The
Tyler Creek Watershed Plan

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Foreword

Read this first – then get INVOLVED!

To those who live along Tyler Creek, enjoy its scenic beauty, or recreate in its waters, the following statement is an obvious one: ***Tyler Creek is a precious resource worth protecting***. This tributary to the Fox River connects numerous natural areas, some of which are of the highest quality in all of Kane County. Tyler Creek provides many benefits:

- **it is the backbone of our watershed ecosystem - the fish, plants, and animals that rely on the stream for habitat and sustenance;**
- **it provides numerous opportunities for recreation – fishing, hiking, bird watching;**
- **it accepts and conveys our stormwater runoff – carrying away runoff from our homes and infrastructure;**
- **it receives some of our treated wastewater, further cleansing the water as it flows over and through the biologically rich substrate that lines channel.**
- **its natural systems assimilate our pollution and act as conduits for groundwater recharge, protecting the Fox River from further degradation and supplementing groundwater supplies. The Fox River and our groundwater are without question to the two most important natural resources in our region and perhaps our most threatened.**

Collectively, these functions can be referred to as the "green infrastructure" or network of natural systems that support the health and integrity of the Tyler Creek Ecosystem. Unlike human designed and constructed infrastructure, Tyler Creek and its natural features are irreplaceable. Once they are gone, the functions they provided cannot be replaced by manmade systems or places.

Development or the conversion of land to urban / suburban uses is now occurring at a dizzying rate in the Tyler Creek Watershed. It is therefore critical that stakeholders in the watershed take action now to recognize, appreciate, and protect our natural resources in the Tyler Creek Watershed.

The Tyler Creek Watershed Plan is intended to provide watershed stakeholders with a framework and the direction needed to protect critical areas and minimize the negative impacts of human activities to Tyler Creek and its green infrastructure –This Plan is an advisory document to be used by all stakeholders in the watershed; from municipal officials and their staff, developers, not-for-profit land stewardship organizations, and private landowners.

Acknowledgements

The Tyler Creek Watershed Plan was prepared utilizing funding from the U.S. Environmental Protection Agency, Section 319 of the Clean Water Act distributed through the Illinois Environmental Protection Agency. Additional funding was also provided by the City of Elgin, Village of Pingree Grove, and the Village of Gilberts.

In-kind services were provided by the City of Elgin, The Fox Valley Land Foundation, The Conservation Foundation, Friends of the Fox River. The planning process was coordinated by the Chicago Metropolitan Agency for Planning (formerly Northeastern Illinois Planning Commission) and The Conservation Foundation. Technical analysis and report preparation were completed by Watershed Resource Consultants, Inc. and Fluidclarity, Ltd. The authors wish to thank all those who contributed to the content and review of this report.

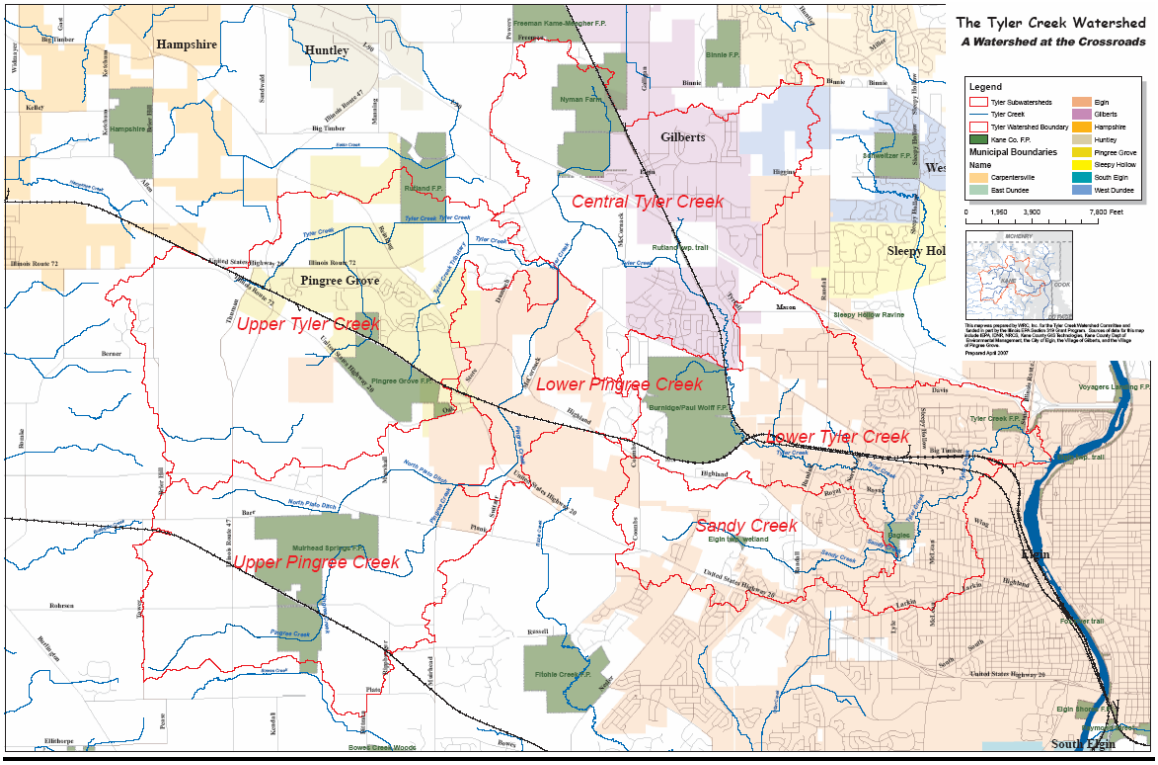
Executive Summary

Watershed Characteristics

Tyler Creek is a medium sized, high quality tributary of the Fox River. From southeast Rutland Township, the stream flows generally to the southeast toward the northwest side of Elgin, where it joins the Fox River. The Tyler Creek Watershed encompasses about 40.5 square miles and includes the small tributaries of Pingree Creek, Sandy Creek, and North Plato Ditch.

The eastern half of the Tyler Creek watershed is heavily urbanized, and has been for decades. However, the central region of the watershed is now rapidly urbanizing, and according to current comprehensive land use plans set forth by the municipalities, the western portion of the watershed is beginning to experience extensive development as well. The governmental stakeholders in the watershed that will have the most impact on the future Tyler Creek are the City of Elgin, the Village of Gilberts, the Village of Pingree Grove, and Kane County.

To facilitate easier dissemination of the findings and recommendations within the Tyler Creek Watershed Plan (TCWP), the Tyler Creek Watershed was divided into six subwatersheds, as illustrated below.



Stream / Water Quality Ratings

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Tyler Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Tyler Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Tyler Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from urban runoff, storm sewers, and runoff from forest / grassland / parklands (geese and other wildlife are a suspected source in these areas). The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Tyler Creek, although the ratings for these uses were classified as "not assessed". Below its confluence with Tyler Creek, however, the Fox River is listed as an impaired waterway for pH, silt, dissolved oxygen, fecal coliform, total suspended solids, habitat and flow modifications, excessive algae, PCBs, and methoxychlor.

Impetus for Updated Watershed Plan

The original watershed plan for Tyler Creek was completed in January 1996 by the Openlands Project, with input and guidance from the City of Elgin, Village of Gilberts, Kane County Forest Preserve District, Kane County, and the Illinois Department of Natural Resources. Funding was provided by the IDNR Office of Realty and Environmental Planning. The plan provided a summary of watershed history, physical, chemical and biological characteristics of the watershed at that time, and an outline for establishment of a watershed greenway plan, general watershed protection guidelines, and recommendations for restoration / protection of specific sites of concern / interest in the watershed's sub-areas.

Above: Growth pressures in the far west end of the Tyler Watershed are quickly turning farm fields into residential development.

In 1997, the City of Elgin completed the Tyler Creek Management Plan, which focused on stormwater management and natural resource protection in the lower one-third of the watershed within the municipal limits of Elgin (current as well as proposed city limits at that time). This plan was the result of the City of Elgin wanting to insure that Tyler Creek

would not experience additional degradation due to future upstream development following municipal expansion.

This 1997 Tyler Creek Management Plan for Elgin identified stormwater management strategies for future development, stormwater retrofit projects, stream corridor restoration / stabilization projects, and wetland banks as part of a plan to improve water quality and reduce flooding.

In 2000, the City took that plan a step further and prepared an EPA 319 grant application that included preliminary design plans and cost estimates for implementing several (12-13) of the projects identified in the 1997 Tyler Creek Management Plan. To date, two of these projects have been constructed / undertaken by the City of Elgin.

In 2005, the Fox River Ecosystem Partnership, with guidance from several local and state natural resource agencies and conservation groups, identified Tyler Creek as a high priority watershed for preventative planning due to the extensive development plans being considered by the municipalities within and adjacent to the watershed. Analysis of the municipal comprehensive land use plans for the region indicate that nearly the entire watershed will be "built out" with suburban development far more extensive than the development suggested by the Kane County 2030 Land Use Plan. Without careful planning and a fundamental change in the way in which land development is designed and implemented, the likelihood of losing the irreplaceable natural resources of the Tyler Creek Watershed is eminent.

As a result, the following Watershed Protection Goals were established to help protect Tyler Creek:

Watershed Protection Goals

Goal 1: **Maintain the Quality of Tyler Creek**

Goal 2: **Prevent Further Negative Impacts of Land Use Change on the Watershed's Natural Resources**

Goal 3: **Reduce Flooding and Flood Damages in Existing Developed Areas of the Watershed**

Goal 4: **Create an effective and lasting watershed stakeholder organization.**

Existing and Future Watershed Protection Challenges

Overall, the health of Tyler Creek today is good. Previous water quality and biological data collection studies over the last eight years confirm that Tyler Creek has the water quality and biological characteristics to qualify it as a highly valuable resource. The two highest quality areas in the watershed are the Tyler Creek stream corridor between Big Timber Road and Randall Road, and the Pingree Grove Wetland in the Pingree Grove Forest Preserve.

However, Tyler Creek is in a state of rapid flux. While the land immediately adjacent to these high quality areas is largely protected from new development, the vast areas upstream of each high quality site are planned for extensive land use changes

(residential / commercial / office / light industrial developments). These drastic land use changes, even when implemented according to the current development & stormwater regulations, will have a profound impact on the remaining high quality natural areas downstream, as current development practices usually result in an increase total runoff as well small storm peak flow frequencies, both of which adversely impact stream stability. Development also creates additional pollutant loading into the stream system, especially nutrients such as phosphorus and nitrogen, which can fuel the growth of algae and aquatic vegetation to nuisance levels, resulting in habitat degradation and low dissolved oxygen.

Plan Organization

The Tyler Creek Watershed Plan is organized into 15 sections:

1. Introduction
2. Watershed Summary
3. Pollutant Loading Analysis
4. Watershed Recommendations
5. Lower Tyler Subwatershed Assessment
6. Central Tyler Subwatershed Assessment
7. Upper Tyler Subwatershed Assessment
8. Sandy Creek Subwatershed Assessment
9. Lower Pingree Subwatershed Assessment
10. Upper Pingree Subwatershed Assessment
11. Green Infrastructure Plan
12. Public Education & Outreach Programs
13. Measuring Watershed Plan Success
14. References
15. Appendices

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Table of Contents

LIST OF ACRONYMS

ADID	Advanced Identification
BMP	Best Management Practice
DEBM	Department of Environmental and Building Management (Kane County)
DEM	Digital Elevation Model
HHQ	High Habitat Quality
IEPA	Illinois Environmental Protection Agency
IDNR	Illinois Department of Natural Resources
FREP	Fox River Ecosystem Partnership
FOFR	Friends of the Fox River
FRSG	The Fox River Study Group
GWLF	Generalized Watershed Loading Function (model)
KCFPD	Kane County Forest Preserve District
LID	Low Impact Development
LTCSW	Lower Tyler Creek Subwatershed
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NPS	Non-point Source
GIS	Geographic Information System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
TCWP	Tyler Creek Watershed Plan
WQS	Water Quality Standard
WWTP	Waste Water Treatment Plant

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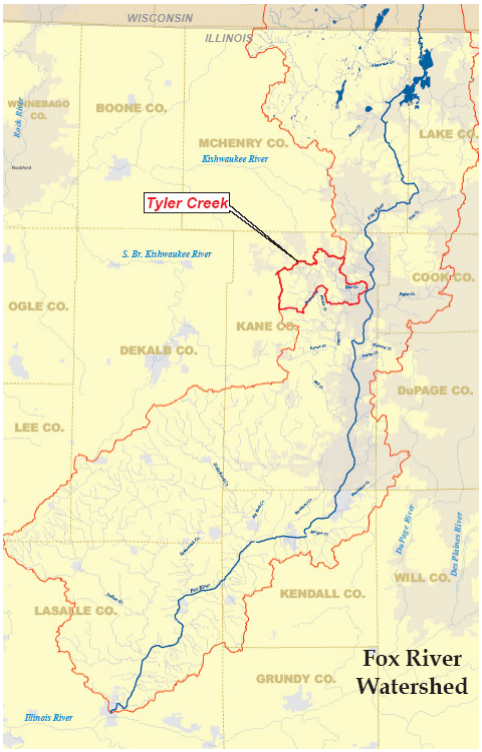
Chapter 1
Introduction

1.1 Watershed Overview

Tyler Creek is a tributary to Fox River, located in northern Kane County, Illinois. This 40.5 square mile watershed includes the small tributary streams, Pingree Creek, Sandy Creek, and North Plato Ditch. The eastern half of the watershed is heavily urbanized, and the central region of the watershed is rapidly urbanizing. The western portion of the watershed is largely comprised of agricultural land, although this will soon change as extensive development is planned for the future, according to current comprehensive land use plans set forth by the municipalities in the region. Without a doubt, the future quality of Tyler Creek and remaining natural areas of the watershed will be largely determined by the land use decisions made by the officials of the City of Elgin, the Village of Gilberts, and the Village of Pingree Grove.



Tyler Creek itself, although currently in good condition in many areas, is listed as being impaired due to fecal coliform, which has been detected by the IEPA in samples collected between Randall Road and just above the confluence with the Fox River at Illinois Route 31. While this is the only "documented" impairment to Tyler Creek by the IEPA, there are other major threats or impairments that have impacted the character and quality of Tyler Creek.

A major existing threat to the watershed is the urban encroachment and lack of water quality practices in the lower portion of the watershed, specifically east of Randall Road. This has resulted in a loss of stream corridor habitat in many areas, and a tremendous influx of untreated, undetained stormwater from high-density development on Elgin's west side.

A major existing impairment is the loss of riparian habitat throughout much of the watershed resulting from the historic draining of wetlands and channelization of Tyler Creek and its tributaries.

Another threat is the rapid spread of invasive species of vegetation into the remaining natural areas, such as wetlands, woodlands, and stream corridors. Nearly every single wetland, woodland, prairie, or other natural open space is facing an onslaught of invasive herbaceous species, including Reed Canary Grass, Common Reed, Honeysuckle, Canada Thistle, Buckthorn, and Garlic Mustard. In addition, the watershed is faced with a proliferation of weedy, low quality trees and brush, which

chokes virtually all stream corridors with thick, shady canopy that exacerbates streambank erosion and sediment delivery into the stream system.

Perhaps the most significant threat to the watershed, however, is yet to come. Despite all of the negative impacts people associate with the row crop agriculture that dominates the watersheds west of the Fox River, they are relatively minor and reversible compared to the permanent impacts of urban and suburban development on the receiving stream. This is due to not so much to land development as a practice, which is inevitable, but instead is due in large part to the ***way*** we undertake land development. As a society, we have allowed development to occur using the cheapest possible land development techniques to minimize construction schedules and maximize construction profit. This, as all other urbanized watersheds in the metropolitan area have shown, has been achieved at the expense of maintaining a quality, sustainable natural environment with cleanest of water, and flourishing native wildlife.

1.2 Watershed Planning – An EPA Perspective

This update to the original Tyler Creek Watershed Plan (1996; Openlands Project), is structured to meet the USEPA criteria for implementing non-point source management programs in accordance with Section 319 of the Clean Water Act. Watershed Plans meeting these requirements are eligible for Section 319 grant funds administered through the Illinois EPA to assist watershed stakeholders with implementing activities in the plan to help mitigate non-point source pollution in the watershed. Section 319 funding provides a 60% federal project cost share from USEPA. In many circumstances, other funding sources can be tapped to provide the 40% local cost share match.

This Tyler Creek Watershed Plan therefore addresses the following nine required components set forth by the EPA:

1. **An identification of the causes and sources or groups of similar sources of pollution that will need to be controlled to achieve the pollutant load reductions estimated in this watershed-based plan.**
2. **An estimate of the pollutant load reductions expected following the implementation of the management measures described under #3 below.**
3. **A description of the non-point source (NPS) management measures that will need to be implemented to achieve the load reductions estimated under #2 above and an identification (using map or a description) of the critical areas in which those measures will be needed to implement this plan.**
4. **An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan.**
5. **A public information/education component that is designed to change social behavior.**
6. **A plan implementation schedule.**
7. **A description of interim, measurable milestones.**
8. **A set of criteria that can be used to determine whether pollutant loading reductions are being achieved over time.**

9. **A monitoring component to evaluate the effectiveness of the implementation efforts over time.**

1.3 Need for an Updated Watershed Plan

The original Tyler Creek watershed plan was completed in January 1996 by Openlands Project with input and guidance from the City of Elgin, Village of Gilberts, Kane County Forest Preserve District, Kane County, and the IDNR. The plan provided a summary of watershed history, as well as the physical, chemical and biological characteristics of the watershed at that time. It also included an outline for establishment of a watershed greenway plan, general watershed protection guidelines, and recommendations for restoration / protection of specific sites of concern/interest in the watershed's sub areas. That plan, while useful at that time for planning purposes, has since become out-dated due to changing development plans which now include the development of virtually all areas of the Tyler Creek Watershed.

Perhaps of more significance is the fact that Tyler Creek discharges into the Fox River, the most important natural resource in Kane County (along with groundwater supply). The Fox River is the primary source of drinking water for more than 236,600 residents in the watershed (the populations of Aurora & Elgin, according to the 2000 U.S. Census). The Fox River is a heavily used resource that is subjected to a number of inputs of pollution, including point sources (storm sewers) and non-point sources (runoff from the landscape), as well as pollution that enters the Fox River's many tributaries, such as Tyler Creek. Downstream of Tyler Creek, the Fox River now is listed on the Illinois EPA's impaired waterways list {known as the 303(d) List, published in accordance with the United States Clean Water Act}. This portion of the Fox River through the Elgin area is listed as impaired due to:

- Municipal Point Sources
- Combined Sewer Overflows
- Urban Runoff/Storm Sewers
- Hydrologic/Habitat Modification
- Flow regulation/ Modification
- Habitat Modification
- Streambank Modification/Destabilization
- Contaminated Sediments

Source: IEPA 303(d) List

These impairments are due to the collective pollution and alterations of the entire Fox River Watershed upstream of this reach, of which Tyler Creek is just a small portion. However, it is most immediate to this impaired reach of the Fox River and most of the watershed's area is or will soon be under the control of the municipal jurisdictions that rely on the resources that the Fox River provides. For this reason, the watershed resource protection efforts outlined in this plan should be implemented to the extent possible to provide an incremental benefit to the Fox River here and downstream.

1.6 Watershed Plan Goals

In order to begin to address and achieve the Watershed Plan Goals, objectives must be established to help identify specific research, implementation projects, or educational outreach activities that need to be accomplished. As the watershed planning process continues, these goals and objectives may change. At this point in time, these are the goals and objectives for Tyler Creek.

Goal 1: Maintain the Quality of Tyler Creek

- **Obj 1: Protect, through acquisition or conservation easements, existing High Quality and High Functional Value ADID Wetlands.**
- **Obj 2: Adopt a "Green Infrastructure Plan" for the watershed to guide future development and the preservation, restoration, and management activities of watershed stakeholders.**
- **Obj 3: Develop partnerships between private landowners, developers, local natural resource agencies, and local not-for-profit land protection organizations to restore/enhance existing and/or former wetland & riparian areas.**
- **Obj 4: Work with NPDES Phase I dischargers to insure that the highest quality treatment is achieved before wastewater effluent is discharged to any water course in the watershed.**
- **Obj 5: Implement a BMP program to reduce stormwater quantity and/or improve stormwater runoff quality wherever possible in the existing developments in the watershed.**

Goal 2: Prevent Further Negative Impacts of Land Use Change on the Watershed's Natural Resources

- **Obj 1: Minimize increases in stormwater runoff flow rates AND total runoff volume for new developments.**
- **Obj 2: Prohibit negative changes in water quality from new development.**
- **Obj 3: Discourage development activities/encroachment within the Green Infrastructure Areas.**

Goal 3: Reduce Flooding and Flood Damages in Existing Developed Areas of the Watershed

- **Obj 1: Work with landowners subjected to repeated flood damages and assist them with seeking planning & design guidance and funding sources develop mitigation plans to reduce the magnitude and frequency of recurring flood damages.**

- **Obj 1: Minimize increases in stormwater runoff flow rates AND total runoff volume for new developments.**
- **Obj 2: Increase total required retention volume required for new developments.**

Goal 4: Create an effective and lasting watershed stakeholder organization.

- **Obj 1: Organize an active and engaged stakeholder group to**

  1.) Promote the Tyler Creek Watershed Plan,

  2.) Track, monitor, and report on the success of implementing the recommendations of the plan, and

  3.) Serve as a forum in which all parties in the watershed can communicate their ideas, concerns, and seek more information on how to maximize the protection efforts in the watershed.

- **Obj 2: Coordinate annual comprehensive reviews of available water quality and biological data collected in the watershed as another way to measure plan success.**

1.7 Getting Involved: The Tyler Creek Watershed Coalition

In order for this Watershed Plan to be effective and lasting, one key precursor to the watershed plan will be to have stakeholders come together and form a Tyler Creek Watershed Coalition. The Tyler Creek Watershed Coalition should be comprised of watershed stakeholders who are committed to work together to preserve and protect the water quality and natural resources of Tyler Creek. The mission of the organization will be to bring together a diverse coalition of stakeholders to protect the unique and irreplaceable natural resources of the Tyler Creek Watershed through cooperative partnerships, smart land use decisions and sensible growth. Stakeholders must include private landowners, homeowner associations, municipal staff & officials, county, state, and federal agency staff charged with natural resource/water resource protection, representatives from umbrella conservation organizations (i.e. Fox River Ecosystem Partnership and the Fox River Study Group, Inc, Fox Valley Land Foundation, The Conservation Foundation).

The Coalition's mission will be achieved by seeing to it that the plan recommendations are implemented by the responsible parties, and by communicating and coordinating with municipalities, developers, and private landowners to insure that resource management is not compromised by rapid, hastily planned development.

The Coalition should designate a lead organization or person to take responsibility for setting up and coordinating meetings of the Coalition, which should occur at least on a quarterly basis (4 times per year) and meet in the watershed.

This is an essential first step, and perhaps most important recommendation of the Tyler Creek Watershed Plan.

1.8 Funding

Funding for this project was generously provided by a grant from the US EPA Section 319 Program of the Clean Water Act, issued through the Illinois EPA.

1.9 Partners / Contributors

The following organizations have contributed information, staff time, and/or funding to prepare this watershed plan:

- City of Elgin
- Village of Gilberts
- Village of Pingree Grove
- Chicago Metropolitan Agency for Planning
- The Conservation Foundation
- Fox Valley Land Foundation

1.10 The Planning Process

The remainder of this watershed plan document is divided into 13 sections.

Chapter 2 provides a summary of watershed characteristics, natural resources, water quality, population, land use, existing watershed impairments, and potential future watershed impairments.

Chapter 3 summarizes the pollutant loading analysis that was prepared for the watershed.

Chapter 4 presents the recommendations to protect watershed resources, including a discussion of watershed-wide recommendations and an overview of the types of recommendations specified for each of the subwatershed units.

Chapter 5 presents a concise summary of features, impairments, and recommendations for the Lower Tyler Creek Subwatershed.

Chapter 6 presents a concise summary of features, impairments, and recommendations for the Central Tyler Creek Subwatershed.

Chapter 7 presents a concise summary of features, impairments, and recommendations for the Upper Tyler Creek Subwatershed.

Chapter 8 presents a concise summary of features, impairments, and recommendations for the Sandy Creek Subwatershed.

Chapter 9 presents a concise summary of features, impairments, and recommendations for the Lower Pingree Creek Subwatershed.

Chapter 10 presents a concise summary of features, impairments, and recommendations for the Upper Pingree Creek Subwatershed.

Chapter 11 details the components and implementation strategy for the proposed Green Infrastructure Plan.

Chapter 12 provides information on existing Public Education & Outreach Programs as well as provides guidance for how these programs can be strengthened and utilized to effect change in watershed awareness by the local stakeholders.

Chapter 13 outlines milestones and a framework for measuring how successful the stakeholders are in implementing the actions of the Watershed Plan. It also outlines the monitoring needed to track watershed health and measure the impacts of implementing the plan recommendations.

Chapter 14 lists the references used to create this document, contact information for organizations and stakeholders in the Tyler Creek Watershed, and other publications in print and on-line that offer reference information on Best Management Practices and planning strategies that are applicable to the watershed.

Chapter 15 consists of appendices where maps and technical information used to make this document can be found.

The hope is that this plan will serve as the reference document that watershed stakeholders will use to plan projects and measure how successful their efforts are to protect the environmental integrity of the Tyler Creek Watershed.

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Chapter 2
Watershed Summary

2.1 Location and Regional Context

The Tyler Creek watershed is located in central Kane County, Illinois. Tyler Creek is a tributary to the Fox River, draining about 40.5 square miles of rural and urbanizing land in Elgin, Rutland, Dundee, and Plato townships. Tyler Creek begins in the farm fields southwest of Starks Corner (west of IL Route 72 & IL Route 47 intersection) and travels east through Rutland Township and then southeast through the City of Elgin, where it enters the Fox River on the Judson College campus about 1.5 miles upstream of the Kimball Street Dam. Tyler Creek is about 16 miles in total length and has 2 major tributaries: Sandy Creek, and Pingree Creek. The other major tributary is North Plato Ditch, which drains into Pingree Creek. Tyler Creek also has 7 smaller, unnamed tributaries.

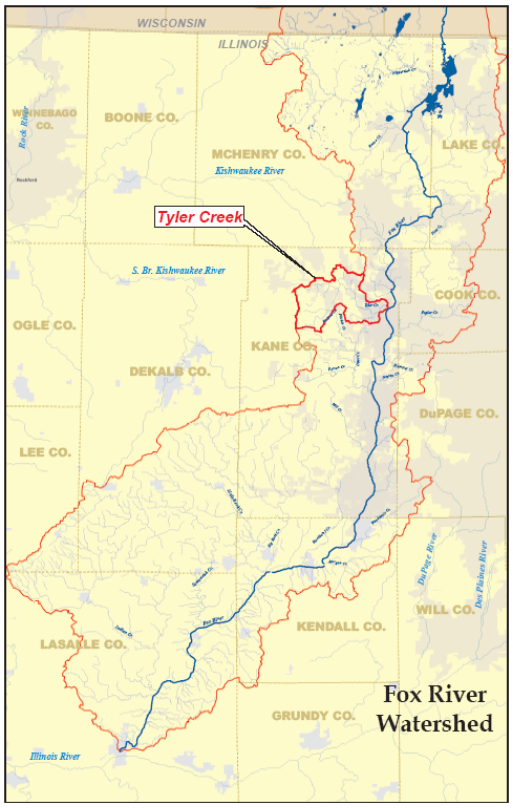

Figure 2.1 Watershed Location Map

The Tyler Creek watershed was formed about 12,500 years ago near the end of the Wisconsinan Glacial Period. The landscape present today in the watershed is a result of ice sheets more than 2,000 feet thick pushing across Kane County from what today is Lake Michigan and leaving behind sand, gravel and soil deposits as the glaciers retreated eastward.

At the westernmost end of the Tyler watershed, the glacier remained in position long enough to create the Marengo Moraine, which is the ridge we observe running parallel to and just west of IL Route 47. This moraine forms the watershed boundary on the west and is the source of the headwaters that form Tyler Creek and its western tributaries. Just east of the moraine, the landscape of western Rutland and Plato townships is very flat, punctuated by a few smaller hills and ridges. These flat plains formed under water, as the quiet deposits of shallow lake beds. The glacial ice melted rapidly in this area, trapping water between the Marengo Moraine on the west and the retreating ice of the glacier to the east. The lakes were temporary, but existed long enough to create distinct types of soil. Geologists have determined that the area around Pingree Grove was once submerged under a large glacial lake of several thousand acres.

Interjected among the lake plains was a confusion of broken ice blocks and materials carried by the receding glacier. As the glacier receded, it created a rough “morainic” area with knobs (hills) and kettles (depressions) known as the Gilberts Moraine, where one can see the kames, eskers and other ice-contact sand and gravel deposits at the far northern edge of the Tyler Creek watershed.

Near the end of the glacial period in the Tyler watershed, the glacier deposited a third moraine at the east end of the watershed, known as the Minooka Moraine. This moraine is the high ground just west of the Fox River, and can be seen in the Tyler watershed where Tyler Creek cuts through it, creating the bluffs in Wing Park and further downstream near Route 31 in the Tyler Creek Forest Preserve.

The first pioneers settled in the Tyler Creek watershed in the late 1830s, and by the 1880s, the landscape had been converted from one of prairies, oak groves and savannas to a landscape dominated by crop fields and pastures.

2.2 Natural Resources

2.2.1 Landscape Resources

Based upon the Land Cover of Illinois 1999-2000 inventory, the watershed was comprised of 67% agricultural lands (row crops, pastures, etc.), 22% development, and 11% natural landscapes such as wetlands, woodlands, and streams, ponds, etc.. Despite the development and extensive agricultural landuses, the watershed still maintains several hundred acres of upland forests, partial forest savannahs, as well as shallow and deep marsh-emergent wetlands.

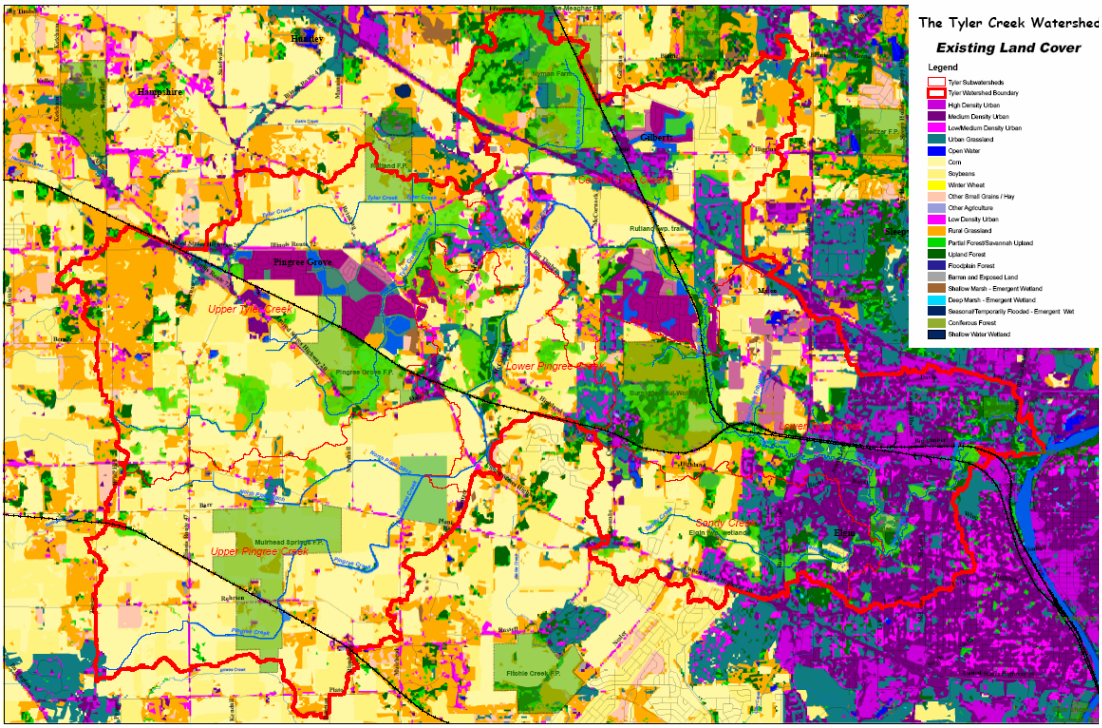

Figure 2.2 Existing Landcover in the watershed (Landcover of Illinois 1999-2000 updated with new developments in watershed as of 2006)

Tyler Creek itself is 16.8 miles long. The lower half (56%) of Tyler Creek is not channelized and still retains a rather natural stream corridor, although the corridor is extremely narrow in areas east of Randall Road due to urban encroachments. Nearly all

of the Tyler Creek and its tributaries upstream of Big Timber Road have been ditched (lowered) and channelized (straightened) in the past to increase agricultural productivity of the rich soils that dominate the Tyler Creek Watershed. These stream channels are characterized as heavily incised, silt or sand bottom channels centered in a very narrow band (< 80 ft) of herbaceous (grass) vegetation.

2.2.1.1 Wetlands

Historically, about 63% (9433 acres) of the Tyler Creek watershed was comprised of wetlands. Today, only 30% (2,800 acres) of those wetlands remain, comprised of 315 complexes including marshes, sedge meadows, floodplain forests, and small fens and seeps. Fifteen of these wetlands, or 837 acres, are classified as High Habitat Quality wetlands, meaning that they possess ecological qualities that make them unique and extremely valuable compared to other wetlands in Kane County.

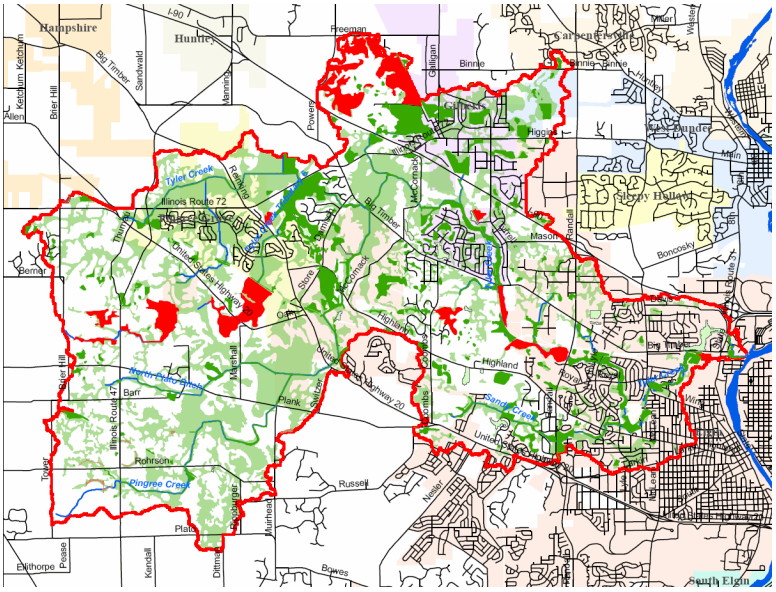

Figure 2.3 Map of Tyler Creek watershed indicating High Quality Wetlands & Stream Corridors in red. Hydric soils are light green and other wetlands are shown in dark green.
Source: Kane County ADID Wetland Study

These high quality natural areas are generally located in 3 areas of the watershed: the far north edge of the watershed northwest of Gilberts near Freeman Kame; the west of downtown Pingree Grove in the Pingree Grove Forest Preserve and along the upstream low lying areas that drain eastward into the Forest Preserve; and the Tyler Creek stream corridor between Big Timber and Randall Road.

2.2.1.2 Forest Preserves & Publicly Owned Land

There are nine County Forest Preserves in the watershed, totaling 2,385 acres, or 9% of the watershed. The City of Elgin, Village of Gilberts, and the Village of Pingree Grove own additional 121 parcels of land totaling 760 acres (3% of the watershed). This total only includes parcels that are used for open space or stormwater management (excludes fire stations, village halls, etc.).

2.2.2 Biological Resources

2.2.2.1 Fishery

Tyler Creek supports more than 30 species of fish, including large and smallmouth bass, channel catfish, sunfish (Green Sunfish & Bluegills), and various lesser-known species of chubs, minnows, darters. While not generally seen (or known about) by the general public, many of these lesser known fish species are extremely sensitive to pollutants in the water and are therefore excellent indicators as to the quality of the water in a stream. As of the last IDNR fish survey in 2002, Tyler Creek is home to 6 pollution-intolerant species, which were found mostly between Big Timber Road and Randall Road. This indicates that the water quality in Tyler Creek near Randall Road was fairly good at that time. Downstream of Randall Road, only 2 pollutant tolerant species of fish were found (within the Tyler Creek F.P.).

Aside from the water quality, the other major factor that determines the health of Tyler Creek's fishery is the presence of good habitat. Good habitat is represented by sand and gravel channel bottom, alternating pool and riffle stream features, stable stream banks, and lush vegetation buffering the stream channel. The segment of Tyler Creek that contains these characteristics can be found between the Gilberts WWTP (just north of Big Timber Road west of Tyrell Road) and Randall Road.

Almost all the fish species in Tyler Creek are native to the Fox watershed, except for the common carp, which has invaded virtually all of our streams and lakes in northeastern Illinois.

2.2.2.2 Mussels

There are 27 species of mussels found in the Fox River and it's tributaries within Kane County. Of these, only 5 species are documented as being found in Tyler Creek. They include:

- Slippershell (St-Threatened)
- Cylindrical papershell
- White heelsplitter
- Creek heelsplitter
- Ellipse

2.2.2.3 Threatened and Endangered Species

There is limited information available about the presence of Threatened or Endangered Species in the Tyler Creek Watershed. The Kane County Forest Preserve does not currently have a database or formal system of records that documents the occurrence of T&E species inhabiting any of it's properties in the watershed. Personel communications with KCFPD staff suggest there are at least a dozen Threatened or Endangered bird species in the Tyler Watershed, the State Threatened Blanding's Turtle and Franklin Ground Squirrel, and many rare species of native plants in the remaining wetlands and woodlands. There are no documented species of T&E fish in the watershed. The only documented aquatic T&E species is the State-Threatened

Slippershell Mussel, which has been found in the vicinity of the Big Timber Road bridge adjacent to the Camp Big Timber Boy scout Camp.

2.2.3 Water Quality

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Tyler Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterbodies (?) that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Tyler Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Tyler Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform bacteria. This bacteria, associated with human and animal waste, was listed as coming from urban runoff, storm sewers, and runoff from forest / grassland / parklands. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Tyler Creek, although the ratings for these uses were classified as "not assessed".

The IEPA maintains three water quality sampling stations in the watershed; all located in the Lower Tyler Creek Subwatershed. They are listed in the table below:

Station	Stream	Location
DTZP01	Tyler Cr.	Tyler Creek at Illinois Route 31 Bridge
DTZP02	Tyler Cr.	Tyler Creek below stone bridge at Tyler Creek Forest Preserve
DTZP04	Tyler Cr.	Tyler Creek at Randall Road

Table 2.1: IEPA Sampling Stations in the Tyler Creek watershed

The Fox River Watershed Monitoring Network (FRWMN), administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites on Tyler Creek. During 2005 and 2006 monitoring periods, the ten FRWMN sites in the watershed reported water quality index values (based on macroinvertebrate sampling) as Fair to Poor. Many of the "Poor" classifications occurred during 2005 when the watershed experienced a severe drought, which likely impacted the number and distribution of macroinvertebrates in the stream channel at the sampling sites.

In 2004, the Valley of the Fox Chapter of the Illinois Sierra Club published a short report on the water quality of streams in the Middle Fox River Area. This study used data collected by Sierra Club volunteers for 12 streams in the Fox Watershed over a three year period.

Stream Name	Phosphate-P	Nitrate – N	Ammonia – N	Chloride	Sulfate	Turbidity
	mg/L	mg/L	mg/L	mg/L	mg/L	Ftu
Tyler Cr.	0.31	2.61	0.13	49.6	60.0	21.4

Table 2.1 Sierra Club Tributary Streams Project Monitoring Results for Tyler Creek
mg/L = milligrams per liter
Ftu =Formazin **Turbidity** Unit

Sierra Club Notes:

1. There currently is no Illinois water quality standard for phosphorus. US EPA recommends 0.08 mg/l total phosphorus as a level indicative of a pristine stream in our ecoregion. Statewide, the average level of total phosphorus (of which phosphates are a subset) in Illinois rivers and streams is 0.38 mg/l.
2. There currently is no Illinois water quality standard for nitrates. USEPA recommends 2.18 mg/l total nitrogen as a level indicative of a pristine stream in our ecoregion. The average level of nitrate-N found in Illinois streams is 3.89 mg/l.
3. Ammonia water quality standards are based on the pH and temperature of the stream as well as the presence of sensitive early life stages of fish. For example, ammonia-nitrogen levels in Tyler Creek should not exceed a monthly average of 1.6 mg/l when early life stages are present. The average level of ammonia found in Illinois streams is 0.32 mg/l ammonia-N.
4. The Illinois water quality standard for both chloride and sulfate is 500 mg/l.
5. There currently is no Illinois water quality standard for turbidity.

The Sierra Club report summarized that of all the streams sampled, Tyler Creek received a “B” grade. The report indicated that water quality of Tyler Creek was roughly the same as Brewster Creek and Mill Creek, but was lower than that found on other Fox River tributaries, such as Poplar Creek, Norton Creek, Waubonsee Creek, Ferson Creek, and Indian Creek.

In 2004, Huff & Huff, Inc, completed a biological and water quality assessment of Tyler Creek between McCornack Road and Randall Road (Central Tyler Subwatershed & Lower Tyler Subwatershed). This study, prepared for the Village of Gilberts relating to expansion of their wastewater treatment plant, collected data on fish species, mussels, macroinvertebrates, and some water quality parameters (dissolved oxygen, phosphorus, nitrogen, and ammonia). The report indicated that during August 2004, dissolved oxygen levels dropped below 5 mg/L between McCormack Road and just downstream of the Gilberts WWTP. Dissolved oxygen in the higher quality sections of Tyler Creek (from Big Timber Road extending downstream to Randall Road) did not drop below the minimum 5 mg/L limit. This is in part due to the changes in stream channel gradient. Upstream of the Gilberts WWTP, the stream channel descends roughly four feet in elevation per mile, while downstream; the stream channel descends almost 24 feet per mile. The low gradient, and somewhat sluggish current in the upper reach, can contribute to warmer water temperatures and lower dissolved oxygen levels. In contrast, the much steeper channel gradient in the downstream reach provides opportunities for oxygenation of the water column, and the more heavily shaded stream corridor helps keep water temperatures lower.

2.3 Human Resources

2.3.1 Population

There are 6 municipalities that have jurisdiction within the Tyler Creek Watershed, although only 3 have significant holdings with any potential for future growth in the watershed.

Municipality	Area in Watershed (acres)	Percent of Watershed	Total Population in 2000[1]	Projected Total Population in 2030[1]
City of Elgin	6,484	25%	94,487	167,375
Village of Gilberts	2,074	8%	1,279	14,045
Village of Pingree Grove	1,878	7%	124	14,147
Village of West Dundee	300	1%	*	*
Village of Carpentersville	25.2	< 0.1%	**	**
Village of Hampshire	0.25	< 0.1%	**	**
Total	10,761	41%		

Table 2.2 Population and area of municipalities in the Tyler Creek watershed.

1. Northeastern Illinois Planning Commission 2030 Forecasts of Population, Households, and Employment by County and Municipality; Revised September 27, 2006

* Of the 300 acres of West Dundee in the Tyler Watershed, 180 acres are owned by the Dundee Park District (Randall Oaks). Dundee has a boundary agreement along the western edge with Gilberts and cannot annex any more property within the watershed. The other 120 acres of land currently under Dundee's jurisdiction is currently in agricultural and planned to become a business park in the future (Ii.e. no population increase). Therefore, population data for West Dundee is not used in the Tyler Creek Watershed Plan.

** Neither Hampshire nor Carpentersville have significant area within the watershed, and therefore their population data is not included in the Tyler Creek Watershed Plan.

The existing total population in the watershed was 23,064 in 2000, according to the U.S. Census Bureau. The Chicago Metropolitan Agency for Planning has prepared population projections for 2030 based on anticipated development patterns in Kane County. Using the municipal population projections and the municipal comprehensive land use plans, it is estimated that the population in the watershed will increase to about 44,000 residents (a 90% increase).

2.3.2 Development

2.3.2.1 Existing Development

There are more than 7,000 acres of urban/suburban development in the watershed as of 2006. Most of the development has occurred in the downstream eastern portion of the watershed, where 51% of the development is located in the lower 28% of the watershed (Lower Tyler and Sandy Creek subwatersheds). New development in the watershed between 1999 and 2006 amounted to about 1,200 acres, increasing the total amount of development in the watershed to about 27%. Nearly all of this new development

occurred in the upper reaches of Tyler Creek – within the Central Tyler and Upper Tyler Creek subwatersheds.

Subwatershed	Total Area (acres)	% Developed	% Agriculture	% Woodland / Forests	% Wetlands & Open Water
Lower Tyler	5,007	53%	29%	17%	1%
Central Tyler	5,194	24%	62%	12%	3%
Upper Tyler	6,366	7%	84%	7%	2%
Sandy Creek	2,217	42%	48%	8%	2%
Lower Pingree Creek	1,825	17%	71%	11%	1%
Upper Pingree Creek	5,361	4%	95%	1.5%	< 1%

Table 2.3 Summary of 1999 Landcover in Tyler Creek subwatersheds.

2.3.2.2 Future Development

The watershed is expected to undergo extensive and rapid development over the next 20 years. The City of Elgin's current inventory of development projects already in the planning/design phase amount at least 11 subdivisions constituting another 3,028 acres of development in the watershed that will be built in the next 5-6 years. This will raise the amount of development in the watershed to more than 38%. Analysis of undeveloped parcels in the watershed and Elgin's comprehensive land use plan indicate that an additional 5,480 acres will be developed into residential, commercial, and office/reaserch developments. The Village of Gilbert's comprehensive plan suggests that it will add 1,475 acres of office/industrial & residential development and the Village of Pingree Grove has plans for at least 740 more acres of development.

All totaled, the Tyler Creek subwatershed will see at least 3,028 acres of new development in the next 5-6 years and another 7,695 acres by the year 2030; possibly sooner. This will increase the total developed area in the watershed to 17,700 acres, or 68% of the total watershed area. Without a doubt, the future quality of Tyler Creek and remaining its natural areas will be largely determined by the land use decisions made by the officials and their constituents in the City of Elgin, the Village of Gilberts, and the Village of Pingree Grove.

Point Source Discharges

There is one permitted point source discharge in the watershed, according to IEPA NPDES data. The Gilberts WWTP, located about 1 mile upstream of Big Timber Road, has a NPDES permit (IL0068764) to discharge up to treated waste water effluent into Tyler Creek It is reported that this WWTP has an average discharge of 300,000 to 400,000 gallons per day. Plant discharge records can be found on-line at the IEPA's Envirofacts wetbsite at:

http://oaspub.epa.gov/enviro/ef_home2.water (enter “Gilberts, IL” in search box)

These records indicate that the plant is discharging within the restrictions set forth by IEPA and no violations have occurred to date.

The Village of Pingree Grove also maintains a wastewater treatment plant in the watershed, however their plant is a land application system that does not discharge into Tyler Creek or it’s tributaries (hence, no NPDES point source discharge permit is needed). Instead, the treated effluent is spray irrigated in designated areas and infiltrates the ground to recharge the underlying aquifers.

2.4 Watershed Impacts & Impairments

2.4.1 Existing Watershed Impacts & Impairments

The IEPA monitors the water quality of the lakes, streams, and rivers of the state. As part of their analysis, the IEPA identifies those water bodies that are not meeting their designated uses.

2.4.1.1 Watershed Impairment Causes Listed on the IEPA 303(d) List

Fecal Coliform

The year 2006 was the first time that Tyler Creek was listed on the Illinois 303(d) list. The cause of the Tyler Creek impairment was identified as the presence of fecal coliform. Specific sources identified in the 303(d) list included urban runoff from storm sewers, and runoff from forest / grassland / parkland. No consistent water quality samplings are available for Tyler Creek to verify the fecal coliform impairments. The IEPA standards for fecal coliform impairments are concentrations higher than 200 numbers per 100 milliliter of sample between the months of May and October.

Potential sources of fecal coliform bacteria include all warm blooded animals (humans, pets, domesticated livestock, birds, and wildlife). Due to the presence of municipal wastewater treatment throughout much of the developed portion of the Tyler Creek watershed, it is somewhat unlikely that that human waste is the source of fecal coliform. For instance, the Gilbert waste water treatment plant NPDES records show no fecal coliform violations. More likely sources include pastures where cattle or horses have access to the stream; flocks of Canada Geese congregating at stream-side parks and golf courses; or even domestic pet waste washed into storm sewers.

One of the major difficulties in developing management strategies for waters contaminated by fecal coliform bacteria is that there are numerous potential sources of bacteria, and the degree of contribution from any given source cannot be easily determined, without extensive water quality analysis. Bacterial source tracking (BST) is a recently developed technology for identifying the sources of fecal coliform bacteria and it may be helpful in targeting where water quality Best Management Practices may need to be implemented.

2.4.1.2 Watershed Impairment Causes NOT Listed on the IEPA 303(d) List

Poor Water Quality Upstream of Stream Segments Evaluated by IEPA

Although not specifically identified or listed by IEPA for Tyler Creek, other 303(d) watershed impairment causes often cited in urban / urbanizing watersheds can include:

- Oils and Grease
- Excessive Nutrients
- Chlorides
- Low Dissolved Oxygen
- Sedimentation / Siltation

Generally speaking, Oils and Grease, Excessive Nutrients, and Chlorides can often be associated with urban stormwater runoff, where highly efficient stormwater systems can rapidly deliver materials deposited on streets into the stream system. This potential likely exists in the older, urbanized portions of the watershed, such as Lower Tyler or Sandy Creek.

Above: Condominium parking lot runoff routed directly to Tyler Creek (Lower Tyler Creek Subwatershed).

Low Dissolved Oxygen, Sedimentation and Siltation, and Excessive Nutrients can often be found in channelized stream segments, where sufficient stream gradient does not exist to allow natural re-oxygenation of the water column; eroding streambanks are delivering sediment to the channel; or where nutrients bound up in eroding soil are being washed into the stream. This potential certainly exists in the upper reaches of the Tyler Creek Watershed (above the IEPA upper most sampling station at Randall Road). However, the same impairment causes could result from sediment laden storm water discharges from a construction site with poor Soil Erosion and Sediment Control practices.

Hydromodification

Hydromodification is a term used to describe human induced activities that changes the dynamics of surface or subsurface water flow. In the Midwest, the most prevalent hydromodification was the historic channelization of streams to improve agricultural productivity. Early settlers recognized that the soils found in the broad expanses of wetlands and wet prairies were ideal for crop production, provided the excess water could be removed. This resulted in the installation of sub-surface drainage tiles to remove the excess groundwater and route it to a point where it could be discharged. In order to have these tiles drain by gravity flow, a receiving drainageway was needed that was at an elevation lower than the drain tile. To achieve this, the receiving drainageway,

often a natural stream channel, would be excavated to a deeper depth. As part of this channelization effort, natural stream channels were typically straightened as well, to facilitate drainage, and to allow fields to be squared off.

By removing this excess water, the areas could be successfully cropped. This gain in agricultural productivity was unfortunately at the expense of large expanses of wetlands, wet prairie, and riparian habitats. The bright side is that in many of these altered areas, if these drainage improvements are modified or removed, those lost habitats can often be restored to some degree to their former function and quality. In the Tyler Creek watershed, this type of hydromodification occurred primarily in the Upper Tyler and Upper Pingree Creek subwatersheds.

Another form of hydromodification that occurred in the Tyler Creek watershed was the filling of wetland and floodplain areas to facilitate development. The loss of these natural flood storage areas forces the receiving waterway to both store and convey the stormwater runoff, which became increasingly difficult as the magnitude of the flow event increased. The short-term result of this is overbank flooding; the longer-term impact is the expansion of the stream channel to accommodate the increased flow volume. This channel expansion can result in significant sediment delivery to the stream channel as the channel deepens and widens.

The deepening (incision) of the stream channel into the landscape can cause a further disconnect between the stream and its floodplain, forcing more frequent flow events to remain within the channel, increasing the scour potential. The incision of the stream channel can also cause groundwater elevations in the streambanks to drop, further stressing any remaining wetland / wet prairie plant communities.

The loss of the depressional wetland and floodplain areas, and their associated pre-disturbance habitats, also served to adversely impact water quality, as these areas were no longer available to trap streamborne pollutants (suspended sediments, nutrients, etc.) The most prevalent current day hydromodification is the result of land development. As the conversion of undeveloped ground to rooftops, pavement, and highly compacted ground, as well as highly efficient storm sewer systems, greatly reduce the potential for precipitation to infiltrate into the ground. Instead, the runoff is routed to stormwater detention ponds, detained for a period of time (per stormwater ordinances) and is released into the receiving stream. However, the detention times mandated by stormwater ordinances are typically not long enough to allow for any significant water quality benefits to occur within the detention pond.

While the use of stormwater detention certainly helps reduce the risk of downstream flooding, it still results in a greater volume of water being discharged to the stream (as compared to pre-development conditions), in the period shortly after the storm is over. This is in contrast to the pre-development condition, when the vast majority of precipitation would infiltrate into the ground, and slowly move towards the receiving stream, providing a year-round source of groundwater discharge of cool, filtered water into the stream.

Downstream of Randall Road, the stream flows have been altered due to the extensive amount of high and medium density development that occurred through the 1980's without any urban stormwater detention controls. For the upper half of this area between Illinois Route 31 and Randall Road, this was due to a plan in the 1970's to

construct a large on-line reservoir west of Randall Road. This facility was intended to provide stormwater detention for a number of different subdivisions planned northwest Elgin at that time.

The developments were built, but the on-line reservoir not built, as it was rejected by the regulatory agencies who sited substantial negative environmental impacts that outweighed the positive benefits to be realized by the flood control it would have provided. This outcome resulted in a loss of stream corridor habitat in many areas and a tremendous influx of untreated, undetained stormwater from high-density development on Elgin's west side.

Invasive Species

Although not typically classified as an impairment to water quality, a threat to health and diversity of the watershed's natural areas is the rapid spread of invasive species of vegetation into the remaining natural areas, such as wetlands, woodlands, and stream corridors. Nearly every stream corridor, wetland, woodland, prairie, or other natural open space is facing an onslaught of invasive species, including Reed Canary Grass, Phragmites (Common Reed), Garlic Mustard, Honey Suckle, and Buckthorn. These aggressive invaders can out-compete native species, diminisnihing the floristic quality and wildlife habitat quality.

Of particular concern are the woody species, such as Box Elder, Common Buckthorn, and Honeysuckle which can dominate unmanaged stream corridors, and create a dense shady canopy that can prevent soil stabilizing herbaceous (grassy) vegetation from establishing on the streambanks. The lack of groundcover vegetation can make the streambank soil more prone to erosion, and as the streambank erosion progresses, and the trees / brush are undermined, they can slump into the channel, causing debris blockages and flow diversion into other unstabilized streambanks.

It must be noted that stream shading and woody debris are critical components of a healthy stream system. Shade cast over the surface of the stream can keep water temperatures cooler, which allows more dissolved oxygen to remain in the water column, available for use by aquatic organisms. However, in much of the upper Tyler Creek watershed, wildfires in pre-settlement times kept much of the stream system brush- and tree-free. The dominant riparian vegetation was dense stands of prairie grasses and forbs, that overhung the stream channel, providing shade and cover.

The key to proper stream corridor management is to still provide shade for water temperature moderation, but to provide it from a variety of vegetation sources, at different elevations.

Similarly, woody debris in a stream channel is the base of the food chain of a stream system, and needs to be present to allow a diversity of small aquatic organisms to prosper. Again, moderation is the key in balancing between a debris clogged channel, and one stripped of every last stick or branch.

2.4.2 Future Impacts and Impairments

Degraded Waters Quality from Development

While existing stormwater ordinances for Kane County provide for adequate flood control for large events (like the 100 year flood) and construction site runoff (if enforced through inspection) during development construction, the ordinances were not designed specifically to mitigate water pollution from development. The ordinance contains many recommendations encouraging new development to utilize innovative practices, however they are not requirements to which all new development must adhere to. The required stormwater retention component provides some opportunities for pollutants to settle out or be assimilated, but as the intent of stormwater management is to only store the water as long as necessary to meet detention requirements, the resulting retention times are often insufficient to achieve any substantial water quality improvement.

Additional Channel Hydromodification

Current stormwater and subdivision ordinances do an adequate job of preventing an increase in peak stormwater discharges for the larger, infrequent events, such as the 100 year event, but recent studies have shown that the further you go downstream in a watershed, the peak discharges for smaller events that effect stream ecology and stream channel stability increases by as much as 66% (reference: Blackberry Creek Alternative Futures Study, 2003).

Loss of Natural Wetlands & Stream Corridor

Current regulations still allow for remaining farmed or lower quality wetlands to be filled or converted to stormwater basins. Developments are currently allowed to build their stormwater infrastructure right up to the edge of the streambank. This is especially true in upper areas of the watershed where stream corridors have long since been drained and streams ditched and channelized to maximize farmable area. The problem is that when new developments are planned, they are allowed to build up to the edge of the current day stream corridor, which today is reduced to a 30 to 60 foot wide strip. This does not reflect the previous expanse of the historic stream corridor, which was perhaps 3 to 5 times that width, when using hydric soils as an indicator. Development infrastructure this close to the existing channelized stream does not account for the possibility of the stream channel reverting to a more natural, meandering pattern, which can occur (and is desired from an environmental resource point of view) if the stream gradient is sufficient.

Reduced Groundwater Recharge

Another impairment threatening the watershed is a reduction in groundwater recharge to the underlying aquifers. The reduction is a result of poorly planned land development that does not consider how and where precipitation is infiltrated into the soil to maintain the groundwater supply. New developments add impervious surface, which creates more runoff, and the runoff is directed into a stormwater collection system rather than directed to areas where it can be infiltrated into the soil. Low quality wetlands and farmed wetlands (depressions one sees in an agricultural field) are usually excavated and converted into detention basins, which by design are drained via a surface outlet. Another contributing factor is the loss of the pervous stream corridor that once buffered

the stream channels in the watershed. Many streams were channelized to maximize usable area for agriculture. When the agricultural parcel is converted to development, the development rarely restores the once-functional stream corridor and instead replaces it with more impervious surfaces or relatively impermeable stormwater storage basins.

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Chapter 3
Pollutant Loading Analysis

3.1 Pollutants of Concern

As previously discussed in Chapter 2 Tyler Creek is identified as Full Support of its Aquatic Life Designated Use. The only impairment that the IEPA has identified is attributable to fecal coliform bacteria. Even though few impairments are listed in the watershed, the Fox River, which is the receiving waterbody, is listed for nutrients, siltation and a host of other pollutants. The key to addressing the impairments in the Fox River is reducing pollutant loads from the tributary watersheds. This is one of the important considerations for the Best Management Practices (BMPs) recommended in this watershed plan. Compared to other watersheds in Illinois, the Tyler Creek watershed is relatively pristine. The main pollutants of concern are generated from non-point sources and include fecal coliform, nutrients, and sediment The main sources of non-point pollutant loads in the watershed at present are agriculture and urban runoff from the isolated developed areas around Woodstock and Gilberts. Rapid development poses the main threat to future water quality in the watershed.

3.2 Pollutant Loading Analysis

A pollutant loading analysis was performed to identify the sources of pollutants and quantify their potential contributions to any identified impairments. The pollutant load analysis is a useful tool for identifying management strategies for addressing existing impairments and potential impairments that may occur as the result of increased human activities. The results of the analysis can help identify problem areas or 'hot spots' under existing and future conditions.

Because of the limited amount of water quality data available in the watershed and the purposes of the analysis, sophisticated modeling approaches were not used. A GIS-based Generalized Watershed Loading Function (GWLF) model was used to estimate the pollutant loads for the six subwatersheds. The GWLF is a mid-level model based on its ease of use and degree of complexity. The model uses readily available watershed specific characteristics such as land cover, topography, soil types and meteorology to estimate pollutant loads. GWLF output consists of monthly averaged quantities that can indicate seasonal trends.

The Illinois Department of Natural Resources (IDNR) 1999 land cover data was enhanced with 2005 aerial photograph of the Tyler Creek watershed and used for this analysis. The GWLF model uses nine categories of land cover. Since some of the land use data had more categories than those used in the GWLF model, some land use maps were aggregated to produce the required nine categories. Table 1 in the attached appendix presents the assignment of the available land uses into these nine land uses.

The following land use categories were used in the analysis.

- Wetlands
- Forest
- Hay/Pasture
- Row Crops
- Low Density Development (≤ 1unit per 1.2 acres)
- High Density Development (≥ 1unit per 1.2 acres)
- Transitional/Quarries
- Turfgrass/Golf Course
- Water

The USGS and Kane County Department of Environmental Management operate station 05550300 at Elgin, Illinois, with records of precipitation from October 1, 1998 to date. Daily precipitation records from this station were used in the Tyler Creek GWLF model. The records defined a 5-year period that was used to estimate the average monthly precipitation and pollutant loads for each subwatershed.

Maximum and minimum daily temperatures are required for GWLF model. Records from the meteorological site at the Argonne National Laboratory, Illinois (USGS Station 414204087594201) were used for the 5-year period modeled. Although this site is outside the Tyler Creek watershed; the records reflect the temperature pattern over the study area. The topography and soil types of Tyler Creek Watershed were defined by USGS Digital Elevation Model (DEM) and USDA-NRCS soil survey of Kane County respectively.

The model was used to generate two scenarios for each subwatershed; the existing land use conditions in the watershed and future year 2030 developed conditions. Projections of future land use were generated using various sources of maps including the Kane County Comprehensive Plan, municipal comprehensive plans and proposed development plan information.

The pollutants analyzed by the GWLF model are sediment and nutrients (nitrogen and phosphorus). These pollutants are considered surrogates for a variety of pollutants generated in typical rural and urban settings. Typically, urban runoff constituents of interest include oils and grease, bacterial, and heavy metals in addition to nutrients and TSS. Sediment particles are also vehicles for transporting other pollutants such as heavy metals, nutrients, oils and grease.

Fecal coliform bacteria are of concern in the watershed. However, the sources of the bacteria are not well known. The main source of the fecal coliforms is suspected to be urban runoff. Fecal coliform concentrations are very variable and unless the sources of these bacteria are isolated, it is difficult to implement an effective pollutant reduction strategy. Nevertheless, as a starting point to addressing the fecal coliform, a simple export-coefficient procedure was used to determine the relative contribution of the pathogen loadings from each subwatershed. The results enabled the most ‘critical’ subwatershed to be isolated so that appropriate BMPs could be prescribed. The simple procedure is justified by the lack of knowledge of the nature of the source and field data. The results of the fecal coliform bacteria load calculations are tabulated in the Sectopn

3.3. In addition to the BMPs, It is recommended that additional monitoring be conducted to further isolate the sources. Typically such monitoring should include low-flow and wet-season sampling. Once the source of the elevated concentrations is identified, then BMPs appropriate to the nature of the sources may be prescribed. More information on the recommended monitoring can be found in Chapter 13, Section 2.

In interpreting and comparing the model results, it is important to note several issues;

- A given amount of sediment from an urban development may contain a greater number of pollutants than the same amount from an agricultural area. In other words, urban sediment contains more pollutants (such as Oils & Grease, toxic metals) than sediment from agricultural areas.
- Seasonal patterns in pollutant movements are important because water quality violations generally occur seasonally. For this reason, the GWLF model can present a more realistic picture of pollutant movement in the watershed than simple event-based models which give annual loads.
- Although total pollutant loads are a good indicator of the overall cause of water quality impairments, water quality criteria/standards are based on concentrations. This is because the toxicity of a pollutant to the aquatic life is more dependent on concentrations than actual total loads.
- Although point sources can be included in the model, their small discharges appeared to be a small compared to non-point source loads.

In conclusion, annual pollutant loads are a good indicator of the potential for impairments but they should be interpreted with caution as they do not necessarily give a complete picture of the vulnerability of a watershed to impairments caused by a particular pollutant. Pollutant load results need to be supplemented with monitoring, especially biological monitoring to have a better assessment of the ecological health of a watershed.

3.3 Pollutant Loading Results and Pollutant Reduction Strategies

3.3.1 Runoff Volume

Runoff is the most critical component of any watershed process. Changes in a watershed physiographic conditions signal changes in runoff. Likewise, changes in runoff may cause profound changes in the dynamics of pollutant processes. As anticipated, the most noticeable change when a watershed urbanizes is an increased in the volume of runoff. The changes of runoff volumes in the Tyler Creek watershed from existing conditions to future conditions for each watershed are summarized in Table 3.1.

Table 3.1: Impact of Development in Runoff Volume

Subwatershed	Area (acres)	Runoff	Runoff	Percent Increase
		(ac-ft/yr)	(ac-ft/yr)	
Lower Tyler Cr.	5,008	1,469	1,531	4.2%
Central Tyler Cr.	5,194	1,617	1,875	16.0%
Upper Tyler Cr.	6,366	1,571	1,735	10.4%
Sandy Cr.	2,217	631	737	16.8%
Lower Pingree Cr.	1,825	491	587	19.6%
Upper Pingree Cr.	5,361	1,518	1,588	4.6%

The results demonstrate that projected future growth scenario in the watershed may result in runoff volume increases in the range 4% to 20%. If such volume increases are not mitigated, impacts from the increased runoff may include more frequent flooding, changes in stream morphology, higher sediment and pollutant loads, and changes in habitat. It may be noticed that the increase in the Lower Tyler Creek is modest because the watershed is already relatively more developed. However, the impact of the increases will be most severe in this subwatershed because it is the most downstream. As discussed in Section 4.2.2 the risk of increased flooding, especially in the of the lower reaches of Tyler Creek on the Judson University Campus as well as residential structures that are currently in proximity to the 100-year floodplain at Wing Street and North Lyle Avenue will need to be considered as part of the long term watershed management strategy.

Best Management Practices for Runoff Reduction

Because the impacts from increased runoff are caused primarily from runoff from upstream subwatersheds, the runoff reduction strategy must focus more on upstream subwatersheds. Mitigation for the effects of increases within the Lower Tyler Creek watershed can be achieved by preserving and restoring the floodplain, discouraging floodplain encroachment, and channel stabilization. It should be noted that such restoration measures manage the runoff rather than reducing it. Watershed-wide BMPs for reducing runoff volumes are recommended, and include:

- Rain garden / rain barrel programs to promote infiltration & runoff re-use
- Preserving open lands to promote infiltration
- Practicing Low Impact Development (Reduction of imperviousness)
- Wetland conversion/restoration to encourage retention and infiltration
- Removal/abandonment of agricultural tile systems.

More information on the above BMPs are provided in Chapter 4.

3.3.2 Tyler Creek pollutant loading results

The following tables summarize the results for pollutant loading analysis for the existing conditions scenario for the Tyler Creek subwatersheds. Estimates of fecal coliform loads from each of the subwatersheds re presented for rural and urban areas separately. The simple 'export' coefficient method was used in which urban and rural areas were assigned an average annual fecal coliform concentrations of 286 FCU/100mL and 250

FCU/100mL respectively. These values were judged to be representative of similar watersheds in Northern Illinois, such as the Poplar Creek or Sequiot Creek watersheds.. Detailed monthly loads for each subwatershed are included in the Appendix 3. The results show the seasonality of pollutant loads, an important factor in planning a monitoring program.

Table 3.2 Estimated Existing Annual Pollutant Load by Subwatershed

Subwatershed	Area (acres)	Sediment (ton/yr)	Total N (lbs/yr)	Total P (lbs/yr)
Lower Tyler Cr.	5008	782.5	20331.3	1300.5
Central Tyler Cr.	5194	979.3	22863.8	1660.8
Upper Tyler Cr.	6366	1755.5	33669.1	3161.2
Sandy Cr.	2217	515.2	9514.4	848.5
Lower Pingree Cr.	1825	460.0	8240.6	820.6
Upper Pingree Cr.	5361	1983.3	37756.7	3893.2
Total	25971	6475.8	132375.9	11684.8

Table 3.3 Estimated Annual Loads of Fecal Coliform Bacteria

Subwatershed	Area (acres)	Annual FC loads (10^9 FCU)	
		Existing	Future (2030)
Lower Tyler Creek Subwatershed			
Urban	2,642	23,348	25,683
Rural	2,366	12,792	11,363
Subtotal	5,008	36,140	37,046
Central Tyler Creek Subwatershed			
Urban	1,230	10,872	11,959
Rural	3,963	21,432	20,767
Subtotal	5,194	32,304	32,726
Upper Tyler Creek Subwatershed			
Urban	436	3,854	4,239
Rural	5,930	32,068	31,832
Subtotal	6,366	35,922	36,072
Sandy Creek Subwatershed			
Urban	931	8,229	9,052
Rural	1,286	6,955	6,451
Subtotal	2,217	15,184	15,503
Lower Pingree Creek Subwatershed			
Urban	315	2,779	3,057
Rural	1,511	8,170	8,000
Subtotal	1,825	10,949	11,057
Upper Pingree Creek Subwatershed			
Urban	196	1,729	1,902
Rural	5,165	27,932	27,826
Subtotal	5,361	29,661	29,729
Total Watershed	25,971	160,160	162,132

Table 3.4 Pollutant load Contribution Index

Subwatershed	Area (acres)	Sediment	Total N	Total P
Lower Tyler Cr.	5,008	63	80	58
Central Tyler Cr.	5,194	76	86	71
Upper Tyler Cr.	6,366	111	104	110
Sandy Cr.	2,217	93	84	85
Lower Pingree Cr.	1,825	101	89	100
Upper Pingree Cr.	5,361	148	138	161

Contribution index = (Percent of total watershed load coming from subwatershed ÷ Percent of watershed area that subwatershed comprises) × 100. Index above 100 indicates subwatershed produces disproportionately large pollutant load. (Adopted from Poplar creek watershed plan)

Table 3.5 Load Contribution Index for Sediment, Total N, and Total P

Subwatershed ID	Area (acres)	Contribution Index		
		Sediment	Total N	Total P
Lower Tyler Creek	5;008	63	80	58
Central Tyler Creek	5;194	76	86	71
Upper Tyler Creek	6;366	111	104	110
Sandy Creek	2;217	93	84	85
Lower Pingree Creek	1;825	101	89	100
Upper Pingree Creek	5;361	148	138	**161**

Contribution index = (Percent of total watershed load coming from subwatershed ÷ Percent of watershed area that subwatershed comprises) × 100. Index above 100 indicates subwatershed produces disproportionately large pollutant load. (Adopted from Poplar creek watershed plan)

Table 3.6 Load Contribution Index for Fecal Coliform

Subwatershed		Contribution as a proportion of watershed		Contribution Index*
ID	Name	Area	Load	
1	Upper Tyler Creek	25%	22%	91
2	Upper Pingree Creek	21%	19%	90
3	Lower Pingree Creek	7%	7%	97
4	Central Tyler Creek	20%	20%	101
5	Sandy Creek	9%	9%	111
6	Lower Tyler Creek	19%	23%	**117**
Total		100%	100%	

In the GWLF output, the annual pollutant loads are broken down by monthly and land cover contribution. The load calculations suggest that:

- The Lower Tyler Creek and Central Tyler Creek subwatersheds contribute more runoff per acre than the other subwatersheds and less sediment and nutrients. This is due to their predominantly urban land cover.
- The Lower Tyler Creek appears to be a 'hot-spot' for fecal coliform loads-as expected because of the higher degree of urbanization.
- The Upper Tyler Creek and Upper Pingree Creek subwatersheds contribute more sediment and nutrients per acre than the subwatersheds. This is due to their predominantly agricultural land cover.

A future conditions land cover scenario was analyzed using the GWLF model. This future land cover scenario combines the proposed comprehensive land use and development data from both Kane County and the municipalities within and adjacent to the watershed. The following assumptions were made to create this scenario:

- Assume that existing wetlands will be preserved.
- Areas defined as open area (forest preserves, etc.) in the Kane County data will retain their existing land cover,
- Area defined as resource management area in the Kane County 2030 Plan data will become low density development (< 1 unit/acre) in the future.

For the existing conditions land use scenario, the primary source of nutrients and sediments are from the agricultural area. As these areas become developed, the total annual nutrient loads decrease. The model predicts decreases in nutrient loads of about 30 percent for TSS, 22 percent for Nitrogen and 38 percent for phosphorus. The reduction in nutrient loads does not necessarily mean improved water quality because as previously discussed, urban runoff contains a greater the range of pollutants, and more toxic pollutants than agricultural runoff (heavy metals, hydrocarbons, etc.).

3.3.3 Pollutant Load Reduction BMP Summary

There is very little data available that would enable subwatershed specific estimates of the pollutant reductions. As was described in Section 2.2.3 Tyler Creek is listed for only fecal coliform impairments. The limited water quality data that has been collected (See Section 2.2.3) though elevated, does not indicate actual impairments according to the IEPA. The management objectives therefore of the watershed plan remain primarily to preserve existing natural resources and to mitigate for future impacts which may result in impairments. Pollutant load reduction targets are normally based on the water quality standards (WQS). For the case of Tyler Creek, there are apparently no violations of WQS. Furthermore, there are no Illinois standards for nutrients in streams. Since the management objectives for the watershed are to preserve the existing natural resources, and to address impairments in the Fox River, a practical, simple approach for assigning pollutant load reduction targets could be assigning average values typical of pristine or high quality streams. Based on the average values for the watershed presented in Section 2.2.3, the proposed target reductions by constituent are listed in Table 3.7 below.

Table 3.7 Pollutant Load Reduction Targets

Constituent	Target Value for Pristine Streams	Average Value adopted for Tyler Creek	Target Load Reduction
	mg/L	mg/L	
Phosphorus	0.08	0.31	74%
Nitrate	2.18	2.61	16.4%
Sediment (TSS)	<113	113	5 to 40%
Fecal Coliform (FC)	<200	200	20 to 30%

The fact that phosphorus loads would require much higher reductions than nitrates is consistent with the fact that phosphorus is usually the limiting nutrient for lakes and streams. The goal of achieving 74% nutrient reduction is therefore conservative, being based on the limiting constituent. Additionally, in the long-term the nutrient loads from the watershed will be reduced as the land use changes from agriculture to urban land use. Since the main source of nutrients in the watershed are fertilizer, the best strategies for reducing pollutant loads would be agricultural BMPs which focus on agricultural activities. In addition, the greatest opportunities for load reductions would be from the undeveloped predominantly agricultural subwatersheds such as Upper Pingree. Opportunities for reducing of pollutant load in urbanized areas of the watershed are limited by cost and land. Urban BMPs can reduce predominantly urban pollutants such as oils & grease, toxic metals, and temperature. They are therefore recommended to supplement the rural BMPs. The effectiveness of BMPs varies depending on the watershed characteristics. The GWLF model was also used to predict the effectiveness of several BMPs in agricultural subwatersheds such as the Upper Pingree Creek Subwatershed.

3.3.3.1 Agricultural Best Management Practices for Reducing Pollutant Loads

Agricultural BMPs are necessary because the watershed is still predominantly agricultural and may remain so for a long period. Typical agricultural BMPs include:

- **Preserving open lands to promote infiltration**
- **Wetland conversion/restoration to encourage retention and infiltration**
- **Removal/abandonment of agricultural tile systems**.
- **Nutrient Management**: Nutrient management is an effective measure for reducing nutrient loads from agriculture. Nutrient management involves managing the amount, source, placement, form and timing of the application of plant nutrients and soil amendment. Nutrient management also applies to farm animal operations. The Kane County NRCS might already be conducting such a program in the watershed and its success might even be the reason why pollutant loads although elevated are not as high as in comparable watersheds in the country. It is recommended that the program be continued or expanded as necessary because of its effectiveness.
- **Riparian Buffers**: A riparian buffer is an area of vegetation (shrubs, grasss or trees) located adjacent to and up-gradient from water bodies and water courses. The location, layout, width, length and plant density are designed to accomplish a specific purpose and function. Riparian

buffers are used to: 1. Create shade to lower water temperatures to improve habitat for fish and other aquatic organisms. 2. Provide a source of detritus and large woody debris for fish and other aquatic organisms.3. Provide wildlife corridors, and 4. Reduce excess amounts of sediment, organic material, nutrients, and pesticides and other pollutants in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow.

3.3.3.1 Best Management Practices for Urban Areas to Reduce Pollutant Loads

Urban BMPs are prescribed for the urbanized sectors of the watershed, particularly the 'hot-spots'. The BMPs are particularly intended to reduce fecal coliform loads because urban runoff has been suspected to be the main contributor. Typical urban BMPs considered include:

- **Regulatory BMP:** Regulatory BMPs include ordinances, regulations, and enforcement procedures that are applicable throughout the watershed and which have a cumulative effect of preventing water quality degradation. Examples include NPDES II pre- and post-construction pollution prevention regulations, zoning codes and regulations countywide stormwater regulations, soil-erosion and sediment control regulations and permitting, and disposal of hazardous wastes. Their effectiveness in reducing pollutant loads vary depending on the degree of enforcement. Regulation-driven pollution prevention controls can reduce pollution significantly (Lori S., Bear, 2007). For purposes of estimating pollutant reduction or removal efficiency of regulatory programs, conservative reduction rates of 2 to 5% have been assumed.

- **Street sweeping:** The effectiveness of street sweeping in removing pollutants varies greatly depending on frequency and the sophistication of the equipment. Modern vacuum dryer sweepers can reduce annual sediment loads by 55 to 88% and nutrients by 0 to 15% (Stormwater Managers Resource Center: http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/ParkingLotandStreetCleaning.htm)

- **Retrofitting existing ponds**

- **Retrofitting outfalls**

- **Practicing Low Impact Development (LID):** LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Instead of conveying and managing / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. This includes not only open space, but also rooftops, streetscapes, parking lots, sidewalks, and medians. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment / revitalization projects

- **Pet waste management:** According to the 'The Practice of Watershed Protection, Art 17', the presence of pet waste in stormwater runoff has a number of implications for urban stream water quality with perhaps the greatest impact from fecal bacteria (for more information see. According to recent research, non-human waste represents a significant source of bacterial contamination in urban watersheds. Genetic studies by Alderiso et al. (1996) and Trial et al. (1993) both concluded that 95 percent of the fecal coliform found in urban stormwater was of non-human origin. Bacterial source tracking studies in a watershed in the Seattle, Washington area also found that nearly 20% of the bacteria isolates that could be matched with host animals were matched with dogs. Pet waste Management is therefore a very important component of reducing fecal coliform bacterial loads in urban runoff.

- **Stormwater Management/Wetland Systems:** Stormwater Management Facilities that utilize a wet pond cell leading to a wetland cell have been reported to be very effective in removing pollutants from urban runoff. The wet pond cell is apparently very effective in pre-treating the incoming runoff; it also reduces its velocity and distributes it more evenly across the marsh.

- **Sand filters** are a relatively new technique for treating storm water, whereby the first flush of runoff is diverted into a self-contained bed of sand. The runoff is then strained through the sand, collected in underground pipes and returned back to the stream or channel.

- **Filter Strips:** These are vegetated sections of land designed to accept runoff as overland sheet flow from upstream development. They may adopt any natural vegetated form, from grassy meadow to small forest. The dense vegetative cover facilitates pollutant removal. Filter strips cannot treat high velocity flows; therefore, they have generally been recommended for use in agriculture and low density development.

- **A Water Quality Inlet** is a three-stage underground retention system designed to remove heavy particulates and small amounts of petroleum products from storm water runoff. Also known as an Oil/grit Separator or an Oil-water Separator. As water flows through the three chambers, oils and grease separate either to the surface or to sediments and are skimmed off and held in the catch basin or storage tank. The storm water then passes on to the sanitary sewer, storm sewer**.**

- **Streambank Stabilization** controls erosion through management of water velocity and/or stream bank stability by natural and manmade controls to decrease bank erosion and sediment loading in waterways. Structural or vegetative means may be used separately or together**.**

Each of the BMPs listed above may be applied individually or in combination to meet desired pollutant load reduction targets as presented in the subsequent chapters for each subwatershed. Further descriptions of the recommended BMPs for Tyler Creek are presented in Chapter 4. Specific BMPs, their locations in the watershed and their expected pollutant load reduction are presented in Chapters 5,6,7,8,9, and 10 corresponding to the six subwatersheds that make up the Tyler Creek Watershed.

Chapter 4
Watershed Plan Recommendations

The recommendations presented in the Tyler Creek Watershed Plan are divided into two basic categories:

- Recommendations that are applicable to the entire Tyler Creek watershed or large regions of the watershed and,
- Recommendations that are site-specific to individual sub-watersheds.

At the end of this chapter (Section 3.3), there is a summary and explanation of the basic types of site-specific recommendations identified in the subwatershed chapters. The actual site-specific recommendations for each subwatershed are contained in Chapters:

5. Lower Tyler Creek
6. Central Tyler Creek
7. Upper Tyler Creek
8. Sandy Creek
9. Lower Pingree Creek
10. Upper Pingree Creek

For example, recommendations related to the retrofitting of existing dry bottom detention ponds in the industrial area northwest of McLean Boulevard and Big Timber Road are found in Chapter 5, the Lower Tyler Creek Subwatershed.

What follows here in Section 4.1 is a summary of the strategies that are essential to achieve the goals and objectives of the Watershed Plain. Overall recommendations for the watershed are listed in Section 4.2.

4.1 Key Watershed Protection Strategies:

1. Organize a Tyler Creek Watershed Coalition

Establish an organization that brings together stakeholders and takes responsibility for encouraging responsible parties to implement the recommendations contained in the Watershed Plan. The Tyler Creek Watershed Coalition should be comprised of watershed stakeholders who are committed to work together to preserve and protect the water quality and natural resources of Tyler Creek. The mission of the organization will be to bring together a diverse coalition of stakeholders to protect the unique and irreplaceable natural resources of the Tyler Creek Watershed through cooperative partnerships, smart land use decisions, and sensible growth. Stakeholders must include private landowners, homeowner associations, municipal staff & officials, and developers.

The Coalition would also benefit from the participation of county, state, and federal agency staff who are charged with natural resource / water resource protection in the watershed, the Fox River Study Group (FRSG), and representatives from umbrella conservation organizations such as the Fox River Ecosystem Partnership (FREP), the Fox Valley Land Foundation, as well as The Conservation Foundation.

The mission of the Coalition will be achieved by working to have the TCWP recommendations implemented by the responsible parties, and by communicating and coordinating with municipalities, developers, and private landowners to ensure that the natural resources of the watershed are not compromised by rapid, hastily planned development.

Table 4.1 Potential Tyler Creek Coalition Participants

Watershed Stakeholders	Advisory Agencies & Groups

• City of Elgin
  ○ Staff
  ○ Elected Officials
• Village of Gilberts
  ○ Staff
  ○ Elected Officials
• Village of Pingree Grove
  ○ Staff
  ○ Elected Officials
• Private Landowners
• Illinois Toll Authority
• Corporate Landowners
• Homeowner / Condo Associations
• Developers (names & contact info available from municipal development / planning departments)
• Kane County F.P. District
• Fox Valley Land Foundation
• Teachers, School Boards
• Interested citizens who live, work or recreate in the watershed.
• Active drainage districts
	• U.S. Fish & Wildlife
	• Illinois Department of Natural Resources
	• Chicago Metropolitan Agency for Planning (CMAP)
	• Kane County Department of Environmental Management
	• The Conservation Foundation
	• Friends of the Fox River
	• Fox River Ecosystem Partnership
	• Kane-DuPage Soil &Water Conservation District
	• USDA – Natural Resource Conservation Service
	• Kane County Farm Bureau

2. Protect the High Quality Section of Tyler Creek from the Gilberts Wastewater Treatment Plant (WWTP) to Randall Road

This three mile long reach of Tyler Creek is the highest quality stream segment in the entire watershed. It contains all of the physical and biological features of a stream in nearly pristine condition. This high quality reach faces two issues that will determine the future sustainability of this unique resource.

The first issue is protection of the remaining parcels along the reach that are not currently protected. Much of the stream corridor in this reach is already protected through public ownership by the Village of Gilberts, Kane County Forest Preserve, and the City of Elgin. There are two sections that are not protected from the impacts of future development. Section One is a ½ mile length of the stream corridor that extends along the west end of the Camp Big Timber Boy Scout property and across the southwest corner of the Randall Point Business Center. The Boy Scout property is privately owned and does not contain any type of legal conservation easements to prohibit development from encroaching into the high quality natural areas along the west and south sides of the camp property (should the property be sold). Enacting permanent protection of the sensitive areas of the property should be a high priority. This could be

accomplished through either a conservation easement or acquisition by the Kane County Forest Preserve District.

The Randall Point Business Center (RPBC) also owns property that contains part of the Tyler stream corridor. The RPBC parcel that contains the stream corridor should be developed in a manner that maximizes the stream corridor buffer to protect the stream and high quality wetland that lies within the stream corridor. Within this same reach, there is also a concern regarding the use of herbicides to control weeds along the Union Pacific Railroad right-of-way where Tyler Creek flows along the lower edge of the railroad embankment.

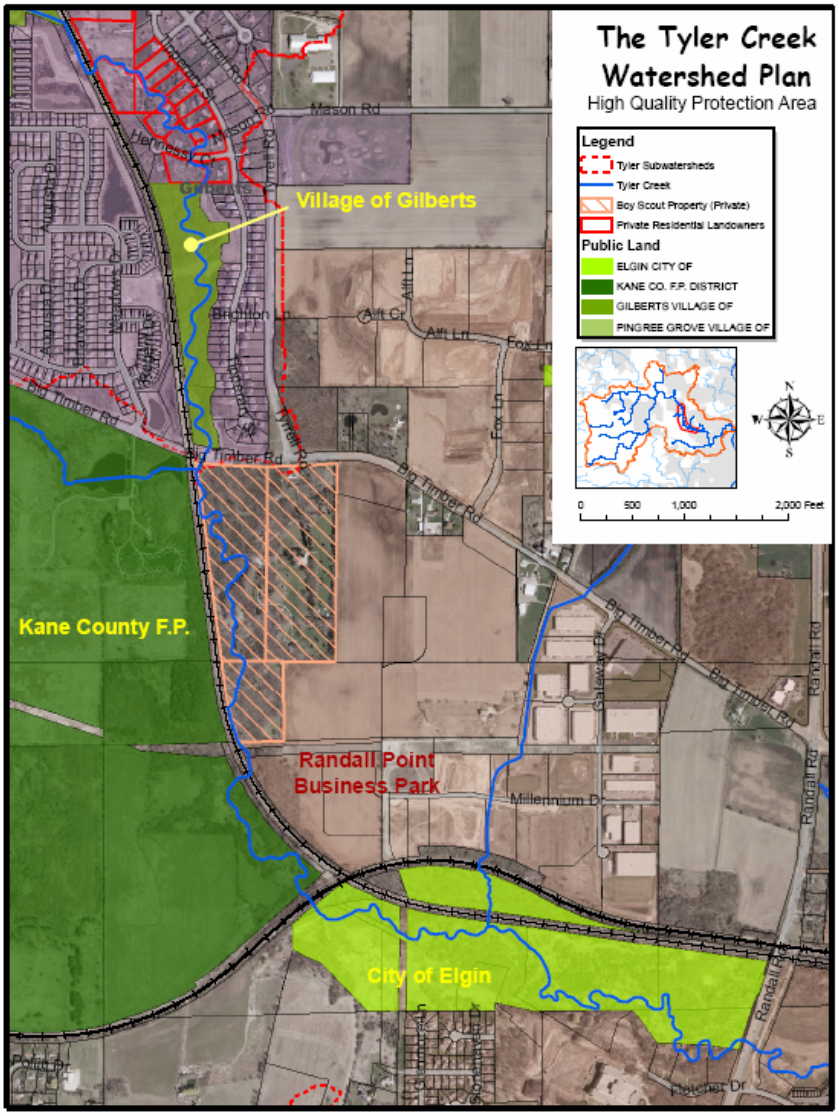

Figure 4.1 Map of high quality reach of Tyler Creek between Randall Road and Gilberts WWTP.

Section Two is a ½ mile long section of the stream corridor north of Big Timber Road that is under private ownership. This section, while containing high-quality in-stream features such as coarse substrate and pool and riffle structures, could benefit significantly by the establishment of a stream buffer and and promoting ?on-going management of a stream buffer of native vegetation between the stream channel and their landscaped lawn areas. This would require educating the landowners on the benefits and necessity of a stream buffer, as well as helping with local technical / funding assistance.

In addition to the permanent protection of the stream corridor along this portion of the Tyler Creek, another issue, no less critical, will be to preserve the quality and quantity of the water flowing in the stream. To accomplish this, a fundamental change must occur

in the way stormwater management is designed and constructed for developments in the Tyler Creek Watershed.

In short, the current Kane County Stormwater Ordinance and municipal & county subdivision ordinances are intended to simplify the design, construction and maintenance of stormwater facilities and control peak flows for only the large storm events, such as the 100-year storm. A study completed by Kane County in 2003 concluded that at the watershed scale, the 0.15 cubic feet per second (cfs) per acre release rate required by the Kane County Stormwater Ordinance does an adequate job of protecting downstream properties from floods with a 5- through 100-year frequency.

However, a watershed developing using conventional stormwater management design in its developments would generate significantly higher peak flows than if conservation development design was employed; up to 66% higher peak flows for the more frequent floods (1- to 2-year events). The science of fluvial geomorphology has demonstrated that it is these flood events, which occur on average every 1 to 2 years, that effectively control the stability of a stream channel (physical characteristics). Thus, a 60+% increase in these channel forming peak flows, as will occur under the current regulatory environment has the potential to do considerable harm to the channel stability of this high-quality reach.

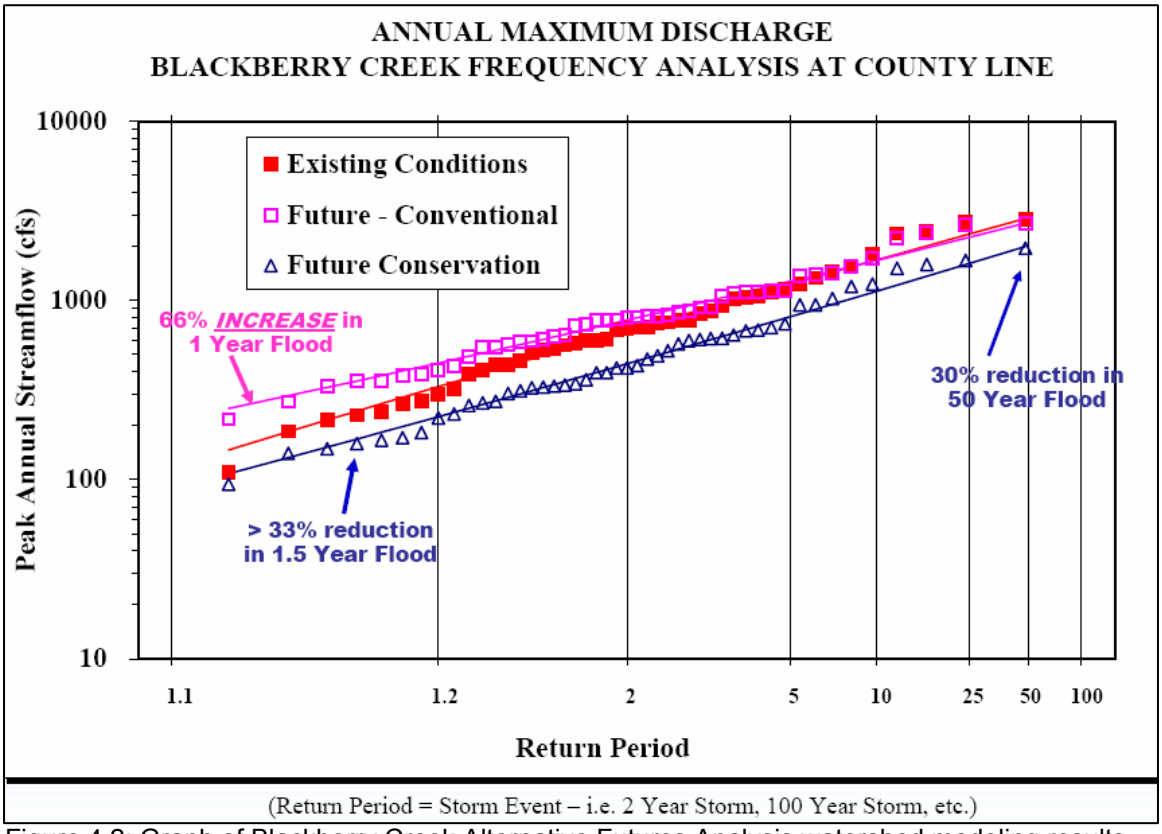

Figure 4.2: Graph of Blackberry Creek Alternative Futures Analysis watershed modeling results.

To mitigate the effects of increases in stormwater discharges resulting from land development, it is recommended that new developments implement stormwater

conservation techniques into their design. Conservation design, a major component of Low Impact Development (LID), includes a wide range of stormwater design elements, but can be summarized according to the following two principles::

- collect stormwater runoff as close to its point of origin as possible (lot scale versus subdivision scale), and
- retain it for infiltration into the soil or evapo-transpiration by the site's vegetation (i.e. – minimize total runoff volume leaving the development).

Examples include: green roofs, rain gardens, rain barrels or cisterns, bio-swales, infiltration trenches, and native vegetative buffers on undisturbed soil. A secondary benefit to this type of approach is that water quality of the remaining runoff that is discharged is usually improved without the need for structural BMP devices at development stormwater outlets. This is because the distributed stormwater system approach can be designed to treat the "first flush" of runoff, which is the first 0.5 – 0.75 inch of stormwater runoff that usually contains the highest concentration of pollutants. The result is that developments utilizing this type of stormwater management usually discharge little, if any, runoff to the receiving stream for the most frequent storm events (1 inch or less).

3. Implement habitat restoration projects and install water quality BMPs in the lower region of watershed east of Randall Road.

The reach of Tyler Creek east of Randall Road has the potential to be restored to a moderately high quality stream. The stream corridor has been preserved in most areas, albeit in a degraded condition due to lack of management, and resultant invasion by noxious plant species. Most reaches between Randall Road and Illinois Route 31 have sufficient stream slope (> 10 feet / mile) and existing in-stream habitat, such as pool and riffle structures, to support a diverse array of aquatic species. The limiting factors in this lower reach are likely poor water quality created by untreated urban stormwater runoff and densely shaded stream corridors choked with invasive plant species. Implementing an aggressive habitat restoration / management program, and pursuing a program to install structural BMPs in the storm sewer network would each have a significant positive impact on the quality and character of Tyler Creek in this lower reach.

4. Revise the existing Tyler Creek Watershed Model

The FRSG is a local watershed stakeholder group that organized in 2001. The group formed in response to concerns about declines in the water quality of the Fox River and its being listed as an Impaired Waterway by the IEPA. The FRSG is comprised of a diverse group of stakeholders representing municipalities, county government, water reclamation districts, environmental and watershed groups from throughout the Fox River watershed. The goal of the FRSG is to address water quality issues in the Fox River watershed and to assist with implementing activities to improve and maintain water quality. Identifying the sources of pollution and mechanisms of transport through the watershed are fundamental to determining which actions are needed to reduce impairment of the river water quality. The FRSG has initiated activities to more accurately characterize the water quality of the Fox River, including data collection and preparation of comprehensive water quality models.

The Illinois State Water Survey (ISWS) assisted the FRSG with the preparation of the computer models, which included preparation of a Tyler Creek watershed loading model

that accurately simulates the hydrology and pollutant loading occurring at the downstream end of Tyler Creek, where it discharges into the Fox River. These efforts and the resulting model represent a major achievement in terms of water quality modeling of Tyler Creek as a whole. However, in order to be used as a management tool within the Tyler Creek Watershed, additional stream monitoring is needed to generate data in the six subwatersheds. This stream monitoring and data acquisition will provide increased resolution and sensitivity so that the model can be updated to evaluate future pollutant loads and BMP effectiveness in specific jurisdictions within the Tyler Creek watershed.

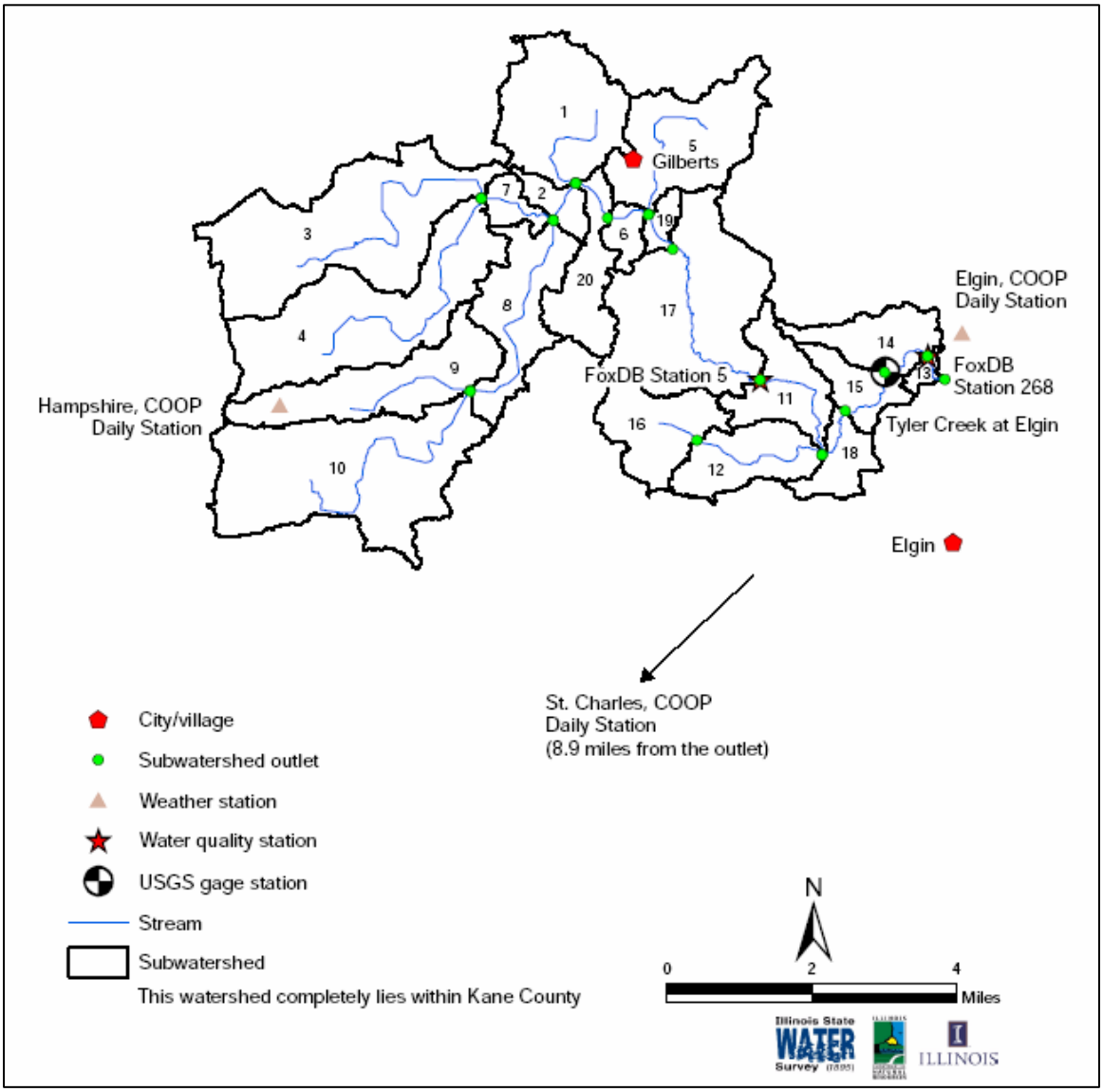

Figure 4.3 Map of Tyler Creek watershed loading model prepared by ISWS for Fox River Study Group, Inc. watershed analysis. More information on monitoring for Tyler Creek can be found in Chapter 13.

4.2 General Watershed Plan Recommendations

The following is a summary of recommendations developed as part of the TCWP. Recommendations in Section 4.2 pertain to programmatic actions-that is, those actions that should be undertaken or pursued in all areas of the Tyler Creek Watershed. Section 4.3 provides an overview and discussion of the types of site-specific recommendations presented at the end of each subwatershed chapter (chapters 5, 6, 7, 8, 9 and 10).

Each recommendation is accompanied with information on the following topics:

- **Type:** Education/Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
- **Target Goals:** Which watershed plan goals the recommendation is intended to address.
- **Initial Cost:** the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
- **Annual Cost:** the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
- **Responsible Party:** Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
- **Priority:** A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 TCWP

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

Recommendation G-1

Establish a Tyler Creek Watershed Coalition.

Type: Education / Outreach
Target Goals: Goal 4, Objectives 1 & 2
Initial Cost: 8 hours per participant for two 4 hour "kickoff" meetings to organize and review watershed plan data.
Annual Cost: 8 hours per participant for 4 quarterly meetings and 16 hours per Responsible Party participants to prepare for meetings.
Responsible Party: The Conservation Foundation with support from municipal staff and officials, and interested watershed stakeholders
Priority: High

Recommendation G-2:

Draft and adopt revised Zoning and Subdivision Ordinances which implement the TCWP's Green Infrastructure Plan.

Type: Regulatory
Target Goals: Goal 2
Initial Cost: unknown (municipal staff / elected official time)
Annual Cost: unknown (municipal staff / elected official time)
Responsible Party: City of Elgin, Village of Pingree, Village of Gilberts, Kane County Board.
Priority: High

Recommendation G-3:

Coordinate with and City Council of Elgin, and village boards of Gilberts and Pingree Grove to endorse and adopt the Recommendations in the TCWP
Type: Regulatory
Target Goals: Goals 1, 2, 3 and 4
Initial Cost: unknown (municipal staff / elected official time)
Annual Cost: unknown (municipal staff / elected official time)
Responsible Party: City of Elgin, Village of Gilberts, Village of Pingree Grove
Priority: High

Recommendation G-4:

Coordinate with all municipal governments to mandate conservation design practices (LID concepts) for land planning and stormwater management design to be used in all new developments to minimize stormwater discharge, maximize groundwater recharge, and maintain / enhance water quality in the watershed's streams. Example ordinance/zoning language can be obtained from the Kane County Department of Building and Environmental Management at:

http://www.co.kane.il.us/kcstorm/blackberry/index.htm .

Note: While this document was written for municipalities in the Blackberry Creek Watershed, it is nonetheless an excellent source for staff & elected officials in other municipalities seeking to build environmentally sustainable communities.

Type: Regulatory
Target Goals: Goal 2, Objectives 1, 2, and 3
Initial Cost: none
Annual Cost: none
Responsible Party: City of Elgin, Village of Gilberts, Village of Pingree Grove
Priority: High

Recommendation G-5:

Work with the FRSGF to update and revise the FRSG's Tyler Creek Watershed model and use the model to provide an accurate assessment of water quality in the watershed for predicted land development scenarios.

This model, when complete, could also be used to update the existing effective regulatory floodplain maps

Type: Education & Outreach
Target Goals: Goals 1 & 2
Initial Cost: $150,000 over 2 year project period.
Annual Cost: about $20,000 per "scenario" if new scenarios need to be assessed after the initial study is complete.
Responsible Party: Tyler Creek Watershed Coalition, with financial support from the City of Elgin, Village of Pingree Grove, and the Village of Gilberts.
Priority High

Recommendation G-6:

Create a locally managed stream monitoring program to collect and evaluate basic water quality data (example: MBI, DO, Temp, TSS, N, P) to supplement the limited data currently collected to date by the IEPA and environmental advocacy groups. Coordinate with FRSG and their monitoring program.

This monitoring effort could also support or supplement the monitoring requirements needed to complete Recommendation G-5, but is really needed over the long term to provide baseline, as well as future, data on the conditions in the watershed's streams at many more locations than the two sections monitored by the IEPA at Randall Road and Illinois Route 31. Six stations should be included in the monitoring program – at the outlet point of each of the six subwatersheds. A three year, intensive monitoring program for low flows and storm flows, similar to those implemented by the FRSG, should be conducted, along with annual sampling by volunteers working with the Fox River Watershed Monitoring Network (FRWMN)

Type: Monitoring
Target Goals: Goals 1 & 2
Initial Cost: $180,000 ($30,000 per station)
Annual Cost: $3000 ($500 per site X 6 sites)
Responsible Party: Tyler Creek Watershed Coalition, with financial support from the City of Elgin, Village of Pingree Grove, the Village of Gilberts and Kane County. Organizations offering support could include: Kane County Forest Preserve District, Friends of the Fox River, Sierra Club, and Fox River Study Group, Inc.
Priority: Medium

Recommendation G-7:

Create and coordinate a watershed education program into the curriculum of schools in the Tyler Watershed. This is occurring to a limited extent at the elementary school level with schools already participating in the FRWMN. The education programs could also be offered to middle school students attending those schools in the watershed. A good local example of one such initiative is the program at Elgin High School centering on the Poplar Creek Watershed (led by educator Deb Perryman)

Type: Education
Target Goals: Goal 4
Initial Cost: unknown (Curriculum materials)
Annual Cost: unknown (Teacher training)
Responsible Party: School Districts U-46 & 301 initially; District 300 as soon as possible before significant development occurs in Upper Pingree Subwatershed; Kane – DuPage Soil & Water Conservation District; Friends of the Fox River
Priority: Medium

Recommendation G-8:

Develop an outreach and incentive program to encourage landowners to de-channelize select stream reaches (tributaries & main stem Tyler) on a voluntary basis. Encourage this practice to be incorporated into the design and planning of all remaining developments proposed on land where Tyler Creek or its tributaries have been channelized.

Type: Regulatory
Target Goals: Goal 1, Objective 3
Initial Cost: staff manhours; varies
Annual Cost: staff manhours; varies
Responsible Party: City of Elgin, Village of Pingree Grove, Village of Gilberts, Kane County Development Department
Priority: Medium

Recommendation G-9:

Complete detailed floodplain mapping for all streams / drainage ways currently mapped as FEMA Flood Zone A or unmapped, with a drainage area equal to or greater than one square mile. This project could be completed on a reach by reach basis and funded by developers as a condition of land development approval. There are an estimated 19.5 miles of stream channel that drain more than 1 square mile and have unmapped floodplains.

Type: Regulatory
Target Goals: Goal 2, Objective 3
Initial Cost: $196,000 ($10,000 / mile)
Annual Cost: none
Responsible Party: Kane County coordinating with City of Elgin, Village of Pingree Grove, and Village of Gilberts.
Priority: High

Recommendation G-10:

Create a Natural Area Inventory database of natural areas in the watershed and the biological flora and fauna that are occur in the individual habitat communities. This database should inventory state and locally recognized natural areas and public forest preserve properties and document the plant and animal species present (all species, including the presence and distribution of state or federally listed threatened or endangered species). The field data collected should also include a description of the habitat types present, their condition at the time of survey, and an assessment as to the issues threatening to degrade these areas and the management strategies that should be implemented to preserve their natural integrity.

This inventory should be maintained by the Kane County Forest Preserve and updated continuously as new data becomes available from state/federal surveys and private entities working on new development. The format should be in an electronic database (such as Microsoft Access) and be made available to the public in a user-friendly format. A good example of such a database is the McHenry County Natural Areas Inventory database created by the McHenry County Conservation District.

Type: Monitoring
Target Goals: Goal 1, Objectives 1 & 3
Initial Cost: $155,000 (1 KCFPD staff @ $55,000 + consult to create database @ $100,000)
Annual Cost: $10,000 (for annual updates to database)
Responsible Party: Kane County Forest Preserve District / Kane County GIS Technologies
Priority: High

4.3 Overview of Subwatershed-specific Recommendations

The following is a discussion of the general types of recommendations which are presented for specific sites within the subwatershed chapters of this report (Chap. 5, 6, 7, 8, 9 and 10).

4.3.1 Site Restoration

Nearly all of the remaining natural areas along Tyler Creek are suffering from some degree of degradation due to invasive and noxious vegetation threatening to overwhelm and out-compete any remaining native vegetation. Eradication and removal of such invaders as Reed Canary Grass, Common Reed, Garlic Mustard, Purple Loosestrife, Common Buckthorn and Honeysuckle from the stream corridor and wetlands in the Tyler Watershed should be a priority action item for property managers and landowners. Stakeholders that could have the largest impact implementing this action item include the Kane County Forest Preserve District, City of Elgin Parks Department, the Village of Gilberts, homeowners association's involved in the management of existing developments, and real estate developers engaged in construction of new developments. Private landowners should also be contacted and educated on how to properly manage wetlands and stream corridors which lie on their property.

4.3.2 Water Quality

Detention basin retrofits

A majority of the detention facilities in the Tyler Creek watershed were constructed as either dry bottom detention basins or traditional wet "ponds". Both are typically characterized by mowed turf grass on steep side slopes. Dry bottom ponds frequently feature a concrete low-flow channel to carry so called "nuisance" flow from the storm outfall directly to the detention basin outlet structure. Dry-bottom basins that do not have this concrete low flow structure are typically landscaped with turf grass in the bottom. Mowed turf grass does not usually hold up to frequent wetting and drying caused by runoff from upstream impervious areas and the result is that the bottom of the turf grass detention basin becomes an unsightly and "mud hole". Neither of the concrete low flow design nor the "mud hole" design provide any significant water quality benefits and are generally unappealing in terms of aesthetics. These dry bottom basins are good candidates for retrofitting with native vegetation and micro-topography, which will improve water quality, increase stormwater residence times, provide wetland / riparian habitat functions, and improve the economic and aesthetic value of land designated for stormwater management.

These dry bottom detention basins should be reconstructed to include wetland micro-pools and native wet prairie and/or wetland vegetation in the bottom to increase pollutant removal efficiency through increase settling and pollutant uptake by the vegetation.

Traditional stormwater "wet ponds" can also be modified to provide wetland / riparian habitat and improve aesthetic value through the installation of native vegetation along the side slopes and shoreline edge. One common problem with traditional wet ponds is that over time the shoreline edge become eroded due to wave action against unnaturally

steep slopes with turf grass ground cover. Even ponds with shoreline rip-rap usually experience shoreline erosion over time, as the ponds are almost always constructed on structurally weak hydric soils that cause rip-rap shore protection to slide or settle into the basin, leaving the pond edge exposed to erosion. A solution to fix these problems in existing ponds is to install and propagate native emergent wetland vegetation along the pond shoreline to dissipate the energy of wave action. A secondary benefit to this type of retrofit is that it increases aquatic habitat, which can increase fishing opportunities in ponds located in residential developments.

Installation of structural BMP devices in the existing storm sewer network

Urban impervious surfaces, such as parking lots and streets, contribute the most concentrated pollutant loads in the watershed. This is especially true in urban areas that were developed without stormwater detention or water quality facilities to temporarily detain runoff or treat it prior to discharge into the stream. Such is the case in the City of Elgin within the Lower Tyler Creek Subwatershed. The City of Elgin has recognized this problem and has taken the initiative to reduce pollutant loadings by constructing water quality facilities as specified in the City of Elgin's Lower Tyler Creek Management Plan. These three proposed facilities are included in the recommendations specified in the Lower Tyler Creek Subwatershed.

Figure 4.4 Water quality basin installed at Wing Park Pool as specified in Elgin's Lower Tyler Creek Management Plan (2000)

In addition to the water quality facilities currently planned for construction by the City of Elgin at three existing storm outfalls to Tyler Creek, there are at least 33 more storm sewer outfalls along Lower Tyler Creek ranging in size from 10 inches to 48 inches in diameter, draining highly urbanized areas up to 200 acres in size. These older storm sewer system networks were designed as a series of concrete inlets and catch basins connected together by a system of pipes which increased in size from upstream to downstream to carry additional stormwater runoff as the areas draining into the sewers increased. Historically, these systems offered virtually no water quality benefits except

for a modest amount of small fines removal, if the catch basins were cleaned on a frequent basis. In other parts of the U.S. where urban areas are located directly adjacent to high quality natural resources such as the Great Lakes, tidal bays or estuaries, self-contained, structural water quality devices have been installed to capture pollutants before they are discharged into the receiving water body. The same practice should be implemented in the Tyler Creek Watershed, as it, too, is a significant natural resource and discharges directly into the Fox River, a regionally significant natural resource and already documented to be impaired by pollution from urban runoff.

There are numerous water quality devices developed in recent years that have been specifically designed for installation within an existing storm sewer network. These are typically installed near the downstream end of the sewer network, just above the sewer outfall to the receiving stream. Larger storm sewer networks may require several structures distributed throughout the sewer network.

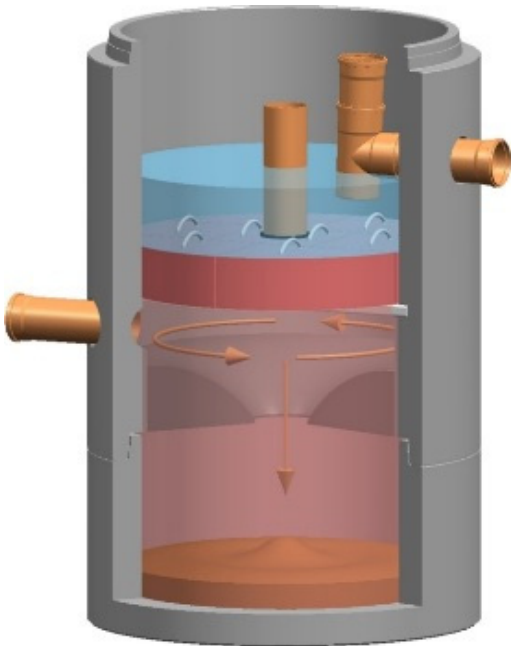

Figure 4.5 Example of a structural water quality device that can be retrofitted into an existing storm sewer network. This system works by providing particulate removal through vortex separation as well as filtration as stormwater flows upward through removable media blocks to the structure outlet.

Source: Ecostorm Plus filtration structure by Royal Environmental Systems, Inc. Minnesota.

Encourage the Installation of rain gardens and rain barrels on existing properties (residential, commercial and office/industrial,)

Rain Gardens are simple, easy to build, landscape features that can be implemented as components of a large scale development, or individually by private landowners. Rain Gardens are created in existing or excavated depressions and planted with deep-rooted, native vegetation. Properly constructed and maintained, these small stormwater features can effectively trap and retain as much as 99% of the common pollutants associated with urban stormwater runoff. There are many resources available both on-line and in the greater Chicagoland area to help homeowners design and install their own rain garden landscapes. Individually, these systems can provide localized pollutant removal, but if installed in large enough numbers, have the potential to reduce peak storm flows and total runoff volumes on a subwatershed scale as well.

Stakeholder municipalities in the Tyler Creek watershed should develop a public outreach plan to encourage private landowners to install rain gardens on their properties and provide technical assistance & information to assist landowners with designing such features or finding a knowledgeable landscape professional who can design & build one for them. These drainage features can be an attractive amenity to any residence while providing incremental benefits in stormwater pollutant and runoff volume reduction.

Another valuable BMP is the use of rain barrels or cisterns to capture rainwater from roof tops and storing it in containers for future uses, such as water for landscaping. While the rain barrel concept can be very effective with residential landowners, it could even be applied to much larger applications such as existing commercial buildings. In these cases, a large tank could be attached to the side of a building and collect all or part of the rain falling on the roof. This tank could then be attached to an underground landscape sprinkler system and used to water the property's landscaping instead of using valuable drinking water. For example, a commercial/office building with a 10,000 square foot roof would generate more than 1,500 gallons of reusable water for only a 1/4" rainfall.

Many cities across the United States have successfully implemented rain garden or rain barrel programs and if implemented aggressively, they can have a measureable positive impact on runoff and pollutant load reduction in existing developed areas.

Figure 4.6
Example of a rain garden using native plant species installed in a roadside swale in a residential development.
(Source: Minnesota DNR)

4.3.3 Permanent Habitat Protection

Acquisition

The Kane County Forest Preserve District has a long history of recognizing the value and importance of preserving stream corridors and their associated wetlands. This approach is the basis of the Green Infrastructure Plan discussed in Chapter 10 of this report. The City of Elgin also has focused on acquiring riparian property, many of which are now public parks. Elgin's plan is to acquire the natural areas retained as part of new developments within its jurisdiction and then turn over ownership and control of these areas to the Kane County Forest Preserve District. The Village of Gilberts and the Village of Pingree Grove have begun to acquire riparian lands as well, largely through developer donations.

All of these agencies should continue to focus on acquiring and maintaining the riparian corridors of the Tyler Creek Watershed. Critical areas include the Camp Big Timber Boy Scout Camp, and the stream corridors in the upper watershed, where development has not yet occurred.

Conservation Easements

It is now recognized that land planning should not result in significant natural resources, such as stream corridors, wetlands, or remnant native plant communities (prairies, savanna's, etc.), being piecemealed onto a number of privately owned lots. It is far better to have these resources be included in a separately platted out-parcel, that can be managed by a homeowners association, using association fees paid by the individual lot owners.

Portions of the Tyler Creek stream corridor were developed decades ago, resulting in numerous small residential lots that each contain a small (50 to 100 feet) length of the stream channel, and little, if any, natural stream buffer. The management of these segmented stream systems can be a challenge, simply because numerous landowners much reach consensus on how to achieve and fund management goals.
For these reasons, encouraging riparian landowners to place a conservation easement on the sensitive portion of their property can be very beneficial. In addition to the real estate tax and income tax benefits that can result from granting the conservation easement to a not-for-profit land trust, such as the Fox Valley Land Foundation, the long-term protection of the area is ensured. If sufficient adjacent conservation easements are acquired (i.e. multiple lots/landowners), the potential for implementing streambank stabilization, vegetation management, and water quality / wildlife habitat benefits greatly increases. It also greatly improves the chances of applying for and receiving funding from environmental grant programs to implement these activities.

4.4 Potential Sources for Funding

By and large, the majority of funding for watershed protection must be a local effort. While the plan acknowledges that municipal and private funding sources in the watershed are limited and already stretched thin to address gray infrastructure costs and other municipal needs (police, fire, etc.), stakeholders must realize that the funding needed to implement the recommendations herein is really an investment in the environmental resources that will be needed to sustain their quality of life for the future. The costs for watershed protection and the small number of remedial activities now will certainly be less than the costs that will be incurred in the future, when delayed actions will create the need for more numerous and expensive remedial measures.

Protection measures in the western 2/3 of the watershed are generally activities that should be implemented when the land use is proposed to change from agricultural to urban development (residential, commercial, etc.). As such, the majority of recommendations for this region are ones that should be mandated by the municipal jurisdiction as green infrastructure requirements to be implemented or carried out as part of each new development in the watershed. These costs, usually viewed by the land development industry as additional costs they must incur, are really the incremental development costs necessary to sustain the community's environmental integrity when the land is converted to an intensive landuse, which includes roads, sewers, buildings, lawns, etc. All of these features of new development contribute excess runoff and pollutant loads that must be actively managed, just as sanitary sewerage is actively managed for each new development.

For watershed recommendations in existing developed areas (such as in Lower Tyler Creek, for example), municipalities should strive to establish a budget for implementing the recommendations, ideally according to their prioritization ranking and the milestones set forth in the watershed plan (see Chapter 12).

There are several state and federal grant programs that could be used to maximize the effectiveness of local funds. For example, the Illinois EPA 319 Grant Program provides up to 52% matching funds for the design and implementation of non-point source pollution control projects, such as the water quality projects identified in this watershed plan. The grant cycle for this program requires project applications be completed and submitted to the IEPA by August 1st of each year, and if the project is selected, funds usually become available the spring of the following year.

Another grant program available is the Illinois Department of Natural Resource's C-2000 Grant Program. This grant program is geared toward the preservation and restoration of the watershed's natural resources, such as streams, wetlands, woodlands and prairies. The C-2000 program (or it's equivalent DNR grant program in the future) provides up to 100% match for projects fitting it's criteria. The ecological restoration projects identified in the watershed plan would be prime candidates for IDNR C-2000 funding. This program requires grant application submittals in February and, if awarded, funding usually becomes available in the following November/December each year.

The Fox River Ecosystem Partnership (FREP) (for more info, see Chapter 12) has an agreement with both granting agencies that encourages potential grant applicants to work with FREP during the preparation of the project applications to insure that the projects support the overall Fox River Watershed protection goals. Projects are more

likely to be funded if they are endorsed by FREP, as it is an indication that collaboration on a watershed scale is occurring between stakeholders and that the best possible watershed improvement/protection projects are being proposed for funding.

Municipal stakeholders in the Tyler Watershed are encouraged to submit at least one grant application for one project each year, as this has the potential to pay for about 50% of the watershed projects in the long term, thus maximizing the effectiveness of local funds.

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Chapter 5
LOWER TYLER CREEK SUBWATERSHED

This section presents a summary of the characteristics of the Lower Tyler Creek Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the TCWP

5.1.1 Subwatershed Location

Lower Tyler Creek is the subwatershed located furthest downstream, in the eastern portion of the Tyler Creek Watershed. This subwatershed has an area of 5,008 acres, or 7.8 square miles. The boundary of the Lower Tyler Creek subwatershed shown in Figure 5.1. The subwatershed is located within parts of Elgin, Dundee and Rutland Townships, and is roughly bordered by Interstate 90 on the north, Highland Avenue to the south, State Route 31 to the east, and both Coombs and Tyrell Road to the west.

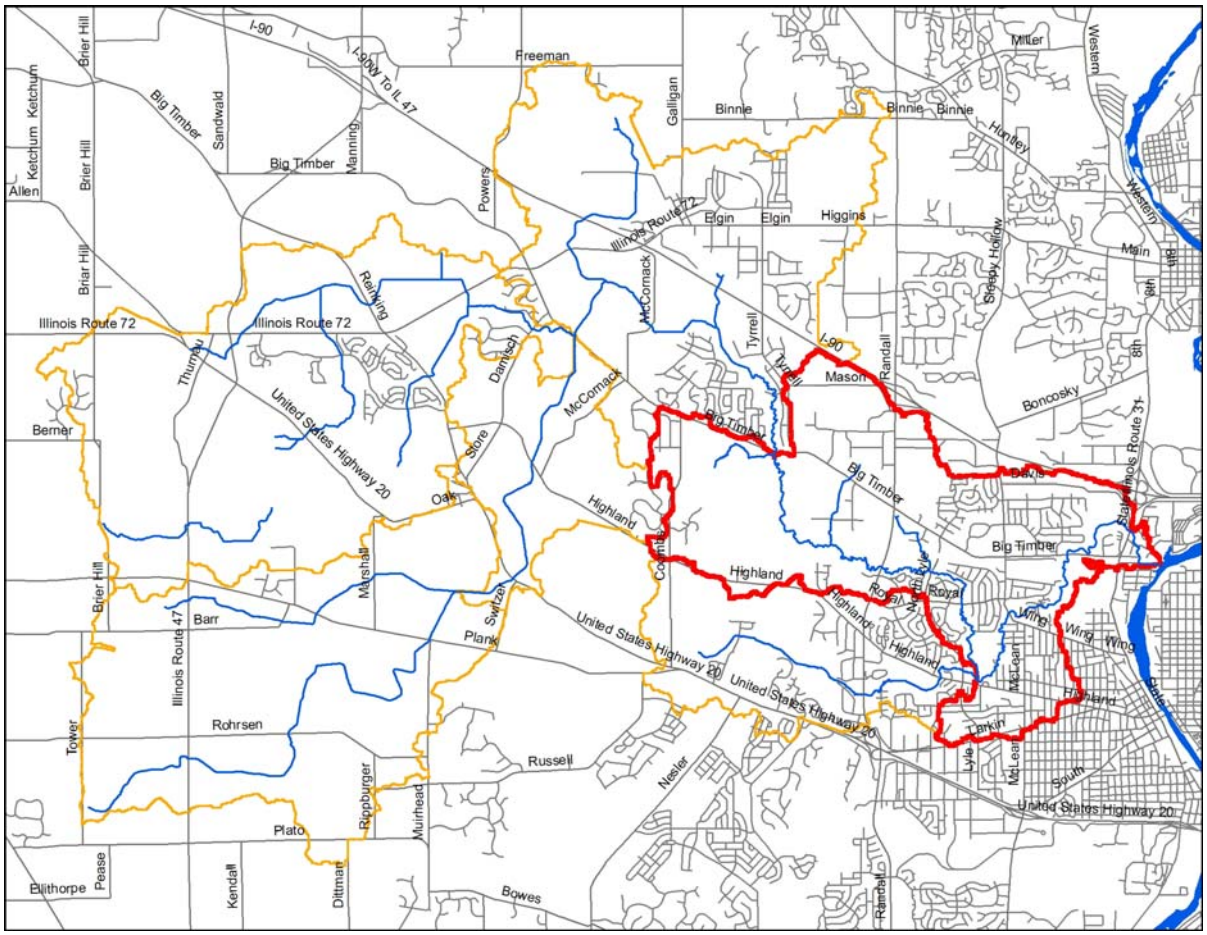

Figure 5.1. Subwatersheds in the Tyler Creek Watershed

5.1.2 Topography & Geology

The topography of the Lower Tyler subwatershed is gently sloping, generally between 0% and 2%, with a maximum elevation of 950 feet and a minimum elevation of 710 feet where Tyler Creek joins the Fox River.

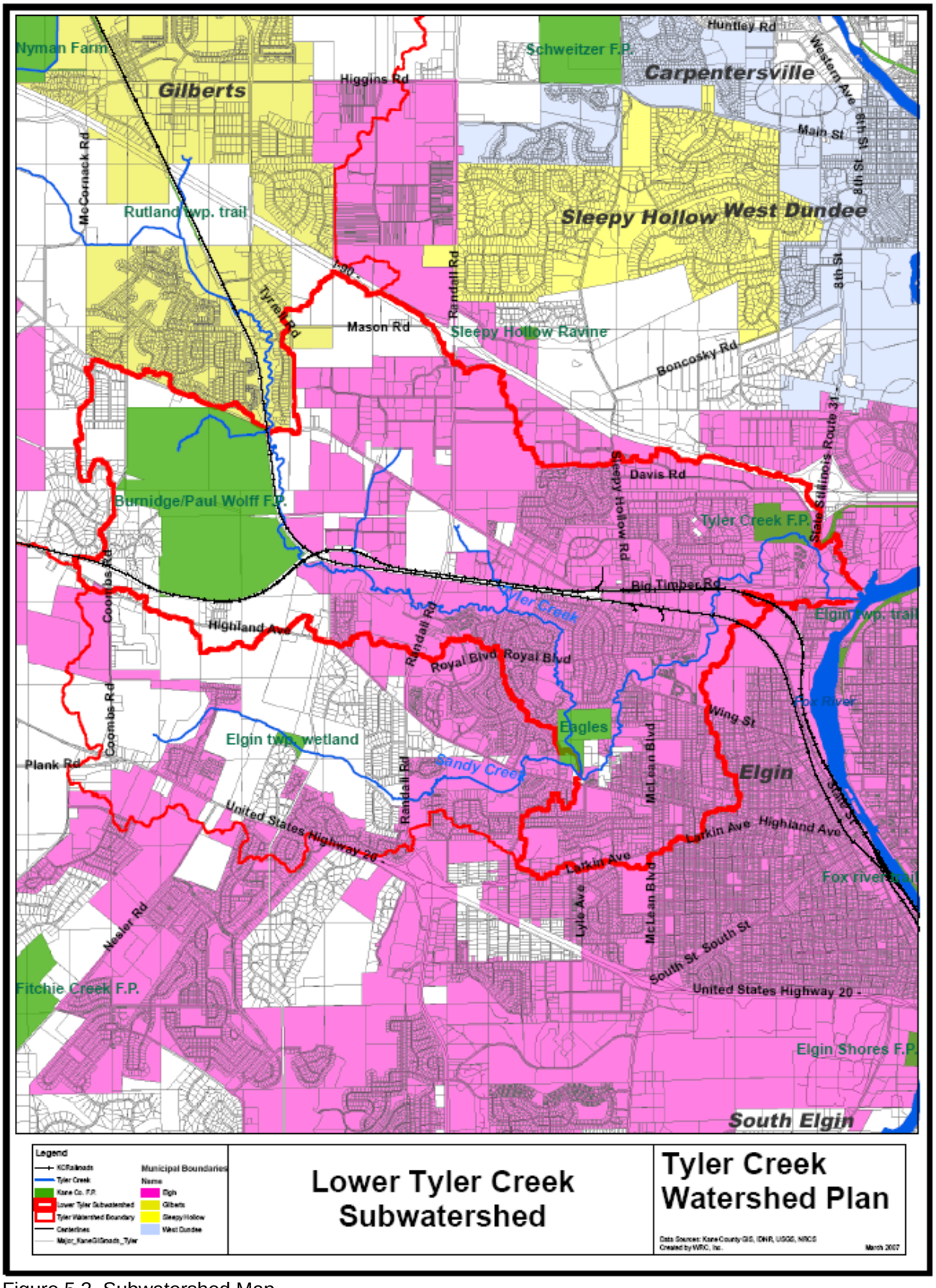

Figure 5.2. Subwatershed Map

5.1.3 Soil Conditions

The glacial advances result in a wide variety of soil map units. The soils in the subwatershed consist of mainly silt loams soil units on 0% - 2% slopes. Each major grouping of soil map units have potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,131 acres, or 22.6% of the 5,008 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

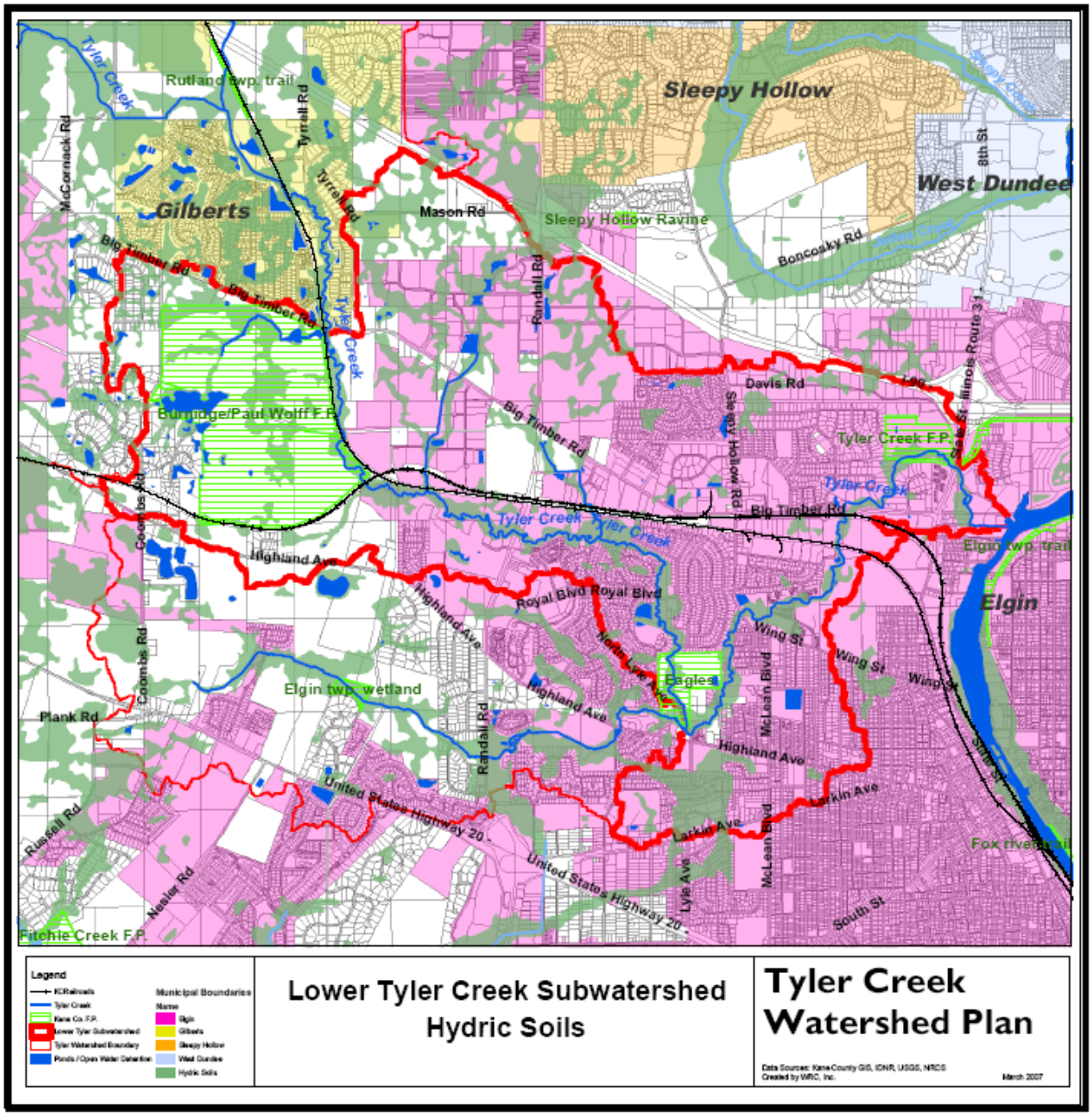

Figure 5.3: Hydric Soils

5.1.4 Subwatershed Drainage Features

Streams

The streams in the Lower Tyler Creek subwatershed consist of the main stem of Tyler Creek and two small unnamed tributaries. This section described the physical conditions of the streams in this subwatershed, including the stream corridor though which they flow. There is a third tributary, Sandy Creek, that enters the Lower Tyler Creek Subwaterhed near Highland Avenue, just east of North Lyle Avenue. Detailed information on Sandy Creek can be found in the Sandy Creek Subwatershed portion of this document (Chapter 7). .

The main stem of Tyler Creek though this subwatershed varies from good to very high quality in terms of the in-stream habitat and natural features of the stream corridor. At the upstream end, between Big Timber and Randall Road, Tyler Creek is a high quality stream, characterized by a steep gradient (17 ft/mi), pool and riffle sequences, and a well preserved stream corridor of deciduous trees and wetland vegetation. Between Randall Road downstream to Wing Street, Tyler Creek has substantially less gradient (about 9-10 ft/mi) and the natural stream corridor is substantially reduced, although about 40% of this reach is on publicly owned land. Upstream of Royal Blvd, the stream channel is located partly on private property, even though there is a 50-70 ft wide publicly owned greenway between the privately owned residential lots. Portions of this reach have been subjected to various types of stabilization treatments by the individual landowners to address areas of streambank erosion.

Between Wing Street and IL Route 31, Tyler Creek has a very steep gradient; varying between 20 and 30 feet per mile. About two-thirds of this reach is located on private property, and the natural vegetation in the stream corridor is preserved, although degraded due to invasive and noxious species. There several areas where streambank erosion is rather severe. One is located upstream of Garden Crescent Street and the other is just downstream of Big timber Road; both are located on primarily private property. Downstream of IL Route 31, the stream gradient flattens out as the stream nears the level of the Fox River. There are remnants of two dams in this reach – both located on the Judson College campus. The upper dam remnant is more substantial (has not fully breached yet), located just downstream of private campus road bridge over Tyler Creek. This dam is a barrier to fish passage at lower flows, although it looks as if moderate to high flows allow fish to move upstream past the dam. The lower dam remnant is located just downstream of the Judson College pedestrian bridge. This dam is fully breached and does not appear to hinder aquatic species movement upstream of downstream.

The first tributary (referred to as Tyler Creek Tributary #1 in this report) begins near the southeast corner of the Big Timber-Randall Road intersection and flows south-southeast through the Randall Point business park on Jansen Farm Drive. The stream has been extensively modified and channelized through the business park and is generally considered to be in a degraded condition. After traversing the business park, the tributary flows south under the two railroad lines and into ADID Wetland #1345. From there, it flows across the wetland and enters Tyler Creek about 200 feet upstream of the North Lyle Avenue stream crossing, north of Clearwater Way.

Tyler Creek Tributary #2 has it's origins at the large detention facility at the south end of Britanna Drive, north of Big Timber Road, about one quarter mile west of Randall Road. This tributary has also been heavily disturbed and channelized to fit into the extensive office/industrial land uses that have been constructed in this section of the City of Elgin. The tributary flows south under Big Timber Road to Millennium Drive, and from there it passes under the Iowa, Chicago & Eastern Railroad and Union Pacific Railroad lines and into a high quality natural area owned by the City of Elgin. It enters Tyler Creek about ½ mile west of Randall Road.

Tyler Creek Tributary #3 is a small ephemeral stream located entirely within the Burnidge / Paul Wolff Forest Preserve. The stream originates at the large wetland just east of Coombs Road in the Forest Preserve. The stream flows to the northeast corner of the forest preserve where it is impounded by two on-line ponds constructed by the original property owners in the 1980's. From the Forest Preserve, the tributary flows less than 200 feet under the Union Pacific Railroad and into Tyler Creek on the Boy Scout property.

Analysis of aerial photography indicates that only about 3% of the main stem of Tyler Creek in the subwatershed is channelized. This contrasts with the subwatershed's four tributary streams, where 61% of the 2.5 miles of tributary streams have been subjected to channelization in recent years as part of new office / industrial developments in the subwatershed.

Urban Drainage Systems

Analysis of land uses and aerial photography indicates that as much as 55% of the Lower Tyler Creek Subwatershed is now drained using storm sewer systems. The 1996 Tyler Creek Watershed Plan indicated that there are at least 48 storm sewer outfalls into Tyler Creek in this subwatershed. This network of sewers is under the jurisdiction of the City of Elgin, and the area roughly corresponds to the developed areas within the corporate limits of the City. There are approximately 29 stormwater detention facilities constructed with the subwatershed, again, all under the jurisdiction of the City of Elgin.

It is of special note that most of the development between Illinois Route 31 and Randall Road was constructed without providing any stormwater detention capacity. This was due to a plan in the 1970's & 1980's to construct a large on-line reservoir west of Randall Road in lieu of several smaller detention facilities that would have served the numerous suburban developments planned for the northwest side of Elgin at that time. The developments were built, but the on-line reservoir was not built. The regulatory agencies determined that the substantial adverse environmental impacts outweighed the positive benefits that would be realized by the flood control aspects.

Given the approximate age of the storm sewer system as a whole and the stormwater regulations under which they were constructed, there do not appear to be any type of structures in the system installed to mitigate the poor water quality associated with urban stormwater runoff in Northeastern Illinois.

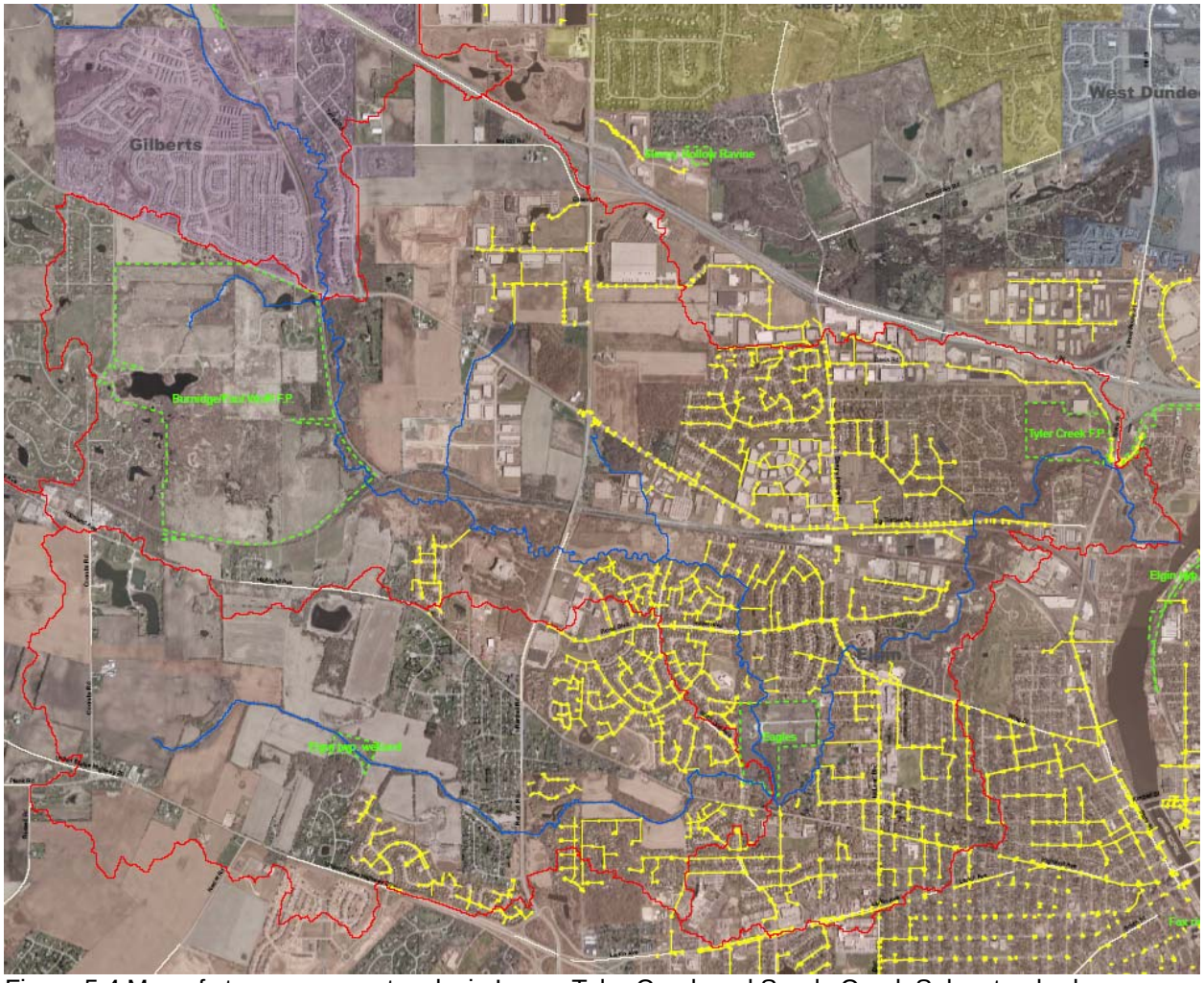

Figure 5.4 Map of storm sewer networks in Lower Tyler Creek and Sandy Creek Subwatersheds

Agricultural Tile Systems

Due to the predominantly urbanized nature of the subwatershed, it is unlikely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the eastern two-third's of the subwatershed. The western one-third may contain some tile systems, as this region has yet to be fully developed and contains many areas of gently sloping to nearly flat hydric soil complexes. Historically, these were the areas that had poor drainage characteristics, but farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

5.1.5 Population

The use and analysis of population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of

impacts to the quality and quantity of the watershed's natural resources. According to the 2000 US Census, the population in the Lower Tyler subwatershed was about 14,029 people, or about 1,800 persons per square mile.

5.1.6 Landuse / Landcover

Land cover data for the Tyler Creek Watershed is available fromIDNR using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was urban, which accounted for roughly 53% of the Lower Tyler subwatershed area. Rural grasslands and agricultural row crops each accounted for another 14% (28% total), while wooded areas and wetlands account for an additional 19% of the subwatershed.

Land Cover Description	Total Acres	Percent of SW
Barren & Exposed Land	10.94	0.2%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	716.78	14.3%
Winter Wheat	0.4	0.0%
Rural Grassland	720.64	14.4%
Low Density Urban	367.38	7.3%
Medium Density Urban	1,200.2	24.0%
High Density Urban	359.64	7.2%
Urban Grassland	714.72	14.3%
Shallow Marsh – Emergent Wetland	39.42	0.8%
Partial Forest /Savannah Upland	234.69	4.7%
Upland Forest	610.17	12.2%
Floodplain Forest	1.8	0.0%
Coniferous Forest	0	0.0%
Deep Marsh / Emergent Wetland	5.4	0.1%
Open Water	25.34	0.5%
Total	**5,007.52**	**100.0%**

Table 5.1 1999 Landcover for the Lower Tyler Creek Subwatershed

5.1.7 Existing Watershed Development

Development in the subwatershed has occurred principally through the efforts of the City of Elgin in their expansion west and northwest into the former undeveloped land that existed west of the Fox River. Much of this development lies in the area between the Fox River and Randall Road. As of 2006, nearly 63% of the Lower Tyler Subwatershed is within Elgin's municipal borders (3,142 of 5,008 acres). Most of the recent development in the LTCSW has occurred in the northern region of the subwatershed, in the form of office / research / industrial development by the City of Elgin in the area between the Union Pacific railroad (south and west), Randall Road (east), and Interstate 90 (north).

The only other municipality in the subwatershed is the Village of Gilberts, which has extended its municipal boundary to the southeast and now has authority over 44 acres in the LTCSW. Unincorporated parcels and rights of way accounts for about 1,821 acres of the subwatershed, and 625 acres of that total are owned by the Kane County Forest Preserve District.

Municipality	Area (acres)	Percent of SW
Elgin	3,141.8	62.7%
Gilberts	44.2	0.9%
Unincorporated	1,821.7	36.4%

There are 64.3 miles of roads in the subwatershed, which equates to about 218 acres of impervious cover (roadway pavement only – excluding parking lots, sidewalks, and driveways).

5.1.8 Natural Resources

Kane County Forest Preserve Properties

There are three Kane County Forest Preserve properties in the subwatershed, totaling about 694 acres, or 13.8% of the Lower Tyler subwatershed area.

Name	Area (acres)
Burnidge / Paul Wolff F.P.	590
Eagles Property	56
Tyler Creek F.P.	48
Total	**694**

Other Publicly Protected Land

The City of Elgin owns 31 parcels totaling 187 acres within the subwatershed. 21 of these parcels, totaling 152 acres, are located at three areas within the Tyler Creek stream corridor:

Name	Area (acres)
Upstream of Randall Road; north of Harvest Bible Chapel (12 parcels)	95.1
Near Royal Blvd (8 parcels)	28.2
Wing Park Pool (1 parcel)	28.6
Total	**151.9**

Wetlands

Kane County completed an Advanced Identification (ADID) Wetland Study in 2004. This study identified a total of 76 wetlands, totaling 441.3 acres, or 12% of the Lower Tyler subwatershed. Of these wetlands, 333.3 acres (75%) were determined to be of High Quality or High Functional Value, the highest rating under the ADID classification system.

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	14	203.4
HHQ	High Habitat Quality	4	129.9
APH	Artificial Pond in Hydric Soils	12	14.9
APN	Artificial Pond in Non-hydric Soils	5	2.5
LWF	Linear Water Feature	4	4.5
NOW	Natural Open Water	1	1.1
R	Fox River	1	0.2
W	Other Wetlands (lower quality)	35	84.8
	TOTAL	**76**	**441.3**

Table 5.5 ADID Wetland Summary for Lower Tyler Creek Subwatershed

All of the ADID wetlands classified as High Habitat Quality are located west / upstream of Randall Road in the subwatershed. There are no known fens or fen recharge areas identified within the Lower Tyler Subwatershed.

Threatened & Endangered Species

The Kane County ADID Wetland Study indicates that there are Threatened and Endangered (T&E) species located within Wetland #1322 (Burnidge / Paul Wolff F.P.) and Wetland #547 (Boy Scout Camp on Big Timber Rd). No data was provided on the specific species and whether the T&E designation was state or federal.

Mussel surveys conducted by the Illinois Department of Natural Resources between 1997 and 2001 indicate that the Slippershell Mussel (*Alasmidonta viridis*), an Illinois State-Threatened Species, is likely to occur in the segment of Tyler Creek between Big Timber Road and Randall Road.

Common Name	Scientific Name	Type	Status
Slippershell Mussel	*Alasmidonta viridis*	Mussel	IL Threatened

Source: IDNR Stream Surveys 1997-2001

Existing Greenways

While there are no formal greenways established in the Lower Tyler subwatershed, there are several publicly owned parcels along Tyler Creek that form a chain of greenway “segments” in the subwatershed. The City of Elgin and Kane County Forest Preserve District own 18 parcels (317.3 acres) along the stream corridor, providing permanent protection for 3.26 miles of Tyler Creek in the LTSW. This figure represents about 39% of Tyler Creek’s length through the subwatershed.

5.2 Analysis of Subwatershed Data and Problem Identification

5.2.1 Water Quality Data & Identified Problems

The IEPA is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Tyler Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Tyler Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Tyler Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from urban runoff, storm sewers, and runoff from forest / grassland / parklands. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Tyler Creek, although the ratings for these uses were classified as "not assessed".

The Illinois Environmental Protection Agency maintains three water quality sampling stations in the LTCSW. They are listed in the table below:

Station	Stream	Location
DTZP01	Tyler Cr.	Tyler Creek at Illinois Route 31 Bridge
DTZP02	Tyler Cr.	Tyler Creek below stone bridge at Tyler Creek Forest Preserve
DTZP04	Tyler Cr.	Tyler Creek at Randall Road

The Fox River Watershed Monitoring Network (FRWMN, administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites on Tyler Creek, six of which are located in the LTCSW. During 2005 and 2006 monitoring periods, the six FRWMN sites in the LTCSW reported water quality index values (based on macroinvertebrate sampling) as Fair to Poor. Many of the "Poor" classifications occurred during 2005 when the watershed experienced a severe drought, which likely impacted the number and distribution of macroinvertebrates in the stream channel at the sampling sites.

In 2004, the Valley of the Fox Chapter of the Illinois Sierra Club published a short report on the water quality of streams in the Middle Fox River Area. This study used data collected by Sierra Club volunteers for 12 streams in the Fox Watershed over a three year period.

Name	Phosphate-P	Nitrate – N	Ammonia – N	Chloride	Sulfate	Turbidity
	mg/L	mg/L	mg/L	mg/L	mg/L	Ftu
Tyler Cr.	0.31	2.61	0.13	49.6	60.0	21.4

Table 5.8 Sierra Club Tributary Streams Project Monitoring Results for Tyler Creek

mg/L = milligrams per liter

Ftu =Formazin **Turbidity** Unit

Sierra Club Notes:

1. There currently is no Illinois water quality standard for phosphorus. USEPA recommends 0.08 mg/l total phosphorus as a level indicative of a pristine stream in our ecoregion. Statewide, the average level of total phosphorus (of which phosphates are a subset) in Illinois rivers and streams is 0.38 mg/l.
2. There currently is no Illinois water quality standard for nitrates. USEPA recommends 2.18 mg/l total nitrogen as a level indicative of a pristine stream in our ecoregion. The average level of nitrate-N found in Illinois streams is 3.89 mg/l.
3. Ammonia water quality standards are based on the pH and temperature of the stream as well as the presence of sensitive early life stages of fish. For example, ammonia-nitrogen levels in Tyler Creek should not exceed a monthly average of 1.6 mg/l when early life stages are present. The average level of ammonia found in Illinois streams is 0.32 mg/l ammonia-N.
4. The Illinois water quality standard for both chloride and sulfate is 500 mg/l.
5. There currently is no Illinois water quality standard for turbidity.

The Sierra Club report summarized that of all the streams sampled, Tyler Creek received a "B" grade. The report indicated that water quality of Tyler Creek was roughly the same as Brewster Creek and Mill Creek, but was lower than that found on other Fox River tributaries, such as Poplar Creek, Norton Creek, Waubonsee Creek, Ferson Creek, and Indian Creek.

5.2.2 Flooding Problems

Overbank flooding problems occur at the very downstream end of the Lower Tyler subwatershed, on the Judson College campus, where Tyler Creek joins the Fox River. There are two college dormitories on the campus that are located within the 100-year floodplain and have experienced flood damages in the past. Judson College staff has indicated that there seems to have been an increase in the frequency of campus buildings flooding over the last 15 years.

Right: Photo of flood damage to building on west side of Judson University campus following a August 2007 thunderstorm

There are no other records of recent flood damage in the Lower Tyler subwatershed, although some residential structures between Wing Street and North Lyle Avenue appear to be within, or at least very close, to the 100-year floodplain.

5.2.3 Projected Development & Growth

As the entire subwatershed falls within the City of Elgin's Comprehensive Planning Area, it is likely that virtually all future development in the Lower Tyler subwatershed will be done by the City of Elgin. There are about 765 acres of land available for new development. If development occurs according to Elgin's plan, about 225 acres of new residential development will be built on parcels along Highland Avenue, Coombs Road, and east of Randall Road along the south side of the railroad right-of-way. The rest of the land to be developed in the subwatershed lies north of the railroad right-of-way and is centered around Randall Road. This 540 acres of land is planned to be developed as office / research / industrial, building onto and adjacent to the existing O/R/I developments previously approved by the City of Elgin.

Based upon the planned residential development patterns proposed by the City of Elgin, the population increase when the subwatershed is "built out" is estimated to be about 2,500 – 3,000. This is in addition to the 14,029 that already call the subwatershed home, or about a 20% increase from the year 2000.

5.2.4 Estimated Pollutant Loading

Water quality concerns in the watershed are closely tied to land uses. Pollutant load estimates in the watershed were estimated under existing and future condition land use scenarios so that strategies for addressing existing and mitigating potential future water quality concerns can be developed. Pollutant load estimates were computed based on land uses using the public domain GIS driven software called the 'Generalized Watershed Loading Function' (GWLF) model. A more detailed discussion of the development of the model is presented in Chapter 3 and Appendix 15.2 . As was mentioned in the previous sections, the main pollutants of concern are sediment and nutrients both of which are contributed mainly from the agricultural activities and urbanization and Fecal Coliform bacteria which, according to the IEPA, are generated from urban runoff. A summary of the annual pollutant load estimates from the Lower Tyler Creek subwatershed is presented in below:

Pollutant	Existing Condition (2005)	Future Condition (Total Build-out)
	Lbs	Lbs
Total N	20,331	18,695
Total P	1,301	1,046
Sediment	1194	1188
Runoff (ac-ft)	1,469	1,531
Fecal Coliform (x10^FCU)	36,140	37,046

Table 5.9 Estimated annual pollutant loads for the Lower Tyler Creek Subwatershed

5.2.5 Natural Area Protection Problems

Forest Preserve Sites

The natural areas within the Tyler Creek Forest Preserve are degraded due to invasive species spreading into both the stream corridor and the upland forest habitat.

ADID Wetland Sites

In the LTCSW, only 441 acres of wetland remain, compared to an estimated 1,131 acres that existed before settlement. That means that 61% of the wetlands have already been lost and can no longer provide the valuable functions. Therefore, it is critical that the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can enjoy the benefits these wetlands provide.

There are four High Habitat Quality wetlands contained in three areas of the subwatershed. Each of these is in need of either protection and / or restoration to maintain the high quality characteristics that make the wetlands so valuable to the watershed.

High Habitat Quality (HHQ) ADID Wetland #1337 is located along Tyler Creek between Randall Road and the Burnidge / Paul Wolff Forest Preserve. About 85% of this highly valued wetland complex is located on property owned by the City of Elgin. About 10% is on property owned by the Harvest Bible Chapel and is protected under a conservation easement. The remaining 5% of the wetland is located on a privately owned parcel on the western edge adjacent to Iowa, Chicago & Eastern Railroad right-of-way. This wetland is one of the true gems in the Tyler Creek Watershed, containing a sedge meadow, seeps, and a fen/calcareous seep. However, its preservation in the future will is dependent on actively managing the invasive species that are moving into the wetland. Consideration should also be given to implementing innovative water quality controls in the areas that drain directly into the wetland, including the Randall Point Business Park, the Harvest Bible Chapel, and the undeveloped land to the west that will inevitably develop in the near future.

HHQ ADID Wetland #547 is located along Tyler Creek between Big Timber Road and the Randall Point Business Park. About 90% of this highly valued wetland complex is located on property owned by the Three Rivers Council, Inc. of the Boy Scouts of America. The southern 10% of the wetland is located on land within the Randall Point Business Park. The wetland is comprised of a highly valued floodplain forest, however it does not have any form of permanent protection (i.e. conservation easement, etc.), and there is no active management of the wetland to control invasive species or address areas of severe stream bank erosion.

HHQ ADID Wetland #1322 is located at the southwest corner of the Burnidge / Paul Wolff Forest Preserve near Coombs Road. This wetland consists of a degraded marsh with open water pockets and as identified in the ADID study, evidence suggests that there is a fen wetland adjacent to the wetland boundary. About 60% of this wetland is protected by the Kane County Forest Preserve District. The remaining 40% of the wetland is located on private property and has no known permanent protection in place. Prior biological investigations on the publicly owned portion of the wetland have indicated the presence of threatened or endangered species of birds.

There are several other wetland complexes that are also in need of restoration and protection. ADID Wetland #1345 is classified as having High Functional Value. This wetland is located on parcels slated for future development between the east side of Randall Road, the UNION PACIFIC railroad right-of-way, and North Lyle Avenue. New development here should be carefully planned to protect the wetland resources along the Tyler Creek stream corridor and configured so that stormwater infiltration is maximized and runoff that must leave the site is cleaned to the maximum extent practicable.

5.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following is a summary list of recommendations for the Lower Tyler Creek Subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Tyler Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 3.

Type: Education/Outreach; Regulatory; Natural Habitat Restoration; Monitoring; Permanent Habitat Protection, Water Quality, Flood Control
Target Goals: Which watershed plan goals the recommendation is intended to address.
Initial Cost: the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost: the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party: Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority: A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

Many of the project recommendations in the Lower Tyler Creek Subwatershed are taken directly from the Lower Tyler Creek Management Project, revised in 2000 for the City of Elgin. The costs for water quality recommendations based on that report are based on the project costs reported in 2000 and adjusted for 5% inflation per year (to 2007).

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2007 Tyler Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

A map of Lower Tyler Creek Subwatershed Recommendations can be found at the end of this section, Figure 5.5

Natural Habitat Restoration Projects

The recommendations in this section are site-specific natural area restoration projects that should be implemented to increase natural habitat quality and diversity along the Tyler Creek stream corridor. Restoration projects not only serve to increase critical native habitats, they also provide many indirect water quality benefits as well. Removing non-native vegetation and installing native, deep – rooted vegetation on slopes and stream banks decreases erosion and the resulting sediment that is washed into the stream. Thinning out invasive and nuisance species along stream corridors also serves to reduce current and potential debris jams, which create artificial, stagnant areas along the stream (resulting in low dissolved oxygen) and also

increases the net amount of nutrient inputs to the stream as the debris breaks down in the channel.

Estimating costs for restoration projects can range from $100 to more than $3,000 per acre of woodland, wetland, or prairie habitat restored. The upper range reflects the unit cost for restoration work contracted out to a private contracting company. Costs can potentially be significantly reduced if the work is performed by agency staff or local volunteers.

Annual costs are estimated to be roughly 10% of the initial cost and cover items such as herbicide applications, brush removal, and controlled burns.

Recommendation 1-1

Implement ecological restoration plan for 9.0 acres of bottomland woods in the Tyler Creek Forest Preserve as outlined in the City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 1)

Type: Natural Habitat Restoration
Target Goals: Goal 1; Objectives 2 & 3
Initial Cost: $27,000
Annual Cost: $2,700
Responsible Party: Kane County Forest Preserve District
Priority: Medium

Recommendation 1-3

Implement 5.3 acre Wetland & Upland Woods Restoration project along Tyler Creek between Union Pacific railroad right-of-way. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 2)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $16,000
Annual Cost: $1,600
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-4

Implement Upland Woods Restoration projects (11.5 acres) on Wing Park property along Tyler Creek stream corridor. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 2)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $34,500
Annual Cost: $3,400
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-9

Implement ecological restoration plan for 11 acres of bottomland woods along Tyler Creek on three private properties between Eagle Road and Hoxie Court. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 3)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $33,000
Annual Cost: $3,300
Responsible Party: Private Landowner
Priority: Medium

Recommendation 1-10

Implement Upland Woods Restoration project (16 acres) on private and public parcels along Tyler Creek stream corridor near Highland Avenue north of Spring Cove Drive. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 3)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $48,000
Annual Cost: $4,800
Responsible Party: Private Landowners / Kane County Forest Preserve District
Priority: Medium

Recommendation 1-11

Implement Bottomland Woods Restoration project (10 acres) on Eagle's Forest Preserve property along Tyler Creek north of Highland Avenue and east of North Lyle Avenue Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 4)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $30,000
Annual Cost: $3,000
Responsible Party: Kane County Forest Preserve District
Priority: Medium

Recommendation 1-12

Implement Upland Woods Restoration project (7.8 acres) on western edge of Eagle's Forest Preserve property Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 4)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $23,400
Annual Cost: $2,300
Responsible Party: Kane County Forest Preserve District
Priority: Medium

Recommendation 1-15

Implement Upland Woods Restoration project (0.9 acres) on Creekside School Property along Tyler Creek stream corridor. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 4)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $2,700
Annual Cost: $270
Responsible Party: U-46 School District / City of Elgin
Priority: Low

Recommendation 1-16

Implement Bottomland Woods Restoration project (4.2 acres) on City of Elgin Property along Tyler Creek south of Royal Boulevard. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 4)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $12,600
Annual Cost: $1,300
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-18

Implement Prairie Restoration Project (1.6 acres) on private property south of Royal Boulevard and between Tyler Creek and Ruth Drive. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 4)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $4,800
Annual Cost: $500
Responsible Party: Private Landowner
Priority: Medium

Recommendation 1-19

Implement Bottomland Woods Restoration projects (8.9 acres) on City of Elgin Property along Tyler Creek north (upstream) of Royal Boulevard. Reference: City of Elgin's Tyler Creek Improvement Project. (June, 2000 plan set; Ecological Restoration, Reach 5)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $26,700
Annual Cost: $2,700
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-21

Recognizing that new development is already planned for the parcel(s) north of Tyler Creek just Randall Road, implement applicable parts of the Tyler Creek Improvement Project for this site, including ecological restoration, streambank stabilization, and water quality improvements Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 6, and Stormwater Quality Facility sites 7 & 8)

Type: Water Quality, Natural Habitat Restoration, Permanent Habitat Protection
Target Goals: Goal 1, Objectives 2 & 3; Goal 2, Objective 2
Initial Cost: $310,000
Annual Cost: $10,000
Responsible Party: City of Elgin Support & Landowner/Developer
Priority: High

Recommendation 1-22

Implement Upland Woods Restoration projects (18 acres) and Wetland Restoration Projects (43.1 acres) on City of Elgin Property along Tyler Creek west of Randall Road. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 6)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $54,000
Annual Cost: $5,500
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-23

Work with Harvest Bible Chapel to remove invasive species and provide long-term management of wetlands and upland woods on their property (18.9 acres). Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Ecological Restoration, Reach 6)

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $56,700
Annual Cost: $5,700
Responsible Party: Not-for-profit Land Trust Organization
Priority: High

Recommendation 1-32

Develop a restoration and flood control plan for the Judson University Campus. Plan will include the following elements:

- 6.5 acres upland woods restoration
- 8.7 acres bottomland woods restoration
- Removal of two partially failed dam structures
- Replacement of existing bridge with a new bridge with a larger span and higher deck elevation (include integrated pedestrian walk)
- Redirect Tyler Creek through Volkman Pond. Remove pedestrian bridge over creek at northeast corner of pond and fill in old channel. Stabilize large, partially wooded slope.
- Install 1000 feet of small flood control levees between Tyler Creek and two low-lying campus buildings.

Type: Natural Habitat Restoration & Flood Control
Target Goals: Goal 1, Objectives 2 & 3; Goal3, Objective 1
Initial Cost: $650,000 ($60,000 natural area restoration; $160,000 new bridge; $260,000 for stream relocation, dam removal and bank/slope stabilization; $170,000 flood control levees)
Annual Cost: $5,000
Responsible Party: Judson College
Priority: High

Recommendation 1-35

Remove abandoned dam on Tyler Creek at Wing Park Pool and replace with constructed rock riffle.

Type: Natural Habitat Restoration & Flood Control
Target Goals: Goal 1, Objectives 2 & 3; Goal3, Objective 1
Initial Cost: $50,000
Annual Cost: $0
Responsible Party: City of Elgin
Priority: Low

Water Quality Projects

The following recommendations are site-specific projects intended to provide incremental pollutant load reduction and therefore directly improve water quality in Tyler Creek.

Recommendation 1-33

Prepare a municipal storm sewer inventory and water quality management plan for all sewers draining to Tyler Creek or one of its tributaries. The inventory should delineate tributary service area, and a tabulation of service area land uses and impervious cover types. The WQ management section should identify target pollutants to be treated in each sewershed and identify specific BMP devices and their proposed installation locations within the individual storm sewer networks.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $35,000
Annual Cost: $50,000 (cost of minimum 1 BMP structure installation per year)
Responsible Party: City of Elgin
Priority: High

Recommendation 1-2

Implement 155 linear feet of streambank stabilization and outfall protection project along Tyler Creek, north of Big Timber Road (partially on three privately owned lots as well as on Big Timber Road right-of-way). Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Streambank Stabilization Plan, Site 20)

Type: Water Quality
Target Goals:
Initial Cost: $43,000
Annual Cost: $500
Responsible Party: Private homeowners with assistance from City of Elgin
Priority: Medium

Recommendation 1-5

Work with townhouse / condo associations to implement a stream corridor restoration plan for 1,700 foot reach of Tyler Creek between Wing Park Pool and Illinois Park Elementary School. Includes bank stabilization and channel relocation. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Streambank Stabilization Plan, Site 18)

Type: Water Quality / Site Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: $241,000
Annual Cost: $5000
Responsible Party: Private Homeowners / Condo Association
Priority: Medium

Recommendation 1-6

Implement Water Quality Facility Project at northeast corner of Illinois Park Elementary School property. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Stormwater Quality Facility – site 6)

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $86.000
Annual Cost: $500
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-7

Implement 150 linear feet of streambank stabilization and bridge abutment protection projects along Tyler Creek, upstream of Eagle Road Bridge (abutment protection on City property; streambank project on private property) Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Streambank Stabilization Plan, Site 21a)

Type: Water Quality
Target Goals: Goal 1, Objective 3 & 5
Initial Cost: $30,000
Annual Cost: $500
Responsible Party: City of Elgin & Private Landowner
Priority: Medium

Recommendation 1-8

Implement storm sewer outfall repair project on Tyler Creek, 700 feet upstream (south) of Eagle Road Bridge. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Streambank Stabilization Plan, Site 21b)

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $5000
Annual Cost: $150
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-13

Implement 200 linear feet of streambank stabilization and storm sewer outfall repair projects along Tyler Creek, at the end of Kimberly Avenue (streambank project on private property). Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Streambank Stabilization Plan, Sites 3 & 22)

Type: Water Quality
Target Goals: Goal 1, Objective 3
Initial Cost: $86,000
Annual Cost: $500
Responsible Party: Private Landowner
Priority: Medium

Recommendation 1-14

Implement Wood Ridge Court storm sewer outfall repair project along Tyler Creek (project on City of Elgin property). Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Site 14)

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $26,000
Annual Cost: $0
Responsible Party: City of Elgin
Priority: Medium

Recommendation 1-17

Implement Water Quality Facility Project on City of Elgin property behind Creekside Elementary School. Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Stormwater Quality Facility – site 5)

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $200,000
Annual Cost: $1500
Responsible Party: City of Elgin
Priority: High

Recommendation 1-20

Contact landowners and assist them with implementing ecologically sustainable stabilization practices along Tyler Creek where the stream has migrated out of the publicly owned parcel and has caused excessive stream bank erosion on private property.

Type: Water Quality
Target Goals: Goal 1, Objective 3
Initial Cost: $25,000
Annual Cost: $500
Responsible Party: City of Elgin Support: Private Landowner(s)
Priority: Medium

Recommendation 1-30

Implement 180 linear feet of streambank stabilization along Tyler Creek downstream of large storm sewer outfall at Highland Ave. & Thomas Moore Drive. (streambank project on private property). Reference: City of Elgin's Tyler Creek Improvement Project. (June 2000 plan set; Streambank Stabilization Plan, Sites 12)

Type: Water Quality
Target Goals: Goal 1, Objective 3 & 5
Initial Cost: $86,000
Annual Cost: $500
Responsible Party: City of Elgin Support: Private Landowner / HOA
Priority: High

Recommendation 1-27

Remove invasive species tree canopy from tributary stream corridor in business park south of Jansen Farm Drive. Work with existing industrial landowners to redirect pavement runoff from stream channel and into new structural BMP devices to treat runoff prior to discharge to the stream.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $25,000
Annual Cost: $500
Responsible Party: City of Elgin, business owners.
Priority: Medium

Recommendation 1-28

Retrofit existing 0.9 acre dry bottom detention basin. Remove concrete low-flow channel, re-grade to increase residence time of small runoff events and replant with native vegetation.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $15,000
Annual Cost: $500
Responsible Party: Kane County D.O.T.
Priority: Medium

Recommendation 1-29

Retrofit existing 0.6 acre dry bottom detention basin. Replant with native vegetation and provide periodic landscape maintenance to insure survival.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $12,000
Annual Cost: $300
Responsible Party: Private Business (Chase); Support from City of Elgin
Priority: Medium

Recommendation 1-34

Retrofit part of existing 2.5 acre dry bottom detention basin to maximize low flow water quality treatment.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $25,000
Annual Cost: $500
Responsible Party: City of Elgin
Priority: Medium

Permanent Habitat Protection Recommendations

Recommendation 1-31:

Protect portions of high-quality ADID Wetland #1322 (near Coombs & Amberwood Drive) that are on private property, by working with landowners to secure conservation easements and providing wetland management assistance to protect T & E species known to occur there.

Type: Permanent Habitat Protection / Natural Habitat Restoration
Target Goals: Goal 1, Objective 1
Initial Cost: $ unknown
Annual Cost: $ unknown
Responsible Party: Not-for-profit Land Trust Organization working with private landowners
Priority: Medium

Ordinance/Planning Recommendations

Recommendation 1-24

Encourage new construction in the Randall Point Business Center to utilize conservation development practices to reduce their runoff to Tyler Creek Tributary #1.

Type: Water Quality
Target Goals: Goal 2, Objectives 1,2, & 3
Initial Cost: unknown (municipal staff & elected official time)
Annual Cost: unknown (municipal staff & elected official time)
Responsible Party: City of Elgin
Priority: High

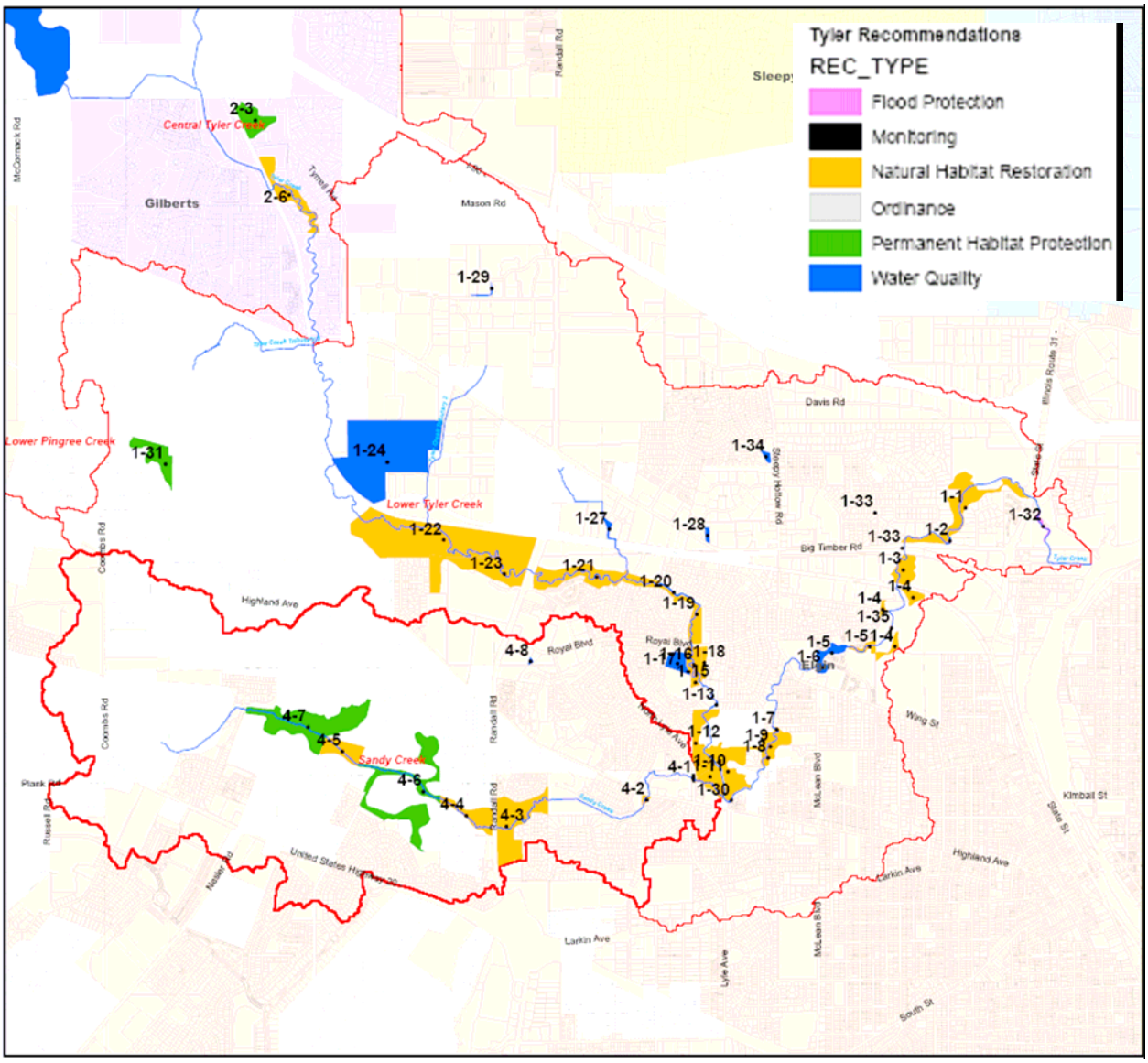

Figure 5.5 : Subwatershed Recommendations Location Map

Table 5.9 Summary of recommended BMPs for the Lower Tyler Creek Subwatershed

REC NUMBER	REC TYPE	DESCRIPTION	RESPONSIBLE PARTY	INITIAL COST	ANNUAL COST	PRIORITY
1-1	Natural Habitat Restoration	Bottomland Woods Restoration on Public and Private Property	KCFPD / Private Landowners	$27,000	$2,700	Medium
1-2	Water Quality	Streambank stabilization - 155 LF on Private Property / Big Timber R.O.W.	Private Landowners / City of Elgin	$43,000	$500	Medium
1-3	Natural Habitat Restoration	Wetland and Upland Woods Restoration on Public Property	City of Elgin	$16,000	$1,600	Medium
1-4	Natural Habitat Restoration	Upland woods restoration at Wing Park	City of Elgin	$11,500	$1,100	Medium
1-5	Water Quality	Implement channel relocation and stabilization plan on Private Property	HOA / Condo Association	$120,500	$2,500	Medium
1-5	Natural Habitat Restoration	Implement stream corridor restoration plan on Private Property	HOA / Condo Association	$120,500	$2,500	Medium
1-6	Water Quality	Construct water quality facility project at Illinois Park Elementary School	City of Elgin	$86,000	$500	Medium
1-7	Water Quality	Streambank Stabilization - 150 LF on Public and Private Property	City of Elgin	$30,000	$500	Medium
1-8	Water Quality	Storm sewer outfall repair	City of Elgin	$5,000	$150	Medium
1-9	Natural Habitat Restoration	Bottomland woods restoration on Private Property	Private Landowners	$33,000	$3,300	Medium
1-10	Natural Habitat Restoration	Upland woods restoration at Eagles F.P. and Private Property	KCFPD / Private Landowners	$48,000	$4,800	Medium
1-11	Natural Habitat Restoration	Bottomland woods restoration at Eagles F.P. and Private Property	KCFD / Private Landowners	$30,000	$3,000	Medium
1-12	Natural Habitat Restoration	Upland woods restoration at Eagles F.P.	KCFPD	$23,400	$2,300	Medium
1-13	Water Quality	Streambank stabilization on Private Property	City of Elgin	$86,000	$500	Medium
1-14	Water Quality	Repair 12" storm sewer outfall from Wood Ridge Court	City of Elgin	$26,000	$0	Medium
1-15	Natural Habitat Restoration	Upland woods restoration at Creekside School	School District U-46	$2,700	$270	Low
1-16	Natural Habitat Restoration	Bottomland woods restoration on Public Property	City of Elgin	$12,600	$1,300	Medium
1-17	Water Quality	Construct water quality facility project at Valley Creek Subdivision storm outfall	City of Elgin	$200,000	$1,500	High
1-18	Natural Habitat Restoration	Prairie restoration on Private Property	Private Property	$4,800	$500	Medium

REC NUMBER	REC TYPE	DESCRIPTION	RESPONSIBLE PARTY	INITIAL COST	ANNUAL COST	PRIORITY
1-19	Natural Habitat Restoration	Bottomland woods restoration on Public and Private Property	City of Elgin	$26,700	$2,700	Medium
1-20	Water Quality	Streambank stabilization as needed where Tyler has meandered out of publicly owned corridor	City of Elgin	$25,000	$500	Medium
1-21	Natural Habitat Restoration	Stream corridor restoration and stabilization on private property scheduled for development	City of Elgin	$310,000	$10,000	High
1-22	Natural Habitat Restoration	Upland woods and wetland restoration on City of Elgin Property	City of Elgin	$54,000	$5,500	Medium
1-23	Natural Habitat Restoration	Upland woods and wetland restoration on Private Property	Private Landowners / NP Land Trust Org support	$56,700	$5,700	High
1-24	Water Quality	Encourage implementation of stormwater conservation practices to minimize excess runoff and water pollution from business park	City of Elgin	N/A	N/A	High
1-27	Water Quality	Install water quality controls to clean parking lot runoff before it enters stream	City of Elgin	$25,000	$500	Medium
1-28	Water Quality	Retrofit dry bottom detention; remove concrete low flow channel	KDOT	$15,000	$500	Medium
1-29	Water Quality	Retrofit dry bottom detention with native vegetation	Chase Corporation	$12,000	$300	Medium
1-30	Water Quality	Streambank stabilization on Private Property	City of Elgin	$86,000	$500	Medium
1-31	Permanent Habitat Protection	Permanently protect privately owned portions of ADID Wetland 1322	Private Landowners / NP Land Trust Org support	N/A	N/A	Medium
1-32	Flood Protection	Develop and implement flood control and restoration project at Judson University	Judson College	$650,000	$5,000	High
1-33	Water Quality	Develop Storm Sewer Outfall BMP Retrofit Program and install a minimum of one BMP structure per year	City of Elgin	$35,000	$50,000	High
1-34	Water Quality	Retrofit part of dry bottom detention basin for low flow WQ treatment	City of Elgin	$25,000	$500	Medium
1-35	Natural Habitat Restoration	Remove abandoned dam and construct rock riffle	City of Elgin	$50,000	$0	Low

Table 5.9 Summary of recommended BMPs for the Lower Tyler Creek Subwatershed (continued)

5.3.1 Lower Tyler Creek BMPs

Recommended BMPs for reducing pollutant loads, implementation costs and projected reductions in the Lower Tyler Creek subwatershed are presented in Table 5.10. BMPs are prescribed for reducing nutrient loads and fecal coliform loads. The predicted load reductions were computed by the GWLF model in conjunction with the simple spreadsheet approach depending on the nature of the BMP. The BMPs do provide multiple benefits consistent with the overall goals of the watershed plan which includes natural resources protection. The scale and time frame for implementation will be driven by cost considerations. The sizes of the BMPs in Table 5.10 and in subsequent Tables are intended to give the approximate potential size at which the BMP could be implemented. The larger the scale of the BMP, the more its effectiveness in reducing pollutant loads.

Table 5.10 Recommended BMPs for the Lower Tyler Creek Subwatershed

BMP Category	BMP Location	Project Locations [2]	BMP		Removal Efficiency**			Total Cost ($)	Pollutant Load Reduction (lbs/year)			Percentage Reduction (%)		
			Size	Unit	TN	TP	TSS		TN	TP	TSS	TN	TP	TSS
Natural Habitat Protection	Site-specific	1-1, 1-3, 1-4, 1-5, 1-9, 1-10, 1-11, 1-12, 1-15, 1-16, 1-18, 1-19, 1-21, 1-22, 1-23; 1-31	150	acres	30%	35%	60%	$776,900	914	68	64	4.5	5.2	5.4
Stormwater BMPs	Site Specific	1-27, 1-32	2	each	53%	51%	88%	$675,000	86	5	8	0.4	0.4	0.7
Stream bank Stabilization	Site Specific	1-2, 1-5, 1-7, 1-13, 1-20, 1-30	98	acres	36%	95%	95%	$390,500	716	121	105	3.5	9.3	8.8
Retrofit Sewer Outfalls	Site Specific	1-8,1-14, 1-33	3	each	-	-	-	$66,000	1,017	65	60	5.0	5.0	5.0
Detention Basin Retrofit	Site Specific	1-28, 1-29, 1-34	18	acres	32%	55%	68%	$52,000	117	13	15	0.6	1.0	1.2
Conservation Development Practices	Site-specific	1-24	1	lump sum	52%	58%	64%	-	33	2	1	0.2	0.2	0.1
Construct Water Quality Facility	Site-specific	1-6, 1-17	81	acres	52%	58%	64%	$286,000	855	61	37	4.2	4.7	3.1
Dam Removal	Site-specific	1-35	1	lump sum	-	-	-	$50,000	203	13	12	1.0	1.0	1.0
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	-	-	-	$10,000	1,017	65	60	5.0	5.0	5.0
Nutrient Management	Watershed-specific	Subwatershed wide – agricultural parcels	1,600	acres	70%	28%	-	$160,000	11,369	582	-	55.9	44.7	-
Total								$2,466,400	16,327	996	363	80.3	76.5	30.4

[2] Project locations and details are described in Section 5.3, table 5.9, and map figure 5.5

** TN = total Nitrogen; TP = total Phosphate; TSS = total Suspended Solids or Sediment; "-" = "not available"

Table 5.11 Recommended BMPs for Reducing Fecal coliform Loads in the Lower Tyler Creek Subwatershed

BMP Category	BMP Location	Project Locations [2]	BMP		FC Removal Efficiency[**]	Total Cost[***] ($)	FC Load Reduction (10^9 FCU/year)	FC Percentage Reduction (%)
			Size	Unit				
Natural Habitat Restoration	Site-specific	1-1, 1-3, 1-4, 1-5, 1-9, 1-10, 1-11, 1-12, 1-15, 1-16, 1-18, 1-19, 1-21, 1-22, 1-23;; 1-31	150	acres	78%	$776,900	4,222	11.7
Stormwater BMPs	Site Specific	1-27, 1-32	2	each	-	$675,000	238	0.7
Stream bank Stabilization	Site Specific	1-2, 1-5, 1-7, 1-13, 1-20, 1-30	98	acres	75%	$390,500	2,653	7.3
Retrofit Sewer Outfalls	Site Specific	1-8,1-14, 1-33	3	each	80%	$66,000	1,446	4.0
Detention Basin Retrofit	Site Specific	1-28, 1-29, 1-34	18	acres	78%	$52,000	507	1.4
Conservation Development Practices	Site-specific	1-24	1	lump sum	-	-	18	0.0
Construct Water Quality Facility	Site-specific	1-6, 1-17	81	acres	-	$286,000	2,280	6.3
Dam Removal	Site-specific	1-35	1	lump sum	-	$50,000	-	-
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	-	$10,000	1,807	5.0
Street Sweeping (bi-weekly)	Watershed-specific	Subwatershed wide/Streets	64	curb miles	2%	$49,920	37	0.1
Pet Waste Management	Sub-watershed	Subwatershed wide	1	watershed	90%	$5,000	3,285	9.1
Sand Filters	Site specific	1-17, 1-34,1-28, 1-29, infiltration basins	19	Units	37%	$38,000	507	1.4
Illicit connection control	Site specific	Sewer & Stormwater Drainage system	1	watershed	-	$10,000	1,084	3.0
Education and Outreach	Sub-watershed	Residential areas	1	each	-	$1,000	904	2.5
Total						$2,410,320	18,988	53

[2] Project locations and details are described in Section 5.3, table 5.9, and map figure 5.5.
[**] FC = Fecal coliform; "-" = Nominal removal efficiency has been applied or Not applicable
[***]Some BMPs, which contribute to the reduction of other pollutants (Total N, Total P, and TSS/Sediment), are also listed here; The costs of those BMPs are re-added up to the "Total Cost ($)" in this table.

Chapter 6
CENTRAL TYLER CREEK SUBWATERSHED

6.1.1 Subwatershed Location

Central Tyler Creek is a subwatershed located in the northern portion of the Tyler Creek Watershed. This subwatershed has an area of 5,194 acres, or 8.1 square miles. The boundary of the Central Tyler Creek subwatershed is shown in Figure 6.1. The subwatershed is located mostly within eastern Rutland Township, with a small portion in Dundee Township. The subwatershed is roughly bordered, by Big Timber Road on the south, Powers Road on the west, Freeman & Binnie Road on the north, and Randall Road on the east.

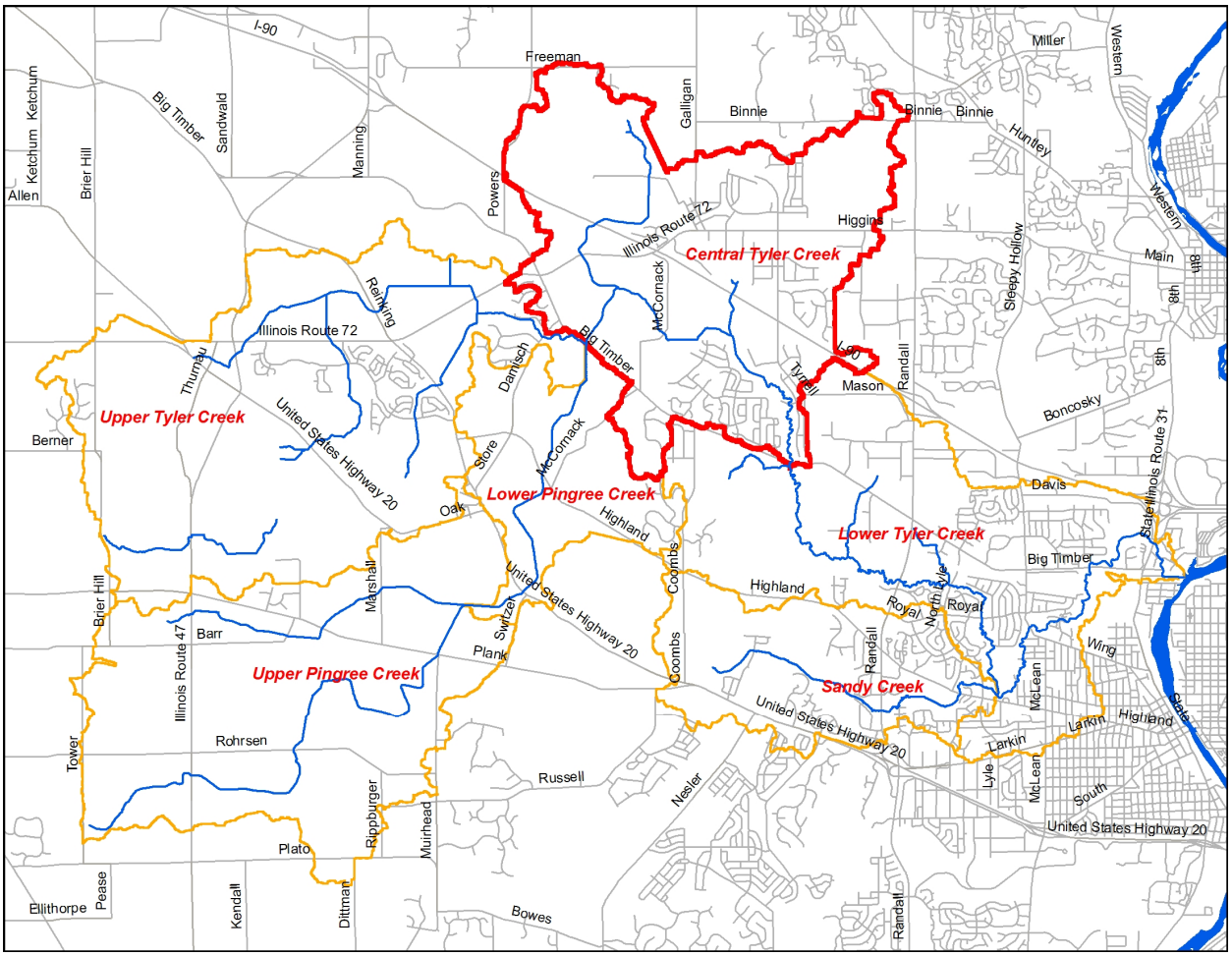

Figure 6.1. Subwatersheds in the Tyler Creek Watershed

6.1.2 Topography & Geology

The topography of the Central Tyler subwatershed is highly variable, from the flat, broad expanses along the Tyler Creek stream corridor to the hilly terrain created by glacial kames in the northwestern portion of the subwatershed. The maximum elevation in the subwatershed is 948 feet above sea level near Freeman and Powers Road. The lowest elevation is 862 feet, where Tyler Creek leaves the subwatershed at Big Timber Road.

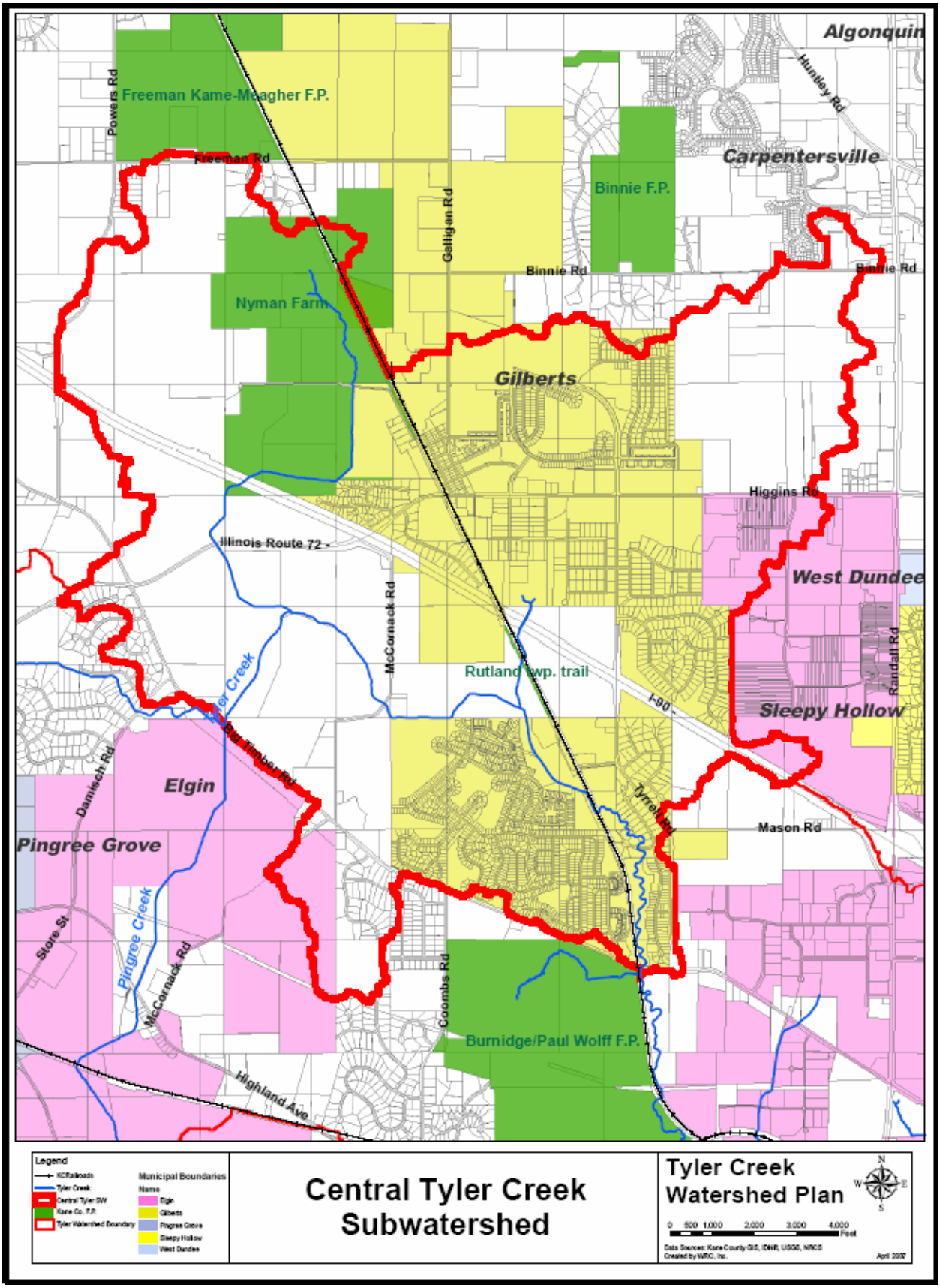

Figure 6.2. Subwatershed Map

6.1.3 Soil Conditions

The glacial advances result in a wide variety of soil map units. The soils in the Central Tyler subwatershed consist of mainly silt loams soil units on 0% - 2% slopes. Each major grouping of soil map units has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 2,201 acres, or 42% of the 5,194 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

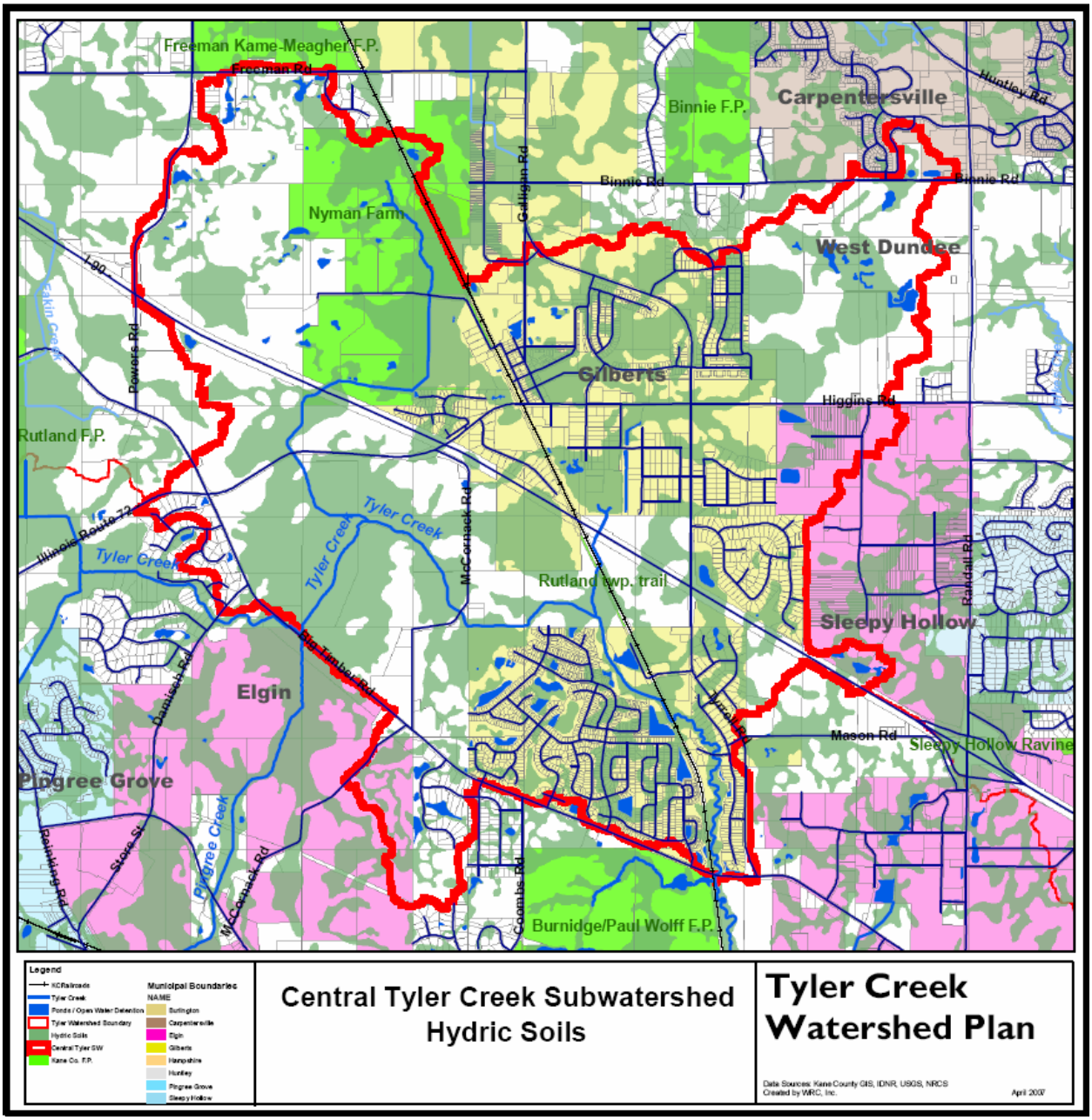

Figure 6.3: Hydric Soils

6.1.4 Subwatershed Drainage Features

Streams

The Central Tyler subwatershed features one main stream, Tyler Creek, and 2 tributary streams; Tyler Creek Tributary #4 and Tyler Creek Tributary #5.

Within this subwatershed, Tyler Creek has two very different characteristics. The first mile of Tyler Creek in this subwatershed (Big Timber Road north to the Union Pacific Railroad Bridge) is in very good condition. This section of Tyler Creek has no channelization and has a sufficient stream corridor buffer consisting of floodplain forest. The stream channel has good habitat (sand & gravel) and fairly stable, low-lying, vegetated streambanks.

The remaining 3.7 miles (80%) of Tyler Creek, upstream of the Union Pacific bridge, has been extensively channelized and its stream corridor has been heavily encroached upon by the historic agricultural landuses that have dominated the landscape for more than 100 years. This upstream section of Tyler Creek is bordered by a 50 to 75 foot wide swath of deciduous tree canopy, comprised of low quality and invasive tree species, such as Box Elder. The stream channel is deeply incised into the landscape, confining flood flows to the channel, and making flood flows more erosive.

Urban Drainage Systems

Analysis of land uses and aerial photography indicates that about 700 acres of the subwatershed is drained via storm sewer system networks. All of the land estimated to be served by storm sewer is within the jurisdiction of the Village of Gilberts. There are approximately 34 stormwater detention facilities constructed with the subwatershed, all under the jurisdiction of the Village of Gilberts.

Agricultural Tile Systems

Given the soils and gentle slopes of the agricultural land that dominates the western half of the subwatershed, it is estimated that about 35% (1,800 acres) of the Central Tyler subwatershed has been modified with the installation of agricultural drain tile systems. Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

6.1.5 Population

The use and analysis of population data in watershed planning is critical because of there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. According to the 2000 US Census, the

population in the subwatershed was about 1,580 people, or about 195 persons per square mile.

6.1.6 Landuse / Landcover

Land cover data for the Tyler Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was row crop agriculture, which accounted for roughly 41% of the subwatershed area. Rural grasslands accounted for another 21%, while wooded areas and wetlands account for an additional 14% of the subwatershed. Urban land cover, including urban grassland comprised the remaining 24% of the subwatershed.

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	8.8	0.17%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	2,119.9	40.82%
Winter Wheat	0	0.00%
Rural Grassland	1,074.5	20.69%
Low Density Urban	232.4	4.47%
Medium Density Urban	274.7	5.29%
High Density Urban	43.3	0.83%
Urban Grassland	679.8	13.09%
Shallow Marsh – Emergent Wetland	106.0	2.04%
Shallow Water Wetland	0.9	0.02%
Partial Forest /Savannah Upland	195.9	3.77%
Upland Forest	435.5	8.39%
Floodplain Forest	3.5	0.07%
Coniferous Forest	0	0.00%
Deep Marsh / Emergent Wetland	2.0	0.04%
Open Water	16.4	0.32%
TOTAL	**5,193.6**	**100.00%**

Table 6.1

6.1.7 Existing Watershed Development

Development in the subwatershed has occurred principally through municipal annexation of agricultural land for new residential, commercial, and office / light industrial developments. The 1999 Landcover data indicates the subwatershed had about 1,230 acres of development through 1999 (24%). New development since then has added about another 630 acres of residential development, bring the total developed area to about 1,860 acres, or 36% of the subwatershed.

Municipality	Area (acres)	Percent of Subwatershed
Carpentersville	25.0	0.5%
Elgin	240.0	4.6%
West Dundee	300.3	5.8%
Gilberts	2030.0	39.1%
Unincorporated	2,599.0	50.0%

Table 6.2

There are 42 miles of roads in the subwatershed, which equates to about 142 acres of impervious cover (roadway pavement only – excluding parking lots, sidewalks, and driveways).

6.1.7.1 Point Source Discharges

There is one permitted point source discharge in the subwatershed, according to IEPA NPDES data. The Gilberts WWTP has a NPDES permit (IL0068764) to discharge up to treated waste water effluent into Tyler Creek It is reported that this WWTP has an average discharge of 300,000 to 400,000 gallons per day.

6.1.8 Natural Resources

Kane County Forest Preserve Properties

There is one Kane County Forest Preserve District (KCFPD) in the subwatershed and parts of two other properties, totaling about 427 acres, or 8.2% of the Central Tyler subwatershed area.

Name	Area (acres)
Freeman Kame – Meagher F.P.	2.4
Rutland Township Trail	2.8
Nyman Farm F.P. (Oury Preserve)	421.8
Total	**427.0**

Table 6.3

Nyman Farm Forest Preserve is a 508 acre property that is one of many geologic gems in Rutland Township owned by the KCFPD. Rolling kettle and kame terrain is testament to the ancient glacial forces that shaped the region. Of exceptional interest to the botanically minded are the kettle wetlands, in the center of the **Oury** preserve, that harbor dozens of rare wetland plants. A very diverse mix of wetland types remain across the Oury preserve. In addition to the wetlands are the vistas afforded atop grassy knobs and knolls topped with ancient oaks. This set of preserves is likely to be a popular picnic and hiking destination in the future.

Other Publicly Protected Land

The Village of Gilberts owns 66 parcels totaling 236.6 acres within the Central Tyler subwatershed. 42 of these parcels, totaling 212.7 acres, protect portions of the Tyler Creek stream corridor, a few natural wetland complexes, and stormwater management areas (detention basins) in some developments. The remaining 24 parcels are public lands not containing any natural features (Village Hall, pump stations, etc.)

Wetlands

Kane County completed an Advanced Identification (ADID) Wetland Study in 2004. This study identified a total of 104 wetlands, totaling 974.4 acres, or 18.8% of the Central Tyler subwatershed. Of these, 43 wetlands, totaling 830.6 acres (85%) were determined to be of High Quality or High Functional Value, the highest rating under the ADID classification system.

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	36	472.9
HHQ	High Habitat Quality	7	357.7
APH	Artificial Pond in Hydric Soils	15	20.6
APN	Artificial Pond in Non-hydric Soils	0	0
LWF	Linear Water Feature	4	24.9
NOW	Natural Open Water	1	0.4
R	Fox River	0	0
W	Other Wetlands (lower quality)	41	97.9
	TOTAL	**104**	**974.4**

Table 6.4

All but one of the ADID wetlands classified as High Habitat Quality are located either within or immediately west of the Nyman Farm Forest Preserve. There is one ADID wetland classified as High Habitat Quality, located on the east side of the railroad tracks from the Gilberts WWTP. According to the ADID field notes, the high quality portion of this wetland is much less than 11.2 acres reported as wetland.

Threatened & Endangered Species

The Kane County ADID Wetland Study indicates that there are Threatened and Endangered species located in Wetland #404 (138 acre marsh / sedge meadow wetland) between Nyman Farm F.P. and Powers Road, south of Freeman Road. No data was provided on the specific species and whether the T&E designation was state or federal.

A mussel survey completed in June 2001 by EA Engineering (found in the 2004 Huff & Huff, Inc. study of Tyler Creek) found numerous specimens of the Illinois State Threatened Slippershell Mussel in Tyler Creek, between Big Timber Road and upstream of Tyler Creek Tributary #4 (northeast side of Timber Trails subdivision). This coincides with the reasonably undisturbed character of Tyler Creek in this reach, which is well preserved in a heavily wooded stream corridor that averages about 200 feet in width.

Common Name	Scientific Name	Type	Status
Slippershell Mussel	*Alasmidonta viridis*	Mussel	IL Threatened

Table 6.5 Source: Nov. 2004 Huff & Huff Report prepared for the Village of Gilberts

Existing Greenways

There are no formal greenways established in the Central Tyler subwatershed, however, the Village of Gilberts received ownership of the parcels adjacent to the Woodland Meadows and Timber trails subdivisions through which the Tyler

Creek flows. The 1.75 miles of Tyler Creek that flow through these parcels are by far the highest quality sections of Tyler Creek in the subwatershed. Upstream of the Timber Trails subdivision, there are no other publicly protected lands adjacent to Tyler Creek to buffer it from agricultural encroachment or future development. The upper 60% of Tyler Creek Tributary #5 (upstream of Interstate 90) is also protected as it flows within the Nyman Farm Forest Preserve.

6.2 Analysis of Subwatershed Data and Problem Identification

6.2.1 Water Quality Data

The EPA is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Tyler Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Tyler Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Tyler Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from urban runoff, storm sewers, and runoff from forest / grassland / parklands. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Tyler Creek, although the ratings for these uses were classified as "not assessed".

The IEPA maintains three water quality sampling stations in the watershed, although none are in the Central Tyler subwatershed. They are listed in the table below:

Station	Stream	Location
DTZP01	Tyler Cr.	Tyler Creek at Illinois Route 31 Bridge
DTZP02	Tyler Cr.	Tyler Creek below stone bridge at Tyler Creek Forest Preserve
DTZP04	Tyler Cr.	Tyler Creek at Randall Road

Table 6.6

The FRWMN, administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites on Tyler Creek, two of which are located in the Central Tyler Subwatershed. FRWMN Site #50 is located on Tyler Creek at the pedestrian bridge just downstream of the Gilberts WWTP. FRWMN Site #18 is located on Tyler Creek downstream of McCornack Road. During 2005 & 2006 monitoring periods, the 2 FRWMN sites in the subwatershed reported water quality index values (based on macroinvertebrate sampling) as Fair to Poor. Many of the "Poor" classifications occurred during 2005 when the

watershed experienced a severe drought, which likely impacted the number and distribution of macroinvertebrates in the stream channel at the sampling sites.

In 2004, Huff & Huff, Inc, completed a biological and water quality assessment of Tyler Creek between McCornack Road and Randall Road (Central Tyler Subwatershed & Lower Tyler Subwatershed). This study, prepared for the Village of Gilberts relating to expansion of their wastewater treatment plant, collected data on fish species, mussels, macroinvertebrates, and some water quality parameters (dissolved oxygen, phosphorus, nitrogen, and ammonia). The report indicated that during August 2004, dissolved oxygen levels dropped below 5 mg/L between McCornack Road and just downstream of the Gilberts WWTP. Dissolved oxygen in the higher quality sections of Tyler Creek (from Big Timber Road extending downstream to Randall Road) did not drop below the minimum 5 mg/L limit.

This is in part due to the changes in stream channel gradient. Upstream of the Gilberts WWTP, the stream channel descends roughly four feet in elevation per mile, while downstream; the stream channel descends almost 24 feet per mile. The low gradient, and somewhat sluggish current in the upper reach, can contribute to warmer water temperatures and lower dissolved oxygen levels. In contrast, the much steeper channel gradient in the downstream reach provides opportunities for oxygenation of the water column, and the more heavily shaded stream corridor helps keep water temperatures lower.

6.2.2 Flooding Problems

There are no known flooding problems in the Central Tyler watershed in which dwellings are subjected to flood damages. The 100-year floodplain along the mainstem of Tyler Creek in the Central Tyler Subwatershed has been calculated, and floodplain elevations have been established. The floodplain for Tyler Creek Tributary #4 has also been determined as far north as Interstate 90, but remains an unnumbered “A” Zone north of that point where the stream originates (near the business park south of Illinois Route 72). The floodplain for Tyler Creek Tributary #5 has been determined only as far as Illinois Route 72, or less than 255 of its length. North of Illinois Route 72, the floodplain for this tributary is listed as an unnumbered “A” Zone floodplain, in which the floodplain area is only estimated. The map suggests that there is substantial floodplain storage in the existing agricultural land between Illinois Route 72 and Interstate 90.

6.2.3 Projected Development & Growth

In 1999, development occupied about 1,230 acres, or 23% of the subwatershed. Between 1999 and 2006, development increased to more than 1,840 acres, or 35% of the subwatershed. More than 85% of this new development occurred under the jurisdiction of the Village of Gilberts. Within the Central Tyler subwatershed, the Village of Gilberts Comprehensive Plan (dated 06/09/03) suggests that Gilberts may add an additional 1,200+ acres of residential, commercial, and office / business park development in the future.

All totaled, the developed land in the Central Tyler Subwatershed will increase from 1,840 acres (35%) to more than 3,060 acres (59%). The Village of Gilbert’s population is projected to increase from 1,297 in 2000 to more than 14,000

residents by the year 2030. As much as 40% of those 14,000 Gilbert residents will live in the portion of Gilberts that lies within the Central Tyler Creek Subwatershed.

If not carefully planned and designed, the proposed land use changes in the subwatershed will result in profoundly negative impacts on water quality, total runoff, stream stability, and the ecological integrity of this portion of Tyler Creek.

6.2.4 Estimated Pollutant Loading

Water quality concerns in the watershed are closely tied to land uses. Pollutant load estimates in the Central Tyler Creek subwatershed were estimated under existing and future condition land uses. Nutrient loads are expected to decrease significantly as agricultural uses decline. Future pollutant estimates assumed low density development. Higher density or commercial development will may results in significant increases in pollutant loads. In addition, if urbanization replaces agriculture, additional pollutants associated with urban land uses will be generated. Strategies for reducing existing sediment, nutrient and fecal coliform loadings are discussed in Chapters 3 and 4 .

Pollutant	Existing Condition	Future Condition
	Lbs	Lbs
Total N	22,864	18,532
Total P	1,661	1,002
Sediment (tons)	1183	1089
Runoff (acre-ft)	1,617	1,875
Fecal Coliform (FC)	32,304	32,726

Table 6.7

6.2.5 Natural Area Protection Problems

Forest Preserve Sites

The Nyman Farm Forest Preserve requires on-going management to rid the site of Reed Canary Grass and Purple Loosestrife.

ADID Wetland Sites

In the CTCSW, only 974 acres of wetland remain, compared to an estimated 2,200 acres that existed before settlement. That means that about 55% of the wetland have already been lost and can no longer provide their valuable functions. Therefore, it is critical that the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can benefit from the functions these wetlands provide.

There are six High Habitat Quality wetlands and one High Functional Value wetland comprising almost 500 acres of wetlands north of Interstate 90 between Powers Road and Galligan Road. There wetlands are critical ecosystem components that provide significant habitat benefits, as well as groundwater recharge. About 40% of these wetlands are located on private properties.

ADID Wetland #521 is a high functional value wetland located along the Tyler Creek stream corridor between Hennessy Court and the Union Pacific railroad bridge to the north. This wetland is part of the highest quality section of stream corridor in the subwatershed and is contiguous with the extremely high quality reach of Tyler Creek between Big Timber Road and Randall Road. This particular wetland is bordered upstream and downstream by publicly protected stream corridor, but remains in private ownership. Aerial photography and ADID field notes indicate that this stream corridor wetland is impaired by turf grass encroachment to the edge of the stream bank in many places and lack of vegetative management to control exotic/invasive species.

6.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following is a summary list of recommendations for the Central Tyler Creek subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Tyler Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Section 2.5. Note that there are several general, or watershed-wide recommendations contained in Chapter 3, Watershed Plan Recommendations.

Type: Education/Outreach; Regulatory; Natural Habitat Restoration; Monitoring; Permanent Habitat Protection, Water Quality, Flood Control
Target Goals: Which watershed plan goals the recommendation is intended to address.
Initial Cost: the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost: the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party: Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority: A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2007 Tyler Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated /accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

A map of Central Tyler Creek Subwatershed Recommendations can be found at the end of this section, Figure 6.6

Ordinance/Planning Recommendations

Recommendation 2-1

Require high-intensity land developments between Interstate 90 and Tyler Creek implement water quality BMPs in their stormwater management system to maximize pollutant removal prior to discharge to Tyler Creek.

Type: Regulatory / Water Quality
Target Goals: Goal 2, Objectives 1, 2 and 3; Goal 3 Objective 1
Initial Cost: unknown (municipal staff & elected official time)
Annual Cost: unknown (municipal staff & elected official time)
Responsible Party: Village of Gilberts
Priority: High

Recommendation 2-2

Accurately map existing 100 year floodplain on Tyler Creek Tributary #5 between IL Route 72 and Interstate 90 and preserve area as regional flood storage. Consider de-channelizing and recreating wetland habitat as part of new development proposed for the properties. Implement water quality BMPs as part of any proposed development.

Type: Regulatory / Water Quality
Target Goals: Goal 1, Objective 2; Goal 2, Objective 3; Goal 3 Objective 1
Initial Cost: $50,000 (for floodplain mapping)
Annual Cost: none
Responsible Party: Village of Gilberts with support from Kane County Dept of Building & Environmental Management
Priority: High

Natural Area Restoration Projects

The recommendations in this section are site-specific natural area restoration projects that should be implemented to increase natural habitat quality and diversity along the Tyler Creek stream corridor. Restoration projects not only serve to increase critical native habitats, they also provide many indirect water quality benefits as well. Removing non-native vegetation and installing native, deep – rooted vegetation on slopes and stream banks decreases erosion and the resulting sediment that is washed into the stream. Thinning out invasive and nuisance species along stream corridors also serves to reduce current and potential debris jams, which create artificial, stagnant areas along the stream (resulting in low dissolved oxygen) and also increases the net amount of nutrient inputs to the stream as the debris breaks down in the channel.

Estimating costs for restoration projects can range from $100 to more than $3,000 per acre of woodland, wetland, or prairie habitat restored. The upper range reflects the unit cost for restoration work contracted out to a private contracting company. Costs (especially annual costs) could be significantly reduced if the work is performed by agency staff or local volunteers.

Annual costs are estimated to be roughly 10% of the initial cost an cover items such as herbicide applications, brush removal, and controlled burns.

Recommendation 2-3

Protect portions of high-quality ADID Wetland #487 (near Tyrell Road and Gilberts WWTP driveway) that is on private property, by working with landowners to secure conservation easements and providing wetland management assistance maintain plant diversity.

Type: Natural Habitat Restoration / Permanent Habitat Protection
Target Goals: Goal 1, Objectives 1 & 3.
Initial Cost: unknown
Annual Cost: unknown
Responsible Party: Local Not-for-profit Land Trust Organization
Priority: Medium

Recommendation 2-6

Protect and restore portions of Tyler Creek stream corridor on private properties between Hennessy Court and UP/C&NW Railroad right of way. Work with landowners to secure conservation easements and providing stream corridor restoration assistance.

Type: Natural Habitat Restoration / Permanent Habitat Protection
Target Goals: Goal 1, Objectives 1 & 3.
Initial Cost: $40,000
Annual Cost: $3,500 (could be substantially reduced if management is done by property owners)
Responsible Party: Private Landowners / support from Local Not-for-profit Land Trust Organization
Priority: Medium

Water Quality Projects

Recommendations 2-1 and 2-2 in the Regulatory Section are intended to facilitate the construction of naturalized stormwater management and recreated wetland features which will improve water quality released to Tyler Creek from adjacent future developments.

Recommendation 2-5:

Investigate feasibility of re-configuring existing wetland to maximize water quality treatment functions to improve runoff from upstream high-intensity urban area.

Type: Water Quality
Target Goals: Goal 1, Objective 1
Initial Cost: Study - $30,000; Construction - $250,000
Annual Cost: Post-Construction Maintenance: $5000
Responsible Party: Village of Gilberts / private landowners
Priority: Low

Recommendation 2-7

Retrofit dry bottom detention basin with native vegetation and micro-topography to increase water quality treatment functions for low flows.

Type: Water Quality
Target Goals: Goal 1, Objective 1
Initial Cost: $5000
Annual Cost: $350
Responsible Party: Triple Oaks Farm HOA / support from Kane Co Water Resources Department
Priority: Low

Permanent Habitat Protection Recommendations

Recommendation 2-4:

Contact private landowners along Freeman and Powers Road and encourage them to provide permanent protection of the high quality wetlands through conservation easement. (ADID wetlands #404, #385, and #386 along south side of Freeman Road and east side of Powers Road).

Type: Permanent Habitat Protection / Site Restoration
Target Goals: Goal 1, Objective 1
Initial Cost: unknown
Annual Cost: unknown
Responsible Party: Private Landowners / Local Not-for-profit Land Trust Organization
Priority: Low

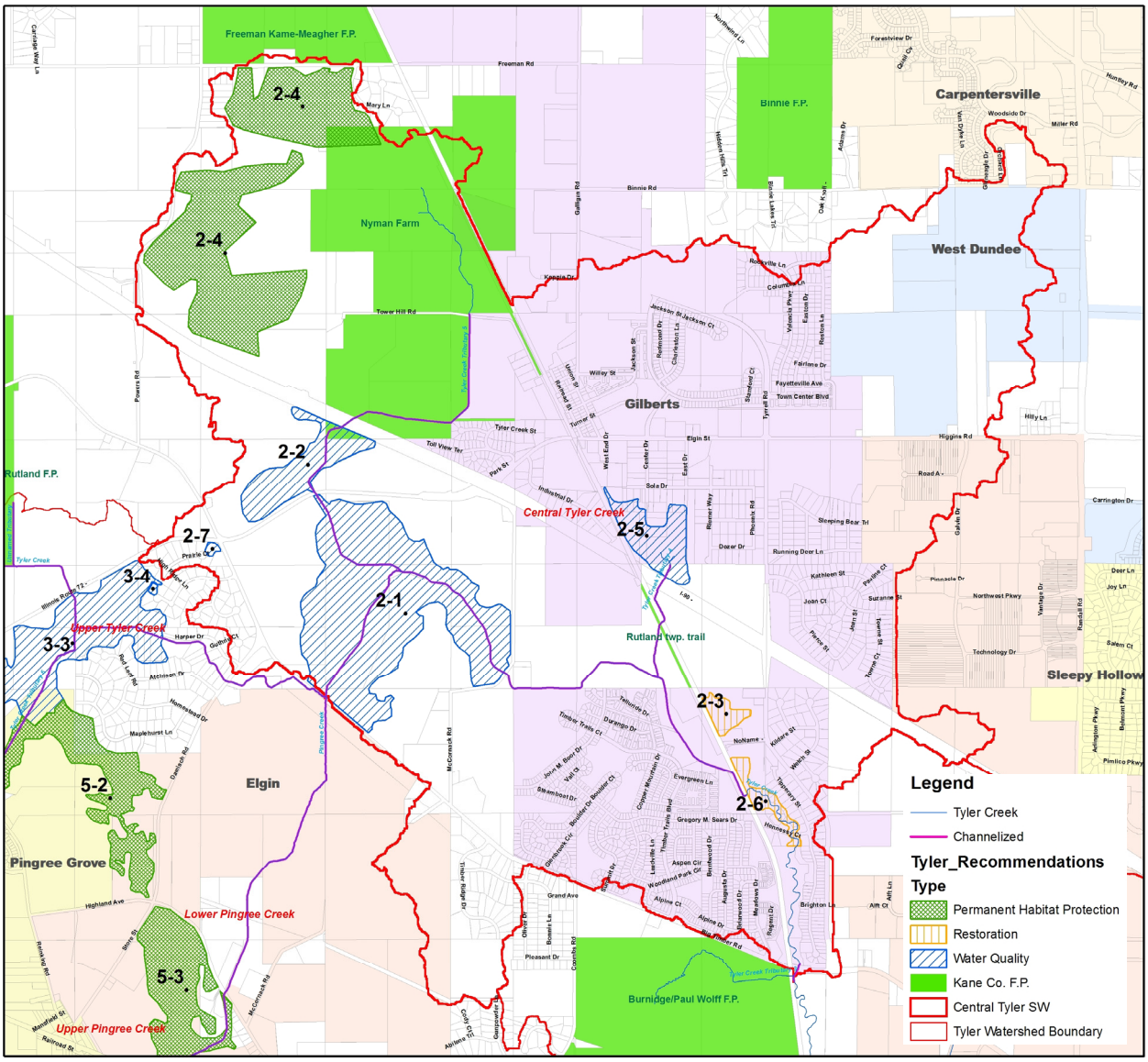

Figure 6.6 Site-specific recommendations location map

REC NUMBER	REC TYPE	DESCRIPTION	RESPONSIBLE PARTY	INITIAL COST	ANNUAL COST	PRIORITY
2-1	Water Quality	Proactive Water Quality BMP and Green Infrastructure planning for future developments	Village of Gilberts	$0	$0	High
2-2	Water Quality	Preserve existing flood storage. Map floodplain. Implment proactive Water Quality BMP and Green Infrastructure planning for future developments	Village of Gilberts	$50,000	$0	High
2-3	Permanent Habitat Protection	Protect and restore high quality ADID Wetland 487	Private Landowners / NP Land Trust Org support	$0	$0	Medium
2-4	Permanent Habitat Protection	Permanently protect high quality ADID Wetland 404	Private Landowners / NP Land Trust Org support	$0	$0	Medium
2-4	Permanent Habitat Protection	Permanently protect high quality ADID Wetlands 385 and 386	Private Landowners / NP Land Trust Org support	$0	$0	Medium
2-5	Water Quality	Investigate feasibility of reconfiguring existing wetland to maximize water quality treatment functions for upstream urban runoff	Village of Gilberts / private landowners	$30,000	$0	Low
2-6	Natural Habitat Restoration	Protect and restore Tyler Creek stream corridor on private property	Private Landowners / NP Land Trust Org support	$40,000	$3,500	Medium
2-7	Water Quality	Retrofit dry bottom detention basin	Triple Oaks Farm HOA	$5,000	$350	Low

Table 6.8 Summary of recommended BMPs for the Central Tyler Creek Subwatershed

The recommended BMPs, projected load reductions and costs for the Central Tyler Creek subwatershed are summarized in Table 6.9 The watershed is about 36% developed. Dominant sources of pollutants remain however agricultural. The Gilberts WWTP is a minor discharger contributing to pollutant loads at lows flows. Future expansion of the WWTP may increase low-flows substantially. Increases of nutrient and BOD loads may also occur. It is recommended that the progress of water quality conditions be tracked so that the contribution of various sources is known. The recommended BMPs will reduce pollutant loads by 24 to 50 per cent.

Table 6.9 Recommended BMPs for the Central Tyler Creek Subwatershed

BMP	Type of BMP	Project Locations [2]	BMP		Removal Efficiency**			Total Cost ($)	Pollutant Load Reduction (lbs/year)			Percentage Reduction (%)		
			Size	Unit	TN	TP	TSS		TN	TP	TSS	TN	TP	TSS
Natural Habitat Restoration	Site-specific	2-6,	14	acres	30%	35%	60%	$40,000	92	8	10	0.4	0.5	0.8
Permanent Habitat Protection	Site-specific	2-3, 2-4	263	acres	53%	51%	88%	0	3,068	214	264	13.4	12.9	22.3
Conservation Development Practices	Site-specific	2-1, 2-2	50	acres	52%	58%	64%	$50,000	572	46	36	2.5	2.8	3.1
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	-	-	-	$10,000	1,143	83	59	5.0	5.0	5.0
Nutrient Management	Watershed-specific	Subwatershed wide – agricultural parcels	500	acres	70%	28%	-	$50,000	7,704	224	-	33.7	13.5	-
Detention Basin Retrofit	Site Specific	2-7	1	lump sum	32%	55%	68%	$5,000	244	26	13	1.1	1.6	1.1
Wetland Restoration	Sub-watershed	2-5	1	lump sum	53%	51%	88%	$30,000	12	1	1	0.1	0.0	0.1
Total								$185,000	12,835	602	383	56.1	36.3	32.4

[2] Project locations and details are described iin Section 6.3, Table 6.8 and in Figure 6.6
** TN = total Nitrogen; TP = total Phosphate; TSS = total Suspended Solids or Sediment.

Chapter 7
UPPER TYLER CREEK SUBWATERSHED

7.1.1 Subwatershed Location

The Upper Tyler Creek subwatershed is located in the northwestern portion of the Tyler Creek Watershed. This subwatershed has an area of 6,366 acres, or 9.9 square miles. The boundary of the Upper Tyler Creek Subwatershed is shown in Figure 7.1. The subwatershed is located within principally in southwestern Rutland Township, but extends somewhat into Hampshire Township and Plato Township. The subwatershed is roughly bordered by Big Timber Road on the north, Briar Hill Road on the west, Plank Road on the south, and Damisch Road on the east.

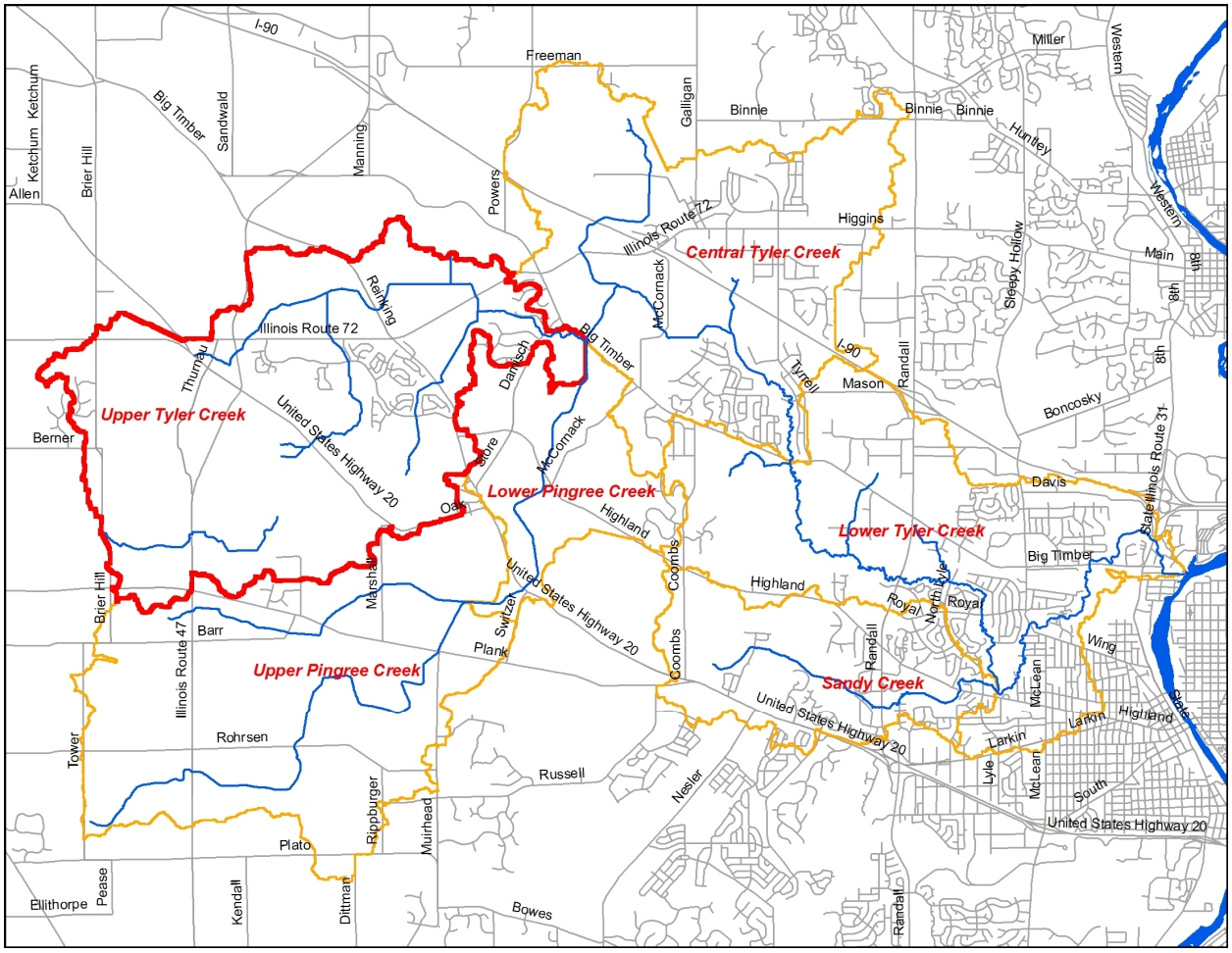

Figure 7.1. Subwatersheds in the Tyler Creek Watershed

7.1.2 Topography & Geology

The topography of the subwatershed varies from flat (< 1% slope) in the north and central regions to moderately steep in the western one-third of the subwatershed (3% - 5% slopes). The highest point in the subwatershed is located at the northwest corner and has a maximum elevation of 1,046 feet. The lowest elevation is if found where Tyler Creek meets Pingree Creek at Big Timber Road, where the elevation is only 886.

7.1.3 Soil Conditions

The glacial advances result in a wide variety of soil associations. The soils in the Upper Tyler subwatershed consist of mainly silty loams soil units on 0% - 2% slopes. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 2,601 acres, or 41% of the 6,366 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

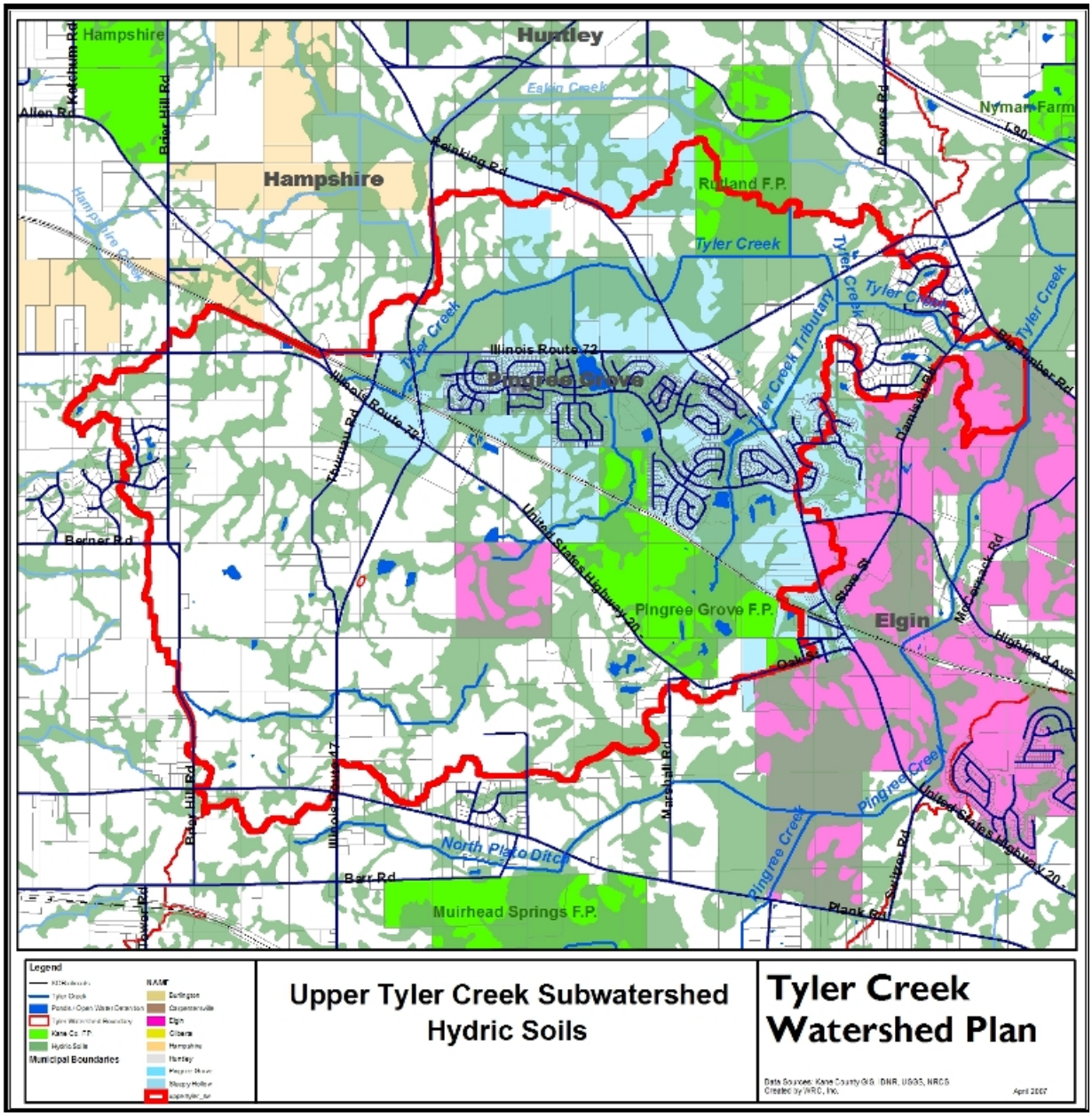

Figure 7.2: Hydric Soils

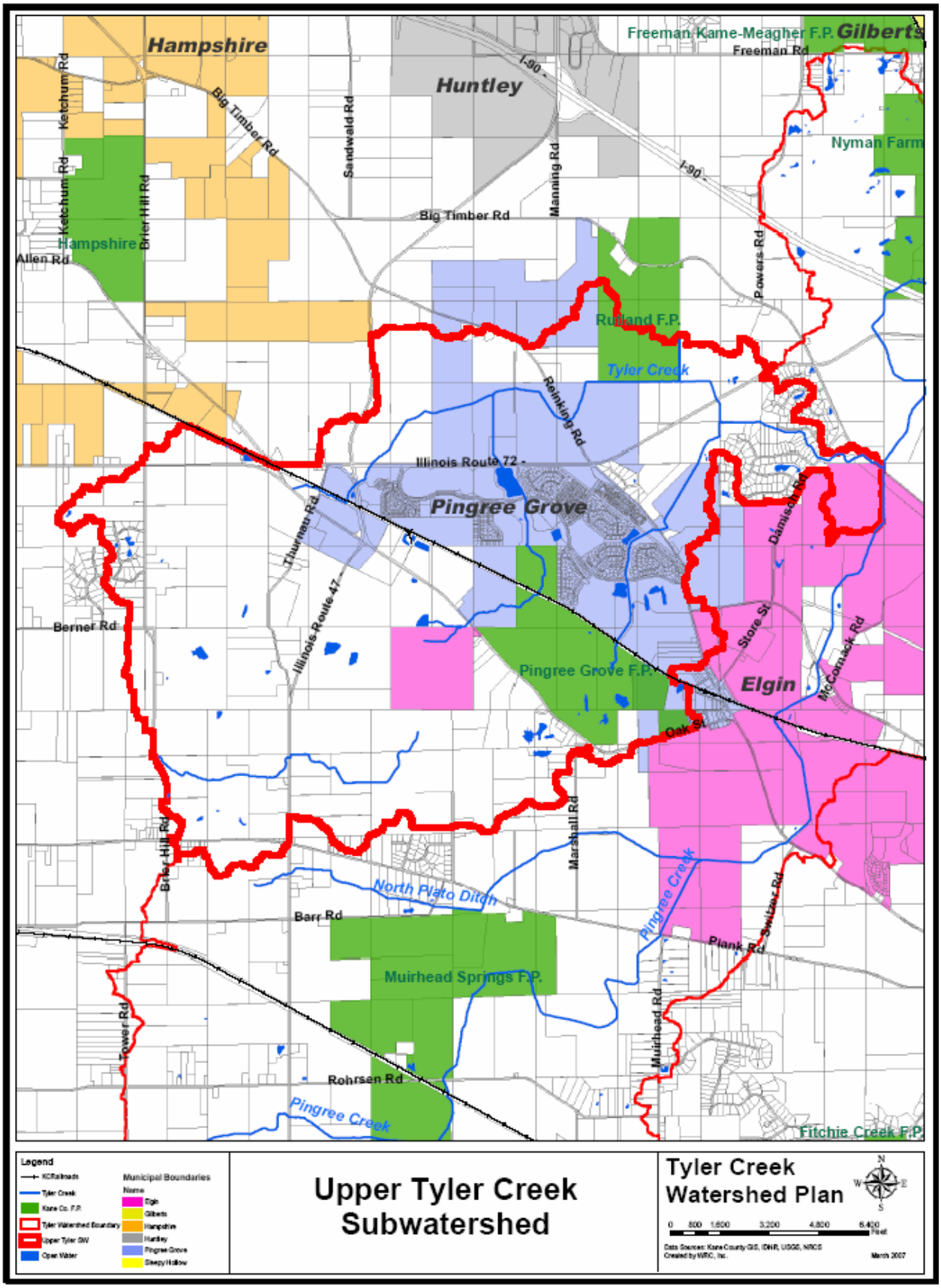

Figure 7.3. Subwatershed Map

7.1.4 Subwatershed Drainage

Streams

The principal stream in the Upper Tyler subwatershed is Tyler Creek. Within this subwatershed, Tyler Creek is a short, 4.6 mile long, low-gradient headwater stream. Tyler Creek's origin can be found in the field south of Illinois Route 72, about ½ mile west of Illinois Route 47. The first mile of Tyler Creek is heavily channelized and bordered by a thick deciduous tree canopy along its narrow stream corridor. Continuing downstream, the stream is 100% channelized for 2.3 miles and is contained within a very narrow, 50 foot wide incised stream corridor dominated by invasive herbaceous vegetation. The lower 1.3 miles of Tyler Creek in the subwatershed is channelized, but passes through a large wetland complex (ADID Wetland 466) and rural residential developments. Overall, the stream channel is very incised with a silty / sand substrate and banks dominated by Reed Canary Grass and Brome Grass.

There are two tributaries in the subwatershed; Tyler Creek Tributary #6, and Tyler Creek Tributary #7. Tyler Creek Tributary #6 originates in the partial forest savannah east of Brier Hill Road, about ½ mile north of Plank Road. This small stream, though historically channelized, passes through four high quality wetland complexes. The interesting feature of this tributary is that in two sections, this small stream actually flows underground through large agricultural field tiles.

Tyler Creek Tributary #7 originates near the Klehm Ornamentals property south of US Route 20, west of Pingree Forest Preserve. This stream has historically been channelized and tiled to the extent that across many parcels, the stream has been directed to flow underground via agricultural drain tile. This agricultural tile traverses the western portion of the Pingree Grove Forest Preserve before emptying into a series of stormwater ponds excavated out of the stream corridor in the Cambridge Lakes development. The last ½ mile of Tributary #7 exists as a channelized ditch through an agricultural field, with a narrow herbaceous buffer.

Analysis of aerial photography indicates that about 83% of the streams in the Upper Tyler Subwatershed have been channelized. This includes 100% of main stem of Tyler Creek.

Urban Drainage Systems

Analysis of land uses and aerial photography indicates that about 10% of the subwatershed is drained via storm sewer systems. The largest of these systems is the storm sewer system that services the Cambridge Lakes development in Pingree Grove. There are an estimated 18 open water stormwater detention basins in the subwatershed, and perhaps five or six dry-bottom detention facilities serving the rural residential developments of the subwatershed, as well as a few of the non-residential commercial / business parcels along US Route 20.

Agricultural Tile Systems

Given the soils and gentle slopes of the agricultural land that dominates the western half of the subwatershed, it is estimated that about 70% (4,456 acres) of the Upper Tyler subwatershed has been modified with the installation of agricultural drain tile systems. Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

7.1.5 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources.

According to the 2000 US Census, the population in the subwatershed was about 759 people, or only 76 persons per square mile. However, it is apparent to even the casual visitor to the subwatershed that there has been a substantial population increase in the last five years with the Cambridge Lakes development in Pingree Grove; adding perhaps as many as 500 new residents, or more than a 60% increase in population since 2000 (increase estimated from Kane GIS data, 2007).

7.1.6 Landuse / Landcover

Land cover data for the Tyler Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was row crop agriculture, which accounted for roughly 60% of the subwatershed area. Rural grasslands accounted for another 24%, while wooded areas and wetlands account for an additional 9% of the subwatershed. Urban land cover, including urban grassland comprised the remaining 7% of the subwatershed.

Land Cover Description	Total Acres	Percent of SW
Barren & Exposed Land	6.5	0.10%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	3,839.2	60.30%
Winter Wheat	0	0.00%
Rural Grassland	1,535.9	24.13%
Low Density Urban	171.2	2.69%
Medium Density Urban	116.8	1.83%
High Density Urban	7.5	0.12%
Urban Grassland	140.6	2.21%
Shallow Marsh – Emergent Wetland	66.6	1.05%
Shallow Water Wetland	0	0.00%
Partial Forest /Savannah Upland	116.7	1.83%
Upland Forest	302.3	4.75%
Floodplain Forest	7.1	0.11%
Coniferous Forest	0	0.00%
Deep Marsh / Emergent Wetland	43.5	0.68%
Open Water	12.5	0.20%
TOTAL	**6,366.4**	**100%**

Table 7.1

7.1.7 Existing Watershed Development

Historically, the Upper Tyler Creek subwatershed was an agricultural area, with a very small amount of rural / estate residential development and the rural villages of Pingree Grove and Starks, which occupied less than 150 acres. Non-agricultural, unincorporated residential development in the subwatershed is currently around 180 dwellings on 256 acres (mean lot size = 1.4 acres). There are about 23 additional rural residential (1+ acre) lots planned (but yet to be

developed) in the Maplehurst subdivision at Damisch and Big Timber Road that will drain into the Upper Tyler subwatershed.

The Village of Pingree Grove has annexed significant portions of the Upper Tyler subwatershed and now has jurisdiction over 1,690 acres, or 27% of the overall Upper Tyler subwatershed. Elgin has annexed to the confluence of Tyler and Pingree Creeks, and has jurisdiction over about 274 acres of the subwatershed. None of the land annexed to the City of Elgin is currently developed and only 50% of the land annexed to Pingree Grove is currently developed.

Municipality	Area (acres)	Percent of SW
Village of Hampshire	0.2	< 0.1%
Elgin	274.1	4.3%
Village of Pingree Grove	1,690.8	26.6%
Unincorporated	4,401.5	69.1%

Table 7.2

There are 29.2 miles of roads in the subwatershed, which equates to about 99 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There are no permitted point source discharges in the subwatershed. The Village of Pingree Grove operates a wastewater treatment facility that serves its growing population, however the plant utilizes a land application system and therefore no wastewater effluent is discharged directly into Tyler Creek or its tributaries.

7.1.8 Natural Resources

Kane County Forest Preserve Properties

There are two Kane County Forest Preserve properties in the Upper Tyler subwatershed, totaling about 511 acres, or 8% of the subwatershed area.

Name	Area (acres)
Rutland F.P.	116.1
Pingree Grove F.P.	394.7
Total	**510.8**

Table 7.3

The Pingree Grove Forest Preserve contains over 300 acres of wetland in this 394 acre property. Pingree Grove is a magnificent marsh and woodland, and contains rich fen edges, prairie and wooded shorelines, Bur Oak-covered islands and peninsulas, and isolated wetland pockets, each with a different high quality plant community. It is home to Great Blue Herons and nesting Sand Hill Cranes, and a host of fine wetland birds. It is also a popular visiting spot for the endangered Yellow-Headed Blackbird and the American Bittern (*Source: Kane County Forest Preserve District webpage*).

Other Publicly Protected Land

The Village of Pingree Grove owns 17 parcels totaling 83.9 acres within the subwatershed. Most of this is comprised of the parcels on which the Village's waste water treatment plant is located,

and in a large detention basin within the Cambridge Lakes development at Route 72 and Richard J. Brown Drive.

Wetlands

Kane County completed an Advanced Identification (ADID) Wetland Study in 2004. This study identified a total of 78 wetlands, totaling 721 acres, or 11% of the Upper Tyler subwatershed. Of these, 16 wetlands, totaling 569.9 acres (79%) were determined to be of High Quality or High Functional Value, the highest rating under the ADID classification system.

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	10	220.1
HHQ	High Habitat Quality	6	349.8
APH	Artificial Pond in Hydric Soils	16	21.8
APN	Artificial Pond in Non-hydric Soils	0	0
LWF	Linear Water Feature	4	7.2
NOW	Natural Open Water	0	0
R	Fox River	0	0
W	Other Wetlands (lower quality)	42	121.9
	TOTAL	**78**	**720.7**

Table 7.4

The wetland with the highest habitat quality in the Upper Tyler Subwatershed is the marsh located within the Pingree Grove Forest Preserve. This wetland actually has the highest weighted score (37) of ALL wetlands in Kane County, not just Tyler Creek (combination of plant diversity & health along with the overall size). Additionally, this wetland and three other High Quality Habitat wetlands are all located along Tributary # 7 (which passes through the Cambridge Lake Development).

Threatened & Endangered Species

The Kane County ADID Wetland Study indicates that there are Threatened and Endangered species located in Wetland #539 (Pingree Grove F.P.) This is likely referring to the occurrence of Sandhill Cranes, an Illinois State Threatened Bird that is known to inhabit the wetland (KCFPD staff records).

Existing Greenways

There are no formal greenways established in the subwatershed.

7.2 Analysis of Subwatershed Data and Problem Identification

7.2.1 Water Quality Data

The -IEPA is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Tyler Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Tyler Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Tyler Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from urban runoff, storm sewers, and runoff from forest / grassland / parklands. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Tyler Creek, although the ratings for these uses were classified as "not assessed".

The IEPA does not maintain any water quality sampling stations in the Upper Tyler Creek subwatershed.

The FRWMN, administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites along Tyler Creek. However, there are no sampling sites in the Upper Tyler subwatershed.

In 2003, stream monitoring was done by Hey & Associates, Inc. to assess the ecological impacts of the proposed expansion of the Pingree Grove Wastewater Treatment Plant. Sampling was done on the main stem of Tyler Creek, and on the first tributary to Tyler Creek in the subwatershed, adjacent to where the Pingree Grove WWTP is located. Sampling was done on this tributary stream at Reinking Road and on the main stem of Tyler Creek at the Big Timber Road bridge (just above the confluence with Pingree Creek). The data reflects the degraded conditions that both the tributary and this upper reach of Tyler Creek have experienced as a result of extensive channelization and agricultural runoff. Macroinvertebrate index values for both sites were above 7.5, which indicates a Class "D" or Limited Aquatic Resource. In August 2003, water quality samples were also collected at both locations and found very high levels of total phosphorus (0.2 – 0.28 mg/L). Ammonia-nitrogen was also found to be very high at the Tyler Creek Tributary / Reinking Road station (0.44mg/L) and dissolved oxygen in the tributary was measured as low as 0.8-2.2 mg/L (5 mg/L is the minimum needed to support a healthy aquatic community, including fish).

7.2.2 Flooding Problems

There are no known flooding problems in the Upper Tyler watershed in which dwellings are subjected to flood damages. However, most of the streams in the subwatershed have not had their floodplains accurately calculated or mapped. The FEMA maps currently show the floodplain for Tyler Creek upstream (west) of Illinois Route 72 to be an unnumbered "A" Zone. The 100-year floodplain for the Tributary #6 through Cambridge Lakes has recently been mapped as part of Pingree Grove's expansion, although the floodplain for this tributary remains unmapped upstream of US Route 20. The second tributary (#7), which joins Tyler Creek west of Rutland Forest Preserve, and had no reported floodplain mapping. However, it is believed that new floodplain mapping has likely been generated as part of the on-going development in the vicinity (Cambridge Lakes South and Cambridge Lakes North developments bordering IL Rt 72).

7.2.3 Projected Development & Growth

In 1999, development occupied about 450 acres, or 7% of the subwatershed. Between 1999 and 2006, development increased to almost 1,100 acres, or 17% of the subwatershed. About 630 acres of the 650 acres of new development in that time period occurred in one development (Cambridge Lakes South) that was part of the Village of Pingree Grove. Within the Upper Tyler Creek subwatershed, the Village of Pingree Grove has another 700 acres of "undeveloped land" within its current municipal borders.

The City of Elgin currently has 689+ acres planned for residential development by 2010, and their Comprehensive Land Use Plans estimates 77 acres of light industrial and 697 acres of business park / warehouse developments along the Illinois Route 47 corridor, along with another 425+ acres of new residential development.

The Village of Gilberts also has indicated plans to annex in the northeast portion of the Upper Tyler subwatershed. There are about 200 acres of agricultural land north of Illinois Route 72 that the Village of Gilberts has proposed to become office / business park.

All totaled, the developed land in the Upper Tyler Creek subwatershed will increase from 1,100 acres (7%) to 3,888+ acres (61%). If not carefully planned and designed, the proposed land use changes in the subwatershed will result in profoundly negative impacts on water quality, total runoff, stream stability, and the ecological integrity of this portion of Tyler Creek.

7.2.5 Estimated Pollutant Loads

The table below summarizes pollutant load estimates in the Upper Tyler Creek subwatershed under existing and future condition land uses are summarized below. Nutrient loads are expected decrease as agricultural uses decline. The future load projections however assumed low-density development. Higher density residential or commercial development will result in higher loads. In addition, if agriculture displaced by urbanization, additional pollutants such as metals, oils and grease will be generated in addition to nutrients and sediment. Strategies for reducing existing pollutant loadings are discussed in Chapter 3 and 4.

Pollutant	Existing Condition	Future Condition
Total N (lbs/yr)	33,669	29,805
Total P (lbs/yr)	3,161	2,445
Sediment (tons/yr)	1,897	1,621
Runoff (acre-ft per yr.)	1,571	1,735
Fecal Coliform (FC)	35,922	36,072

Table 7.5 Estimated annual pollutant loads for the Upper Tyler Creek Subwatershed

7.2.5 Natural Area Protection Problems

Forest Preserve Sites

As of this writing, there is no information about specific management issues or concerns from KCFPD staff on specific properties in the subwatershed.

ADID Wetland Sites

In the Upper Tyler subwatershed, only 721 acres of wetland remain, compared to an estimated 2,601 acres that existed before settlement. That means that about 72% of the wetlands have already been lost and can no longer provide their valuable functions. Therefore, it is critical that the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can continue to benefit from the functions these wetlands provide.

There are six High Habitat Quality wetlands in the subwatershed. Each of these is in need of either protection and/or restoration to maintain the high quality characteristics that make the wetlands so valuable to the watershed.

High Habitat Quality (HHQ) ADID Wetland #539 is located in the Pingree Grove Forest Preserve and is the highest rated wetland in all of Kane County. This 120 acre marsh, despite its high quality and protection status as a Forest Preserve, is suffering from invasive species (Cattails & Reed Canary Grass). This site also faces future threats from altered hydrology and poor water quality associated with urban stormwater runoff from future developments planned upstream of the Forest Preserve.

High Habitat Quality (HHQ) ADID Wetland #1085 is located on private property along the south side of US Route 20, across from the Pingree Forest Preserve. Threats to this 56+ acre marsh are invasive species, and in the future, altered hydrology and poor water quality associated with urban stormwater runoff from future upstream developments.

High Habitat Quality (HHQ) ADID Wetland #1086 is located on private property between Illinois Route 47 and US Route 20 about ½ mile north of Plank Road. This 109 acre wetland contains sedge meadow, wet prairie and marsh communities and is noted for its good plant diversity. This wetland is currently threatened by invasive species (Reed Canary Grass), but more importantly it is located on properties planned for residential development in the next 3 years as far of the City of Elgin Far West Plan.

High Habitat Quality (HHQ) ADID Wetland #1087 is located on private property west of Illinois Route 47, about 1.2 mile north of Plank Road. This 34 acre wetland contains a high quality sedge meadow with good species diversity. This wetland is located on properties planned for warehouse / business park development in the future by the City of Elgin as part of a future annexation.

High Habitat Quality (HHQ) ADID Wetland #1094 is located on private property west of Illinois Route 47, about a ¼ mile north of Plank Road. This 17 acre sedge meadow wetland is currently being threatened by invasive species, including Reed Canary Grass and various noxious shrub species. There are no current plans for future development adjacent to this wetland, although the property's proximity to the Illinois Route 47 / Plank Road intersection suggests that may change in the near future.

ADID Wetland #466, is located at the confluence of Tyler Creek and the Pingree Tributary, between Illinois Route 72, Damisch Road, and Big Timber Road. This wetland is more than 200 acres in size and is classified as a High Functional Value wetland. The two streams that pass through the wetland are ditched, which has invariably altered the water table and the resulting species make-up of this marsh and sedge meadow community. The wetland is currently degraded as a result of this channelization and the invasive species (Reed Canary Grass) that have come to dominate the wetland. The future of this wetland is also of concern, as it is located entirely on privately owned parcels and about one-third of the wetland is on land that is planned for development by both the City of Elgin and Village of Pingree Grove.

7.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following is a summary list of recommendations for the Upper Tyler Creek Subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Tyler Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Section 2.5. Note that there are several general, or watershed-wide recommendations contained in Chapter 3, Watershed Plan Recommendations.

Type: Education/Outreach; Regulatory; Natural Area Restoration; Monitoring; Permanent Habitat Protection, Water Quality; Flood Control
Target Goals: Which watershed plan goals the recommendation is intended to address.
Initial Cost: the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost: the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party: Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority: A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2007 Tyler Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

Ordinance/Planning Recommendations

Recommendation 3-1

Direct development plans for parcels west & south of US Route 20 along Tyler Creek Tributary #6 to permanently protect High Habitat Quality ADID Wetlands #1085, 1086, 1087, and 1094 from the impacts of proposed development. This includes both direct encroachment as well as discharge of untreated stormwater runoff from detention basins or storm sewer outfalls. A direct greenway connection of at least 100 foot width should also be provided to link these 4 wetland complexes together along the historic drainage way of Tyler Creek Tributary #6.

This will protect the remaining high quality habitat in the subwatershed.

Type: Permanent Habitat Protection / Water Quality
Target Goals: Goal 1; Objectives 1,2
Initial Cost: unknown (municipal staff & elected official time)
Annual Cost: unknown (municipal staff & elected official time)
Responsible Party: City of Elgin
Priority: High

Natural Area Restoration Projects

The following recommendations are site-specific natural area restoration projects that should be implemented to increase natural habitat quality and diversity along the Tyler Creek stream corridor.

Recommendation 3-2

Develop and implement an ecological restoration plan to remove and manage invasive species (Cattails & Reed Canary Grass) in 120 acre marsh at Pingree Grove Forest Preserve. Investigate feasibility of water level control structure at wetland outlet under railroad.

Type: Site Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: $120,000
Annual Cost: $5,000
Responsible Party: Kane County Forest Preserve District
Priority: High

Water Quality Projects

Recommendation 3-3:

Develop a permanent protection and habitat restoration plan for ADID Wetland #466, the 200+ acre wetland complex located at the confluence of Tyler Creek and the Tyler Creek Tributary #6, between Illinois Route 72, Damisch Road, west of Big Timber Road. Manage invasive species (Reed Canary Grass) and investigate feasibility of dechannelizing the streams through the wetland to maximize the water quality benefits provided by the natural wetland. This wetland extends across the subwatershed divide into Central Tyler Creek.

Type: Permanent Habitat Protection / Site Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: $200,000
Annual Cost: $10,000
Responsible Party: Kane County Department of Environmental Management
Priority: Medium

Recommendation 3-4:

Retrofit existing dry bottom, turf grass detention basin in Triple Oaks Farm subdivision (at Meadow Court). Project will provide incremental water quality benefits as well as aesthetic improvements.

Type: Permanent Habitat Protection / Site Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: $20,000
Annual Cost: $500
Responsible Party: Triple Oaks Farm Subdivision HOA
Priority: Medium

Recommendation 3-6:

Investigate possible heavy metals/oil/hydrocarbon pollution source from abandoned car storage directly adjacent to high-quality ADID Wetland #492 and Tyler Creek Tributary #6 (private property). If pollution is found, work with landowner to development a pollution control plan to remove/protect pollution sources from discharging to the stream or groundwater.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $900 for water sampling & laboratory analysis at each site
Annual Cost: N/A
Responsible Party: Kane County Water Resources Dept. / Kane County Health Dept.
Priority: High

Permanent Habitat Protection Recommendations

Recommendation 3-5:

Protect portions of high-quality ADID Wetland #492 located at the east end of Reinking Woods Subdivision (unincorporated). About 50% of this wetland is located on property that is available for future development. Develop a management plan to remove invasive species (Reed Canary Grass)

Type: Permanent Habitat Protection / Site Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: unknown
Annual Cost: unknown
Responsible Party: Local Not-for-profit Land Trust Organization
Priority: Medium

Recommendation 3-7:

Develop a plan to permanently protect the oak woodlands and savannahs remnants on agriculture parcels along Thurnau Rd at the upper edge of the Tyler Watershed. Work with existing landowners to develop and implement management plans to restore these historic remnants to their full potential.

Type: Permanent Habitat Protection / Site Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: unknown
Annual Cost: unknown
Responsible Party: Local Not-for-profit Land Trust Organization / City of Elgin (during future development planning)
Priority: Low

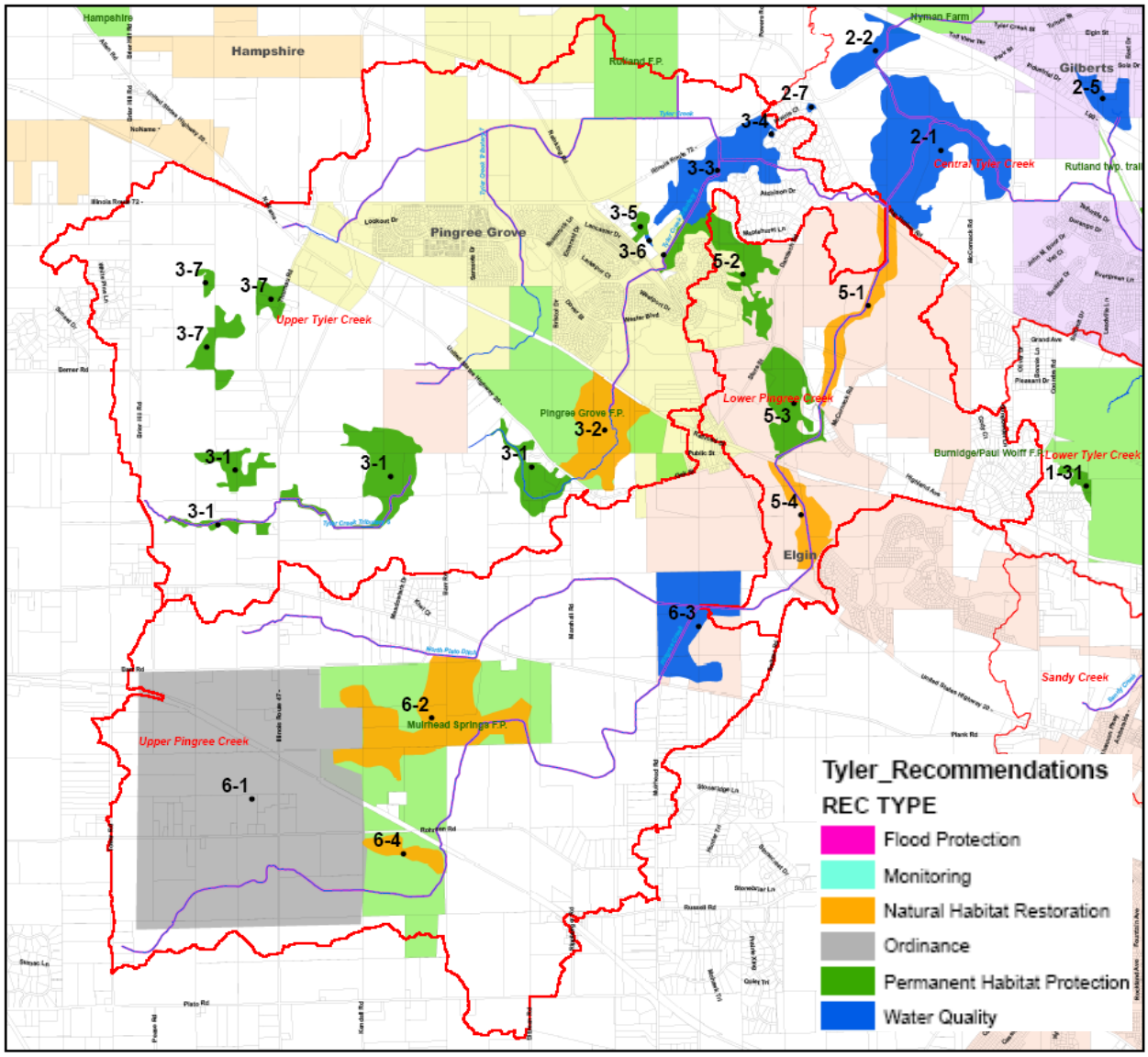

Figure 7.5 Upper watershed recommendations location map

REC NUMBER	REC TYPE	DESCRIPTION	RESPONSIBLE PARTY	INITIAL COST	ANNUAL COST	PRIORITY
3-1	Permanent Habitat Protection	Permanently protect and restore ADID Wetland 1085	City of Elgin	$0	$0	High
3-1	Permanent Habitat Protection	Permanently protect and restore ADID Wetland 1086	City of Elgin	$0	$0	High
3-1	Permanent Habitat Protection	Permanently protect and restore ADID Wetland 1094	City of Elgin / Private Landowner	$0	$0	High
3-1	Permanent Habitat Protection	Permanently protect and restore ADID Wetland 1087	City of Elgin	$0	$0	High
3-2	Natural Habitat Restoration	Water level control structure and invasive species removal at Pingree F.P. wetland	KCFPD	$120,000	$5,000	High
3-3	Water Quality	Permanently protect ADID Wetland 466; dechannelize and reconfigure to increase pollutant removal and stream water polishing properties	Kane Co. Dept of Environmental Management	$200,000	$10,000	Medium
3-4	Water Quality	Retrofit dry bottom detention basin	Triple Oaks Farm HOA	$20,000	$500	Medium
3-5	Permanent Habitat Protection	Permanently protect ADID Wetland 492	NP Land Trust Organization	$0	$0	Medium
3-6	Water Quality	Investigate possible water pollution source from auto storage on private property	Kane County Water Resources Dept.	$900	$0	High
3-6	Water Quality	Investigate possible water pollution source from auto storage on private property	Kane County Water Resources Dept.	$900	$0	High
3-7	Permanent Habitat Protection	Protect and restore remaining oak woodlands	Private Landowners / NP Land Trust Org support	$0	$0	Low

Table 7.6 Summary of recommended BMPs for the Upper Tyler Creek Subwatershed

Recommended BMPs, costs and projected load reductions for the Upper Tyler Creek are presented in Table 7.7. Table 3.4 shows the subwatershed contributes disproportionately higher sediment and nutrient loads, consistent with the little data available from the Hey & Associates data as reported in section 7.2.1. The disproportionate contribution may warrant more intensive application of BMPs since there would be the potential for greater pollutant reductions. The limited water quality data in the subwatershed indicates elevated levels of nutrients possibly create DO violations. It is important to improve water quality conditions in this watershed because of the abundance of natural resources. In addition to the BMPs implementation, monitoring has been recommended in order to assess the risk that might be posed by increasing nutrient loads due to increased urbanization.

Table 7.7 Recommended BMPs for the Upper Tyler Creek Subwatershed

BMP Category	BMP Location	Project Locations [2]	BMP		Removal Efficiency**			Total Cost ($)	Pollutant Load Reduction (lbs/year)			Percentage Reduction (%)		
			Size	Unit	TN	TP	TSS		TN	TP	TSS	TN	TP	TSS
Natural Habitat Restoration	Site-specific	3-2	120	acres	30%	35%	60%	$120,000	952	104	107	2.8	3.3	5.7
Permanent Habitat Protection	Site-specific	3-1, 3-5, 3-7	282	acres	53%	51%	88%	0	3,952	357	370	11.7	11.3	19.5
Point Source Control	Site-specific	3-6	1	lump sum	-	-	-	$1,800	673	63	38	2.0	2.0	2.0
Ecological Restoration	Site-Specific	3-3	123	acres	53%	51%	88%	$200,000	1,724	156	161	5.1	4.9	8.5
Detention Basin Retrofit	Site Specific	3-4	1	lump sum	32%	55%	68%	$20,000	8	1	1	0.0	0.0	0.1
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	-	-	-	$10,000	1,683	158	95	5.0	5.0	5.0
Nutrient Management	Watershed-specific	Subwatershed wide – agricultural parcels	750	acres	70%	28%	-	$75,000	13,883	521	-	41.2	16.5	-
Rain Gardens	Watershed	Subwatershed wide – urban parcels	2	acres	46%	61%	10%	$21,400	24	3	0	0.1	0.1	0.0
Total								$448,200	22,901	1,364	772	68.0	43.2	40.7

[2] = Site specific location numbers correspond with BMPs specified in table 7.6 and map figure 7.5
** TN = total Nitrogen; TP = total Phosphate; TSS = total Suspended Solids or Sediment; "-" = "not available" or nominal values have been applied.

Chapter 8
SANDY CREEK SUBWATERSHED

8.1.1 Subwatershed Location

The Sandy Creek subwatershed is located in the southeastern portion of the Tyler Creek Watershed. This subwatershed has an area of 2,217 acres, or 3.5 square miles. The boundary of the Sandy Creek subwatershed shown in Figure 8.1. The subwatershed is located within Elgin Township, and is roughly bordered, by US Route 20 on the south, Highland Avenue on the north, Coombs Road on the west, and Lyle Avenue on the east.

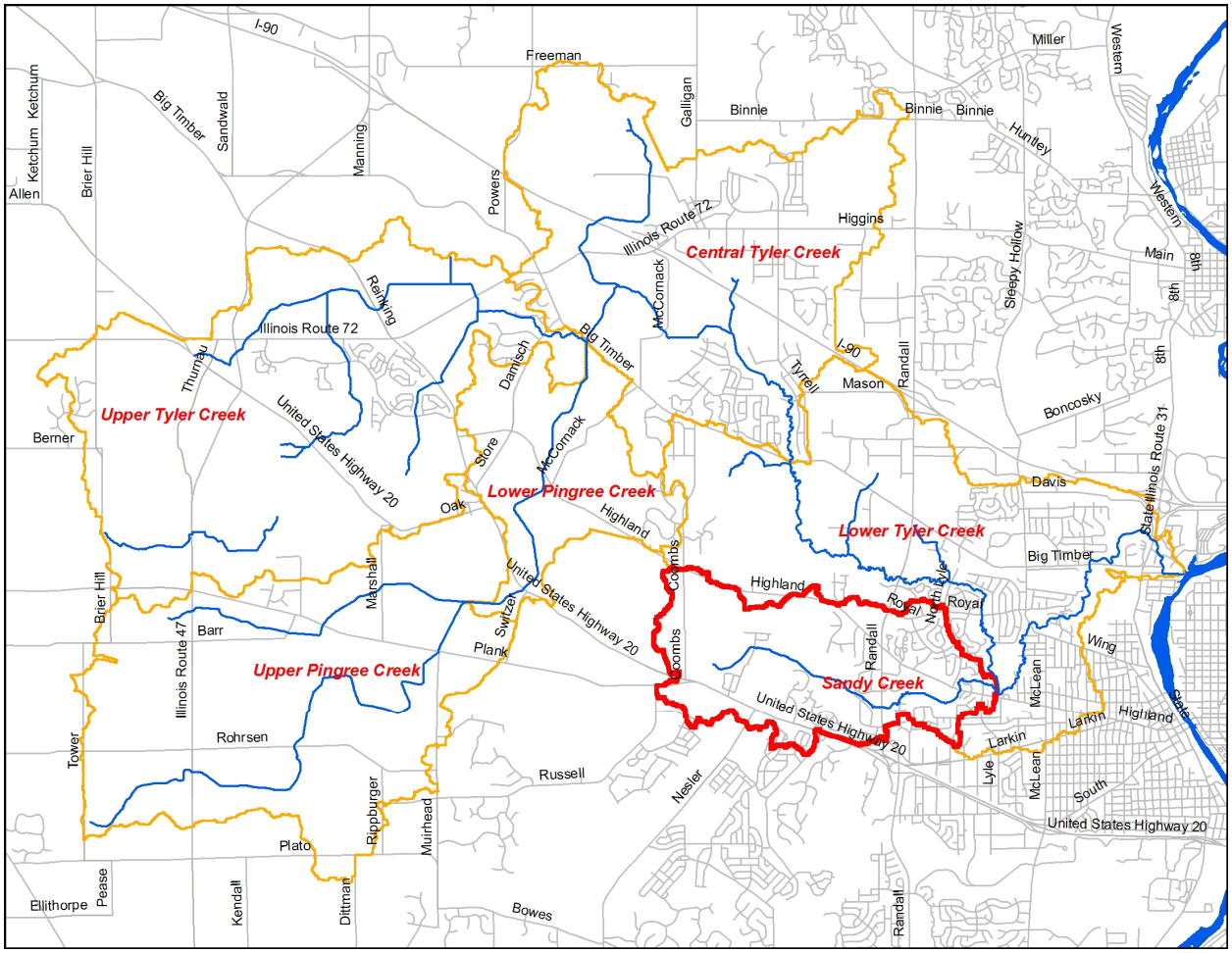

Figure 8.1. Subwatersheds in the Tyler Creek Watershed

8.1.2 Topography & Geology

The topography of the subwatershed is moderately sloping, generally between 2% and 4%, with a maximum elevation of 948 feet at Highland and Coombs Road and a minimum elevation of 792 feet where Tyler Creek joins the Fox River.

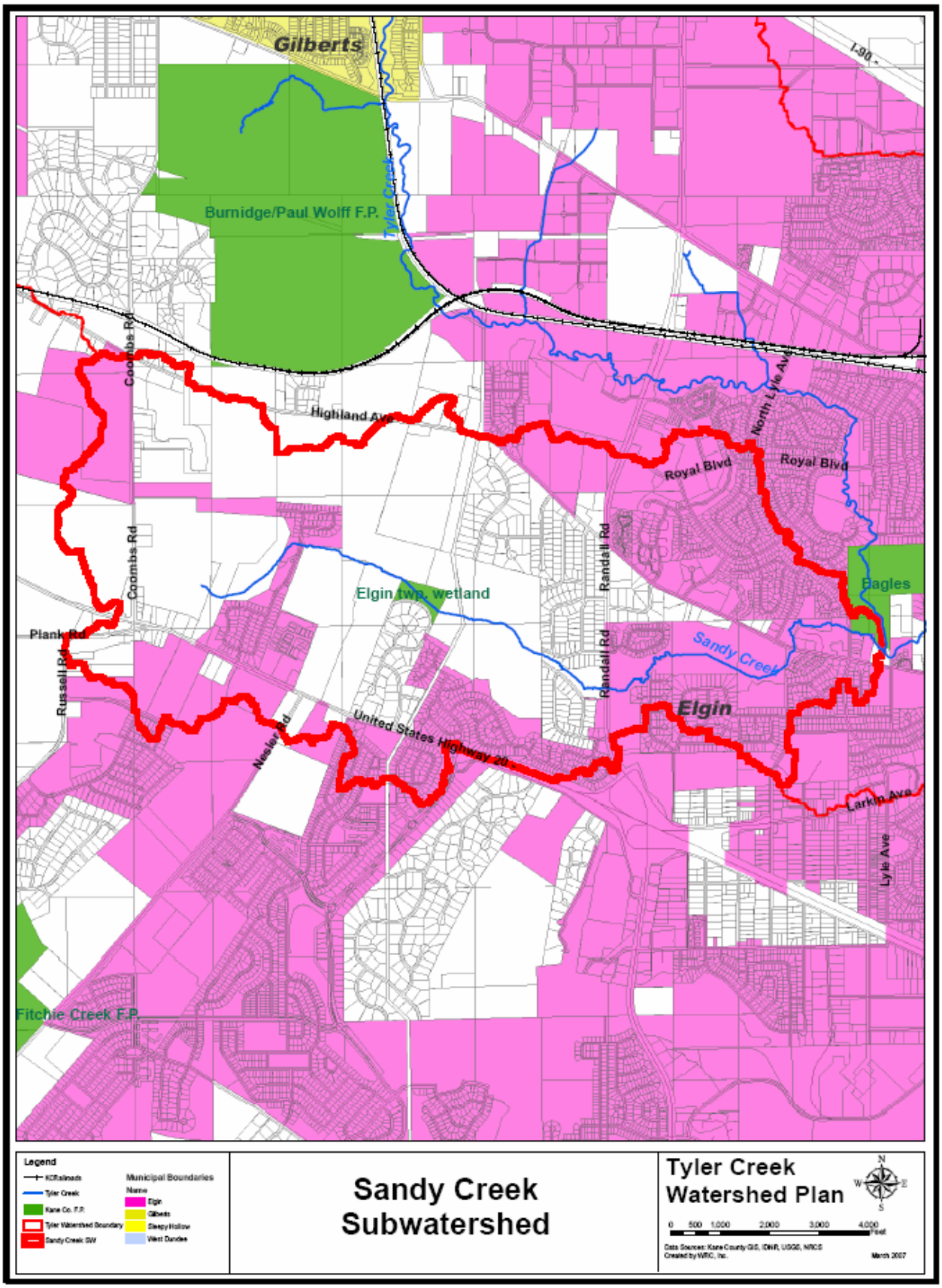

Figure 8.2. Subwatershed Map

8.1.3 Soil Conditions

The glacial advances result in a wide variety of soil associations. The soils in the Upper Tyler subwatershed consist of mainly silty loams soil units on 2%t o 4% slopes. Each major grouping of soil associations have potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 511 acres, or 23% of the 2,217 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

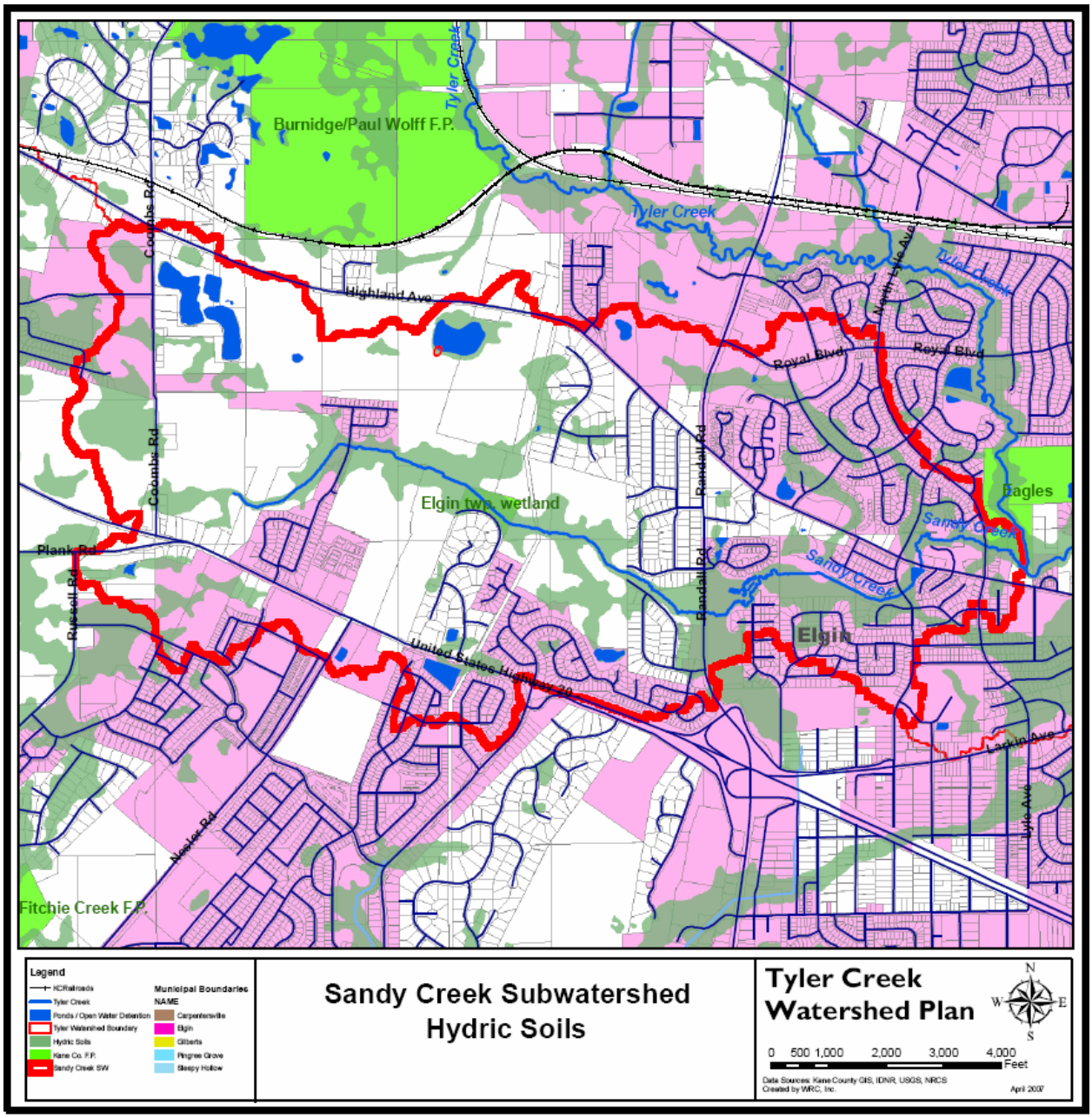

Figure 8.3: Hydric Soils

8.1.4 Subwatershed Drainage Features

Streams

Sandy Creek is the only stream in the subwatershed. Sandy Creek begins at an agricultural tile outlet near the northeast intersection of US Route 20 and Coombs Road. Although Sandy Creek appears to have been almost completely channelized in the past (when the subwatershed was entirely devoted to agricultural uses), the steeper gradient of the stream and lack of on-going channel maintenance has allowed the stream to begin the re-adjustment process back to a natural, meandering stream. Evidence can be seen in the sinuosity that the channel exhibits in the agricultural parcels at the west end of the subwatershed and is even more evident in reaches such as the residential development on the west side of Randall Road. The stream corridor ranges in size from about 60 feet on agricultural parcels to more than 200 feet in most sections downstream of Randall Road.

Analysis of aerial photography indicates that only about 54% of Sandy Creek is channelized, although the absence of on-going channel maintenance by landowners has allowed the stream to begin re-meandering in several sections upstream of Randall Road.

Urban Drainage Systems

Analysis of land uses and aerial photography, landcover data, and County GIS data indicates that about 30% of the Sandy Creek subwatershed is now drained using storm sewer systems. This network of sewers is principally under the jurisdiction of the City of Elgin, and the area roughly corresponds to the developed areas within the corporate limits of the City and is concentrated in the eastern half of the subwatershed. There are 12 stormwater detention facilities constructed with the subwatershed; all but one of those appears to be under the jurisdiction of the City of Elgin. Given the approximate age of the storm sewer system as a whole and the stormwater regulations under which they were constructed, there do not appear to be any type of structures in the system installed to mitigate the poor water quality associated with the urban stormwater runoff

There is also one on-line detention facility on Sandy Creek, owned and maintained by the Lincolnwood Terrace Townhouse Association. The on-line basin is located just east of the intersection of Highland Avenue and North Airlite Street. This stormwater facility is an open water pond with a concrete spillway that creates a five to six foot head above the downstream channel invert. As the basin is constructed on-line, the pond volume has been drastically reduced by the continual inflow of sediment from further upstream in the watershed. The Lincolnwood Terrace Townhouse Association has previously sought technical and financial assistance to have the basin dredged to restore the open water aesthetics that were present when the pond was constructed.

Agricultural Tile Systems

Due to the predominantly urbanized nature of the subwatershed, it is unlikely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the eastern two-third's of the subwatershed. The western one-third may contain some tile systems, as this region has yet to be fully developed and contains many areas of gently sloping to nearly flat hydric soil complexes. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

8.1.5 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources.
According to the 2000 US Census, the population in the subwatershed was about 5,123 people, or only 1,479 persons per square mile.

8.1.6 Landuse / Landcover

Land cover data for the Sandy Creek subwatershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was urban land cover, comprising 42% of the subwatershed. Row crop agriculture accounted for roughly 39% of the subwatershed area. Rural grasslands accounted for another 9%, while wooded areas and wetlands account for the remaining 10% of the subwatershed.

Land Cover Description	Total Acres	Percent of SW
Barren & Exposed Land	2.3	0.10%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	873.3	39.39%
Winter Wheat	0	0.00%
Rural Grassland	188.5	8.50%
Low Density Urban	157.3	7.09%
Medium Density Urban	385.2	17.37%
High Density Urban	33.5	1.51%
Urban Grassland	355.2	16.02%
Shallow Marsh – Emergent Wetland	9.5	0.43%
Shallow Water Wetland	0	0.00%
Partial Forest /Savannah Upland	40.0	1.80%
Upland Forest	132.8	5.99%
Floodplain Forest	1.0	0.05%
Coniferous Forest	0	0.00%
Deep Marsh / Emergent Wetland	2.9	0.13%
Open Water	35.8	1.61%
TOTAL	**2,217.3**	**100.0%**

Table 8.1

8.1.7 Existing Watershed Development

Development in the subwatershed has occurred principally through the efforts of the City of Elgin in their expansion westward into the agricultural land that existed west of the Fox River. Much of this development lies in the area between the Fox River and Randall Road. As of 2006, about 46% of the Sandy Creek subwatershed is within Elgin's municipal borders (1,020 of 2,217 acres). There are about 275 acres of unincorporated, county-regulated residential subdivisions in the subwatershed, most of which were developed between 1970 and 1990. About half of these older, unincorporated developments are characterized by ½ acre lots with private wells and septic systems. The other half appear to be newer (late 1980s or 1990s) and are similar in character but on minimum 1 acre lots.

The City of Elgin is the only municipality that has jurisdiction in the subwatershed.

Municipality	Area (acres)	Percent of SW
City of Elgin	1,020	46%
Unincorporated	1,197	54%

Table 8.2

There are 26.3 miles of roads in the subwatershed, which equates to about 90 acres of impervious cover (roadway pavement only – excluding parking lots, sidewalks, and driveways).

8.1.8 Natural Resources

Kane County Forest Preserve Properties

There is only one property in the subwatershed controlled by the Kane County Forest Preserve District. It is the 9.5 acre Elgin Township Wetland, located at the north end of the Hidden Hill Subdivision near US Route 20, east of Nestler Road.

Other Publicly Protected Land

The City of Elgin owns 14 parcels totaling 30 acres within the subwatershed. Twelve of these parcels, totaling 26 acres, are located along the Sandy Creek stream corridor or its adjacent wetlands.

Wetlands

Kane County completed an Advanced Identification (ADID) Wetland Study in 2004. This study identified a total of 22 wetlands, totaling 209.1 acres, or 9% of the Sandy Creek subwatershed. Of these 6 wetlands, totaling 152.6 acres (72%) were determined to be of High Habitat Quality or High Functional Value, rating an ADID classification.

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	6	152.6
HHQ	High Habitat Quality	0	0
APH	Artificial Pond in Hydric Soils	5	12.5
APN	Artificial Pond in Non-hydric Soils	0	0
W	Other Wetlands (lower quality)	11	44.0
	TOTAL	**22**	**209.1**

Table 8.3

Threatened & Endangered Species

The Kane County ADID Wetland Study indicates that there are no Threatened or Endangered species in the Sandy Creek subwatershed. No other records of T&E Species were found.

Existing Greenways

While there is no formal greenway established along Sandy Creek, there are a reasonably adequate collection of public and private out-lot parcels through which the stream flows, between Randall Road and its confluence with Tyler Creek. The private out-lots are owned by the Oak Club Townhouse Association, the soon-to-be-created Tuscan Woods HOA (now Ryland Group, Inc.), and the Manor Homes of Sandy Creek HOA. Sandy Creek east of North Lyle Avenue flows through three private residential lots before emptying into Tyler Creek. Upstream of Randall Road, Sandy Creek flows through two HOA out-lot parcels that are part of the Almora Heights & Countryside subdivision.

8.2 Analysis of Subwatershed Data and Problem Identification

8.2.1 Water Quality Data

The FRWMN, administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites along Tyler Creek. At this time, the FRWMN does not have a monitoring station in the Sandy Creek Subwatershed.

Because there are no monitoring stations in the subwatershed, it is impossible to quantify the water quality characteristics of Sandy Creek. At least one water quality monitoring station should be established to collect periodic data on water quality constituents or benthic macroinvertebrates. Sampling benthic macroinvertebrates (as done by the FRWMN) is a simple procedure that could be accomplished with volunteers and would provide at least qualitative information about the habitat in the stream channel and the quality of the water flowing through the sample reach.

8.2.2 Flooding Problems

There are no documented flooding problems along Sandy Creek. The 100-year floodplain has been previously calculated and mapped from the confluence with Tyler Creek upstream to US Route 20. Existing floodplain mapping indicates that there may be as many as 17 dwellings within the regulatory floodplain.

8.2.3 Projected Development & Growth

As the entire subwatershed falls within the City of Elgin's Comprehensive Planning Area, it is likely that all future development in the subwatershed will be done by the City of Elgin. There are about 650 acres of land available for new development. Elgin currently has approved more than 850 single family or multi-family residential homes to be constructed on 430 acres as part of six new developments. The remaining 220+/- acres of agricultural land is slated for low density residential development (2.1-4.0 units per net acre) as part of Elgin's Comprehensive Plan.

The end result will be an addition of more than 1,000 new residences and between 2,500 and 3,300 new people. If not carefully planned and designed, the net affect the proposed land use changes in the subwatershed will result in profoundly negative impacts on water quality, total runoff, stream stability, and the ecological integrity of Sandy Creek, as well as Tyler Creek.

8.2.4 Estimated Pollutant Loads

Pollutant load estimates in the Sandy Creek subwatershed under existing and future condition land uses are summarized below. Nutrient loads are expected to decrease as agricultural uses decline. Future land use however, assumed low density development will replace agriculture. In addition to nutrient and sediment loads, urban runoff contains a host of other pollutants such as oils and grease, heavy metals. Strategies for reducing existing pollutant loadings are discussed in Chapters 3 and 4.

Pollutant	Existing Condition	Future Condition
Total N (lbs/yr)	9,514	5,953
Total P (lbs/yr)	849	279
Sediment (tons / yr)	577	335
Runoff (acre-ft per yr.)	631	737
Fecal Coliform (FC in 10^9FCU)	15,184	15,503

Table 8.4 Estimated annual pollutant loads from the Sandy Creek Subwatershed

8.2.5 Natural Area Protection Problems

Forest Preserve Sites

The Elgin Township Wetland property, as noted in the ADID Wetland study, is threatened by invasive species (Reed Canary Grass).

Wetlands

- The most significant wetland issue in the Sandy Creek subwatershed is the protection of ADID Wetland #1364. This wetland is 83 acres in size and extends up the Sandy Creek stream corridor from Randall Road to the headwaters of Sandy Creek near Coombs Road. This wetland spans several parcels which are planned for new residential development. It is also being degraded by invasive species, most notably Reed Canary Grass.

8.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following is a summary list of recommendations for the Sandy Creek Subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Tyler Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Section 2.5.

Type: Education/Outreach; Regulatory; Natural Area Restoration; Monitoring; Permanent Habitat Protection, Water Quality; Flood Control
Target Goals: Which watershed plan goals the recommendation is intended to address.
Initial Cost: the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost: the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party: Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority: A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2007 Tyler Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies /research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

Monitoring Projects

Recommendation 4-1

Establish a stream monitoring station on Sandy Creek at North Lyle Avenue on Kane County Forest Preserve Property. Monitoring protocol should include biological (macroinvertebrates) and basic chemical constituents (temp, DO, pH, TSS, phosphorus, nitrogen, etc.)

Type: Monitoring
Target Goals: Goal 4, Objective 2.
Initial Cost: $1500
Annual Cost: $ 750
Responsible Party: Friends of the Fox River – Fox River Watershed Monitoring Network / City of Elgin
Priority: Medium

Water Quality Projects

Recommendation 4-8

Retrofit dry-bottom, turf grass detention basin to include native plantings and minor re-grading to increase pollutant load removal from parking lot runoff.

Type: Water Quality
Target Goals: Goal 1, Objective 5
Initial Cost: $25,000
Annual Cost: $500 (for maintenance of replanted vegetation in basin)
Responsible Party: Home Depot USA, Inc.
Priority: Medium

Natural Habitat Restoration Projects

The following recommendations are site-specific natural area restoration projects that should be implemented to increase natural habitat quality and diversity along the Tyler Creek stream corridor.

Recommendation 4-2

Remove or modify the on-line stormwater basin spillway to reduce the impoundment and re-establish sediment transport function and fish passage in Sandy Creek.

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objective 3
Initial Cost: $125,000
Annual Cost: $500 (for maintenance of replanted vegetation in basin
Responsible Party: Lincolnwood Terrace Townhome Association. Support from City of Elgin.
Priority: High

Recommendation 4-3

Prepare and implement an ecological restoration plan for the 29 acre ADID wetland (#1379) along Sandy Creek east of Randall Road.

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 2 & 3
Initial Cost: $87,000
Annual Cost: $5000
Responsible Party: City of Elgin / Oaks Club Townhome Association
Priority: Low

Recommendation 4-4

Prepare and implement an ecological restoration plan for the 80+ acre ADID wetland (#1364) along Sandy Creek west of Randall Road. Provide permanent protection of wetland where it extends across undeveloped parcels.

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objectives 1,2 & 3
Initial Cost: $200,000
Annual Cost: $10,000
Responsible Party: City of Elgin, working with private landowners.
Priority: Medium

Permanent Habitat Protection Recommendations

Recommendation 4-5

Encourage Hidden Hill Subdivision HOA to work with Kane County Forest Preserve District to restore 9 acres of ADID Wetland 1364 on KCFPD property located at north end of subdivision.

Type: Permanent Habitat Protection
Target Goals: Goal 1, Objectives 1,2,3
Initial Cost: $27,000
Annual Cost: $2,700
Responsible Party: Kane County Forest Preserve District
Priority: Medium

Recommendation 4-6

Protect ADID Wetland 1364 on properties planned for future development. Encourage developers to incorporate this wetland corridor into their development plan as a part of their Green Infrastructure.

Type: Permanent Habitat Protection
Target Goals: Goal 1, Objectives 1,2,3
Initial Cost: municipal staff & elected official time working with developer
Annual Cost: $0
Responsible Party: City of Elgin
Priority: Medium

Recommendation 4-7

Protect portions of ADID Wetland 1364 on these parcels planned for future development. Encourage developers to incorporate this wetland corridor into their design as a part of their Green Infrastructure Plan for the proposed land development.

Type: Permanent Habitat Protection
Target Goals: Goal 1, Objectives 1,2,3
Initial Cost: municipal staff & elected official time working with developer
Annual Cost: $0
Responsible Party: City of Elgin
Priority: Medium

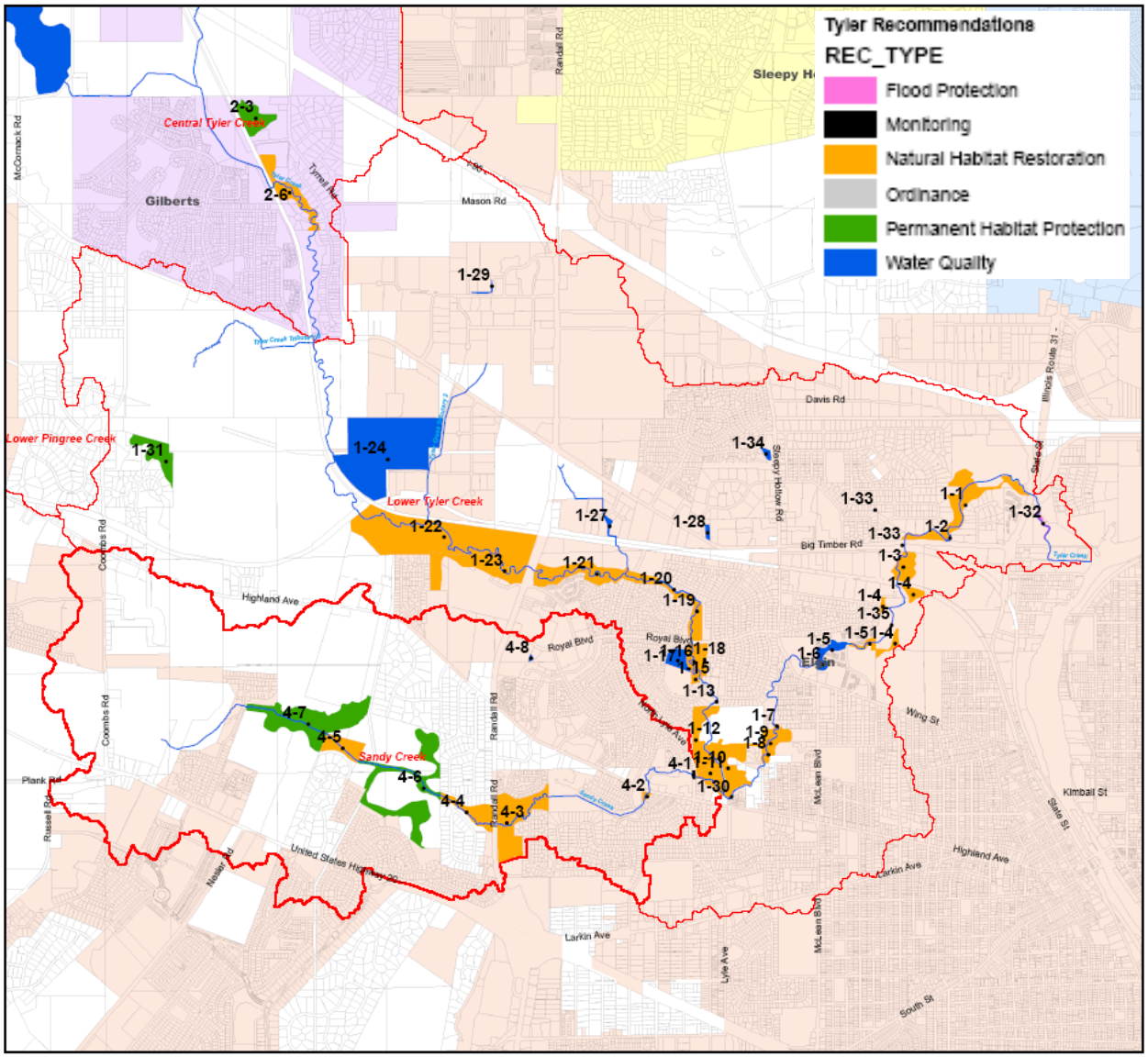

Figure 8.5 : Subwatershed Recommendations Location Map

Table 8.5 Summary of recommended BMPs for the Sandy Creek Subwatershed

REC NUMBER	REC TYPE	DESCRIPTION	**RESPONSIBLE PARTY**	**INITIAL COST**	**ANNUAL COST**	**PRIORITY**
4-1	Monitoring	Establish stream monitoring station on Sandy Cr at N Lyle Ave for macroinvertabrates and basic WQ constituents - grab samples	Fox River Watershed Monitoring Network	$1,500	$750	Medium
4-2	Natural Habitat Restoration	Remove private on-line dam on Sandy Creek at Highland Avenue and restore pond bottom to natural stream corridor with passive recreation features for residents	Linwood Terrace HOA	$125,000	$500	High
4-3	Natural Habitat Restoration	Wetland restoration on City of Elgin property and townhome association property	City of Elgin / Private Landowner HOA	$87,000	$5,000	Low
4-4	Natural Habitat Restoration	Wetland restoration of ADID Wetland 1364 on HOA property	HOA / City of Elgin support	$200,000	$10,000	Medium
4-5	Natural Habitat Restoration	Wetland restoration of portion of ADID Wetland 1364 on KCFP property at Hidden Hill Subdivision	KCFPD	$27,000	$2,700	Medium
4-6	Permanent Habitat Protection	Protect and restore portion of ADID Wetland 1364 on property planned for furture development	City of Elgin	N/A	N/A	Medium
4-7	Permanent Habitat Protection	Protect and restore portion of ADID Wetland 1364 on property planned for furture development	City of Elgin	N/A	N/A	Medium
4-8	Water Quality	Retrofit dry bottom detention basin to increase pollutant removal from Home Depot parking lot runoff	Home Depot USA, Inc.	$25,000	$500	Medium

Recommended BMPs, costs and projected load reductions for the Sandy Creek watershed are presented in Table 8.6 The main pollutants of concern in this largely undeveloped watershed are nutrients for agricultural uses. There are no water quality data that can be used to verify the degree of impairments from these pollutants. The recommended BMPs in conjunction with the proposed monitoring program will ensure the pollutant loads are reduced over time.

Table 8.6 Recommended BMPs for the Sandy Creek Subwatershed

BMP Category	BMP Location	Project Locations [2]	BMP		Removal Efficiency**			Total Cost ($)	Pollutant Load Reduction (lbs/year)			Percentage Reduction (%)		
			Size	Unit	TN	TP	TSS		TN	TP	TSS	TN	TP	TSS
Natural Habitat Restoration	Site-specific	4-3, 4-4, 4-5	118	acres	30%	35%	60%	$314,000	760	79	92	8.0	9.3	16.0
Permanent Habitat Protection	Site-specific	4-6, 4-7	69	acres	53%	51%	88%	-	785	67	79	8.2	7.9	13.7
Dam Removal	Site-specific	4-2	1	each	-	-	-	$125,000	190	17	12	2.0	2.0	2.0
Point Source Control	Site-specific	4-1	1	lump sum	-	-	-	$1,500	95	8	6	1.0	1.0	1.0
Detention Basin Retrofit	Site Specific	4-8	1	lump sum	32%	55%	68%	$25,000	7	1	1	0.1	0.1	0.2
Rain Gardens	Watershed	Subwatershed wide – urban parcels	1	acres	46%	61%	10%	$10,700	10	1	0	0.1	0.1	0.0
Nutrient Management	Watershed-specific	Subwatershed wide – agricultural parcels	10	acres	70%	28%	-	$1,000	150	5	-	1.6	0.6	-
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	-	-	-	$10,000	476	42	29	5.0	5.0	5.0
Total								$487,200	2,472	222	218	26.0	26.1	37.8

2 = Site specific location numbers correspond with BMPs specified in table 8.5 and map figure 8.5

** TN = total Nitrogen; TP = total Phosphate; TSS = total Suspended Solids or Sediment; "-" = "not available" or nominal values have been applied

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Chapter 9
LOWER PINGREE CREEK SUBWATERSHED

9.1.1 Subwatershed Location

The Lower Pingree Creek subwatershed is the smallest in the Tyler Creek Watershed, located in southeastern Rutland Township and northeastern Plato Township. The subwatershed occupies 1,825 acres, or 2.9 square miles and drains the area between the Pingree Creek / North Plato Ditch confluence and the confluence of Pingree Creek downstream with Tyler Creek. This area is roughly bordered by US Route 20 on the south, Big Timber Road on the north, Reinking Road on the west, and Coombs Road on the east.

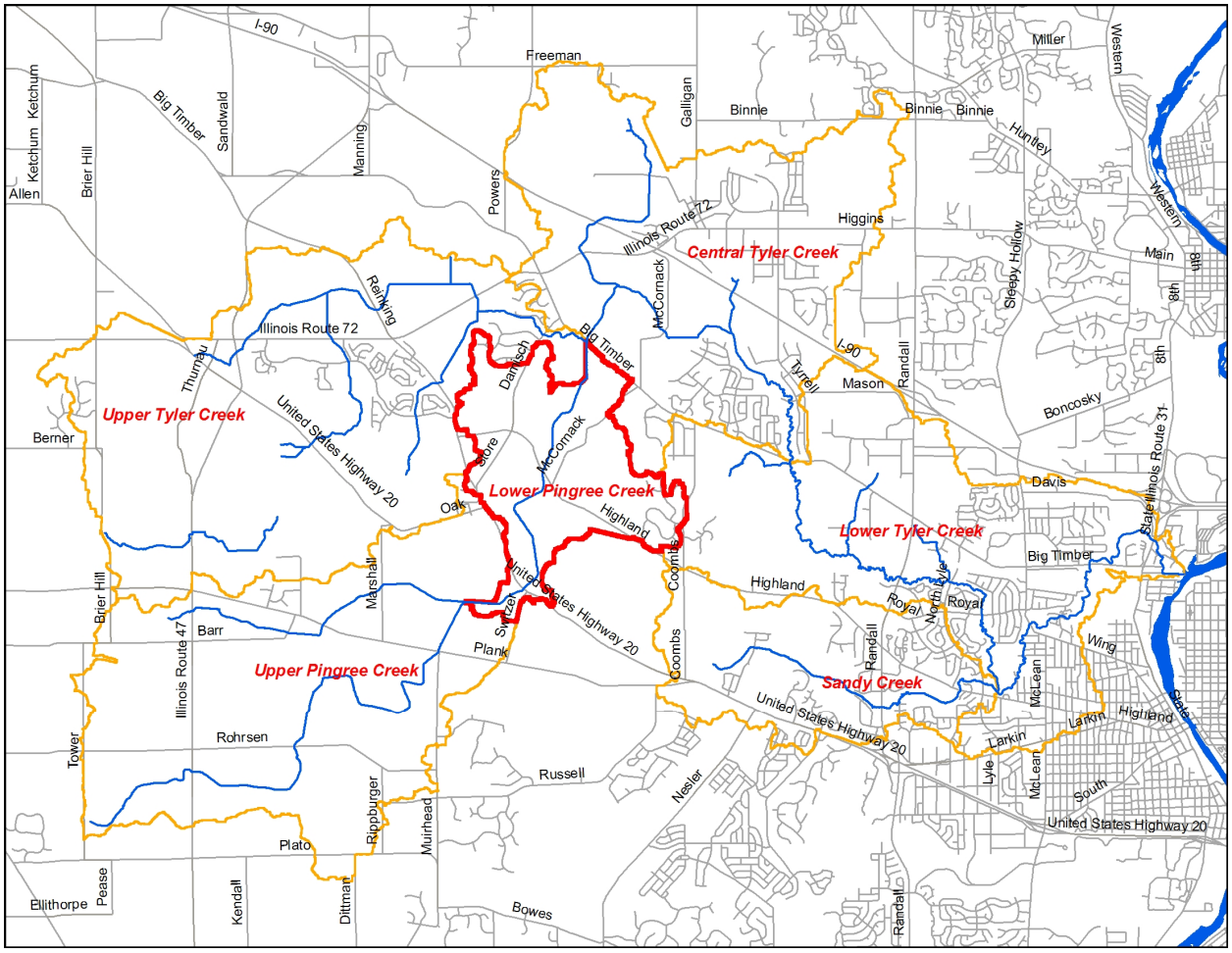

Figure 9.1. Subwatersheds in the Tyler Creek Watershed

9.1.2 Topography & Geology

The topography of the Lower Pingree subwatershed varies from 0-2% slopes along the Pingree Creek floodplain to steeper than 10% slopes near the west boundary of the subwatershed. The maximum elevation in the subwatershed is 954 feet and the minimum elevation is 886 feet where Pingree Creek joins Tyler Creek at Big Timber Road.

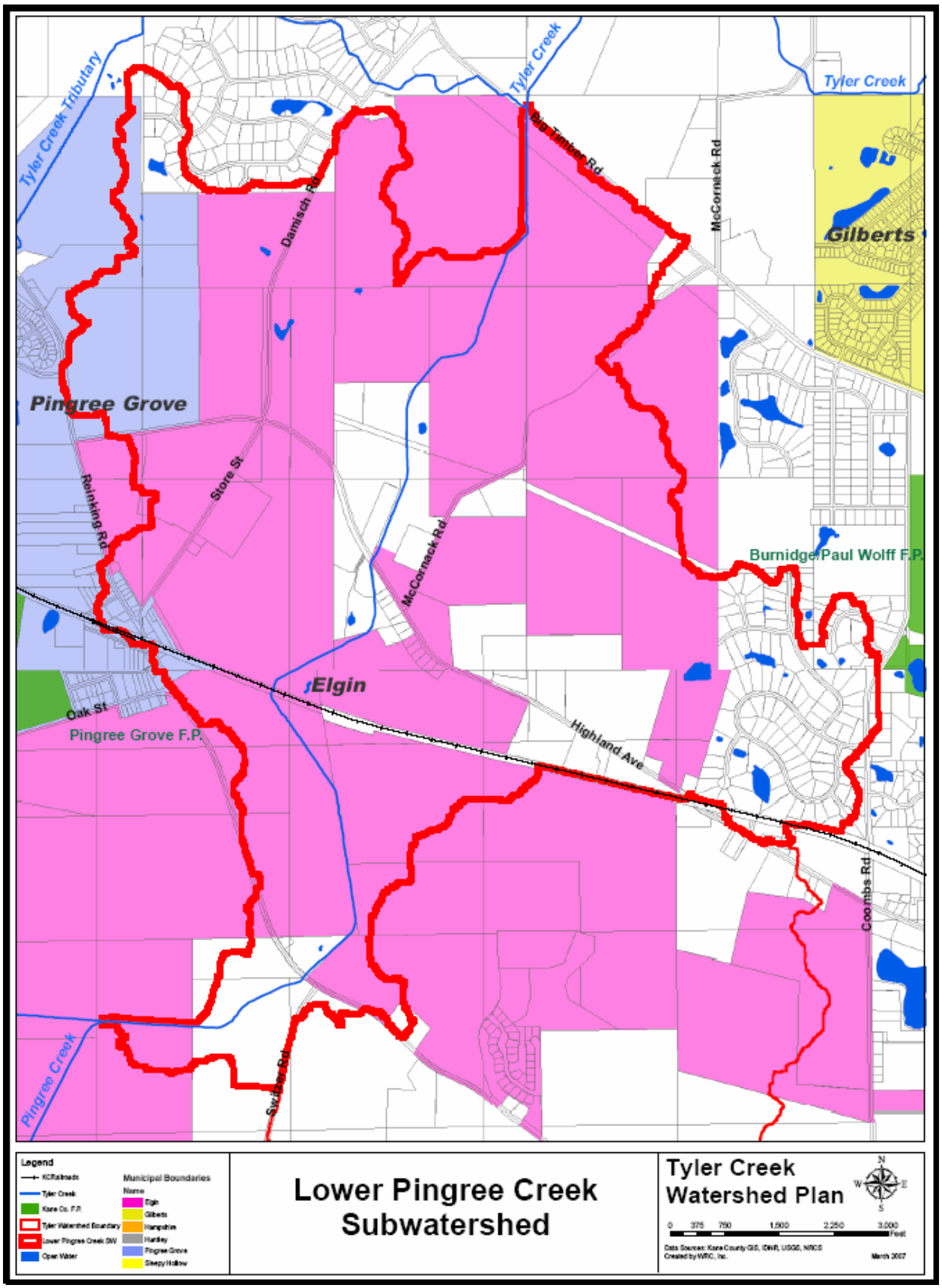

Figure 9.2. Subwatershed Map

9.1.3 Soil Conditions

The glacial advances result in a wide variety of soil units. The soils in the Lower Pingree subwatershed consist of mainly silt loams soil units on 0% to 2% slopes. Each major grouping of soil map units has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 723 acres, or 40% of the 1,825 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

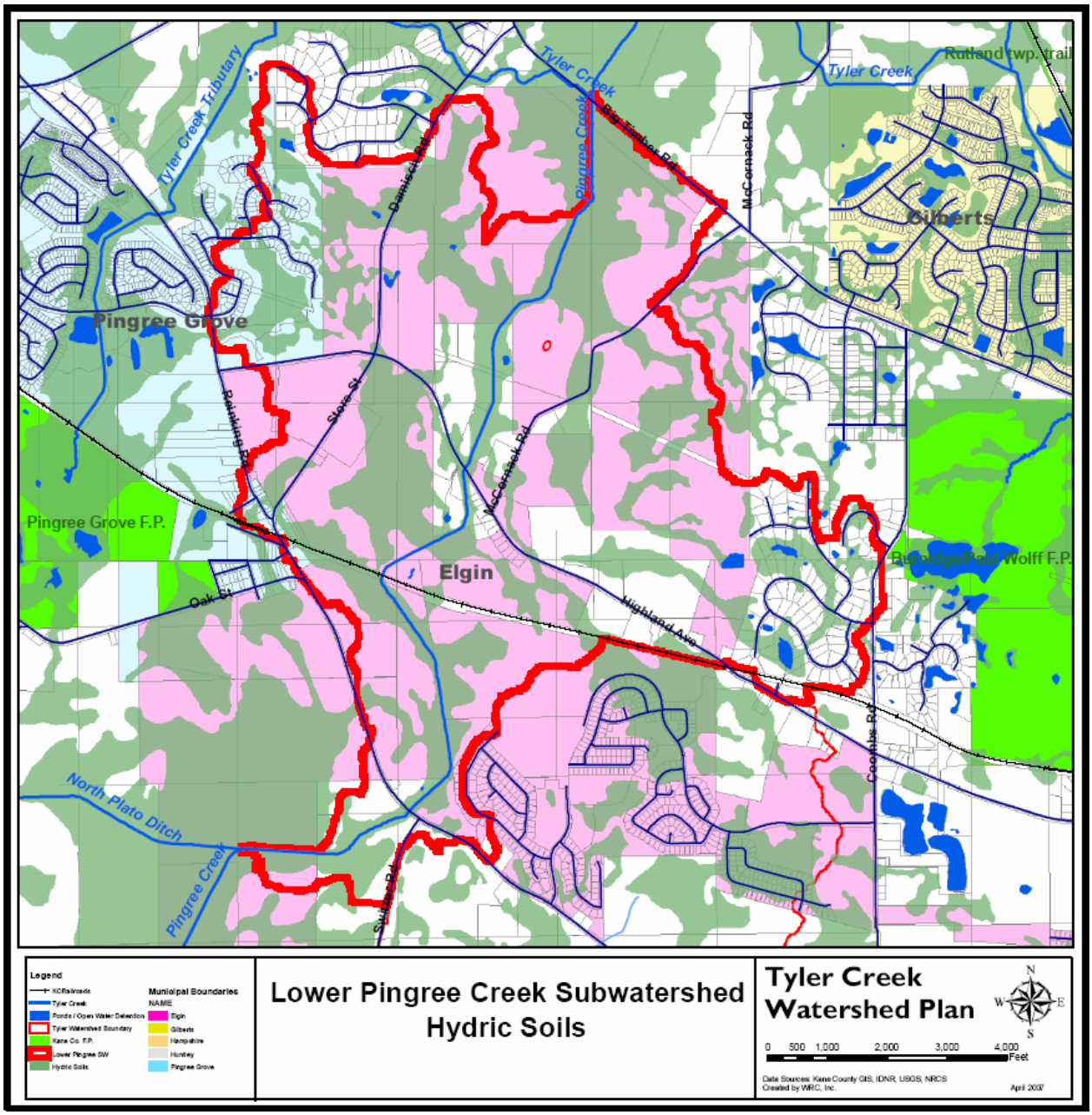

Figure 9.3: Hydric Soils

9.1.4 Subwatershed Drainage Features

Streams

There is only one stream in the Lower Pingree Creek Subwatershed – Pingree Creek. Pingree Creek in this region is extremely flat, with an average slope of less than 0.08%. The 1860 Atlas of Kane County suggests that Pingree Creek likely did not exist as a stream channel south of Highland Avenue and was probably extended southward by farmers as part of their agricultural ditch system to improve field drainage. The stream corridor between Big Timber Road and US Route 20 is narrow (< 100 feet in most places), and dominated by a thick canopy of low quality deciduous trees and invasive shrubs. Downstream of US Route 20, the stream channel is heavily incised below the agricultural lands adjacent to the stream. In this reach, the stream corridor is less than 60 feet wide and dominated by invasive herbaceous vegetation (grasses & weeds).

Urban Drainage Systems

Analysis of land uses and aerial photography indicates that there is only a small portion of the subwatershed that is serviced by storm sewer networks. The sewered area is found in the 130+ acres of the Cambridge Lakes subdivision under construction along Reinking Road within the Village of Pingree Grove. The Maplehurst and Wildwood West subdivisions likely do not have an underground storm sewer system, as rural residential landscapes such as these often rely upon grassed swales for stormwater conveyance. Both of these subdivisions, as well as Cambridge Lakes, have stormwater detention basins (five or six in total) to temporarily detain stormwater to reduce 100-year flood discharges into Pingree Creek.

Agricultural Drainage Systems

Given the soils and gentle slopes of the agricultural land that dominates the western half of the subwatershed, it is estimated that about 70% (1,825 acres) of the Lower Pingree subwatershed has been modified with the installation of agricultural ditch and tile systems. Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat. It is probable that many of the depressional and low lying areas in the subwatershed that are now drained by tile systems were once wetland and wet prairie ecosystems that supported very diverse habitats.

9.1.5 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources.

According to the 2000 US Census, the population in the subwatershed was about 652 people, or only 229 persons per square mile.

9.1.6 Landuse / Landcover

Land cover data for the Tyler Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was row crop agriculture, which accounted for roughly 51% of the subwatershed area. Rural grasslands accounted for another 20%, while wooded areas and wetlands account for an additional 12% of the subwatershed. Urban land cover, including urban grassland comprised the remaining 17% of the subwatershed.

Land Cover Description	Total Acres	Percent of SW
Barren & Exposed Land	2.8	0.15%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	922.9	50.56%
Winter Wheat	0	0.00%
Rural Grassland	370.6	20.30%
Low Density Urban	87.8	4.81%
Medium Density Urban	31.7	1.74%
High Density Urban	0.8	0.04%
Urban Grassland	194.2	10.64%
Shallow Marsh – Emergent Wetland	19.4	1.06%
Shallow Water Wetland	0	0.00%
Partial Forest /Savannah Upland	31.2	1.71%
Upland Forest	157.2	8.61%
Floodplain Forest	3.7	0.20%
Coniferous Forest	0	0.00%
Deep Marsh / Emergent Wetland	0	0.00%
Open Water	3	0.16%
TOTAL	**1,825.3**	**100.0%**

Table 9.1

9.1.7 Existing Watershed Development

Development in the subwatershed has historically occurred as unincorporated, rural residential development on 1+ acre parcels, except for the smaller lots developed along in downtown Pingree Grove. According to the Land Cover analysis, the subwatershed had about 315 acres of development, or 17% of the subwatershed. Almost half of this developed land is contained in the Wildwood West unincorporated subdivision near Highland Avenue and Coombs Road. Since 2000, there has been an additional 31 acres of medium density residential development in the Cambridge Lakes subdivision and an additional 20 acres of rural residential development in the Maplehurst subdivision, bringing the total estimated development in the subwatershed to 366 acres, or 20% of the total area.

Although development to date in the subwatershed has been mainly unincorporated residential development or recent residential development on the west side by Pingree Grove, the City of Elgin currently has jurisdiction over 66% of the subwatershed as a result of recent annexations.

Municipality	Area (acres)	Percent of SW
Village of Pingree Grove	138.1	7.6%
City of Elgin	1207.7	66%
Unincorporated Kane County	479.2	26.2%

Table 9.2

There are 8.4 miles of roads in the subwatershed, which equates to about 28 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

9.1.8 Natural Resources

Kane County Forest Preserve Properties

There are no Kane County Forest Preserve properties in the Lower Pingree Creek Subwatershed; the Pingree Grove F.P. and Burnidge / Paul Wolff F.P. are located immediately adjacent to the subwatershed on its east and west boundaries.

Other Publicly Protected Land

The Village of Pingree Grove owns 23 parcels totaling 66 acres within the subwatershed. These parcels appear to be outlots given to the Village within Unit 16 of the Cambridge Lakes subdivision. It appears that about half of this land is planned for future subdivision stormwater management basins and the other half is designated open space to protect the portion of ADID Wetland #466 that extends into the Cambridge Lakes subdivision. The City of Elgin owns one parcel that covers about 15.2 acres, located at the far upstream end of the subwatershed at a future city park site where the North Plato Ditch and Pingree Creek merge.

Name	Area (acres)
Village of Pingree Grove	66.0
City of Elgin	15.2
Total	**81.2**

Table 9.3

Wetlands

Kane County completed an Advanced Identification (ADID) Wetland Study in 2004. This study identified a total of 29 wetlands, totaling 305 acres, or 16.7% of the Lower Pingree subwatershed. Of these, 5 wetlands, totaling 221.9 acres (73%) were determined to be of High Quality or High Functional Value, rating an ADID classification.

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	5	221.9
HHQ	High Habitat Quality	0	0
APH	Artificial Pond in Hydric Soils	3	3.2
APN	Artificial Pond in Non-hydric Soils	0	0
LWF	Linear Water Feature	3	29.4
NOW	Natural Open Water	0	0
R	Fox River	0	0
W	Other Wetlands (lower quality)	18	50.5
	TOTAL	**29**	**305.0**

Table 9.4

While there are no High Habitat Quality wetlands in the Lower Pingree subwatershed, there is a large interconnected complex of High Functional Value wetlands that extends from the Maplehurst Subdivision southeast for 1.5 miles to Pingree Creek, where it flows under the Iowa, Chicago & Eastern Railroad. Nearly all of this wetland complex is located on private property that is planned for a large mixed use development under the jurisdiction of the City of Elgin.

Threatened & Endangered Species

The Kane County ADID Wetland Study does not indicate the presence of any Threatened or Endangered Species. The Illinois Department of Natural Resources' on-line Ecological Compliance Assessment Tool (EcoCAT) lists the following species may be present within this subwatershed:

Common Name	Scientific Name	Type	Status
Slippershell Mussel	*Alasmidonta viridis*	Mussel	IL Threatened
Sandhill Crane	*Grus Canadensis*	Bird	IL Threatened
Swainson's Hawk	*Buteo swainsoni*	Bird	IL Endangered
Least Bittern	*Ixobrychus exilis*	Bird	IL Threatened
Common Moorhen	*Gallinula chloropus*	Bird	IL Threatened

Table 9.5 (Source: INDR EcoCAT webpage)

Existing Greenways

There are no existing greenways in the Lower Pingree Creek Subwatershed.

9.2 Analysis of Subwatershed Data and Problem Identification

9.2.1 Water Quality Data

The IEPA is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Tyler Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Tyler Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Tyler Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from urban runoff, storm sewers, and runoff from forest / grassland / parklands. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Tyler Creek, although the ratings for these uses were classified as "not assessed".

The IEPA does not sample water quality on Pingree Creek at this time (2007). The nearest water quality sampling station maintained by the State is on Tyler Creek at Randall Road.

The FRWMN, administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites on Tyler Creek. The FRWMN has a monitoring station in the Lower Pingree Creek Subwatershed where Pingree Creek crosses Highland Avenue (FRWMN Site #28). This site was monitored 11 times between September 2004 and September 2005. FRWMN protocols classified this section of Pingree Creek as having "poor" water quality based on poor instream habitat and very low numbers of pollution intolerant macroinvertebrates. Limited chemical monitoring was also done at this site, and reported nitrate concentrations as high as 8.26 mg/L during the winter (12/6/04 & 1/26/05) and phosphorus concentrations as high as 6.10 mg/L during the summer (9/30/04). All measurements were taken during low flow periods, in which there was little or no precipitation.

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9.2.2 Flooding Problems

There are no documented flooding problems along Pingree Creek in the subwatershed. The 100-year floodplain for Pingree Creek has been calculated and accurately mapped in the subwatershed as far upstream as US Route 20, and indicates that there are no dwellings in the floodplain.

9.2.3 Projected Development & Growth

The biggest challenge in maintaining the ecological and hydrologic integrity of the Lower Pingree Creek subwatershed is implementing environmentally sustainable development practices. Elgin has currently annexed 66% of the subwatershed, and their comprehensive land use plan suggests that all unincorporated land not presently developed will eventually become developed in the future. Assuming that no development occurs within the existing 100-year floodplain or ADID wetlands, and does not encroach within 100 feet of Pingree Creek, the total amount of development / land use change in the subwatershed could be more than 1,350 acres, or 74% of the subwatershed.

If not carefully planned and designed, the proposed land use changes in the subwatershed will result in profoundly negative impacts on water quality, total runoff, stream stability, and the ecological integrity of this portion of Tyler Creek.

9.2.4 Estimated Pollutant Loads

Pollutant load estimates in the Lower Pingree Creek subwatershed under existing and future condition land uses are summarized below. This watershed is mostly rural. Nutrient loads are expected to decrease significantly as agricultural uses decline. The future load estimates assumed low-density replacing agriculture. Higher loads may be generated if higher density residential or commercial development occurs. In addition, as discussed above, urbanization may result in rapid deterioration of water quality because of the additional pollutants associated with urban runoff such as oils and grease, road salt, and heavy metals. Strategies for reducing existing pollutant loadings are discussed in Chapter 10.

Pollutant	Existing Condition	Future Condition
Total N (lbs/yr)	8,241	4,372
Total P (lbs/yr)	821	273
Sediment (tons/yr)	487	292
Runoff (acre-ft per yr.)	491	587
Fecal Coliform (in 10^9 FCU)	10,949	11,057

Table 9.6 Estimated annual pollutant loads from the Lower Pringree Creek Subwatershed

9.2.5 Natural Area Protection Problems

ADID Wetland Sites

In the Lower Pingree subwatershed, only 305 acres of wetland remain, compared to an estimated 723 acres that existed before settlement. That means about 57% of the wetland have already been lost and can no longer provide their valuable functions. Therefore, it is critical that

the remaining wetland resources in the subwatershed be protected and managed so that stakeholders can continue to benefit from the functions these wetlands provide.

9.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following is a summary list of recommendations for the Lower Pingree Creek Subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Tyler Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 3. Note that there are several general,or watershed-wide recommendations contained in Chapter 3, Watershed Plan Recommendations.

Type: Education/Outreach; Regulatory; Natural Habitat Restoration; Monitoring; Permanent Habitat Protection, Water Quality; Flood Control
Target Goals: Which watershed plan goals the recommendation is intended to address.
Initial Cost: the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost: the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party: Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority: A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2007 Tyler Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

Natural Habitat Restoration Projects

The following recommendations are site-specific natural area restoration projects that should be implemented to increase natural habitat quality and diversity along the Tyler Creek stream corridor.

Recommendation 5-1

Encourage new developments along Pingree Creek north of Highland Avenue to include stream corridor restoration plans in their overall development plan. The goal is to remove invasive species and noxious trees that have completely over-shaded the stream channel.

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objective 2; Goal 2, Objective 3
Initial Cost: unknown (municipal staff & elected official time)
Annual Cost: unknown (municipal staff & elected official time)
Responsible Party: City of Elgin
Priority: High

Recommendation 5-4

Encourage new developments along Pingree Creek south of Highland Avenue to include stream corridor restoration plans in their overall development plan. The goal is to remove invasive species and noxious trees that have completely over-shaded the stream channel.

Type: Natural Habitat Restoration
Target Goals: Goal 1, Objective 2; Goal 2, Objective 3
Initial Cost: unknown (municipal staff & elected official time)
Annual Cost: unknown (municipal staff & elected official time)
Responsible Party: City of Elgin
Priority: High

Water Quality Projects

There are no recommendations for site-specific water quality improvement projects identified in the Lower Pingree Creek Subwateshed. Water quality improvements may be realized through the implementation of a green infrastructure plan that will require new developments along Tyler Creek to restore natural stream channel and stream corridor functions and implement ecologically and hydrologically sensitive stormwater management practices (i.e. wetland setbacks, level spreader outlets, more on-site infiltration, etc.).

Permanent Habitat Protection Recommendations

Recommendation 5-2:

Encourage developers of the Pingree Creek Subdivision to preserve and protect all of ADID Wetlands #466 from encroachment by new development. This 80+ acre wetland complex extends northwest of the Damisch Road / Highland Avenue intersection.

Type: Permanent Habitat Protection / Site Restoration
Target Goals: Goal 1, Objective 1, Goal 2, Objective 3
Initial Cost: (planning & coordination time between developer and municipal staff)
Annual Cost: $0
Responsible Party: City of Elgin
Priority: High

Recommendation 5-3:

Encourage developers of the Pingree Creek Subdivision to preserve and protect all of ADID Wetlands #535 from encroachment by new development. This wetland occupies 85 acres of low lands extending southeast of the Damisch Road / Highland Avenue intersection.

Type: Permanent Habitat Protection / Natural Habitat Restoration
Target Goals: Goal 1, Objective 1, Goal 2, Objective 3
Initial Cost: (planning & coordination time between developer and municipal staff)
Annual Cost: $0
Responsible Party: City of Elgin
Priority: High

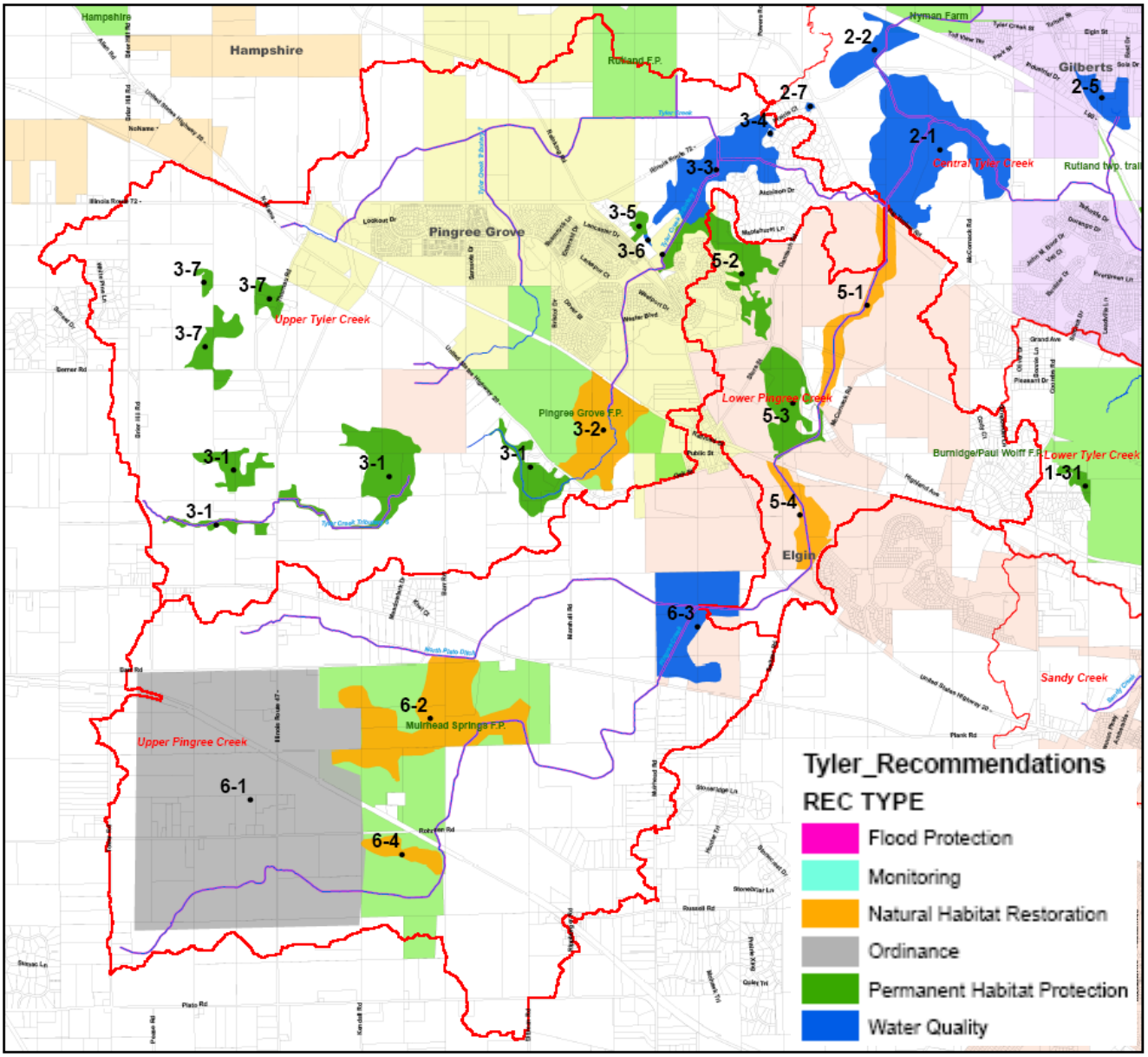

Figure 9.5 Lower Pingree Creek subwatershed recommendations location map

REC NUMBER	REC TYPE	DESCRIPTION	RESPONSIBLE PARTY	INITIAL COST	ANNUAL COST	PRIORITY
5-1	Natural Habitat Restoration	Encourage new developments along Pingree Creek to include stream corridor restoration plans in development construction to remove invasive species and restore stream corridor habitat	City of Elgin	N/A	N/A	High
5-2	Permanent Habitat Protection	Permanently protect ADID Wetland 466	City of Elgin	N/A	N/A	HIgh
5-3	Permanent Habitat Protection	Permanently protect ADID Wetland 535	City of Elgin	N/A	N/A	High
5-4	Natural Habitat Restoration	Encourage new developments along Pingree Creek to include stream corridor restoration plans in development construction to remove invasive species and restore stream corridor habitat	City of Elgin	N/A	N/A	High

Table 9.9 Lower Pingree Creek Subwatershed Recommendations Summary Table

Recommended BMPs, costs and projected load reductions in the Lower Pingree Creek subwatershed are summarized in Table 9.10. Based on the monitoring results of one site, nutrients do appear to cause impairments such as low DO. There are many opportunities for restoring wetlands. Wetlands provide multiple benefits such as habitat enhancement and water quality improvements. The monitoring plan presented in the Chapter 13 will assess the effectiveness of these measures when they are implemented.

Table 9.10 Recommended BMPs for the Lower Pingree Creek Subwatershed

BMP Category	BMP Location	Project Locations [2]	BMP		Removal Efficiency**			Total Cost ($)	Pollutant Load Reduction (lbs/year)			Percentage Reduction (%)		
			Size	Unit	TN	TP	TSS		TN	TP	Size	Unit	TN	TP
Natural Habitat Restoration	Site-specific	5-1, 5-4	135	acres	30%	35%	60%	-	914	106	108	11.1	12.9	22.2
Permanent Habitat Protection	Site-specific	5-2, 5-3	165	acres	53%	51%	88%	-	1,974	189	194	24.0	23.1	39.8
Rain Gardens	Watershed	Subwatershed wide – urban parcels	1	acres	46%	61%	10%	$10,700	10	1	0	0.1	0.2	0.0
Nutrient Management	Watershed-specific	Subwatershed wide – agricultural parcels	180	acres	70%	28%	-	$18,000	2,845	113	-	34.5	13.8	-
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	-	-	-	$10,000	412	41	24	5.0	5.0	5.0
Total								$38,700	6,156	451	326	74.7	55.0	67.0

2 = Site specific location numbers correspond with BMPs specified in table 9.9 and map figure 9.5

** TN = total Nitrogen; TP = total Phosphate; TSS = total Suspended Solids or Sediment; "-" = "not available" or nominal values have been applied.

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Chapter 10
UPPER PINGREE CREEK SUBWATERSHED

10.1.1 Subwatershed Location

Upper Pingree Creek is a subwatershed located in the southeastern portion of the Tyler Creek Watershed. This subwatershed has an area of 5,361 acres, or 8.4 square miles. The boundary of the Upper Pingree Creek subwatershed shown in Figure 10.1. The subwatershed is located within Plato Township and is roughly bordered by Tower Road to the west, Plato Road to the south, Muirhead & Switzer Roads on the east, and parts of US Route 20 and Plank Road on the north.

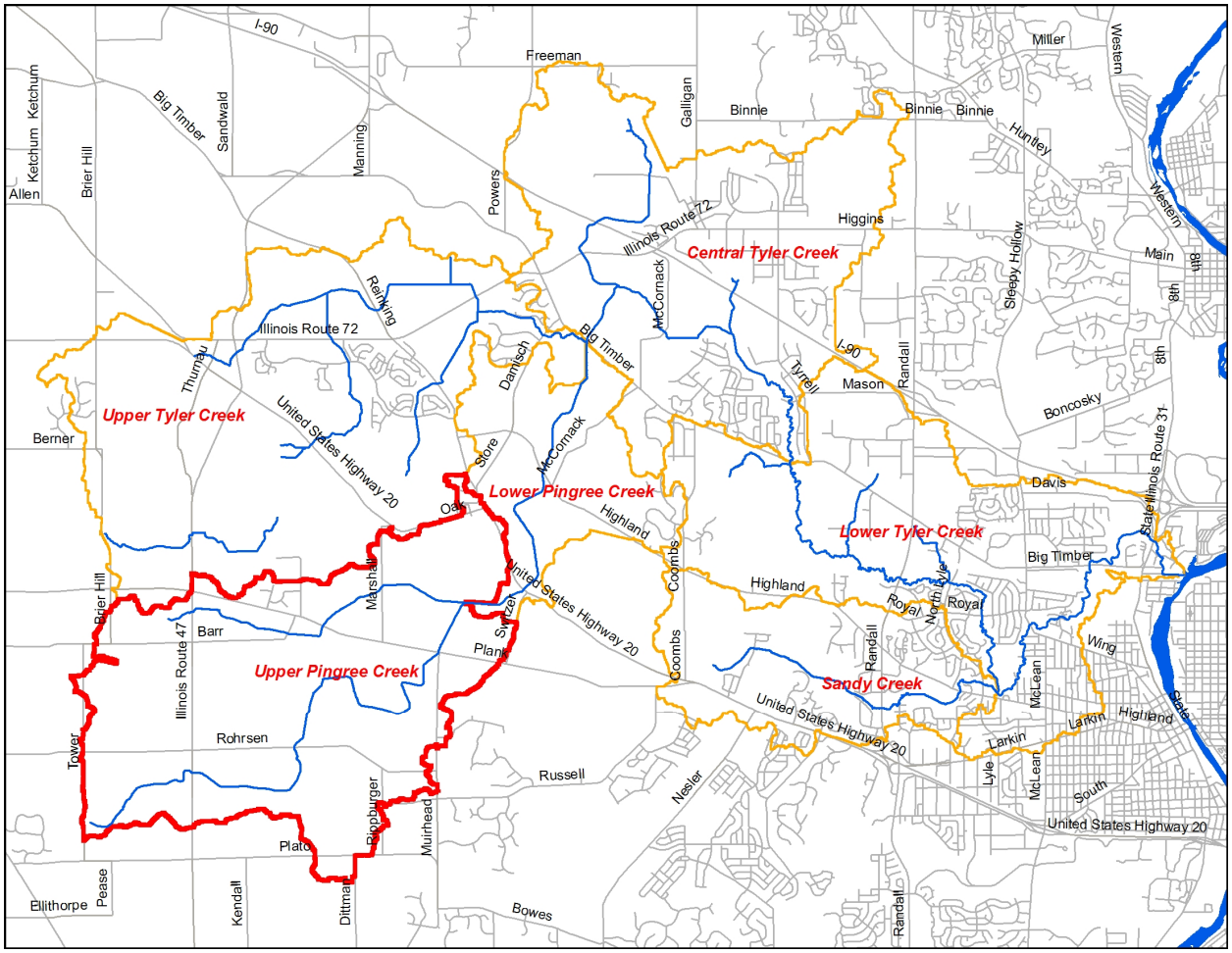

Figure 10.1. Subwatersheds in the Tyler Creek Watershed

10.1.2 Topography & Geology

The topography of the subwatershed ranges from extremely flat (<1%) in the eastern two-third's of the subwatershed to gently sloping (2%) in the western one-third. The high point in the subwatershed is elevation 1,058 feet and the lowest point is at elevation of 902 where Pingree Creek exits the subwatershed.

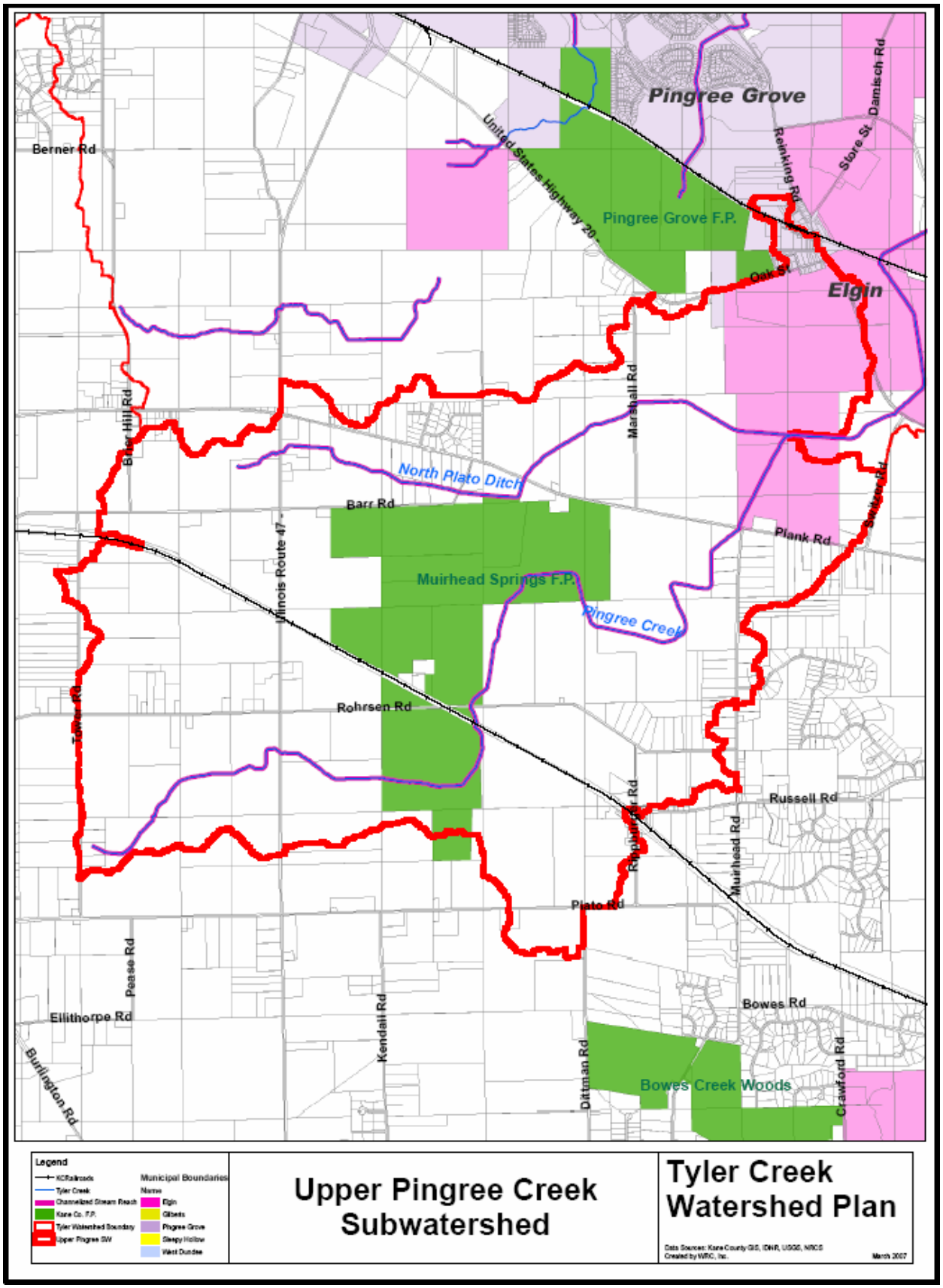

Figure 10.2 Upper Pingree Creek Subwatershed Map

10.1.3 Soil Conditions

The glacial advances result in a wide variety of soil map units. The soils in the Lower Pingree subwatershed consist of mainly silty loams soil units on 0% to 2% slopes. Each major grouping of soil map units has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 2,265 acres, or 42% of the 5,361 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

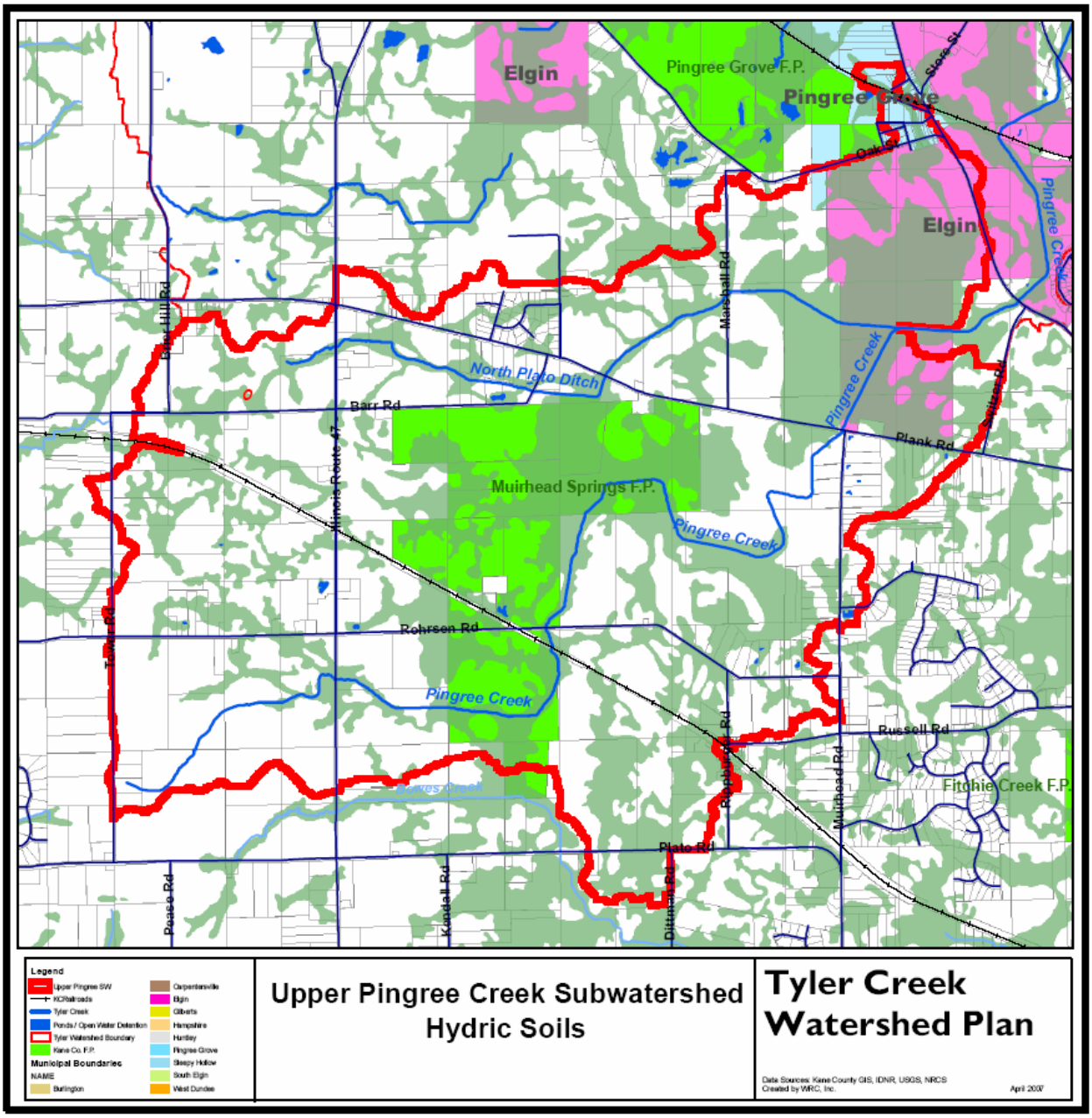

Figure 10.3: Hydric Soils

10.1.4 Subwatershed Drainage

Streams

The stream system of the Upper Pingree Creek subwatershed has been completely disturbed by human activities. Historically, the drainage system of the Upper Pingree Creek Subwatershed was likely made up of wide, shallow wet prairies which retained and infiltrated most of the precipitation and snowmelt. These wet swales exhibited few characteristics similar to those of what we now consider a "normal" stream channel. This type of wetland drainage system was not conducive for the agricultural demands set forth by the early settlers of the region, and so, by the 1920's these flat, slow-draining landscapes where ditched and channelized to lower the water table and more efficiently move runoff downstream and away from the farmer's crops. The result is the Upper Pingree subwatershed has experienced 100% channelization and has lost nearly all of its natural features.

There are only two stream channels in the subwatershed. The first is Pingree Creek, which extends from the subwatershed outlet upstream to the southwest, near the intersection of Tower Road and Plato Road. The Pingree Creek stream corridor is only 15 to 30 feet wide on either stream bank and is largely composed of brome grass and to some degree invasive species, such as Reed Canary Grass. Trees only the stream corridor are typically isolated and almost all are low quality or invasive species, such as Box Elder and Buckthorn.

The only tributary to Pingree Creek in this subwatershed is the North Plato Ditch. The characteristics of this stream channel can be inferred by its very name – the stream exists today as a channelized ditch through agricultural fields. The stream corridor surrounding North Plato Ditch has likewise been narrowed to 15 to 30 feet on either side of the channel and is mostly composed of perennial grasses. About one-third of the stream's length (near Plank Road) has some tree cover along the channel.

Analysis of aerial photography and field investigations revealed that the entire stream system in the subwatershed has is more or less a constructed agricultural ditch.

Urban Drainage Systems

Analysis of land uses and aerial photography suggests that there are very few, if any, storm sewers or stormwater detention basins. There may be a few small networks of storm sewers and a couple of small detention basins in the two urbanized areas that partially extend into the subwatershed – downtown Pingree Grove and the northwest portion of Plato Center. Both of these areas are far from the two stream channels and runoff from these areas likely drain either overland or through old agricultural field tiles to the streams.

Agricultural Tile Systems

Identifying agricultural drain tile networks is important because local flooding & drainage problems are often due to drain tile failure or the inadvertent removal or disconnection of a tile from a contributing tile system. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of recreating valuable wetland habitat. No doubt many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a diverse ecosystem. In the case of the Upper Pingree Creek Subwatershed, there is evidence that as much as 50% of the subwatershed is drained by agricultural drain tile networks.

10.1.5 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. According to the 2000 US Census, the population in the subwatershed was about 419 people, or 50 persons per square mile.

10.1.6 Landuse / Landcover

Land cover data for the Tyler Creek Watershed is available from the IDNR using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was row crop agriculture, which accounted for roughly 83% of the subwatershed area. Rural grasslands accounted for another 11%, while wooded areas and wetlands account for an additional 2% of the subwatershed. Urban land cover, including urban grassland comprised the remaining 4% of the subwatershed.

Land Cover Description	**Total Acres**	**Percent of SW**
Barren & Exposed Land	5.2	0.10%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	4,469.6	83.37%
Winter Wheat	0	0.00%
Rural Grassland	605.6	11.30%
Low Density Urban	99.8	1.86%
Medium Density Urban	41.8	0.78%
High Density Urban	3.3	0.06%
Urban Grassland	50.8	0.95%
Shallow Marsh – Emergent Wetland	7	0.13%
Shallow Water Wetland	0	0.00%
Partial Forest /Savannah Upland	31.8	0.59%
Upland Forest	44.4	0.83%
Floodplain Forest	0.6	0.01%
Coniferous Forest	0	0.00%
Deep Marsh / Emergent Wetland	0.005	0.00%
Open Water	1.2	0.02%
TOTAL	**5,361.1**	**100.00%**

Table 10.1

10.1.7 Existing Watershed Development

Development in the subwatershed to date has been limited almost exclusively to large lot, rural / estate residential, where parcel sizes are larger than 1.25 acres. There about 100 of these residential lots in the subwatershed as of 2006. There are approximately 13 smaller residential lots in Pingree Grove in the Upper Pingree subwatershed, and there about six residential lots in Plato Center which drain towards Pingree Creek. The only other development to speak of in the subwatershed is the presence of about 20 commercial / industrial parcels totaling 21 acres.

These properties are located either in Pingree Grove or on the northwest side of Plato Center, of which a portion lies within the Upper Pingree subwatershed.

Municipality	Area (acres)	Percent of SW
Elgin	465.3	8.7%
Pingree Grove	49.2	0.9%
Unincorporated	4,846.5	90.4%

Table 10.2

There are 17.6 miles of roads in the subwatershed, which equates to about 60 acres of impervious cover (roadway pavement only – excluding parking lots, sidewalks, and driveways).

10.1.8 Natural Resources

Kane County Forest Preserve Properties

There is one Kane County Forest Preserve in the Upper Pingree Creek subwatershed; Muirhead Springs Forest Preserve. It has an area of 742 acres, or 13.8% of the subwatershed area.

Name	Area (acres)
Muirhead Springs FP	742

Other Publicly Protected Land

The City of Elgin owns five parcels totaling 205 acres within the subwatershed. This property is located at the confluence of Pingree Creek and North Plato Ditch. This land is planned to become a future park site for the Elgin Park District for both active (ballfields) and passive recreation.

Wetlands

Kane County completed an Advanced Identification (ADID) Wetland Study in 2004. This study identified a total of 32 wetlands, totaling 150.1 acres, or 3% of the Upper Pingree subwatershed. Of these, two wetlands, totaling 33.5 acres (22%) were determined to be of High Quality or High Functional Value, the highest rating under the ADID classification system.

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	2	33.5
HHQ	High Habitat Quality	0	0
APH	Artificial Pond in Hydric Soils	4	2.9
APN	Artificial Pond in Non-hydric Soils	1	0.2
LWF	Linear Water Feature	6	75.7
NOW	Natural Open Water	0	0
FW	Farmed Wetlands	6	20.0
R	Fox River	0	0
W	Other Wetlands (lower quality)	13	17.8
	TOTAL	**32**	**150.1**

Table 10.3 ADID Wetlands

There are no known fens or fen recharge areas identified within the Upper Pingree subwatershed.

Threatened & Endangered Species

The Kane County ADID Wetland Study indicates that there are no Threatened or Endangered species located in the Upper Pingree subwatershed.

Existing Greenways

There are no formal greenways established in the subwatershed, as almost all of the land is privately owned and used for row crop agricultural. Kane County Forest Preserve owns about 1.5 miles of stream corridor along Pingree Creek where it passes through the Muirhead Springs Forest Preserve. However, this forest preserve is still being used for agricultural uses and the stream corridor is less than 50 feet wide in most places.

10.2 Analysis of Subwatershed Data and Problem Identification

10.2.1 Water Quality Data

TheIEPA does not sample water quality on Pingree Creek at this time (2007). The nearest water quality sampling station maintained by the State is on Tyler Creek at Randall Road.

The FRWMN, administered by the not-for-profit group, *Friends of the Fox River*, maintains ten volunteer stream monitoring sites on Tyler Creek. At this time, the FRWMN does not have a monitoring station in the Upper Pingree Creek subwatershed. The closest station is about two miles downstream in the Lower Pingree subwatershed, where Pingree Creek crosses Highland Avenue.

Because there are no monitoring stations in the subwatershed, it is impossible to quantify the water quality characteristics of Pingree Creek or its tributaries in this subwatershed. At least one water quality monitoring station should be established to collect periodic data on water quality constituents or benthic macroinvertebrates. Sampling benthic macroinvertebrates (as done by the FRWMN) is a simple procedure that could be accomplished with volunteers and would provide at least qualitative information about the habitat in the stream channel and the quality of the water flowing through the sample reach.

10.2.2 Flooding Problems

There are no documented flooding problems along Pingree Creek or North Plato Ditch in this subwatershed. The 100-year floodplain has not been accurately mapped in the subwatershed, as the floodplain shown on both streams is only estimated by FEMA (Zone A). It is likely that the lower portions of the subwatershed (eastern half) contain vast expanses of floodplain, given the flat topography and hydric soils that predominate this area. A detailed mapping effort should be undertaken to accurately map the 100-Year Floodplain for Pingree and North Plato Ditch before the subwatershed undergoes any further development on a large scale.

10.2.3 Projected Development & Growth

More than 95% of the Upper Pingree Creek subwatershed falls within the City of Elgin's Comprehensive Plan Area. Of the remaining undeveloped land (estimated to be about 4,000 acres), all but 175 acres is planned for residential or office/commercial/light industrial development. Past development history in the region has shown that the developments of this type create huge amounts of new impervious surfaces, strip existing topsoil and create pervious surfaces (lawns) which have almost no infiltrative properties, and cram "ecologically poor quality" stormwater control facilities (detention basins) in the floodplain as close as possible to the receiving stream (or sometimes ON the stream).

10.2.4 Estimated Pollutant Loads

Annual pollutant load estimates in the Upper Pingree Creek subwatershed under existing and future condition land uses are summarized below. Future loads calculations assumed low density residential development will replace farmland. Presently,less than 2% of the watershed is urbanized. Therefore nutrient and sediment loads will be the major pollutants of concern for the foreseeable future. Agricultural BMPs for reducing nutrient loads are discussed in Chapters 3 and 4.

Pollutant	Existing Conditions	Future Conditions
Total N (lbs./yr)	37,757	30,723
Total P (lbs./yr)	3,893	3,016
Sediment (tons/yr)	2,082	1,938
Runoff (acre-ft per yr.)	1,518	1,588
Fecal Coliform (in 10^9 FCU)	29,661	29,729

Table 10.4 Estimates of annual pollutant loads in the Upper Pingree Creek Subwatershed

10.2.5 Natural Area Protection Problems

Wetlands

Nearly all of the historic wetlands that once dominated the subwatershed (40+ percent of the area) have already been lost to agricultural activities of the last 150 years. Only 150 acres remain, and half of that total is limited to the narrow ribbon of vegetation that borders the two stream channels. Therefore, it is imperative that the existing wetland resources be protected from further encroachment when the land is converted from agricultural landuse to suburban landuses.

10.3 Subwatershed-specific Recommendations to Protect Watershed Resources

The following is a summary of recommendations for the Upper Pingree Creek Subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Tyler Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Section 2.4. Note that there are several general or watershed-wide recommendations contained in Chapter 4, Watershed Plan Recommendations.

Type: Education/Outreach; Regulatory; Restoration; Monitoring; Permanent Habitat Protection, Water Quality; Flood Control
Target Goals: Which watershed plan goals the recommendation is intended to address.
Initial Cost: the initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost: the long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party: Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority: A ranking of High, Medium, or Low, where High is represents a recommendation of utmost importance to be pursued immediately and Low represents those recommendations which may take more time and are less critical in terms their impact on meeting the watershed plan goals.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2007 Tyler Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies/research needed to determine an updated /accurate project cost. They should not solely rely on the cost estimates presented in the TCWP report as the basis for their grant request.

Ordinance/Planning Recommendations

Recommendation 6-1

Direct development plans for parcels in this subwatershed to implement the maximum number of water quality BMPs possible. Given the extensive amount of development proposed, the limited natural area resources (wetlands) in this subwatershed, and the proliferation of high quality wetlands and stream reaches in downstream subwatersheds, the goal in this subwatershed is to protect what little natural areas remain (narrow stream corridors) while making every effort possible to infiltrate stormwater and treat runoff leaving developments before it enters Pingree Creek or North Plato Ditch.

Type: Regulatory
Target Goals: Goal 2, Objective 1
Initial Cost: unknown (municipal staff & elected official time)
Annual Cost: unknown (municipal staff & elected official time)
Responsible Party: City of Elgin
Priority: High

Natural Area Restoration

Recommendation 6-2

Construct broad wetland treatment basins (235 ac.) on KCFP property for to recreate much-needed natural habitat in the subwatershed. Additional benefits include pollutant removal from upstream agricultural as well as treating runoff discharged onto KCFPD property from future upstream developments.

Type: Restoration & Water Quality
Target Goals: Goal 2, Objective 1
Initial Cost: $2,350,000
Annual Cost: $40,000
Responsible Party: Kane County Forest Preserve District
Priority: Low

Recommendation 6-3

Construct regional-scale water quality best management practices at the 224 acre park site under development by the City of Elgin. Park development should include site-scale BMPs to mitigate pollutant loading from the proposed active-recreation / playing field areas of the park as well. If possible, implement a water quality monitoring program to measure effectiveness of various BMPs installed to accommodate specific landuse types (parking lot, playing field, etc.)

Type: Natural Habitat Restoration & Water Quality
Target Goals: Goal 2, Objective 1
Initial Cost: $1,600,000
Annual Cost: $25,000 (for monitoring and water quality reporting)
Responsible Party: City of Elgin
Priority: High (since project is already in design process)

Recommendation 6-4

Construct broad wetland treatment basins (29 ac.) on KCFP property south of Rohrsen Road to recreate much-needed natural habitat in the subwatershed. Additional benefits include pollutant removal from upstream agricultural runoff in the and as well as to treat runoff discharged onto KCFPD property from future upstream developments.

Type: Natural Habitat Restoration & Water Quality
Target Goals: Goal 2, Objective 1
Initial Cost: $435,000
Annual Cost: $10,000
Responsible Party: Kane County Forest Preserve District
Priority: Low

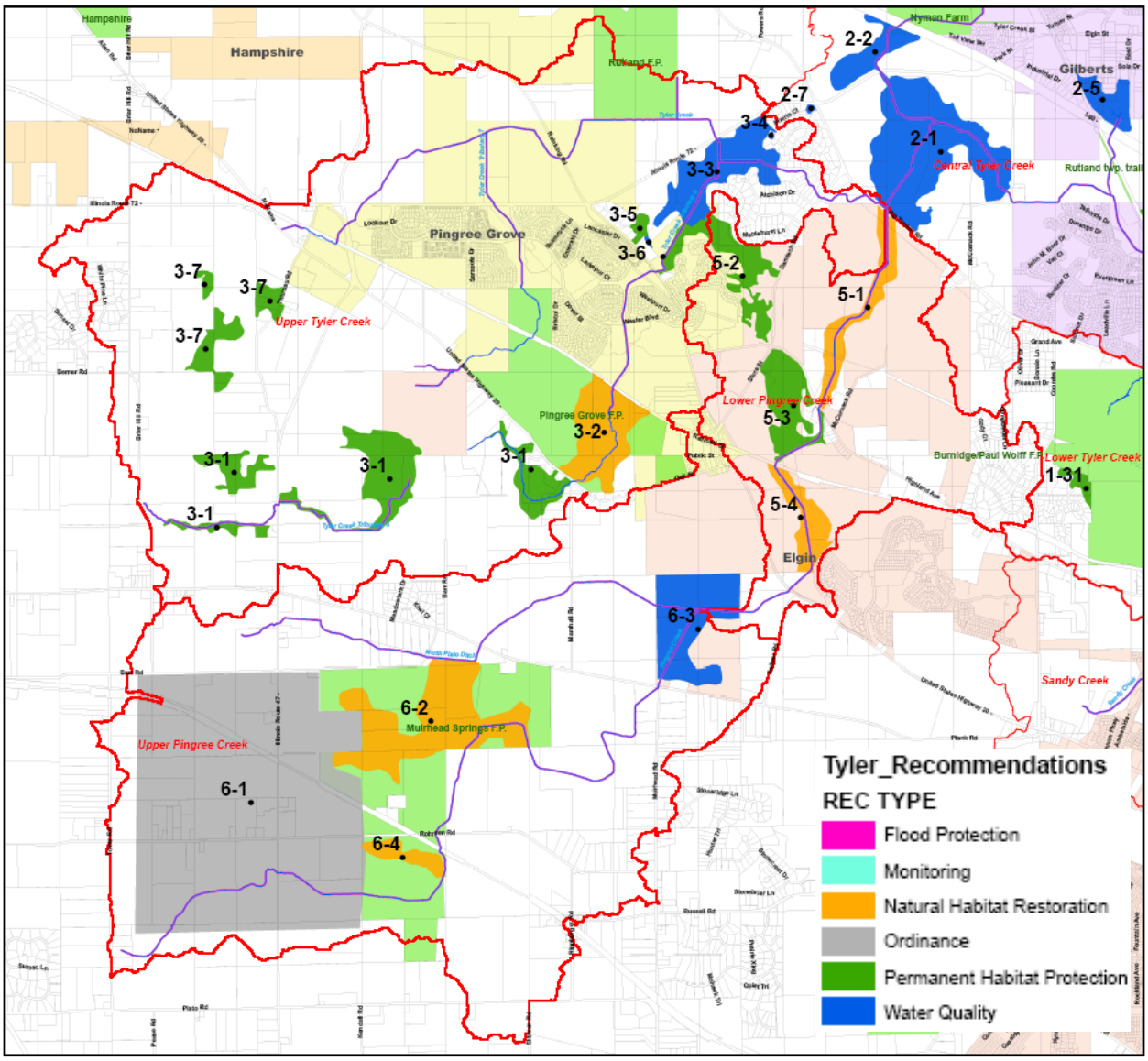

Figure 10.5 Site-specific recommendations for the upper watershed area.

REC NUMBER	REC TYPE	DESCRIPTION	RESPONSIBLE PARTY	INITIAL COST	ANNUAL COST	PRIORITY
6-1	Ordinance	Implement BMP programs for all future developments in Upper Pingree Cr SW	City of Elgin	N/A	N/A	High
6-2	Natural Habitat Restoration	Reconstruct wetland on KCFP property north of Rohrsen Road for habitat and treatment of runoff from future developments upstream	KCFPD	$2,350,000	$40,000	Low
6-3	Water Quality	Reconstruct wetlands at future Elgin park site for habitat and treatment of runoff from future upstream development	City of Elgin	$1,600,000	$25,000	High
6-4	Natural Habitat Restoration	Reconstruct wetland on KCFP property south of Rohrsen Road for habitat and treatment of runoff from future developments upstream	KCFP	$435,000	$10,000	Low

Table 10.5 Summary of Best Management Practices recommended for the Upper Pingree Creek Subwatershed

Table 10.6 presents BMPs costs and projected load reductions in the Pingree Creek subwatershed. There are no water quality monitoring stations in this subwatershed. Therefore in order to monitor the effectiveness of the BMPs in improving water quality and enhancing ecological conditions, a monitoring station has been recommended for this watershed. The pollutants of concern currently are nutrients produced from agricultural land uses & activities.

Table 10.6 Recommended BMPs for the Upper Pingree Creek Subwatershed

BMP Category	BMP Location	Project Locations [2]	BMP		Removal Efficiency**			Total Cost ($)	Pollutant Load Reduction (lbs/year)			Percentage Reduction (%)		
			Size	Unit	TN	TP	TSS		TN	TP	TSS	TN	TP	TSS
Natural Habitat Restoration	Site-specific	6-2, 6-4	264	acres	30%	35%	60%	$2,785,000	2,789	335	308	7.4	8.6	14.8
Conservation Development Practices	Site-specific	6-1	1	lump sum	52%	58%	64%	-	3,479	400	236	9.2	10.3	11.3
Construct Water Quality Facility	Site-specific	6-3	224	acres	52%	58%	64%	$1,600,000	4,102	472	278	10.9	12.1	13.4
Regulatory	Watershed-Specific	Subwatershed wide	1	lump sum	5%	5%	5%	$10,000	1,888	195	104	5.0	5.0	5.0
Nutrient Management	Watershed-specific	Subwatershed wide – agricultural parcels	200	acres	70%	28%	-	$20,000	4,930	203	-	13.1	5.2	-
Rain Gardens	Watershed	Subwatershed wide – urban parcels	1	acres	46%	61%	10%	$10,700	16	2	0	0.0	0.1	0.0
Total								$4,425,700	17,204	1,608	926	45.6	41.3	44.5

2 = Site specific location numbers correspond with BMPs specified in table 10.5 and map figure 10.5

** TN = total Nitrogen; TP = total Phosphate; TSS = total Suspended Solids or Sediment; "-" = "not available" or nominal values have been applied.

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Chapter 11
Protecting the Tyler Creek's Green Infrastructure

11.1 What is a Green Infrastructure Plan?

Green Infrastructure is the interconnected network of both publicly and privately owned open spaces and natural areas, such as greenways, stream corridors, wetlands, woodlands, grasslands, parks, and forest preserves. Collectively, these natural features support native flora and fauna, maintain natural ecological processes, sustain air and water resources, manages stormwater, reduce flooding risk and protects / improves water quality.

Green Infrastructure significantly contributes to the health and quality of life of the people who live, work, and recreate in the watershed. As many of these benefits arise from having clean water, it is not surprising that water resources, both surface and subsurface, form the framework of a Green Infrastructure Plan. By protecting our streams, ponds, and wetlands, surface water quality is protected. By protecting areas where groundwater resources can be replenished from surface infiltration, and shallow groundwater resources can discharge cool, clear water into our streams, major components of the hydrologic cycle benefit. These water resources also sustain our biological resources as well, including native wildlife species, and diverse native plant communities.

Above: Example of green infrastructure incorporated along Morgan Creek, in Will County, Illinois

The purpose of a Green Infrastructure Plan is to clearly define those areas that must be preserved, protected, re-connected, and integrated into our developed landscapes (whether they are agricultural farm fields, pastures, roads, or suburban development).

Land disturbances, such as agriculture, land development, and mining all generate pollutants that are washed off the landscape and into our streams, lakes, and wetlands. The increase in stormwater runoff that comes from the new pavement and roof tops generated by land development, even when first detained to comply with stormwater regulations, can destabilize receiving streams.

The overall increase in the volume of stormwater runoff can lead to stream channels downcutting and widening, leading to accelerated stream erosion, and sediment delivery. These impacts contribute to the sediment pollution in streams, threaten public infrastructure such as bridges and culverts, cause safety concerns for adjacent property owners, aesthetically unappealing, and are not healthy for the people and animals who recreate and/or use the stream.

However, natural systems such as wetlands, floodplain forests, and prairies are extremely capable of reducing the volume of stormwater runoff through infiltration and evapotranspiration. These natural systems are also very efficient at removing pollutants from the runoff that passes through them.

A Green Infrastructure Plan is divided into two components – the first is the protection of existing natural areas. The second is the preservation and expansion of natural landscape systems to buffer the high quality natural areas from future development.

11.2 Need for a Green Infrastructure Plan

There are many existing government regulations involving wetlands, floodplains, land use, and stormwater management that can collectively provide a measure of protection against direct impacts to surface water resources, if they are thoughtfully implemented. However, regulations protecting woodlands, native prairie remnants, lowland soils, or wildlife habitat are often inadequate or non-existent, resulting in their destruction during the development process.

To provide a more comprehensive level of protection, it is necessary to consider the benefits these areas collectively provide, and determine how to integrate a reasonable, higher level of protection.

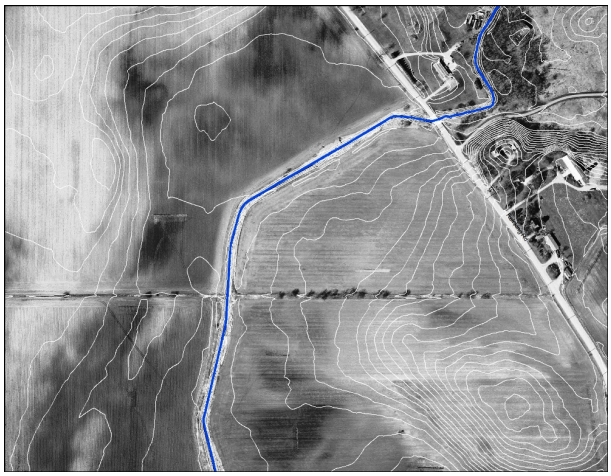
From a watershed perspective, the landscape feature that ties everything together is the mosaic of soils deposited by the glacial advances. These soils have the most significant influence on land development. For example, a gravel pit will only be sited where there are sufficient reserves of gravel available, and ideally a sanitary landfill would be sited in an area of thick, impermeable clays. Similarly, early farmers recognized the tremendous productivity of prairie soils, and only needed to develop a plow to cut through the dense root systems, or install drainage improvements to allow wet soils to be cultivated.

About 9,500 acres (36%) of the Tyler Creek watershed is comprised of hydric soils, which in pre-settlement times, were comprised of wetlands, wet prairies, or shallow drainage swales. Most of these hydric soil areas were converted to cropland by the construction of drainage ditches, installation of subsurface drain tiles, or the channelization of streams. While now suitable for agricultural purposes, and not necessarily considered regulatory wetlands, these converted hydric soils were not a location where you would want to build a home, or expect to have a functioning septic system.

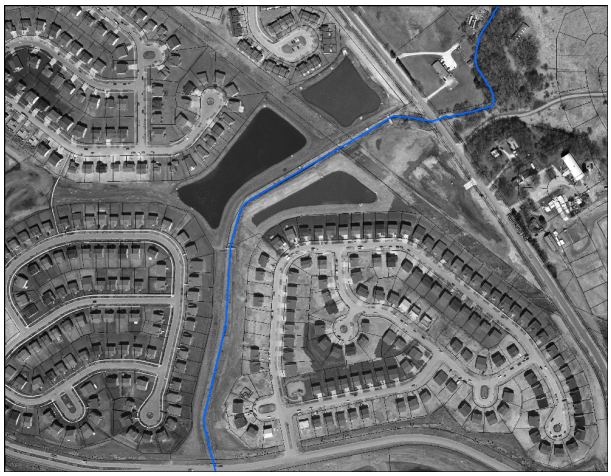
If residential development in the Tyler Creek watershed were only comprised of single lot projects, individually developed, there would be a natural tendency for those landowner's to avoid the damper parts of their property. The soils in the low-lying areas would be left undisturbed, and would still provide significant groundwater recharge and flood storage benefits. Some communities, such as the Village of Long Grove, have recognized the limitations, as well as benefits, associated with these low-lying areas, and have adopted a "Lowland Conservancy" ordinance.

In contrast, when it comes to large-scale urban development projects, the existing soil characteristics become less and less of a factor, as site engineering and large grading

equipment moving and rearranging huge volumes of soil can transform areas with significant natural soil limitations into just another development site. Unfortunately, this approach totally ignores the natural benefits of the multi-horizoned organic soils. In a natural, undeveloped state, these soils provide tremendous filtering and storage benefits for precipitation. The microscopic void spaces between soil particles can collectively store and gradually release large volumes of water.



"Pre-development" photo illustrating agricultural landuse. Stream is channelized and stream corridor is very narrow, but could be expanded easily by simply altering agricultural practices.



"Post-development" photo illustrating how stream corridor has now been permanently lost due to encroachment by residential development and its required stormwater drainage system.

The photographs above demonstrate how green infrastructure is often permanently lost when agricultural land is converted to development. In the pre-development photo on the right, the topography and hydric soils (those dark areas on the photo) suggest that the green infrastructure prior to agricultural development was probably a very wide, flat wetland that drained to upper right of the photo. To increase agricultural productivity, the wetlands and saturated (hydric) soils were drained by excavating a ditch and installing drain tiles so that row crops could be planted to the very edge of the constructed stream channel. While this had negative impacts to the water quality of the downstream receiving stream (sediment, nutrients from fertilizers, etc.), it still was a "reversible" condition. The problem occurs when these agricultural parcels are planned for development, the development design fails to recognize the water quality and habitat benefits that the landscape had prior to the agricultural land use and only the narrow agricultural channel is preserved. Stormwater basins are excavated within the green infrastructure area and designed to discharge as point sources directly into the stream system. This type of development layout does not take advantage of the filtering capabilities of the natural soils and historic wetlands and does not preserve or restore the natural habitat that makes the watershed a sustainable place for its residents to live, work and recreate.

If as part of land development activities, these undisturbed soils were subject to compaction (not excavation) from the operation of construction activity, these benefits in the upper soil would be impaired for a period of time, but would return as a result of freeze-thaw cycles, earthworm activity, and other natural processes.

However, the typical scenario in large scale development is to strip off the existing layer of topsoil, often two to three feet in depth, and stockpile it. The exposed clay is then graded, formed, and compacted to create the future landscape. Four to six inches of

stockpiled topsoil is then respread over the compacted clay to allow a vegetative cover (turfgrass) to be established. The balance of the topsoil is then sold, and leaves the site, and the filter / storage benefits are lost forever.

In reality, these mass graded areas can often exhibit a significant degree of imperviousness due to this compaction, but because they are subsequently planted to turf-grass, they are not accurately accounted for in stormwater detention calculations. More importantly, the natural storage capacity of the pre-disturbance soil horizon has been lost, and not accounted for in stormwater detention calculations. While natural processes may eventually restore some infiltration capacity to the compacted hardpan, it will likely take many decades or more (after all, the original soils took CENTURIES to form).

By preserving undisturbed corridors of hydric soils, larger wetlands that remain in the landscape can also be connected to local stream corridors. While more than 40% of the stream corridor in the lower region of Tyler Creek was identified and preserved when developments were constructed in the past, most of the wetlands and ephemeral tributaries draining into Lower Tyler Creek were drained and filled during development. This trend has continued in the upper reaches of Tyler Creek as well, and can be observed in newer developments in Gilberts and Pingree Grove.

Preservation of the existing stream corridor along Tyler Creek and its major tributaries is a step in the right direction; however, protecting these narrow corridors alone will not adequately protect the ecological integrity or water quality of Tyler Creek. Upstream of the Gilberts WWTP, the stream corridor has been severely narrowed and wetlands drained to suit the agricultural uses that, until recently, have dominated the landscape of the Tyler Watershed. If development of these areas proceeds according to existing development and stormwater ordinances, there is concern that the remaining green infrastructure left over will be too small, too disturbed, and to fragmented to provide any of the ecological or water quality benefits that are necessary to protect and enhance Tyler Creek.

The way to address these problems is for land-use decision makers in the watershed to establish a green infrastructure plan for their community which defines a green infrastructure boundary and sets up criteria as to how new development can integrate with the watershed's green infrastructure.

11.3 Getting Started - Delineating the Green Infrastructure Boundary

One of the first steps in developing a Green Infrastructure Plan is to create a preliminary map of green infrastructure areas using available map data. It should be noted that the green infrastructure areas delineated in this plan are PRELIMINARY and are intended to serve as a guide to local officials and planning staff. Actual green infrastructure boundaries on a given parcel must ultimately be determined by adoption of specific green infrastructure criteria (rules set forth by the local jurisdiction) and field survey done on the parcel in question.

The establishment of Green Infrastructure Areas in this Tyler Creek Watershed Plan was accomplished by determining appropriate setback guidelines for specific natural features (such as high quality wetlands) and overlaying available GIS datasets on top of one another. These combined data layers of natural resource information created "linkages" of geographic areas.

The boundary for the Tyler Creek Watershed's Green Infrastructure Plan is delineated using the following guidelines:

- A minimum 50 foot wide buffer along each side of all streams identified in the stream channel network
- 100-Year Floodplain, as mapped on FEMA's Digital Flood Insurance Rate Map (FIRM) Floodplain Map
- All Kane County Forest Preserve District Properties
- A minimum 100 foot buffer width around all Advanced Identification (ADID) study identified High Habitat Quality and Natural Open Water Wetlands.
- A minimum 50 foot buffer around all Advanced Identification (ADID) study identified High Functional Value and other, lower quality wetlands contiguous with a stream channel or larger than 5.0 acres in size.
- All Advanced Identification (ADID) study identified Farmed Wetlands (with no additional buffer)
- Areas mapped as hydric (wetland) soils that can serve as connecting corridors between isolated wetlands larger than 5.0 acres to provide habitat and natural drainage connection between the wetlands and the perennial stream system.
- The map was then edited to ensure that existing buildings and developments were not included within the green infrastructure boundary.

The maps in Figures 11.1 – 11.5 illustrate several of the incremental steps using the guidelines above to delineate the boundary of the draft green infrastructure plan. Priority areas included publicly owned natural open space parcels, stream corridors, and high quality wetlands. This draft Green Infrastructure Plan recognizes that it is not feasible, nor practical to protect and connect each and every isolated wetland, regardless of quality, to the integrated green infrastructure network of the watershed. Therefore, only isolated wetlands larger than five acres in size are proposed to be included in the boundary. This would allow future development to incorporate and reconfigure smaller, lower quality wetlands (wetlands not classified as High Habitat Quality or containing T&E species) within proposed development areas into their proposed stormwater system, if it is not feasible to preserve them without disturbing their underlying soils.

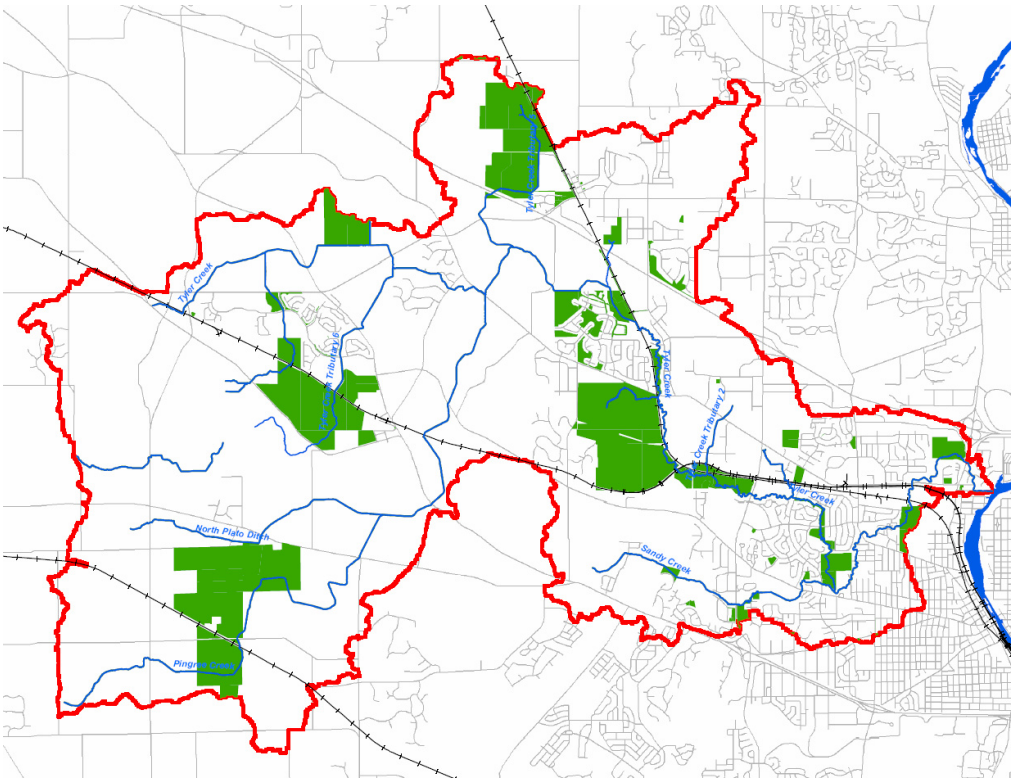


Figure 11.1 Publicly owned land and stream channels buffered 50 feet.

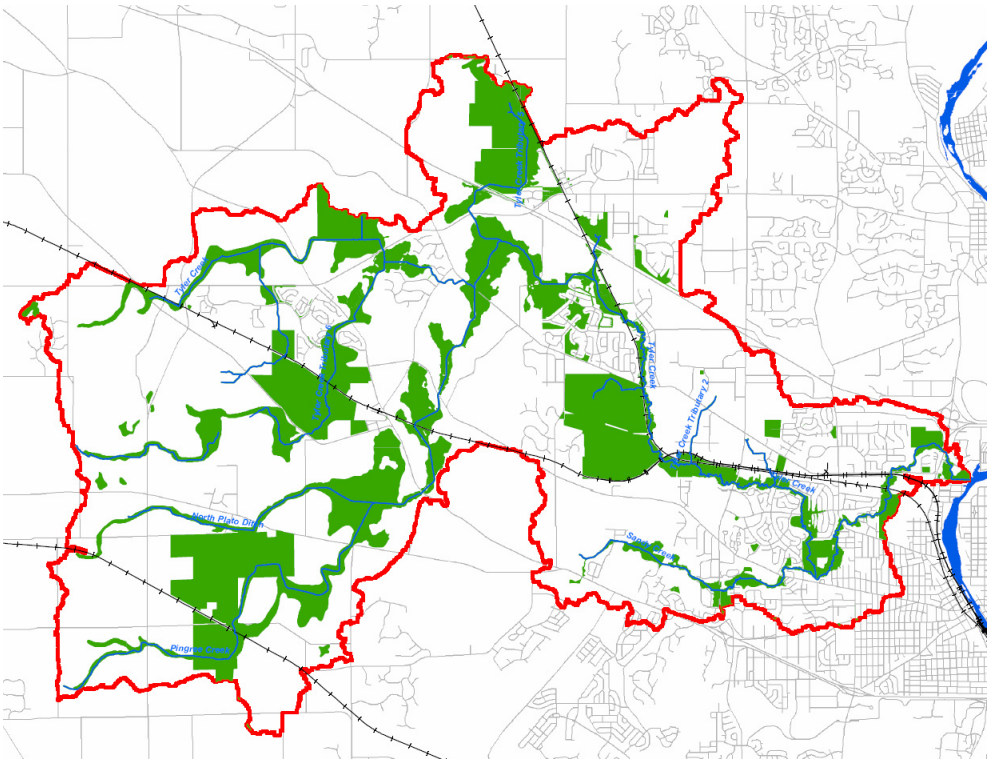


Figure 11.2 Public open space, streams buffered 50 feet, and 100 year floodplain.

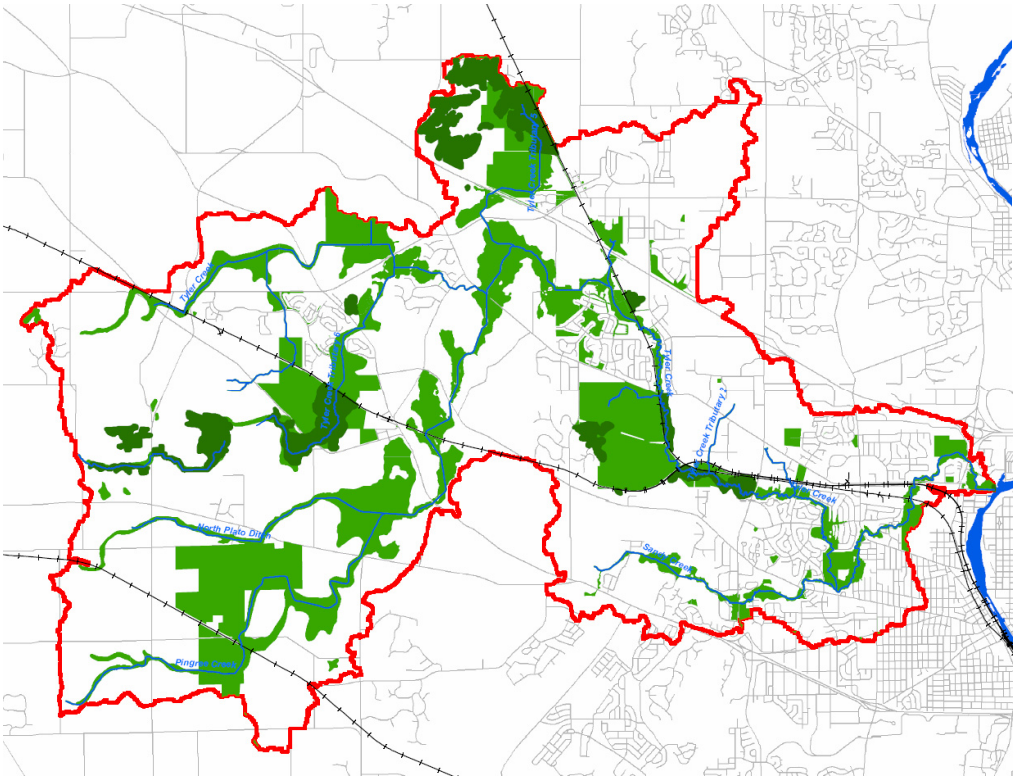


Figure 11.3 Public land, streams, floodplains, and high quality ADID wetlands (HQ wetlands shown in dark green)

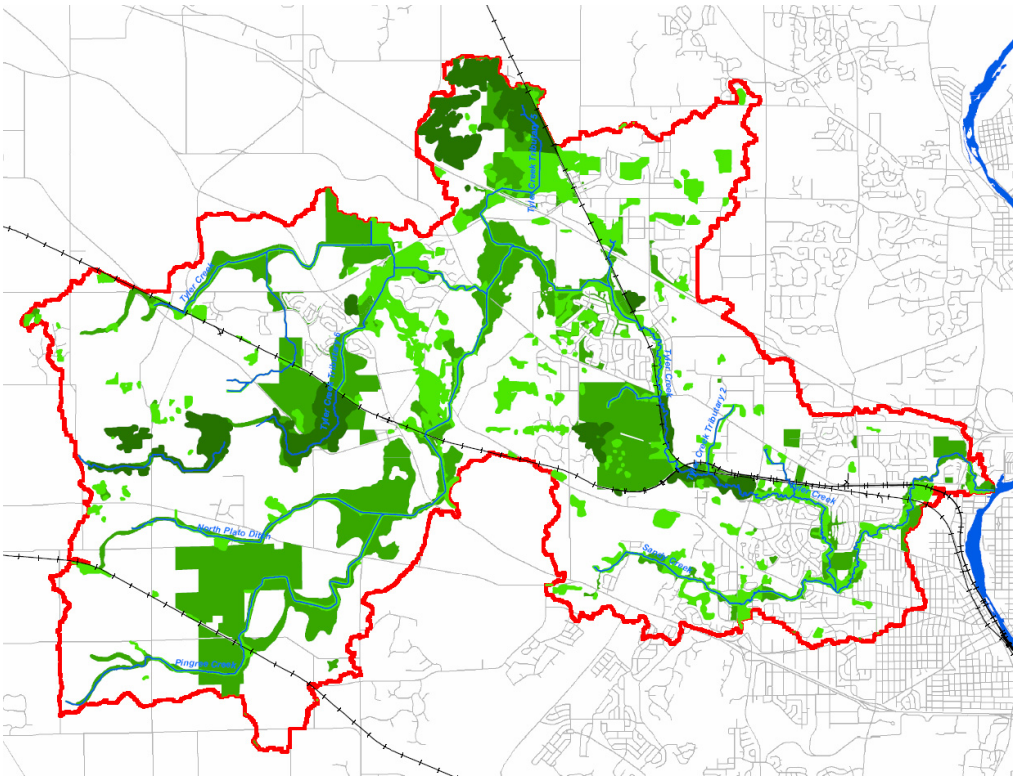


Figure 11.4 Public Land, streams, floodplains, high quality ADID, and high functional value ADID wetlands.

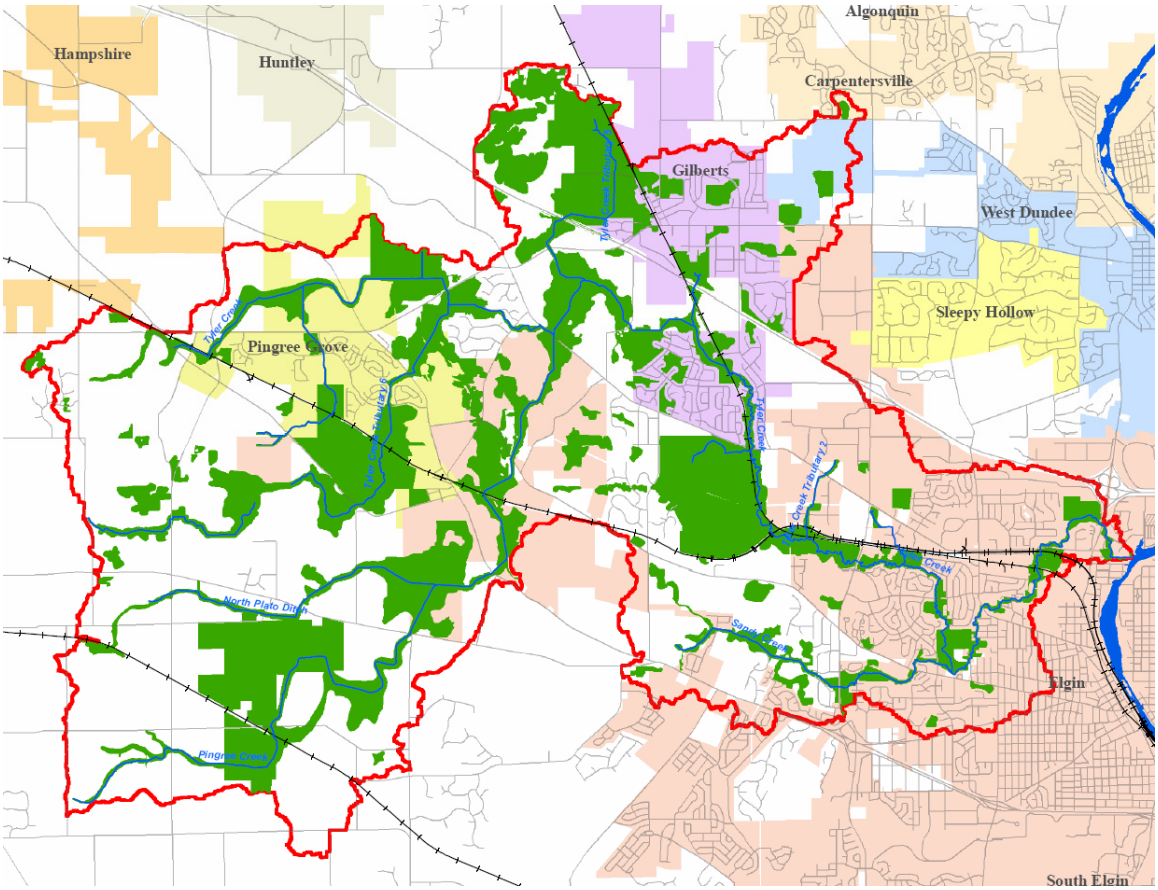


Figure 11.5 Proposed Draft Green Infrastructure Boundary created from composite GIS datasets.

11.4 Guidelines for Interfacing with and Utilizing Tyler Creek's Green Infrastructure

Where development has already occurred in or immediately adjacent to existing natural areas or the stream corridor, the Green Infrastructure Plan can be used as a guide to promote the installation of buffers to help protect those sensitive areas.

On parcels in which development is proposed for future construction, the green infrastructure boundary indicates the areas where the existing land features should be preserved and perhaps enhanced to receive and transport runoff much as it did in its natural, pre-development or pre-agriculture state.

11.5 Implementing the Green Infrastructure Plan

The municipalities in the watershed should review the draft Green Infrastructure Plan criteria presented in this chapter and adopt their own green infrastructure plan to be incorporated into their comprehensive land use plans as well as their subdivisions ordinances. This will allow municipal staff to guide developments early on in the planning process and will give perspective developers a clear picture as how a community wants new development designed to meet their community goals, which should support and compliment the goals and objectives of the Tyler Creek Watershed Plan.

Because the green infrastructure boundary presented in this plan is derived purely from GIS datasets and not field data, the boundary shown on the exhibits represents the approximate extent and not the exact boundary on a given parcel should occur. It is useful at this resolution to assist land planners and engineers during the concept planning stage of development to help locate areas within the proposed development which should remain undisturbed or require additional stormwater treatment to protect high quality sensitive areas. The exact boundaries of the green infrastructure on a parcel planned for development should be determined early on during the development design stage using wetland and soil field investigations, and mapping of the true 100 year floodplain (not Zone A approximations) on the project site using 1 foot topography. Wherever possible, isolated depressional areas (such as farmed wetlands) should be preserved and connected to the green infrastructure network using relatively undisturbed overland flow corridors.

11.5.1 Suggested Ordinance & Zoning Revisions

The following restrictions and requirements should be considered by the municipalities to incorporate the green infrastructure concepts into their ordinances and zoning designations:

- Review existing subdivision and zoning ordinances to determine if higher building densities could be offered to developers in exchange for them providing Green Infrastructure Plan elements in their proposed plans.

- Require developers to submit a delineated Green Infrastructure Boundary on their development plans and provide a brief explanation of how existing green infrastructure will be protected or how the green infrastructure will be restored to provide enhanced ecological, water quality, and aesthetic benefits to the watershed.

- Restrict encroachment and disturbances in the green infrastructure boundary (GIB) by new development. Allow disturbances only if they are absolutely necessary and in those cases enforce strict guidelines as to the amount of disturbance allowed and degree of site restoration required (along the lines of “put it back to a condition better than you found it”).

- Require stormwater facilities be constructed outside of the green infrastructure boundary and all stormwater discharges to the green infrastructure area occur via outlet systems designed to release runoff as sheet flow rather than concentrated point discharges from traditional storm sewer outfalls (i.e. level spreaders, subsurface drains, etc.).

- If new development infrastructure, such as stormwater facilities, must be constructed within the green infrastructure area, then such facilities must be designed to maximize habitat and replicate the geometries of natural wetlands (i,e, shallow side slopes, native wetland vegetation, etc.)

- Where new development occurs near channelized stream corridors or isolated low quality wetlands, the development should be required to restore or enhance

these features to replicate their pre-disturbed vegetative quality and hydrologic function.

- Review existing landscape ordinances to ensure that property owners who maintain a green infrastructure buffer are not cited for weed nuisance laws

- Review existing ordinances to ensure that prohibitions on landscape waste or pet waste disposal in green infrastructure area exist, and can be enforced.

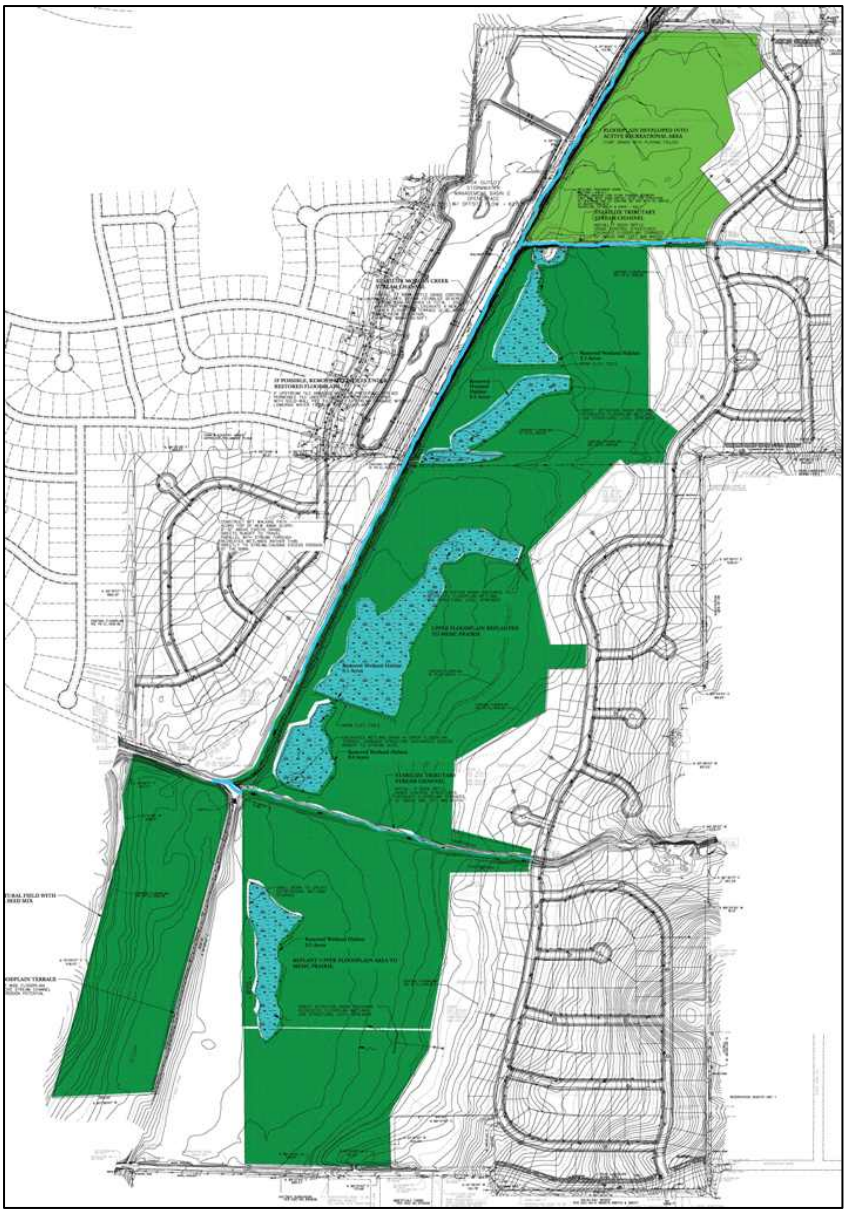


Figure 11.6: Example of green infrastructure being preserved as part of a future development. In this case, the development proposed for the east side of the stream is locating it's stormwater drainage system outside of the greenway (shown here in green) and restoring a 300 foot to 800 foot buffer along the stream corridor to native prairie as well as converting farmed wetlands and hydric soil depressions back into functioning wetland basins. All stormwater detention on the east side of this new corridor will discharge using level spreaders to maximize infiltration and pollutant removal as runoff flows from the development overland through the restored prairie and wetland communities. Development on the west side of the creek was already under construction at the time of this project, and it is very apparent that traditional planning was utilized, resulting in essentially no functional green infrastructure on the west side of the stream.

11.5.2 Landowner Outreach & Education on Green Infrastructure

Outreach and education on the components of and benefits associated with the watershed's green infrastructure should occur at two levels.

11.5.2.1 Developers

The Green Infrastructure Plan should be adopted by the municipal leaders and presented to developers as a guide to illustrate which existing landscapes the municipality values and desires to see them preserved or enhanced as part of development on a given parcel. The green infrastructure plan should be made available to developers as soon as possible in the concept planning stage and developers should be encouraged to contact and coordinate with municipal staff to discuss the how the development will be designed to fit within the framework of the green infrastructure network.

11.5.2.2 Private Landowners

A practical Green Infrastructure Plan recognizes that existing buildings and manicured landscapes have already encroached into the Tyler Creek's green infrastructure zone. Where possible, the plan should recommend that landowners consider the benefits to Tyler Creek by re-establishing a buffer of native vegetation between maintained landscapes and the adjacent stream or wetland. The draft plan recommends that landowners maintain or re-establish a 50 -100 foot natural buffer wherever possible along stream corridors and 25 - 50 foot buffers around natural wetlands. Access paths are recommended rather than large turf grass borders along wetlands and stream channels. Prohibit dumping of waste (like grass clippings, landscape waste, construction debris, garbage, etc.) in the buffer zone.

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Chapter 12
Public Outreach and Education Programs

12.1 Summary of Existing Programs

12.1.1 Friends of the Fox River

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.

Friends of the Fox River is a non-profit organization made up of citizens and organizations taking action to protect and maintain the quality of the Fox River and its tributaries. Through their programs and activities, FOFR encourages both adults and students to become involved in protecting the river and its watershed. Each year, FOFR administers programs for watershed stakeholders that include a watershed-wide monitoring program (FOFR's Fox River Watershed Monitoring Network), river and stream cleanups, river habitat improvement projects, and water quality education events.

Hundreds of people are members of the FOFR's Watershed Monitoring Network. Members volunteer to collect water quality data, assist at education events, and/or offer their individual expertise or talents. Watershed stakeholders are encouraged to become FOFR members and more importantly, become active stewards of the Fox River Watershed.

The hallmark of the Fox River Watershed Monitoring Network is the water quality monitoring program. Once a year, Network volunteers monitor the water quality of the Fox River and its tributaries at stream monitoring sites throughout the watershed. They collect physical, chemical, and biological data used to assess water quality trends. This data can be the first warning sign of problems in the watershed.

FOFR also sponsors continuing education and community outreach events through special seminars on stream ecology and speaking at public hearings on issues that potentially impact the quality of the Fox River or its tributaries.

More information can be found at: www.friendsofthefoxriver.org

12.1.2 Kane County

Public education and outreach from Kane County is offered mainly through the County's Department of Environmental and Building Management (Kane County DEBM). This department is charged with administering the County's NPDES Phase II Permit issued by the Illinois EPA and insuring that the County is meeting the 6 Minimum Control Measures. Kane County DEBM has also taken responsibility to offer public education and outreach assistance to municipalities throughout the County in the form of public speakers to present watershed / environmental topics to municipal leaders, staff, and private citizens to further explain the importance of watershed resource protection. For more information, visit: www.co.kane.il.us/kcstorm/index.asp

12.1.3 Kane-DuPage Soil & Water Conservation District

The Kane-DuPage Soil and Water Conservation District provides a variety of outreach programs for K-12 classrooms and scout groups. Programs are interdisciplinary and can be designed to meet the needs of classroom curriculum. Possible outreach program topics include, but are not limited to the following topics:

Early Elementary Level

- **Dirt Decomposers**
  Did you know there is more life in the ground than above? A teaspoon of soil contains more than a billion organisms! Students will discover the world underneath their feet as they learn about the critters that help recycle plant nutrients and form soil.
- **Trees and Plants**
  Plants give us life! Not only do they provide us with oxygen, they provide homes and food for wildlife, help prevent soil erosion, and provide many products we use every day. This program will expose students to the diversity, function, and importance of trees and other plants.
- **Water Wonders**
  Water is a key element for all life. The water we drink today is the same water from the time of the dinosaurs! Water is used not only in our homes but by industry and agriculture as well. Learn how water is recycled, how we use this precious natural resource and the importance of water conservation.

Late Elementary Level

- **Groundwater**
  Groundwater supplies nearly half of Illinois' residents with their water needs. Activities on the land have an impact on the quality of this resource. Learn about groundwater and its role in the water cycle. Students will see groundwater in action through a demonstration using a groundwater model.
- **Soil**
  Soil is more than the loose brown stuff underneath our feet. There are many different types of soil with distinct textures and colors. Students will get their hands dirty as they investigate the formation, components and importance of soil.
- **Wetlands**
  Wetlands are important and productive ecosystems. Along with providing habitat for wildlife, they are able to slow flooding and filter impurities from the water. In this program the importance of wetlands will be demonstrated by using the enviroscape model.

Middle School Level

- **The Changing Landscape**
  Kane and Du-Page counties have experienced huge growth and development. Students will use historical aerial photos and maps to learn how their area has changed over time and the effects of these land use changes.
- **Pollution Around Us**
  Pollution is more than just garbage, it includes any type of contamination to land, air, or water. Pollution affects the natural resources on which we depend. Through use of a model students will investigate sources of point and nonpoint source pollution as well as some ways to prevent it.
- **Watersheds**
  Everyone lives in a watershed. Watersheds are simply the area of land from which

surface runoff drains into a stream, river or lake. Learn how the shape of the land determines watersheds boundaries as well how our activities can effect these areas.

High School Level

- **Envirothon** Envirothon Page
  Envirothon is an annual competition, which gives students the opportunity to learn about the environment and the role of individuals in natural resource management. Local competition is held in early April.
- **Solving Land Use Problems**
  It is important to take the natural resources of an area into consideration when planning to build on a site. Students will learn how aerial photos and maps are used to determine whether a site is appropriate for proposed land uses
- **Resource Consumption**
  We all create waste from the products we use in our daily lives. This problem is made greater by the waste generated from packaging, manufacturing and consumption of products. Students will examine this problem and determine ways to reduce the strain on landfills and natural resources in this program.

For more information, visit: www.kanedupageswcd.org

12.1.4 Fox River Ecosystem Partnership (FREP)

REP was formed in 1996 after IDNR designated a core of high-quality ecological resources in the northern-most watershed as a "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 the Fox Chain O'Lakes (one of the nation's busiest inland waterways), many high quality Natural Areas, and suburban areas with some of the highest growth rates in the state. The Partnership is a diverse group, made up of landowners, businesses, non-profit organizations, agencies and governments within the Fox River Watershed region.

In 1998 FREP began a comprehensive planning process, identifying 16 critical factors and 6 areas of concern. The result was the ***Integrated Management Plan for the Fox River Watershed in Illinois*** that makes 35 recommendations for action. The Fox River Ecosystem Partnership is a 501(c)3 not for profit organization.

FREP is open to all watershed stakeholders and interested persons wishing to participate in watershed protection activities or simply wanting to get more information about the Fox River Watershed and the challenges and solutions that people are working on to protect the watershed. General meetings are held every other month and usually include a short presentation about a particular watershed protection activity or program. On “off months” the Fox River Ecosystem Partnership hosts a Noon Network Program, where anyone interested can attend a lunchtime gathering in which a guest speaker is invited to present information about a particular watershed protection or restoration project they are involved in. The goal of the Noon Networks is to share information with other stakeholders and create an opportunity for stakeholders to “network” and learn more about programs and actions they can implement in their region of the Fox Watershed.

For more information, visit: www.foxriverecosystem.org

12.1.5 The Conservation Foundation

The Conservation Foundation is a not for profit land and watershed protection organization. Their mission is to preserve 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.

Conservation@Home is a program started by The Conservation Foundation in 2004. It is an extension of homeowner education and watershed protection efforts that encourages and recognizes property owners that protect and/or create yards that are environmentally friendly and conserve water. It includes planting native vegetation, such as prairie and woodland wildflowers, trees and shrubs, creating butterfly and rain gardens, and removing exotic species of plants. It promotes planting "flower bed" areas. It does not require planting them across an entire yard – as many assume is required in order to achieve some environmental benefit. It encourages individual responsibility to counter practices that have long contributed to environmental degradation, particularly in our rivers and streams. Homeowners association, garden clubs, and others often contact The Conservation Foundation to educate them on the benefits of native plantings, how individuals can use these approaches to make a difference, as well as on how other practices such as rain barrels and other environmentally-friendly practices can be used. This program could be expanded into the Tyler Creek watershed to promote the practices recommended by this watershed plan.

The Conservation Foundation also works with the Kane County Forest Preserve District and private landowners to protect land. We recently ran a campaign passing Kane County's third referenda for open space protection, in the amount of $85 million. We help them contact landowners and negotiate purchase of properties they wish to acquire and preserve as open space. The Conservation Foundation also works with private landowners to assist with conservation easements to protect natural lands. Both of these approaches are important components to protecting the watershed's green infrastructure and thereby protecting and improving its water quality. The Conservation Foundation will continue this work throughout Kane County and the Tyler Creek Watershed.

Another outreach effort of The Conservation Foundation is to work with municipalities to encourage sustainable development practices. This not only includes implementing multiple and cumulative stormwater best management practices in a residential or commercial development, but also working on the development of covenants and restrictions to appropriately address stewardship and maintenance of these areas, with funding dedicated to that. Such work requires immersing ourselves in the development process from the start of annexation agreement negotiations through to the final plat. It includes working with the municipality's staff and elected officials, representatives for the developer (planners and engineers), and educating the public. The Conservation Foundation has requested funding from Kane County to support its efforts in working with municipalities on these issues. Tyler Creek Watershed will be included in those efforts.

Activities that The Conservation Foundation is involved with in other areas they serve include a storm drain stenciling program, educational efforts about stormwater best

management practices, as well as watershed education including information about where stormwater goes after it hits the street, volunteers to monitor creeks, and youth-based environmental education.

For more information on The Conservation Foundation, visit their website at: www.theconservationfoundation.org

12.2 Education & Outreach Recommendations

Overall, it appears that there are several education and outreach programs already active and working in parts of the Tyler Creek Watershed and indeed throughout the entire Fox River Watershed. It is difficult to quantify just how effective these individual programs are at reaching the public at large and effecting psychological/cultural changes as to how citizens implement watershed resource protection in their everyday life.

In order to maximize the effectiveness of the individual education & outreach programs, one suggestion might be work with all of these organizations in setting up an annual "education & outreach conference" where all of the organizations could come together and learn about the success each entity has and identify critical areas of outreach that are missing and determine which organization or organizations could position themselves to address those critical outreach concerns. This conference could be organized according to education & outreach stakeholders working throughout Kane County, for example, and the conference could be structured to provide a session or discussion period on the efforts being done in a specific subwatershed, such as Tyler Creek.

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Chapter 13
Measuring Watershed Plan Success

13.1 Suggested Milestones

Establishing milestones for the watershed plan is a means of tracking whether or not the recommended management practices or other control actions are being implemented. Milestones are usually organized into three relative time scales:

- Short-term Milestones (1-2 years)
- Mid-term Milestones (2-5 years)
- Long-term Milestones (5+ years)

The difficultly with setting aggressive milestones to expedite implementation of a comprehensive watershed plan is that the staff time and funding needed to implement many recommendations at the municipal level is almost always in direct competition with limited staff and even more limited operating budgets that are needed for day to day operation and maintenance of the traditional municipal infrastructure (the "gray infrastructure" – roads, sewers, etc.)

13.1.1 Public Education/Outreach

13.1.1.1 Tyler Creek Watershed Coalition

Short-term Milestones:

- Summer 2008: Organize a Tyler Watershed Coalition and conduct plan review and refinement meetings with participants at least quarterly.
- Maintain www.tylercreek.org webpage with current information on stakeholder participation opportunities and post watershed plan documents to webpage as revisions are completed.
- Summer 2008: Coalition begins process of securing funding and implementing a more detailed watershed loading model based upon the work completed by the Fox River Study Group and the Illinois State Water Survey for the overall Fox River Watershed.
- Spring 2010: Complete watershed loading model project and revise plan recommendation strategies and development guidelines to achieve desired water quality and stream stability goals.

Long-term Milestone:

- Coalition will keep www.tylercreek.org webpage current and utilize it as a means of connecting with watershed stakeholders about plan progress and participation opportunities.
- Coalition will develop a working relationship with municipal leaders and staff to insure all elements of the watershed protection plan are implemented.

13.1.1.2 Existing Public Education / Outreach Organizations

Short-term Milestones:

- Organize a 1 day conference in 2008 for agencies and organizations who have educational & outreach programs in the watershed. See Plan Section 11.2 for more information.

Long-term Milestone:

- Establish an annual 1 day conference for Education & Outreach organizations.
  - Achieve municipal staff attendance to the conference so they are aware of the programs available to municipal staff, leaders, and their constituents.

13.1.2 Regulatory Milestones

Short-term Milestones:

- By 2nd quarter 2008, each municipality will pass a resolution adopting the practices and principles the Tyler Creek Watershed Plan and pledge to implement the recommendations specified therein as funding for projects becomes available.
- As soon as possible, municipalities will begin working with perspective land developers to incorporate the elements of the Green Infrastructure Plan into future developments in the watershed.
- By end of 2008, each municipality should incorporate revised subdivision and zoning guidelines into their existing ordinances that encourage the use of low impact / conservation techniques in new development proposed in the watershed.

Long-term Milestone:

- All proposed new developments are designed and constructed in an efficient manner that is profitable for local economy without adversely impacting water quality or the existing natural resources in the watershed.

13.1.3 Monitoring

Short-term Milestones:

- Spring 2009: Coordinate with the Fox River Study Group to develop and implement a stream monitoring program to collect the necessary water quality and flow data needed to update the Tyler Creek watershed loading model.

Long-term Milestone:

- Work with the IEPA and USGS to establish and maintain water quality and stream flow monitoring stations at strategic locations throughout the watershed (coinciding with the monitoring locations required to prepare the updated watershed loading model).

13.1.4 Site Restoration

Short-term Milestones:

- Spring 2008: City of Elgin and Kane County Forest Preserve District each submit grant applications for state/federal funding to implement at least one of the Site Restoration Recommendations specified in Section 4.3
- Each year, at least one site restoration project should be completed by each responsible party.
- Spring 2008 Municipalities and/or Coalition members have contacted private landowners identified as potential participants in Site Restoration projects and provide them with information on technical guidance and possible funding sources to assist them with management of their privately owned natural areas along the stream corridor.

Long-term Milestone:

- All site restoration projects completed by 2020 – estimated to be 110 acres of woodland and prairie management and restoration.

13.1.5 Water Quality

Short-term Milestones:

- Fall 2009: City of Elgin completes construction of water quality facility in Valley Creek Subdivision downstream of Royal Blvd. (identified as Recommendation 1-17 in this plan; Site 5 in the Tyler Creek Management Plan)
- Spring 2008: City of Elgin submits IEPA 319 grant application for funding assistance to install up to 5 structural BMP devices to capture pollutants from medium to large storm sewer networks in the Lower Tyler Creek Subwatershed.
- Summer 2009: Kane County Department of Transportation. completes dry-bottom detention basin retrofit project identified in Recommendation 1-28.

Mid-term Milestones:

- 2010: City of Elgin organizes and promotes a rain barrel & rain garden program to encourage private landowners to implement these parcel-scale stormwater conservation practices in areas lacking the proper stormwater detention facilities.
- 2013: City of Elgin completes construction of remaining water quality facilities identified in Recommendations 1-2, 1-5, 1-6, 1-7, 1-8, 1-13, 1-14, ,1-27, 1-30.

Long-term Milestone:

- All water quality recommendations implemented by 2020.

13.1.5 Permanent Habitat Protection

Short-term Milestones:

- High quality wetlands on Camp Big Timber Boy Scout property permanently protected from encroachment or water quality impacts from adjacent future development.
- Not-for-profit land protection organizations successfully negotiate easements for protection of at least on ADID High Quality wetland each year beginning in 2008.

Long Term Milestones:

- By year 2017, all ADID High Quality wetlands are protected through either public ownership or private conservation easements.

13.2 Water Quality Monitoring Plan and Assessing BMP Performance

A monitoring plan for the Tyler Creek watershed is important is providing the following information:

- Base line data-both biological and chemical where there are none. The data are useful for identifying changes in the watershed.

- Data for updating the FRSG modeling effort for the Tyler Creek sub-watershed. The product of this effort can be used by local agencies to plan and evaluate various water resource initiatives (or BMPs) in the watershed-including flooding, land use conservation, stormwater management and evaluation of point-sources.

The review of the current water quality and biological monitoring in the watershed presented in Section 2.2.3 suggests that an enhanced monitoring effort driven by the goals of the watershed plan would complement decision making, plan implementation and updating both in the short term and in the future. Biological monitoring is important for assessing the actual progress of the pollutant load reduction strategies and the overall ecological health of the watershed. Field data would enable the effectiveness of BMPs to be evaluated and appropriate adjustments to the plan to be determined.

There are indications that there are could be low-flow problem reaches in Tyler Creek and its tributaries that may be exacerbated by on-going and future capital improvements in the existing WWTP. It is important that such locations be identified for appropriate restorative action. Based on the above considerations, the following Table summarizes the recommended minimum monitoring program for the watershed.

Table 13.1 Water Quality Monitoring Plan Recommendations

Location	Type of Monitoring	Resources & Program	Objectives and Recommendations	Annual Monitoring Costs
DTZP01 DTZP02 DTZP04	Existing Water Quality Stations.	IEPA	On-going. • Increase frequency of monitoring to include dry and wet weather • Monitor D/S of Gilbert WWTP at low-flow Monitor Fecal Coliform to establish sources	N/A It is anticipated that IEPA will continue monitoring Fecal coliform to confirm basis for listing and isolating sources
Stream Stations (10)	Grab Sampling at: Low-flow Wet-flow Constituents: nutrients, DO, TSS, Chlorides Min: 5 samples/season/storm	FRWMN	Expand Stations to 14 to include: • Upper Pingree Creek • Sandy Creek • Central Tyler Creek D/S of Gilberts WWTP: • Upper Pingree Creek Biological monitoring at all sites, once/year	$2,500 per station (Based on 5 samples in dry season 5 samples in wet season) Total Cost for 4 stations = $10,000
Main stem Outlet Tyler Creek	Weather, Flow Include Water Quality at low-flow & High flows: Constituents: nutrients, DO, TSS, Chlorides Minimum 5 samples/season/storm	USGS FRSG	Continue collecting data to refine FRSG-Tyler Creek Model	$2,500 for single station (Based on 5 samples in dry season and 5 samples in wet season)

A monitoring plan will help determine trends in pollutant loadings resulting from BMP implementation. The main pollutants of concern were fecal coliforms, nutrient, and sediment loads. The proposed monitoring plan includes these parameters in addition to biological indicators... Depending on the available resources, modeling using monitoring data is the most comprehensive procedure for determining pollutant load reductions.

Trends in pollutant load reductions can be detected by factors such as:

- Reduction of stream bank erosion
- Reduction in frequency of exceedences or concentration of fecal coliform bacteria
- Reduction of algae blooms indicating reduced nutrient enrichment
- Reduction of TSS concentrations, signaling reduced sediment loads
- Reduction of phosphorus and nitrogen concentrations
- Improvement in biological indicators

Sediment loads is by far the most critical parameter for assessing BMP performance.

Monitoring eroding stream banks is an indirect means of quantifying soil loss by erosion. Historical aerial photographs allow a comparison between channel with discrete points in time and translating changes into an average annual rate can provide an estimate of the rate of sediment loading due to instream sources. Erosion rates can be measured directly by installing and monitoring bank pins in the reaches of interest. Pins or stakes are driven into the channel banks flush with the surface. The amount of pin exposed due to erosion is the amount of change at the streambank erosion site between the times of observation. Sediment loading reductions can be quantified by comparing the erosion rates with the rates for a stable reach.

Reduction in TSS is a measure of decreasing sediment loads. Reduction of sediment loads is also an indirect indicator of reductions in nutrient loads since a significant amount of nutrient loads is carried by sediments. Since nutrient enrichment results in algae blooms and excessive growth in streams and lakes, absence or reduction of algae blooms is an indirect way of assessing reduction of nutrient loads.

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Chapter 14
References

14.1 Watershed Plan References

Openlands Project 1996. “Protecting and Restoring Tyler Creek: Creating an Ecological Greenway in a Watershed Context”

City of Elgin, 2005. “Comprehensive Plan & Design Guidelines”

Conservation Design Forum 2003. “Blackberry Creek Watershed Alternatives Futures Analysis”

Illinois EPA, 2006 . “2006 Illinois Water 305(b) Quality Report”

Kane County, 2005 “Kane County Stormwater Technical Guidance Manual”

“The Practice of Watershed Protection”, 2000. Editors Thomas R. Schueler and Heather K. Holland, Center for Watershed Protection

Kane County, 2004. “Kane County 2030 Land Resource Management Plan”

Huff, James E., Quartucci, Greg, and Blomquist, Bonnie, 2004. “Buiological Assessment of Tyler Creek, Kane County, Illinois”, Huff & Huff, Inc. Lagrange, Illinois

Rhoads BL, Herricks EE. 1996. Naturalization of headwater streams in Illinois: challenges and possibilities. In *River Channel Restoration: Guiding Principles for Sustainable Projects*, Brookes A, Shields Jr FD (eds). Wiley: New York; 331–367.

Rhoads BL, Urban MA. 1997. Human-induced geomorphic change in low-energy agricultural streams: an example from East-central Illinois. In *Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision*, Wang SS, Langendoen EJ, Shields Jr FD (eds). Center for Computational Hydroscience and Engineering, The University of Mississippi: 968–973

Thrash, J.P. 2007 “Ecologically Functional Stormwater Basin Retrofits”. Stormwater Magazine, May 2007.

US EPA 2005. “Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters”. EPA document 841-B-05-005.

Village of Gilberts, 2003. “Future Land Use Plan Map” (from Village web page).

13.2 Watershed Protection References & Resources

13.2.1 Organization & Agencies

Kane County Department of Environmental & Building Management
http://www.co.kane.il.us/Environment/index.asp

U.S. Environmental Protection Agency
http://www.epa.gov/owow/nps/

Fox Valley Land Foundation
http://www.fvlf.org/

Friends of the Fox River
http://www.friendsofthefoxriver.org/

Fox River Ecosystem Partnership
http://www.foxriverecosystem.org/

Kane-DuPage Soil & Water Conservation District
http://www.kanedupageswcd.org/

Fox River Study Group, Inc.
http://foxriverstudygroup.org/

The Center for Watershed Protection
http://www.cwp.org/

13.2.2 Publications

"Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters". 2005. United States Environmental Protection Agency. EPA document 841-B-05-005.
http://www.epa.gov/nps/watershed_handbook/

"The Practice of Watershed Protection", 2000. Editors Thomas R. Schueler and Heather K. Holland, Center for Watershed Protection
www.stormwatercenter.net

"Changing Cost Perceptions: An Analysis of Conservation Development". February 2005. Conservation Research Institute.
http://www.cdfinc.com/CDF_Resources/CDF_Resources.htm

APPENDIX 1

SUBWATERSHED MAPS

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APPENDIX 2

Table 1: ASSIGNMENT OF LAND USE CATEGORIES FOR GWLF ANALYSIS

IDNR Land Cover Description	GWLF Land Cover Description
Shallow Marsh-Emergent Wetland	1.Wetland
Deep Marsh- Emergent Wetland	
Seasonal/Temporary flooded Wetland	
Shallow Water Wetland	
Floodplain Forest	2.Forest
Partial Forest/Savannah Upland	
Upland Forest	
Coniferous Forest	
Other Small Grains and Hay	3.Hay/Pasture
Rural Grassland	
Corn	4.Row Crops
Soybeans	
Winter Wheat	
Low Density Urban	5.Low Density Development (< 1unit per 1.2 acres)
Medium Density Urban	6.High Density Development (≥ 1unit per 1.2 acres)
High Density Urban	
Barren and Exposed Land	7.Transitional/Quarries
Urban Grassland	8.Turfgrass/Golf Course
Open Water	9.Water

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APPENDIX 3

GWLF RESULTS: DETAILED MONTHLY LOADS BY SUBWATERD

The Lower Tyler Creek Subwatershed

Existing Loading Estimates		
Pollutant	Lbs/Yr	Contribution Index
Total N	20331.3	80
Total P	1300.5	58
Sediment*	782.5	63
Stream Bank Sediment	410.5	
Runoff*	1469	104

Future Scenario	
Lbs/Yr	Contribution Index
18694.6	90
1046.2	67
703.7	72
484.0	
1531	99

*Sediment in Ton/Yr and Runoff in Ac-ft/Yr

Existing Loading Estimates by Source				
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	491.7	1.0	68.9	3.5
Hay/Pasture	649.9	21.3	418.5	53.4
High-Density Development	1608.7	16.7	5015.0	556.1
Low-Density Development	397.8	6.8	27.4	3.7
Forest	568.3	1.4	22.0	2.6
Row Crops	664.7	301.5	2628.9	509.8
Transitional	2.5	2.8	22.3	4.5
Turfgrass/Golf Course	580.7	20.5	270.9	30.7
Water	43.7	-	-	-
Stream bank	-	410.5	41.1	18.1
Groundwater	-	-	11816.2	118.2
Total	5008	782.5	20331.3	1300.5

Future Scenario			
Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
491.7	1.0	68.9	3.5
526.3	17.0	337.3	42.8
1608.7	16.9	5061.9	561.3
901.9	15.6	143.0	19.1
568.3	1.4	21.8	2.5
336.1	147.1	1298.6	250.1
2.5	2.3	19.3	3.8
528.8	18.2	244.2	27.4
43.7	-	-	-
	484.0	48.4	21.3
	-	11451.2	114.5
5008	703.7	18694.6	1046.2

The Central Tyler Creek Subwatershed

Existing Loading Estimates		
Pollutant	Lbs/Yr	Contribution Index
Total N	22863.8	86
Total P	1660.8	71
Sediment*	979.3	76
Stream Bank Sediment	204.0	
Runoff*	1617	111

Future Scenario	
Lbs/Yr	Contribution Index
18532.3	86
1001.9	62
743.3	74
346.0	
1875	116

*Sediment in Ton/Yr and Runoff in Ac-ft/Yr

Existing Loading Estimates by Source				
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	971.1	2.1	235.4	10.2
Hay/Pasture	672.1	18.3	410.2	49.5
High-Density Development	649.9	6.7	812.5	90.1
Low-Density Development	410.2	6.9	28.9	3.9
Forest	279.2	0.7	10.5	1.2
Row Crops	1692.7	715.8	7964.0	1326.9
Transitional	7.4	8.9	79.1	15.1
Turfgrass/Golf Course	457.1	16.1	212.9	24.1
Water	54.3	-	-	-
Stream bank	-	204.0	20.4	9.0
Groundwater	-	-	13089.9	130.9
Total	5194.0	979.3	22863.8	1660.8

Future Scenario			
Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
971.1	2.1	235.4	10.2
486.8	12.7	294.2	35.1
649.9	5.6	960.0	106.5
1579.0	22.4	440.5	58.7
279.2	0.7	10.6	1.2
780.9	331.8	3683.5	614.5
7.4	8.4	67.7	13.8
385.5	13.5	179.4	20.3
54.2	-	-	-
-	346.0	34.6	15.2
-	-	12626.3	126.3
5194.0	743.3	18532.3	1001.9

The Upper Tyler Creek Subwatershed

Existing Loading Estimates		
Pollutant	Lbs/Yr	Contribution Index
Total N	33669.1	104
Total P	3161.2	110
Sediment*	1755.5	111
Stream Bank Sediment	141.0	
Runoff*	1571	88

Future Scenario	
Lbs/Yr	Contribution Index
29804.6	113
2444.7	124
1469.2	119
251.8	
1735	88

*Sediment in Ton/Yr and Runoff in Ac-ft/Yr

Existing Loading Estimates by Source				
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	729.0	1.6	102.9	5.3
Hay/Pasture	1322.0	41.3	839.1	105.5
High-Density Development	121.1	0.8	26.7	3.0
Low-Density Development	247.1	3.5	8.8	1.2
Forest	232.3	0.4	7.8	0.7
Row Crops	3563.3	1559.1	17079.2	2871.8
Transitional	4.9	4.9	41.1	8.2
Turfgrass/Golf Course	108.7	2.9	44.9	4.3
Water	37.6	-	-	-
Stream bank	-	141.0	14.1	6.2
Groundwater	-	-	15504.5	155.1
Total	6366	1755.5	33669.1	3161.2

Future Scenario			
Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
729	1.6	103.0	5.3
1089.7	33.8	690.1	86.6
163.1	1.5	45.8	5.1
1154	17.0	200.0	26.7
227.3	0.4	7.7	0.7
2720.6	1155.7	12832.3	2140.7
2.5	2.6	21.3	4.3
173	4.8	169.9	7.2
106.8	-	-	-
-	251.8	25.2	11.1
-	-	15709.5	157.1
6366	1469.2	29804.6	2444.7

The Sandy Creek Subwatershed

Existing Loading Estimates		
Pollutant	Lbs/Yr	Contribution Index
Total N	9514.4	84
Total P	848.5	85
Sediment*	515.2	93
Stream Bank Sediment	62.4	
Runoff*	631	101

Future Scenario	
Lbs/Yr	Contribution Index
5953.3	65
279.3	41
223.0	52
112.1	
737	107

*Sediment in Ton/Yr and Runoff in Ac-ft/Yr

Existing Loading Estimates by Source				
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	190.3	0.4	27.1	1.4
Hay/Pasture	140.8	4.9	92.3	12.0
High-Density Development	447.3	5.4	453.2	50.3
Low-Density Development	155.7	2.7	4.2	0.6
Forest	126	0.3	4.5	0.5
Row Crops	805.6	424.5	3540.3	706.4
Transitional	2.5	3.2	28.1	5.4
Turfgrass/Golf Course	301.5	11.3	144.9	17.0
Water	47.3	-	-	-
Stream bank	-	62.4	6.2	2.8
Groundwater	-	-	5213.5	52.1
Total	2217	515.2	9514.4	848.5

Future Scenario			
Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
190.3	0.4	27.0	1.4
51.9	1.5	32.2	3.9
447.3	5.6	463.5	51.4
976.1	19.7	195.5	26.1
126	0.3	4.5	0.5
148.3	71.9	753.0	130.1
2.5	3.2	24.8	5.2
227.3	8.3	107.8	12.5
47.3	-	-	-
-	112.1	11.2	4.9
-	-	4333.7	43.3
2217	223.0	5953.3	279.3

The Lower Pingree Creek Subwatershed

Existing Loading Estimates		
Pollutant	Lbs/Yr	Contribution Index
Total N	8240.6	89
Total P	820.6	100
Sediment*	460.0	101
Stream Bank Sediment	27.4	
Runoff*	491	96

Future Scenario	
Lbs/Yr	Contribution Index
4371.5	58
273.0	48
212.4	60
80.3	
587	104

*Sediment in Ton/Yr and Runoff in Ac-ft/Yr

Existing Loading Estimates by Source				
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	331.1	0.7	80.4	3.5
Hay/Pasture	244.6	7.2	152.8	18.9
High-Density Development	29.7	0.2	1.8	0.2
Low-Density Development	135.9	2.1	2.9	0.4
Forest	103.8	0.2	3.7	0.4
Row Crops	845.1	415.2	4323.3	749.3
Transitional	2.5	2.6	21.5	4.4
Turfgrass/Golf Course	126	4.3	57.9	6.4
Water	6.3	-	-	-
Stream bank	-	27.4	2.7	1.2
Groundwater	-	-	3593.6	35.9
Total	1825	460.0	8240.6	820.6

Future Scenario			
Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
331.1	0.7	80.4	3.5
74.1	1.8	44.1	5.2
29.7	0.2	1.9	0.2
1018.1	16.6	209.9	28.0
103.8	0.2	3.7	0.4
232.3	109.0	1157.4	198.2
2.5	2.6	21.5	4.3
27.2	0.9	12.3	1.3
6.2	-	-	-
-	80.3	8.0	3.5
-	-	2832.5	28.3
1825	212.4	4371.5	273.0

The Upper Pingree Creek Subwatershed

Existing Loading Estimates		
Pollutant	Lbs/Yr	Contribution Index
Total N	37756.7	138
Total P	3893.2	161
Sediment*	1983.3	148
Stream Bank Sediment	98.7	
Runoff*	1518	101

Future Scenario	
Lbs/Yr	Contribution Index
30723.3	138
3015.7	181
1698.0	163
240.4	
1588	96

*Sediment in Ton/Yr and Runoff in Ac-ft/Yr

Existing Loading Estimates by Source				
Source	Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
Wetland	150.7	0.3	36.3	1.5
Hay/Pasture	590.6	19.1	1207.3	98.7
High-Density Development	44.5	0.3	3.8	0.4
Low-Density Development	163.1	2.5	4.2	0.6
Forest	59.3	0.1	5.1	0.3
Row Crops	4304.6	1854.8	25126.2	3662.5
Transitional	4.9	6.1	48.2	10.0
Turfgrass/Golf Course	39.5	1.3	17.6	1.9
Water	3.8	-	-	-
Stream bank	-	98.7	9.9	4.3
Groundwater	-	-	11298.3	113.0
Total	5361	1983.3	37756.7	3893.2

Future Scenario			
Area Acres	Sediment Ton	Total N Lbs	Total P Lbs
150.7	0.3	36.4	1.5
400.3	12.9	817.7	66.8
44.5	0.3	3.8	0.4
1532.1	21.6	411.2	54.8
64.2	0.1	5.5	0.4
3128.3	1415.2	18664.1	2762.6
4.9	6.2	48.5	10.1
32.1	1.0	14.1	1.5
3.9	-	-	-
-	240.4	24.0	10.6
-	-	10698.0	107.0
5361	1698.0	30723.3	3015.7