was impressive and as a result numerous opportunities were identified to implement projects throughout the watershed with the goal of improving water quality within the Jelkes Creek-Fox River watershed plan. In fact, the Villages of Algonquin and Carpentersville hired a consultant, Applied Ecological Services, to assist in the identification of water quality improvement projects within the portions of the watershed located in those municipalities. Copies of the two reports resulting from this effort are provided as part of this appendix. An extensive list of the projects identified during the watershed planning process for the entire study area is included here.

The expectation is that the projects included here would be eligible for funding from the appropriate funding sources presented in Section 5.3 (e.g., the Illinois Environmental Protection Agency's 319 Program or the Illinois Green Infrastructure Grant Program for Stormwater Management).

ID	IEPA Category	Project Location & Description	Best Management Practices (BMPs)	Code	Unit	Implementer/Landowner	Potential Partners
1	Agricultural	Fruin Farm Alice Lundstrom Trust	WASCB with underground outlet and possibly new drain tile or a series of grassed waterways with a stable outlet such as a rock chute	various		Private	SWCD IDNR USDA-NRCS
2	Agricultural	Southwest corner of Randall and Higgins Road	Drainage Management System, easement that would promote infiltration, or any other soil erosion reduction practices such as conservation tillage etc.	329, 570	acres	Private	SWCD IDNR USDA-NRCS
3	Hydrologic	Lake Beatrice in Unincorporated Kane County South & West of Bonkosky Road & Route 31	Channel restoration study (BMPs could include bypass channel for fish passage, hemi-marsh wetland filtration, open water areas and upstream forebay sediment trap)	various		Lake Beatrice Individual Residents	Kane County
4	Hydrologic	Longmeadow Parkway Site, Between Randall Road and Huntley Road	Potential wetland mitigation site for wetland impacts associated with potential Longmeadow Road expansion project and other development along Randall Road within the Jelkes-Fox Watershed.	various		Village of Carpentersville	
5	Hydrologic	Four Winds Way Creek Reach 1, South portion of Shenandoah Subdivision	Design & implement project to stabilize stream banks using bio-engineering techniques where possible, restore adjacent riparian corridor, and reconnect floodplain where feasible.	580	feet	Village of Carpentersville	SWCD
6	Hydrologic	Four Winds Way Creek Reach 2, Route 31 to Fox River	Floodplain modeling and FEMA map updates to potentially remove adjacent homes from 100 year floodplain. Storm damage in 2008 significantly widened and lowered creek. Design & implement project to stabilize stream banks using bio-engineering techniques	580	feet	Village of Carpentersville	SWCD
7	Hydrologic	Carpenter Creek Reach 3, East of Brook Street & south to Maple Avenue	Design, permit, and construct project to stabilize banks and create floodplain storage along Brook St.	580	feet	Village of Carpentersville	SWCD
8	Hydrologic	Carpenter Creek Reach 4, Within Carpenter Park	Design, permit, and construct project to create additional floodplain shelf where needed and plant banks and floodplain area to native vegetation. Small rock grade controls could also be installed to create riffles and reduce erosion. Remove concrete structure	580, 410	feet/#	Village of Carpentersville	SWCD
9	Hydrologic	Carpenter Creek Site, East of Carpenter Park/north of Cleveland Avenue	Potentially acquire land then design and construct wetland restoration that also incorporates adjacent usable parkland. Wetland improvements to be minimized to existing wetland areas, as all other portions of property are prime industrial / institutional	657	acres	Village of Carpentersville	
10	Hydrologic	Lake Marian Creek Reach 5, Williams Road to Fox River	Design, permit, and construct project to remove debris, stabilize banks, and improve riparian corridor. This can be combined with an adjacent bike path project.	580	feet	Village of Carpentersville	
11	Hydrologic	Lake Marian Creek Reach 4, Confluence of Reaches 2 & 3 to Skyline Dr.	Design, permit, and construct project to create additional floodplain shelf where needed and plant banks and floodplain area to native vegetation. Small rock grade controls could also be installed to create riffles and reduce erosion.	410, 580	#/feet	Village of Carpentersville	SWCD
12	Hydrologic	Lake Marian Creek Reach 2, Sacramento Drive to confluence with Reach 3 in Keith Andres Park	Design, permit, and construct project that incorporates several grade control and stabilization measures as well as ongoing channel maintenance and restoration of the adjacent riparian zone. Stabilization measures crucial to reducing streambed erosion	various		Village of Carpentersville	SWCD
13	Hydrologic	Lake Marian Creek Reach 3, Tulsa Avenue to confluence with Reach 2 in Keith Andres Park	Design, permit, and construct project that incorporates several grade control and stabilization measures as well as ongoing channel maintenance and restoration of the adjacent riparian zone.	various		Village of Carpentersville	SWCD
14	Hydrologic	Lake Marian Creek Reach 1, Route 25 to Kings Road	Design, permit, and construct project to stabilize streambanks, improve riparian corridor, and replace culverts.	580	feet	Village of Carpentersville	SWCD
15	Hydrologic	ADID 761, 755, 760 southwest corner of Randall and Higgins Road	Enhance, restore, maintain quality, improve function of existing wetlands	657	acres	Private	USDA-NRCS
16	Hydrologic	Upstream of the Fox River Dam in the Village of East Dundee near Water Street and North Street on East Bank	Ice Booms: re-instate the use of ice booms in the Fox River. Ice booms installed by IDNR in the past but no more due to funding. Installed on a straight section, hold back the ice flow, reduce bank scour a bends.	various		Village of East Dundee	IDNR
17	Hydrologic	Van Buruen and Lake Shore Roads in East Dundee at McIntosh Creek	DAM REMOVAL: Culvert replacement and dam-situation removal and stream stabilization restoration project approximately 800 feet of McIntosh Creek would allow for fish passage upstream	16	#	Village of East Dundee and Private	Friends of the Fox, Fox River Study Group, IDNR, USACE

18	Hydrologic	Willoughby Farms Forest Preserve	Management strategy /invasive management	326	acres	Kane County Forest Preserve District	
19	Hydrologic	Dixie Creek Reach 2	Implement long term management for 10 years including controlled burns, supplemental brushing, herbiciding invasive species, and removal of problematic debris from stream channel.	various		Village of Algonquin	
20	Hydrologic	Ratt Creek Tributary (Dixie Creek) Streambank Stabilization	Implement short term management for 3-5 years to establish plantings then implement long term management for 10 years including controlled burns, supplemental brushing, herbiciding invasive species, and removal of problematic debris from stream channel.	various		Village of Algonquin	
21	Hydrologic	Dixie Creek Reach 2	Design and install project to remove existing dam and replace with new control structure that allows for natural flow of stream and movement of sediment.	16	#	Village of Algonquin	Friend of the Fox
22	Hydrologic	Willoughby Farms Park Wetland	Convert area between tennis courts and detention pond to a native vegetation buffer. Install bioswales where appropriate. Implement 3-5 year management to establish plantings then implement long term (10-year) management.	various		Village of Algonquin	
23	Hydrologic	Bobby Moss property at Tollway Plaza 9 outfall into ADID wetland and woodland seep FEN #8131	wetland FEN restoration, ravine stabilization, possible easement for protection small pockets of woodland seep survive despite severe erosion from tollway drainage; see plant lists; Symplocarpus foetidus dominant in several areas	644, 657	acres	Private	IL State Highway Tollway Authority
24	Hydrologic/Urban	Carpenter Creek Reach 1, Route 25 to Lake Marian Road	Remove turf grass and plant native vegetation buffer on sideslopes through first 2/3 of reach. Remove all invasive trees, shrubs, and trash from final 1/3 of reach and replant native vegetation if desired. Implement short and long term	326, 342	feet	Village of Carpentersville	
25	Hydrologic/Urban	Carpenter Creek Reach 2, Dundee Township Park District property & east of Sedgewick Street	Design, permit, and construct project to relocate stream channel to the east behind residential area and create additional floodplain storage. Very high potential to remove numerous adjacent residences from floodplain.	various		Village of Carpentersville	
26	Hydrologic/Urban	Carpenter Creek Reach 5, South of Carpenter Park on Revcor Property	Design, permit, and construct project to remove debris, stabilize banks, and improve riparian corridor. This can be combined with an adjacent bike path project.	342, 580	acres/feet	Village of Carpentersville	SWCD
27	Hydrologic/Urban	Carpenter Creek Reach 6, South Washington Street to Fox River	Design, permit, and construct project to stabilize streambanks and improve riparian corridor. Could be combined with project to replace restrictive culverts that will increase culvert sizes to reduce erosive stream velocities.	342, 580	acres/feet	Village of Carpentersville	SWCD
28	Hydrologic/Urban	Tartans Glen Subdivision, West of Tartan Drive and IL Route 72	Remove accumulated debris and invasive vegetation, restore storage capacity to original design and replace turf bottom with appropriate vegetation to an intermittent dry/wet bottom detention facility	342, 800	acres/#	Village of East Dundee	
29	Hydrologic/Urban	Ratt Creek Reach 5	Design & implement project to remove concrete dam and stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD, Friends of the Fox
30	Hydrologic/Urban	Ratt Creek Reach 2	Investigate feasibility to remove old farm dam and restore stream channel within first 500 feet of stream reach. Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance. Restore riparian area south of residential homes up to Kirkland Rd. by removing invasive woody species and seeding with native prairie.	various		Village of Algonquin	SWCD, Friends of the Fox

31	Hydrologic/Urban	Lake Braewood Detention	Design & implement project to create minimum 15' wide naturalized basin buffer of native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10. Alternatively, investigate feasibility to remove online dam and restore natural stream channel and floodplain function.	16, 800	#	Village of Algonquin	
32	Other	Fox River Bridge replacement at I90	Install a water quality monitoring station after the reconstruction of the I90 bridge over the Fox River	2	#	IL State Highway Tollway Authority ISTHA	Friends of the Fox, Fox River Study Group
33	Other	Randall Road Swamp (McNamee Estate Parcel)	Protection of wet woodland, enhancement, infiltration	657, 666	acres	Private	Dundee Township
34	Other	Keele Farms Detention 2, Keele Farms Subdivision between Birch Street & Cambridge Drive	Design and implement project to naturalize basins with native prairie vegetation, restore adjacent oak woodland, add east side bike path, and replace 100 year outlet structure. Implement short term maintenance for 3-5 years to establish native plantings	various		Village of Carpentersville	
35	Other	East Dundee	Open to Ordinance suggestions to improve Water Quality	1, 15	#	Village of East Dundee	
36	Other	30 acre Cook co parcel owned by Prairie Materials	30 acre parcel coming into East Dundee for development, could JF-WAG give some recommendations to East Dundee on watershed-based planning for this parcel	various		Private	Jelkes Creek-Fox River Watershed Action Group
37	Other	Kimbal Farms	Storm drain stenciling	1	#	Local residents	Jelkes Creek-Fox River Watershed Action Group
38	Urban	MacIntosh Creek Headwaters, Between LW Besinger Drive & Ravine Road	Design and construct naturalized stormwater storage facility on site that incorporates two tributaries and preserves existing mature bur oak, red oak, and walnut trees as island features. Implement short term maintenance for 3-5 years to establish native plantings	657	acres	Village of Carpentersville	
39	Urban	Northwest Business Park at northwest Road and Randall Road	Possible opportunity for Bioswale, pervious pavement, detention, infiltration basins, or any other volume reducing BMPs	various		Private	Village of Gilberts & City of Elgin
40	Urban	Tartans Hill, Unit #2 Subdivision, East of Tartan Drive and Glenmoor Drive	Plant native vegetation, restore storage capacity to original design and replace turf bottom with appropriate vegetation to an intermittent dry/wet bottom detention facility. possible BIOSWALE installation after discharge channel	342, 814	acres/feet	Village of East Dundee	
41	Urban	Santa's Village parking lot located South down Route 25 from Southwest corner of Route 25 & Route 72	Possible option for permeable pavers or other bmps	various		Private	Village of East Dundee
42	Urban	West bank of Fox River just west of Railroad Street in East Dundee	Oil and Grit Separator or Vortex type storm structures on pipes or upstream within the system to help stormwater that outlets directly to the Fox River.	10	#	Village of East Dundee	
43	Urban	IL Route 72 east of Christina Drive approximately 6,000 feet of Roadway	Bioswale within the grassed median along Rt. 72 east of Christina Drive to provide pretreatment of stormwater runoff from the highway	814	feet	Village of East Dundee, IDOT	IDOT
44	Urban	Rain Garden at Downtown Depot property between Railroad Street and Barrington at Meier and River Street	Rain Gardens at Downtown Train Depot property. Rain garden to collect roof runoff and needs signage for community education	13	#	Village of East Dundee & Kane County Forest Preserve District	SWCD
45	Urban	Lakewood Lodge Estates - Ravine Road lots 638-654 and Council Hill Road lots 711-721 in East Dundee just west of Valley View School	Ravine rock check dams and stream bank stabilization within the ravine area to help reduce bank erosion, preserve rear yards, and ultimately reduce sedimentation	580	feet	Private	Village of East Dundee
46	Urban	Permeable Paver parking lot retrofit for the Elgin City Hall	3.17 acres or approximately 138,000 square feet of permeable paver retro fit	890	acres	City of Elgin	
47	Urban	Lawndale Creek starting just west of the intersection of Gaslight and Hanson flowing south to lot 141 or 1455 Springhill Drive between Kensington and Spring Hill in Algonquin	486 feet reach. 293' of Stone toe protection and Boulder revetment, 4 Bendway Weirs, 486' of Native Vegetation Buffer and trees for riparian area	580	feet	Village of Algonquin	SWCD

48	Urban	Shaw Creek located within Dundee Township 1600 feet of bank stabilization proposed	Rock riffles, stone toe protection, stream barbs totaling 1600 feet of stabilization	580	feet	Dundee Township	SWCD
49	Urban	Dixie Creek within Dixie Fromm Dundee Township Open Space	Streambank stabilization	580	feet	Dundee Township	SWCD
50	Urban	Jelke Creek Bird Sanctuary - upper mid section	Swale/gully stabilization	410	#	Dundee Township	SWCD
51	Urban	Nollman Annex to Jelke Creek 23 acre parcel	Wetland filtration, Stream remeandering, stream stabilization	9	feet	Dundee Township	SWCD
52	Urban	Grandview Park	Naturalized swale, erosion control, plugs ect.	814	feet	Dundee Township Park District	
53	Urban	Lake Cornish; Lake Gillilan; Lake Plumleigh	Design & implement project to naturalize all lake sideslopes with native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	342, 580	acres/feet	Village of Algonquin	SWCD
54	Urban	Dixie Creek Reach 3	Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor in "Critical Area". This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
55	Urban	Dixie Creek Reach 4	Design & implement project to restore west floodplain by removing invasive woody species and installing native vegetation to blend in with stream and riparian restoration work at Dixie Briggs Fromm.	326, 580	acres/feet	Village of Algonquin	SWCD
56	Urban	Lawndale Park Creek Reach 1	Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor in "Critical Area". This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
57	Urban	Ratt Creek Reach 1	Area 350 feet west of Stonegate Dr.: Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) enhance buffer area to northwest by replacing old field vegetation with native vegetation; 5) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
58	Urban	Ratt Creek Reach 4	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
59	Urban	Ratt Creek Reach 5	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD

60	Urban	Ratt Creek Reach 6	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
61	Urban	Ratt Creek Tributary 1	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance. Another alternative is to reroute stormwater via a pipe around residential area.	various		Village of Algonquin	SWCD
62	Urban	Ratt Creek Tributary 2	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
63	Urban	Souwanas Creek Reach 1	Upper portion of reach ("Critical Area"): Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	various		Village of Algonquin	SWCD
64	Urban	Souwanas Creek Reach 2	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance. Restore adjacent savanna to increase buffer function.	various		Village of Algonquin	SWCD
65	Urban	Dixie Creek Reach 1	Following implementation of 3-year restoration & maintenance plan, implement long term management for 10 years including controlled burns, supplemental woody resprout treatments, and removal of debris from stream channel. Construct multiple artificial riffles/grade controls in stream channel to help stabilize banks.	410, 580	#/feet	Village of Algonquin	SWCD
66	Urban	Algonquin Lakes Preserves	Potential "Critical Area" land acquisition to increase buffer along Souwanas Creek headwaters and bridge gap between Algonquin Lakes Preserves. Convert to naturalized landscape following acquisition.	342	acres	Village of Algonquin	
67	Urban	Falcon Ridge Nature Preserve	Naturalize savanna with native herbaceous species to prevent erosion and to buffer Falcon Ridge detention basin. Following seeding, implement short and long term maintenance including controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental brushing as needed.	342	acres	Village of Algonquin	

68	Urban	High Hill Park	Create native plant buffer and install bioswales on turf grass areas south of playground and north of residential homes adjacent to riparian corridor Manage for 3-5 years to establish prairie/swales then implement long term management through year 10.	342, 814	acres/feet	Village of Algonquin	
69	Urban	Foxview Detention, Foxview Subdivision: Oxford & Bolz Roads	Design and implement project to remove invasive trees & shrubs from basin side slopes. Regrade eroded slopes and stabilize with erosion control blanket and native herbaceous vegetation. Repair/stabilize erosion around water main. Install aeration system	800	#	Village of Carpentersville	SWCD
70	Urban	Providence Point Detention 1, Providence Point Subdivision east of Providence Drive	Design and implement project to naturalize basin side slopes and dry bottom area with native vegetation. Plant native emergent plants along shoreline. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance	800	#	Village of Carpentersville	
71	Urban	Providence Point Detention 2, Providence Point Subdivision between Huntley & Miller Roads	Design and implement project to naturalize basin side slopes with native prairie vegetation, install emergent plants along the shoreline, & restore adjacent oak woodland. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	
72	Urban	Providence Point Detention 3, Providence Point Subdivision south of Nathan Lane	Design and implement project to naturalize basin side slopes and dry bottom area with native prairie vegetation, install emergent plants along the shoreline, & repair outlet structure. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
73	Urban	Shenandoah Detention 1, Shenandoah Subdivision northeast & northwest	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
74	Urban	Shenandoah Detention 2, Shenandoah Subdivision northeast & northwest	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
75	Urban	Shenandoah Detention 3, Shenandoah Subdivision at southwest corner of Miller and Sleepy Hollow Roads	Design and implement project to disable failing under drain and naturalize side slopes and basin bottom with appropriate native vegetation based on wetness measured off exiting outlet structure. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
76	Urban	Shenandoah Detention 4, Shenandoah Subdivision at southwest corner of Miller and Shenandoah Roads	Design and implement project to naturalize entire basin with native vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	800	#	Village of Carpentersville	SWCD
77	Urban	Kimball Farms Detention 1, Kimball Farms Subdivision south of Grandview Drive	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
78	Urban	Kimball Farms Detention 2, Kimball Farms Subdivision west of Westwood Drive	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
79	Urban	Menards Detention, Southwest corner of Huntley & Randall Roads	Design and implement project to naturalize side slopes with native vegetation and install emergent plants into coir fiber logs along toe of slope. Implement short term maintenance for 3-5 years to establish native plantings	800	#	Village of Carpentersville	SWCD
80	Urban	Sierra Woods Detention 1, Sierra Woods Subdivision near northwest corner of Miller & Sierra Woods Roads	Design and implement project to naturalize basin side slopes with native vegetation and install emergent plants along the shoreline. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance	800	#	Village of Carpentersville	SWCD

81	Urban	Fairfiew Park, Between Sparrow Road and Tee Lane	Design and construct 2-tiered stormwater storage facility on southern 2/3 of site. 1st tier is naturalized wetland area/rain garden designed to hold frequent/lighter rain events. 2nd tier is usable turf grass area/ball field designed to store water during larger rain events	13, 800	#	Village of Carpentersville	
82	Urban	Fairhills Subdivision, East of Fairhills Drive and Boncosky flows west to wet bottom then South under Bonkosky Road	Remove accumulated debris and inappropriate vegetation, restore storage capacity to original design and replace turf bottom with appropriate vegetation to an intermittent dry/wet bottom detention facility	800	#	Village of East Dundee	
83	Urban	Santa's Village detention located at the southwest corner of Route 25 & Route 72	Provide detention modifications to improve the water quality of the outflow and reclaim an existing silted in detention pond	800	#	Village of East Dundee	
84	Urban	Lions Park in East Dundee just east of Oak and King Streets	Rain Garden, Infiltration basin, and/or retrofit. In the south of the park, is a stormwater holding area in a depression with no gravity outlet. A Native Infiltration Basin/ large RG would hv hydrologic, aesthetic & educational benefit	800	#	Village of East Dundee	SWCD, Dundee Township Park District
85	Urban	Stoneridge Detention	Design and implement project to naturalize side slopes with native prairie vegetation and emergent plants along margins. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10. Potential acquisition for Village.	800	#	Village of Algonquin	
86	Urban	White Chapel Detention	Design and implement project to naturalize side slopes with native prairie vegetation in "Critical Area". Remove invasive species from basin bottom and supplement with native emergent species. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	800	#	Village of Algonquin	
87	Urban	Notting Hill Detention	Construct new outlet structure that properly functions to help infiltrate and release water in basin. Remove existing vegetation and plant native prairie.	800	#	Village of Algonquin	
88	Urban	Wynnfield Detention	Design & implement project to naturalize basin with native prairie vegetation. Clear debris and remove willow species from inlet/outlet low flow channel. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	800	#	Village of Algonquin	
89	Urban	High Hill Detention	Design and implement project to naturalize basin with native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	800	#	Village of Algonquin	
90	Urban	Blue Ridge Detention	Design and implement project to disable concrete channels, replace turf grass with native plant communities, and install outlet restrictor that promotes water quality treatment and infiltration. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	800	#	Village of Algonquin	
91	Urban	Algonquin Lakes Detentions #1, 2, 3	Design & implement project to naturalize basins with native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	800	#	Village of Algonquin	
92	Urban	Creeks Crossing Subdivision Detentions #1-5	Implement long term maintenance through year 10. This should include controlled burns every three years and spot herbicide applications to control non-natives and invasives.	800	#	Village of Algonquin	
93	Urban	Oak Creek Detention	Implement short term maintenance for 3-5 years to establish prairie then implement long term maintenance through year 10. This should include controlled burns every three years and spot herbicide applications to control non-natives and invasives.	800	#	Village of Algonquin	

94	Urban	Lawndale Detention	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, supplemental brushing as needed, and supplemental seeding of poorly established areas.	800	#	Village of Algonquin	
95	Urban	Countryside Naturalized Detention	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental seeding of poorly established areas.	800	#	Village of Algonquin	
96	Urban	Yellowstone Naturalized Detention & Woodland	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, supplemental brushing in woodland, and supplemental seeding of poorly established areas.	800	#	Village of Algonquin	
97	Urban	Gaslight Bird & Butterfly Sanctuary (Detention)	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental seeding of poorly established areas.	800	#	Village of Algonquin	
98	Urban	Century Oaks West Subdivision (southwest corner of McLean Boulevard and Forest Drive)	Retrofit manicured detention basin	800	#	City of Elgin	
99	Urban	Detention basin between Airport Road and I-90 exit ramp to Route 31	Retrofit manicured detention basin	800	#	City of Elgin	
100	Urban	Detention basin at Exhibit Concepts, Airport Road	Retrofit manicured detention basin	800	#	Private	City of Elgin
101	Urban	Detention basin at Wanxiang, 88 Airport Road	Retrofit manicured detention basin	800	#	Private	City of Elgin
102	Urban	Detention basin at north end of Scottsdale Court	Retrofit manicured detention basin	800	#	Private	City of Elgin
103	Urban	Detention basin at Creekside Circle and Creekside Court	Retrofit manicured detention basin	800	#	Century Oaks Homeowners Association	City of Elgin
104	Urban	Detention basin at The Grove on Randall Road	Retrofit manicured detention basin	800	#	Private	City of Elgin
105	Urban	Detention basin at Northwest Corporate Park west side of Galvin Drive	Retrofit manicured detention basin	800	#	Private	City of Elgin
106	Urban	Falcon Ridge Nature Preserve	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental brushing as needed. Interseed poorly established native plant buffer with mesic prairie grasses and forbs.	various		Village of Algonquin	
107	Urban	Willoughby Farms Park Wetland	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental brushing as needed.	various		Village of Algonquin	
108	Urban	Arbor Hills Nature Preserve	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives (primarily teasel, willow, reed canary grass, common reed, and purple loosestrife), supplemental brushing as needed, and supplemental seeding of poorly established areas.	various		Village of Algonquin	

109	Urban	High Hill Park Riparian Corridor	Potential land acquisition to extend green infrastructure network at headwaters of Ratt Creek. Convert to naturalized landscape following acquisition.	342	acres	Village of Algonquin	
110	Urban	Fields Property	Potential "Critical Area" land acquisition to increase and preserve buffer along Ratt Creek and bridge gap between Braewood Lake and restored section of Ratt Creek just downstream. Restore stream and adjacent natural communities following acquisition.	342	acres	Village of Algonquin	
111	Urban	High Hill Park Riparian Corridor	Implement management program throughout corridor to eradicate invasive species. Follow up eradication with controlled burns and native seeding where needed.	various		Village of Algonquin	
112	Urban	High Hill Park Riparian Corridor	Implement management program to brush and/or herbicide invasive species followed by seeding with native prairie and long term management via controlled burns.	various		Village of Algonquin	
113	Urban	High Hill Park Riparian Corridor	Restore function of buffer by removing old field vegetation and invasive shrubs then plant prairie vegetation. Manage for 3-5 years to establish prairie then implement long term management through year 10.	various		Village of Algonquin	
114	Urban	Algonquin Lakes Preserves	Convert all turf grass and/or old field corridors to native vegetation. Manage for 3-5 years to establish prairie then implement long term management through year 10.	342	acres	Village of Algonquin	
115	Urban	Braewood Riparian Corridor Pump Station	Create native plant buffer and install bioswale on turf grass area just west of pump station. Manage for 3-5 years to establish prairie/swales then implement long term management through year 10.	342	acres	Village of Algonquin	
116	Urban	Potential Longmeadow Wetland Mitigation Site	Potential wetland mitigation site for wetland impacts associated with potential Longmeadow Rd. expansion project and other development along Randall Rd within the Jelkes-Fox Watershed. Potential 150 acre wetland mitigation site on future Village of Algonquin annexation land. Additional 50 acre potential wetland mitigation site to south on future Carpentersville annexation land. Combined potential 200 acre wetland mitigation site that could generate approximately 50-75 acres of wetland impact credit.	various		Village of Algonquin	
117	Urban	Keele Farms Detention, Keele Farms Subdivision between Birch Street & Cambridge Drive	Naturalize Detention Basin or Detention Basin Retrofit or Critical Area Planting	342	acres	Village of Carpentersville	
118	Urban	Wal-Mart just South of the Southeast corner of Route 25 (Dundee) and Route 72 (Main)	Wal-Mart is looking to expand, possible BMPs could be recommended (East Dundee is looking for design recommendations)	various		Private	Village of East Dundee
119	Urban	Parcel just North of the Northwest corner of Route 25 (Dundee) and Route 72 (Main) East Dundee calls "River Haven PUD"	Plote will be developing in the near future an affordable housing project with Wetland in the southeast corner	various		Private	Village of East Dundee

VILLAGE OF ALGONQUIN:

WATER QUALITY PROJECTS IN JELKES/FOX RIVER WATERSHED

Submitted to:

Village of Algonquin
110 Meyer Dr.
Algonquin, IL 60102

April 20, 2011
(AES Project # 11-0053)

Prepared by:

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1.0 INTRODUCTION & METHODS

Introduction

In 2010, the Kane-DuPage Soil & Water Conservation District (KDSWCD) was awarded an IEPA 319 Water Quality Grant to complete a Watershed-Based Plan for the Jelkes Creek-Fox River Watershed located primarily in northeast Kane County, Illinois. Much of the Village of Algonquin is located in the northern portion of this watershed.

The Village became aware during initial watershed planning meetings that identification of potential water quality improvement projects would not be the responsibility of KDSWCD's planning effort. However, identification of site specific water quality projects is the most important component of any IEPA Watershed-Based Plan because any project that is identified in the plan becomes immediately eligible for future IEPA 319 Grant funding. Identified projects also carry more weight when applying for other grants such as the IEPA's Illinois Green Infrastructure Grant (IGIG). Therefore, the Village hired Applied Ecological Services, Inc. (AES) in March, 2011 to evaluate selected Village-owned parcels or stream easements located within the watershed and to identify potential water quality BMP projects that can be included in the final Jelkes Creek-Fox River Watershed-Based Plan being completed by KDSWCD.

Methods

An AES Ecologist worked with the Village of Algonquin to identify future water quality BMP projects located on Village-owned property or stream easements within the Jelkes Creek-Fox River Watershed. The Village prepared maps that clearly outlined stream reaches, detention basins, open space, and/or other areas where the Village was interested in implementing future water quality improvement projects. These maps were used by the ecologist during site visits conducted in March 2011. AES developed water quality BMP data sheet that were completed in the field for each potential project site or stream reach. The data sheets included information related to the existing condition and potential BMP opportunities or recommendations. Photos were also taken of each potential project site and location shown on the site maps.

AES then used data collected during the site visits to compile a spreadsheet containing all potential water quality improvement projects. Specific information about each project location is included such as: 1) Project Location/Stream Reach ID, 2) Size, 3) Ownership, 4) Existing Condition, 5) Water Quality BMP Recommendations, 6) Priority, 7) Sources of Technical Assistance, and 8) Cost Estimate. **It is important to note that "Critical Areas" as defined by the IEPA are highlighted in orange in the spreadsheet and should be looked at in more detail in KDSWCD's planning effort.**

The information that follows is meant to be used in the following way:

1) Locate a potential water quality improvement project of interest in the Projects Table (Section 2);
2) Locate the potential project of interest on the appropriate Aerial Site Map to visually see its location within the context of the surrounding area (Section 3);
3) Locate the potential project photographs to visually see the existing condition and why particular water quality improvement BMP recommendations were made in the Projects Table (Section 4).

SECTION 2.0: ALGONQUIN WATER QUALITY PROJECTS IN JELKES/FOX RIVER WATERSHED

Project Name or Stream Reach ID	Location	Acres/ Linear ft.	Public or Private/ (Owner)	Existing Condition	Water Quality BMP Recommendation	Priority/Critical Area?	Sources of Technical Assistance	Cost Estimate
DETENTION BASIN RETROFITS Detention basin retrofit recommendations primarily address water quality and infiltration but also improve natural resources and wildlife habitat as a secondary function.								
Stoneridge Detention	Dixie Creek Riparian Corridor (east of Stoneridge Ln.)	0.8 acre	Private (HOA)	Wet bottom detention basin with side slopes planted to turf grass. Detention is immediately adjacent to and outlet to Dixie Creek Riparian Corridor. Maintained by HOA.	Design and implement project to naturalize side slopes with native prairie vegetation and emergent plants along margins. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10. Potential acquisition for Village.	Medium	Village, Ecological Consultant	$8,000/acre
White Chapel Detention	Dixie Creek Riparian Corridor (Willoughby Farms Subdivision off White Chapel Rd.)	1.7 acres	Public (Village)	Wetland bottom detention basin with side slopes planted to turf grass. Basin bottom is primarily cattail. Basin outlets adjacent to fen wetland to north along Dixie Creek. Detention maintained by Village.	Design and implement project to naturalize side slopes with native prairie vegetation in "Critical Area". Remove invasive species from basin bottom and supplement with native emergent species. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	High (Critical Area)	Ecological Consultant	$8,000/acre
Notting Hill Detention	Dixie Creek Riparian Corridor (Willoughby Farms Subdivision south of Notting Hill Rd.)	0.2 acres	Public (Village)	Dry bottom detention basin dominated by turf grass and old field vegetation. Outlets to Dixie Creek and is managed by the Village. Outlet engineering unknown.	Construct new outlet structure that properly functions to help infiltrate and release water in basin. Remove existing vegetation and plant native prairie.	Medium	Village Engineer, Ecological Consultant	$8,000/acre/ Varies
Wynnfield Detention	Adjacent to Dixie Creek Riparian Corridor (Willoughby Farms Subdivision off Wynnfield Rd.)	3 acres	Public (Village)	Dry bottom detention basin planted to turf grass. Maintained by Village.	Design & implement project to naturalize basin with native prairie vegetation. Clear debris and remove willow species from inlet/outlet low flow channel. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium	Ecological Consultant	$8,000/acre
High Hill Detention	High Hill Park Riparian Corridor (west of Stonegate Rd.)	2.75 acres	Private (HOA)	Dry bottom detention basin planted to turf grass. Detention area is immediately adjacent to and outlets to Ratt Creek Reach 1within headwater area. within the High Hill Park Riparian Corridor. Maintained by HOA; potential acquisition for Village.	Design and implement project to naturalize basin with native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	High	Village, Ecological Consultant	$8,000/acre
Blue Ridge Detention	Between Blue Ridge Pkwy & Applewood Ln.	5 acres	Public (Village)	Dry bottom detention basin that collects stormwater from headwater residential area ("Critical Area") and eventually outlets to Souwanas Creek. Basin has two low flow concrete channels and is planted to turf grass. Maintained by Village.	Design and implement project to disable concrete channels, replace turf grass with native plant communities, and install outlet restrictor that promotes water quality treatment and infiltration. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	High (Critical Area)	Village Engineer, Ecological Consultant	$70,000
Lake Cornish; Lake Gillilan; Lake Plumleigh	Algonquin Lakes Preserves (South of IL Route 62)	45 acres	Public (Village)	Lakes/detentions created during previous gravel mining operations, now surrounded by residential development. Slopes surrounding lakes are steep, contain old field vegetation, and exhibit eroded gullies. Invasive common reed is problematic along all lake margins. Maintained by Village.	Design & implement project to naturalize all lake sideslopes with native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Low	Ecological Consultant	$8000/acre
Algonquin Lakes Detentions #1, 2, 3	Algonquin Lakes Preserves (South of IL Route 62)	5 acres	Public (Village)	Dry bottom detention basins dominated by old field vegetation. Maintained by Village.	Design & implement project to naturalize basins with native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium	Ecological Consultant	$8000/acre
Lake Braewood Detention	North of Gaslight Dr. inline with Dixie Creek	4 acres	Public (Village)	Open water detention area created by dam online with Dixie Creek. Heavy siltation present. Narrow buffer of turf grass and old field vegetation. Maintained by Village.	Design & implement project to create minimum 15' wide naturalized basin buffer of native prairie vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10. Alternatively, investigate feasibility to remove online dam and restore natural stream channel and floodplain function.	Low	Ecological Consultant	$8000/acre. Varies

STREAM & RIPARIAN CORRIDOR RESTORATION

Streambank/riparian corridor restoration projects are implemented primarily to improve water quality but also have excellent secondary benefits for reducing flooding and improving natural resources. They improve water quality by resulting in stabilized banks, reduce flooding by reconnecting channelized streams to the historic riparian corridor/floodplain, and improve natural resources by improving habitat.

Dixie Creek Reach 3	Dixie Creek Riparian Corridor (Wynnfield Dr. to Dixie Briggs Fromm)	1,500 lf	Public (Village)	Stream channel is relatively stable through first half of reach but is downcut and banks highly eroded along second half. Riparian corridor is dominated by non-native and invasive woody species with very little herbaceous understory. A high quality fen wetland is perched along the south side of the stream along the southern half of the reach. Reaches upstream and downstream have been restored using natural approaches.	Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor in "Critical Area". This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	High (Critical Area)	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Dixie Creek Reach 4	Dixie Briggs Fromm to Gaslight Dr.	700 lf	Public (Village)	Reach is entirely within Village owned parcel. Stream banks restored and riffles created approximately 10 years ago; native prairie planted along east buffer. West floodplain area is dominated invasive woody species. Beaver are ongoing problem in this stream reach.	Design & implement project to restore west floodplain by removing invasive woody species and installing native vegetation to blend in with stream and riparian restoration work at Dixie Briggs Fromm.	Medium	Ecological Consultant	$10,000/acre
Ratt Creek Reach 5	Fields Property (Lake Braewood to Edgewood Dr.)	2000 lf	Private	Reach is on privately owned parcel but with Village easement. Stream channel is downcut and banks are moderately to severely eroded. Older concrete dam located north of Edgwood Dr. Riparian corridor is generally degraded and dominated by woody invasive species through the first portion of the reach and bordered by degraded oak savanna along the areas south of Edgewood Dr.	Design & implement project to remove concrete dam and stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	High	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Lawndale Park Creek Reach 1	Lawndale Park (southwest corner of County Line Rd. & Spring Hill Dr.)	600 lf	Public (Village)	Headwater reach of tributary to Dixie Creek on Village owned Lawndale Park. Stream banks are moderately eroded and channel is downcut. Riparian corridor is heavily dominated by non-native and invasive woody species with very little herbaceous understory. No functioning floodplain exists. Stream is migrating west onto residential lots.	Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor in "Critical Area". This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	High (Critical Area)	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Ratt Creek Reach 1	High Hill Park Riparian Corridor (Randall Rd. to Stonegate Rd.)	1,800 lf	Public (Village)	Stream banks and channel are stable from marsh area to within 350 ft of Stonegate Dr. where the riparian area is open and dominated by wetland environments. Stream banks are moderately eroded and channel is downcut in area 350 ft west of Stonegate Dr.where riparian corridor is heavily dominated by non-native and invasive woody species with little to no herbaceous understory.	Area 350 feet west of Stonegate Dr.: Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) enhance buffer area to northwest by replacing old field vegetation with native vegetation; 5) Implement short and long term maintenance.	Medium	Corps; IDNR-OWR; IDNR, Ecological Consultant	$100-300/lf
Ratt Creek Reach 2	High Hill Park Riparian Corridor (Stonegate Rd. to Kirkland Dr.)	2000 lf	Public (Village)	First 500 feet of stream is reed canary grass wetland formed by old farm dam. Stream channel from dam to residential houses was widely channelized in past but is now recovering; however moderate to severe erosion is occurring just west of houses. Stream south of residential area to Kirkland Dr. is moderately stable but with riparian area heavily dominated by invasive woody species. Upstream and downstream reaches are stable.	Investigate feasibility to remove old farm dam and restore stream channel within first 500 feet of stream reach. Design & implement project to stabilize stream banks using bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance. Restore riparian area south of residential homes up to Kirkland Rd. by removing invasive woody species and seeding with native prairie.	High	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Ratt Creek Reach 4	Hanson Rd. to Harnish Dr.	2,100 lf	Private (Village easement)	First half of reach is bordered by residential. Turf grass is planted up to stream edge along most of this residential area and bank erosion is moderate. Second half of reach begins at Jaycee Park (Village owned) and continues to Harnish Dr. The stream in this area is bordered by degraded bottomland woodland and is suffering from moderate to severe erosion and woody debris jams.	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	Low	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Ratt Creek Reach 5	Harnish Dr. to High Hill Dam	1,500 lf	Public (Village)	Entire stream reach is located within Village owned High Hill Dam Preserve. This entire corridor is essentially an online detention created by High Hill Dam. The stream banks in this reach are moderately to highly eroded and the riparian corridor is dominated by dense cover of invasive woody species.	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	Medium	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf

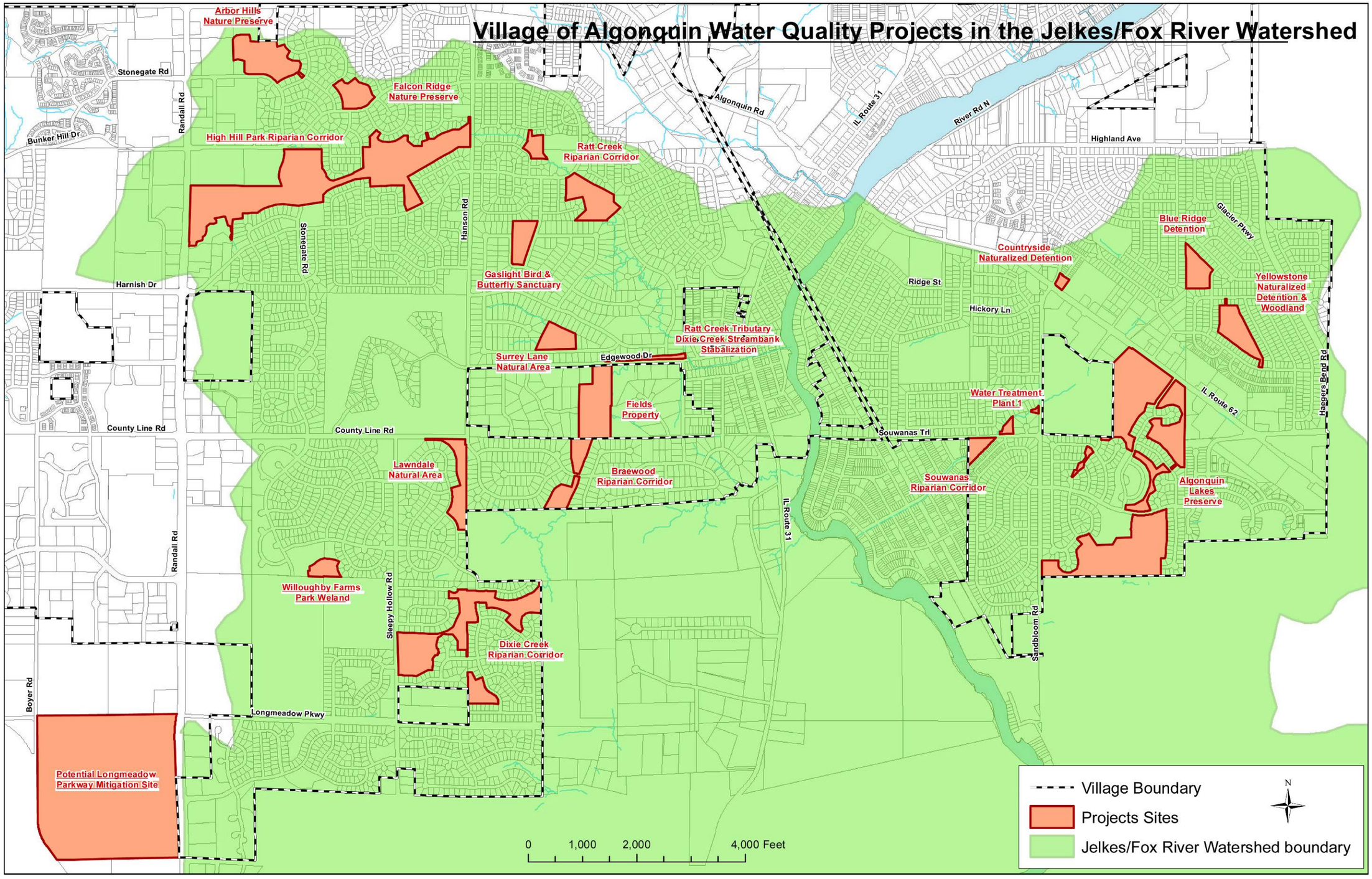
Ratt Creek Reach 6	High Hill Dam to Harper Dr.	3,500 lf	Private (Village easement)	Stream reach flows entirely through large lot residential area. Bank erosion is generally moderate but severe along many meanders that abut steep slopes. Riparian corridor is degraded bottomland woodland surrounded by degraded oak savanna.	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	Low	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Ratt Creek Tributary 1	Residential Lot to Surrey Ln.	1,500 lf	Public (Village); Private (Village easement)	Stream reach begins at outfall pipe behind residential lot. Bank erosion is moderate to severe, especially along outside bends. Riparian corridor is mostly residential up to Surrey Lane Natural Area (Village owned). The remainder of the riparian corridor is degraded bottomland woodland dominated by invasive woody species. Stream likely did not carry extensive stormwater runoff historically.	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance. Another alternative is to reroute stormwater via a pipe around residential area.	Medium	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf/ Varies
Ratt Creek Tributary 2	Surrey Ln to Surrey Ln.	2,000 lf	Public (Village); Private (Village easement)	Stream reach begins at outfall pipe carrying stormwater from golf course to west and flows behind residential lots. Bank erosion is moderate to severe and woody debris jams are common. Riparian corridor is mostly residential up to Surrey Lane Natural Area (Village owned). The remainder of the riparian corridor is degraded bottomland woodland dominated by invasive woody species. Stream likely did not carry extensive stormwater runoff historically.	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	Medium	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Souwanas Creek Reach 1	Sandbloom Rd. to Souwanas Trl.	600 lf	Public (Village); Private (Village easement)	Upper portion of reach is a "Critical Area" with migrating headcuts, severe bank erosion, and woody debris jams. This reach is bordered primarily by residential land. Lower portion of reach to Souwanas Trl. is relatively stable, especially along Village owned property behind Water Treatment Plant 1 where the Village has implemented streambank and riparian corridor restoration work.	Upper portion of reach ("Critical Area"): Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	High (Critical Area)	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
Souwanas Creek Reach 2	Souwanas Trl. to Pokagon Trl	600 lf	Public (Village)	Reach is entirely within Village owned parcel. Upper portion of stream exhibits highly eroded banks while the remainder of the stream banks are moderately eroded. Residential land abuts the southeast side of the stream corridor; shrub-shrub vegetation and reed canary grass wetland border the northwest portion. A degraded oak savanna abuts the corridor to the northwest.	Design & implement project to stabilize stream banks using combination of hard armoring and bio-engineering techniques and restore adjacent riparian corridor. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance. Restore adjacent savanna to increase buffer function.	High	Corps; IDNR-OWR, IDNR, Ecological Consultant	$100-300/lf
MAINTENANCE FOR EXISTING WATER QUALITY PROJECTS Water quality projects that have been implemented in recent years often degrade without short term and long term management. Stream maintenance is also conducted to keep the stream channel and riparian area clear of debris that may cause erosion & flooding issues.								
Dixie Creek Reach 1	Sleepy Hollow Road to Oak Creek Detention	1,200 lf	Public (Village)	Headwater reach of Dixie Creek. Degraded stream and riparian corridor currently under 3-year restoration and management plan. Stream is partially channelized, moderately eroded, and exhibits many debris jams. Riparian corridor is dominated by invasive and non-native shrubs, trees, and herbaceous species.	Following implementation of 3-year restoration & maintenance plan, implement long term management for 10 years including controlled burns, supplemental woody resprout treatments, and removal of debris from stream channel. Construct multiple artificial riffles/grade controls in stream channel to help stabilize banks.	Medium	Corps, Ecological Consultant	$15,000
Dixie Creek Reach 2	Oak Creek Detention to Wynnfield Dr.	1,000 lf	Public (Village)	Naturally meandering and stable stream channel and managed riparian area. Village currently managing by removing invasive & non-native woody species and installing native seed in riparian areas.	Implement long term management for 10 years including controlled burns, supplemental brushing, herbiciding invasive species, and removal of problematic debris from stream channel.	Low	Village, Ecological Consultant	$10,000
Ratt Creek Tributary (Dixie Creek) Streambank Stabilization	Along north side of Edgewood Dr.	1,200 lf	Private (Village easement)	Stream and riparian area restoration project completed by Village in 2010. Use of hard armoring and bioengineering was used to stabilize stream channel and banks. Invasive species were cleared from riparian area followed by planting of native vegetation.	Implement short term management for 3-5 years to establish plantings then implement long term management for 10 years including controlled burns, supplemental brushing, herbiciding invasive species, and removal of problematic debris from stream channel.	Low	Village, Ecological Consultant	$10,000
Creeks Crossing Subdivision Detentions #1-5	Dixie Creek Riparian Corridor (Creeks Crossing Subdivision)	4 acres	Public (Village)	Five recently (2010) created wet bottom detention basins planted with native vegetation along side slopes. Village Plan is in place to manage these detentions for 3 years.	Implement long term maintenance through year 10. This should include controlled burns every three years and spot herbicide applications to control non-natives and invasives.	Low	Village, Ecological Consultant	$15,000

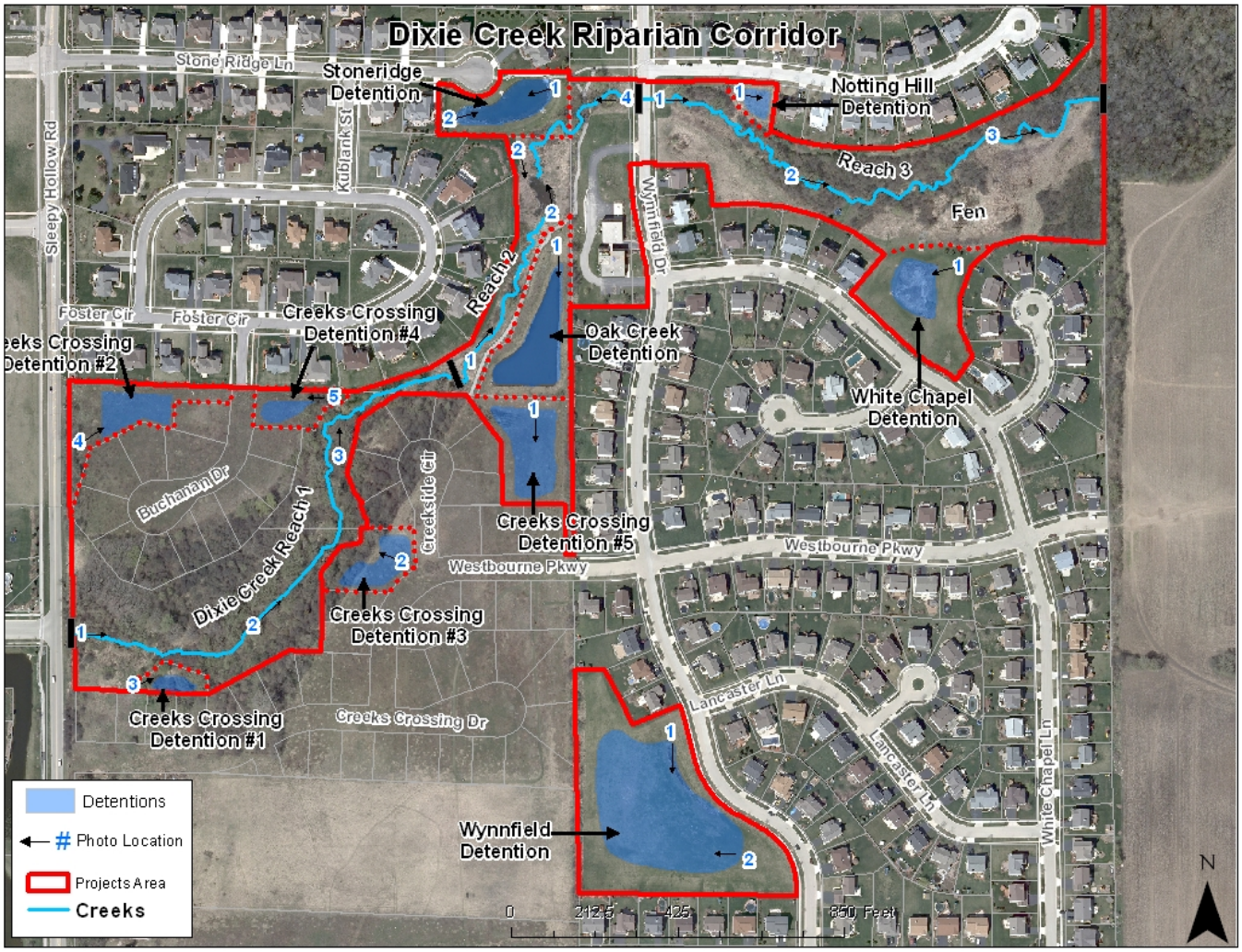
Oak Creek Detention	Dixie Creek Riparian Corridor (southwest of WTP 2)	2 acres	Private (HOA)	Wet bottom detention basin seeded with native vegetation along sideslopes in 2010.	Implement short term maintenance for 3-5 years to establish prairie then implement long term maintenance through year 10. This should include controlled burns every three years and spot herbicide applications to control non-natives and invasives.	Low	Village, Ecological Consultant	$6,000
Falcon Ridge Nature Preserve	Between Huntington Dr. & Oakleaf Rd.	4 acres	Public (Village)	Wetland bottom detention basin retrofitted with native vegetation along sideslopes. Currently managed by Village.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental brushing as needed. Interseed poorly established native plant buffer with mesic prairie grasses and forbs.	Low	Village, Ecological Consultant	$7,000
Willoughby Farms Park Wetland	Southeast corner of Wynnfield Dr. & Stonegate Rd.	2.3 acres	Public (Village)	Wet bottom detention basin planted with native vegetation along sideslopes. Currently managed by Village. Several site improvements were made in 2010 including planting emergent plants, seeding poorly established buffers, and brushing invasive shrubs.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental brushing as needed.	Low	Village, Ecological Consultant	$6,000
Lawndale Detention	Lawndale Natural Area (southwest corner of County Line Rd. & Spring Hill Dr.)	1.4 acres	Public (Village)	Wetland bottom detention basin at headwaters of Lawndale Creek planted with native vegetation along sideslopes. Currently managed by Village.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, supplemental brushing as needed, and supplemental seeding of poorly established areas.	Medium	Village, Ecological Consultant	$7,000
Arbor Hills Nature Preserve	North of Stonegate Rd. & West of Safford Dr.	6 acres	Public (Village)	Wetland bottom detention basin planted with native vegetation along sideslopes and emergent areas. Restored savanna buffer is located in central and south portions of site. Currently managed by Village.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives (primarily teasel, willow, reed canary grass, common reed, and purple loosestrife), supplemental brushing as needed, and supplemental seeding of poorly established areas.	Low	Village, Ecological Consultant	$10,000
Countryside Naturalized Detention	Between Il Route 62 & Golf Ln.	1 acre	Public (Village)	Dry bottom/turf grass detention basin retrofitted with native vegetation in 2007 by Village. Located in headwater to Souwanas Creek.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental seeding of poorly established areas.	Medium	Village, Ecological Consultant	$6,000
Yellowstone Naturalized Detention & Woodland	Between Yellowstone Pkwy. & Cumberland Pkwy.	7.5 acres	Public (Village)	Dry bottom/turf grass detention basin retrofitted with native vegetation in 2007 by Village. Adjacent woodland buffer also restored in 2007. Located in headwaters to Souwanas Creek.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, supplemental brushing in woodland, and supplemental seeding of poorly established areas.	Medium	Village, Ecological Consultant	$12,000
Gaslight Bird & Butterfly Sanctuary (Detention)	Between Terrace Dr. & Lexington Dr.	2.3 acres	Public (Village)	Dry bottom/turf grass online detention basin retrofitted with native vegetation in 2008 by Village. Creek stabilization work also completed by Village. Currently under 3-year management plan.	Implement long term maintenance through year 10. This should include controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental seeding of poorly established areas.	Low	Village, Ecological Consultant	$7,000
POTENTIAL LAND ACQUISITIONS								
Strategic land acquisitions can be very important for improving water quality, especially when located along stream and headwater reaches or to bridge a gap between other open space areas thereby extending a green infrastructure network.								
High Hill Park Riparian Corridor	Agricultural land at southwest corner of Huntington Dr. & Stonegate Dr.	20	Private Land Owner	Agricultural field bordering Ratt Creek Reach 1 (headwaters) to north.	Potential land acquisition to extend green infrastructure network at headwaters of Ratt Creek. Convert to naturalized landscape following acquisition.	High	Village, Ecological Consultant	Fair market value
Algonquin Lakes Preserves	Agricultural land between Algonquin Lakes Preserves & Sandbloom Rd.	70 acres	Private Land Owner	Agricultural field between Algonquin Lakes Preserves and Sandbloom Rd., south of IL Route 62. Headwaters of Souwanas Creek.	Potential "Critical Area" land acquisition to increase buffer along Souwanas Creek headwaters and bridge gap between Algonquin Lakes Preserves. Convert to naturalized landscape following acquisition.	High (Critical Area)	Village, Ecological Consultant	Fair market value
Fields Property	Residential/pasture land between Lake Braewood & Edgewood Dr.	17 acres	Private Land Owner	Part residential with open pasture, degraded oak savanna, pond, and contains Reach 5 of Ratt Creek between Braewood Lake upstream and Edgewood Dr. downstream.	Potential "Critical Area" land acquisition to increase and preserve buffer along Ratt Creek and bridge gap between Braewood Lake and restored section of Ratt Creek just downstream. Restore stream and adjacent natural communities following acquisition.	High (Critical Area)	Village, Ecological Consultant	Fair market value
OTHER WATER QUALITY PROJECTS								
Many types of projects can be implemented to improve water quality such as native plant buffers, rain gardens, bioswales/grassed swales, removal of non-natives and naturalization with natives, green infrastructure connections, parking lot BMPs, etc.								

Dixie Creek Reach 2	Northwest of WTP 2	n/a	Public (Village)	Old/unstable dam constructed during time when adjacent land was farmed. Dam alters natural flow of channel and creates sediment trap.	Design and install project to remove existing dam and replace with new control structure that allows for natural flow of stream and movement of sediment.	Medium	Village, Corps, Ecological Consultant	Varies
Falcon Ridge Nature Preserve	Between Huntington Dr. & Oakleaf Rd.	2 acres	Public (Village)	Potential buffer area adjacent to Falcon Ridge Detention Basin. Area was previously a tree farm that is being restored by the Village to a savanna. Site currently exhibits bare soil prone to erosion.	Naturalize savanna with native herbaceous species to prevent erosion and to buffer Falcon Ridge detention basin. Following seeding, implement short and long term maintenance including controlled burns every three years, spot herbicide applications to control non-natives and invasives, and supplemental brushing as needed.	Low	Ecological Consultant	$10,000
Willoughby Farms Park Wetland	Southeast corner of Wynnfield Dr. & Stonegate Rd.	0.5 acre	Public (Village)	Area between tennis courts and detention pond is currently planted to turf. The area has two swales that drain stormwater directly to the detention pond.	Convert area between tennis courts and detention pond to a native vegetation buffer. Install bioswales where appropriate. Implement 3-5 year management to establish plantings then implement long term (10-year) management.	Medium	Ecological Consultant	$8,000
High Hill Park Riparian Corridor	Randal Rd. to Hanson Rd.	6,000 lf/30 acres	Public (Village)	Heavy pockets of invasive species requiring management through corridor including common reed, reed canary grass, purple loosestrife, teasel, willow, and narrow-leaved cattail.	Implement management program throughout corridor to eradicate invasive species. Follow up eradication with controlled burns and native seeding where needed.	Medium	Village, Ecological Consultant	$2,000/acre
High Hill Park Riparian Corridor	Randal Rd. to Hanson Rd.	8 acres	Public (Village)	Various buffer areas between riparian corridor and residential development consists of low quality scrub-shrub woodland dominated by invasive woody species including box elder, buckthorn, willow, and various old field vegetation.	Implement management program to brush and/or herbicide invasive species followed by seeding with native prairie and long term management via controlled burns.	Medium	Village, Ecological Consultant	$6,500/acre
High Hill Park Riparian Corridor	Buffer area south of Ratt Creek Reach 2	10 acres	Public (Village)	Buffer area south of Ratt Creek Reach 2 (between Stonegate Rd. & residential houses) is currently old field vegetation with heavy cover by young invasive shrubs and trees.	Restore function of buffer by removing old field vegetation and invasive shrubs then plant prairie vegetation. Manage for 3-5 years to establish prairie then implement long term management through year 10.	Medium	Village, Ecological Consultant	$6,500/acre
High Hill Park	High Hill Park Riparian Corridor (between Flora Dr. & Chatham Cir.)	4 acres	Public (Village)	Existing turf grass park located on a relatively steep slope south of Ratt Creek Reach 3. Site contains two eroding turf grass swales that converge and flow into Ratt Creek Reach 3. Turf grass buffer area north of residential homes appears unused as park. Evidence of phosphorus entering stream corridor.	Create native plant buffer and install bioswales on turf grass areas south of playground and north of residential homes adjacent to riparian corridor Manage for 3-5 years to establish prairie/swales then implement long term management through year 10.	High	Village, Ecological Consultant	$8,000/acre
Algonquin Lakes Preserves	Open space corridors at Algonquin Lakes Preserves (South of IL Route 62)	Varies	Public (Village)	Open space corridors along trail systems is currently turf grass and/or old field vegetation and provides no water quality treatment or erosion control.	Convert all turf grass and/or old field corridors to native vegetation. Manage for 3-5 years to establish prairie then implement long term management through year 10.	Low	Ecological Consultant	$6,000/acre
Braewood Riparian Corridor Pump Station	Between Dixie Briggs Fromm & Gaslight Dr.	1 acre	Public (Village)	Turf grass open space adjacent to pump station with turf grass swale leading to Dixie Creek Reach 4.	Create native plant buffer and install bioswale on turf grass area just west of pump station. Manage for 3-5 years to establish prairie/swales then implement long term management through year 10.	Low	Village, Ecological Consultant	$6,000/acre
POTENTIAL WETLAND MITIGATION SITES Wetland mitigation projects are primarily constructed to create "Wetland Credits" that developers can purchase for impacts to wetlands on the development site. Wetland mitigation sites also improve water quality, reduce flooding, and improve natural resource quality.								
Potential Longmeadow Wetland Mitigation Site	Between Randall Rd. and Huntley Rd.	150 acres	Private; Future Village Annexation	Existing 150 acre agricultural field comprised of at least 1/3 drained hydric soils and future Village of Algonquin annexation. 50 acre area to south is future Village of Carpentersville annexation and is also an agricultural field with approximately 50% drained hydric soils. Entire 200 acre area appears to drain west under Huntley Rd. via tiles and is likely not in the Jelkes-Fox River Watershed. However, proximity to proposed Longmeadow Rd. corridor expansion (located immediately to north and extending from Huntley R. east across the Fox River) and future development along Randal Rd. within the Jelkes-Fox Watershed makes this a potentially important site.	Potential wetland mitigation site for wetland impacts associated with potential Longmeadow Rd. expansion project and other development along Randall Rd within the Jelkes-Fox Watershed. Potential 150 acre wetland mitigation site on future Village of Algonquin annexation land. Additional 50 acre potential wetland mitigation site to south on future Carpentersville annexation land. Combined potential 200 acre wetland mitigation site that could generate approximately 50-75 acres of wetland impact credit.	High (Critical Area)	Villages of Algonquin & Carpentersville, Corps, Kane County, Kane County DOT, Ecological Consultant, Wetland Banker	Fair market value for land and 15K/acre for wetland bank creation

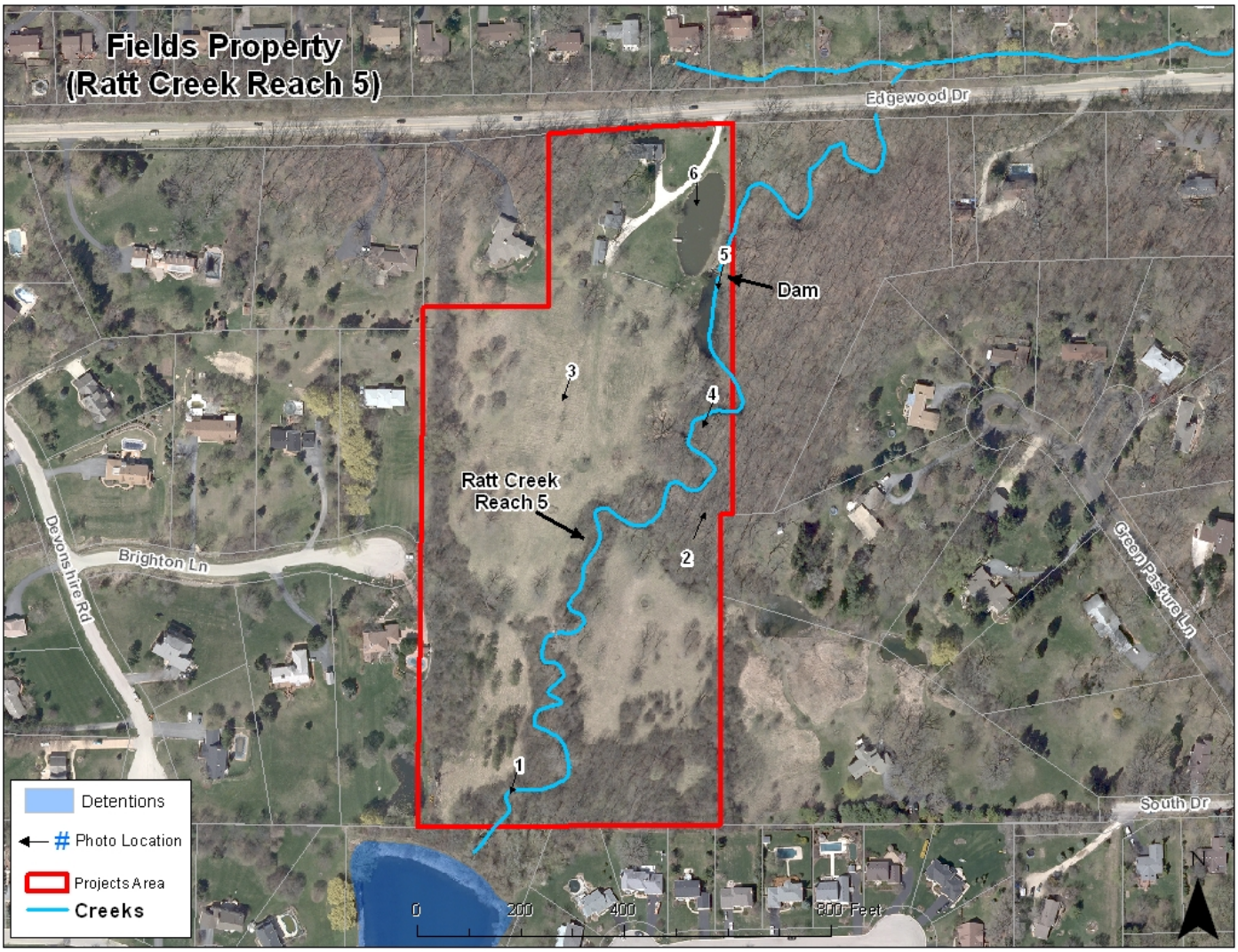
3.0 PROJECT LOCATION AERIAL SITE MAPS

Village of Algonquin Water Quality Projects in the Jelkes/Fox River Watershed

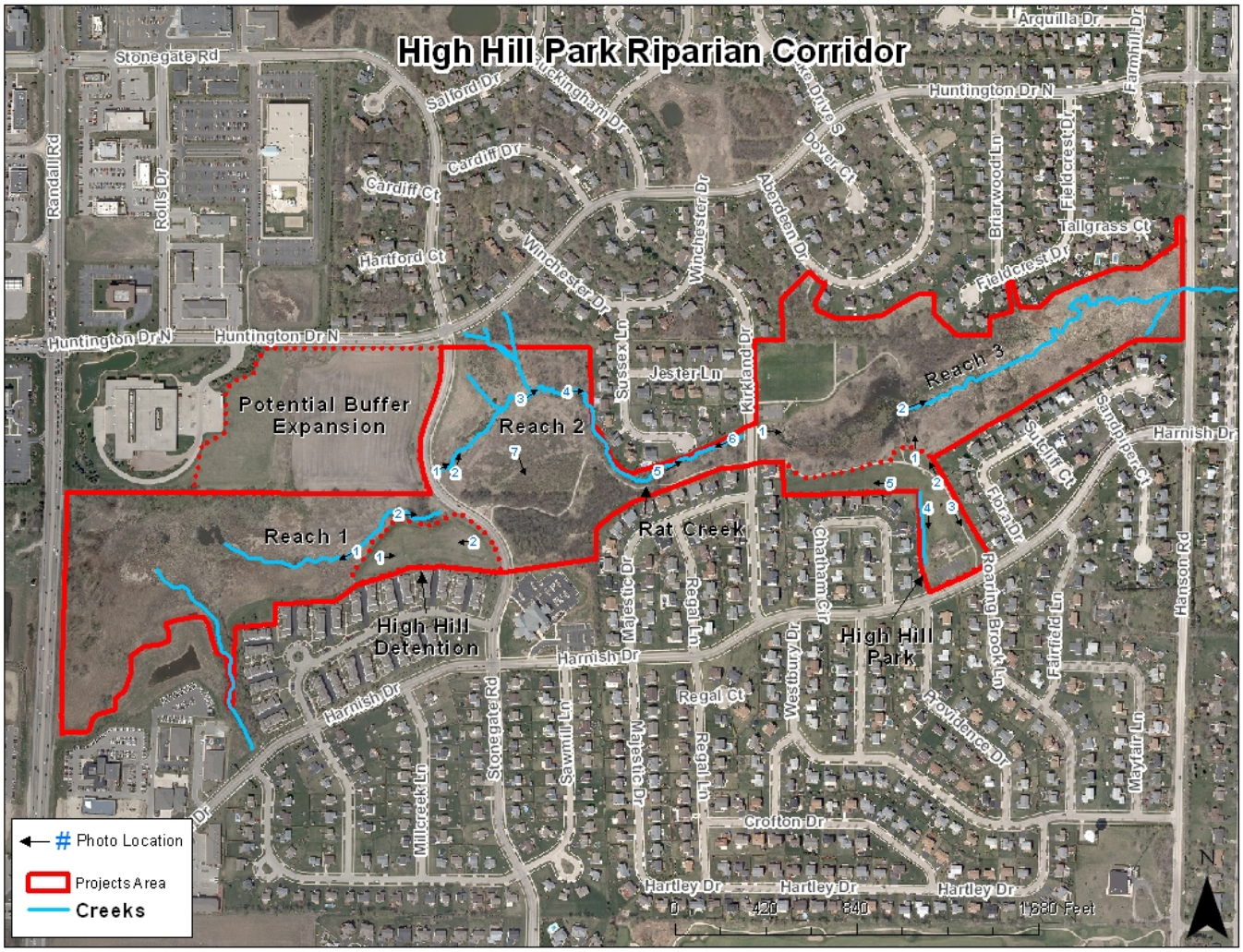


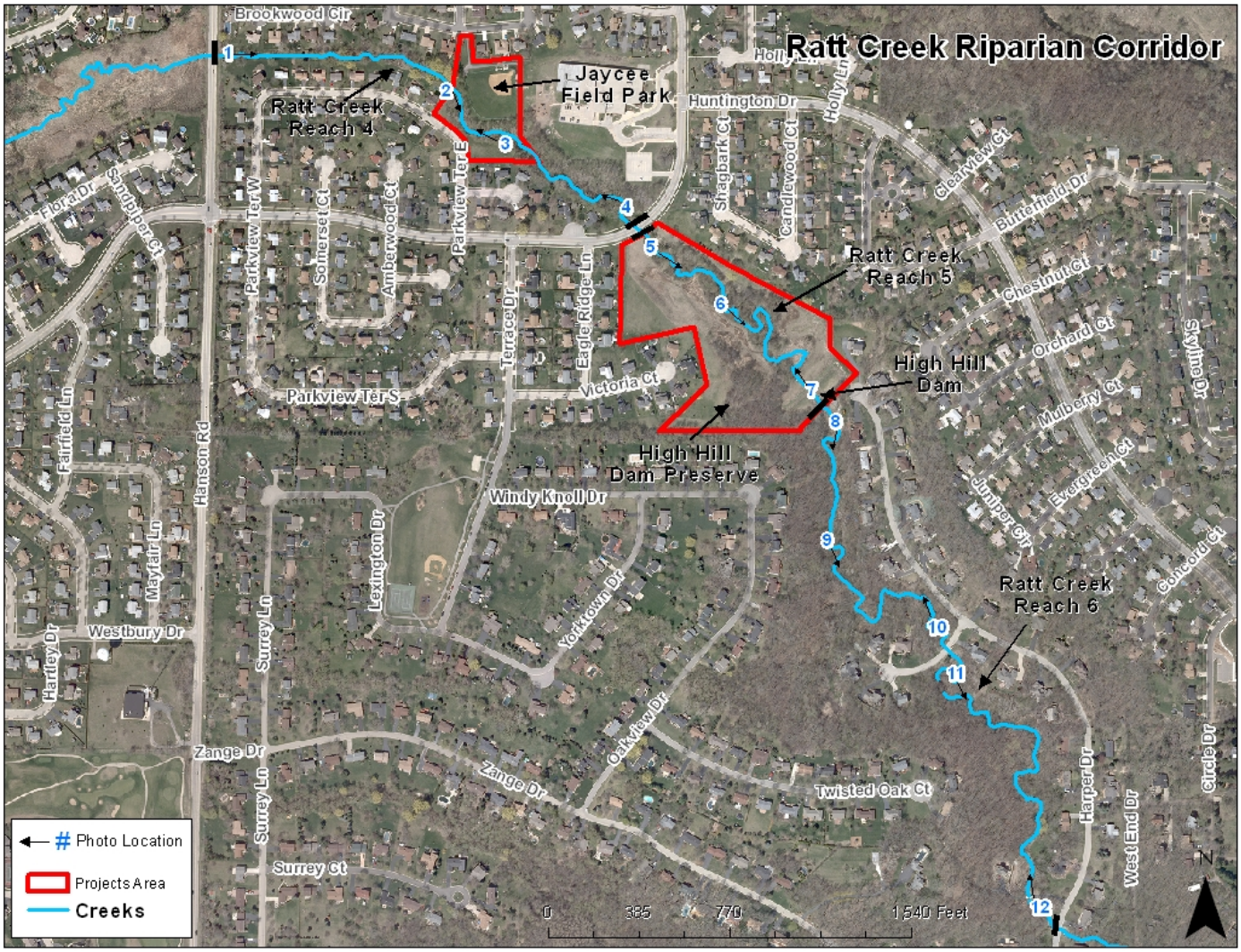

Dixie Creek Riparian Corridor
Stone Ridge Ln
Stoneridge Detention
Notting Hill Detention
Sleepy Hollow Rd
Kubiank St
Reach 3
Fen
Wynnfield Dr
Reach 2
Foster Cir
Foster Cir
Creeks Crossing Detention #4
Creeks Crossing Detention #2
Oak Creek Detention
White Chapel Detention
Buchanan Dr
Dixie Creek Reach 1
Creekside Cir
Creeks Crossing Detention #5
Westbourne Pkwy
Westbourne Pkwy
Creeks Crossing Detention #3
Lancaster Ln
Lancaster Ln
White Chapel Ln
Creeks Crossing Dr
Creeks Crossing Detention #1
Wynnfield Detention
Detentions
Photo Location
Projects Area
Creeks
0
212.5
425
850 Feet
N

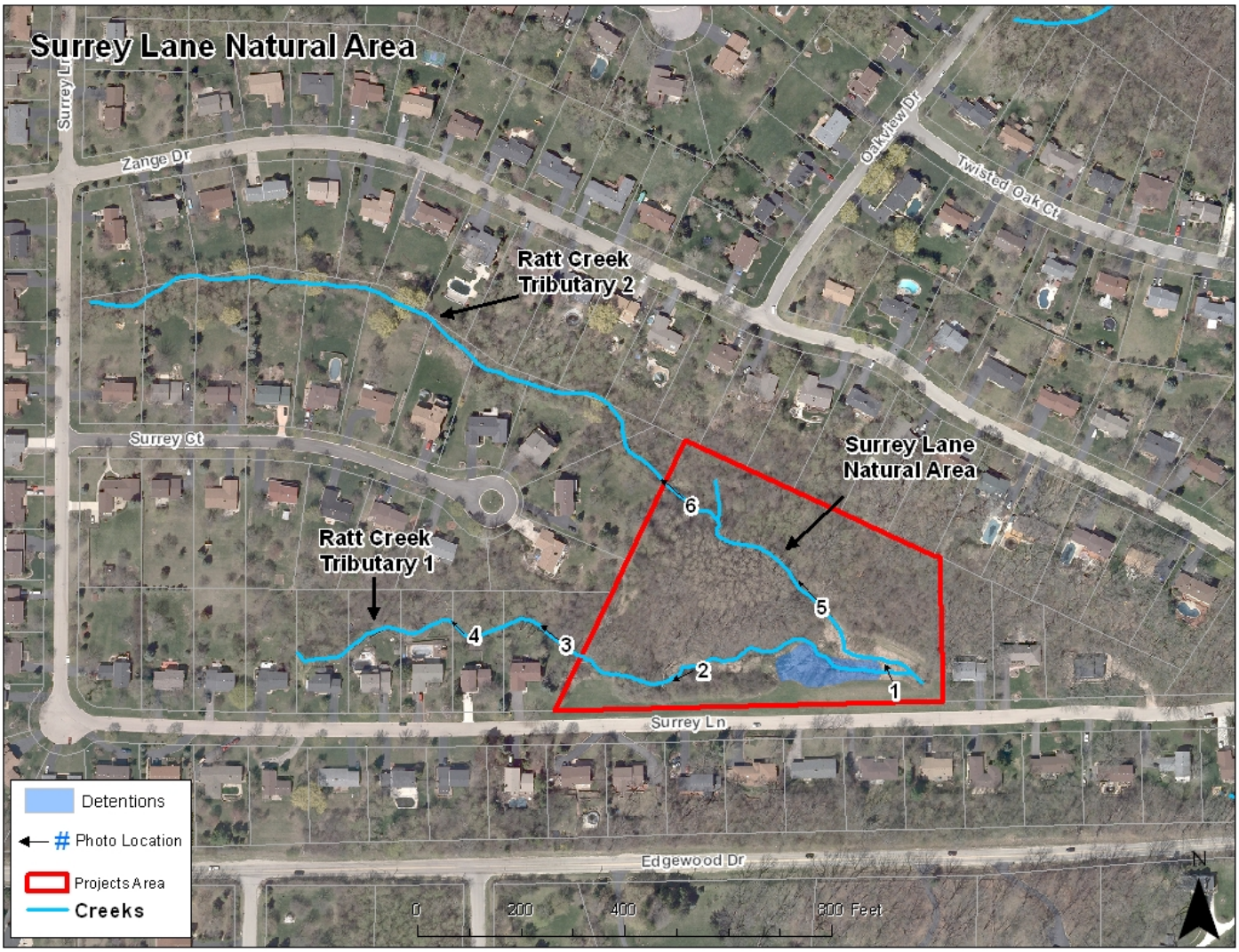

Braewood Riparian Corridor
Lake Braewood Detention
Spring Hill Dr
Brandywine Cir
Gaslight Dr
Braewood Dr
Braewood Dr
Dixie Creek Reach 4
Pump Station
1
2
3
4
5
6
Detentions
Photo Location
Projects Area
Creeks
0
100
200
400 Feet
N

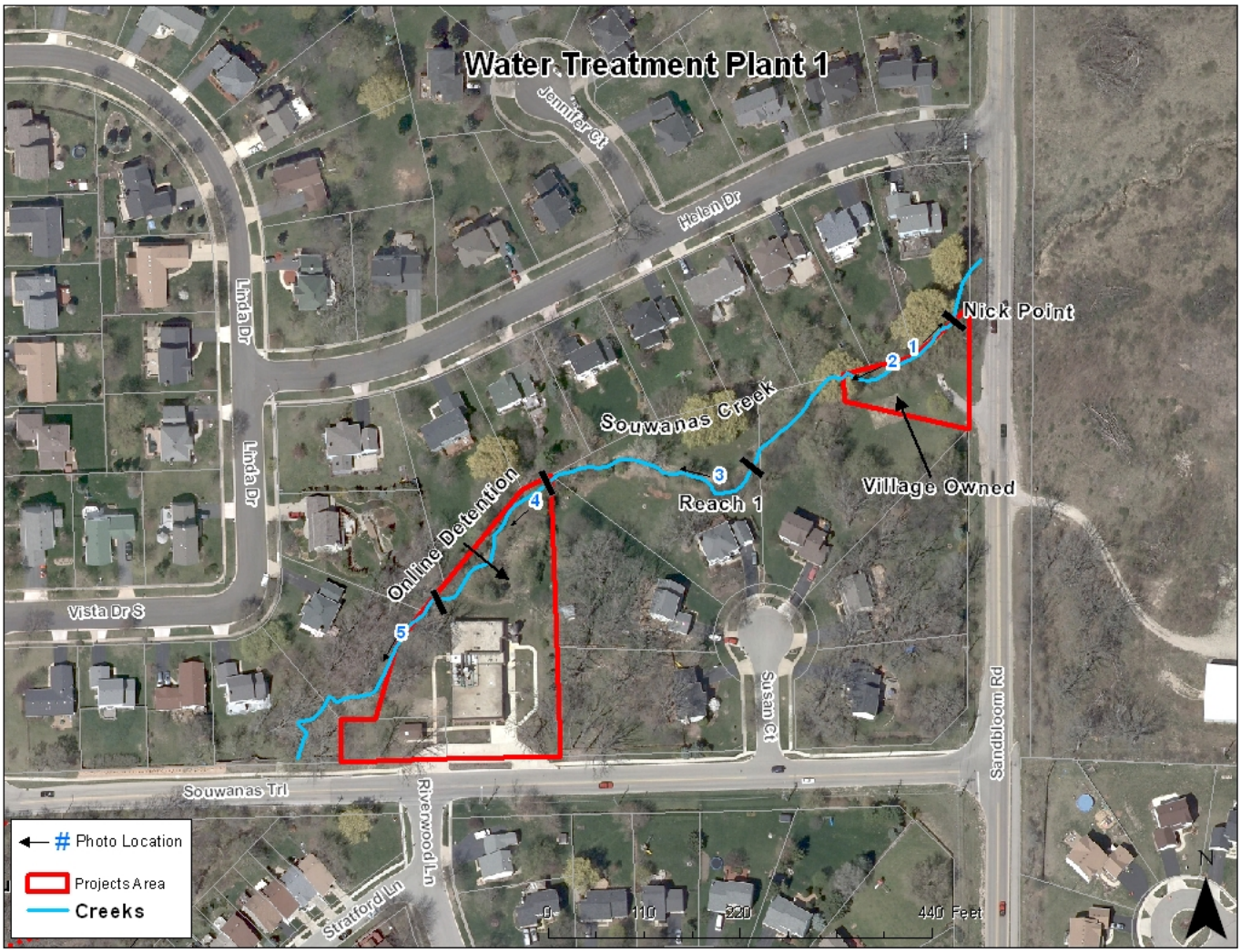

Fields Property
(Ratt Creek Reach 5)
Edgewood Dr
Dam
Ratt Creek
Reach 5
Brighton Ln
Devonshire Rd
Green Pasture Ln
South Dr
1
2
3
4
5
6
Detentions
Photo Location
Projects Area
Creeks
0
200
400
800 Feet
N


Ratt Creek Tributary Dixie Creek Streambank Stabalization
Zange Dr
Surrey Ln
Zange Dr
Harper Dr
West End Dr
Edgewood Dr
Cardinal Dr
Beach Dr
1
2
3
4
5
Photo Location
Projects Area
Creeks
0
125
250
500 Feet
N


High Hill Park Riparian Corridor
Potential Buffer Expansion
Reach 1
Reach 2
Reach 3
Rat Creek
High Hill Detention
High Hill Park
Photo Location
Projects Area
Creeks
Stonegate Rd
Huntington Dr N
Harnish Dr
Hartley Dr
Crofton Dr
Regal Ct
Regal Ln
Majestic Dr
Westbury Dr
Chatham Ct
Roaring Brook Ln
Providence Dr
Fairfield Ln
Hanson Rd
Millcreek Ln
Stonegate Rd
Sawmill Ln
Waterstone Dr
Randall Rd
Rolls Dr
Salford Dr
Buckingham Dr
Cardiff Dr
Cardiff Ct
Hartford Ct
Winchester Dr
Dover Ct
Aberdeen Dr
Briarwood Ln
Fieldcrest Dr
Tallgrass Ct
Arquilla Dr
Fairmill Dr
Sussex Ln
Jester Ln
Kirkland Dr
Sunchaser Ct
Sunchiff Ct
Flora Dr
0
420
840
1,680 Feet
N


Ratt Creek Riparian Corridor
Brookwood Cir
Jaycee Field Park
Ratt Creek Reach 4
Huntington Dr
Holly Ln
Shagbark Ct
Candlewood Ct
Clearview Ct
Butterfield Dr
Chestnut Ct
Orchard Ct
Skyline Dr
Mulberry Ct
Evergreen Ct
Juniper Cir
Concord Ct
Ratt Creek Reach 5
High Hill Dam
High Hill Dam Preserve
Victoria Ct
Parkview Ter S
Parkview Ter W
Parkview Ter E
Somerset Ct
Amberwood Ct
Terrace Dr
Eagle Ridge Ln
Windy Knoll Dr
Lexington Dr
Yorktown Dr
Ratt Creek Reach 6
Oakview Dr
Twisted Oak Ct
Harper Dr
West End Dr
Circle Dr
Zange Dr
Surrey Ln
Surrey Ct
Westbury Dr
Hartley Dr
Maytair Ln
Fairfield Ln
Hanson Rd
Sandpiper Ct
Flora Dr
Photo Location
Projects Area
Creeks
0
385
770
1,540 Feet
N

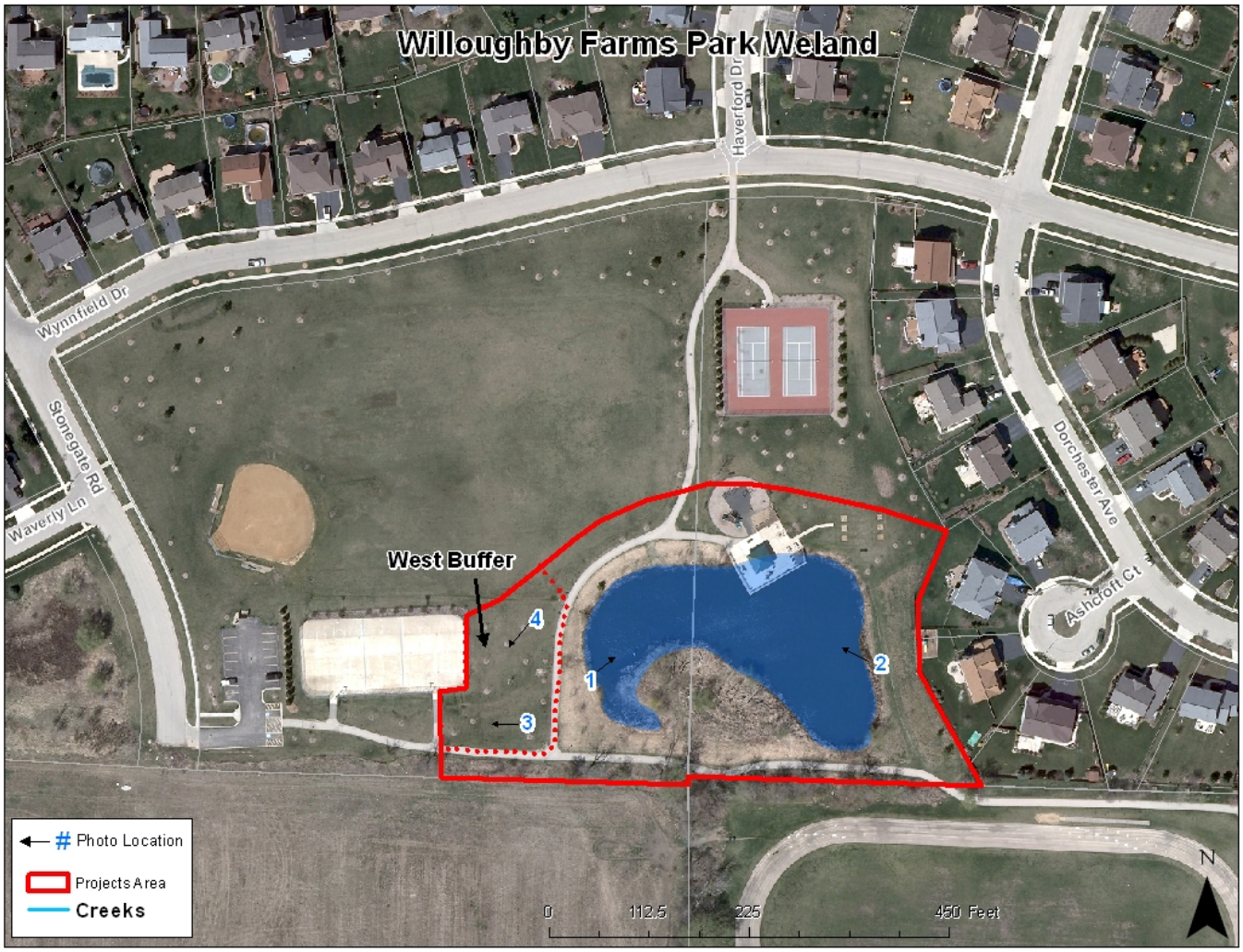

Surrey Lane Natural Area
Surrey Ln
Zange Dr
Oakview Dr
Twisted Oak Ct
Ratt Creek Tributary 2
Surrey Ct
Surrey Lane Natural Area
Ratt Creek Tributary 1
6
5
4
3
2
1
Surrey Ln
Edgewood Dr
Detentions
Photo Location
Projects Area
Creeks
0
200
400
800 Feet
N


Water Treatment Plant 1
Jennifer Ct
Helen Dr
Linda Dr
Linda Dr
Nick Point
1
2
Souwanas Creek
3
Reach 1
Village Owned
4
Online Detention
5
Vista Dr S
Susan Ct
Sandbloom Rd
Souwanas Trl
Riverwood Ln
Stratford Ln
Photo Location
Projects Area
Creeks
0
110
220
440 Feet
N

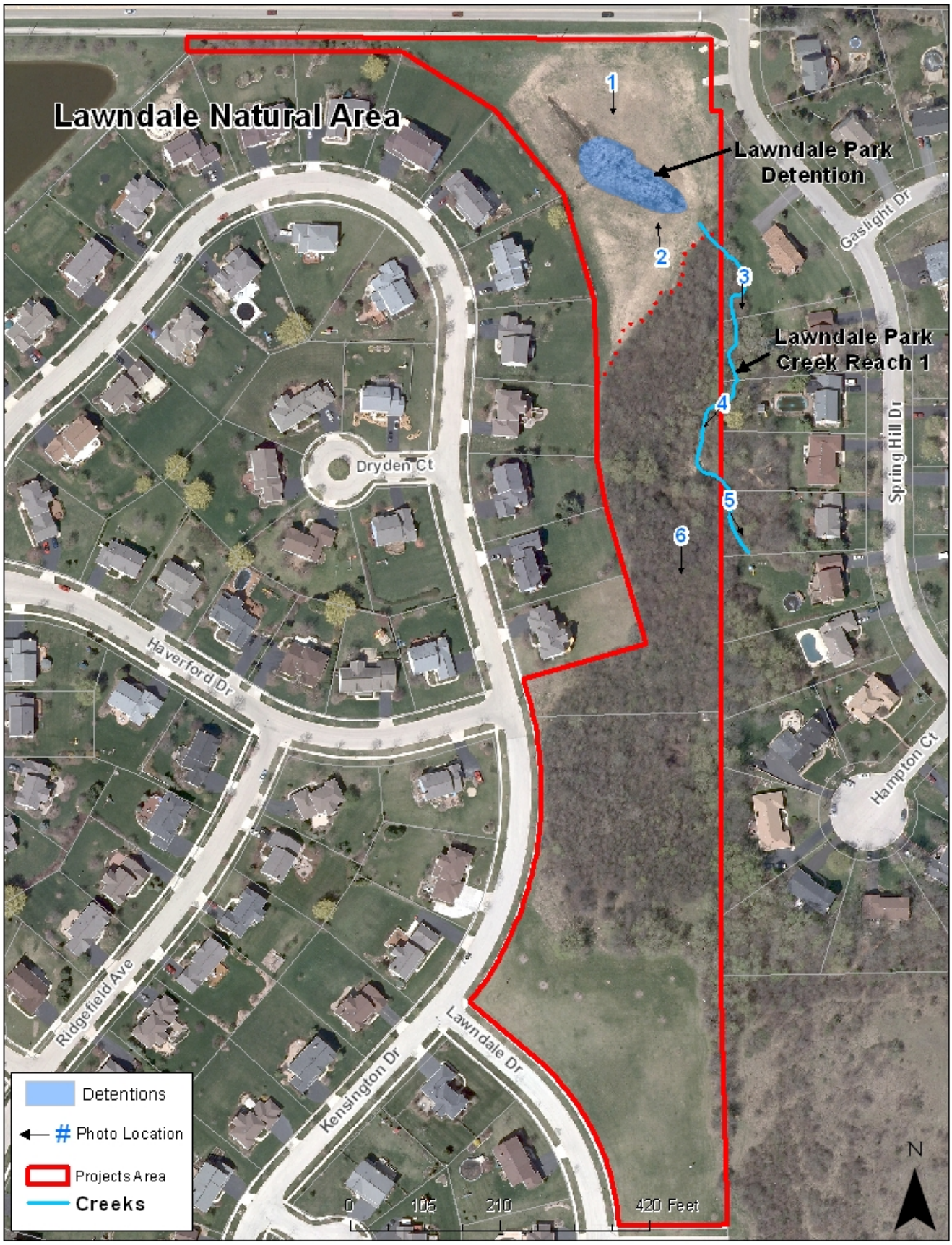

Souwanas Riparian Corridor
Vista Dr S
Tamarac Dr
Vista Dr S
Carriage Dr
Souwanas Trl
Savanna Buffer
1
2
3
4
Riverwood Ln
Meghan Ave
Stratford Ln
Souwanas Creek
Reach 2
Minnehaha Trl
Wahtgan Trl
Riverwood Dr
Greenridge Ave
N
Photo Location
Projects Area
Creeks
0
110
220
440 Feet


Blue Ridge Detention
Aspen Dr
Prairie Dr
Blue Ridge Pkwy
2
1
Detentions
Photo Location
Projects Area
Creeks
0
60
120
240 Feet
N


Falcon Ridge Nature Preserve
Portsmith Ct
Oakleaf Rd S
Lake Drive S
1
2
3
4
Savanna Buffer
Huntington Dr N
Dover Ct
Buckingham Dr
Huntington Dr N
Winchester Dr
Aberdeen Dr
Detentions
Photo Location
Projects Area
Creeks
0
80
160
320 Feet
N

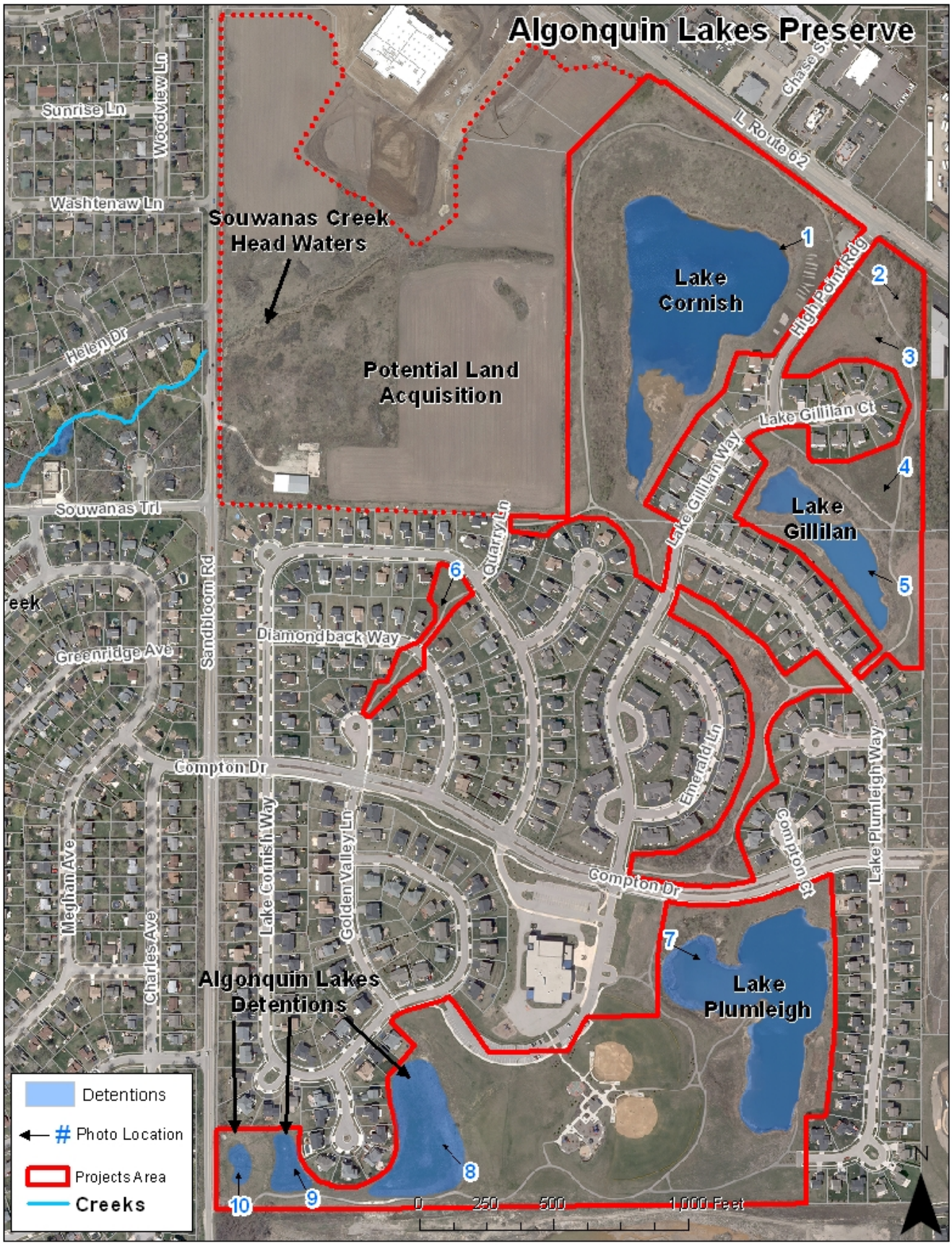

Willoughby Farms Park Weland
Haverford Dr
Wynnfield Dr
Stonegate Rd
Waverly Ln
Dorchester Ave
Ashcroft Ct
West Buffer
1
2
3
4
Photo Location
Projects Area
Creeks
0
112.5
225
450 Feet
N


Arbor Hills Nature Preserve
Salford Ct
Oakleaf Rd S
Salford Dr
Buckingham Dr
Stonegate Rd
Rochester Ct
Stonegate Rd
Savanna Buffer
1
2
3
4
5
6
Photo Location
Projects Area
Creeks
0
137.5
275
550 Feet
N


Lawndale Natural Area
Lawndale Park Detention
Lawndale Park Creek Reach 1
1
2
3
4
5
6
Gaslight Dr
Spring Hill Dr
Dryden Ct
Haverford Dr
Hampton Ct
Ridgefield Ave
Kensington Dr
Lawndale Dr
Detentions
Photo Location
Projects Area
Creeks
0
105
210
420 Feet
N


Countryside Naturalized Detention
Ballard Dr
Wesley Ln
Wesley Ln
Golf Ln
1
2
Countryside Dr
Sandbloom Rd
IL Route 62
Detentions
Photo Location
Projects Area
Creeks
0
45
90
180 Feet
N


Yellowstone Naturalized Detention & Woodland
Woodland Buffer
1
2
3
Glacier Pkwy
Yellowstone Pkwy
Ozark Pkwy
Cumberland Pkwy
Teton Pkwy
Detentions
Photo Location
Projects Area
Creeks
0
80
160
320 Feet
N


Algonquin Lakes Preserve
Souwanas Creek Head Waters
Potential Land Acquisition
Lake Cornish
Lake Gillilan
Lake Plumleigh
Algonquin Lakes Detentions
Sunrise Ln
Woodview Ln
Washtenaw Ln
Helen Dr
Souwanas Trl
Greenridge Ave
Sandbloom Rd
Diamondback Way
Quarry Ln
Lake Gillilan Way
Lake Gillilan Ct
High Point Rdg
IL Route 62
Chase St
Compton Dr
Emerald Ln
Compton Ct
Lake Plumleigh Way
Golden Valley Ln
Lake Cornish Way
Meghan Ave
Charles Ave
1
2
3
4
5
6
7
8
9
10
Detentions
Photo Location
Projects Area
Creeks
0
250
500
1,000 Feet
N


Gaslight Bird & Butterfly Sanctuary
Windy Knoll Dr
Windy Knoll Dr
Lexington Dr
Terrace Dr
Yorktown Dr
1
2
3
Photo Location
Projects Area
Creeks
0
110
220
440 Feet
N


Potential Longmeadow Parkway Mitigation Site
Boyer Rd
Longmeadow Pkwy
Stonegate Rd
Broadsmore Dr
Grandview Dr
Huntley Rd
Randall Rd
Detentions
Photo Location
Projects Area
Creeks
0
405
810
1,620 Feet
N

4.0 SITE PHOTO LOG:

DIXIE CREEK RIPARIAN CORRIDOR (includes Dixie Creek Reaches 1-3)

Stoneridge Detention

Photo 1

Photo 2

White Chapel Detention

Photo 1

Notting Hill Detention

Photo 1

Wynnfield Detention

Photo 1

Photo 2

Oak Creek Detention

Photo 1

Creeks Crossing Subdivision Detentions #1-5

Photo 1: Detention #5

Photo 2: Detention # 3

Photo 3: Detention #1

Photo 4: Detention # 2

Photo 5: Detention #4

Dixie Creek Reach 1

Photo 1

Photo 2

Photo 3

Dixie Creek Reach 2

Photo 1

Photo 2

Photo 3: Old dam in Reach 2

Photo 4

Dixie Creek Reach 3

Photo 1

Photo 2

Photo 3

BRAEWOOD RIPARIAN CORRIDOR (includes Dixie Creek Reach 4)

Dixie Creek Reach 4

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

FIELDS PROPERTY (includes Dixie Creek Reach 5)

Photo 1

Photo 2

Photo 3

Photo 4. Dixie Creek Reach 5

Photo 5: Dam at Fields Property

Photo 6: Pond at Fields Property

RATT CREEK TRIBUTARY STREAMBANK STABILIZATION (includes Dixie Creek Reach 6)

Dixie Creek Reach 6/Ratt Creek Tributary

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

HIGH HILL PARK RIPARIAN CORRIDOR (includes Ratt Creek Reaches 1-3)

High Hill Detention

Photo 1

Photo 2

High Hill Park

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Ratt Creek Reach 1

Photo 1

Photo 2

Ratt Creek Reach 2

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7: Degraded buffer south of Reach 2.

Ratt Creek Reach 3

Photo 1

Photo 2

RATT CREEK RIPARIAN CORRIDOR (includes Ratt Creek Reaches 4-6)

Ratt Creek Reach 4

Photo 1

Photo 2

Photo 3

Photo 4

Ratt Creek Reach 5

Photo 5

Photo 6

Photo 7

Ratt Creek Reach 6

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

SURREY LANE NATURAL AREA (includes Ratt Creek Tributaries 1 & 2)

Ratt Creek Tributary 1

Photo 1

Photo 2

Photo 3

Photo 4

Ratt Creek Tributary 2

Photo 5

Photo 6

Photo 7

WATER TREATMENT PLANT 1 (includes Souwanas Creek Reach 1)

Souwanas Creek Reach 1

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

SOUWANAS RIPARIAN CORRIDOR (includes Souwanas Creek Reach 2)

Souwanas Creek Reach 2

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

BLUE RIDGE DETENTION

Photo 1

Photo 2

FALCON RIDGE NATURE PRESERVE

Falcon Ridge Detention & Savanna Buffer

Photo 1

Photo 2

Photo 3

Photo 4. Savanna buffer adjacent to detention

WILLOUGHBY FARMS PARK WETLAND

Detention & West Buffer

Photo 1

Photo 3

Photo 2

Photo 4

ARBOR HILLS NATURE PRESERVE

Detention & Savanna Buffer

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

LAWNDALE NATURAL AREA (includes Lawndale Park Creek Reach 1)

Lawndale Detention

Photo 1

Photo 2

Lawndale Park Creek Reach 1 & Riparian Area

Photo 3

Photo 4

Photo 5

Photo 6

COUNTRYSIDE NATURALIZED DETENTION

Photo 1

Photo 2

YELLOWSTONE NATURALIZED DETENTION & WOODLAND

Photo 1

Photo 2

Photo 3

ALGONQUIN LAKES PRESERVES

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

GASLIGHT BIRD & BUTTERFLY SANCTUARY (RATT CREEK REACHES 4, 5, 6)

Photo 1

Photo 2

Photo 3

VILLAGE OF CARPENTERSVILLE:
WATER QUALITY PROJECTS IN JELKES/FOX RIVER WATERSHED

SUBMITTED TO:

Village of CARPENTERSVILLE ILLINOIS
Building a Better Tomorrow . . . Today

VILLAGE OF CARPENTERSVILLE
1200 L. W. BESINGER DRIVE
CARPENTERSVILLE, IL 60110

JUNE 20, 2011
(AES PROJECT # 11-0201)

Prepared By

APPLIED ECOLOGICAL SERVICES

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West Dundee, IL 60118
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With Village comments by Scott Marquardt October 2011

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1.0 INTRODUCTION & METHODS

Introduction

In 2010, the Kane-DuPage Soil & Water Conservation District (KDSWCD) was awarded an IEPA 319 Water Quality Grant to complete a Watershed-Based Plan for the Jelkes Creek-Fox River Watershed located primarily in northeast Kane County, Illinois. The majority of the Village of Carpentersville (Village) is located in this watershed.

The Village became aware during initial watershed planning meetings that identification of potential water quality improvement projects would not be the sole responsibility of KDSWCD's planning effort but rather the responsible of individual communities. Identification of site specific water quality projects is the most important component of any IEPA Watershed-Based Plan because any project that is identified in the plan becomes immediately eligible for future IEPA 319 Grant funding. Identified projects also carry more weight when applying for other grants such as the IEPA's Illinois Green Infrastructure Grant (IGIG). Therefore, the Village hired Applied Ecological Services, Inc. (AES) in April, 2011 to evaluate selected Village-owned parcels and/or stream reaches and various privately owned locations within the watershed to identify potential water quality BMP projects that can be included in the final Jelkes Creek-Fox River Watershed-Based Plan being completed by KDSWCD.

Methods

An AES Ecologist worked with the Village Engineer and Development Engineer to identify future water quality BMP projects located on Village-owned and various privately owned locations within the Jelkes Creek-Fox River Watershed. The Village supplied AES with the location of potential sites. AES then prepared maps that clearly outlined stream reaches, detention basins, open space, and/or other areas where the Village was interested in implementing future water quality improvement projects. These maps were used by the Ecologist and Village Engineers during site visits conducted in May 2011. AES developed water quality BMP data sheets that were completed in the field for each potential project site or stream reach. The data sheets included information related to the existing condition and potential BMP opportunities or recommendations. Photos were also taken of each potential project site and location shown on the site maps.

AES then used data collected during the site visits to compile a spreadsheet containing all potential water quality improvement projects. Specific information about each project location is included such as: 1) Project Location/Stream Reach ID, 2) Size, 3) Ownership, 4) Existing Condition, 5) Water Quality BMP Recommendations, 6) Priority, 7) Sources of Technical Assistance, and 8) Cost Estimate. **It is important to note that "Critical Areas" as defined by the IEPA are highlighted in orange in the spreadsheet and should be looked at in more detail in KDSWCD's planning effort.**

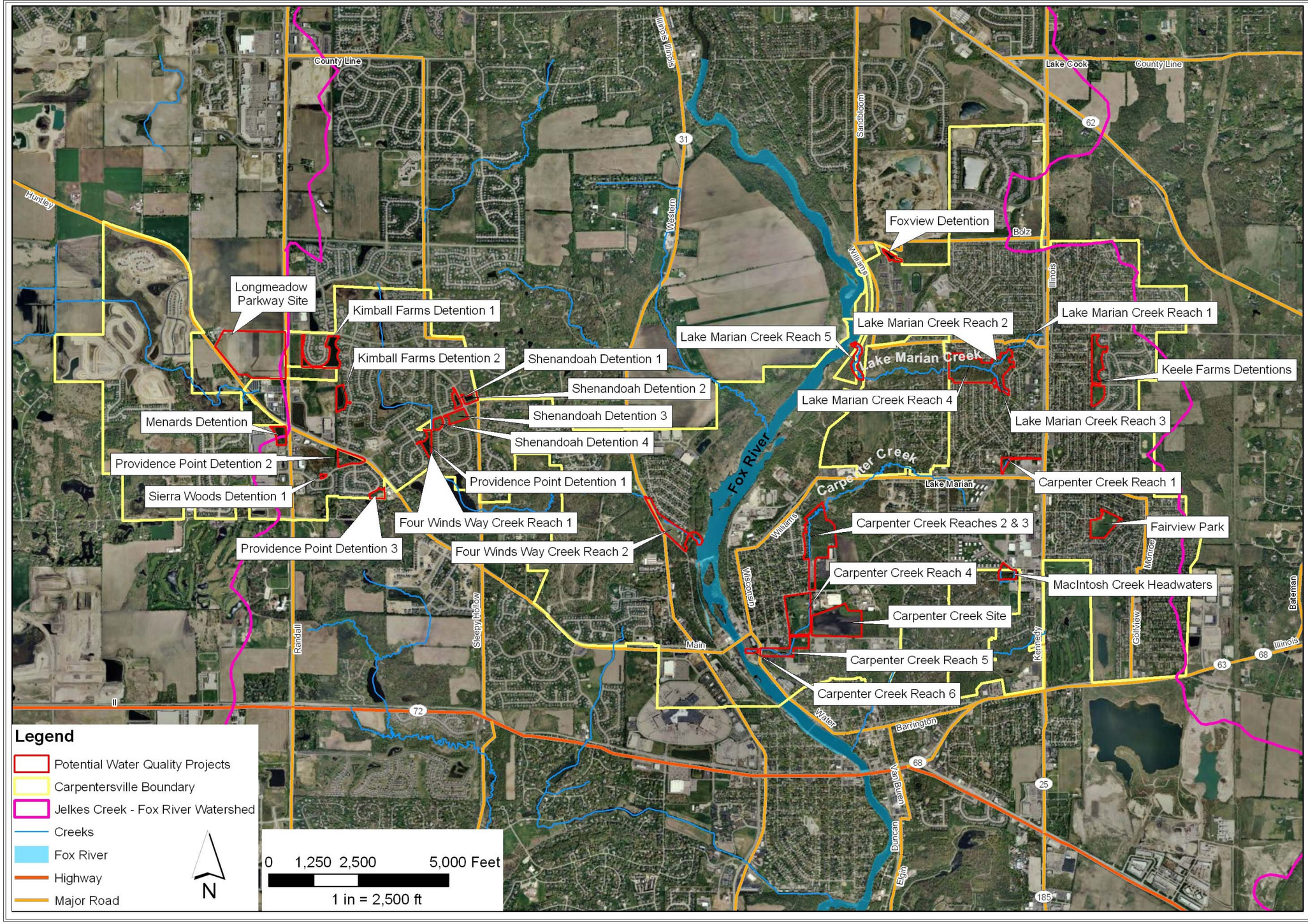
In October 2011 Village of Carpentersville staff began water quality monitoring testing at three locations within the watershed in order to obtain qualitative data on existing water conditions. This will provide a benchmark against to compare results after completion of various future projects. The three locations where samples are being taken are:

1. Just upstream of Carpenter Creek Reach 6
2. At western (downstream) end of Lake Marian Creek Reach 4
3. On Macintosh Creek approximately 2,000 feet downstream of headwaters, at Van Buren Avenue crossing

The information that follows is meant to be used in the following way:

1) Locate a potential water quality improvement project of interest on the Overall Project Location Map (Figure 1) or in the Projects Table (Table 1);
2) Locate the potential project of interest on the appropriate Aerial Site Map (Figures 2-20) to visually see its location within the context of the surrounding area (Section 3.0);
3) Locate the potential project photographs (Section 4.0) to visually see the existing condition and why particular water quality improvement BMP recommendations were made in the Projects Table.

2.0 WATER QUALITY PROJECTS IN JELKES/FOX RIVER WATERSHED (Replace Map)



Carpentersville Water Quality Projects
Carpentersville, Illinois, Kane County
Village of Carpentersville
1200 L.W. Besinger Dr.
Carpentersville, Illinois 60110

Figure 1:
Overall Project
Location Map

REVISIONS

No.	Date	By
1	10/26/2011	mlb

Description: Updated site names.

No. 2 | Date: | By:
Description:

No. 3 | Date: | By:
Description:

No. 4 | Date: | By:
Description:

AES Proj.#: 11-0201
Checked:
Approved:
Drawn by: mlb
File: CvilleWQFinalIndexMap.mxd
Date: 6/16/2011
Coordinate System: IL SP East, NAD83
Stamped:
Date:

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TABLE 1: CARPENTERSVILLE WATER QUALITY PROJECTS IN JELKES/FOX RIVER WATERSHED

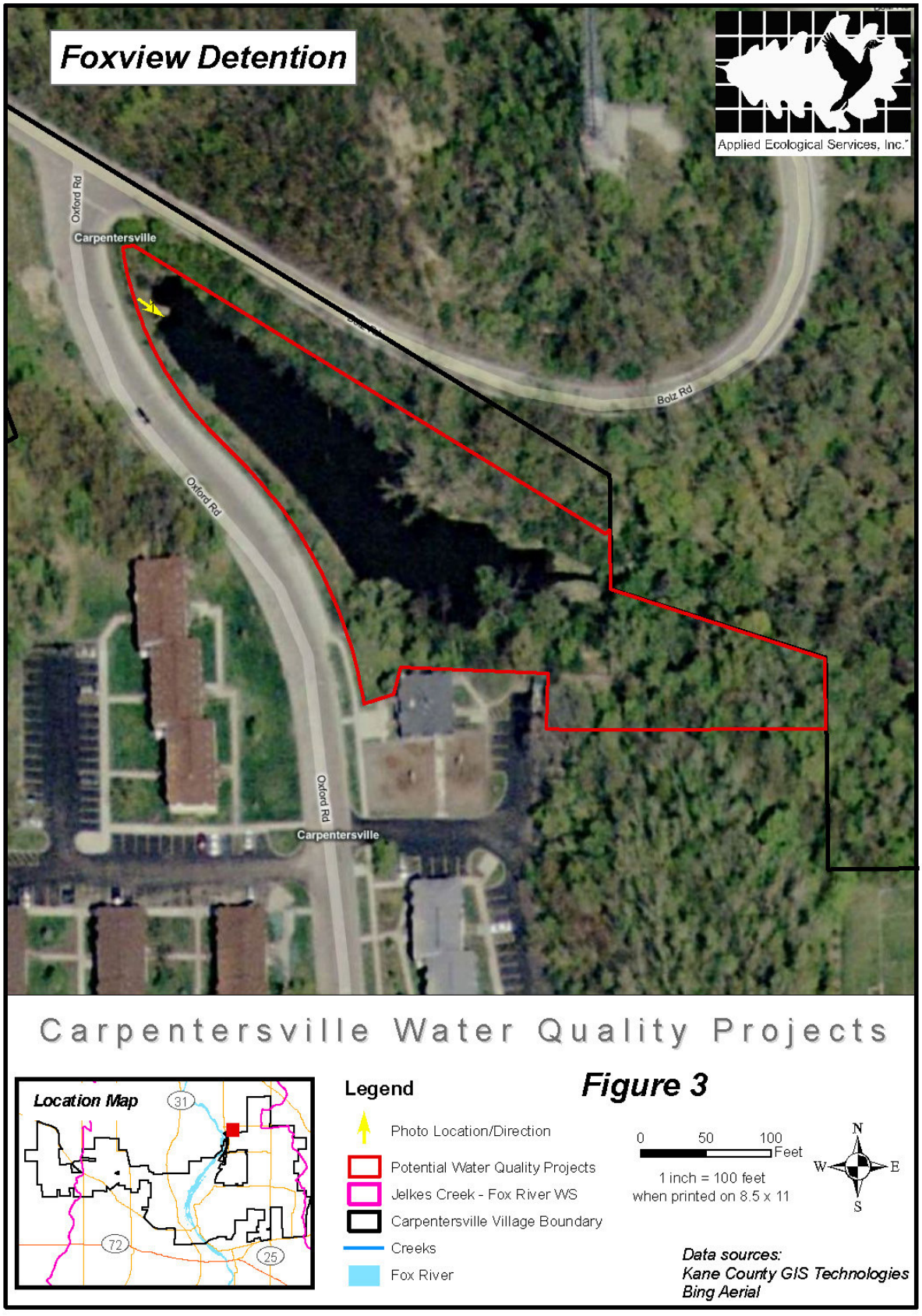
Project Name or Stream Reach ID	Location	Acres/ Linear ft.	Public or Private/ (Owner)	Existing Condition	Water Quality BMP Recommendation	Priority/Critical Area?	Sources of Technical Assistance	Cost Estimate
DETENTION BASIN RETROFIT PROJECTS Detention basin retrofit recommendations primarily address water quality and infiltration but also improve natural resources and wildlife habitat as a secondary function.								
Keele Farms Detentions 1 & 2	Keele Farms Subdivision between Birch St. & Cambridge Dr.	14 acres	VOC (SSA)	Two hydrologically connected dry bottom detention basins separated by degraded oak woodland & Redwood Ln. Basins are currently planted to turf grass throughout. 100 year overflow is eroding and creating flooding problems. Basins and woodland are maintained by Village via SSA.	Design and implement project to naturalize basins with native prairie vegetation, restore adjacent oak woodland, add east side bike path, and replace 100 year outlet structure. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium: excellent retrofit opportunity & potential to increase green space/trails	Village Engineer, Ecological Consultant	$8K/acre to naturalize; $12K/acre for woodland restoration; 60K to replace outlet
Foxview Detention	Foxview Subdivision: Oxford & Bolz Roads.	1 acre	Trust (Steadfast Foxview)	Wet bottom detention basin with side slopes dominated by invasive shrubs & trees. Side slopes are generally eroding in most locations; severe erosion was noted around a water main at the southwest corner. In addition, water in basin is stagnant and turbid. Basin is maintained by Trust- Steadfast Foxview.	Design and implement project to remove invasive trees & shrubs from basin side slopes. Regrade eroded slopes and stabilize with erosion control blanket and native herbaceous vegetation. Repair/stabilize erosion around water main. Install aeration system to improve water quality. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Low	Village Engineer, Ecological Consultant	$8K/acre to naturalize; $2K to repair water main erosion; $2K to install aerator
Providence Point Detention 1	Providence Point Subdivision east of Providence Dr.	3.3 acres	HOA	Wet bottom detention basin with dry bottom area at northern portion. Located adjacent to/outlets to Four Winds Way Creek immediately to east. Currently planted to turf grass along slopes; toe of slope is stabilized with rock. Basin is maintained by subdivision HOA.	Design and implement project to naturalize basin side slopes and dry bottom area with native vegetation. Plant native emergent plants along shoreline. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10. Project would increase/improve green infrastructure along Four Winds Way Creek.	Low	Ecological Consultant	$8K/acre to naturalize
Providence Point Detention 2	Providence Point Subdivision between Huntley & Miller Roads	4.5 acres	HOA	Wet bottom detention basin with rock at toe of slope and turf grass along slopes. A 2.5 acre degraded oak woodland buffers the basin to the west. Basin is maintained by subdivision HOA. Note: site abuts ADID wetland to west.	Design and implement project to naturalize basin side slopes with native prairie vegetation, install emergent plants along the shoreline, & restore adjacent oak woodland. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Low	Ecological Consultant	$8K/acre to naturalize; $12K/acre for woodland restoration
Providence Point Detention 3	Providence Point Subdivision south of Nathan Ln.	1.5 acres	HOA	Small wet bottom detention basin on west end; dry bottom basin extends to east. Side slopes of wet basin and entire dry basin is planted to turf grass. Outlet structure is eroded and separated. Basin is maintained by subdivision HOA. Note site abuts ADID wetland to south.	Design and implement project to naturalize basin side slopes and dry bottom area with native prairie vegetation, install emergent plants along the shoreline, & repair outlet structure. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Low	Village Engineer, Ecological Consultant	$8K/acre to naturalize; 3K to repair outlet
Sierra Woods Detention 1	Sierra Woods Subdivision near northwest corner of Miller & Sierra Woods Roads	0.7 acre	HOA	Small wet bottom detention basin bordered by turf grass side slopes. Water flows into basin from ADID wetland to north. ADID wetland is also part of Sierra Woods and EDCO stormwater detention system. Basin is maintained by subdivision HOA.	Design and implement project to naturalize basin side slopes with native vegetation and install emergent plants along the shoreline. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Low	Ecological Consultant	$8K/acre to naturalize
Shenandoah Detentions 1 & 2	Shenandoah Subdivision northeast & northwest corners of Miller and Sleepy Hollow Roads	#1= 1.9 acres; #2 = 2.4 acres	HOA	Two similar wet bottom detention basins planted to turf grass along slopes and exhibit some erosion along toe of slope. Basins are maintained by subdivision HOA.	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Low	Ecological Consultant	$8K/acre to naturalize; $20/lf for coir logs
Shenandoah Detention 3	Shenandoah Subdivision at southwest corner of Miller and Sleepy Hollow Roads	3.5 acres	HOA	Dry bottom basin with failing underdrain system. Basin is planted to turf grass but areas not draining are mud flats or comprised of wet vegetation such as cattail & rush. Basin is maintained by subdivision HOA.	Design and implement project to disable failing under drain and naturalize side slopes and basin bottom with appropriate native vegetation based on wetness measured off exiting outlet structure. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium: HOA expressed interest in retrofitting basin	Village Engineer; Ecological Consultant	$8K/acre to naturalize
Shenandoah Detention 4	Shenandoah Subdivision at southwest corner of Miller and Shenandoah Roads	2.0 acres	HOA	Dry bottom basin planted to turf grass throughout. Located adjacent to/outlets to Four Winds Way Creek immediately to west. Basin is maintained by subdivision HOA	Design and implement project to naturalize entire basin with native vegetation. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10. Project would increase/improve green infrastructure along Four Winds Way Creek.	Medium: excellent retrofit opportunity & potential to increase green infrastructure	Ecological Consultant	$8K/acre to naturalize

Kimball Farms Detention 1	Kimball Farms Subdivision south of Grandview Dr.	8 acres	HOA	Two similar wet bottom detention basins hydrologically connected via turf grass swale and storm sewer beneath swale south of townhomes. Both basins are planted to turf grass along slopes and exhibit some erosion along toe of slope. Basins are maintained by subdivision HOA.	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium: HOA expressed interest in retrofitting basin	Ecological Consultant	$8K/acre to naturalize; $20/lf for coir logs
Kimball Farms Detention 2	Kimball Farms Subdivision west of Westwood Dr.	4 acres	HOA	Wet bottom detention basin planted to turf grass along slopes and exhibits some erosion along toe of slope. Basin is maintained by subdivision HOA.	Design and implement project to naturalize side slopes with native vegetation and install emergent plants along the shoreline and eroded toe. Install coir fiber logs where necessary along toe. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium: HOA expressed interest in retrofitting basin	Ecological Consultant	$8K/acre to naturalize; $20/lf for coir logs
Menards Detention	Southwest corner of Huntley & Randall Roads.	4 acres	Menards	Wet bottom detention basin planted to turf grass along slopes and exhibiting erosion along the majority of the toe of slope. Basin is heavily used by Canada geese. Basin is maintained by Menards. Note: Basin drains to ADID wetland east of Randall Rd.	Design and implement project to naturalize side slopes with native vegetation and install emergent plants into coir fiber logs along toe of slope. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	Medium: Basin drains to ADID wetland to east	Ecological Consultant	$8K/acre to naturalize; $20K for coir logs
STREAM & RIPARIAN CORRIDOR RESTORATION PROJECTS Streambank/riparian corridor restoration projects are implemented primarily to improve water quality but also have excellent secondary benefits for reducing flooding and improving natural resources. They improve water quality by resulting in stabilized banks, reduce flooding by reconnecting channelized streams to the historic riparian corridor/floodplain, and improve natural resources by improving habitat.								
Four Winds Way Creek Reach 1	South portion of Shenandoah Subdivision	2,000 lf	HOA	Stream appears to be an old farm ditch that is highly channelized through entire reach with banks exhibiting moderate erosion. Spoil piles are present on both banks generally disconnecting the stream from the historic floodplain. The riparian corridor is heavily dominated by non-native and invasive woody species with very little herbaceous understory. Little to no water quality benefits or residential area aesthetics is provided by the current condition.	Design & implement project to stabilize stream banks using bio-engineering techniques where possible, restore adjacent riparian corridor, and reconnect floodplain where feasible. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) remove spoil piles to reconnect floodplain; 4) Seed riparian area with native vegetation; 5) Implement short and long term maintenance.	Low	Corps; IDNR-OWR, Village Engineer, Ecological Consultant	$200-300/lf for design, construction, & maintenance
Four Winds Way Creek Reach 2	Rt. 31 to Fox River	2,200 lf	FPDKC & Village	800' stream segment upstream from Kane County project is moderately eroded, downcut 3-4 ft., and dominated by invasive trees & shrubs along the riparian corridor. 400' stream segment downstream from Kane County project (south of Riverview Dr.) is low/moderately eroded, downcut 2-3 ft., and dominated on the west bank/riparian area by invasive trees & shrubs. In addition, 23 adjacent single family residences are in floodplain and the culvert under Riverview Dr. is undersized.	Floodplain modeling and FEMA map updates to potentially remove adjacent homes from 100 year floodplain. Storm damage in 2008 significantly widened and lowered creek. Design & implement project to stabilize stream banks using bio-engineering techniques where possible, and restore adjacent riparian corridor to expand upon similar work previously funded by IDNR 319 grant that restored damaged area. This should be achieved by: 1) Remove all invasive and non-native woody species; 2) Install riffles/grade controls and/or restore streambanks as needed; 3) Seed riparian area with native vegetation; 4) Implement short and long term maintenance.	Medium	Corps; IDNR-OWR, Village Engineer, Ecological Consultant	$50K for floodplain modeling and FEMA map updates, $200-300/lf for design, permitting, construction, & maintenance, $100K for culvert replacement
Carpenter Creek Reach 1	Rt. 25 to Lake Marian Rd.	1,300 lf	Trust: Fresh Market Property	Stream is stable although highly channelized and planted with turf grass on banks through first 2/3 of reach. Final 1/3 of reach is sinuous and moderately stable with a degraded but functional bottomland woodland floodplain area. Heavy debris and trash loading is present in the final 1/3 of reach. Reach 1 is currently managed by property owner (Besinger Properties).	Remove turf grass and plant native vegetation buffer on sideslopes through first 2/3 of reach. Remove all invasive trees, shrubs, and trash from final 1/3 of reach and replant native vegetation if desired. Implement short and long term management.	Medium	Ecological Consultant	$6K/acre for tree & shrub removal, $8K/acre to naturalize with natives and maintain
Carpenter Creek Reach 2	DTPD property & east of Sedgewick St.	1,800 lf	DTPD, VOC, Residences, TJK Ind.	Approximately 1,800 lf section of Carpenter Creek that begins on DTPD property then enters backyards of private residences (w/in floodplain) east of Sedgewick St. and TJK Industries property. Stream banks in reach are highly eroded and threaten residential structures; the channel is downcut 3-5 feet. Bordering riparian vegetation is mostly degraded bottomland woodland/shrub-shrub on DTPD property and west side of stream through TJK property. Manicured lawns are present on the west side of stream behind residences. In addition, a dry-bottom turf grass detention area is located on VOC property at the end of Reach 1 on the west side of the stream. Project site is "Critical Area".	Design, permit, and construct project to relocate stream channel to the east behind residential area and create additional floodplain storage. Very high potential to remove numerous adjacent residences from floodplain. Floodplain modeling and FEMA map update project currently underway by the VOC. This should be achieved by: 1) remove trees & shrubs from project area; 2) remove large quantities of soil in order to relocate stream to east and create floodplain storage; 3) reconstruct new stream channel with riffles/grade controls etc; 4) vegetate stream banks and floodplain with native vegetation; 5) Implement short and long term maintenance. Also, retrofit dry-bottom basin on VOC property with native vegetation.	High (Critical Area)	Corps; IDNR-OWR, FEMA, Village Engineer, Structural Engineer Ecological Consultant	$400-500/lf for design, permitting construction, & maintenance; 8K/acre to naturalize detention
Carpenter Creek Reach 3	East of Brook St. & south to Maple Ave.	900 lf	VOC ROW & TJK Industries	Channelized/moderately eroded banks with channel that is downcut 3-5 feet with spoil piles on both banks and minimal functioning floodplain. Adjacent riparian area is scrub-shrub degraded woodland and parking lot to east and Brook St. to west. VOC and TJK Industrials property owner has conducted some invasive tree removal along riparian area. Several eroded and/or displaced stormwater inlets are also present.	Design, permit, and construct project to stabilize banks and create floodplain storage along Brook St. This should be achieved by: 1) remove additional trees & shrubs from project area; 2) remove soil in ROW in order to create floodplain storage; 3) reconstruct new stream channel with riffles/grade controls etc; 4) vegetate stream banks and floodplain with native vegetation; 5) Implement short and long term maintenance. Also, replace stormwater inlets as needed. Land could potentially be acquired from TJK property to east to extend project width.	Medium	Corps; IDNR-OWR, FEMA, Village Engineer, Ecological Consultant	$200-300/lf for design, permitting, construction, & maintenance; 2K per each stormwater inlet replacement

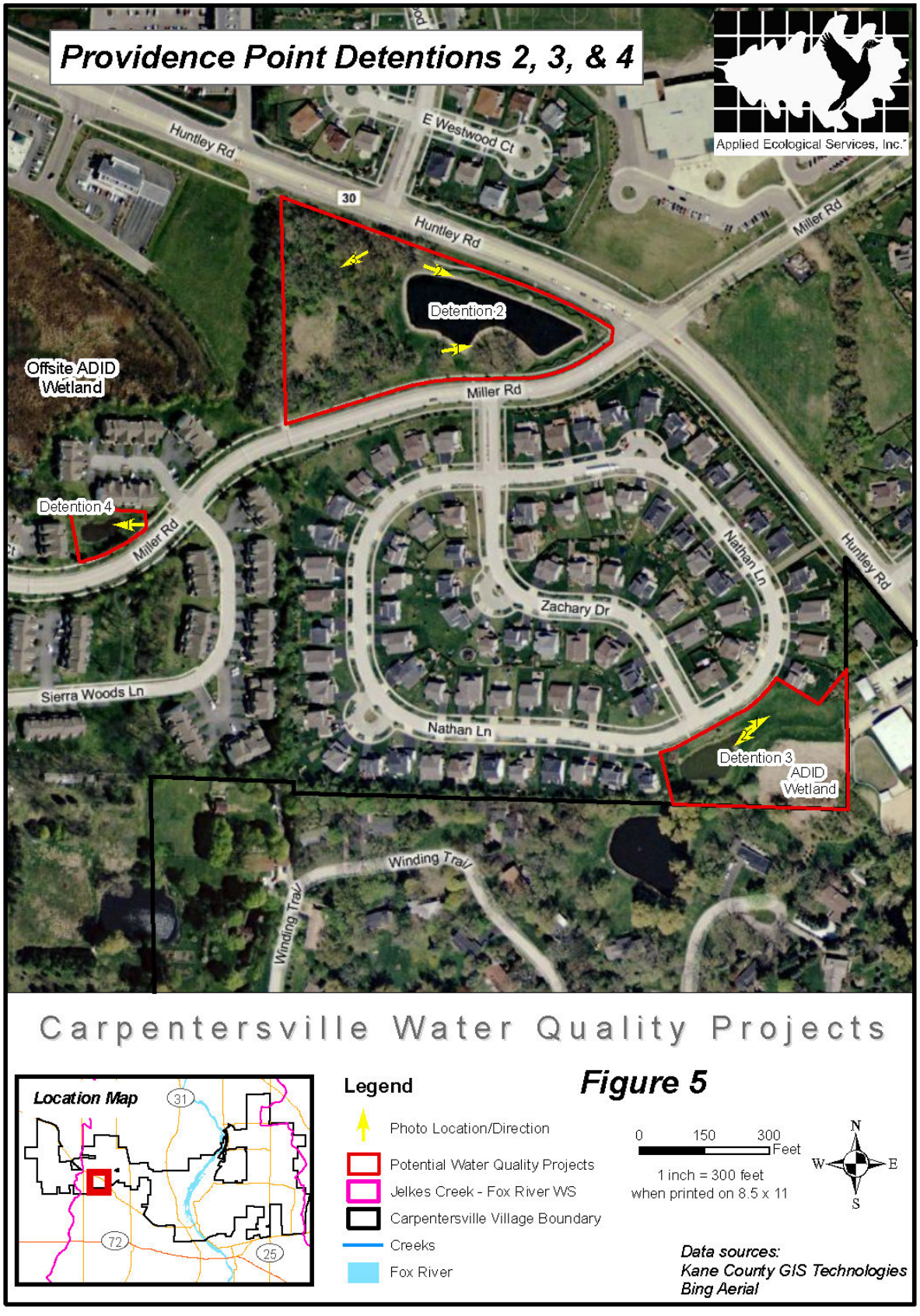
Carpenter Creek Reach 4	Within Carpenter Park	2,000 lf	VOC	Moderately channelized reach planted to turf grass on both banks/floodplain area. Functioning floodplain along most of Reach 4 allows for stable streambanks. Note: Cement structure is present downstream of first foot bridge and rock armoring is present in segment downstream from Spring St.	Design, permit, and construct project to create additional floodplain shelf where needed and plant banks and floodplain area to native vegetation. Small rock grade controls could also be installed to create riffles and reduce erosion. Remove concrete structure and rock armoring from segment south of Spring St.	High: VOC property	Corps; IDNR-OWR, Village Engineer, Ecological Consultant	$200-300/lf for design, permitting, and construction of shelf, concrete removal, & planting; $2K per each grade control
Carpenter Creek Reach 5	South of Carpenter Park on Revcor Property	500 lf	Revcor	Moderately channelized reach exhibiting highly eroded streambanks, heavy debris loading, and channel downcutting 4-6 feet. Riparian area is degraded bottomland woodland. Reach is drastically different from stable Reach 4 in Carpenter Park just upstream. Large FES at upstream end is likely contributing additional stormwater that is exacerbating degraded condition.	Design, permit, and construct project to remove debris, stabilize banks, and improve riparian corridor. This can be combined with an adjacent bike path project. This should be achieved by: 1) remove all invasive or non-native trees & shrubs from project area; 2) remove all debris jams; 3) regrade & stabilize stream banks with combination of hard armoring and bioengineering; 4) install riffles/grade controls; 5) vegetate stream banks and floodplain with native vegetation; 6) Implement short and long term maintenance.	Medium	Corps; IDNR-OWR, Village Engineer, Ecological Consultant	$200-300/lf for design, permitting, construction, & maintenance
Carpenter Creek Reach 6	S. Washington St. to Fox River	300 lf	Grist Mill, Quiltmaster, VOC, FPDKC	Stream reach is managed by multiple owners. Fox River Bike Trail crosses stream in this reach via former RR. Stream in this reach is downcut 4-6 feet, banks are moderately eroded, and it appears that fill material has been placed in adjacent riparian areas, particularly on left bank. Remaining riparian corridor is comprised of degraded bottomland woodland.	Design, permit, and construct project to stabilize streambanks and improve riparian corridor. Could be combined with project to replace restrictive culverts that will increase culvert sizes to reduce erosive stream velocities. This should be achieved by: 1) remove all invasive or non-native trees & shrubs from project area; 2) regrade & stabilize stream banks with combination of hard armoring and bioengineering; 3) install riffles/grade controls; 4) vegetate stream banks and floodplain with native vegetation; 5) Implement short and long term maintenance.	Low	Corps; IDNR-OWR, Village Engineer, Ecological Consultant	$600-800/lf for design, permitting, construction, & maintenance; $100-$200K each for culvert replacements
Lake Marian Creek Reach 1	Rt. 25 to Kings Rd.	600 lf	Numerous individual Residences	Stream channel and riparian area are confined between numerous residences that own and manage the stream. Stream is moderately channelized, streambanks exhibit moderate erosion, and channel is downcut 4-6 feet. Immediate riparian vegetation is degraded bottomland woodland & shrub-shrub. In addition, existing culverts under Alameda Dr. and Kings Rd. are undersized.	Design, permit, and construct project to stabilize streambanks, improve riparian corridor, and replace culverts. This should be achieved by: 1) remove all invasive or non-native trees & shrubs from project area; 2) regrade & stabilize stream banks with combination of hard armoring and bioengineering; 3) install riffles/grade controls; 4) vegetate stream banks and riparian area with native vegetation; 5) replace culverts; 6) Implement short and long term maintenance. Note: Lake Marian River Watershed Plan completed by EEI and dated October 2009 was reviewed and used to help develop recommendations and costs.	Medium	Corps; IDNR-OWR, Village Engineer, Structural Engineer, Ecological Consultant	$200-300/lf for design, permitting, construction, & maintenance of stream, $150-200K each for culvert replacement
Lake Marian Creek Reach 2	Sacramento Dr. to confluence with Reach 3 in Keith Andres Park	500 lf	VOC	Reach 2 enters the northeast portion of Keith Andres Park via a large culvert. Water then flows through a 20+ foot wide concrete lined channel that is displaced in several areas. The concrete channel remains effective at controlling erosion in most areas. Adjacent riparian vegetation consists of a combination of upland woodland, shrub-shrub, and bottomland woodland all are in a degraded condition.	Design, permit, and construct project that incorporates several grade control and stabilization measures as well as ongoing channel maintenance and restoration of the adjacent riparian zone. Stabilization measures crucial to reducing streambed erosion which has potential to undermine and rupture sanitary interceptor sewer which runs under/adjacent to streambed. Recommended measures include installing combination of instream grade controls such as hard drop weirs, cross vanes, and J-hooks. In addition, the existing concrete bottom could be broken up throughout the reach to increase roughness and slow stream flow. Note: Lake Marian River Watershed Plan completed by EEI and dated October 2009 was reviewed and used to help develop recommendations and costs.	Medium	Corps; IDNR-OWR, Village Engineer, Structural Engineer, Ecological Consultant	$300K for design, permitting, construction, & maintenance of instream grade controls; $12K/ acre to restore riparian areas
Lake Marian Creek Reach 3	Tulsa Ave. to confluence with Reach 2 in Keith Andres Park	1,000 lf	VOC	Reach 3 is a wooded ravine system exhibiting moderate to highly eroded banks that likely resulted from increased stormwater input following residential development. Scattered debris jams are also present and worsen erosion problems. In addition, the adjacent ravine banks and riparian zone is dominated by a variety of young trees and invasive shrubs while herbaceous groundcover vegetation is somewhat sparse.	Design, permit, and construct project that incorporates several grade control and stabilization measures as well as ongoing channel maintenance and restoration of the adjacent riparian zone. Recommended measures include installing combination of instream grade controls such as hard drop weirs and cross vanes. Note: Lake Marian River Watershed Plan completed by EEI and dated October 2009 was reviewed and used to help develop recommendations and costs.	Medium	Corps; Village Engineer, Structural Engineer, Ecological Consultant	$200K for design, permitting, construction, & maintenance of instream grade controls; $12K/ acre to restore riparian areas
Lake Marian Creek Reach 4	Confluence of Reaches 2 & 3 to Skyline Dr.	1,300 lf	VOC, Township	The portion of Reach 4 extending 500 feet downstream from the confluence of Reaches 2 & 3 is confined by steep and highly eroded banks; the channel is downcut up to 8 feet. The floodplain is wider and gradient less through the area downstream to Skyline Dr. Here, erosion is moderate and channel downcut 2-3 feet. Problematic debris jams are found throughout Reach 4. In addition, the adjacent riparian zone is dominated by a variety of young invasive trees while herbaceous groundcover vegetation is somewhat sparse.	Design, permit, and construct project that incorporates several grade control and stabilization measures as well as ongoing channel maintenance and restoration of the adjacent riparian zone. Stabilization measures crucial to reducing streambed erosion which has potential to undermine and rupture sanitary interceptor sewer which runs under/adjacent to streambed. Recommended measures include installing combination of instream grade controls such as hard drop weirs, cross vanes, and J-hooks. Note: Lake Marian River Watershed Plan completed by EEI and dated October 2009 was reviewed and used to help develop recommendations and costs.	Medium	Corps; IDNR-OWR, Village Engineer, Structural Engineer, Ecological Consultant	$250K for design, permitting, construction, & maintenance of instream grade controls; $12K/ acre to restore riparian areas

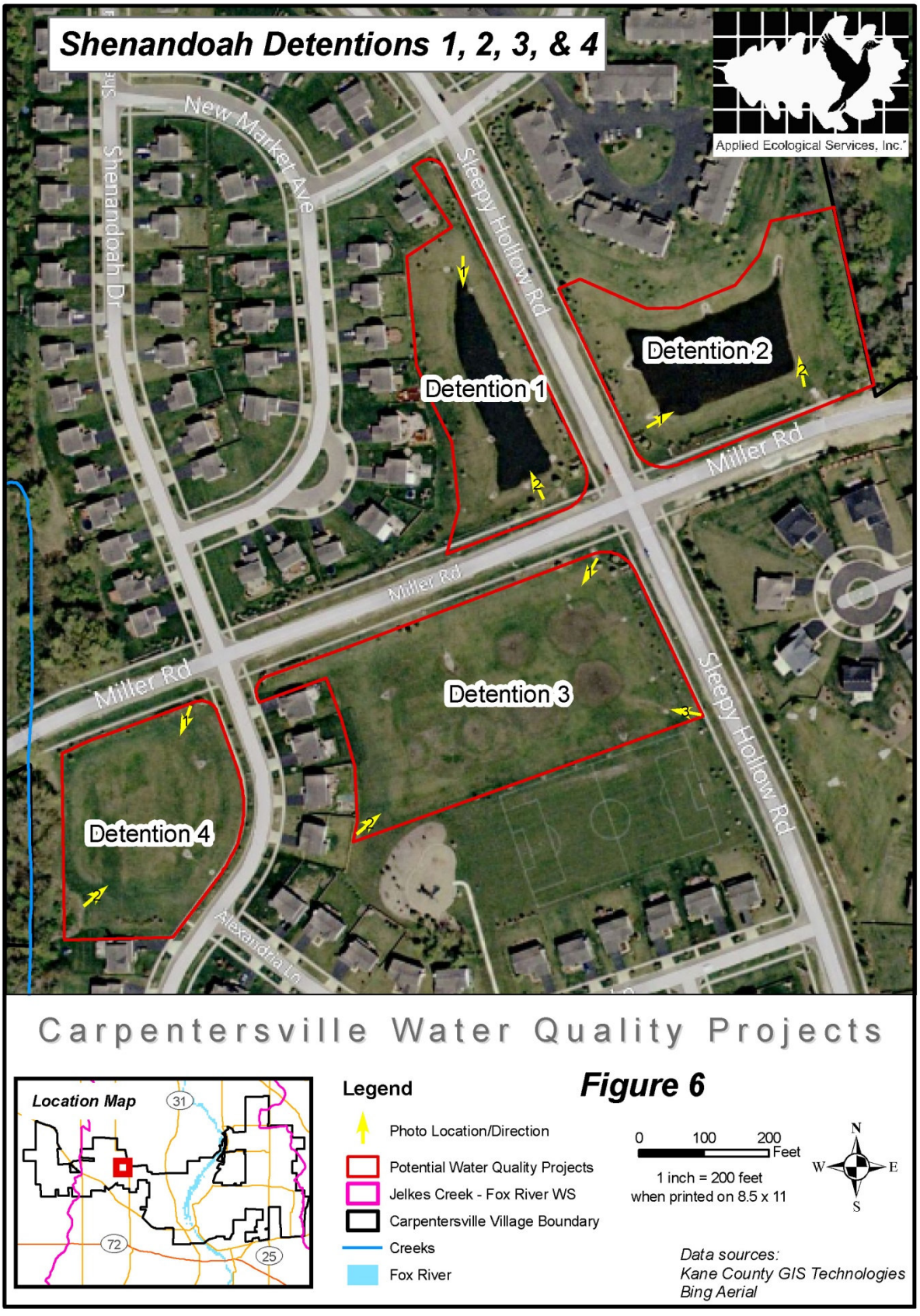
Lake Marian Creek Reach 5	Williams Rd. to Fox River	1,600 lf	VOC	Reach 5 contains a meandering segment of Lake Marian Creek through the Fox River floodplain. Evidence suggests that flows are extremely high following significant storm events. The wetted channel width is only 5 feet during low flow conditions but the bankfull channel width is nearly 20 feet wide and downcut 3-4 feet with moderately eroded banks. Large woody debris blockages are also common. In addition, the adjacent riparian zone is dominated by a variety of young invasive trees & shrubs.	Implementing ongoing channel maintenance to remove debris jams. Restore adjacent riparian zone by removing invasive trees & shrubs followed by restoring riparian area with native vegetation. Install large check dams to help slow velocity and reconnect floodplain.	Low	Corps; IDNR-OWR, Village Engineer, Structural Engineer, Ecological Consultant	$15-20 K for one time debris removal, $12K/acre to restore riparian areas, $50K for check dams
OTHER WATER QUALITY PROJECTS Many types of projects can be implemented to improve water quality such as native plant buffers, rain gardens, bioswales/grassed swales, wetland storage areas, naturalization with natives, green infrastructure connections, parking lot BMPs, etc.								
Fairview Park	Between Sparrow Rd. & Tee Ln.	9.5 acres	DTPD & D300)	Public park with underutilized turf grass area on southern 2/3 of site; ball field is located on northeast portion of site. Park currently takes on large quantities of stormwater runoff that floods adjacent roadways and residential properties.	Design and construct 2-tiered stormwater storage facility on southern 2/3 of site. 1st tier is naturalized wetland area/rain garden designed to hold frequent/lighter rain events. 2nd tier is usable turf grass area/ball field designed to store water during less frequent/heavy rainfall events. In addition, install educational trail system in park. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	High: Village currently in planning phase	Village, School District, Park District, Ecological Consultant	$20-30K/acre to design, construct, plant, & maintain
Macintosh Creek Headwaters	Between LW Besinger Dr. & Ravine Rd.	4 acres	Trust	Site currently consists of turf grass area south of LW Besinger Dr. & degraded oak woodland north of Ravine Rd. Two degraded intermittent headwater tributaries enter the site via culverts from the north and exit the site under Ravine Rd. to the south. Site receives large quantities of stormwater runoff from Meadowdale Mall to the north. Runoff currently causes numerous erosion and flooding problems downstream in the Village of East Dundee. Site is a "Critical Area" that has potential to store 25 acre-feet of water if converted in storage facility.	Design and construct naturalized stormwater storage facility on site that incorporates two tributaries and preserves existing mature bur oak, red oak, and walnut trees as island features. Implement short term maintenance for 3-5 years to establish native plantings then implement long term maintenance through year 10.	High (Critical Area)	Corps; IDNR-OWR; Village Engineer, Village of East Dundee, Ecological Consultant	$60-80K/acre to design, construct, plant, & maintain
POTENTIAL WETLAND MITIGATION SITE PROJECTS Wetland mitigation projects are primarily constructed to create "Wetland Credits" that developers can purchase for impacts to wetlands on the development site. Wetland mitigation sites also improve water quality, reduce flooding, and improve natural resource quality.								
Longmeadow Parkway Site	Between Randall Rd. and Huntley Rd.	50 acres	Private; Future Village Annexation	Existing 50 acre agricultural field comprised of at least 1/2 drained hydric soils and future Village of Carpentersville annexation. 150 acre area to north is future Village of Algonquin annexation and is also an agricultural field with approximately 30% drained hydric soils. Entire 200 acre area appears to drain west under Huntley Rd. via tiles and is likely not in the Jelkes-Fox River Watershed. However, proximity to proposed Longmeadow Rd. corridor expansion (located immediately to north and extending from Huntley R. east across the Fox River) and future development along Randall Rd. within the Jelkes-Fox Watershed makes this a potentially important site to restore wetlands and create "Wetland Mitigation Credits". Wetland improvements shall be contained only to existing wetland areas, other property is prime commercial development property which is highest and best use of that land.	Potential wetland mitigation site for wetland impacts associated with potential Longmeadow Rd. expansion project and other development along Randall Rd. within the Jelkes-Fox Watershed. Wetland improvements to be minimized to existing wetland areas, as all other portions of property are prime commercial development property which is highest and best use of that land. Smart development using cluster / conservation design is appropriate for this property to provide both wetland and development benefits. The Village of Carpentersville strongly objects to the use of this entire property as a wetland mitigation site.	Low	Villages of Algonquin & Carpentersville, Corps, Kane County, Kane County DOT, Ecological Consultant, Wetland Banker	Fair market value for land and $15K/acre for wetland bank creation & maintenance
POTENTIAL WETLAND RESTORATION PROJECTS Wetland restoration projects are implemented primarily to improve water quality but also have excellent secondary benefits for reducing flooding and improving natural resource quality.								
Carpenter Creek Site	East of Carpenter Park/north of Cleveland Ave.	20+ acres	Private	Existing 20+ acre agricultural field at northeast corner of Carpenter Blvd. and Cleveland Ave. Site is comprised of at least 2/3 drained hydric soils. Site drains west under Carpenter Blvd. and into Carpenter Creek within Carpenter Park. Site provides wetland restoration potential. Northwest portion of property is also encumbered by 100 year floodplain.	Potentially acquire land then design and construct wetland restoration that also incorporates adjacent usable parkland. Wetland improvements to be minimized to existing wetland areas, as all other portions of property are prime industrial / institutional / residential development property which is highest and best use of that land. Smart development using cluster / conservation design is appropriate for this property to provide both wetland and development benefits. The Village of Carpentersville strongly objects to the use of this entire property as a wetland mitigation site.	Low	Corps, Village Engineer, Ecological Consultant	Fair market value for land and $20K/acre for design, wetland restoration & maintenance

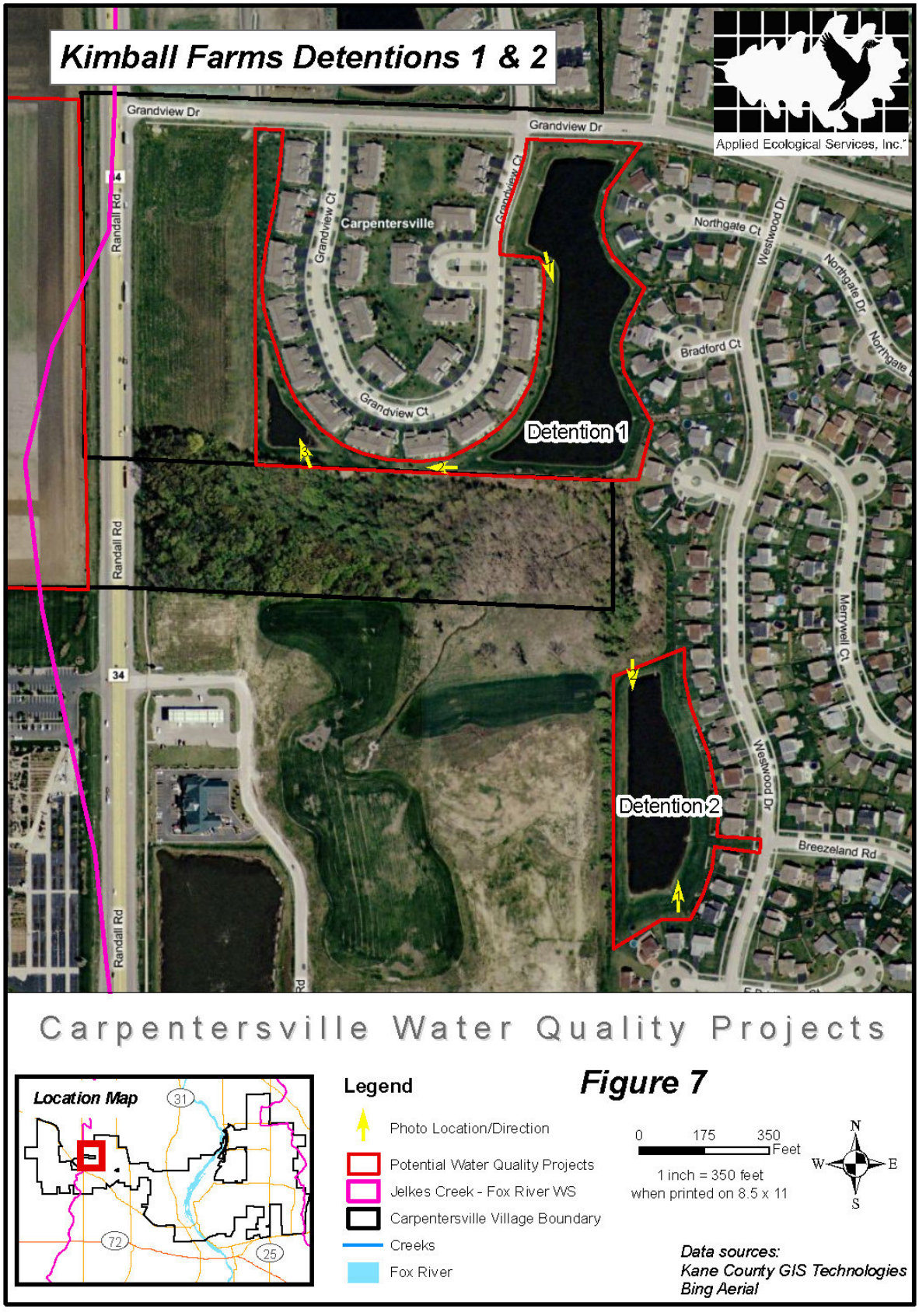
3.0 PROJECT LOCATION AERIAL SITE MAPS


Foxview Detention
Applied Ecological Services, Inc.
Oxford Rd
Carpentersville
Bolz Rd
Oxford Rd
Oxford Rd
Carpentersville
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Figure 3
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
0
50
100
Feet
1 inch = 100 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

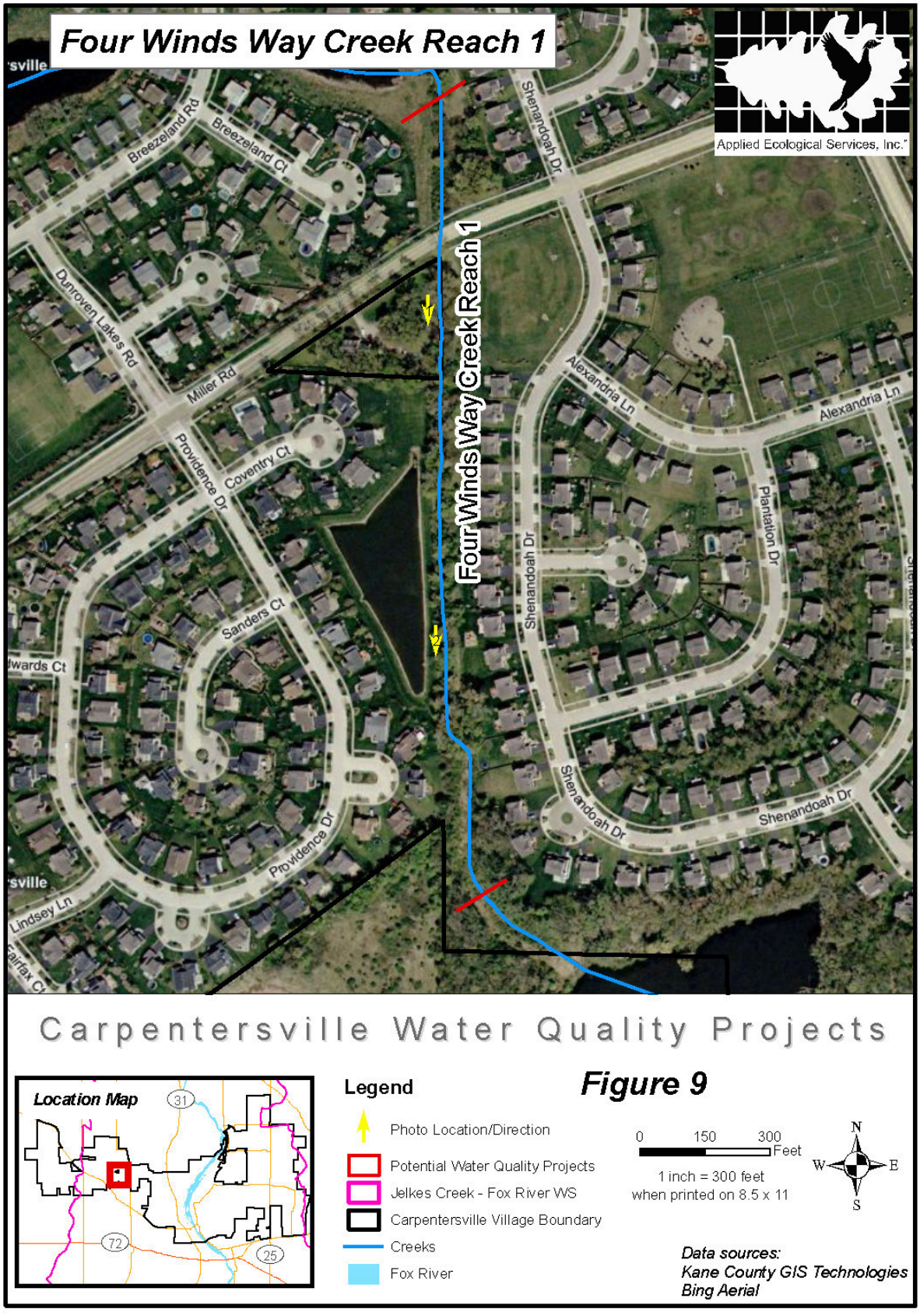

Providence Point Detention 1
Applied Ecological Services, Inc.
Dunroven Lakes Rd
Miller Rd
Carpentersville
Providence Dr
Coventry Ct
Shenandoah Dr
Detention 1
Sanders Ct
Providence Dr
Shenandoah Dr
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 4
0 75 150 Feet
1 inch = 150 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

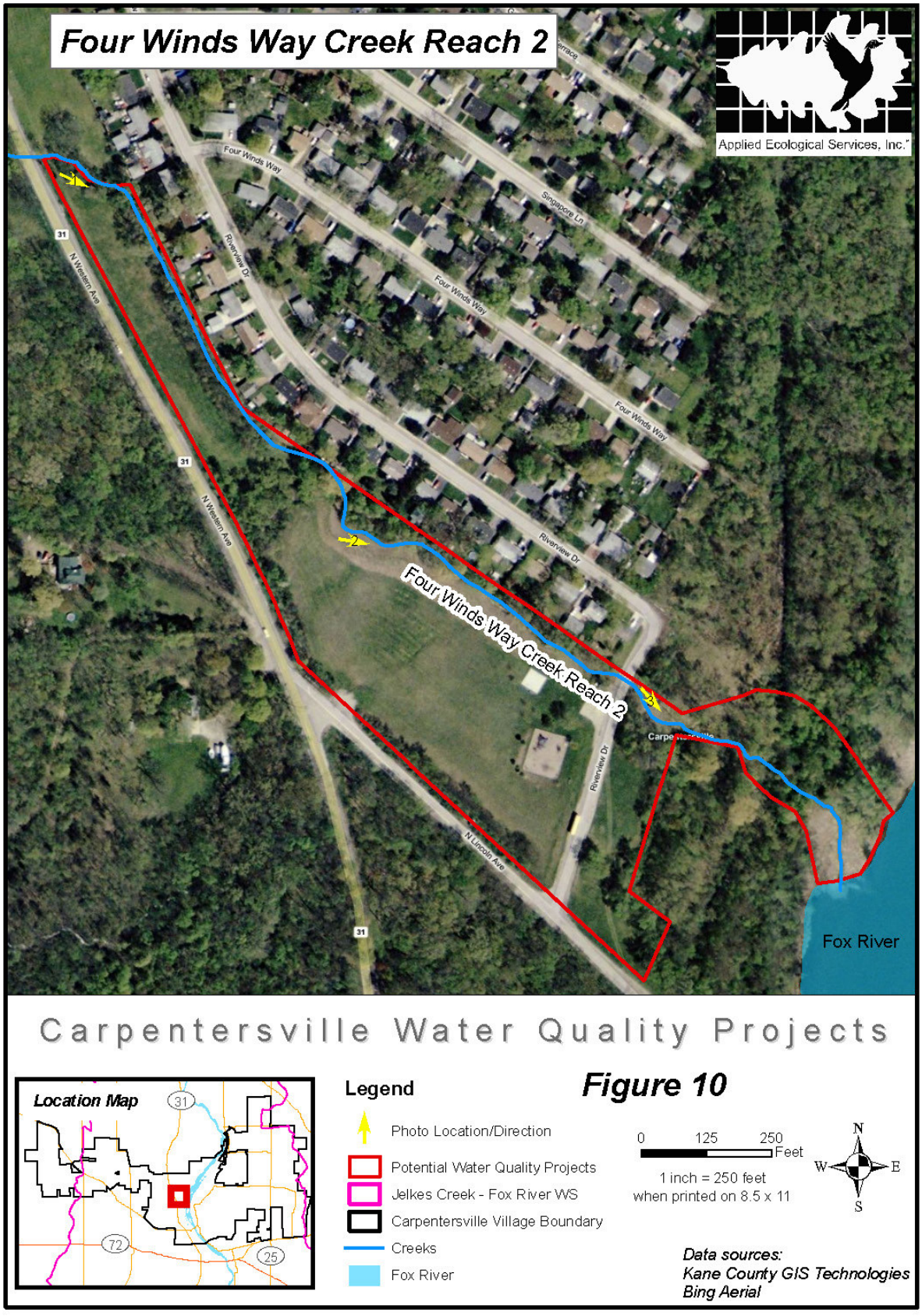

Providence Point Detentions 2, 3, & 4
Applied Ecological Services, Inc.
Huntley Rd
E Westwood Ct
30
Huntley Rd
Miller Rd
Detention 2
Offsite ADID Wetland
Miller Rd
Detention 4
Miller Rd
Nathan Ln
Huntley Rd
Zachary Dr
Sierra Woods Ln
Nathan Ln
Detention 3
ADID Wetland
Winding Trail
Winding Trail
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 5
0
150
300
Feet
1 inch = 300 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

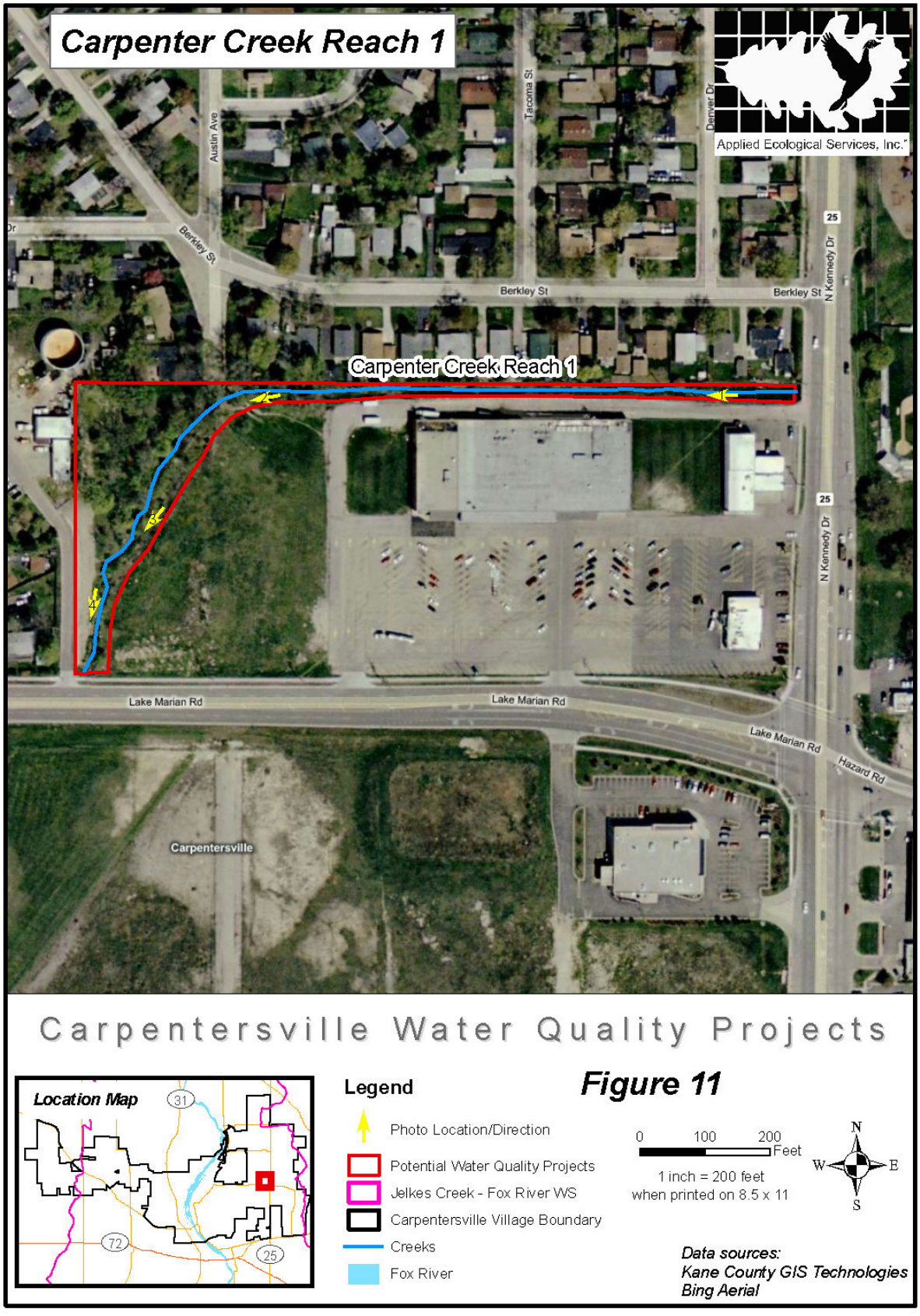

Shenandoah Detentions 1, 2, 3, & 4
Applied Ecological Services, Inc.
New Market Ave
Shenandoah Dr
Sleepy Hollow Rd
Detention 1
Detention 2
Miller Rd
Miller Rd
Miller Rd
Detention 3
Sleepy Hollow Rd
Detention 4
Alexandria Ln
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 6
0 100 200 Feet
1 inch = 200 feet
when printed on 8.5 x 11
N
W E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

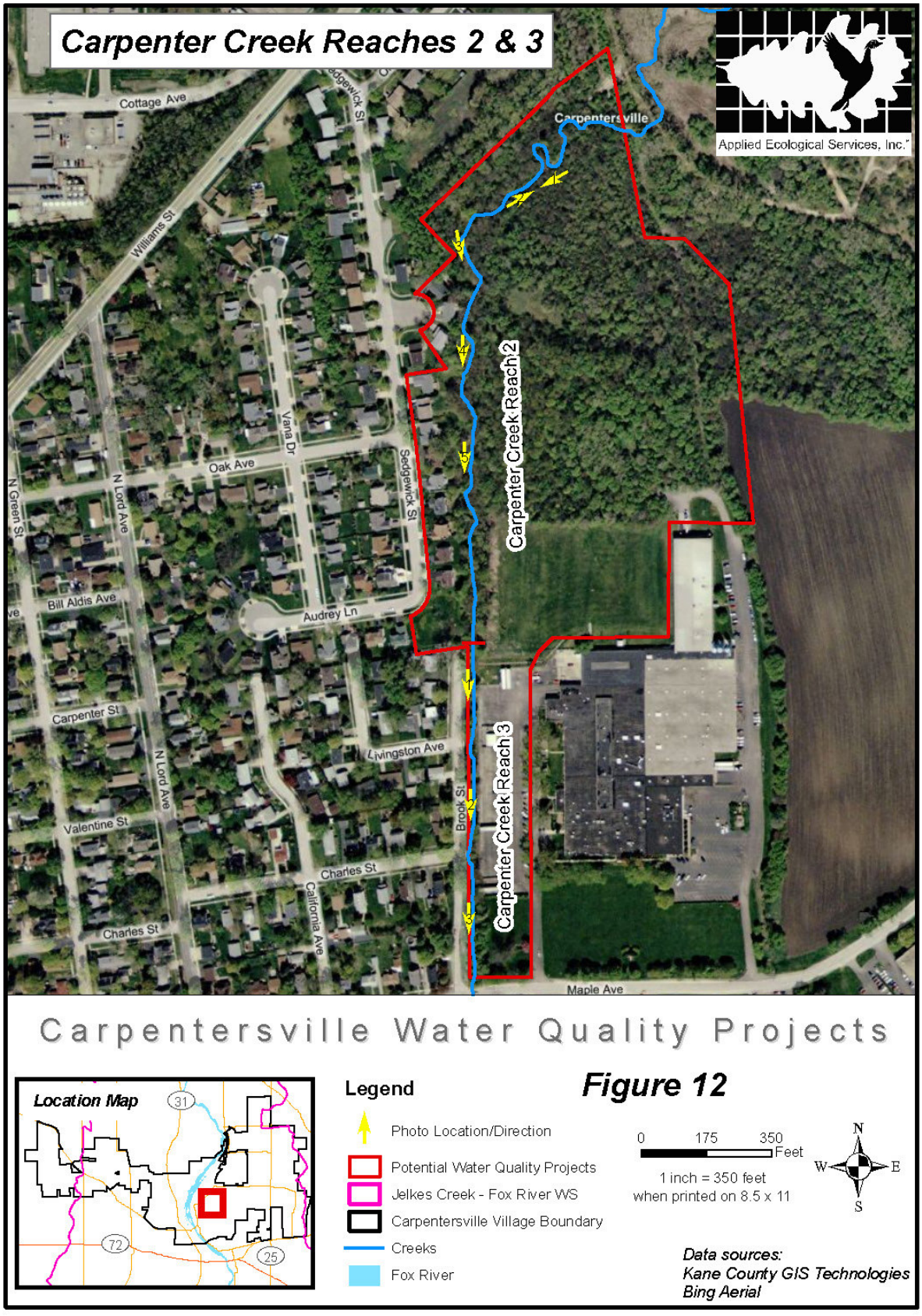

Kimball Farms Detentions 1 & 2
Applied Ecological Services, Inc.
Grandview Dr
Grandview Dr
Grandview Ct
Carpentersville
Grandview Ct
Grandview Ct
Randall Rd
Randall Rd
Randall Rd
34
Northgate Ct
Westwood Dr
Northgate Dr
Bradford Ct
Detention 1
Detention 2
Merrywell Ct
Westwood Dr
Breezeland Rd
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Figure 7
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
0
175
350
Feet
1 inch = 350 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

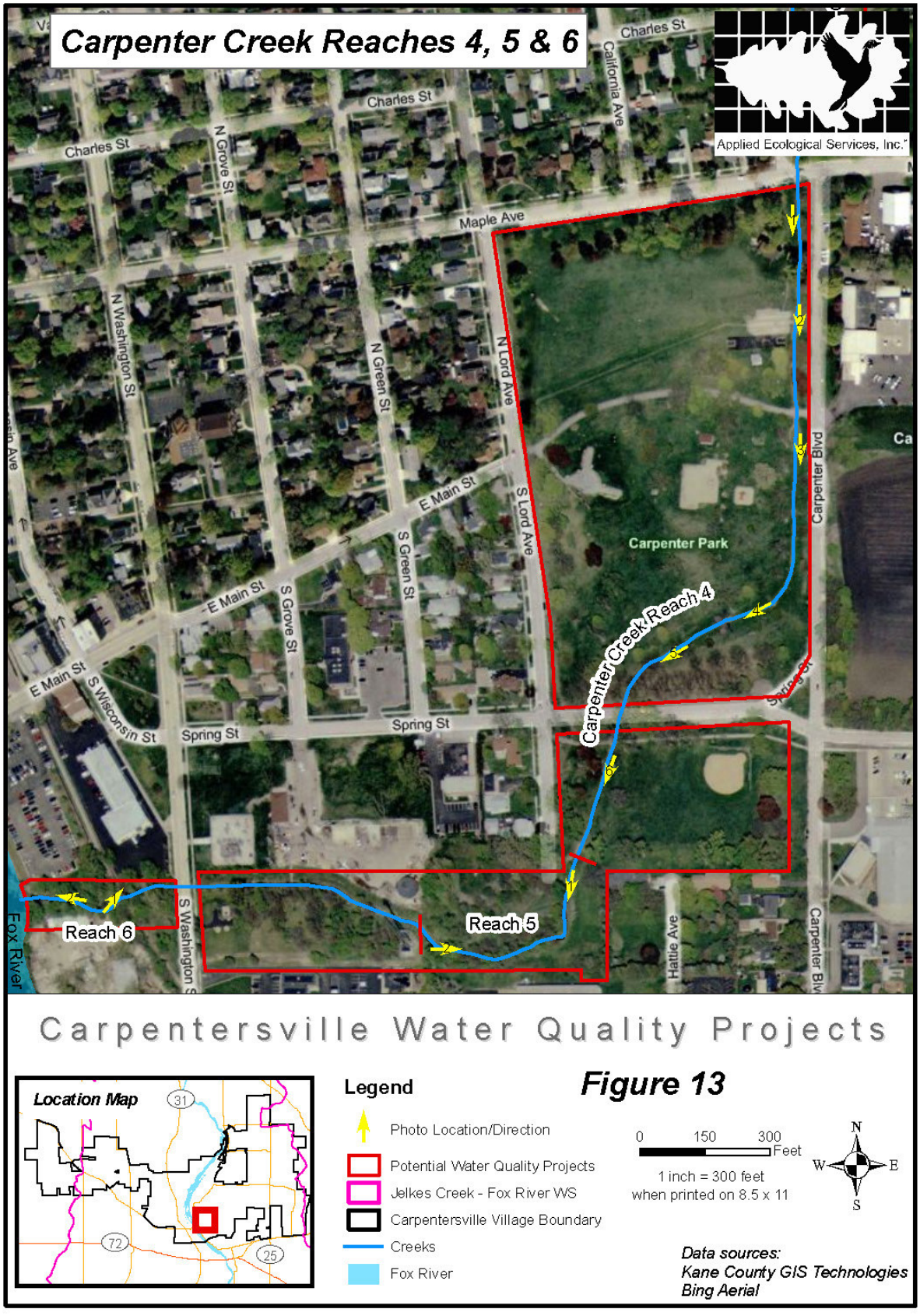

Menards Detention
Applied Ecological Services, Inc.
Huntley Rd
Randall Rd
Carpentersville
30
34
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 8
0 50 100 Feet
1 inch = 100 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

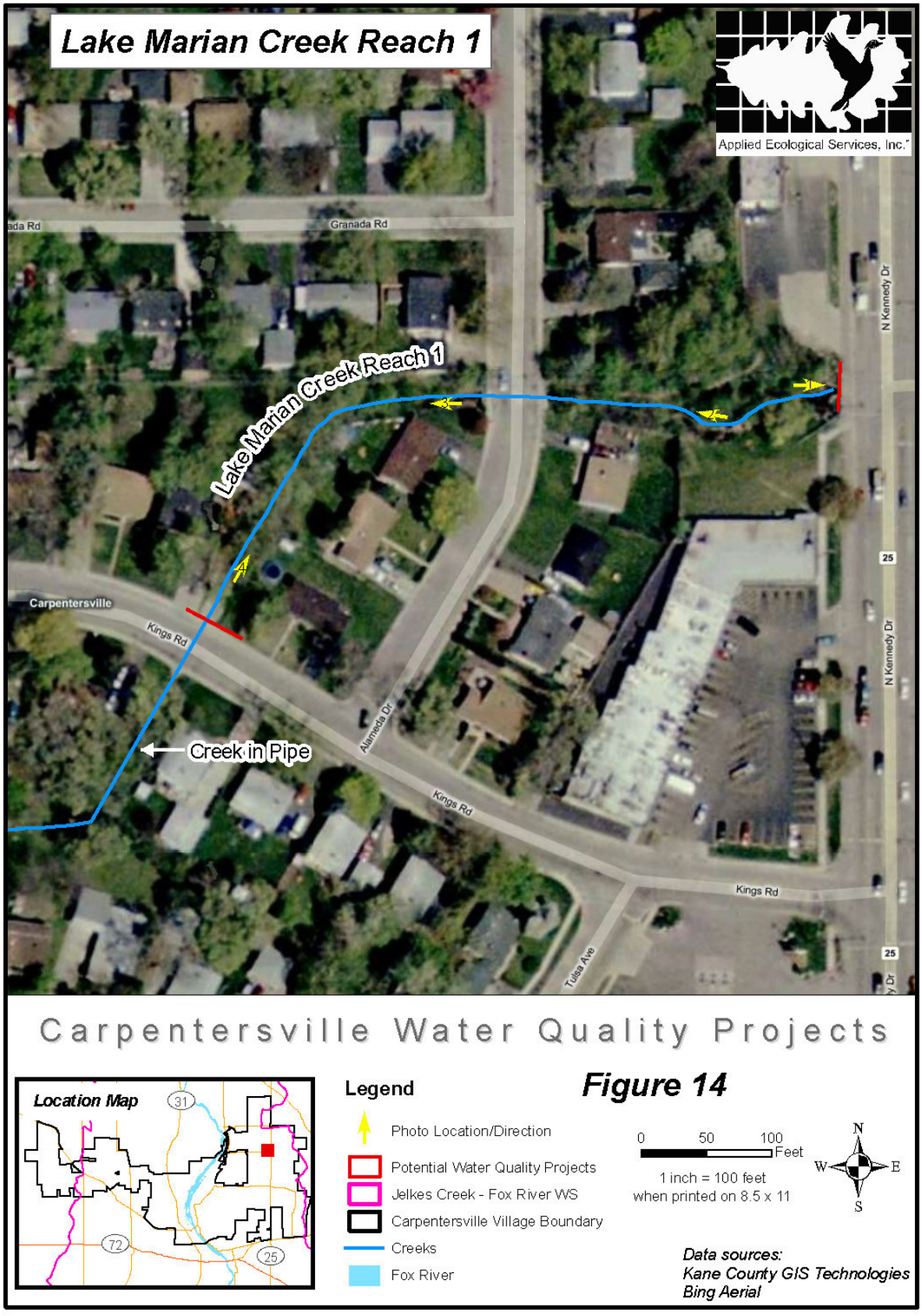

Four Winds Way Creek Reach 1
Applied Ecological Services, Inc.
Four Winds Way Creek Reach 1
Breezeland Rd
Breezeland Ct
Shenandoah Dr
Dunroven Lakes Rd
Miller Rd
Providence Dr
Coventry Ct
Alexandria Ln
Alexandria Ln
Plantation Dr
Shenandoah Dr
Sanders Ct
Shenandoah Dr
Shenandoah Dr
Providence Dr
Lindsey Ln
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Figure 9
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
0
150
300
Feet
1 inch = 300 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

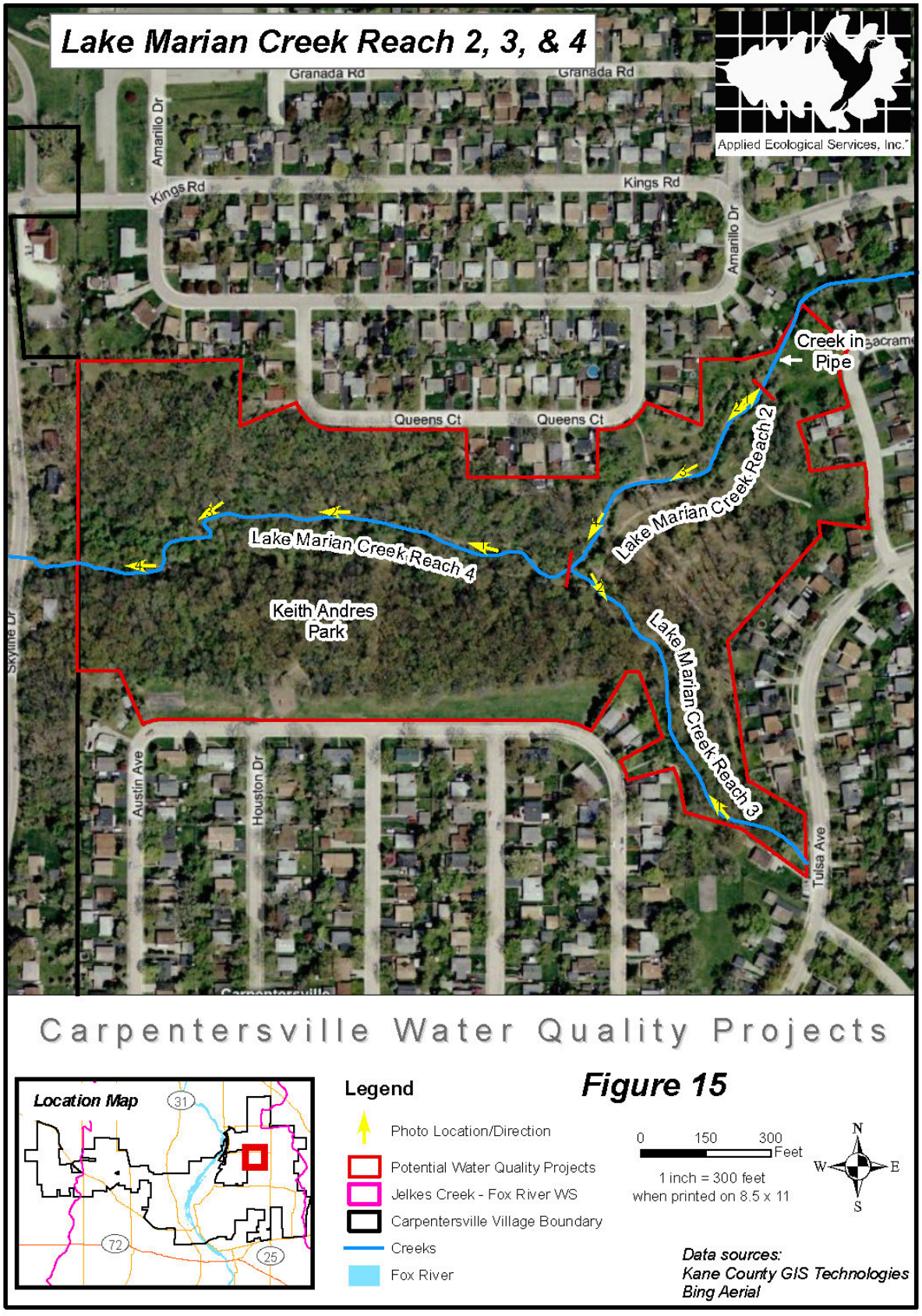

Four Winds Way Creek Reach 2
Applied Ecological Services, Inc.
Four Winds Way
Singapore Ln
Riverview Dr
N Western Ave
31
Four Winds Way Creek Reach 2
N Lincoln Ave
Fox River
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 10
0 125 250 Feet
1 inch = 250 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

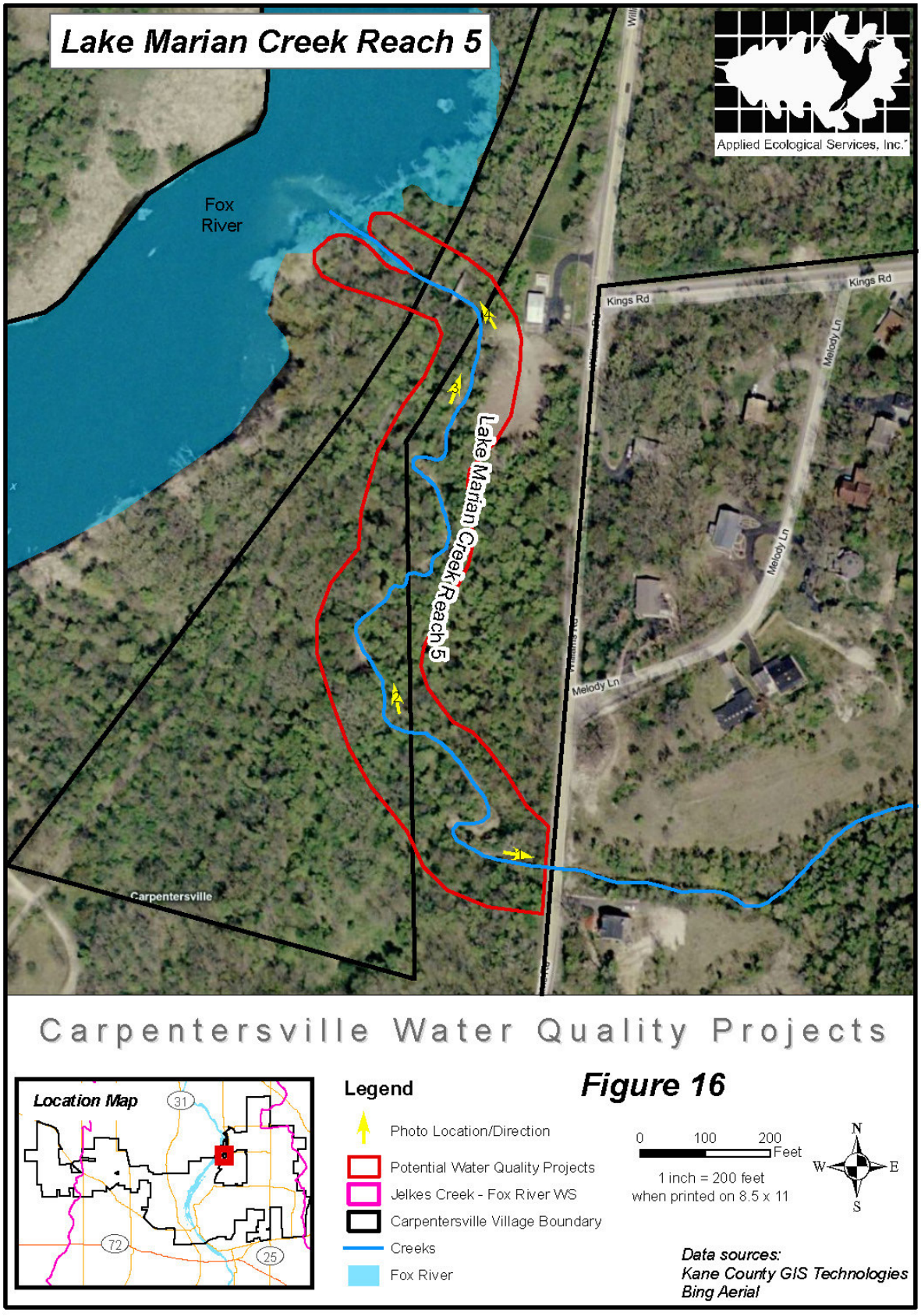

Carpenter Creek Reach 1
Applied Ecological Services, Inc.
Austin Ave
Tacoma St
Denver Dr
Berkley St
Berkley St
Berkley St
N Kennedy Dr
25
Carpenter Creek Reach 1
N Kennedy Dr
25
Lake Marian Rd
Lake Marian Rd
Lake Marian Rd
Hazard Rd
Carpentersville
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Figure 11
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
0
100
200
Feet
1 inch = 200 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial


Carpenter Creek Reaches 2 & 3
Applied Ecological Services, Inc.
Cottage Ave
Williams St
Sedgewick St
Carpentersville
Carpenter Creek Reach 2
Vana Dr
Oak Ave
N Green St
N Lord Ave
Bill Aldis Ave
Audrey Ln
Carpenter St
Livingston Ave
Brook St
Carpenter Creek Reach 3
Valentine St
Charles St
California Ave
Maple Ave
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Figure 12
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
0
175
350
Feet
1 inch = 350 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

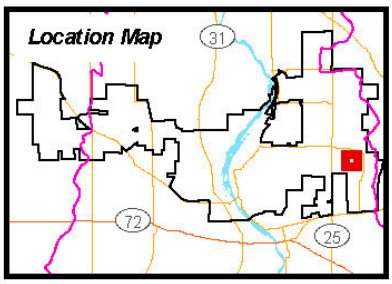

Carpenter Creek Reaches 4, 5 & 6
Applied Ecological Services, Inc.
Charles St
California Ave
N Grove St
Maple Ave
N Washington St
N Green St
N Lord Ave
E Main St
S Lord Ave
S Green St
S Grove St
Carpenter Park
Carpenter Blvd
Carpenter Creek Reach 4
S Wisconsin St
Spring St
Reach 6
Reach 5
Fox River
Hattie Ave
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 13
0 150 300 Feet
1 inch = 300 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial


Lake Marian Creek Reach 1
Applied Ecological Services, Inc.
Granada Rd
Lake Marian Creek Reach 1
N Kennedy Dr
Carpentersville
Kings Rd
Alameda Dr
Creek in Pipe
Kings Rd
Kings Rd
Tulsa Ave
25
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 14
0 50 100 Feet
1 inch = 100 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial


Lake Marian Creek Reach 2, 3, & 4
Applied Ecological Services, Inc.
Granada Rd
Granada Rd
Amarillo Dr
Kings Rd
Kings Rd
Amarillo Dr
Creek in Pipe
Queens Ct
Queens Ct
Lake Marian Creek Reach 2
Lake Marian Creek Reach 4
Keith Andres Park
Lake Marian Creek Reach 3
Skyline Dr
Austin Ave
Houston Dr
Tulsa Ave
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 15
0
150
300
Feet
1 inch = 300 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial


Lake Marian Creek Reach 5
Applied Ecological Services, Inc.
Fox River
Kings Rd
Kings Rd
Melody Ln
Melody Ln
Melody Ln
Lake Marian Creek Reach 5
Carpentersville
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 16
0 100 200 Feet
1 inch = 200 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

Carpentersville Water Quality Projects



Legend

- Photo Location/Direction
- Potential Water Quality Projects
- Jelkes Creek - Fox River WS
- Carpentersville Village Boundary
- Creeks
- Fox River

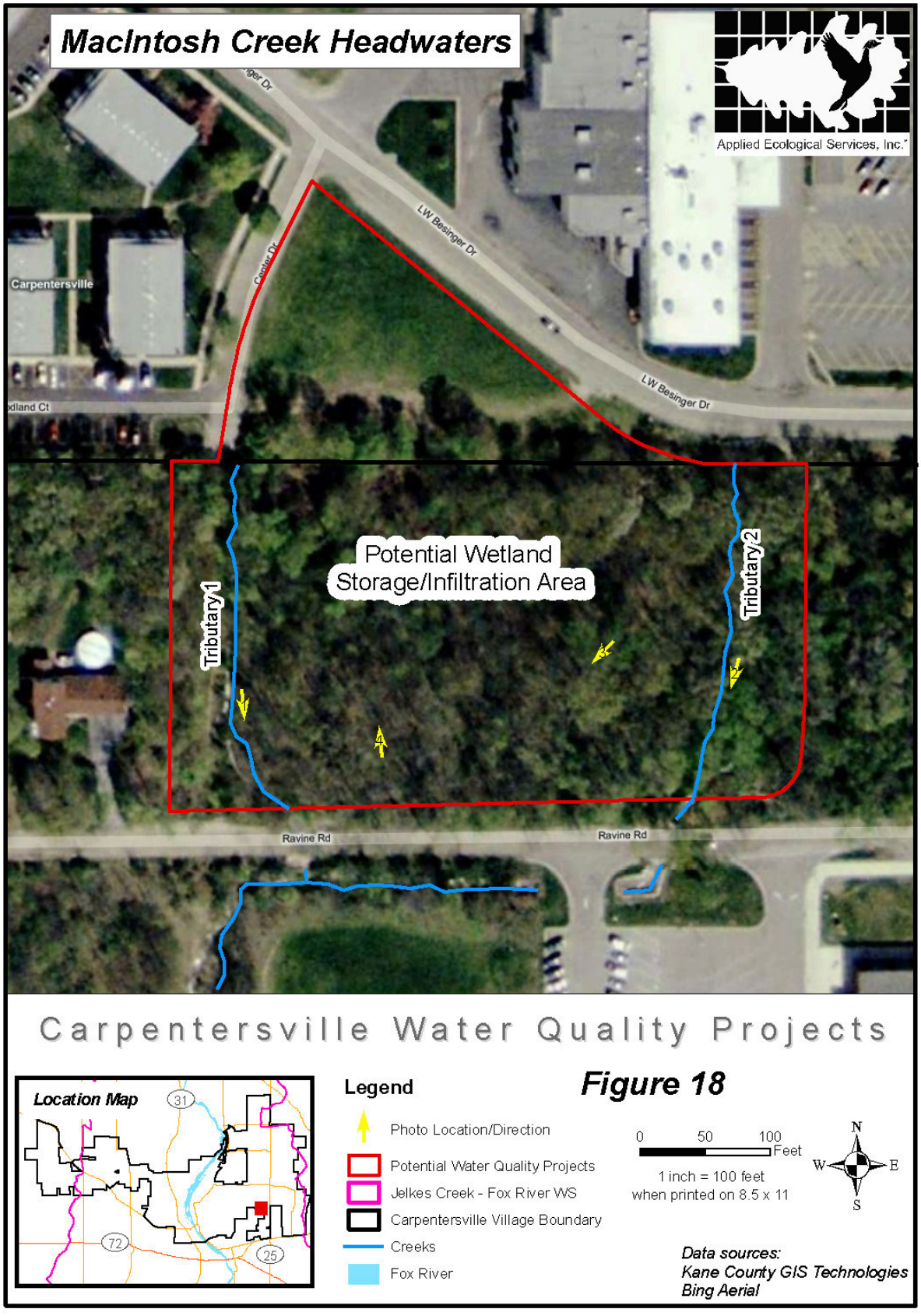
Figure 17

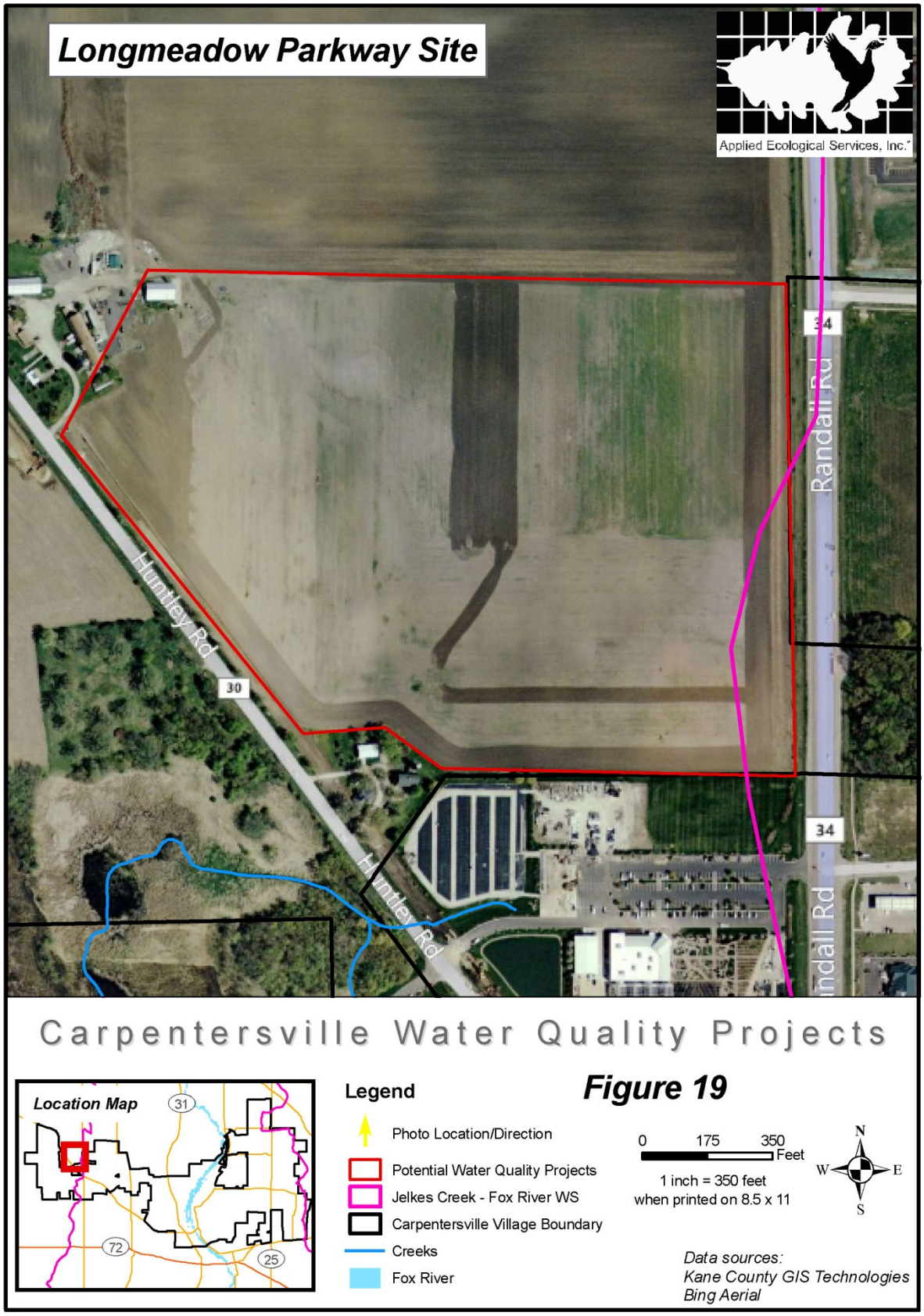
0 75 150 Feet

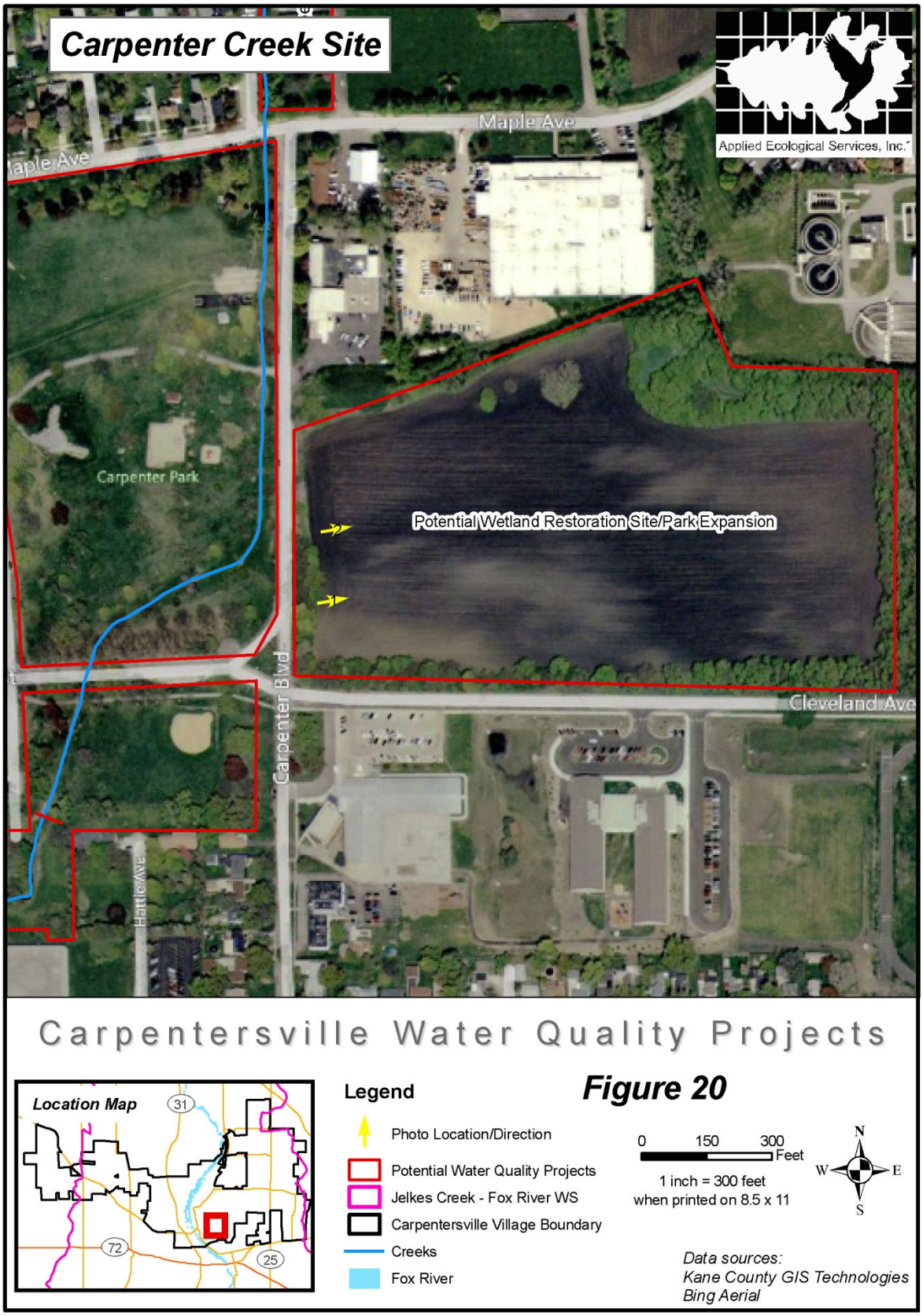
1 inch = 150 feet
when printed on 8.5 x 11

N
W E
S

Data sources:
Kane County GIS Technologies
Bing Aerial


MacIntosh Creek Headwaters
Applied Ecological Services, Inc.
LW Besinger Dr
Center Dr
Carpentersville
LW Besinger Dr
Potential Wetland
Storage/Infiltration Area
Tributary 1
Tributary 2
Ravine Rd
Ravine Rd
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 18
0 50 100 Feet
1 inch = 100 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial


Longmeadow Parkway Site
Applied Ecological Services, Inc.
Huntley Rd
30
Randall Rd
34
Huntley Rd
34
ndall Rd
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 19
0 175 350
Feet
1 inch = 350 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial


Carpenter Creek Site
Applied Ecological Services, Inc.
Maple Ave
Carpenter Park
Potential Wetland Restoration Site/Park Expansion
Carpenter Blvd
Cleveland Ave
Hattie Ave
Carpentersville Water Quality Projects
Location Map
31
72
25
Legend
Photo Location/Direction
Potential Water Quality Projects
Jelkes Creek - Fox River WS
Carpentersville Village Boundary
Creeks
Fox River
Figure 20
0 150 300
Feet
1 inch = 300 feet
when printed on 8.5 x 11
N
W
E
S
Data sources:
Kane County GIS Technologies
Bing Aerial

4.0 SITE PHOTO LOG:

KEELE FARMS DETENTIONS 1 & 2

Photo 1: Detention Basin 1

Photo 2: Detention Basin 2

Photo 3: Detention Basin 2

Photo 4: Woodland between Detentions 1 & 2

FOXVIEW DETENTION

Photo 1.

PROVIDENCE POINT DETENTIONS 1-3

Detention 1

Photo 1.

Photo 2.

Photo 3.

Detention 2

Photo 1.

Photo 2.

Photo 3: Oak Woodland buffer

Detention 3

Photo 1.

Photo 2.

SIERRA WOODS DETENTION 1

Photo 1.

SHENANDOAH DETENTIONS 1-4

Detention 1

Photo 1.

Photo 2.

Detention 2

Photo 1.

Photo 2.

Detention 3

Photo 1.

Photo 2.

Photo 3.

Detention 4

Photo 1.

Photo 2.

KIMBALL FARMS DETENTIONS 1 & 2

Detention 1

Photo 1.

Photo 2: Swale between detention areas

Photo 3.

Detention 2

Photo 1.

Photo 2.

MENARDS DETENTION

Photo 1.

Photo 2.

FOUR WINDS WAY CREEK

Reach 1

Photo 1: South of Miller Rd.

Photo 2: South of Miller Rd.

Reach 2

Photo 1: Just east of Route 31

Photo 2: Between Route 31 & Riverview Dr.

Photo 3: South of Riverview Dr.

CARPENTER CREEK

Reach 1

Photo 1: Headwaters just west of Route 25

Photo 2: Between Route 25 and Lake Marian Rd.

Photo 3: Between Route 25 and Lake Marian Rd.

Photo 4: Just north of Lake Marian Rd.

Reach 2

Photo 1: Northeast of residential area

Photo 2: Northeast of residential area

Photo 3: East of Sedgewick St. residential area

Photo 4: East of Sedgewick St. residential area

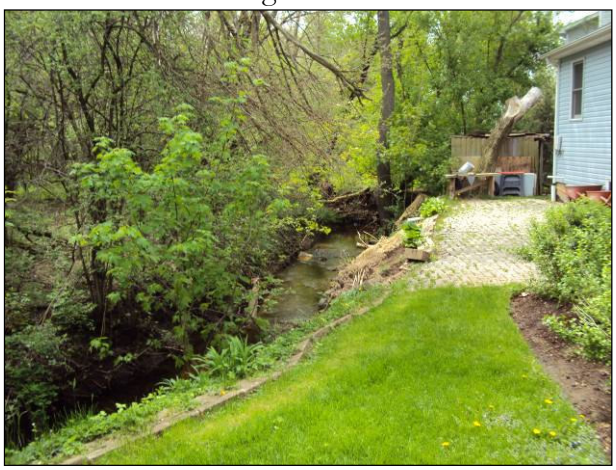


Photo 5: East of Sedgewick St. residential area

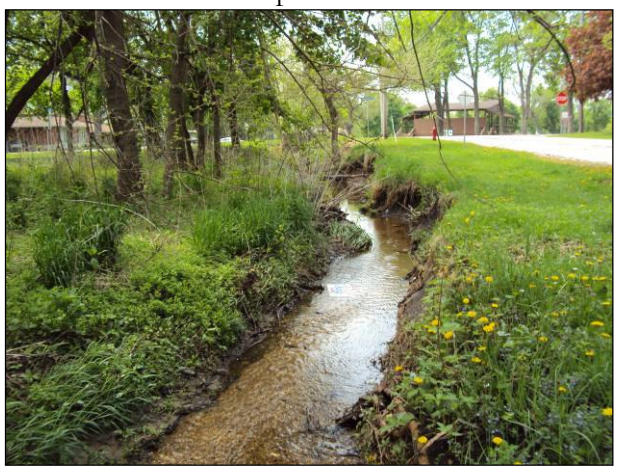
Photo 6: Adjacent detention north of Brook St.

Reach 3

Photo 1: East of Brook St.

Photo 2: East of Brook St.

Photo 3: North of Maple Ave.



Reach 4

Photo 1: South of Maple Ave.

Photo 2: West of Carpenter Blvd.

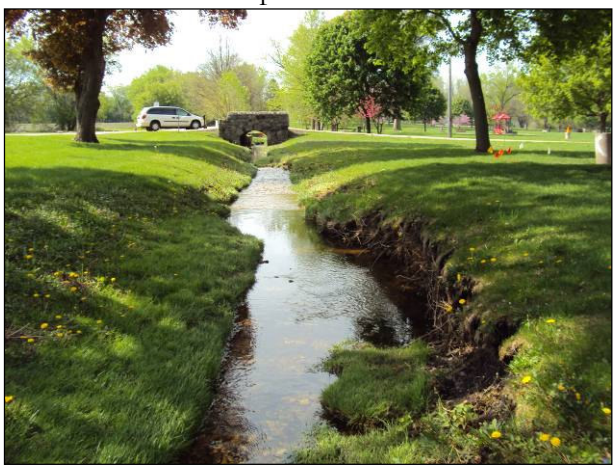


Photo 3: West of Carpenter Blvd.

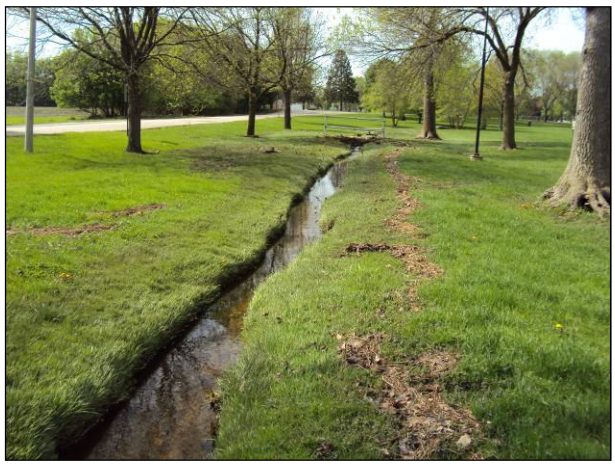


Photo 4: North of Spring St.

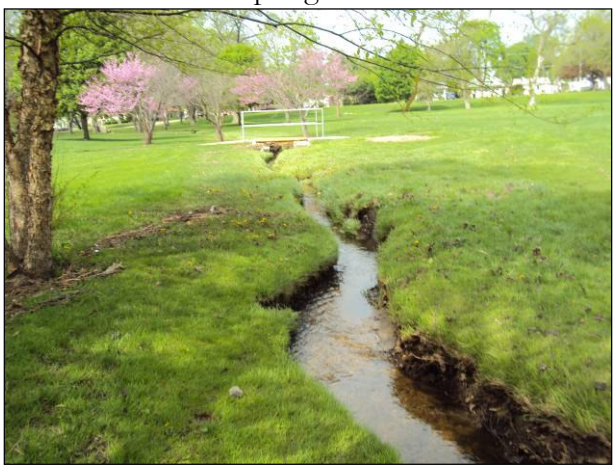


Photo 5: North of Spring St.

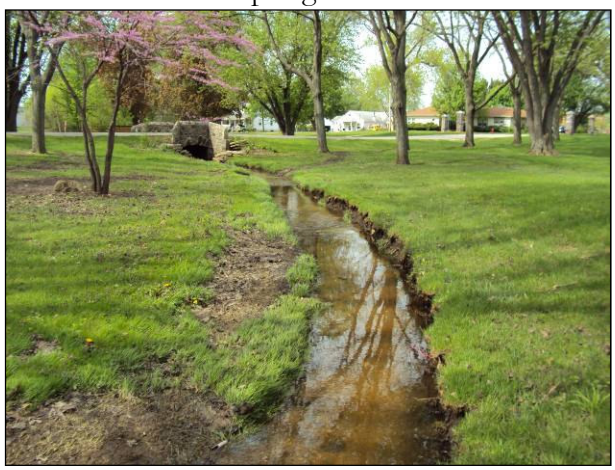
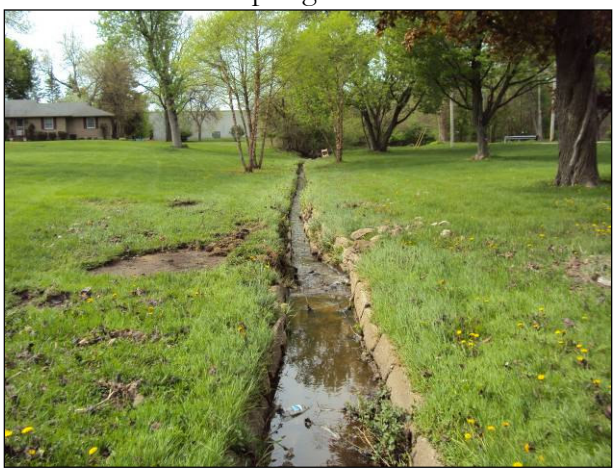


Photo 6: South of Spring St.



Reach 5

Photo 1: South of Carpenter Park (Revcor)

Photo 2: East of VOC pump station (Revcor)

Reach 6

Photo 1: Between Washington St. & Fox River

Photo 2: Between Washington St. & Fox River

LAKE MARIAN CREEK

Reach 1

Photo 1: Culvert under N. Kennedy Dr.

Photo 2: Between Kennedy Dr. & Alameda Dr.

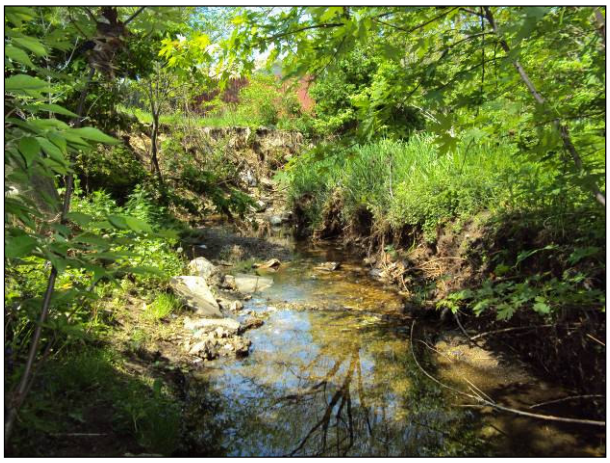


Photo 3: West of Alameda Dr.

Photo 4: North of Kings Rd.

Reach 2

Photo 1: Culvert to Keith Andres Park

Photo 2. Between culvert & confluence

Photo 3. Between culvert & confluence

Photo 4. Near confluence

Reach 3

Photo 1: Near headwaters

Photo 2: Near confluence

Reach 4

Photo 1: Upstream portion of Reach

Photo 2: Central portion of Reach

Photo 3: Central portion of Reach

Photo 4: Downstream portion of Reach

Reach 5

Photo 1: Culvert under Williams Rd.

Photo 2: Between Williams Rd. & Fox River

Photo 3: Between Williams Rd. & Fox River

Photo 4: Between Williams Rd. & Fox River

FAIRVIEW PARK

Photo 1: Potential storage/infiltration area.

Photo 2. Potential storage/infiltration area.

MACINTOSH CREEK HEADWATERS

Photo 1: Tributary 1

Photo 2: Tributary 2

Photo 3: Wooded depressional area

Photo 4: Mature Bur Oak

CARPENTER CREEK SITE

Potential Wetland Restoration & Development Site West of Reach 4/Carpenter Blvd.

Photo 1.

Photo 2.

Note: No photographs for Potential Longmeadow Parkway Wetland Mitigation Site.