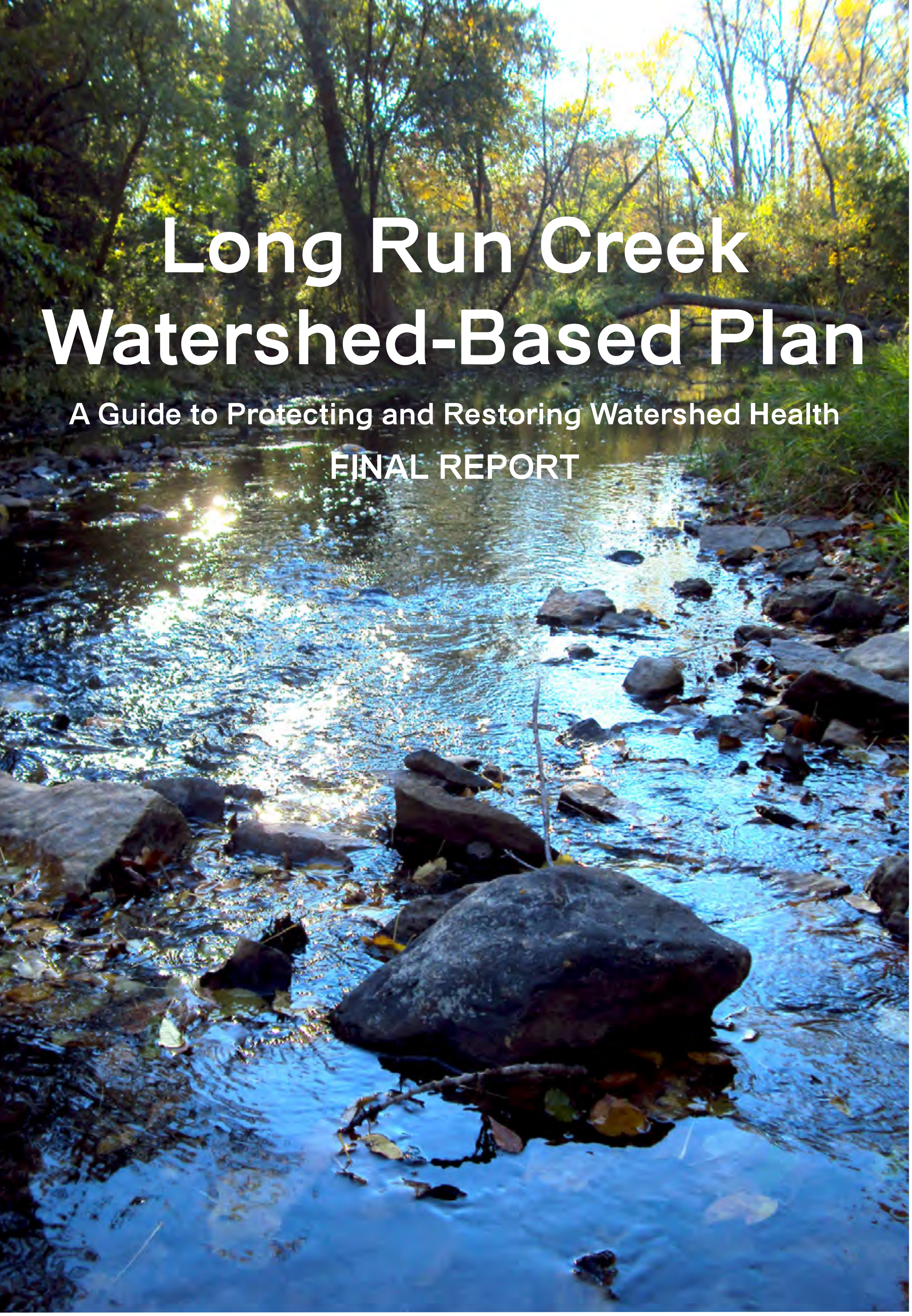
Long Run Creek Watershed-Based Plan

A Guide to Protecting and Restoring Watershed Health

FINAL REPORT



Prepared for
Long Run Creek Watershed Planning Committee
By Applied Ecological Services, Inc.
March 2014

Applied Ecological Services, Inc.™

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LONG RUN CREEK WATERSHED-BASED PLAN

Cook and Will Counties, Illinois

A Guide for Protecting and Restoring Watershed Health

FINAL REPORT

March 2014
(AES #10-0381)

Prepared by:

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for

Long Run Creek Watershed Planning Committee

Long Run Creek Watershed Planning Committee
with the Village of Lemont as fiscal agent

Funding for this project provided, in part, by the Illinois Environmental Protection Agency through Section 319 of the Clean Water Act (#3191115).

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Acknowledgements

Funding for the Long Run Creek Watershed-Based Plan was provided, in part, by the Illinois Environmental Protection Agency (IEPA) through Section 319 of the Clean Water Act via Financial Assistance Agreement #3191115. The Village of Lemont is the recipient of the IEPA grant. Additional funding was provided by the watershed partners. Of particular mention is an $18,000 grant from Hanson Material Service (HMS) for completing an in-depth Information & Education Plan.

Scott Ristau acted as project manager for Illinois EPA's Bureau of Water while Marcia De Vivo (President: Lower Des Plaines Ecosystem Partnership) acted as Watershed Coordinator for Long Run Creek Watershed Planning Committee (LRCWPC) and worked closely with watershed partners and Applied Ecological Services, Inc. (AES) to produce the watershed planning document. James Brown (Lemont Planning & Economic Development Director) and Martha Glas (Lemont-Village Planner), representing the Village of Lemont, performed consultant contract administration, and finance management.

Long Run Creek Watershed Planning Committee (LRCWPC) consists of representatives from various municipal, governmental, private, and public organizations as well as local residents. Key partners include the Forest Preserve District of Will County (FPDWC), Forest Preserve District of Cook County (FPDCC), Christopher Burke Engineering, Illinois Department of Natural Resources (IDNR), Illinois Nature Preserves Commission (INPC), Lower Des Plaines Ecosystem Partnership (LDPEP), Will-South Cook Soil and Water Conservation District (SWCD), City of Lockport, Village of Homer Glen, Village of Lemont, Village of Orland Park, Village of Palos Park, Lemont Township, Homer Township Highway Department, Lemont Township Highway Department, Will County Planning and Zoning Commission, Will County Stormwater Management Planning Committee, Big Run Golf Course, Crystal Tree Golf & Country Club, Woodbine Golf Course, Old Oak Golf Course, Byzantine Church, Hanson Material Service, Enbridge and Cardno JFNew (representing ComEd). These partners played an important role in providing input on watershed goals & objectives, various planning approaches, and input on potential watershed projects.

Bluestem Communications (formerly Biodiversity Project) was hired as a subconsultant to produce a detailed watershed Information & Education Plan. Bluestem Communications also headed up a pilot project that included a campaign to educate residents about the benefits and consequences of living in a watershed.

Applied Ecological Services, Inc. (AES) conducted analysis, presented at LRCWPC meetings, summarized results, and authored the Long Run Creek Watershed-Based Plan.

People from the following entities attended and provided input at LRCWPC meetings:

Applied Ecological Services, Inc.: Steve Zimmerman
Big Run Golf Course: Terry Hogan
Bluestem Communications: Rebeca Bell, Meg Kelly
Byzantine Church: Father Thomas Loya
Cardno JFNew (representing ComEd): Marcy Knysz
City of Lockport: Jack Linehan
Christopher Burke Engineering: Travis Parry
Crystal Tree Golf & Country Club: Les Rutan
Enbridge: Jennifer Smith
Forest Preserve District of Cook County (FPDCC): Charles O'Leary, Kristen Pink
Forest Preserve District of Will County (FPDWC): Tim Good
Hanson Material Service: Randy Boisvert
Homer Township Highway Department: Mike De Vivo, Debbie Stevens
Illinois Department of Natural Resources (IDNR): Lynn Boerman
Illinois Nature Preserves Commission (INPC): Kim Roman
Lemont Township: Kathy Hendrickson
Lemont Township Highway Department: Sig Vaznelis
Lower Des Plaines Ecosystem Partnership/Coordinator - Marcia De Vivo
Old Oak Golf Club: Al Lieponis
Village of Homer Glen: Mike Salamowicz

Village of Lemont: Martha Glas, James Brown, Maggie Richardson
Village of Orland Park: Jane Turley
Village of Palos Park: Mike Sibraver
Will County Planning and Zoning Commission: Derek O'Sullivan
Will County Stormwater Management Planning Committee: Ken Carroll
Will-South Cook Soil & Water Conservation District (SWCD): Neil Pellmann, Randy Edwards
Woodbine Golf Club: Jim Ludwic

All photos by Applied Ecological Services, Inc. (AES) unless otherwise noted.

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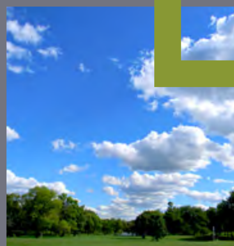
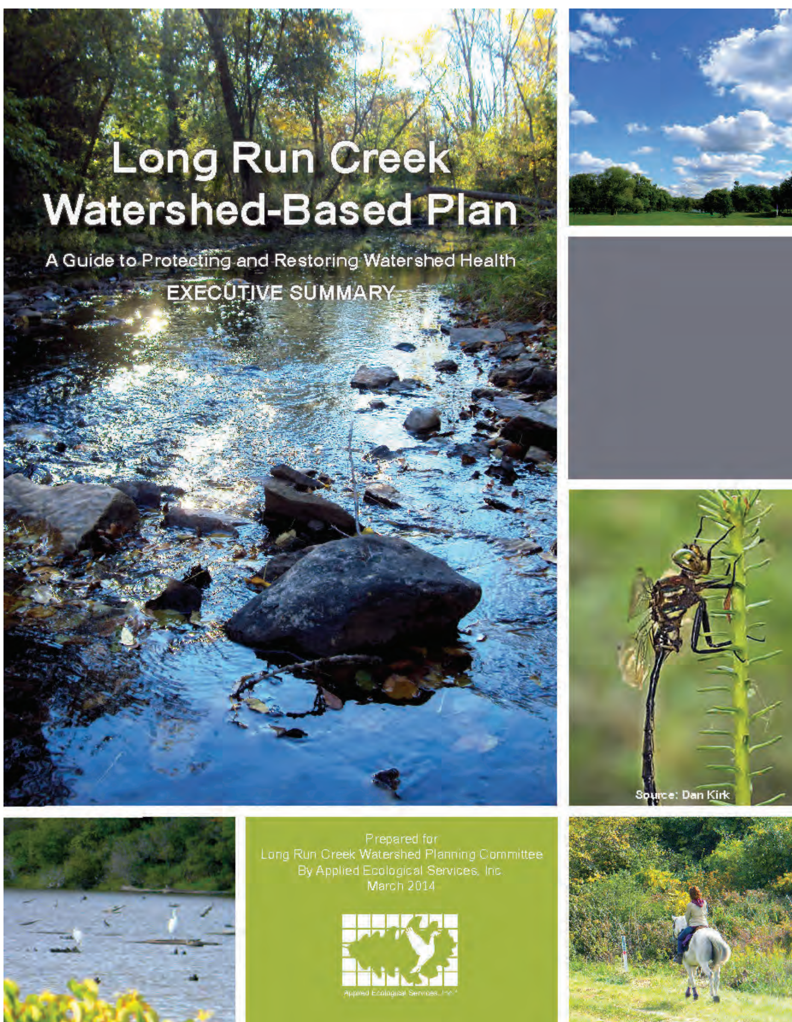


EXECUTIVE SUMMARY



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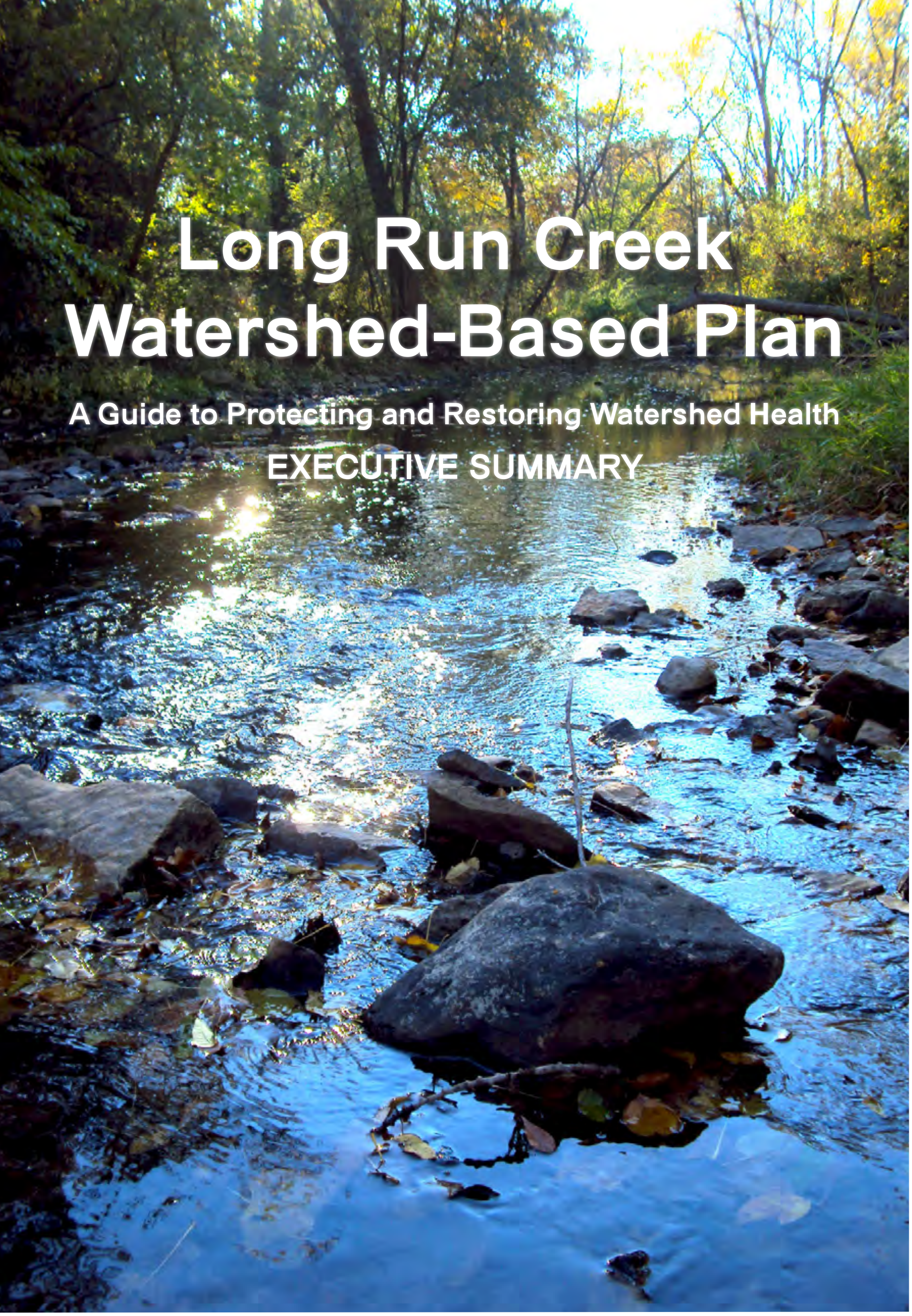

Long Run Creek Watershed-Based Plan

A Guide to Protecting and Restoring Watershed Health

EXECUTIVE SUMMARY

Source: Dan Kirk

Prepared for
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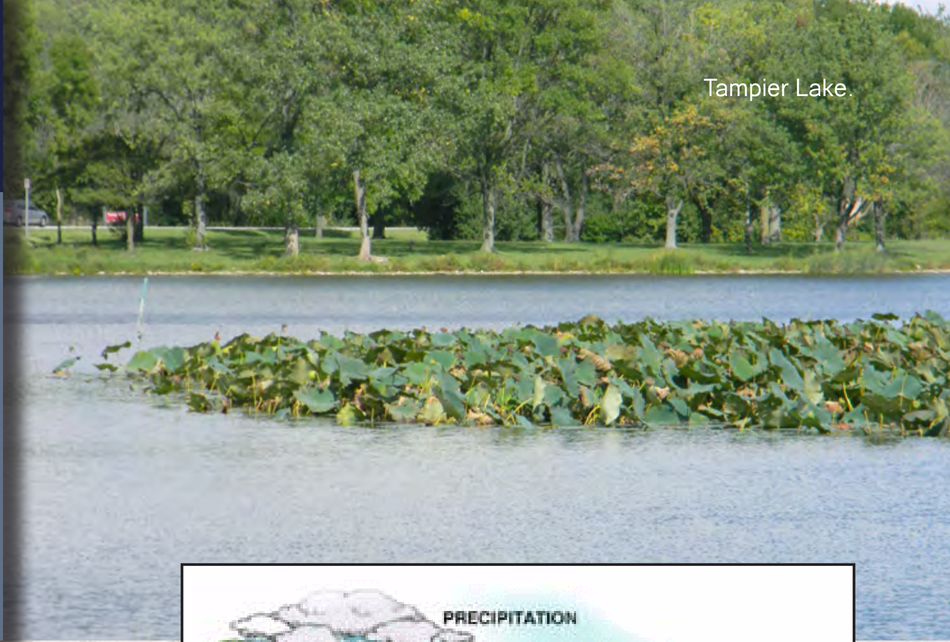
By Applied Ecological Services, Inc.
March 2014

Applied Ecological Services, Inc.™

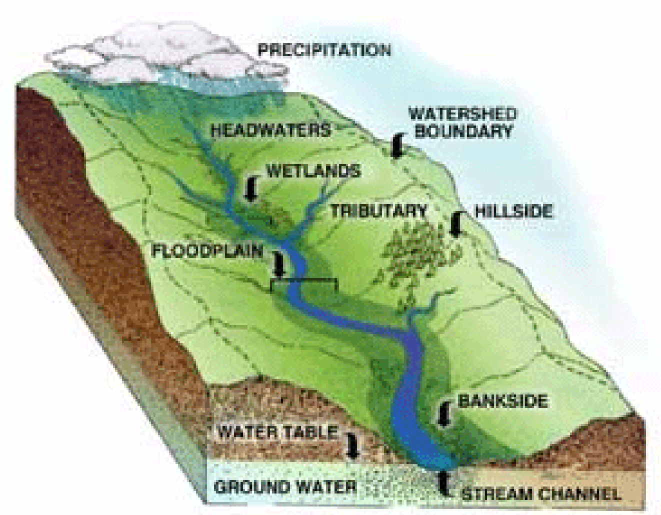
WHAT YOU WILL FIND INSIDE
THIS EXECUTIVE SUMMARY:



Tampier Lake.

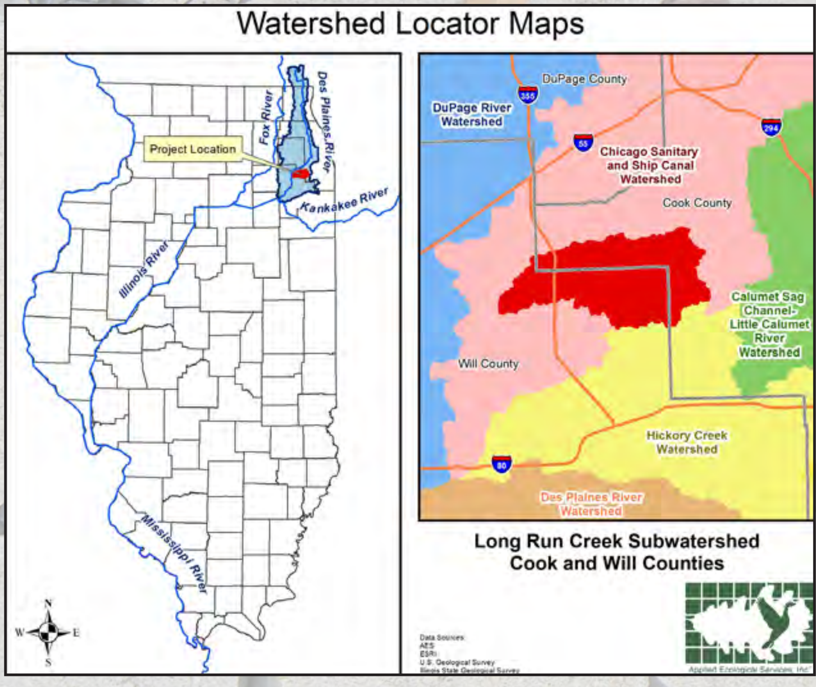
INTRODUCTION

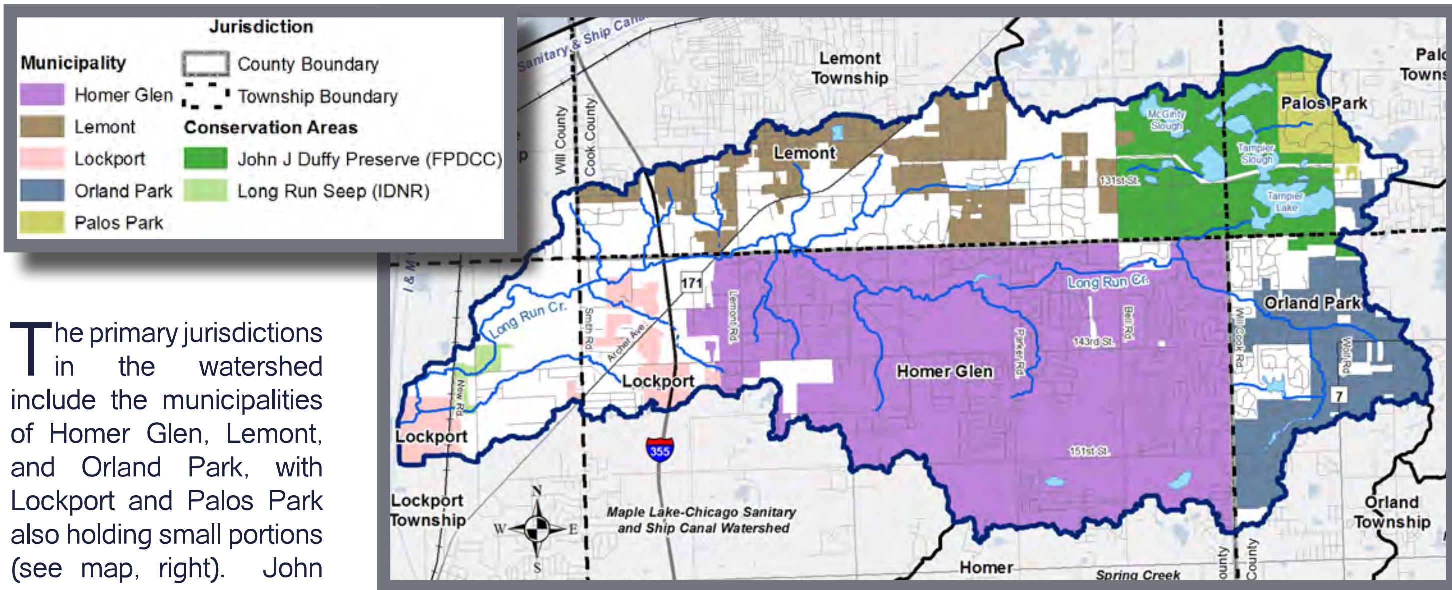
Each of us lives, works, and plays in a watershed. A watershed is best described as an area of land where surface water drains to a common location such as a stream, river, or lake. The source of groundwater recharge to aquifers, streams, and lakes is also considered part of a watershed. Watersheds are complex systems because there is interaction between natural elements such as climate, surface water, groundwater, vegetation, wildlife, and human elements. Human influences generally produce polluted stormwater runoff, increase impervious surfaces, alter stormwater flows, and degrade or fragment natural areas.



Source: City of Berkley - Public Works.

Long Run Creek watershed (HUC# 071200040703) is located 24 miles southwest of Chicago in both Cook and Will Counties, Illinois (see map, right). Long Run Creek and its many smaller tributaries account for roughly 32.7 stream and tributary miles that drain approximately 26.1 square miles (16,714 acres) of land surface. Long Run Creek drains westward for approximately 12.5 miles before it joins the Illinois and Michigan (I & M) Canal north of the City of Lockport. From there the I&M Canal flows south and parallels the Chicago Sanitary & Ship Canal for approximately 6 miles prior to joining the Des Plaines River. The Des Plaines River Basin (HUC# 07120004) drains over 1,300 square miles in Kenosha County, Wisconsin and Lake, Cook, DuPage, and Will Counties in Illinois. The Des Plaines River eventually joins the Kankakee River near Morris, Illinois to form the Illinois River. The Illinois River flows southwest across the heart of Illinois before joining the Mississippi River north of St. Louis, Missouri.





WATERSHED JURISDICTIONS

The primary jurisdictions in the watershed include the municipalities of Homer Glen, Lemont, and Orland Park, with Lockport and Palos Park also holding small portions (see map, right). John J. Duffy Preserve and Long Run Seep Nature Preserve, owned by the Forest Preserve District of Cook County and Illinois Department of Natural Resources, respectively, also represent large holdings within the watershed.

PURPOSE

Tampier Lake, located in the northeast portion of the watershed, appears on the Illinois Environmental Protection Agency's 303(d) impaired waters list. Long Run Creek is not 303(d) listed, but water quality, biological, and habitat data suggest moderate impairment. In addition, critical habitat for the federally endangered Hine's Emerald Dragonfly is threatened by human activities. In response, a group of voluntary stakeholders came together to form the Long Run Creek Watershed Planning Committee (LRCWPC).

In 2010, LRCWPC applied for and received Illinois Environmental Protection Agency funding for 2012 through Section 319 of the Clean Water Act to undergo a volunteer planning effort to produce a comprehensive "Watershed-Based Plan" for Long Run Creek watershed. With this plan, identified improvement projects become eligible for state and federal grants. All recommendations in this plan are for guidance only and not required by any federal, state, or local agency.

MISSION

The Long Run Creek Watershed Planning Committee (LRCWPC) is comprised of concerned watershed stakeholders dedicated to the preservation, protection, and improvement of Long Run Creek watershed. The LRCWPC's mission is to:

"Develop and encourage the funding and implementation of a long-range plan among landowners, government, and other appropriate groups which will enhance, manage, and protect the human, ecological, and socio-economic resources within Long Run Creek watershed.

The Watershed-Based Plan will promote the health and safety of human inhabitants, stormwater management, improve surface and groundwater quality, aesthetic values, education, wildlife protection, and address the present and future flooding issues."

GOALS

GOAL 1: *Manage natural and cultural components of the identified Green Infrastructure Network.*

GOAL 2: *Improve groundwater recharge to benefit public water supply and federally endangered Hine's Emerald Dragonfly critical habitat.*

GOAL 3: *Improve surface water quality to meet applicable standards.*

GOAL 4: *Create and/or update county and local policy to protect watershed resources.*

GOAL 5: *Manage and mitigate for existing and future structural flood problems.*

GOAL 6: *Implement watershed educational opportunities.*

McGinty Slough.

THE PAST

Glaciers that receded about 14,000 years ago formed the existing landscape in Long Run Creek watershed. During this period the earth's temperature warmed and the ice slowly retreated leaving behind moraines, ridges, and river valleys. A tundra-like environment covered by spruce forest was the first ecosystem to colonize after glaciers retreated. As temperatures continued to rise, tundra was replaced by cool, moist deciduous forests and eventually by oak-hickory woodlands, oak savannas, prairies, and wetlands.

The U.S. public land surveys in the mid-1800s described the western half of Long Run Creek watershed as "Timber" while the eastern half was described as mostly "Prairie" mixed with areas of "Marsh" and pockets of "Timber." This mixture of "Prairie" and "Timber" is referred to today as "Savanna". The prairie-savanna landscape was maintained by and adapted to frequent lightning-strike fires, fires ignited by Native Americans, and grazing by bison and elk. Running through the prairie-savanna landscape were meandering stream corridors and low wet depressions consisting of sedge meadow, marsh, wet prairie and highly unique seeps, springs, and fen wetlands hydrated by alkaline rich groundwater discharge.

Photo, above: Pre-European settlement landscape at nearby Lockport Prairie Nature Preserve.

THE PRESENT

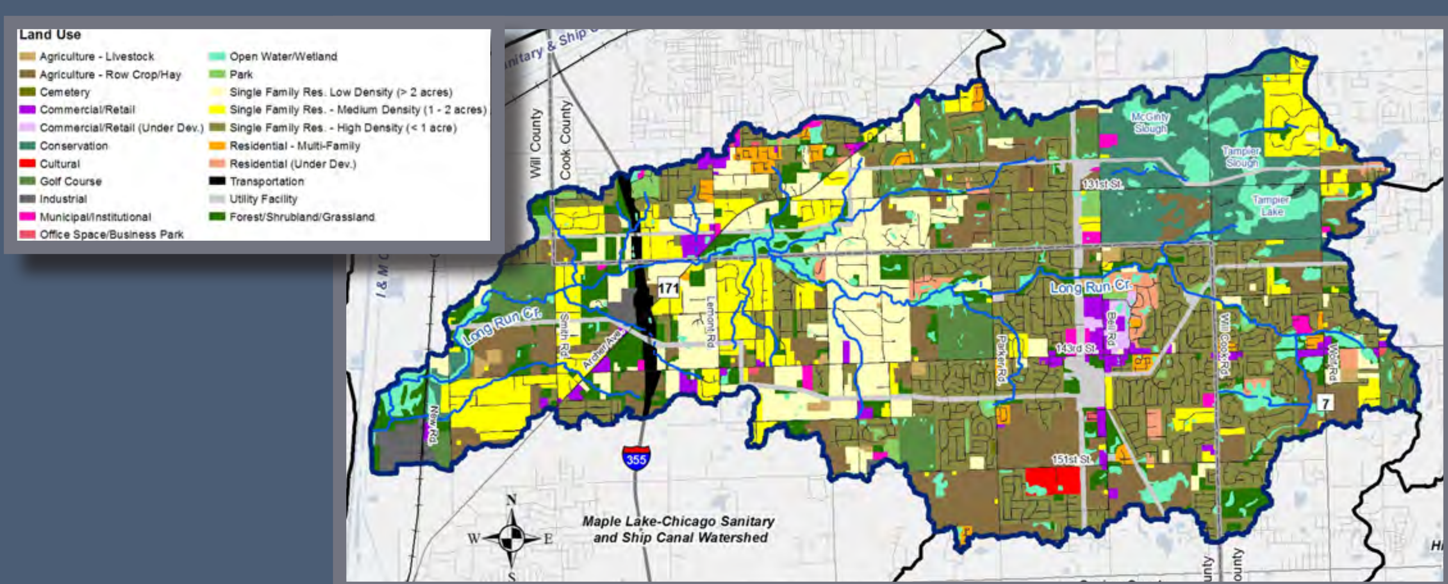
European settlement in the mid-1800s resulted in drastic changes to the fragile ecology of the watershed. Fires no longer occurred, bison and elk were extirpated, prairie and wetlands were tilled under or drained for farmland or developed, and many ditches were excavated through wetland areas to further drain the land for farming purposes. By the mid-1900s, many of the woodland communities described in the western portion of the watershed remained but farmland had replaced most of the prairie and wetland.

Conversion from farmland to residential and commercial uses swelled between the 1950s and early 2000s. By 2012, residential communities comprised over 40% of the watershed (see map, below). Most of this development used "traditional" practices that increased impervious surfaces and reduced groundwater recharge.

THE FUTURE

Predicted land use changes (see map, right) show most of the remaining farmland converting to residential, office space, or commercial uses. One of the best opportunites for local communities will be utilizing requirements for "Conservation" or "Low Impact" development that incorporates and preserves green infrastructure, thereby improving water quality, wildlife habitat, groundwater recharge, and quality of life for people.

EXISTING 2012 LAND USE/LAND COVER



CHALLENGES & THREATS

ERODED STREAMBANKS

SURFACE WATER

- Two wastewater treatment plants account for 56% and 65% of phosphorus and nitrogen loading, respectively.
- Fertilizer use on agricultural, residential, and commercial/retail land is contributing to phosphorus loading.
- 19% of the stream and tributary length is highly channelized.
- 20% of stream and tributary banks are highly eroded and account for 82% of sediment loading.
- 69% of the 185 detention basins surveyed are poorly designed for water quality benefits.
- Livestock and mulch processing operations threaten critical habitat for the endangered Hine's Emerald Dragonfly.
- Old and/or failing septic systems are a potential nutrient and bacteria threat.

POOR DETENTION DESIGN

GROUNDWATER

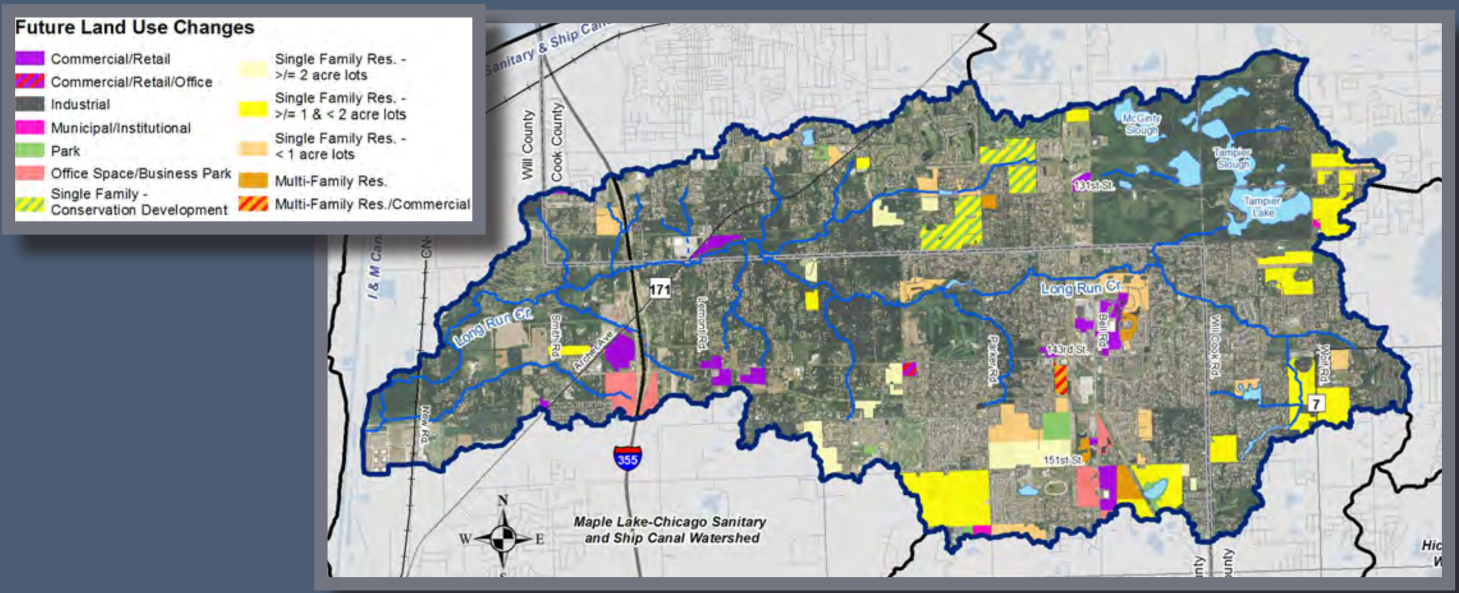
- Endangered Hine's Emerald Dragonfly habitat in seeps at Long Run Seep Nature Preserve is threatened by contaminated groundwater and hydrology changes.
- Studies by Illinois State Water Survey show deep aquifer drawdown exceeding 500 feet within the watershed.
- "Traditional" development over the past 20 years generally did not incorporate groundwater infiltration practices.

MULCH PROCESSING

LAND

- 1,600 acres of agricultural land and 200 acres of forest/grassland are predicted to become mostly residential or commercial/retail in the future.
- Invasive species such as common reed, reed canary grass, common buckthorn, and box elder are threats to most natural areas.
- Overall development policy among the watershed communities does not adequately protect green infrastructure.
- Chicago Metropolitan Agency for Planning predicts a 20,059 (47%) population increase by 2040.
- 37% of stream & tributary riparian areas are in "poor" ecological condition.
- 2,121 acres (64%) of historic wetlands have been lost to changing land uses.
- Educational surveys suggest that there is a lack of knowledge regarding watershed issues among residents and decision makers.

PREDICTED LAND USE CHANGES

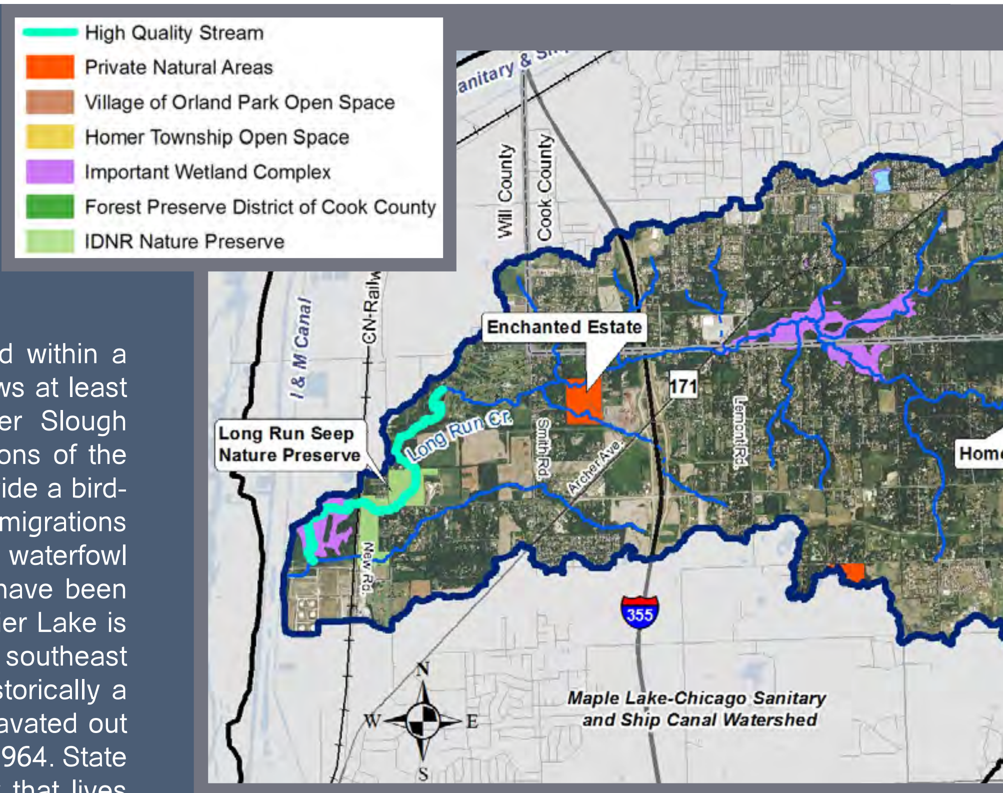


IMPORTANT NATURAL AREAS

JOHN J. DUFFY PRESERVE

TAMPIER SLOUGH

The watershed planning area has 1,614 acres of land within John J. Duffy Preserve which is owned and managed by the Forest Preserve District of Cook County. The preserve contains a variety of natural habitats including young and older growth woodlands, prairie, wetland sloughs, and lakes. A slough is a wetland within a channel or series of shallow lakes that flows at least periodically. McGinty Slough and Tampier Slough are found in the northwest and east portions of the preserve, respectively. These sloughs provide a bird-watchers paradise during spring and fall migrations when thousands of shorebirds, egrets, and waterfowl stop over. In fact, over 300 bird species have been spotted in and around the preserve. Tampier Lake is a 160-acre, man-made lake, found in the southeast portion of the preserve. This area was historically a series of shallow sloughs which were excavated out of peat to create a lake between 1958 and 1964. State endangered Ospreys, a large bird of prey that lives and breeds near wetlands and lakes, is known to nest at Tampier Lake.



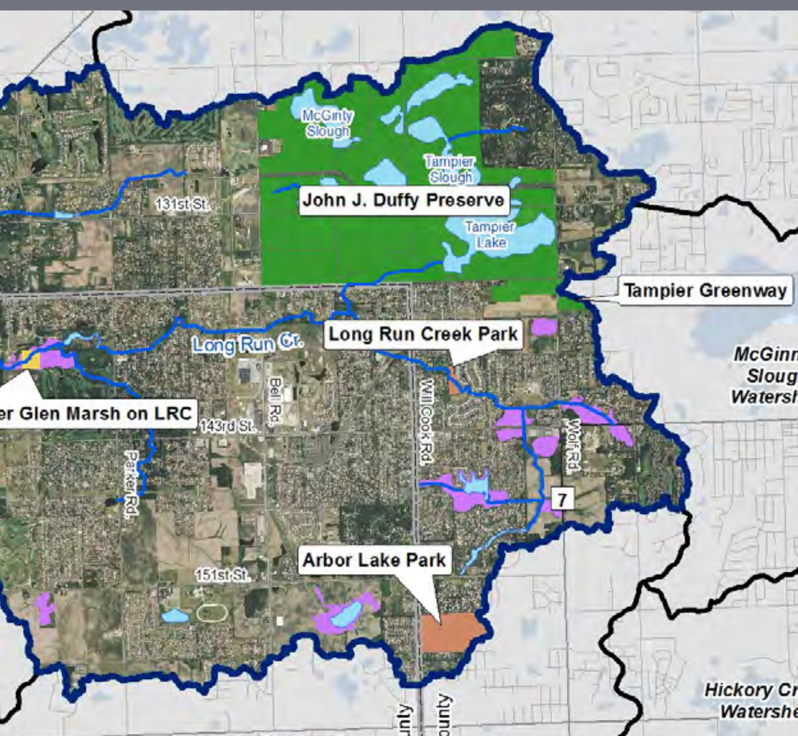
Long Run Seep Nature Preserve is owned by the Illinois Department of Natural Resources. This 89-acre site is home to seep, fen, wet-mesic floodplain forest, and dry-mesic woodland plant communities as well as the main channel of Long Run Creek and a tributary known locally as South Ditch. Of these communities, it is the seep and fen formed at the base of the Des Plaines River valley bluffs, that provide cold calcareous groundwater that supports many threatened and endangered plant species, including beaked spike rush (*Eleocharis rostellata*), grass pink orchid (*Calopogon tuberosa*), and slender bog arrow grass (*Triglochin palustris*). The seeps provide critical habitat for the federally endangered Hine's Emerald Dragonfly.

A 2.2-mile stretch of Long Run Creek meanders naturally between Big Run Golf Club and the I & M Canal and is of high quality. Dolomite is close to the surface providing stable substrate, good riffle-pool development, minimal bank erosion, and good aquatic habitat.

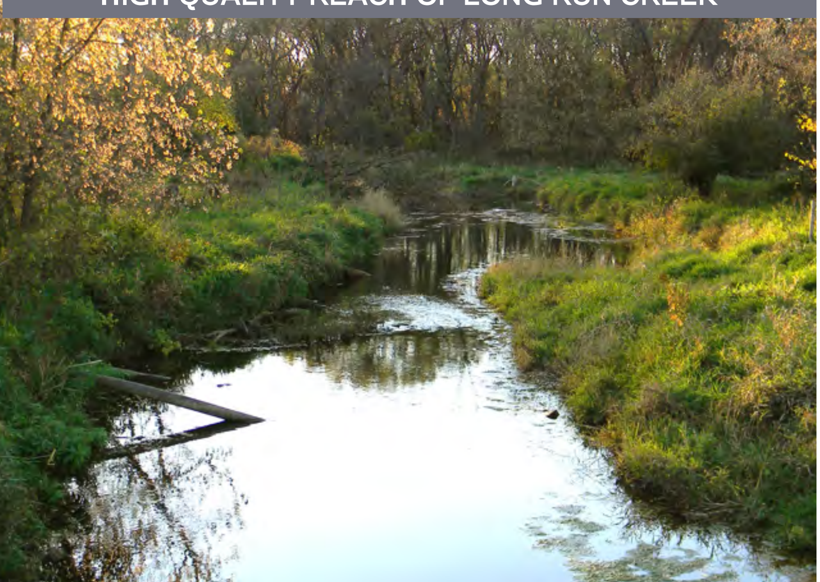
Several other important natural areas exist within Long Run Creek watershed, including twelve wetland complexes, Homer Glen Marsh on Long Run Creek, Arbor Lake Park, Long Run Creek Park, and two private woodlands.

LONG RUN SEEP NATURE PRESERVE

IMPORTANT NATURAL AREAS



HIGH QUALITY REACH OF LONG RUN CREEK



HINE'S EMERALD DRAGONFLY

Long Run Seep Nature Preserve provides critical habitat for the Hine's Emerald Dragonfly (HED), a federal and state listed endangered species. Recent studies have documented HED larval habitat and recruitment in Long Run Seep. The HED is defined by its brilliant emerald-green eyes and dark brown and metallic green body, with yellow stripes on its sides. Today, the HED is only found in a few locations in four states: Illinois, Michigan, Missouri, and Wisconsin. Its preferred habitat is calcareous spring-fed marshes, seeps, fens, and sedge meadows overlaying dolomite bedrock such as those found at Long Run Seep. The HED relies on the unique water quality features of calcareous seeps where the female lays eggs that later emerge into nymphs that live in the seeps for up to 4 years before becoming a flying adult dragonfly.

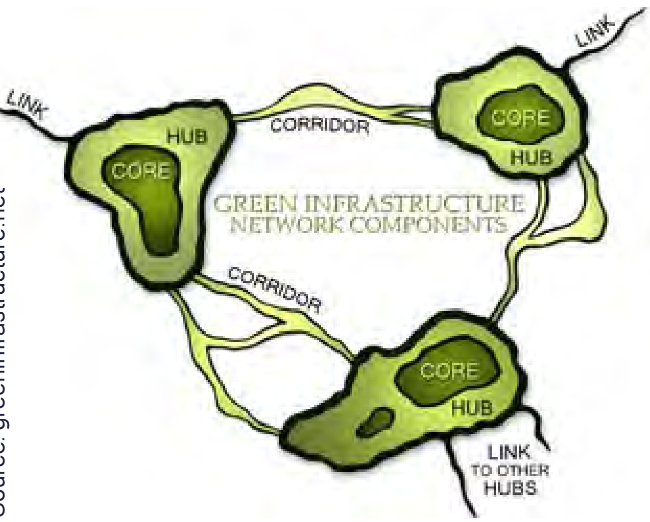
To help protect HED critical habitat, the Illinois Nature Preserves Commission (INPC) petitioned Illinois EPA in 2012 to designate the groundwater recharge area to Long Run Seep Nature Preserve as a Class III Special Resource Groundwater Classification. Class III designation allows an area to be subjected to special water quality standards and, if an impact to a protected nature preserve's groundwater resource can be shown, the Office of the Illinois Attorney General can immediately cease the source activity of the impact. INPC's petition process involves enlisting help from the Illinois State Geological Survey to delineate a "Final Groundwater Contribution Area (GCA)" to Long Run Seep Nature Preserve. The GCA extends east covering the southern 2/3 of Long Run Creek watershed and south into several adjacent watersheds. The total area is a vast 26,543 acres or 41.5 square miles. Note: The Final GCA is not considered a Class III area until it is designated as such by Illinois EPA.

HINE'S EMERALD DRAGONFLY

SOURCE: DAN KIRK

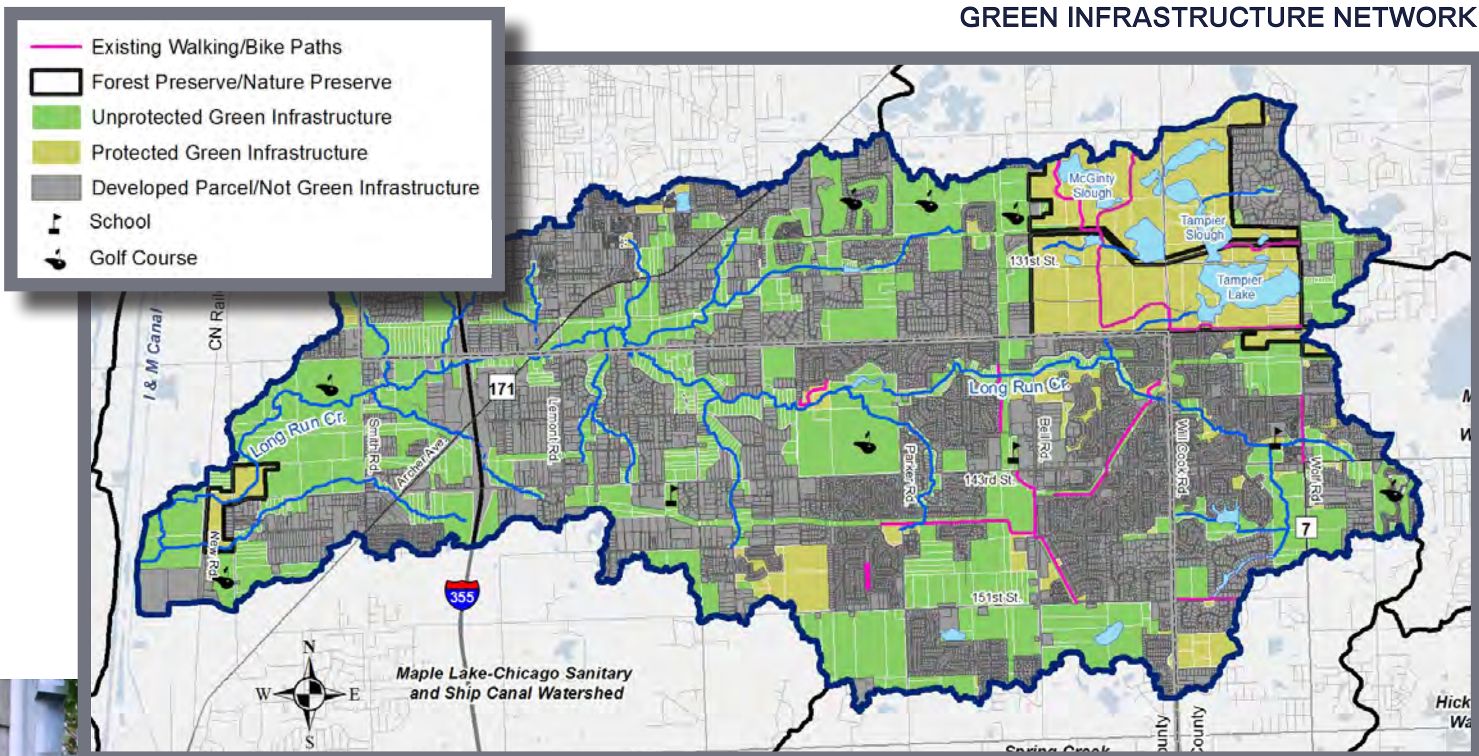
GREEN INFRASTRUCTURE & YOUR BACKYARD

A Green Infrastructure Network is a connected system of natural areas and other open space that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to wildlife and people. The network (see map, below) is made up of hubs and linking corridors. Hubs generally consist of the largest and least fragmented areas such as John J. Duffy Preserve, Long Run Seep Nature Preserve, large agricultural areas, and golf courses. Corridors are generally formed by smaller private residential parcels along developed reaches of Long Run Creek and tributaries. Corridors are extremely important because they provide biological conduits between hubs. However, most parcels forming corridors are not ideal green infrastructure until residents embrace the idea of managing stream corridors or creating backyard habitats.



Source: greeninfrastructure.net

GREEN INFRASTRUCTURE NETWORK



RAIN BARREL

RAIN GARDEN

If a portion of a stream runs through your backyard, here are some tips to help properly manage your piece of the green infrastructure network:

1. **MANAGE FERTILIZER USE**
   Avoid over fertilizing lawns adjacent to streams and only use phosphorus when soil testing shows that it is necessary.
2. **NO DUMPING**
   Avoid dumping yard waste and clear heavy debris jams.
3. **REMOVE NON-NATIVE SPECIES**
   Identify and remove plants that are out of place (see photo guide, right).
4. **PLANT NATIVE VEGETATION**
   Plants adapted to the Midwest climate can help control erosion by stabilizing banks.
5. **A NATURAL, MEANDERING STREAM IS A HAPPY STREAM**
   Work with experts to restore degraded streams.

For more detailed information, check out the Lake County Stormwater Management Commission's booklet, "Riparian Area Management: A Citizen's Guide," at www.lakecountyil.gov/stormwater.


Source: Appalachian Traveller.

Any property owner can improve green infrastructure. Create a safe place for wildlife by providing a few simple things such as food, water, cover, and a place for wildlife to raise their young. The National Wildlife Federation's Certified Wildlife Habitat® and the Conservation Foundation's Conservation@Home programs can help you get started. Golf courses can become certified through the Audubon Cooperative Sanctuary Program.

Creating a rain garden, or a small vegetated depression, to capture water is another way of promoting infiltration while beautifying your yard and providing additional habitat. Disconnecting your roof downspouts and capturing that runoff in rain barrels not only reduces the amount of runoff entering streams, but also serves as a great source of water for irrigating your yard.


STREAM RESTORATION

REMOVE THESE NON-NATIVE AND INVASIVE SPECIES


COMMON REED


BUCKTHORN

Source: Loras.edu.


REED CANARY GRASS


PURPLE LOOSESTRIFE


GARLIC MUSTARD


TEASEL

ACTION RECOMMENDATIONS

The Long Run Creek Watershed-Based Plan includes an "Action Plan" developed to provide stakeholders with recommendations to specifically address plan goals. The Action Plan includes two subsections: programmatic recommendations and site specific recommendations. Programmatic recommendations are general remedial, preventative, and regulatory watershed-wide actions. Site specific recommendations include actual locations where projects can be implemented to improve surface and groundwater quality, green infrastructure, and habitat. Programmatic recommendations and site specific High Priority-Critical Areas are discussed in this section.

POLICY TYPE PROGRAMMATIC GUIDANCE RECOMMENDATIONS*

*All recommendations are for guidance only and not required by any federal, state, or local agency.

NATURALIZED DETENTION

Plan Adoption and/or Support & Implementation Policy Recommendations

- Watershed Partners adopt the Long Run Creek Watershed-Based Plan as a "Guidance Document."

Green Infrastructure Network Policy Recommendations

- Each municipality consider incorporating the Green Infrastructure Network (GIN) into comprehensive plans and development review maps.
- Utilize tools such as protection overlays, setbacks, open space zoning, conservation easements, conservation and/or low impact development, etc. on GIN parcels.
- Utilize tools such as Development Impact Fees, Stormwater Utility Taxes, Special Service Areas (SSA) taxes, etc. to help fund future management of green infrastructure components where new and redevelopment occurs.
- Encourage developers to protect sensitive natural areas, restore degraded natural areas and streams, then donate all natural areas and naturalized stormwater management systems to a public agency or conservation organization for long-term management.
- Establish incentives for developers who propose sustainable or innovative approaches to preserving green infrastructure and using naturalized stormwater treatment trains.
- Consider limiting mitigation for all wetlands lost to development to occur within the watershed.

Groundwater Policy Recommendations

- Encourage extensive stormwater management practices that clean and infiltrate water in all new and redevelopment occurring within the Class III Groundwater Contribution Area (GCA) to Long Run Seep Nature Preserve.
- Limit future mitigation dollars from impacts to Hine's Emerald Dragonfly (HED) habitat to managing and restoring HED habitat or to fund projects that support groundwater recharge within the Class III GCA.

Road Salt Policy Recommendations

- Each municipality/township consider supplementing existing programs with deicing best management practices.

Lawn Fertilizer Policy Recommendations

- Municipalities/townships extend phosphorus regulation to all non-commercial applicators, consider soil testing pre-application, or ban out-right.

Stormwater Management Facility Policy Recommendations

- Allow new development and redevelopment to use stormwater management facilities that serve multiple functions including storage, water quality benefits, infiltration, and wildlife habitat.
- Consider reduced runoff volume from new and retrofitted detention basins.

Native Landscaping/Natural Area Restoration

- Allow native landscaping within local ordinances and ensure local "weed control" ordinances do not discourage or prohibit native landscaping.

Watershed tour at Annunciation of the Mother of God Byzantine Church.

OTHER PROGRAMMATIC RECOMMENDATIONS FOUND IN THE PLAN

Dry & Wet Bottom Detention Basin Design/Retrofits, Establishment, & Maintenance	*Rain Gardens*
Stream & Riparian Area Restoration & Maintenance	*Street Sweeping*
Natural Area Restoration & Native Landscaping	*Pervious Pavement*
Conservation & Low Impact Development	*Wetland Restoration*
Agricultural Management Practices	*Vegetated Filter Strips*
Rainwater Harvesting & Re-use	*Green Infrastructure Planning*
Septic System Maintenance	*Vegetated Swales (bioswales)*

HIGH PRIORITY-CRITICAL AREA SITE SPECIFIC PROJECT RECOMMENDATIONS (see map, below)

Detention Basin Retrofits & Maintenance

Many detention basins can be retrofitted by naturalizing with native vegetation. Naturalized basins improve water quality from developed areas, improve habitat, and require less maintenance. Twenty two detention basins were identified as High Priority-Critical Areas in the watershed.

Wetland Restoration

Wetland restoration sites are generally associated with large areas that were historically wetland prior to European settlement in the 1830s but were drained for agricultural purposes. Thirteen High Priority-Critical Area wetland restoration sites were identifiied, many of which can be restored by breaking existing drain tiles and planting with native vegetation as part of future development.

Streambank & Channel Restoration

Six stream reaches have been identified as High Priority-Critical Areas because they exhibit highly eroded banks or degraded channel conditions that are a major source of total suspended solids (sediment). Streambank stabilization and channel restoration using bioengineering will reduce sediment and improve habitat.

Riparian Area & Lake Buffer Restoration

Riparian areas along four stream reaches and a 9,000-linear foot section of shoreline along Tampier Lake are High Priority-Critical Areas because they are in poor ecological condition but have excellent ecological restoration potential.

Green Infrastructure Protection Areas

Nineteen green infrastructure protection areas have been selected in the watershed after careful review of predicted land use changes. Most parcels are existing agricultural land planned for future development. The recommendation is that these parcels be preserved or developed using conservation or low impact development designs.

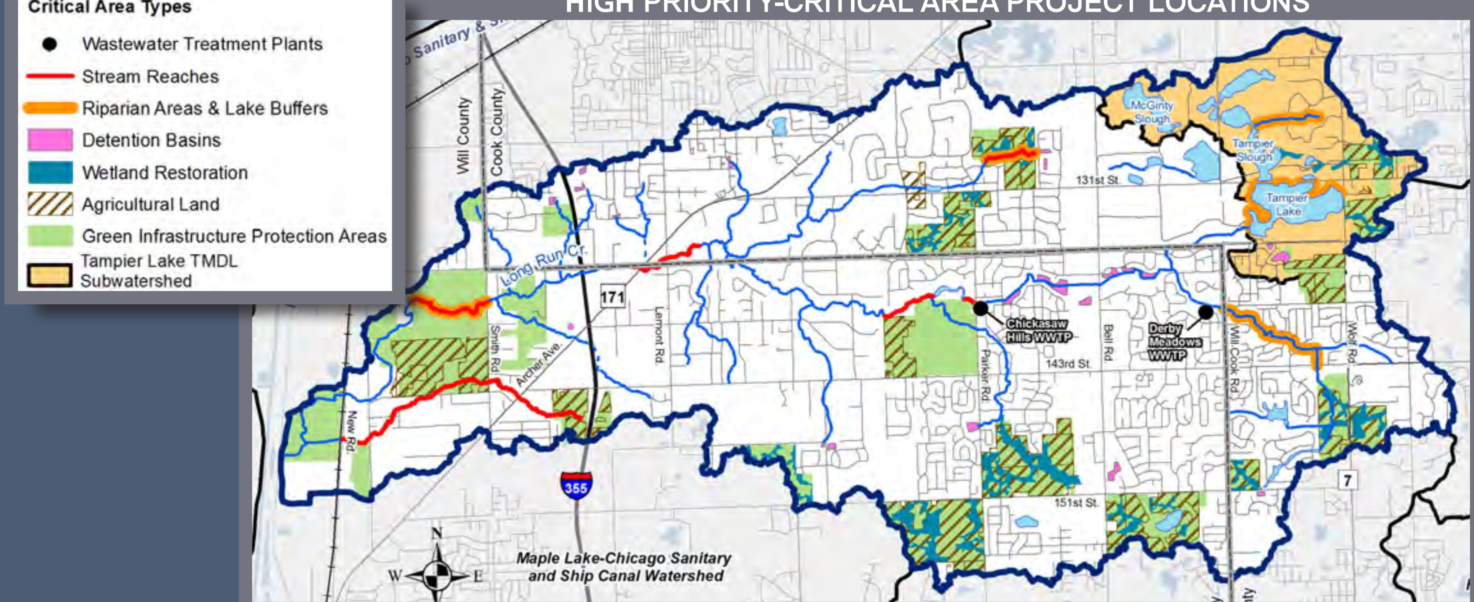
Agricultural Management Practices

Agricultural measures would greatly reduce pollutant loading in the watershed. Recommendations in the plan include conservation tillage (no till) for cropland and manure management on livestock operations. Thirteen cropland areas and two livestock operations were identified as High Priority-Critical Areas for potential pollutant reduction based on their size and/or location in the watershed.

Wastewater Treatment Plant Upgrades

There are two permitted wastewater treatment plant (WWTP) discharges to Long Run Creek: Chickasaw Hills WWTP and Derby Meadows WWTP. These facilities are High Priority-Critical Areas because, combined, they contribute over 65% of the total nitrogen loading and over 56% of the total phosphorus loading. These plants should eventually upgrade with nutrient removal technologies. Local municipalities can also enforce a nutrient loading ordinance.

HIGH PRIORITY-CRITICAL AREA PROJECT LOCATIONS



GET INVOLVED

Watershed planning and implementation is a voluntary effort. Active watershed stakeholders are needed to put this watershed plan into action. The Long Run Creek Watershed Planning Committee is in place to support plan implementation and future planning efforts. Contact the Lower Des Plaines Ecosystem Partnership to learn how you can help. The Long Run Creek Watershed-Based Plan can be downloaded at: www.lowerdesplaines.org.

How can *you* help Long Run Creek?

Residents & Businesses

☐ Reduce fertilizer use on lawns and only use phosphorus based on soil testing results.
☐ Use less salt on driveways, parking lots, and sidewalks during winter months.
☐ Use native landscaping to decrease watering needs and maintenance.
☐ Install rain gardens and use rain barrels to reduce stormwater runoff.
☐ Manage your backyard as part of the green infrastructure network.
☐ Attend meetings with decision makers to express concerns about the watershed.
☐ Build a sense of community in your neighborhood around Long Run Creek and the watershed.
☐ Attend watershed education events.

Agricultural Community

☐ Consult your local Natural Resources Conservation Service (NRCS) office regarding enrollment in conservation programs to help reduce soil erosion, enhance water supplies, improve water quality, increase habitat, and reduce flood damages.

Forest Preserve Districts & IDNR

☐ Control non-native/invasive species and replace with native vegetation.
☐ Look for opportunities to acquire green infrastructure protection areas.
☐ Educate the public about the Hine's Emerald Dragonfly.

Municipalities & Townships

☐ Adopt the Long Run Creek Watershed-Based Plan and inform the public that a plan has been developed.
☐ Incorporate watershed plan goals and recommended actions into local comprehensive plans, zoning overlays, codes, and ordinances.
☐ Build "demonstration projects," or large-scale water quality & public education projects, near public facilities.
☐ Distribute materials to help residents manage streams in their backyards.

Long Run Creek Watershed Planning Committee

☐ Identify "champions" to participate at future Long Run Creek Watershed Planning Committee meetings, pursue projects, and to discuss and evaluate watershed plan implementation progress.
☐ Hire a Watershed Implementation Coordinator to follow through on plan implementation.

This plan was prepared using United States Environmental Protection Agency funds under Section 319 (h) of the Clean Water Act distributed through the Illinois Environmental Protection Agency. The findings and recommendations herein are not necessarily those of the funding agencies.

Long Run Creek Watershed Planning Committee

BLUESTEM communications
Supporting coalitions • Building capacity • Inspiring action

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

Historic LEMONT est. 1836

For more information contact:
Lower Des Plaines Ecosystem Partnership
www.lowerdesplaines.org

Watershed Coordinator:
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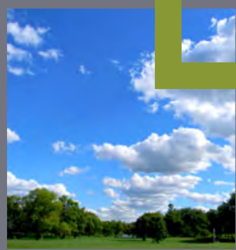
bluestemcommunications.org

Executive Summary & Plan produced by:
Applied Ecological Services, Inc.
www.appliedeco.com

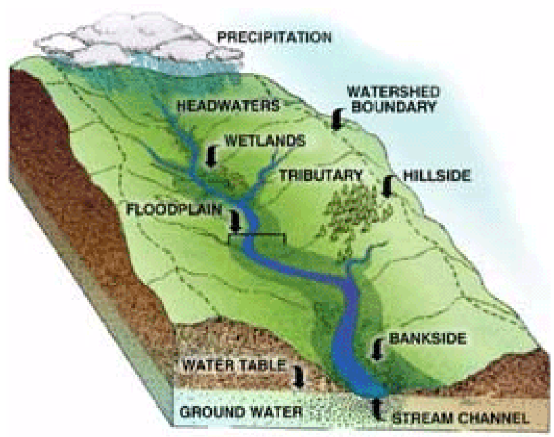
All photos by AES unless otherwise noted.



1.0 INTRODUCTION

1.1 LONG RUN CREEK WATERSHED SETTING

People live, work, and recreate in areas of land known as "Watersheds." A watershed is best described as an area of land where surface water drains to a common location such as a stream, river, lake, or other body of water (Figure 1). The source of groundwater recharge to streams, rivers, and lakes is also considered part of a watershed. Despite the simple definition for a watershed, they are complex in that there is interaction between natural elements such as climate, surface water, groundwater, vegetation, and wildlife as well as human elements such as agriculture and urban development that produce polluted stormwater runoff, increase impervious surfaces thereby altering stormwater flows, and degrade or fragment natural areas. Other common names given to watersheds, depending on size, include basins, sub-basins, subwatersheds, and Subwatershed Management Units (SMUs).



Source: City of Berkley-Public Works

Figure 1. Hypothetical Watershed Setting.

Long Run Creek watershed (HUC 071200040703) is located 24 miles southwest of Chicago in both Cook and Will Counties, Illinois (Figure 2). Long Run Creek and its many smaller tributaries account for approximately 32.7 stream/tributary miles that drain approximately 26.1 square miles (16,714 acres) of land surface. Long Run Creek drains west for approximately 12.5 miles before it joins the Illinois and Michigan Canal (I & M) north of the City of Lockport. From there the I & M Canal flows south and parallels the Chicago Sanitary & Ship Canal for approximately 6 miles prior to joining the Des Plaines River. The Des Plaines River Basin (HUC 07120004) drains over 1,300 square miles in Kenosha County, Wisconsin and Lake, Cook, DuPage, and Will Counties in Illinois. The Des Plaines River eventually joins the Kankakee River near Morris, Illinois to form the Illinois River. The Illinois River flows southwest across the heart of Illinois before joining the Mississippi River north of St. Louis, Missouri.

Pre-European settlement ecological communities in Long Run Creek watershed and surrounding area were balanced ecosystems with clean water and diverse with plant and wildlife populations. The mosaic of oak-hickory woodlands, forests, and savannas mixed with open prairie and wetlands were largely maintained and shaped by frequent fires ignited by both lightning and the Native Americans that inhabited the area. Herds of bison and elk also helped maintain the ecosystem via large scale grazing. During these times most of the water that fell as precipitation was absorbed in prairie and wooded communities and within the extensive floodplain wetlands that existed along stream and tributary corridors.

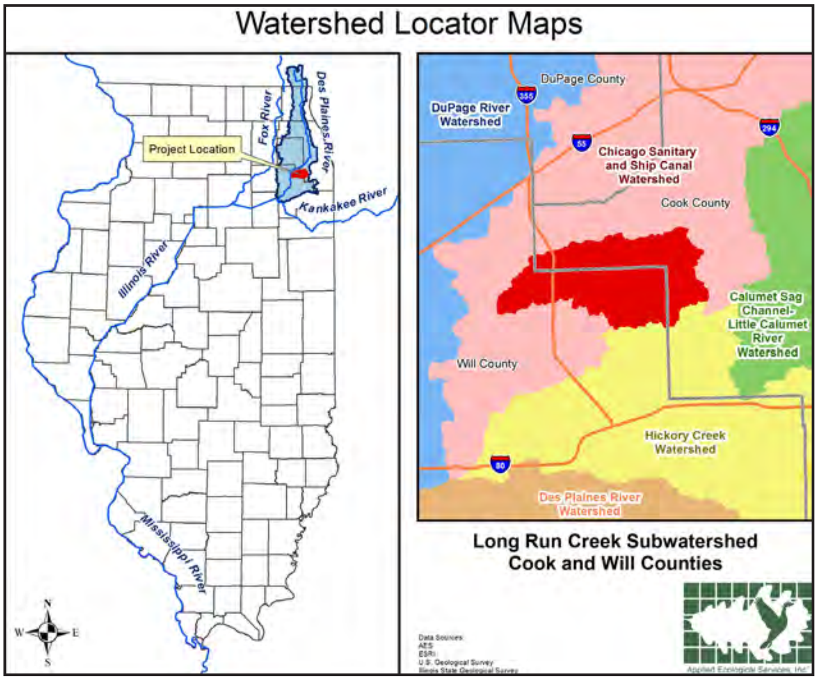


Figure 2. Watershed Locator Maps.

Ecological conditions changed quickly and drastically following European settlement in the mid 1800s. Large scale fires no longer occurred and bison and elk were extirpated. Significant portions of wooded communities and nearly all prairies were tilled and tile systems were installed to drain wetland areas as farming became the primary land use by the early 1900s. Conversion from farmland to primarily residential and commercial uses followed and continues to this day. Long Run Creek watershed is presently dominated by residential subdivisions, commercial/industrial

Depiction of Pre-European settlement prairie & wetland landscape at nearby Lockport Prairie centers, farmland, forest preserve land, and until recently, eight golf courses. Woodbine Golf Course was purchased in December 2013 by Homer Glen and will become mostly park while the club house will become the Village Hall.

Homer Glen open space; formerly Woodbine Golf Course

With ongoing "Traditional" development and landscape change in the watershed comes negative impacts to the environment. Impervious surfaces greatly reduce the ability of precipitation to infiltrate into the ground and instead cause stormwater runoff to quickly reach streams and tributaries. This in turn results in downcutting, widening, and bank erosion causing sediment and nutrient loading downstream. Meanwhile, invasive species established in adjacent floodplain wetlands are causing loss of wildlife habitat and reduced floodplain function. In addition, nutrients from residential lawn fertilizers and effluent from wastewater treatment plants is negatively impacting the biological communities in Long Run Creek. Discharged water from various sources that is not properly filtered is referred to as "non-point source pollution" and is the primary focus of this plan.

Tampier Lake, located in the northeast portion of the watershed, currently appears on the Illinois Environmental Protection Agency's (Illinois EPA) 303(d) impaired waters list (IEPA 2012). Illinois EPA lists total suspended solids (TSS), phosphorus, aquatic plants, and aquatic algae as the causes of impairment to the "Aesthetic Quality" Designated Use of Tampier Lake. Long Run Creek is not currently 303(d) listed and fully supports its "Aquatic Life" Designated Use according to Illinois EPA. More recent data, however, suggest moderate impairment to Long Run Creek.

The Long Run Creek Watershed Planning Committee (LRCWPC) became concerned over the health of Long Run Creek watershed when it began showing signs of degradation. In 2010 LRCWPC hosted a meeting of local volunteer stakeholders and partners in the watershed to discuss the possibility of updating a watershed plan that had been completed by Illinois Department of Natural Resources (IDNR) 10 years prior and was not current with Illinois EPA standards. One of the most important reasons to update the plan is to protect Long Run Seep Nature Preserve, home to the federally endangered Hine's Emerald Dragonfly. The rare seep ecosystem which supports the endangered dragonfly is fragile, and if impacts from development and water quality impairment continue to worsen, the dragonfly population could decline or disappear altogether.

NOTEWORTHY - Watershed at a Glance

- Long Run Creek and its tributaries drain **26.1 square miles** of land in Cook and Will Counties, Illinois.
- Long Run Creek is **moderately impacted** by nutrients, sediment, & channel/riparian modification.
- 67% of streams and tributaries are naturally meandering; 33% are moderately to highly channelized.
- 35% of streams and tributaries exhibit minimal bank erosion; 65% are moderately to highly eroded.
- 63% of the riparian areas are "Moderate" quality; 37% are in "Poor" condition.
- **Tampier Lake** is an Illinois EPA 303(d) **impaired water body** in 2012 caused by high phosphorus levels.
- Prairie, marsh, and woodland were the primary land cover types prior to European settlement in the 1830s.
- There were 3,312 acres of **wetlands** prior to European settlement; 1,191 acres or **36% remain** in 2012.
- The dominant land uses in 2012 include residential, agricultural, and forest/shrubland/ grassland.
- Municipalities in the watershed include **Homer Glen, Lemont, Lockport, Orland Park, and Palos Park**.
- The **population** of the watershed in 2012 was over **42,000** and expected to increase to over 62,000 by 2040.
- Long Run Seep Nature Preserve is home to the **federally endangered Hine's Emerald Dragonfly**.
- There are 185 known detention basins. Only 20 (11%) provide "Good" ecological/ water quality benefits.
- Open space parcels comprise approximately 6,637 acres or 40% of the watershed.
- 17 "Important Natural Areas" are found in the watershed; John J. Duffy Preserve is the largest at 1,614 ac.
- Groundwater provides the community water supply to over half the watershed.
- In 2012, INPC petitioned Illinois EPA to designate the groundwater recharge area to **Long Run Seep Nature Preserve** as a **Class III Special Resource Groundwater Classification**.
- Two NPDES permitted **WWTPs** account for **56% and 65% of phosphorus & nitrogen loading** respectively.
- **Streambank erosion** accounts for over **82% of sediment loading**.
- >64.4% phosphorus, >58.1% nitrogen, & >62% suspended solid reduction is needed in LRC to meet targets.
- >48% of 0.5 lbs/day reduction in phosphorus from external watershed sources is needed in Tampier Lake.

1.2 PROJECT SCOPE & PURPOSE

In 2010, Long Run Creek Watershed Planning Committee (LRCWPC) applied for and received Illinois Environmental Protection Agency (Illinois EPA) funding in 2012 through Section 319 of the Clean Water Act to undergo a watershed planning effort and produce a comprehensive "Watershed-Based Plan" to act as a "**guidance document**" for stakeholders in Long Run Creek watershed that would meet requirements as defined by the United States Environmental Protection Agency (USEPA). Ultimately, the intent of 319 funding is to develop and implement Watershed-Based Plans designed to achieve water quality standards. The Village of Lemont, acting as the fiscal agent, hired Applied Ecological Services, Inc. (AES) in July 2012 to develop the plan.

The watershed planning process is a collaborative effort involving voluntary stakeholders with the primary scope to restore impaired waters and protect unimpaired waters by developing an ecologically-based management plan for Long Run Creek watershed that focuses on improving water quality by protecting green infrastructure, creating protection policies, implementing ecological restoration, and educating the public. Another important outcome is to improve the quality of life for people in the watershed for current and future generations.

The primary purpose of this plan is to spark interest and give stakeholders a better understanding of Long Run Creek watershed to promote and initiate plan recommendations that will accomplish the goals and objectives of this plan. This plan was produced via a comprehensive watershed planning approach that involved input from stakeholders and analysis of complex watershed issues by Applied Ecological Service's watershed planners, ecologists, GIS specialists, and environmental engineers.

LRCWPC held regular, public meetings the second half of 2012, throughout 2013, and into 2014 to guide the watershed planning process by establishing goals and objectives to address watershed issues and to encourage participation of stakeholders to develop planning and support for watershed improvement projects and programs.

Interests, issues, and opportunities identified by LRCWPC were addressed and incorporated into the Watershed-Based Plan. The plan acknowledges the importance of managing remaining green infrastructure to meet many of the goals and objectives in the plan and provides scientific and practical rational for protecting appropriate green infrastructure from traditional development and entering into relationships with public, private, and non-profit entities to manage these properties to maximize watershed benefits. In addition, ideas and recommendations in this plan are designed to be updated through adaptive management that will strengthen the plan over time as additional information becomes available. **It is important to note that all recommendations in this plan are for guidance only and not required by any federal, state, or local agency.**

1.3 USEPA WATERSHED-BASED PLAN REQUIREMENTS

In March 2008, the United States Environmental Protection Agency (USEPA) released watershed protection guidance entitled *Non-point Source Program and Grant Guidelines for States and Territories*. The document was created to ensure that Section 319 funded Watershed-Based Plans and projects make progress towards restoring waters impaired by non-point source pollution. Applied Ecological Services, Inc. consulted USEPA's *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (USEPA 2008) and Chicago Metropolitan Agency for Planning's (CMAP's) *Guidance for Developing Watershed Implementation Plans in Illinois* (CMAP 2007) to create this watershed plan. Having a Watershed-Based Plan will allow Long Run Creek watershed stakeholders to access 319 Grant funding for watershed improvement projects recommended in this plan. Under USEPA guidance, "Nine Elements" are required in order for a plan to be considered a Watershed-Based Plan.

NOTEWORTHY - USEPA Nine Elements

Element A: 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 the watershed-based plan;

Element B: Estimate of the pollutant load reductions expected following implementation of the management measures described under Element C below;

Element C: Description of the BMPs (non-point source management measures) that are expected to be implemented to achieve the load reductions estimated under Element B above and an identification of the critical areas in which those measures will be needed to implement

Element D: 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 the plan;

Element E: Public information/education component that will be implemented to enhance public understanding of the project and encourage early and continued participation in selecting, designing, and implementing/ maintaining non-point source management measures that will be implemented;

Element F: Schedule for implementing the activities and non-point source management measures the plan; identified in this plan that is reasonably expeditious;

Element G: Description of interim, measurable milestones for determining whether non-point source management measures or other control actions are being implemented;

Element H: Set of environmental or administrative criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards;

Element I: Monitoring component to evaluate the effectiveness of the implementation efforts over time.

1.4 PLANNING PROCESS

Watershed Stakeholder Planning Committee

The Long Run Creek Watershed Planning Committee (LRCWPC) first met in July 2012 to kickoff the watershed planning process. At this meeting, Applied Ecological Services, Inc. (AES) provided stakeholders with an overview of the steps involved in the watershed planning process. The LRCWPC Watershed Coordinator engaged stakeholders by explaining how their input and participation would benefit the overall outcome of the project. Volunteer stakeholders representing LRCWPC met 9 times throughout the planning process. The committee generally consisted of representatives from various municipal, governmental, private, and public organizations as well as local residents.


Site visit to Annunciation of the Mother of God Byzantine Catholic Church during watershed stakeholder tour

The LRCWPC developed goals and objectives for the watershed and identified problem areas and opportunities. Meetings were initiated by the Watershed Coordinator and generally covered one or more watershed topics. Meetings were devoted to development of goals and objectives, watershed assessment findings, and action plan items. Local experts and watershed residents were also invited to give presentations on specific topics. A list of the meetings is summarized in Table 1. Complete meeting minutes are included in Appendix A.

Table 1. Long Run Creek Watershed Planning Committee (LRCWPC) meeting schedule.

Date	Agenda	Summary
Jul. 25, 2012	· Watershed Planning Summary · Stakeholder Involvement	AES summarized to LRCWPC "Elements" needed in a USEPA approved watershed plan. The Watershed Coordinator discussed how stakeholder participation would benefit the overall outcome of the project.
Nov. 29, 2012	· Watershed Field Inventory Results · Detention Basin Discussion · Mission Statement · Discuss Future Meetings	AES summarized the results of the "Watershed Resource Inventory" field investigation. A discussion followed regarding the importance of detention basins. A mission statement was created. The Watershed Coordinator discussed options for future meetings.
Feb. 14, 2013	· Long Run Seep Nature Preserve · Watershed Inventory: Part 1 · Identification of Impairments	Kim Roman of INPC presented info about Long Run Seep Nature Preserve, rare species found there, and groundwater recharge. AES updated stakeholders with watershed information including jurisdictions, demographics, land use, soils, open space and natural areas. A discussion was then held to identify potential impairments in the watershed.
Apr. 24, 2013	· Watershed Inventory: Part 2 · Critical Areas & Pollutant Targets · Identify & Prioritize Goals · Discuss Future Meetings	AES updated stakeholders with watershed information including the watershed drainage system, groundwater issues, wastewater treatment plants, water quality for LRC and Tampier Lake, pollutant loading, and identification of Critical Areas and pollutant reduction targets. The LRCWPC then completed a goals exercise.
June 13, 2013	· Watershed Tour	A watershed tour via bus was conducted to introduce stakeholders to various aspects of the watershed including streams, open space, residential development, and potential watershed projects. Twelve sites were visited during the tour.
July 31, 2013	· Education and Outreach	Bluestem Communications (formerly Biodiversity Project) presented stakeholders with an outline of the education and outreach plan for LRC watershed. LRCWPC provided input that will be incorporated into the final plan.
Sep. 25, 2013	· Watershed Action Plan · Education & Outreach Pilot Project	AES presented the "Programmatic" and "Site Specific" Action Plan to the LRCWPC. Bluestem Communications (formerly Biodiversity Project) then discussed potential education and outreach pilot projects. LRCWPC then voted on a pilot project.
Nov. 20, 2013	· Water Quality Monitoring Plan · Plan Evaluation Report Cards	AES presented a water quality monitoring plan for the watershed then went through each of the six report cards developed for each plan goal/objectives. LRCWPC provided input that clarified monitoring roles and appropriate report card milestones.
Feb. 19, 2014	· Education and Outreach · Conservation Development · Future Plan Implementation	Bluestem Communications discussed the Pilot Project process. AES then presented on Conservation Development. The meeting ended with an open discussion regarding future plan implementation.

1.5 USING THE WATERSHED-BASED PLAN

The information provided in this Watershed-Based Plan is prepared so that it can be easily used as a tool by any stakeholder including elected officials, federal/state/county/municipal staff, and the general public to identify and take actions related to watershed issues and opportunities. The pages below summarize what the user can expect to find in each major "Section" of the Watershed-Based Plan. **All recommendations in this plan are for guidance only and not required by any federal, state, or local agency.**

Section 2.0: Mission, Goals, and Objectives

Section 2.0 of the plan contains the Long Run Creek Watershed Planning Committee's (LRCWPC) mission and goals/objectives. Goal topics include protection of green infrastructure, improved groundwater recharge, improved surface water quality, updates to watershed policy, reduction in problematic flooding, and implementation of education opportunities. In addition, "Measurable Objectives" were developed where possible for each goal so that the progress toward meeting each goal can be measured in the future by evaluating information included in Section 9.0: Measuring Plan Progress & Success.

Section 3.0: Watershed Resource Inventory

An inventory of the characteristics, problems, and opportunities in Long Run Creek watershed is examined in Section 3.0. Resulting analysis of the inventory data led to recommended watershed actions that are included in Section 6.0: Management Measures Action Plan. Inventory results also helped identify causes and sources of watershed impairment as required under USEPA's *Element A* and found in Section 5.0.

Section 3.0 includes summaries and analysis of the following inventory topics:

Watershed Resource Inventory Topics *Included* in the Plan

- **3.1** Geology & Climate
- **3.2** Pre-European Settlement Landscape & Present Landscape
- **3.3** Topography, Watershed Boundary, Subwatersheds
- **3.4** Soils
- **3.5** Jurisdictions
- **3.6** Existing Policies
- **3.7** Demographics
- **3.8** Existing & Future Land Use
- **3.9** Transportation Network
- **3.10** Impervious Cover Impacts
- **3.11** Open Space and Green Infrastructure
- **3.12** Important Natural Areas
- **3.13** Watershed Drainage System
    - Long Run Creek Hydrology & Flow
    - Long Run Creek & Tributaries
    - Detention Basins
    - Tampier Lake
    - Wetlands
    - Floodplain & Flood Problem Areas
- **3.14** Groundwater and Community Water
- **3.15** Wastewater Treatment Plants and Septic

Section 4.0: Water Quality & Pollutant Modeling Assessment

A summary and analysis of available water quality data for the watershed and pollutant modeling assessment is included in its own section because of its importance in the watershed planning process. This section includes a detailed summary of all physical, chemical, and biological data available for Long Run Creek, Tampier Lake, and the two wastewater treatment plants (WWTPs). The pollutant loading assessment identifies pollutant loads from various land cover types and the two WWTPs. Water quality data combined with pollutant loading data provides information that sets the stage for developing pollutant reduction targets outlined in Section 5.0.

Section 5.0: Causes/Sources of Impairment & Reduction Targets

This section of the plan includes a list of causes and sources of watershed impairment as identified in Section 3.0 that affect Illinois EPA "Designated Uses" for water quality and other watershed features. As required by USEPA, Section 5.0 also addresses all or portions of *Elements A, B, & C* including an identification of the "Critical Areas", pollutant load reduction targets, and estimate of pollutant load reductions following implementation of Critical Area Management Measures identified in Section 6.0.

Section 6.0: Management Measures Action Plan

A "Management Measures Action Plan" is included in Section 6.0. The Action Plan is divided into a Programmatic Action Plan and a Site Specific Action Plan. Programmatic recommendations are described in paragraph format; site specific recommendations are presented in paragraph, figure, and table formats with references to entities that would provide consulting, permitting, or other technical services needed to implement specific measures. The site specific tables also outline project priority, pollutant reduction efficiency, implementation schedule, sources of technical and financial assistance, and cost estimates. As required by Illinois EPA, this section also contains a watershed-wide summary table of specific information for all recommended site specific management measures combined including "Units," "Cost," and "Estimated Pollutant Load Reduction". This section addresses all or a portion of USEPA *Elements C & D*. **All recommendations in the Action Plan are for guidance only and not required by any federal, state, or local agency.**

Section 7.0: Information & Education Plan

This section is designed to address USEPA *Element E* by providing an Information & Education component to enhance public understanding and to encourage early and continued participation in selecting, designing, and implementing recommendations provided in the Watershed-Based Plan. This is accomplished by providing a matrix that outlines each education objective followed by primary and secondary recommended education activities. For each activity, a target audience, package (vehicle and pathways for reaching audiences), priority/schedule, lead and supporting agencies, what the expected outcomes or behavior change will be, and estimated costs to implement is provided.

Sections 8.0 & 9.0: Plan Implementation & Measuring Plan Progress & Success

A list of key stakeholders and discussion about forming a Watershed Implementation Committee that forms partnerships to implement watershed improvement projects is included in Section 8.0. Section 9.0 includes two monitoring components: 1) a "Water Quality Monitoring Plan" that includes specific locations and methods where future monitoring programs should focus and a set of water quality "Criteria" that can be used to determine whether pollutant load reduction targets are being achieved over time and 2) "Report Cards" for each plan goal used to measure milestones and to determine if Management Measures are being implemented on schedule, how effective they are at achieving plan goals, and need for adaptive management if milestones are not being met. Sections 8.0 and 9.0 address USEPA *Elements F, G, H, and I*.

Sections 10.0 & 11.0: Literature Cited and Glossary of Terms

Section 10.0 includes a list of literature that is cited throughout the report. The Glossary of Terms (Section 11.0) includes definitions or descriptions for many of the technical words or agencies that the user may find useful when reading or using the document.

Appendix

The Appendix to this report is included on the attached CD located on the back cover (hard copies only). It contains LRCWPC meeting minutes (Appendix A), results of the watershed resource field inventory (Appendix B), Center for Watershed Protection local ordinance review summary (Appendix C), raw data used to develop the STEPL pollutant loading and reduction models (Appendix D), a list of Long Run Creek stakeholders & partners (Appendix E), and a list of potential funding opportunities (Appendix F).

1.6 PRIOR STUDIES & PROJECTS

Various studies have been completed describing and analyzing conditions within Long Run Creek watershed. Several ecological restoration efforts have also been implemented. This Watershed-Based Plan uses existing data to analyze and summarize work that has been completed by others and integrates new data and information. A list of known studies or restoration work is summarized below.

1. In May 2013, the USFWS-Chicago Ecological Services Field Office completed a 5-year review of the federally endangered Hine's Emerald Dragonfly (USFWS 2013). The 5 year review is a periodic analysis of HED status conducted to ensure that the listing classification as threatened or endangered is appropriate. The study also tracks the progress toward recovery and to propose appropriate next steps for HED conservation.

2. The Village of Homer Glen completed a project in 2012 at Yangas Park that involved stabilizing a section of Long Run Creek to improve water quality/reduce sedimentation while serving as a pilot project for residents. The Village wanted to provide an example for bank stabilization in an easily accessible location that residents could view. The project included cutting back the near vertical banks at a 3:1 slope

Streambank project completed by Homer Glen

SECTION 1.0

and either installing native plantings via plugs or placing a prairie seed mix with erosion blanket. The Village will also place interpretive signage at the trail/creek crossing to provide information of the completed project. The Village also worked with the Homer Township Highway Department to clear dead trees/limbs to open the canopy above to allow the new plantings to grow. This project was ultimately completed using grant funds provided by Hanson Material Services, Inc. (HMS).

3. In 2012, the Illinois Nature Preserves Commission (INPC) petitioned Illinois EPA to designate a Regional Groundwater Contribution Area (GCA) developed by Illinois State Geological Survey (ISGS) as a Class III Special Resource Groundwater Classification area. This designation allows an area to be subjected to special water quality standards and can result in the Office of the Illinois Attorney General ceasing operations that impact a groundwater resource to a nature preserve.

4. Integrated Lakes Management, Inc. (ILM) prepared the “Hydrologic Characterization - Long Run Seep” report in 2008 (ILM, 2008). The purpose of the project was to delineate and characterize the recharge area for Long Run Seep to understand impacts on habitat for the Hine’s Emerald Dragonfly (HED), a federally endangered species. The goal was to define the contributing aquifer for the seep with the ultimate goal of putting together a protection program for the HED.

Master Landscape Plan for Annunciation of the Mother of God Byzantine Catholic Parish

5. The Annunciation of the Mother of God Byzantine Catholic Parish in Homer Glen incorporates green practices into the surrounding landscape such as rainwater collection, replenishment, and irrigation features. These features are supplemented by use of native plant ecosystems that improve water quality and provide wildlife habitat. The site won a “Conservation and Native Landscaping” award from Illinois EPA/Chicago Wilderness in 2006.

   The Byzantine Church also purchased a lot on the west side of the property that included a dry bottom detention basin. This detention basin was retrofitted with prairie and wetland vegetation and incorporates pervious pavement into a sitting area overlooking the basin. The project is known as “Transformation Prairie” and won an award from Homer Glen in 2012 for Community & Nature in Harmony.

“Transformation Prairie” detention retrofit

6. In the spring of 2006, the Village of Homer Glen received a grant from the IDNR C2000 Ecosystem Program to conduct a detailed baseline physical and biological survey of Long Run Creek. Integrated Lakes Management, Inc. (ILM) was hired to perform the work in 2007 (ILM, 2007). The study reviewed historical data and profiled the physical character of the stream corridor noting in-stream habitat, as well as stream biology, which is an indicator of the quality of water. The report is intended to aid in community decision making regarding future development and to be able to assess the impact of surrounding changes in the watershed.

7. Baetis Environmental Services, Inc. completed a benthic macroinvertebrate

survey at four locations along Long Run Creek in 2004. The purpose of the survey was to assemble baseline information about the macroinvertebrate community and to ascertain the effects of wastewater treatment plant discharges on aquatic life. One study site was upstream of both discharges; the other three study sites were downstream of both. Two commonly used indicators of stream health, the Hilsenhoff Biotic Index utilizing taxa-specific pollution tolerance values, and EPT Richness, suggests that the effects of the two wastewater treatment plants diminishes with downstream distance.

8. The Illinois Nature Preserves Commission (INPC) has been conducting management at Long Run Seep Nature Preserve since 2004 by introducing fire, removing invasive woody species, and herbiciding invasive purple loosestrife, common reed, and reed canary grass around seep/fen areas. Much of this work is being done to protect the Federally Endangered Hine's Emerald Dragonfly that inhabits the site.

9. In 2001, the Long Run Creek Watershed Planning Committee (LRCWPC) partnered with the Village of Homer Glen to develop the "Long Run Creek Watershed Plan" (LRCWPC 2001), with funding from the IDNR C2000 Ecosystem Program. In all, the plan developed dozens of recommendations grouped into seven categories including flooding, water quality, soil erosion and sedimentation, education and outreach, wildlife and open space, development and natural resources, and vegetation. At the time of publication however, the USEPA had not yet issued its Nine Elements of a Watershed-Based-Plan. Therefore, the plan addresses some but not all Elements that are now required.

10. Municipal comprehensive plans are available for the Village of Homer Glen (2005), Village of Lemont (2002), Village of Palos Park (2009), and Village of Orland Park (2013).

11. Illinois EPA collects water samples at three locations within Tampier Lake (sites ILRGZO1-3) via the Ambient Lakes Monitoring Program (ALMP). This data is included in biannual *Integrated Water Quality Reports*. These reports must describe how Illinois assessed water quality and whether assessed waters meet or do not meet water quality standards specific to each "Designated Use" of a waterbody.

12. Existing Cook and Will County and CMAP Geographic Information System (GIS) data for Long Run Creek watershed was obtained and used to analyze various data related to wetlands, soils, land use, demographics, and other relevant information.

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2.0 MISSION, GOALS, & OBJECTIVES

2.1 LONG RUN CREEK WATERSHED PLANNING COMMITTEE MISSION

The Long Run Creek Watershed Planning Committee (LRCWPC) is comprised of watershed stakeholders dedicated to the preservation, protection, and improvement of Long Run Creek watershed. The LRCWPC's mission is to:

"Develop and encourage the funding and implementation of a long-range plan among landowners, government, and other appropriate groups which will enhance, manage, and protect the human, ecological, and socio-economic resources within Long Run Creek watershed."

"The Watershed-Based Plan will promote the health and safety of human inhabitants, stormwater management, improve surface and groundwater quality, aesthetic values, education, wildlife protection, and address the present and future flooding issues"

2.2 GOALS & OBJECTIVES

Watershed stakeholders were first presented with information about the character and quality of watershed resources over the course of three separate meetings prior to developing goals. Next, stakeholders listed a variety of issues, concerns, and opportunities that were sorted into six general goals that should be addressed in the watershed plan. Stakeholders were then given the opportunity to vote on goals they felt were most important.

The voting process occurred following the April 24, 2013 stakeholder meeting. Each stakeholder was given five votes. Each person was allowed to use up to two votes on a single goal if he or she felt strongly about it. The voting process helped focus on goals that need to be adequately addressed in the planning process and within this watershed plan report. Tallied votes are as follows:

1. Manage natural and cultural components of the identified Green Infrastructure Network – *18 votes*
2. Improve groundwater recharge to benefit public water supply and federally endangered Hine's Emerald Dragonfly critical habitat– *18 votes*
3. Improve surface water quality to meet applicable standards– *14 votes*
4. Create and/or update county and local policy to protect watershed resources – *14 votes*
5. Manage and mitigate for existing and future structural flood problems– *13 votes*
6. Implement watershed educational opportunities – *10 votes*

Objectives for each goal were also formulated and are very specific where feasible and designed to be measurable so that future progress toward meeting goals can be assessed. Goals and objectives ultimately lead to the development of action items. The Management Measures Action Plan section of this report is geared toward addressing watershed goals by recommending programmatic and site specific Management Measure actions to address each goal. The goals and objectives are examined in more detail when measuring plan progress and success via milestones and "Report Cards" in Section 9.

Goal 1: *Manage natural and cultural components of the identified Green Infrastructure Network.*

Objectives:

1. Include the identified Green Infrastructure Network in all county and municipal comprehensive plans and development review maps.
2. Implement conservation or low impact design standards for applicable "Critical Green Infrastructure Protection Areas" where new or redevelopment occurs.
3. Prepare and implement management plans for all publically owned Important Natural Areas within the Green Infrastructure Network.
4. Incorporate natural landscaping into golf courses within the Green Infrastructure Network.
5. Extend and connect trails through appropriate ComEd utility corridors and other corridors within the Green Infrastructure Network.
6. Private land owners with parcels along Long Run Creek and tributaries manage their land for green infrastructure benefits.

Goal 2: *Improve groundwater recharge to benefit public water supply and federally designated Hine's Emerald Dragonfly critical habitat.*

Objectives:

1. Assign all future mitigation dollars from impacts to Hine's Emerald Dragonfly critical habitat to fund projects that support management and restoration of critical habitat or to fund projects that support groundwater recharge within the proposed Class III Groundwater Contribution Area to Long Run Seep Nature Preserve.
2. Use stormwater infiltration/cleaning practices in all new and redevelopment within the proposed Class III Groundwater Contribution Area to Long Run Seep Nature Preserve to meet Illinois EPA recommendations.
3. Establish a monitoring plan for Hine's Emerald Dragonfly at Long Run Seep Nature Preserve to study groundwater/seep water chemistry, seep discharge, estimate population size and dynamics, and conduct population augmentation via captive-rearing.
4. Model groundwater impacts to Hine's Emerald Dragonfly habitat prior to installing new wells.

Goal 3: *Improve surface water quality to meet applicable standards.*

Objectives:

1. Incorporate nutrient removal technologies into future upgrades for Derby Meadows and Chickasaw Hills wastewater treatment plants that reduce effluent total phosphorus to <1.0 mg/l and total nitrogen to <5.5 mg/l.
2. Stabilize 26,789 linear feet of highly eroded streambank located along six “High Priority-Critical Area” stream reaches.
3. Restore 14,966 linear feet of buffer along four “High Priority-Critical Area” riparian areas.
4. Install a vegetated buffer along 9,650 linear feet of Tampier Lake shoreline at “High Priority-Critical Area”.
5. Restore 355 acres of wetland at thirteen “High Priority-Critical Area” wetland restoration sites.
6. Retrofit 21 “High Priority-Critical Area” detention basins.
7. Implement conservation tillage (no till) farming practices on 13 sites (1,282 acres) identified as “High Priority-Critical Area” cropland.
8. Implement manure reduction practices on two sites (24 acres) identified as “High Priority-Critical Area” livestock operations.
9. Decrease the use of phosphorus (in fertilizer) in agricultural, commercial, and residential areas based on soil testing and Illinois Phosphorus Law.
10. Identify septic systems in violation of county ordinance requirements and require maintenance or adequate sizing.
11. Municipalities in the watershed implement minimum bi-weekly street sweeping programs.

Goal 4: *Create and/or update county and local policy to protect watershed resources.*

Objectives:

1. All key watershed partners adopt and/or support (via a resolution) the Long Run Creek Watershed-Based Plan as a “guidance document.”
2. Amend existing municipal comprehensive plans and zoning ordinances to include tools such as conservation/low impact design standards for use at “High Priority-Critical Area” Green Infrastructure Protection Areas where new development occurs.
3. Utilize tools such as Development Impact Fees, Stormwater Utility Taxes, Special Service Area (SSA) Taxes, etc. to help fund future management of green infrastructure components where new and redevelopment occurs.
4. Developers protect sensitive natural areas, restore degraded natural areas and streams, then donate all natural areas and naturalized stormwater management systems to a public agency or conservation organization for long term management with dedicated funding via tools such as Development Impact Fees, Stormwater Utility Taxes, Special Service Area (SSA) Taxes, etc.
5. Amend existing municipal zoning ordinances to include recommendations for stormwater infiltration practices in all new and redevelopment within the proposed Class III Groundwater Contribution Area to Long Run Seep Nature Preserve.
6. Consider limiting mitigation for all wetlands lost to development to occur in the watershed.
7. Amend local ordinances to allow for native landscaping.
8. Require reduced or no phosphorus fertilizer use based on soil testing and Illinois Phosphorus Law.

Goal 5: *Manage and mitigate for existing and future structural flood problems.*

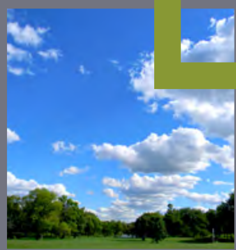
Objectives:

1. Reconnect channelized portions of Long Run Creek along Reaches 3 and 4 to adjacent floodplain where feasible.
2. Implement impervious reduction measures into development that is predicted to occur within Subwatershed Management Units 1, 8, 18, and 20 which are "Highly Vulnerable" to future development and associated impervious cover.
3. Mitigate for identified structural flood problem areas on a case by case basis where feasible.
4. Limit development in the identified FEMA 100-year floodplain.
5. Provide tax incentives for homeowners or businesses using stormwater infiltration, harvesting, and/or re-use technology.

Goal 6: *Implement watershed educational opportunities.*

Objectives:

1. Build a sense of community around Long Run Creek and the watershed.
2. Connect residents to decision-makers and experts with knowledge about water issues, like pollution and problematic flooding, and their potential solutions.
3. Educate watershed stakeholders on ways to improve water quality and reduce problematic flooding in Long Run Creek and its tributaries.
4. Educate watershed stakeholders on ways to preserve groundwater supply to serve future demands for water supply and to benefit Hine's Emerald Dragonfly.
5. Educate municipalities about ways to promote responsible development and best management practices in their communities.



3.0 WATERSHED RESOURCE INVENTORY

3.1 GEOLOGY, CLIMATE, & SOILS

Geology

The terrain of the Midwestern United States was created over thousands of years as glaciers advanced and retreated during the Pleistocene Era or "Ice Age". Some of these glaciers were a mile thick or more. The Illinois glacier extended to southern Illinois between 300,000 and 125,000 years ago. It is largely responsible for the flat, farm-rich areas in the central portion of the state that were historically prairie. Only the northeastern part of Illinois was covered by the most recent glacial episode known as the Wisconsin Episode that began approximately 70,000 years ago and ended around 14,000 years ago (Figure 3). During this period the earth's temperature warmed and the ice slowly retreated leaving behind moraines and glacial ridges where it stood for long periods of time (Hansel, 2005). A tundra-like environment covered by spruce forest was the first ecological community to colonize after the glaciers retreated. As temperatures continued to rise, tundra was replaced by cool moist deciduous forests and eventually by oak-hickory forests, oak savannas, marshes, and prairies.

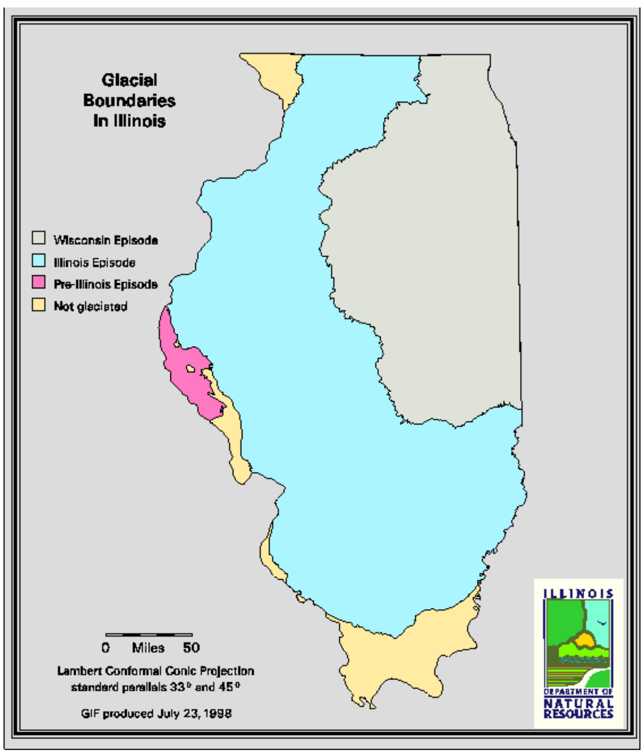


Figure 3. Glacial boundaries in Illinois.

The nearby Des Plaines River and surrounding area was formed at the end of the Wisconsin glaciation within deposits left by the Valparaiso Moraine System. Long Run Creek watershed is part of this Valparaiso Moraine System, which created the picturesque rolling hills and valleys found there today (Hansel, 2005). The composition of the soil in the watershed is also a remnant of that ancient ice movement. Above the bedrock lies a layer of deposits left behind from the glaciers, consisting of clay, silt, sand, and gravel (Hansel, 2005). Silurian Dolomite is located near the surface on the far west portion of the watershed.

Climate

The northern Illinois climate can be described as temperate with cold winters and warm summers where great variation in temperature, precipitation, and wind can occur on a daily basis. Lake Michigan does influence the study area to some degree but not as much as areas immediately adjacent, south, and east of the lake where it reduces the heat of summer and buffers (warms) the cold of winter. Surges of polar air moving southward or tropical air moving northward cause daily and seasonal temperature fluctuations. The action between these two air masses fosters the development of low-pressure centers that generally move eastward and frequently pass over Illinois, resulting in abundant rainfall. Prevailing winds are generally from the west, but are more persistent and blow from a northerly direction during winter.

The Weather Channel website (www.weather.com) provides an excellent summary of climate statistics including monthly averages and records for most locations in Illinois. Data for Lemont represents the climate and weather patterns experienced in Long Run Creek watershed (Figure 4). The winter months are cold averaging highs around 33° F while winter lows are around 17° F. Summers are warm with average highs around 80° F and summer lows around 57° F. The highest recorded temperature was 105° F in July 1995 while the lowest temperature was -26° F in January 1985.

Fairly typical for the Midwest, the current climate of Long Run Creek watershed consists of an average rainfall around 36 inches and snowfall around 38 inches annually. According to data collected in Lemont, the most precipitation on average occurs in August (4.34 inches) while January receives the least amount of precipitation with 1.91 inches on average.

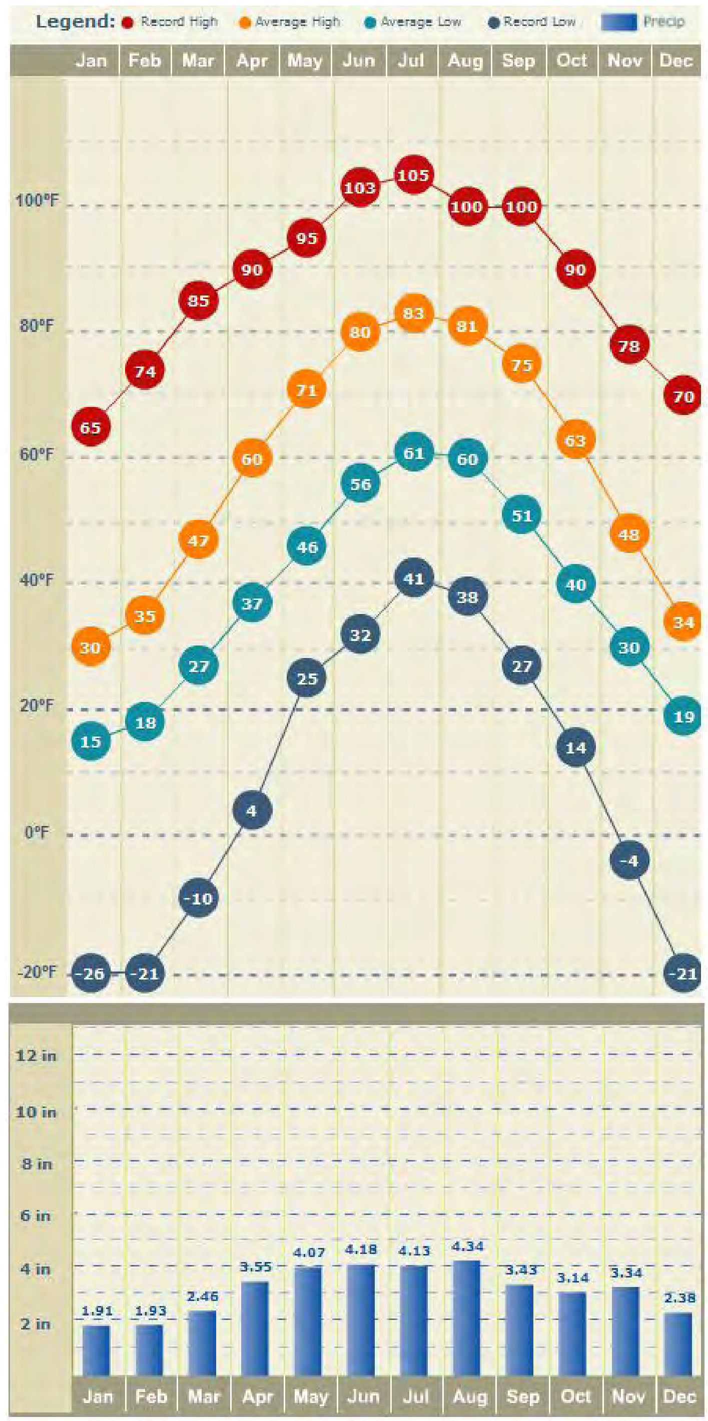


Figure 4. Monthly averages for temperature and precipitation in Lemont, Illinois. Source: The Weather Channel

Pre-European settlement prairie-savanna landscape

3.2 PRE-EUROPEAN SETTLEMENT LANDSCAPE COMPARED TO PRESENT LANDSCAPE

The last Native American Indian tribe to call the area home was the Potawatomie. However, they were removed from the land with the signing of a treaty in 1833. The original public land surveyors that worked for the office of U.S. Surveyor General in the early and mid 1800s mapped and described natural and man-made features and vegetation communities while creating the "rectangular survey system" for mapping and sale of western public lands of the United States (Daly & Lutes et. al., 2011). Ecologists know by interpreting survey notes and hand drawn Federal Township Plats of Illinois (1804-1891) that a complex interaction existed between several ecological communities including prairies, woodlands, savannas, and wetlands prior to European settlement in the 1830s.

The surveyors described the western half of Long Run Creek watershed as "Timber" while the eastern half was described as mostly "Prairie" mixed with areas of "Marsh" and pockets of "Timber" (Figure 5). This mixture of "Prairie" and "Timber" across the landscape was widely described in the mid 1800s as the surveyors and early settlers moved west out of the heavily forested eastern portion of the United States and encountered a much more open environment that ecologists now refer to as "Savanna." The prairie-savanna landscape was maintained and renewed by frequent lightning strike fires, fires ignited by Native Americans, and grazing by bison and elk. Fires ultimately removed dead plant material, exposing the soils to early spring sun, and returning nutrients to the soil. Running through the prairie-savanna landscape were meandering stream corridors and low wet depressions consisting of sedge meadow, marsh, wet prairie and highly unique seeps, springs, and fen wetlands hydrated by alkaline-rich groundwater discharge.

During pre-European settlement times most of the water that fell as precipitation was absorbed in upland prairie and savanna communities and within the extensive wetlands that existed along stream corridors. Infiltration and absorption of water was so great that most of the defined stream channels seen today were simply wetland complexes. This is true for most of the central and eastern portions of Long Run Creek. It is also interesting to note that Long Run Creek once flowed south for several miles prior to joining the Des Plaines River. Sometime between 1840 and 1939, the stream channel was altered and made to flow directly into the I & M Canal which was also a human created feature.

European settlement resulted in drastic changes to the fragile ecological communities. Fires no longer occurred, prairie and wetlands were tilled under or drained for farmland or developed, and many channels/ditches were excavated through wetland areas to further drain the land for farming purposes. The earliest aerial photographs taken in 1939 (Figure 6) depict Long Run Creek watershed when row crop farming was the primary land use but before residential and commercial development seen today. Many of the woodland communities described in the western portion of the watershed were still present in 1939 but farmland clearly replaced most of the prairie and wetland communities. With the advent of farming came significant changes in stormwater runoff. By 1939 defined stream channels had formed or were created throughout the watershed.

Figure 7 shows a 2012 aerial photograph of Long Run Creek watershed. It is clear that residential and commercial development replaced much of the farmland, particularly in the eastern half of the watershed. The dark signatures in the western half of the watershed reveal stands of remnant oak and hickory groves that persist but are mostly fragmented by residential development. Another area of interest is John J. Duffey preserve, located in the northeast corner of the watershed. In the late 1950s the Forest Preserve District of Cook County (FPDCC) began converting wetlands into shallow sloughs and Tampier Lake. In addition, there are also seven golf courses located in the watershed.

With degraded ecological conditions comes the opportunity to implement ecological restoration to improve the condition of Long Run Creek watershed. Present day knowledge of how pre-European settlement ecological communities formed and evolved provides a general template for developing present day natural area restoration and management plans. One of the primary goals of this watershed plan is to identify, protect, restore, and manage remaining natural areas.

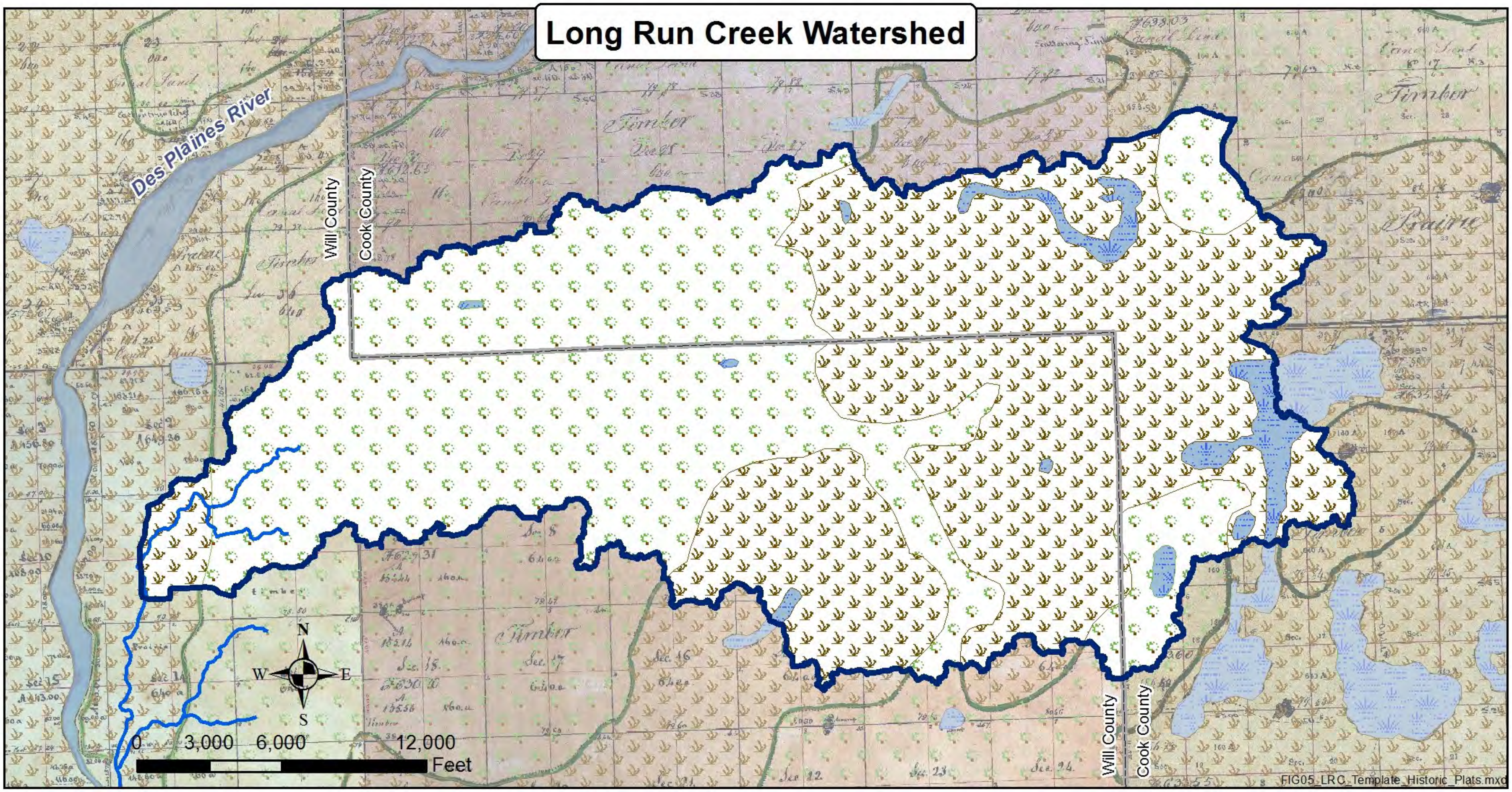


Figure 5

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Fig. 5: Pre-European Settlement Vegetation (1830s)

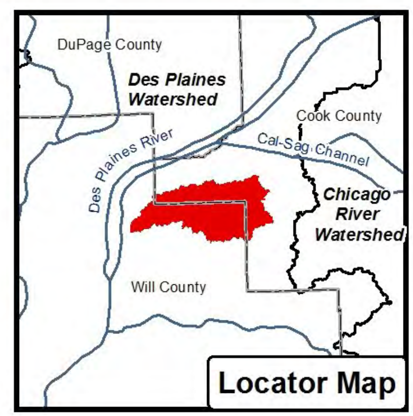
Legend

- LRC Watershed Boundary
- County Boundary
- Presettlement Streams & Tributaries
- Des Plaines River

Presettlement Vegetation (1830's)

- Marsh (Wetland)
- Prairie (Upland & Wet Prairie)
- Timber (Oak Woodland & Savanna)

Data Sources:
IL State Archives



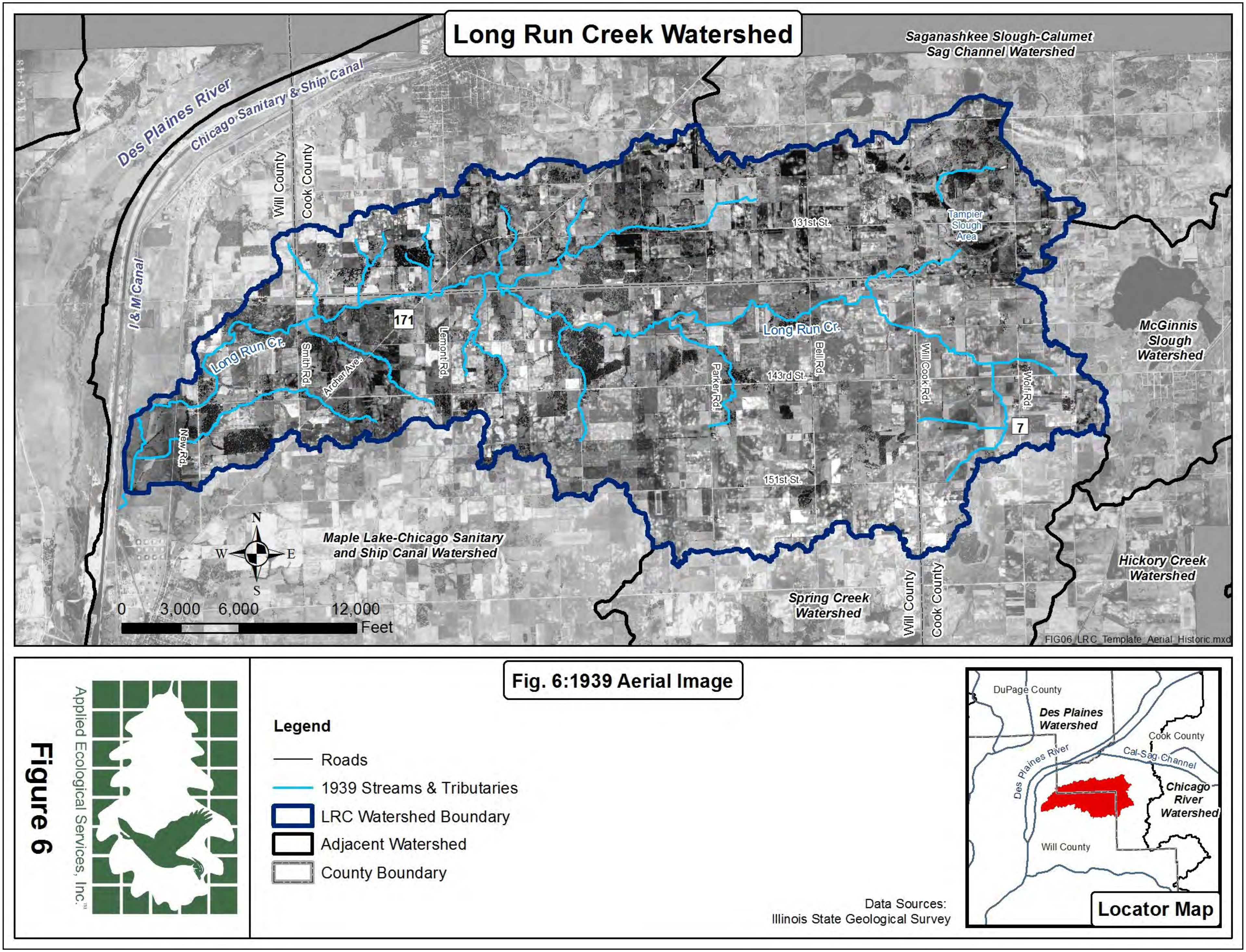


Fig. 6:1939 Aerial Image

Figure 6

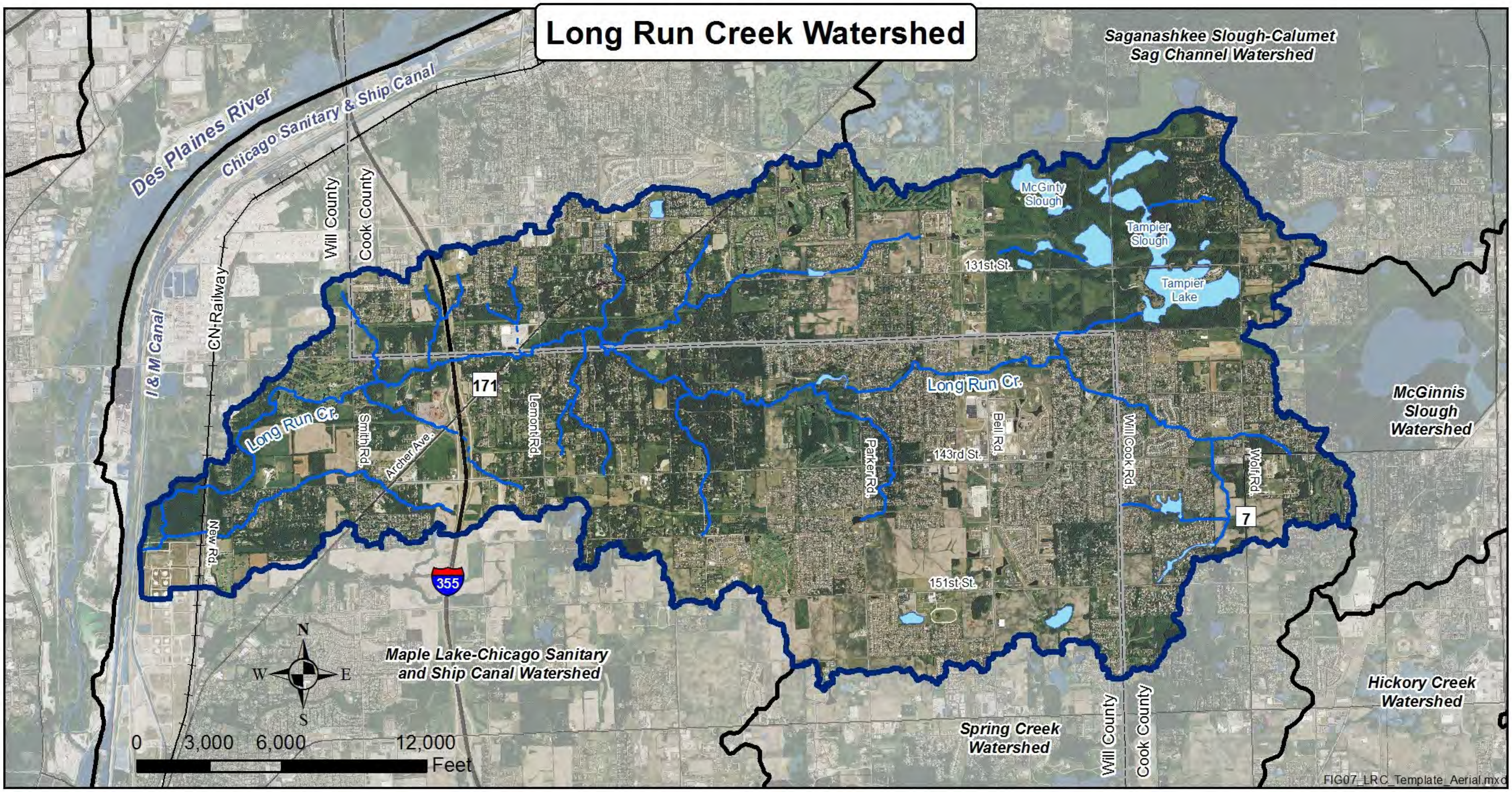


Fig. 7: 2012 Aerial Image

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Data Sources:
NAIP 2012

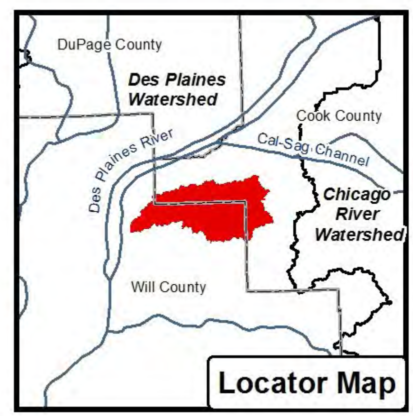


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Figure 7

3.3 TOPOGRAPHY, WATERSHED BOUNDARY, & SUBWATERSHED MANAGEMENT UNITS

Topography & Watershed Boundary

The Wisconsin glacier that retreated 14,000 years ago formed much of the topography and defined the Long Run Creek watershed boundary observed today. Topography refers to elevations of a landscape that describe the configuration of its surface and ultimately defines watershed boundaries. The specifics of watershed planning can not begin until a watershed boundary is clearly defined.

The Long Run Creek watershed boundary was updated and refined for this study using the most up-to-date 2-foot topography data available from Cook and Will Counties. The refined watershed boundary was then input into a GIS model (Arc Hydro) that generated a Digital Elevation Model (DEM) of the watershed (Figure 8). Long Run Creek watershed is 16,714 acres or 26.1 square miles in size.

Long Run Creek watershed generally drains from east to west before entering the I & M Canal and eventually the Des Plaines River. Elevation within the watershed ranges from a high of 792 feet above mean sea level (AMSL) to a low of 577 feet AMSL for a total relief of 215 feet (Figure 8). The highest point is found in the south central portion of the watershed. Higher elevations also extend along much of the southern portion of the watershed. As expected, the lowest elevation occurs where Long Run Creek enters the I & M Canal with lower elevations extending along the main stem of Long Run Creek and many tributaries.

The DEM (Figure 8) depicts the rolling topography of the watershed. Land north and south of Long Run Creek in the central and west portions of the watershed have slopes ranging from 10-20% while the land in the east portion of the watershed is relatively flat (0-5% slopes).

Rolling topography viewed from John J. Duffy Preserve

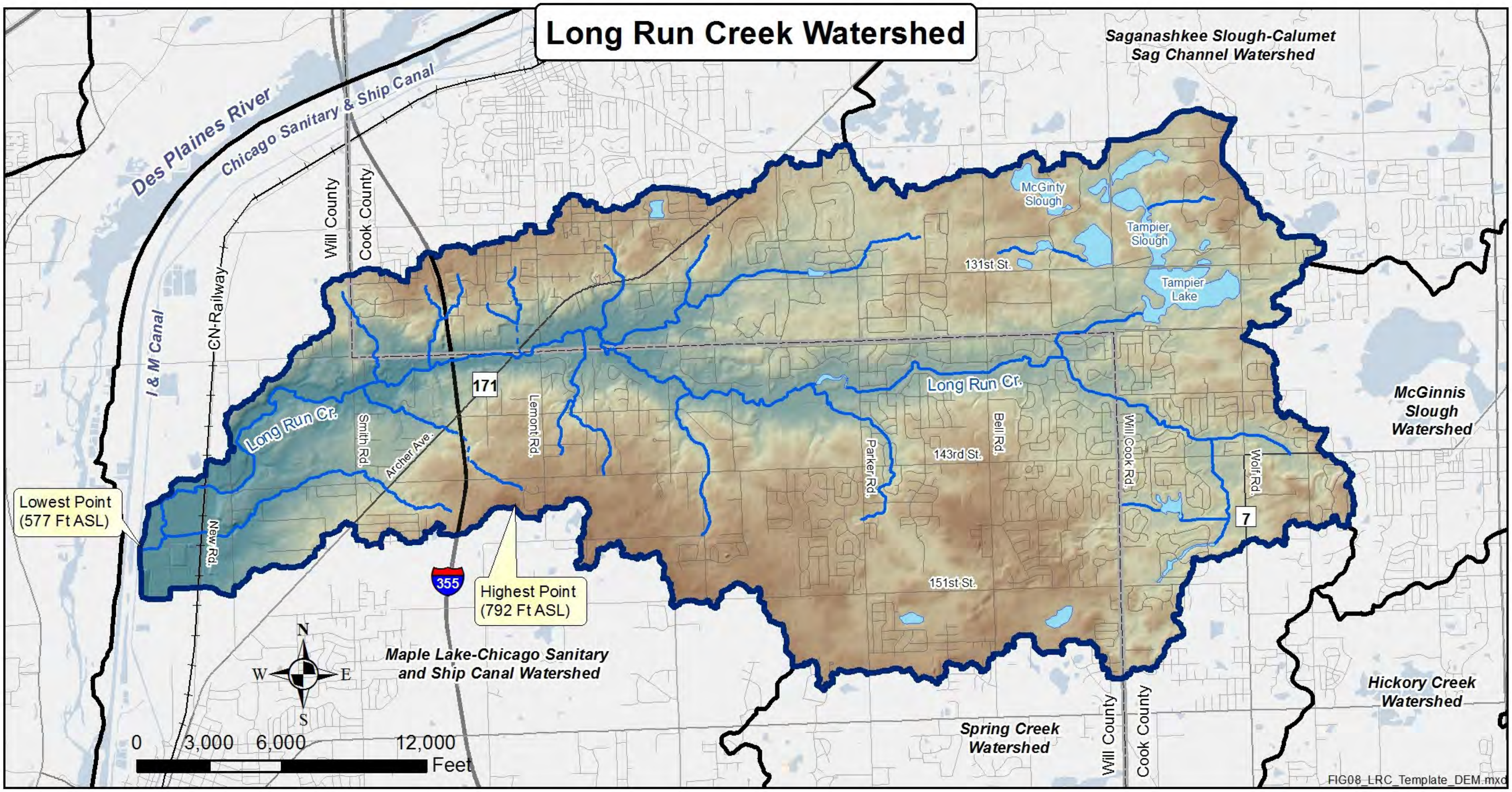


Figure 8

Applied Ecological Services, Inc.™

Fig. 8: Digital Elevation Model

Legend

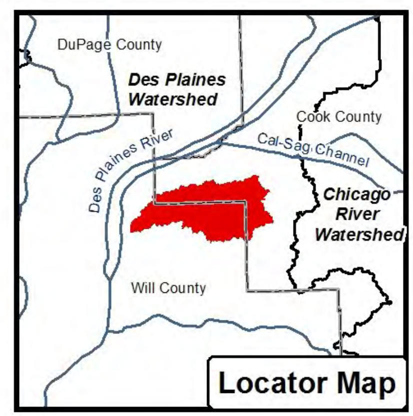
- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Feet Above Sea Level (ASL)

High : 792

Low : 577

Data Sources:
Cook County
Will County



Subwatershed Management Units (SMUs)

The Center for Watershed Protection (CWP) is a leading watershed planning agency and has defined watershed and subwatershed sizes appropriate to meet watershed planning goals. In 1998, the CWP released the "Rapid Watershed Planning Handbook" (CWP 1998) as a guide to be used by watershed planners when addressing issues within urbanizing watersheds. The CWP defines a watershed as an area of land that drains up to 100 square miles. Broad assessments of conditions such as soils, wetlands, and water quality are generally evaluated at the watershed level and provide some information about overall conditions. Long Run Creek watershed is about 16 square miles and therefore this plan allows for a detailed look at watershed characteristics, problem areas, and management opportunities. However, an even more detailed look at smaller drainage areas must be completed to find site specific problem areas or "Critical Areas" that need immediate attention.

To address issues at a small scale, a watershed can be divided into subwatersheds called Subwatershed Management Units (SMUs). Long Run Creek watershed was delineated into 20 SMUs by using the Digital Elevation Model (DEM). Information obtained at the SMU scale allows for detailed analysis and better recommendations for site specific "Management Measures" otherwise known as Best Management Practices (BMPs). Table 2 presents each SMU and size within the watershed. Figure 9 depicts the location of each SMU boundary delineated within the larger Long Run Creek watershed.

Table 2. Subwatershed Management Units and size.

SMU#	Total Acres	Total Square Miles
SMU 1	743.6	1.2
SMU 2	410.2	0.6
SMU 3	1,218.2	1.9
SMU 4	493.9	0.8
SMU 5	1,576.6	2.5
SMU 6	633.4	1.0
SMU 7	1,290.7	2.0
SMU 8	1,969.1	3.1
SMU 9	1,037.0	1.6
SMU 10	772.8	1.2
SMU 11	2,047.8	3.2
SMU 12	434.6	0.7
SMU 13	445.9	0.7
SMU 14	549.1	0.9
SMU 15	362.4	0.6
SMU 16	215.2	0.3
SMU 17	281.4	0.4
SMU18	545.4	0.8
SMU19	779.9	1.2
SMU 20	907.3	1.4
Totals	**16,714.1**	**26.1**

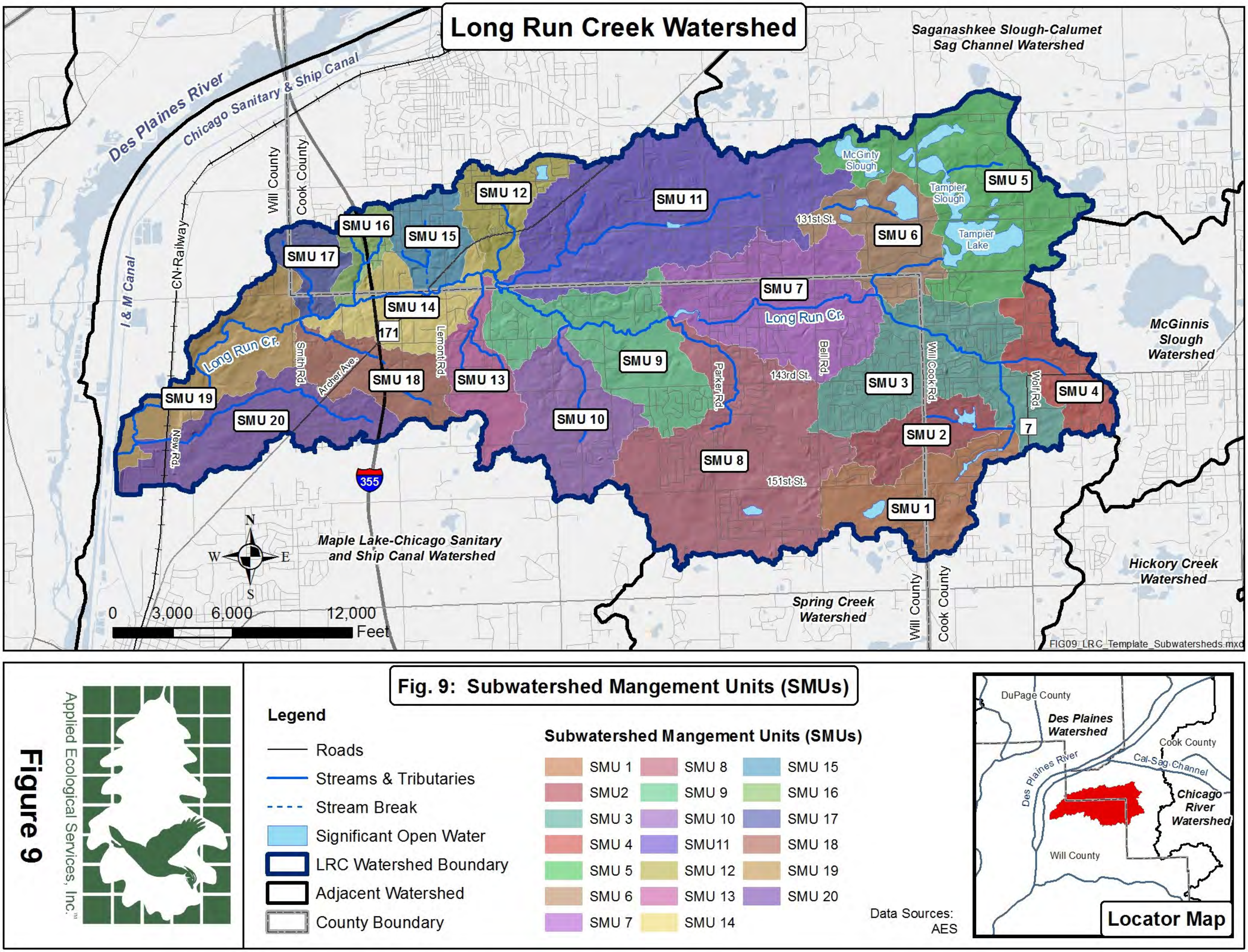


Fig. 9: Subwatershed Mangement Units (SMUs)

Figure 9

3.4 HYDRIC SOILS, SOIL ERODIBILITY, & HYDROLOGIC SOIL GROUPS

Soils

Deposits left by the Wisconsin glaciation 14,000 years ago are the raw materials of present soil types in the watershed. These raw materials include till (debris) and outwash. A combination of physical, biological, and chemical variables such as topography, drainage patterns, climate, and vegetation, have interacted over centuries to form the complex variety of soils found in the watershed. Most soils formed under wetland, woodland, and prairie vegetation. The most up to date soils mapping provided by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was used to summarize the extent of soil types, including hydric soils, soil erodibility, and hydrologic soil groups within Long Run Creek watershed (Tables 3 and 4; Figures 10-12).

Hydric Soils

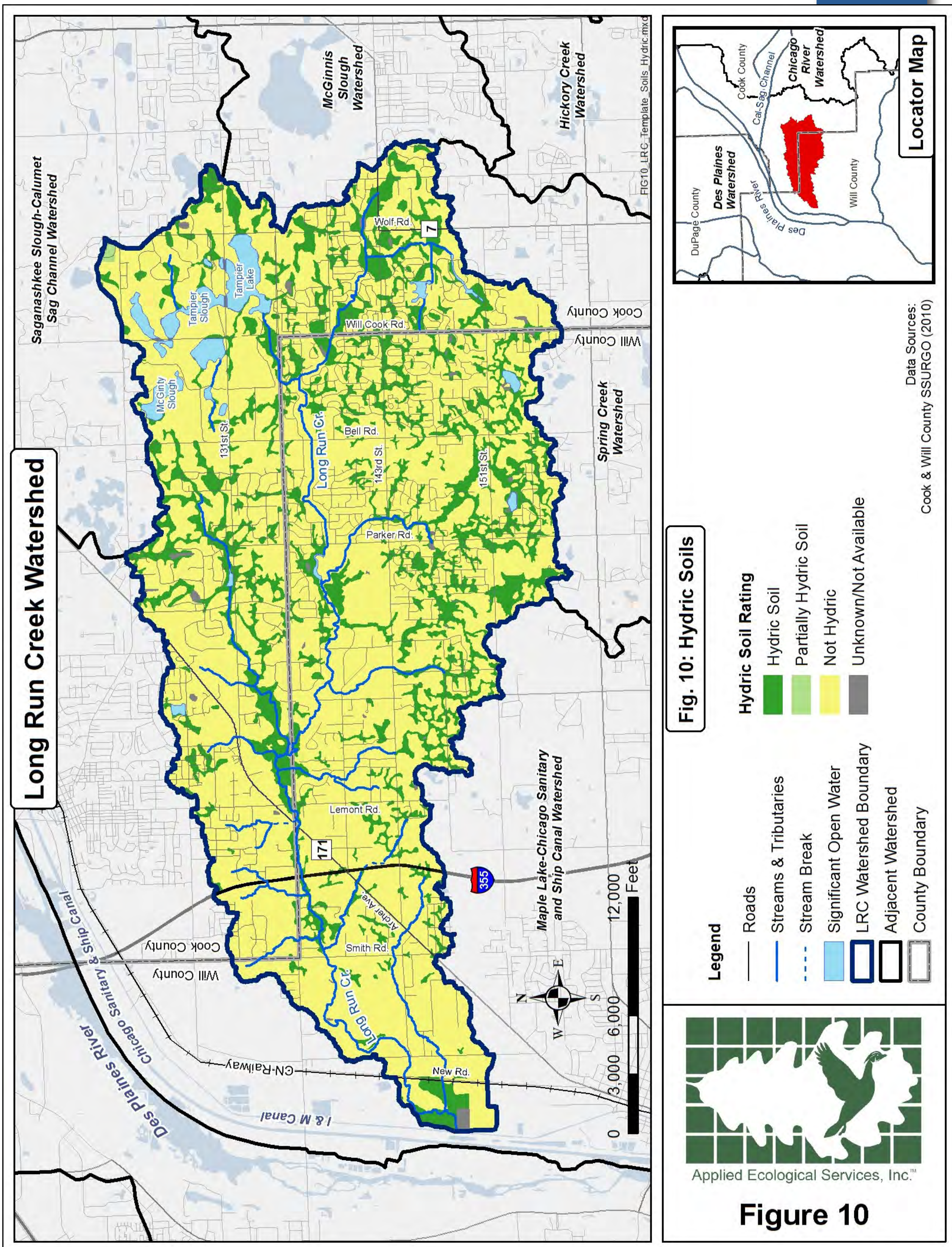
Wetland or "Hydric Soils" generally form over poorly drained clay material associated with wet prairies, marshes, and other wetlands and from accumulated organic matter from decomposing surface vegetation. Hydric soils are important because they indicate the presence of existing wetlands or drained wetlands where restoration may be possible. Most of the wetlands in Long Run Creek watershed were intact until the late 1830s when European settlers began to alter significant portions of the watershed's natural hydrology and wetland processes. Where it was feasible wet areas were drained, streams channelized, and woodland and prairie cleared to farm the rich soils.

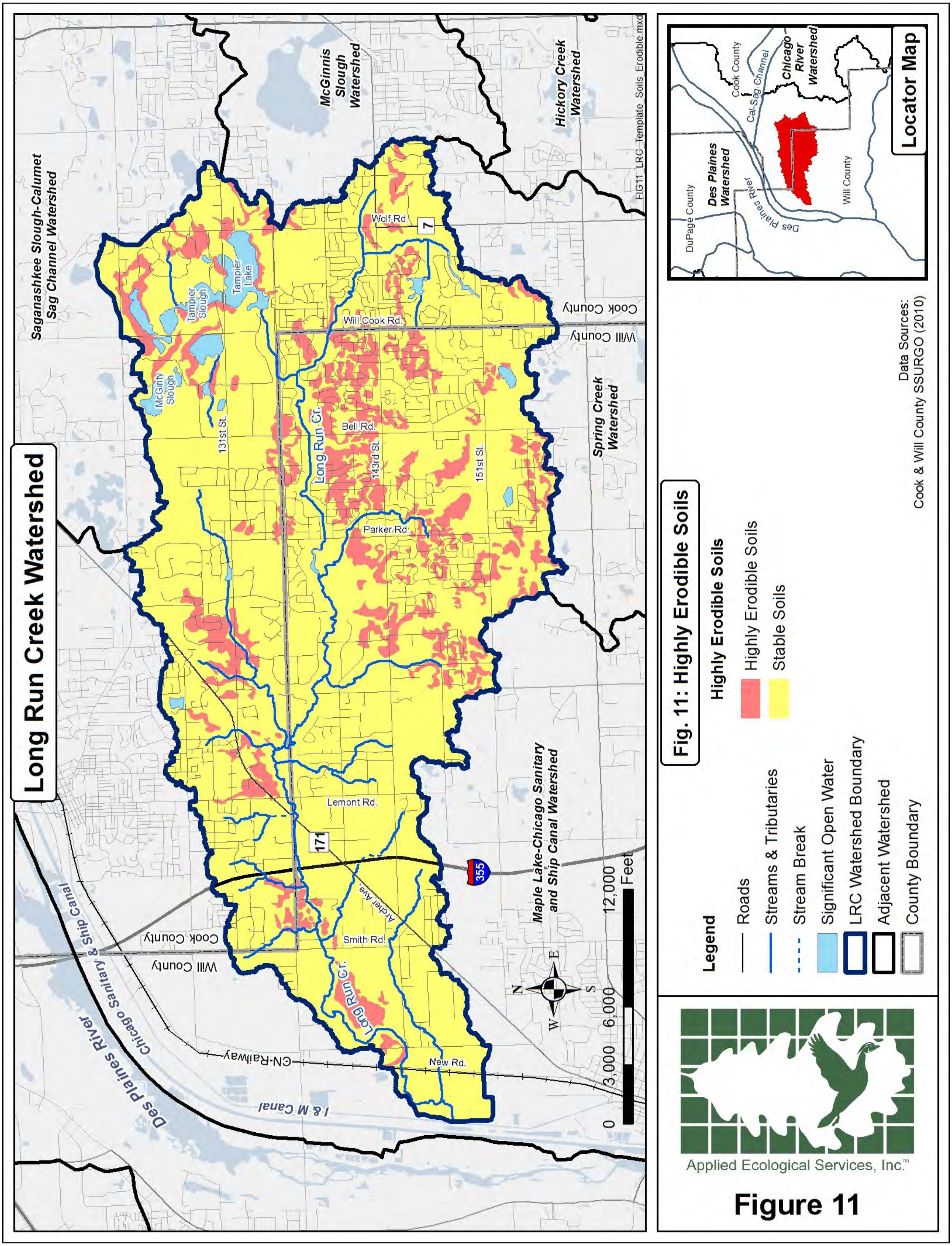
Historically there were approximately 3,312 acres of wetlands in the watershed. Approximately 12,967 acres are not hydric and the remaining 435 acres have unknown classification because they have been heavily disturbed by human land practices. According to existing wetland inventories, 1,191 acres or 36% of the pre-European settlement wetlands remain. The location of hydric soils in the watershed is depicted on Figure 10. Existing wetlands and wetland restoration opportunities are discussed in detail in Section 3.13.

Soil Erodibility

Soil erosion is the process whereby soil is removed from its original location by flowing water, wave action, wind, and other factors. Sedimentation is the process that deposits eroded soils on other ground surfaces or in bodies of water such as streams and lakes. Soil erosion and sedimentation reduces water quality by increasing total suspended solids (TSS) in the water column and by carrying attached pollutants such as phosphorus, nitrogen, and hydrocarbons. When soils settle in streams and lakes they often blanket rock, cobble, and sandy substrates needed by fish and aquatic macroinvertebrates for habitat, food, and reproduction. Sedimentation is a problem in several stream reaches in the watershed (see Section 3.13).

A highly erodible soils map was created by selecting soils with particular attributes such as soil type and the percent slope on which a soil is located (Figure 11). It is important to know the location of highly erodible soils because these areas have the highest potential to degrade water quality during farm tillage and development. Based on mapping, 2,305 acres or 14% of the soils in the watershed are potentially highly erodible. Fortunately, a good portion of these soils are located in upland areas that are currently stabilized by existing land uses/cover. But others are located on row crop farmland in the south and far west portions of the watershed where erosion following annual tilling is a possibility.


Long Run Creek Watershed
Fig. 10: Hydric Soils
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Hydric Soil Rating
Hydric Soil
Partially Hydric Soil
Not Hydric
Unknown/Not Available
Data Sources:
Cook & Will County SSURGO (2010)
Locator Map
Applied Ecological Services, Inc.™
Figure 10
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Tampier Slough
Tampier Lake
McGinty Slough
Long Run Cr.
131st St.
143rd St.
151st St.
Wolf Rd.
Will Cook Rd.
Bell Rd.
Parker Rd.
Lemont Rd.
Smith Rd.
Archer Ave.
New Rd.
Cook County
Will County
0 3,000 6,000 12,000 Feet
FIG10_LRC_Template_Soils_Hydric.mxd



Long Run Creek Watershed
Fig. 11: Highly Erodible Soils
Highly Erodible Soils
Highly Erodible Soils
Stable Soils
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Data Sources:
Cook & Will County SSURGO (2010)
Locator Map
DuPage County
Des Plaines Watershed
Cook County
Cal-Sag Channel
Chicago River Watershed
Will County
Des Plaines River
Applied Ecological Services, Inc.™
Figure 11
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Tampier Lake
Tampier Slough
McGinty Slough
Long Run Cr.
Wolf Rd.
Will Cook Rd.
Bell Rd.
Parker Rd.
Lemont Rd.
Smith Rd.
New Rd.
Archer Ave.
131st St.
143rd St.
151st St.
Cook County
Will County
7
171
355
0
3,000
6,000
12,000
Feet
N
S
E
W
FIG11_LRC_Template_Soils_Erodible.mxd

Hydrologic Soil Groups

Soils also exhibit different infiltration capabilities and have been classified to fit what are known as "Hydrologic Soil Groups" (HSGs). HSGs are based on a soil's infiltration and transmission (permeability) rates and are used by engineers and planners to estimate stormwater runoff potential. Knowing how a soil will hold water ultimately affects the type and location of recommended infiltration Management Measures such as wetland restorations and detention basins. More important, however, is the link between hydrologic soil groups and groundwater recharge areas. Groundwater recharge is discussed in detail in Section 3.14.

HSG's are classified into four primary categories; A, B, C, and D, and three dual classes, A/D, B/D, and C/D. Figure 12 depicts the location of each HSG in the watershed. The HSG categories and their corresponding soil texture, drainage description, runoff potential, infiltration rate, and transmission rate are shown in Table 3 while Table 4 summarizes the acreage and percent of each HSG. Group B soils are dominant throughout the watershed at about 48% coverage and are found along the main stem of Long Run Creek. Group C and C/D soils also make up a significant portion of the watershed at around 40% combined.

Table 3. Hydrologic Soil Groups and their corresponding attributes.

HSG	Soil Texture	Drainage Description	Runoff Potential	Infiltration Rate	Transmission Rate
A	Sand, Loamy Sand, or Sandy Loam	Well to Excessively Drained	Low	High	High
B	Silt Loam or Loam	Moderately Well to Well Drained	Moderate	Moderate	Moderate
C	Sandy Clay Loam	Somewhat Poorly Drained	High	Low	Low
D	Clay Loam, Silty Clay Loam, Sandy Clay Loam, Silty Clay, or Clay	Poorly Drained	High	Very Low	Very Low

Table 4. Hydrologic Soil Groups including acreage and percent of watershed.

Hydrologic Soil Group	Area (acres)	% of Watershed
A	1.8	<1
A/D	780.3	4.7
B	8,006.2	47.9
B/D	1,460.9	8.7
C	4,819.1	28.8
C/D	1,548.7	9.3
D	37.7	0.2
Unclassified	59.0	0.4
Totals	**16,714**	**100%**

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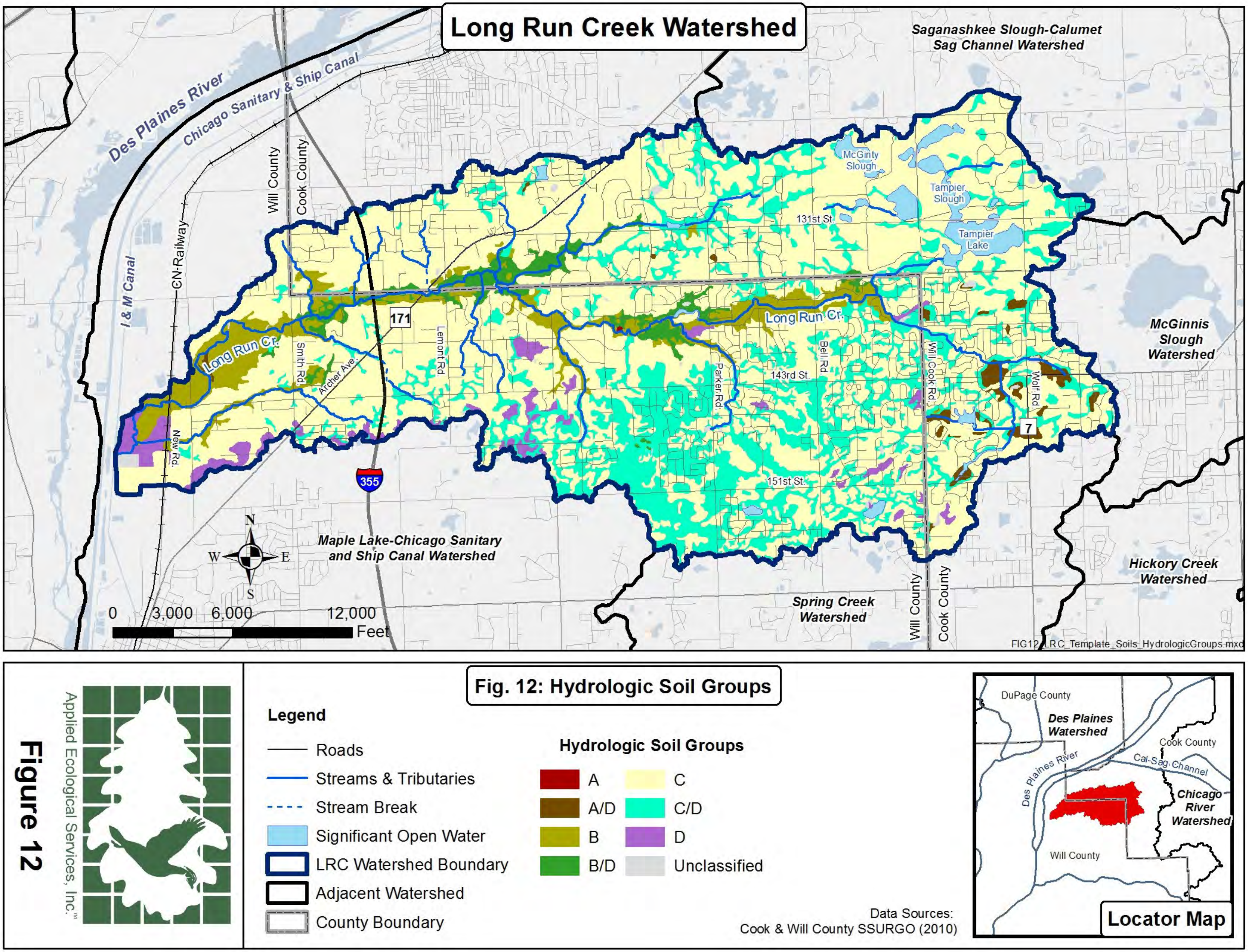
Long Run Creek Watershed
Saganashkee Slough-Calumet Sag Channel Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Will County
Cook County
McGinty Slough
Tampier Slough
Tampier Lake
131st St.
143rd St.
151st St.
Long Run Cr.
Smith Rd.
Archer Ave.
Lemont Rd.
Parker Rd.
Bell Rd.
Will Cook Rd.
Wolf Rd.
New Rd.
171
7
355
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
N
S
E
W
0
3,000
6,000
12,000
Feet
FIG12_LRC_Template_Soils_HydrologicGroups.mxd
Figure 12
Applied Ecological Services, Inc.™
Fig. 12: Hydrologic Soil Groups
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Hydrologic Soil Groups
A
A/D
B
B/D
C
C/D
D
Unclassified
Data Sources:
Cook & Will County SSURGO (2010)
DuPage County
Des Plaines Watershed
Cook County
Des Plaines River
Cal-Sag Channel
Chicago River Watershed
Will County
Locator Map

3.5 JURISDICTIONS, ROLES, & PROTECTIONS

Long Run Creek watershed is located in two counties, portions of six townships, and five municipalities (Table 5, Figure 13). Most of the northern portion of the watershed (7,556; 45%) is located in Cook County while the remaining 9,158 acres (55% of the watershed) in the southern and far eastern portions of the watershed are located in Will County. Of the five municipalities in the watershed, Homer Glen is the largest (6,578 acres; 39%) followed by Lemont (1,364 acres; 8%) and Orland Park (1,276; 8%). Lockport and Palos Park account for 817 acres or 5% of the watershed. The largest Unincorporated areas are found in Lemont Township (2,205 acres; 13%) and Lockport Township (1,305 acres; 6%). In addition, conservation areas at John J. Duffy Preserve and Long Run Seep account for another 1,702 acres or 10% of the watershed. These areas are owned and managed by the Forest Preserve District of Cook County (FPDCC) and Illinois Nature Preserves Commission (INPC), respectively.

Table 5. County, township, unincorporated, and municipal jurisdictions.

Jurisdiction	Area (acres)	% of Watershed
County	**16,714**	**100**
Cook	7,556	45
Will	9,158	55
Township	**16,714**	**100**
Du Page Township	96	<1
Homer Township	7,757	46
Lemont Township	4,391	26
Lockport Township	1,305	8
Orland Township	1,896	11
Palos Township	1,269	8
Unincorporated Areas	**5,073**	**30**
Unincorporated Du Page Twp.	92	1
Unincorporated Homer Twp.	971	6
Unincorporated Lemont Twp.	2,205	13
Unincorporated Lockport Twp.	1,017	6
Unincorporated Orland Twp.	625	4
Unincorporated Palos Twp.	163	1
Municipalities	**10,034**	**60**
Homer Glen	6,578	39
Lemont	1,364	8
Lockport	507	3
Orland Park	1,276	8
Palos Park	310	2
Conservation Areas	**1,702**	**10**
John J. Duffy Preserve	1,613	10
Long Run Seep Nature Preserve	89	<1

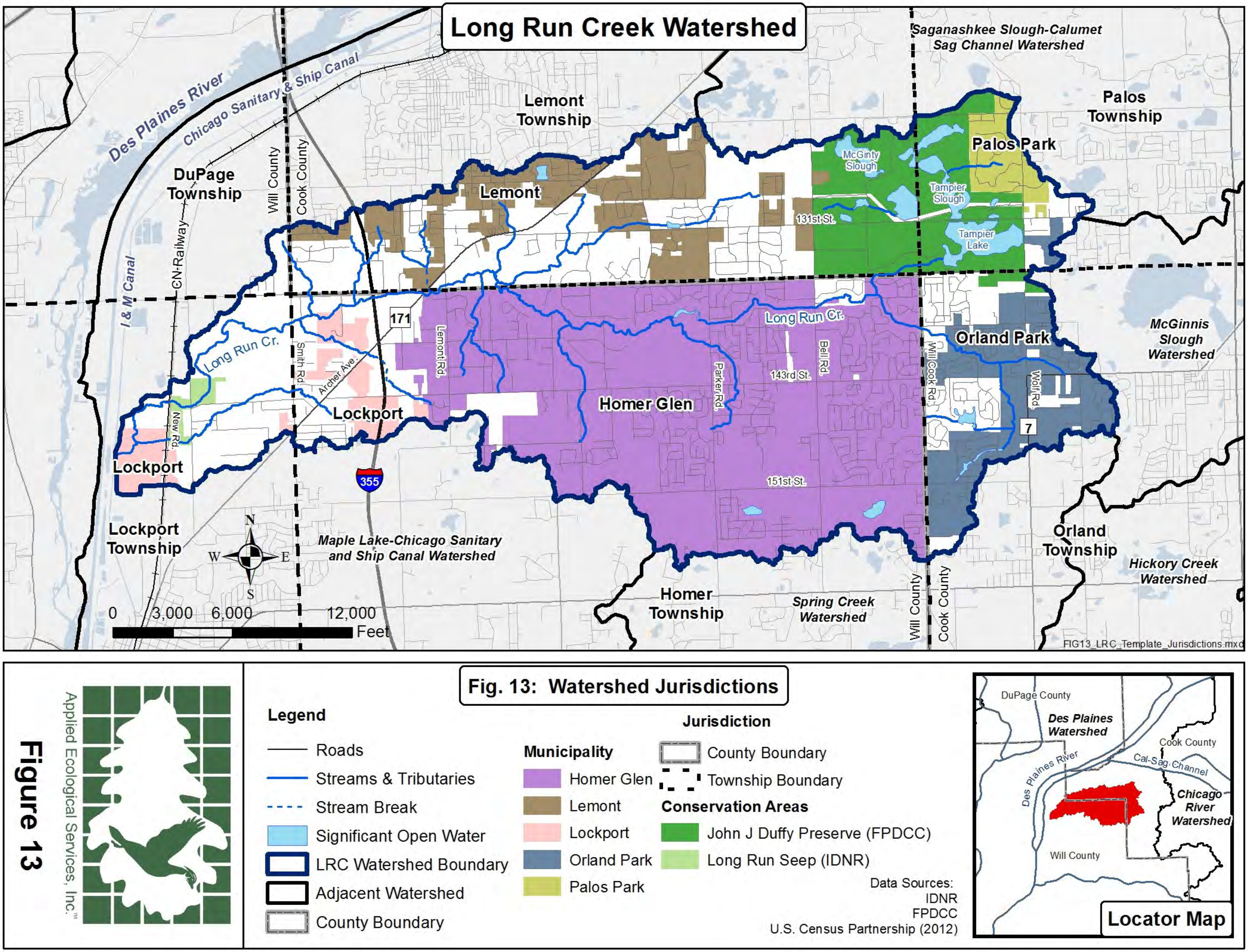

Fig. 13: Watershed Jurisdictions

Figure 13

Jurisdictional Roles and Protections

Many types of natural resources throughout the United States are protected to some degree under federal, state, and/or local law. In the Chicagoland region, the U.S. Army Corps of Engineers (USACE) and surrounding counties regulate wetlands through Section 404 of the Clean Water Act and county Stormwater Ordinances respectively. The U.S. Fish and Wildlife Service (USFWS),

Illinois Department of Natural Resources (IDNR), Illinois Nature Preserves Commission (INPC), and Forest Preserve Districts protect natural areas and threatened and endangered species. Local municipalities also have ordinances that address other natural resource issues. The Illinois EPA Bureau of Water regulates wastewater and stormwater discharges to streams and lakes. Watershed protection in Cook and Will Counties is primarily the responsibility of county and municipal level government.

Land development affecting water resources (rivers, streams, lakes, wetlands, and floodplains) is regulated by the USACE when "Waters of the U.S." are involved. These types of waters include any wetland or stream/river that is hydrologically connected to navigable waters. The USACE primarily regulates filling activities and requires buffers or wetland mitigation for developments that impact jurisdictional wetlands.

Land development in Will County is regulated by the Will County Stormwater Management Ordinance (last revised March 25, 2010). In October 2013 the Metropolitan Water Reclamation District of Greater Chicago (MWRD) adopted the Cook County Watershed Management Ordinance. Ordinances are enforced by county agencies or by "Certified Communities" or "Authorized Municipalities." Homer Glen, Lockport, and Orland Park are all "Certified Communities" in the Will County portion of the watershed. Lemont, Palos Park, and Orland Park have the option to become "Authorized Municipalities" and enforce the Cook County Watershed Management Ordinance.

Land development located on unincorporated land within Cook and Will Counties is ultimately regulated by the Cook County Department of Building and Zoning and Will County Land Use Department respectively. Unincorporated areas include 92 acres in Du Page Township, 971 acres in Homer Township, 2,205 acres in Lemont Township, 1,017 acres in Lockport Township, 625 acres in Orland Township, and 163 acres in Palos Township. Development in these townships must be reviewed by the respective agencies listed above.

Other governments and private entities with watershed jurisdictional or technical advisory roles include the USFWS and IDNR, County Board Districts, and the Will/South Cook Soil and Water Conservation District (SWCD). The USFWS and IDNR play a critical role in natural resource protection, particularly for rare or high quality habitat and threatened and endangered species. They protect and manage land that often contains wetlands, lakes, ponds, and streams. County Boards oversee decisions made by respective county governments and therefore have the power to override or alter policies and regulations. The SWCDs provide technical assistance to the public and other regulatory agencies. Although the SWCDs have no regulatory authority, they influence watershed protection through soil and sediment control and pre and post-development site inspections.

Municipalities in the watershed may or may not provide additional watershed protection above and beyond existing watershed ordinances under local Village Codes. Municipal codes present opportunities for outlining and requiring recommendations in this plan such as conservation development, Special Service Area (SSA) or watershed protection fees, and native landscaping.

NPDES Phase II Stormwater Permit Program

The Illinois EPA Bureau of Water regulates wastewater and stormwater discharges to streams and lakes by setting effluent limits, and monitoring/reporting on results. The Bureau oversees the National Pollutant Discharge Elimination System (NPDES) program. The NPDES program was initiated under the federal Clean Water Act to reduce pollutants to the nation's waters. This program requires permits for discharge of: 1) treated municipal effluent; 2) treated industrial effluent; and 3) stormwater from municipal separate stormsewer systems (MS4's) and construction sites.

The Illinois EPA's NPDES Phase I Stormwater Program began in 1990 and applies only to large and medium-sized municipal separate stormsewer systems (MS4's), several industrial categories, and construction sites hydrologically disturbing 5 acres of land or more. The NPDES Phase II program began in 2003 and differs from Phase I by including additional MS4 categories, additional industrial

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coverage, and construction sites hydrologically disturbing greater than 1 acre of land. More detailed descriptions can be viewed on the Illinois EPA's web site.

Under NPDES Phase II, all municipalities with small, medium, and large MS4's are required to complete a series of Best Management Practices (BMPs) and measure goals for six minimum control measures:

1. Public education and outreach
2. Public participation and involvement
3. Illicit discharge detention and elimination
4. Construction site runoff control
5. Post-construction runoff control
6. Pollution prevention and good housekeeping

The Phase II Program also covers all construction sites over 1 acre in size. For these sites the developer or owner must comply with all requirements such as completing and submitting a Notice of Intent (NOI) before construction occurs, developing a Stormwater Pollution Prevention Plan (SWPPP) that shows how the site will be protected to control erosion and sedimentation, completing final stabilization of the site, and filing a Notice of Termination (NOT) after the construction site is stabilized.

All of the municipalities and townships in Long Run Creek watershed have been issued NPDES permits by Illinois EPA for stormwater discharges to MS4s. There are also two NPDES permitted wastewater treatment plant (WWTP) discharges to Long Run Creek. Chickasaw Hills WWTP discharges under NPDES Permit No. IL0031984. Derby Meadows WWTP discharges under NPDES Permit No. IL0045993.

3.6 EXISTING POLICIES & ORDINANCE REVIEW

Protection of natural resources and green infrastructure during future urban growth will be important for the future health of Long Run Creek watershed. To assess how future growth might further impact the watershed, an assessment of local municipal ordinances was performed to determine how development currently occurs in each municipality. In this way, potential improvements to local ordinances can be identified. As part of the assessment, municipal governments were asked to compare their local ordinances against model policies outlined by the Center for Watershed Protection (CWP) in a publication entitled "*Better Site Design: A Handbook for Changing Development Rules in Your Community*. (CWP, 1998)"

Applied Ecological Services, Inc. (AES) began the assessment process by reviewing municipal ordinances for Homer Glen, Lemont, Lockport, Orland Park, and Palos Park. The results of the initial review were then sent to each municipality for review and update if needed. Lemont, Homer Glen, and Orland Park provided updates that were then added to AES's original review. The results of the review for each municipality can be found in Appendix C.

CWP's recommended ordinance review process involves assessments of three general categories including "Residential Streets & Parking Lots," "Lot Development," and "Conservation of Natural Areas." Various questions with point totals are examined under each category. The maximum score is 100. CWP also provides general rules based on scores. Scores between 60 and 80 suggest that it may be advisable to reform local development ordinances. Scores less than 60 generally mean that local ordinances are not environmentally friendly and serious reform may be needed. Municipal scores ranged from 7 to 50 with an average score of 29 (Figure 14).

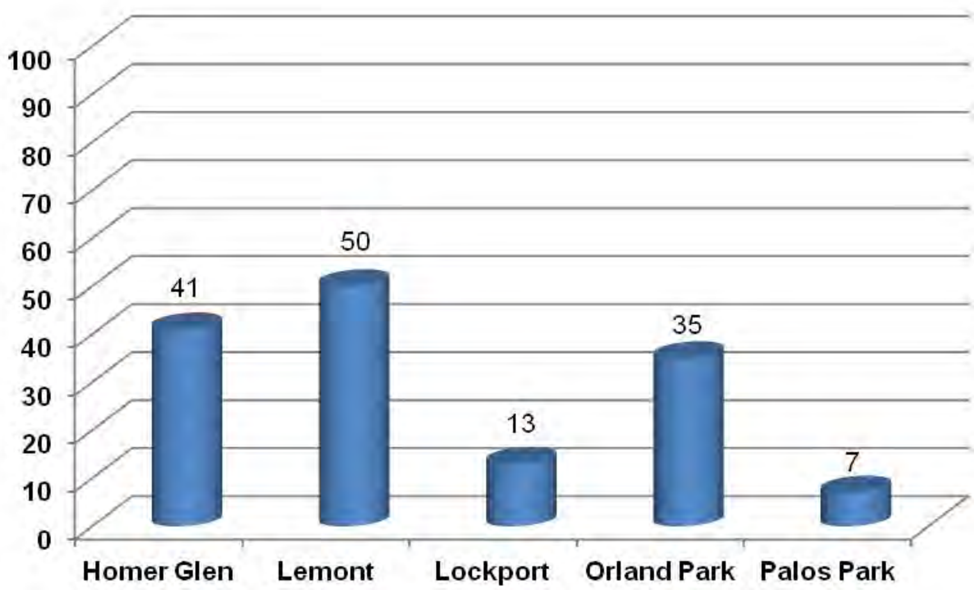


Figure 14. Center for Watershed Protection ordinance review results for local municipalities.

Lemont scored the highest with 50 points followed by Homer Glen with 41 and Orland Park with 35 points. Although all scores are low, it should be noted that this assessment is meant to be a tool to local communities to help guide development of future ordinances. Various policy recommendations are included in the Action Plan section of the report to address general ordinance deficiencies.

3.7 DEMOGRAPHICS

The Chicago Metropolitan Agency for Planning (CMAP) provides a 2040 regional framework plan for the greater Chicagoland area to plan more effectively with growth forecasts. CMAP's 2010 to 2040 forecasts of population, households, and employment was used to project how these attributes will impact Long Run Creek watershed (Table 6). CMAP develops these forecasts by first generating region-wide estimates for population, households, and employment then meets with local governments to determine future land development patterns within each jurisdiction. The data is generated by township, range, and quarter section and is depicted on Figures 15 and 16. It is also important to note that much of CMAP's work was done prior to the economic downturn beginning in 2006/2007 and may not accurately reflect future projections. Note: Applied Ecological Services, Inc. (AES) used GIS to overlay the Long Run Creek watershed boundary onto CMAP's quarter section data. If any part of a quarter section fell inside the watershed boundary, the statistics for the entire quarter section were included. It is important to note that this methodology makes best use of the data limitations but likely increases estimates, especially for municipalities such as Lemont that have urbanized areas along the north portion of the watershed boundary.

The combined population of the watershed is expected to increase from 42,344 in 2010 to 62,403 by 2040, a 47.4% increase. Household change follows this trend and is predicted to increase from 13,156 to 19,684 (49.6% increase). The highest population and household increase is expected in areas that are currently agriculture along Bell Road and 151st Street within the Village of Homer Glen (Figure 15). Most employment change is also predicted along Bell Road and 151st Street in areas with predicted household/population change (Figure 16).

Socioeconomic Status

The communities within the watershed can best be described as actively growing and affluent. These "satellite" suburbs of the Chicago region offer excellent amenities such as parks, shopping, conservation areas, quality schools and libraries, safe neighborhoods, and are in close proximity to commuter rail and interstate access. 2010 U.S. Census Bureau information for the Villages of Homer Glen, Lemont, and Orland Park, the largest communities in the watershed, were averaged and used as a basis for profiling the socioeconomic status of Long Run Creek watershed. To summarize, the area is comprised of a mostly white population (>92%) with a median household income over $87,000. In addition, approximately 90% of housing units are owner occupied, about 38% of residents hold a college bachelor's degree or higher, and over 70% of the employed population work in white collar/professional jobs.

Table 6. CMAP 2010 data and 2040 forecast data.

Data Category	2010	2040	Change (2010-2040)	Percent Change
Population	42,344	62,403	20,059	+47.4
Household	13,156	19,684	6,528	+49.6
Employment	9,338	15,045	5,706	+61.1

Source: Chicago Metropolitan Agency for Planning 2040 Forecasts

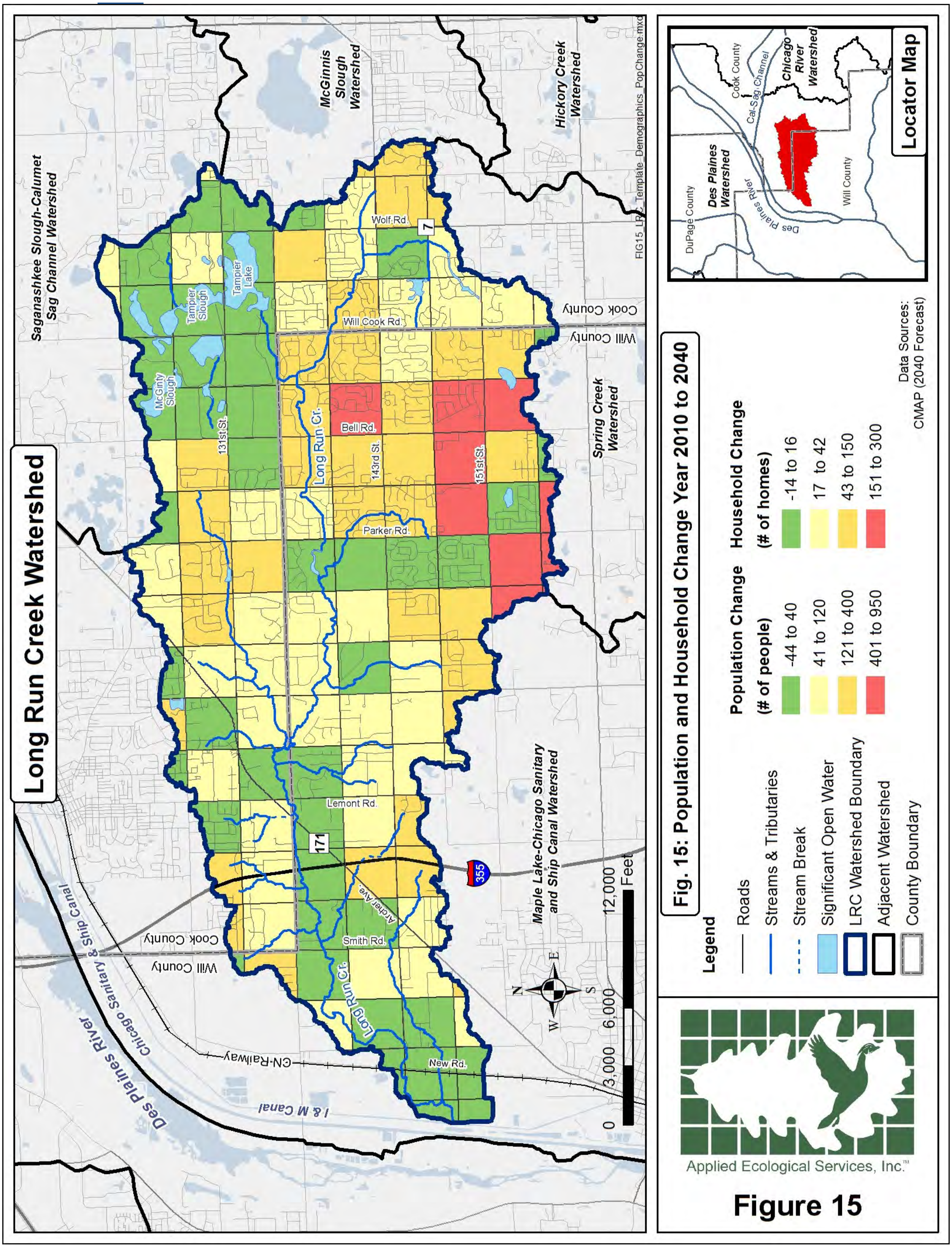


Fig. 15: Population and Household Change Year 2010 to 2040

Figure 15

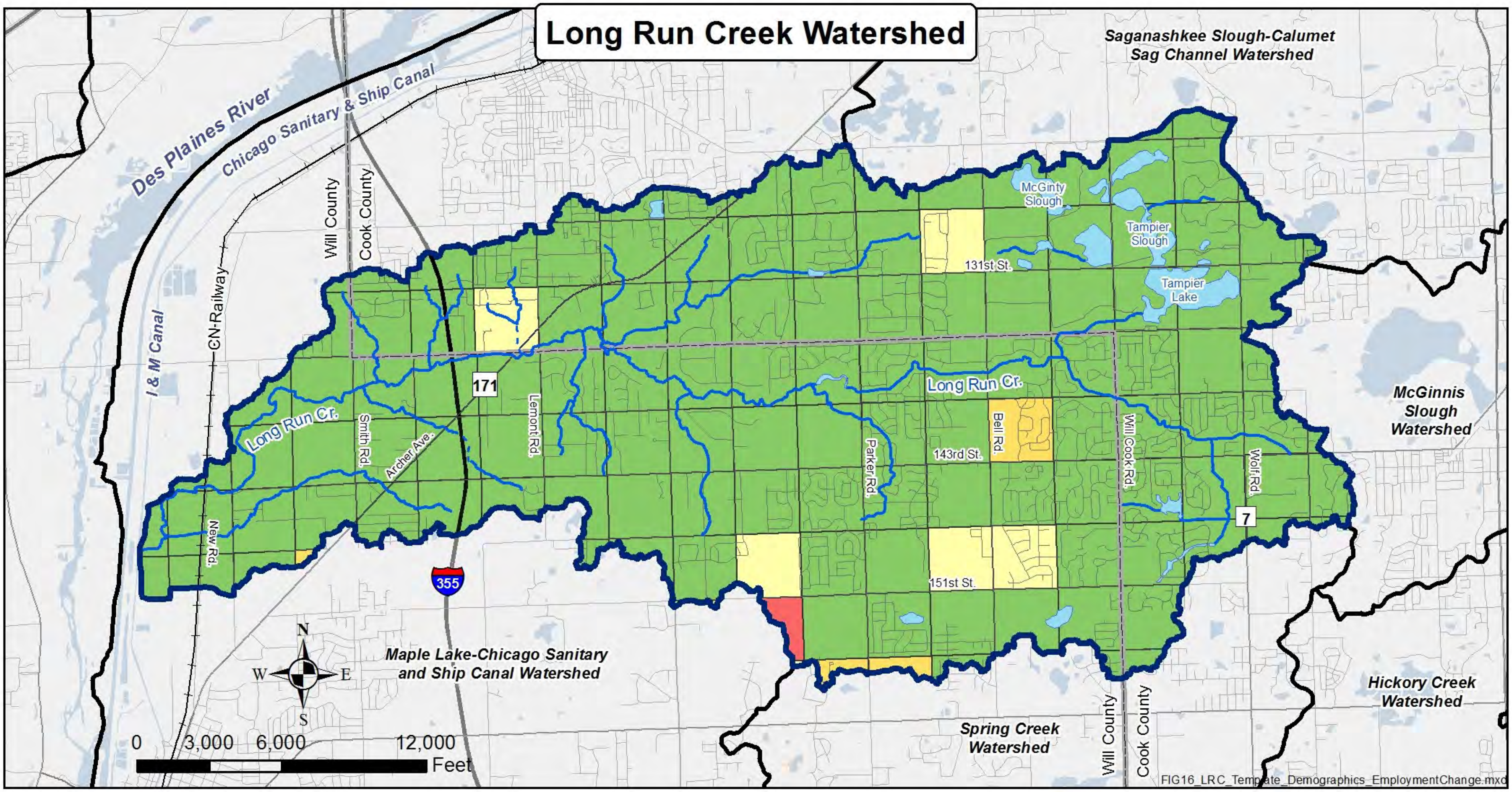
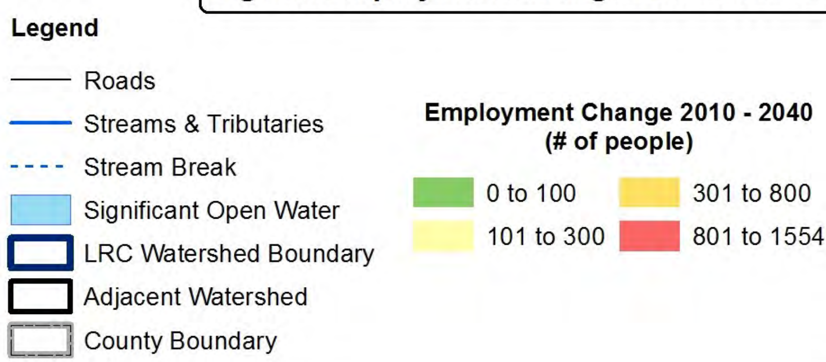


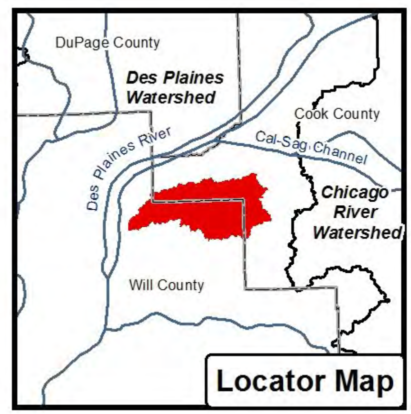
Figure 16

Applied Ecological Services, Inc.™

Fig. 16: Employment Change Year 2010 to 2040



Data Sources:
CMAP (2040 Forecast)



3.8 EXISTING & FUTURE LAND USE/LAND COVER

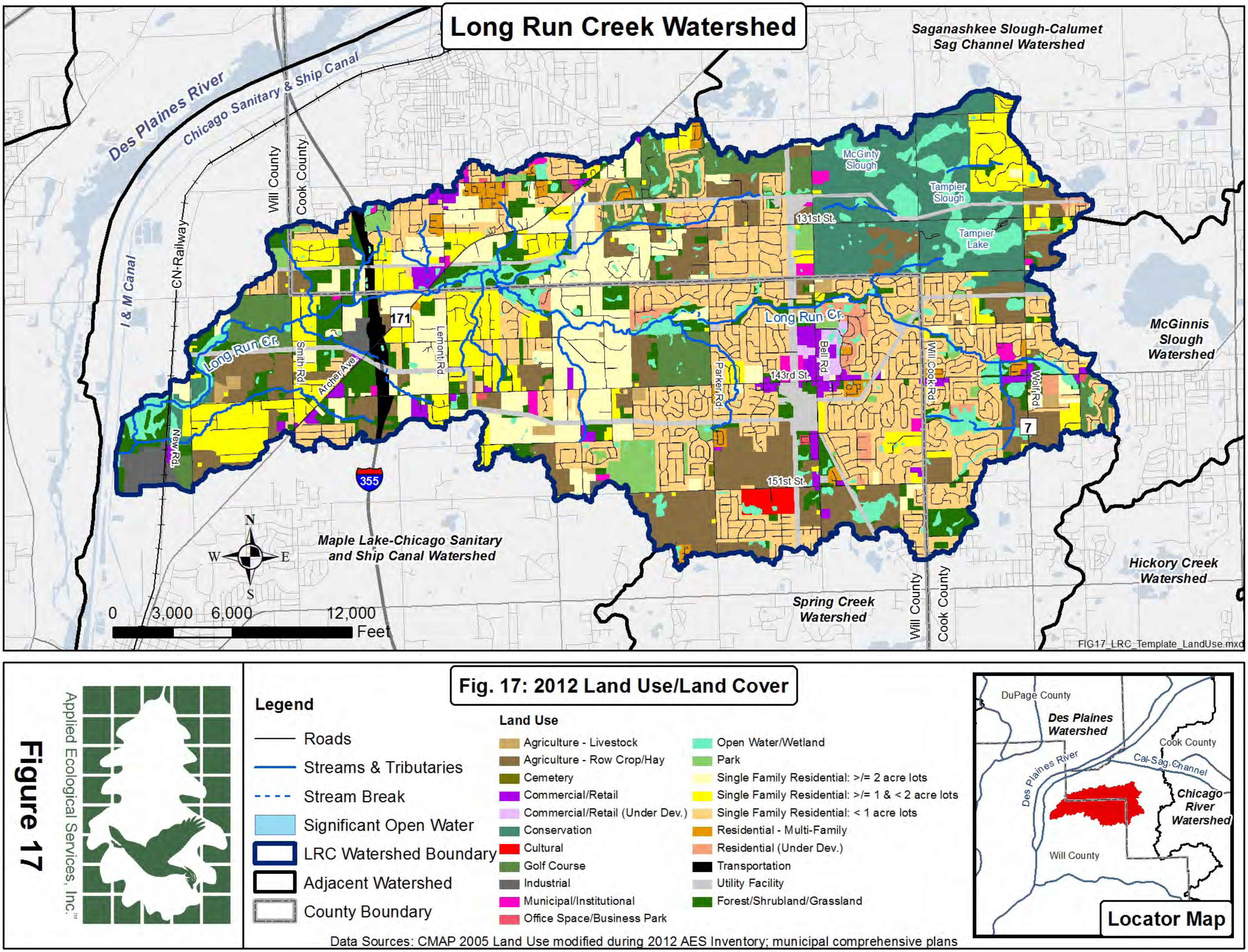
2012 Land Use/Land Cover

Highly accurate land use/land cover data was produced for Long Run Creek watershed using several sources of data. First, Chicago Metropolitan Agency for Planning (CMAP) 2005 land use data was used as a base layer. Next, the most recent land use/ land cover data from the municipalities in the watershed was obtained from comprehensive plans and adjustments were made to CMAP's data where appropriate. 2012 USDA aerial photography of the watershed was also overlaid on existing land use data in GIS so that additional discrepancies could be corrected. Finally, several corrections were made to land use based on field notes taken by Applied Ecological Services, Inc (AES) during the fall of 2012 watershed resource inventory. The 2012 land use/land cover data and map for Long Run Creek watershed is included in Table 7 and depicted on Figure 17. Land cover classifications are defined in the "Noteworthy-Land Use/Land Cover Definitions" side bar below.

Residential areas are the most abundant land use in the watershed at 7,231 acres or 44.4%. Other common land uses include agricultural (2,010.9; 12%), private forest/ shubland/grassland (1,236.3 acres; 7.4%), public conservation areas (1,210.7 acres; 7.2%), open water/wetland (1,160.5 acres; 6.9%), transportation (905.3 acres; 5.4%), golf courses (748.6 acres; 4.5%), and utility facilities (703 acres; 4.2%).

Table 7. 2012 land use/land cover classifications and acreage.

Land Use	Area (acres)	% of Watershed
Agricultural-Livestock	100.8	0.6
Agriculture-Row Crop/Hay	2,010.9	12.0
Cemetery	3.7	<0.5
Commercial/Retail	313.1	1.9
Commercial/Retail (under dev.)	52.8	<0.5
Conservation (public)	1,210.7	7.2
Cultural	67.1	<0.5
Golf Course	748.6	4.5
Industrial	158.9	0.9
Municipal/Institutional	124.7	0.7
Office Space/Business Park	17.9	<0.5
Open Water/Wetland	1,160.5	6.9
Park	275.4	1.6
Single Family Residential (2 acre lots)	1,878.0	11.2
Single Family Residential (1 acre & < 2 acre lots)	1,578.1	9.4
Single Family Residential (< 1 acre lots)	3,774.9	22.6
Residential-Multifamily	195.9	1.2
Residential (under dev.)	196.5	1.2
Transportation	905.3	5.4
Utility Facility	703.0	4.2
Forest/Shrubland/Grassland (private)	1,236.3	7.4
Total	**16,714.0**	**100**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McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
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Fig. 17: 2012 Land Use/Land Cover
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Agriculture - Row Crop/Hay
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Commercial/Retail (Under Dev.)
Conservation
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Golf Course
Industrial
Municipal/Institutional
Office Space/Business Park
Open Water/Wetland
Park
Single Family Residential: >/= 2 acre lots
Single Family Residential: >/= 1 & < 2 acre lots
Single Family Residential: < 1 acre lots
Residential - Multi-Family
Residential (Under Dev.)
Transportation
Utility Facility
Forest/Shrubland/Grassland
Data Sources: CMAP 2005 Land Use modified during 2012 AES Inventory; municipal comprehensive plans
DuPage County
Des Plaines Watershed
Cook County
Cal-Sag Channel
Des Plaines River
Chicago River Watershed
Will County
Locator Map
Applied Ecological Services, Inc.™

Figure 17

Agricultural land dominated the watershed from the late 1800s to the 1990s. Agricultural row crops and hay operations are reduced to 2,110.9 acres or 12% of the watershed in 2012. Agricultural areas are spread out with the largest tracts remaining in the south central portion of the watershed. Several of these areas are slated for future residential and commercial development.

Most natural areas can be found in forest/shrubland/grassland, open water/wetlands, and conservation land uses. Forest/shrubland/grassland areas are generally private and are scattered throughout the watershed while conservation areas are public and include Cook County Forest Preserve District's (CCFPD's) John J. Duffy Preserve in the northeast corner of the watershed and the Illinois Nature Preserve Commission's (INPC's) Long Run Seep in the far west portion of the watershed. Many of the open water/wetland features are located in and around natural areas with the largest wetland complexes found in the corridor along Long Run Creek and the largest lake/slough complexes found within John J. Duffy Preserve.

The roads and interstates making up the transportation network are abundant. Interstate 355, in the western half of the watershed, is a major north-south interstate connecting many western Chicago suburbs. Other major two lane roads include east-west roads 127th Street, 131st Street, 143rd Street, and 151st Street. Major north-south two land roads are New Road, Smith Road, Lemont Road, Parker Road, Bell Road, Will-Cook Road, and Wolf Road. Many secondary two lane roads also traverse the watershed within residential areas.


Utility easement off High Road

The area in and around Long Run Creek watershed is dense with golf courses. Until December 2013, there were eight golf courses found in the watershed: 1) Lockport Golf and Recreation, 2) Big Run Golf Club, 3) Ruffled Feathers Golf Course, 4) Glen Eagles Country Club, 5) Crystal Tree Golf & Country Club, 6) Old Oak Country Club, 7) Mid Iron Golf Club, and) Woodbine Golf Course. Woodbine Golf Course was purchased in December 2012 by Homer Glen and will become mostly park. The club house will become the Village Hall.

Unique to Long Run Creek watershed is a diverse system of Com Ed utility easements/corridors that stem from a main power plant located on the west side of Bell Road in the south central portion of the watershed. Utility corridors provide opportunities for trails and green infrastructure connections.

In addition, total open space land uses such as agricultural lands, conservation, golf courses, open water/wetlands, parks, utility easements, and forest/shrubland/grassland make up 7,446 acres or 44.5% of the watershed. Developed land uses account for the remaining 9,268 acres or 55.5% of the watershed.

Noteworthy-Land Use/Land Cover Definitions:

Agricultural: Land use that includes out-buildings and barns, row & field crops and fallow field farms and pasture, includes dairy and other livestock grazing. Also includes nurseries, greenhouses, orchards, tree farms, and sod farms.

Cemetery: Land use that includes burial grounds and associated chapels and mausoleums.

Commercial/Retail: Land use that includes shopping malls and their associated parking, single structure office/hotels and urban mix (retail trade like lumber yards, department stores, grocery stores, gas stations, restaurants, etc.).

Conservation: Open space in a mostly natural state that includes public land such as federal, state, county, or other conservation areas and nature preserves.

Cultural: Land use that includes museums, zoos, historic sites, amphitheaters, stadiums, race tracks, conference centers, fairgrounds, and amusement parks.

Golf Course: Public or private golf courses, country clubs and driving ranges; including associated buildings and parking.

Municipal/Institutional: Land use that includes medical facilities, educational facilities, government buildings, religious facilities, and others.

Industrial: Land use that includes industrial, warehousing and wholesale trade, such as mineral extraction, manufacturing and processing, associated parking areas, truck docks, etc.

Office Space/Business Park: Land use that includes office campuses, research parks, and business parks defined as non-manufacturing and characterized by large associated manicured landscape.

Open Water & Wetland: Open water and wetland areas including rivers, streams, canals, lakes, ponds, detention basins, reservoirs, lagoons/sloughs, marshes, wet prairie, meadows, bogs, etc.

Park: Recreational open space with greater than 50% manicured turf such as playgrounds and athletic fields.

Single Family Residential (≥ 2 acre lots): Land use that includes single family homes and farmhouses and immediate residential area around them with lot sizes greater than or equal to 2 acres and impervious cover less than 5%.

Single Family Residential (≥ 1 acre & < 2 acre lots): Land use that includes single family homes and farmhouses and immediate residential area around them with lot sizes greater than or equal to 1 acre but less than 2 acres and impervious cover around 15%.

Single Family Residential (< 1 acre lots): Land use that includes single family homes and farmhouses and immediate residential area around them with lot sizes less than 1 acre and impervious cover around 30%.

Residential-Multifamily: Land use that includes multifamily residences. These include duplex and townhouse units, apartment complexes, retirement complexes, mobile home parks, trailer courts, condominiums, and associated parking on lots less than 1/8 acre with impervious cover around 65%.

Transportation: Land use that includes railroads, rail rapid transit and associated stations, rail yards, linear transportation such as streets and highways, and airport transportation.

Upland Forest and Grassland: Natural land cover that includes private and public property that has not been developed for any human purpose.

Utility Facility: Land use that includes telephone, radio and television towers, dishes, gas, sewage pipeline, right-of-ways, waste water facilities, etc.

Future Land Use/Land Cover Predictions

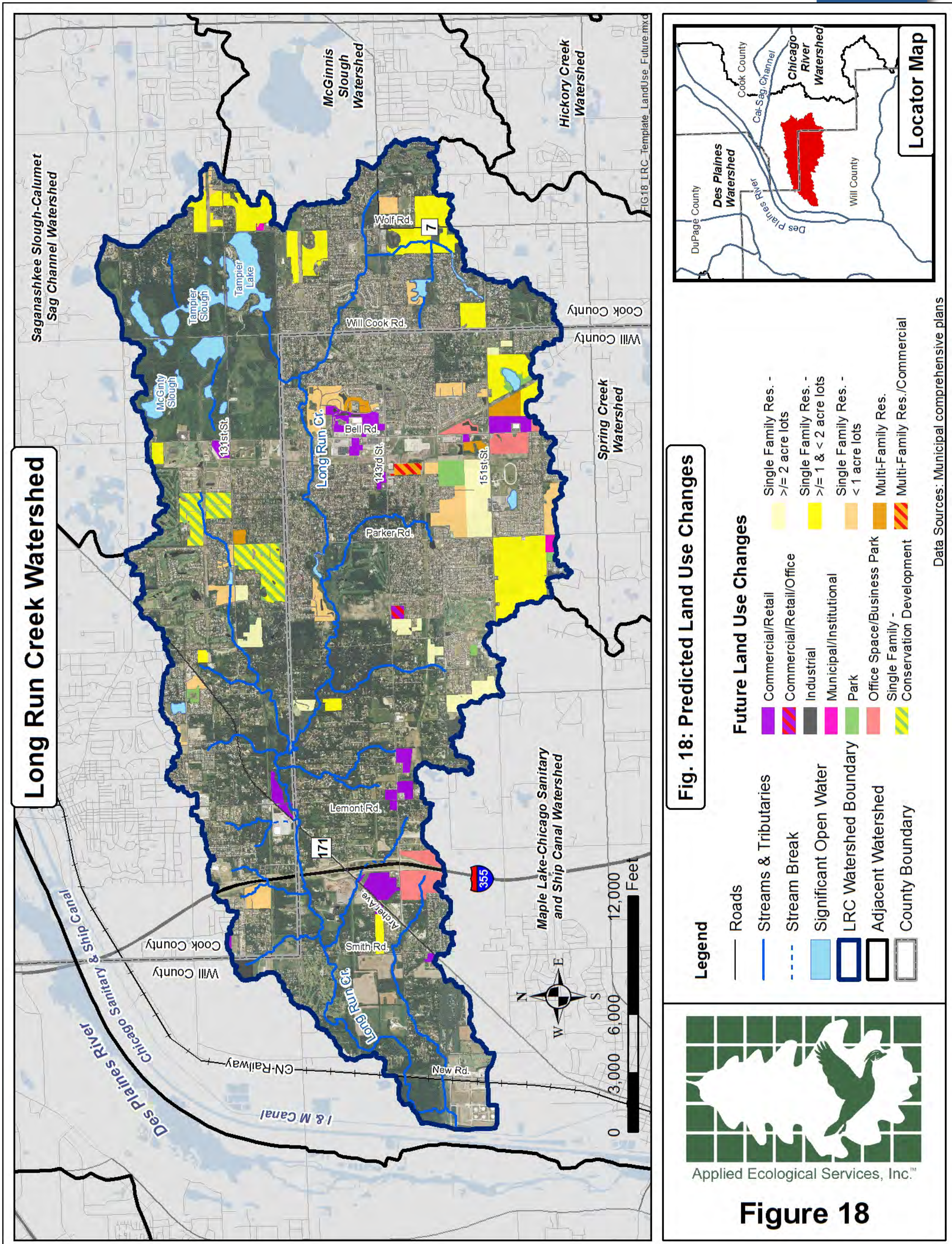
Information on predicted future land use/land cover for the watershed was obtained primarily from municipal comprehensive plans where available. Available data was analyzed and GIS used to map predicted land use/land cover changes. The results are summarized in Table 8 and Figure 18.

Table 8 compares existing land use/land cover acreage to predicted future land use/land cover acreage. The largest loss of a current land use/land cover is expected to occur on agricultural row crop/hay land where approximately 1,581.4 acres of the existing 2,010.9 acres (78.3% decrease) is expected to be converted to mostly residential and commercial/retail land uses. The majority of these changes are expected to occur in the eastern half of the watershed within the municipalities of Lemont, Orland Park, and Homer Glen. In addition, it is important to note that existing forest/shrubland/grassland is also expected to decrease significantly from 1,236.3 acres to 1,008.6 acres in the future, an 18.9% decrease. To summarize, about 1,944 acres of existing open space within agricultural lands, open water/wetland, and forest/shrubland/grassland is expected to be lost to development. However, it is also important to note that 80 acres of public parks are expected to be created, a 50% increase from existing acreage. Revamping of Woodbine Golf Course by Home Glen in the future will add another 100+ acres of park land.

Conversely, commercial/retail development and office space are predicted to increase by over 400 acres. But the most development change occurs where residential land uses will replace primarily farm land and account for nearly 1,600 additional acres in the future.

Table 8. Comparison between 2012 and predicted future land use/land cover statistics.

Land Use/Land Cover	Current Area (acres)	Current % of Watershed	Predicted Area (acres)	Predicted % of Watershed	Change (acres)	Percent Change
Agricultural-Livestock	100.8	0.6	91.1	0.5	-9.7	-16.7
Agriculture-Row Crop/Hay	2,010.9	12.0	429.5	2.6	-1,581.4	-78.3
Cemetery	3.7	<0.5	3.7	<0.5	0	0
Commercial/Retail	313.1	1.9	558.3	3.3	+245.2	+73.7
Commercial/Retail (under dev.)	52.8	<0.5	0	0	-52.8	-100.0
Conservation (public)	1,210.7	7.2	1210.7	7.2	0	0
Cultural	67.1	<0.5	67.1	<0.5	0	0
Golf Course	748.6	4.5	748.6	4.5	0	0
Industrial	158.9	0.9	182.1	1.1	+23.2	+22.2
Municipal/Institutional	124.7	0.7	138.7	0.8	+14.0	+14.3
Office Space/Business Park	17.9	<0.5	174.4	1.0	+156.5	+100.0
Open Water/Wetland	1,160.5	6.9	1,095.2	6.6	-65.3	-4.3
Park	275.4	1.6	355.0	2.1	+79.6	+50.0
Single Family Residential (≥ 2 acre lots)	1,878.0	11.2	1,136.1	12.8	+258.1	+14.3
Single Family Residential (≥ 1 & < 2 acre lots)	1,578.1	9.4	2,336.3	14.0	+758.2	+48.9
Single Family Residential (< 1 acre lots)	3,774.9	22.6	4,081.4	24.4	+306.5	+8.0
Residential-Multifamily	195.9	1.2	264.3	1.6	+68.4	+33.3
Residential (under dev.)	196.5	1.2	0	0	-196.5	-100.0
Transportation	905.3	5.4	905.3	5.4	0	0
Utility Facility	703.0	4.2	703.0	4.2	0	0
Forest/Shrubland/Grassland (private)	1,236.3	7.4	1,008.6	6.0	-227.7	-18.9



Long Run Creek Watershed
Fig. 18: Predicted Land Use Changes
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Future Land Use Changes
Commercial/Retail
Commercial/Retail/Office
Industrial
Municipal/Institutional
Park
Office Space/Business Park
Single Family - Conservation Development
Single Family Res. - >/= 2 acre lots
Single Family Res. - >/= 1 & < 2 acre lots
Single Family Res. - < 1 acre lots
Multi-Family Res.
Multi-Family Res./Commercial
Data Sources: Municipal comprehensive plans
Locator Map
DuPage County
Des Plaines Watershed
Des Plaines River
Cal-Sag Channel
Cook County
Chicago River Watershed
Will County
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Tampier Lake
Tampier Slough
McGinty Slough
Wolf Rd.
Will Cook Rd.
Bell Rd.
131st St.
143rd St.
151st St.
Parker Rd.
Long Run Cr.
Lemont Rd.
Archer Ave.
Smith Rd.
New Rd.
CN-Railway
I & M Canal
Chicago Sanitary & Ship Canal
Des Plaines River
Cook County
Will County
7
171
355
0 3,000 6,000 12,000 Feet
FIG18_LRC_Template_LandUse_Future.mxd
Applied Ecological Services, Inc.™
Figure 18

3.9 TRANSPORTATION NETWORK

Roads

There are approximately 286 miles of roads in the watershed. Two lane roads make up 280 miles and four lane roads make up the remaining 6 miles. Four lane roads include Interstate 355 and two sections of 143rd Street. Interstate 355 (Veterans Memorial Tollway) is the most highly used road in the watershed and connects to I-55, I-88, and I-290 north of the watershed and to I-80 south of the watershed (Figure 19). The portion of the interstate between I-55 and I-80 was recently constructed and opened in November 2007. The extension was delayed for over six years however due to the discovery of the federally endangered Hine's Emerald Dragonfly. The Tollway Authority was required to address Environmental Impact Statement (EIS) concerns and funded several habitat restoration projects in nearby preserves.

Several other major roads are worth mentioning. Major east-west roads include 127th Street, 131st Street, 135th Street, 143rd Street, and 151st Street. Major north-south roads include New Road, Smith Road, Lemont Road, Parker Road, Bell Road, Will-Cook Road, and Wolf Road.

Railroads

The Canadian National Railway (CN) purchased the Illinois Central (IC) line in 1998. The IC line ran thru Lemont and served various industries. CN then purchased the Elgin, Joliet & Eastern Railway Company (EJ&E) in 2009. The railway runs north-south along New Road in the far west portion of the watershed (Figure 19). The CN system skirts the perimeter of the Chicago area, running from Waukegan, Illinois to Gary, Indiana. Along the way it crosses or connects with every other railroad going into Chicago. This rail line came into existence in December 1888 and has been used primarily to transport steel products to the Chicago land area. Since its purchase in 2009, the CN has seen increased freight traffic from across the US, allowing railway traffic to bypass the congested rail system of the City of Chicago.

Trails/Bike Paths

Available data on the location of existing trails and bike paths in the watershed reveals a relatively broken network (Figure 19). Homer Glen and Cook County Forest Preserve District (CCFPD) have done the best job of creating and connecting trail networks but many opportunities remain, especially along existing Com Ed utility easement right-of-ways that span the entire watershed. According to most municipal comprehensive plan transportation maps, most of the municipalities in the watershed show proposed trails and bike paths that traverse and connect much of the watershed however most of these trail systems remain in the planning phase. A good system of trails would give the community a unique opportunity to interact with nature and see the benefits of green infrastructure planning.

Horse/walking trail in John J. Duffy Preserve

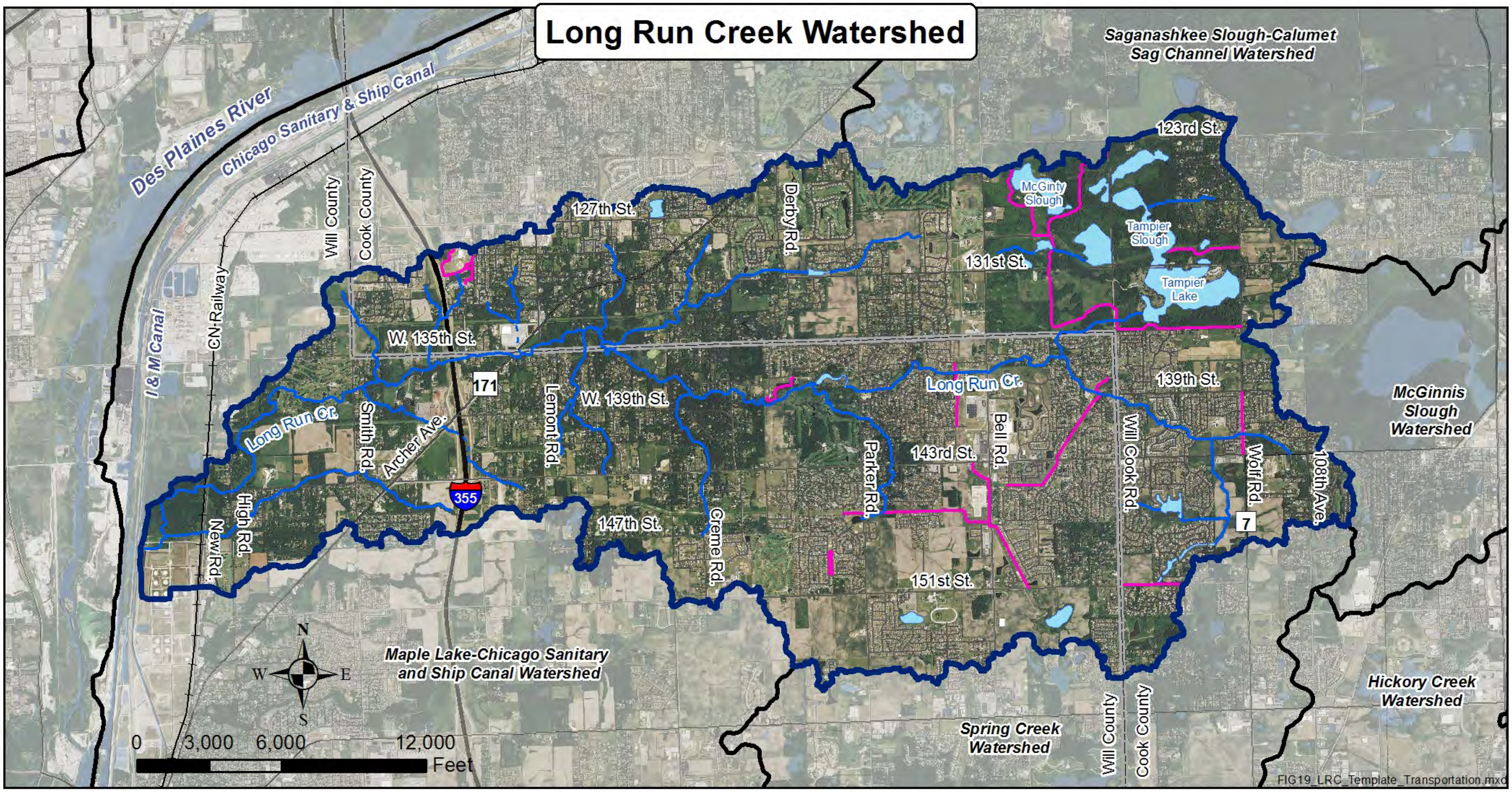
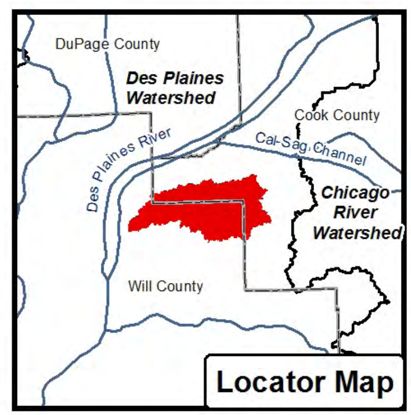


Fig. 19: Existing Transportation Network

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary
- Existing Walking/Bike Paths

Data Sources:
Municipal comprehensive plans; TIGER 2010



Applied Ecological Services, Inc.™

Figure 19

3.10 IMPERVIOUS COVER

Impervious cover is defined as surfaces of an urban landscape that prevent infiltration of precipitation (Scheuler, 1994). Imperviousness is an indicator used to measure the impacts of urban land uses on water quality, hydrology and flows, flooding/depressional storage, and habitat related to streams (Figure 20). Based on studies and other background data, Scheuler (1994) and the Center for Watershed Protection (CWP) developed an Impervious Cover Model used to classify streams within subwatersheds into three quality categories: Sensitive, Impacted, and Non-Supporting (Table 9). In general, Sensitive subwatersheds have less than 10% impervious cover, stable channels, good habitat, good water quality, and diverse biological communities whereas streams in Non-Supporting subwatersheds generally have greater than 25% impervious cover, highly degraded channels, degraded habitat, poor water quality, and poor-quality biological communities. In addition, runoff over impervious surfaces collects pollutants and warms the water before it enters a stream resulting in a shift from sensitive species to ones that are more tolerant of pollution and hydrologic stress.

Figure 20. Relationship between impervious surfaces, evapotransporation, & infiltration. Source: The Federal Interagency Stream Restoration Working Group, 1998 (Rev. 2001).

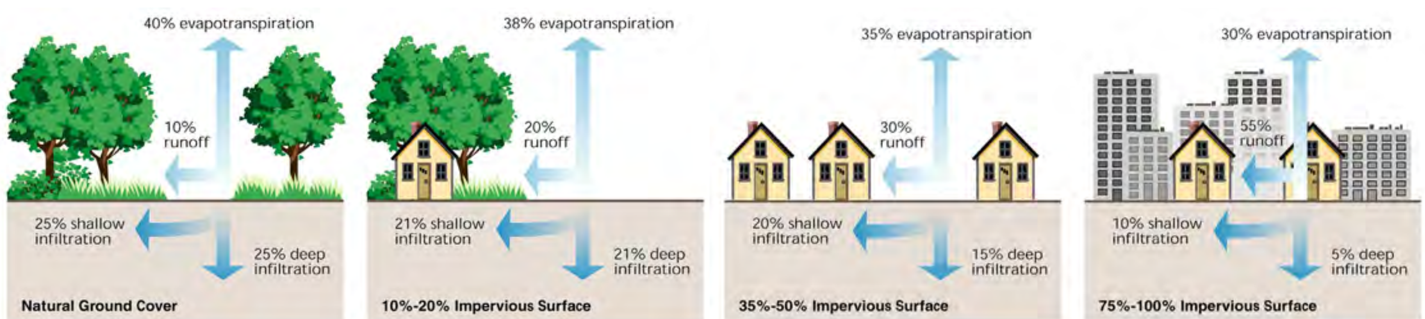


Table 9. Impervious category & corresponding stream condition via the Impervious Cover Model. Source: Zielinski, 2002.

Category	% Impervious	Stream Condition within Subwatershed
Sensitive	<10%	Stable stream channels, excellent habitat, good water quality, and diverse biological communities
Impacted	>10% but <25%	Somewhat degraded stream channels, altered habitat, decreasing water quality, and fair-quality biological communities.
Non-Supporting	>25%	Highly degraded stream channels, degraded habitat, poor water quality, and poor-quality biological communities.

Sensitive Stream

Impacted Stream

Non-Supporting Stream

The following paragraphs describe the implications of increasing impervious cover:

Water Quality Impacts

Imperviousness affects water quality in streams and lakes by increasing pollutant loads and water temperature. Impervious surfaces accumulate pollutants from the atmosphere, vehicles, roof surfaces, lawns and other diverse sources. During a storm event, pollutants such as nutrients (nitrogen and phosphorus), metals, oil/grease, and bacteria are delivered to streams and lakes. According to monitoring and modeling studies, increased imperviousness is directly related to increased urban pollutant loads (Schueler, 1994). Furthermore, impervious surfaces can increase stormwater runoff temperature as much as 12 degrees compared to vegetated areas (Galli, 1990).

According to the Illinois Pollution Control Board (IPCB), water temperatures exceeding 90□F (32.2□C) can be lethal to aquatic fauna and can generally occur during hot summer months.

Hydrology and Flow Impacts

Higher impervious cover translates to greater runoff volumes thereby changing hydrology and flows in streams. If unmitigated, high runoff volumes can result in higher floodplain elevations (Schueler, 1994). In fact, studies have shown that even relatively low percentages of imperviousness (5% to 10%) can cause peak discharge rates to increase by a factor of 5 to 10, even for small storm events. Impervious areas come in two forms: 1) disconnected and 2) directly connected. Disconnected impervious areas are represented primarily by rooftops, so long as the rooftop runoff does not get funneled to impervious driveways or a stormsewer system. Significant portions of runoff from disconnected surfaces usually infiltrate into soils more readily than directly connected impervious areas such as parking lots that typically end up as stormwater runoff directed to a stormsewer system that discharges directly to a waterbody.

Flooding and Depressional Storage Impacts

Flooding is an obvious consequence of increased flows resulting from increased impervious cover. As stated above, increased impervious cover leads to higher water levels, greater runoff volumes, and high floodplain elevations. Higher floodplain elevations usually result in more flood problem areas. Furthermore, as development increases, wetlands and other open space decrease. A loss of these areas results in increased flows because wetlands and open space typically soak up rainfall and release it slowly via groundwater discharge to streams and lakes. Detention basins can and do minimize flooding in highly impervious areas by regulating the discharge rate of stormwater runoff, but detention basins do not reduce the overall increase in runoff volume.

Habitat Impacts

A threshold in habitat quality exists at approximately 10% to 15% imperviousness (Booth and Reinelt, 1993). When a stream receives more severe and frequent runoff volumes compared to historical conditions, channel dimensions often respond through the process of erosion by widening, downcutting, or both, thereby enlarging the channel to handle the increased flow. Channel instability leads to a cycle of streambank erosion and sedimentation resulting in physical habitat degradation (Schueler, 1994). Streambank erosion is one of the leading causes of sediment suspension and deposition in streams leading to turbid conditions that may result in undesirable changes to aquatic life (Waters, 1995). Sediment deposition alters habitat for aquatic plants and animals by filling interstitial spaces in substrates important to benthic macroinvertebrates and some fish species. Physical habitat degradation also occurs when high and frequent flows result in loss of riffle-pool complexes.

2012 Impervious Cover Estimate & Future Vulnerability

In 1998, the Center for Watershed Protection (CWP) published the Rapid Watershed Planning Handbook. This document introduced rapid assessment methodologies for watershed planning. The CWP released the Watershed Vulnerability Analysis as a refinement of the techniques used in the Rapid Watershed Planning Handbook (Zielinski, 2002). The vulnerability analysis focuses on existing and predicted impervious cover as the driving forces impacting potential stream quality within a watershed. It incorporates the Impervious Cover Model described at the beginning of this subsection to classify Subwatershed Management Units (SMUs). SMUs are defined and examined in more detail in Section 3.3.

Applied Ecological Services, Inc. (AES) used a modified Vulnerability Analysis to compare each SMU's vulnerability to predicted land use changes across Long Run Creek watershed. Three steps were used to generate a vulnerability ranking of each SMU. The results were used to make and rank recommendations in the Action Plan related to curbing the negative effects of predicted land use changes on the watershed. The three steps are listed below and described in detail on the following pages:

Step 1: Existing impervious cover classification of SMUs based on 2012 land use/land cover
Step 2: Predicted future impervious cover classification of SMUs based on predicted land use/land cover changes
Step 3: Vulnerability Ranking of SMUs based on changes in impervious cover and classification

Step 1: Existing Impervious Cover Classification

Step 1 in the Vulnerability Analysis is an existing classification of each SMU based on 2012 land use/land cover and measured impervious cover. 2012 impervious cover was calculated by assigning an impervious cover percentage for each land use/land cover category based upon the United States Department of Agriculture's (USDA) Technical Release 55 (TR55) (USDA 1986). Highly developed land such as commercial/retail for example is estimated to have over 70% impervious cover while a typical medium density residential development exhibits around 25% impervious cover. Open space areas such as forest preserves generally have less than 5% impervious cover. GIS analysis was used to estimate the percent impervious cover for each SMU in the watershed using 2012 land use/land cover data. Each SMU then received an initial classification (Sensitive, Impacted, or Non-Supporting) based on percent of existing impervious cover (Table 10; Figure 21).

To summarize, three SMUs (SMUs 5, 6, and 19) were classified as Sensitive, twelve as Impacted (SMUs 1, 4, 8, 9, 10, 11, 13, 14, 16, 17, 18, & 20), and five as Non-Supporting (SMUs 2, 3, 7 12, & 15) based on 2012 impervious cover estimates. Sensitive SMUs 5 and 6 include John J. Duffy Preserve in the northeast corner of the watershed. Sensitive SMU 19 is also found in an area with mostly open space comprised of Big Run Golf Club, agricultural land, Long Run Seep Nature Preserve, and wetland areas owned by Hanson Material Services, Inc. Most of the Impacted SMUs are located in the central portion of watershed where medium and low density residential development and scattered agricultural areas are common. All of the Non-Supporting SMUs are associated with highly impervious commercial/retail and high density residential development in portions of Lemont, along Bell Road, and surrounding communities in Homer Glen and Orland Park.

Table 10. 2012 & predicted future impervious cover by Subwatershed Management Unit.

SMU #	Step 1: Existing Impervious %	Existing (2012) Impervious Classification	Step 2: Predicted Impervious %	Predicted Impervious Classification	Percent Change	Step 3: Vulnerability
SMU1	17.6%	Impacted	28.6%	Non-Supporting	11.0%	High
SMU2	26.5%	Non-Supporting	28.3%	Non-Supporting	1.8%	Low
SMU3	29.0%	Non-Supporting	31.0%	Non-Supporting	2.0%	Low
SMU4	22.7%	Impacted	24.2%	Impacted	1.5%	Medium
SMU5	6.7%	Sensitive	8.5%	Sensitive	1.8%	Medium
SMU6	6.7%	Sensitive	7.8%	Sensitive	1.1%	Low
SMU7	25.5%	Non-Supporting	30.3%	Non-Supporting	4.8%	Low
SMU8	20.8%	Impacted	28.7%	Non-Supporting	7.9%	High
SMU9	14.9%	Impacted	16.3%	Impacted	1.4%	Low
SMU10	16.0%	Impacted	16.5%	Impacted	0.5%	Low
SMU11	13.8%	Impacted	15.7%	Impacted	1.9%	Low
SMU12	26.2%	Non-Supporting	26.4%	Non-Supporting	0.2%	Low
SMU13	15.2%	Impacted	22.4%	Impacted	7.2%	Medium
SMU14	19.2%	Impacted	19.9%	Impacted	0.7%	Low
SMU15	32.5%	Non-Supporting	36.7%	Non-Supporting	4.2%	Low
SMU16	22.6%	Impacted	23.0%	Impacted	0.4%	Low
SMU17	12.6%	Impacted	20.5%	Impacted	7.9%	Medium
SMU18	21.6%	Impacted	30.7%	Non-Supporting	9.1%	High
SMU19	7.0%	Sensitive	7.0%	Sensitive	0.0%	Low
SMU20	21.6%	Impacted	28.7%	Non-Supporting	7.1%	High

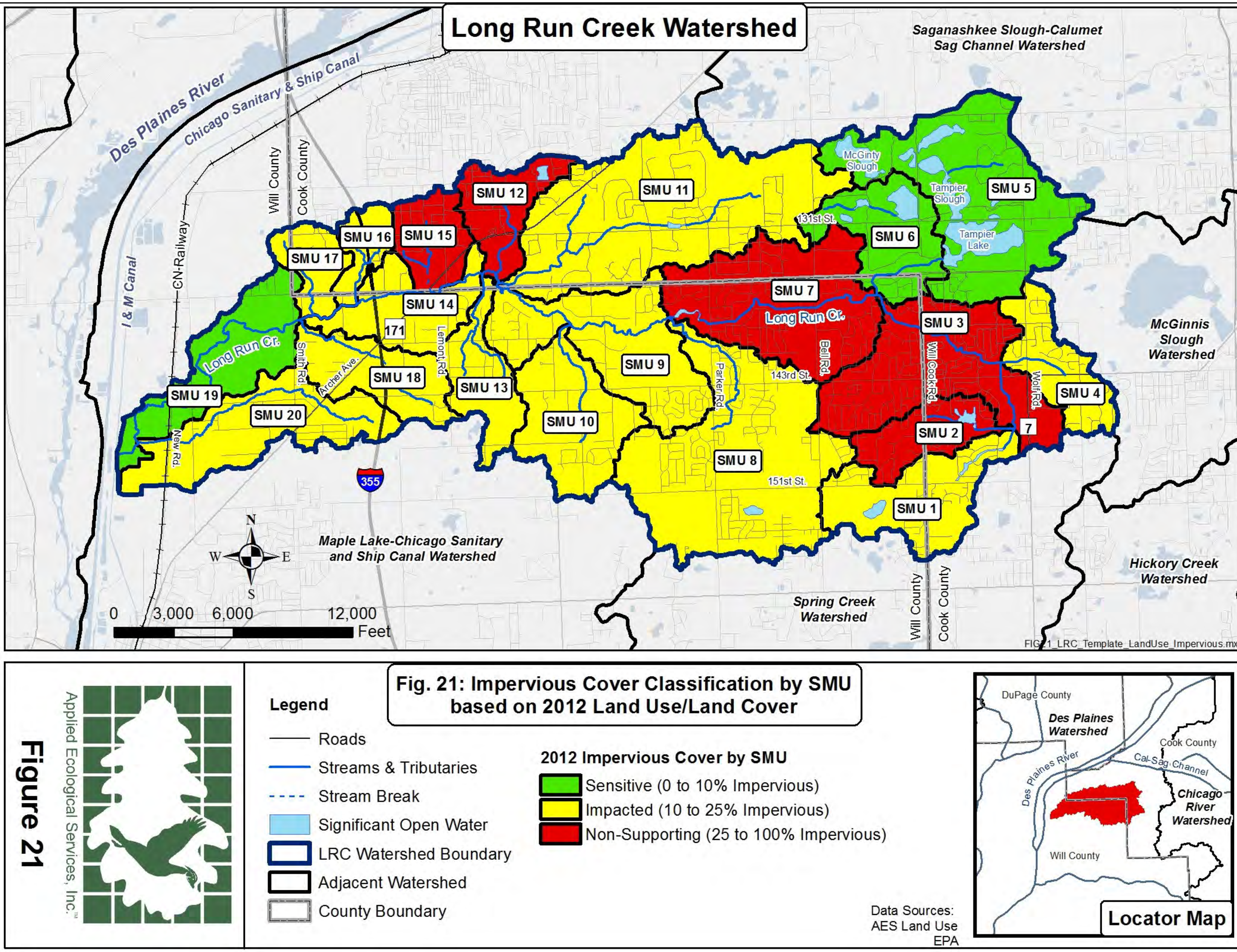


Fig. 21: Impervious Cover Classification by SMU based on 2012 Land Use/Land Cover

Figure 21

Step 2: Predicted Future Impervious Cover Classification

Predicted future impervious cover was evaluated in Step 2 of the vulnerability analysis by classifying each SMU as Sensitive, Impacted, or Non-Supporting based on predicted land use changes. Table 10 and Figure 22 summarize and depict predicted future impervious cover classifications for each SMU. This step identifies Sensitive and Impacted SMUs that are most vulnerable to future development pressure. SMUs 1, 8, 18, and 20 all changed from Impacted to Non-Supporting. These changes are attributed to predicted commercial/retail/office and residential development in the southern and southwest portions of the watershed that are currently agriculture land or other type of open space resulting in a significant increase in impervious cover.

Step 3: Vulnerability Ranking

The vulnerability of each SMU to predicted future land use changes was determined by considering the following questions:

1. Will the SMU classification change?
2. Does the SMU classification come close to changing (within 2%)?
3. What is the absolute change in impervious cover from existing to predicted conditions?

Vulnerability to future development for each SMU was categorized as Low, Medium, or High:

Low = no change in classification; <2% change in impervious cover
Medium = classification close to changing (within 2%) and/or 5-10% change in impervious cover
High = classification change or close to changing (within 2%) and/or >10% change in impervious cover

The vulnerability analysis resulted in 4 High, 4 Medium, and 16 Low ranked SMUs (Table 10; Figure 23). SMUs 1, 8, 18 and 20 are ranked as highly vulnerable to future problems associated with impervious cover because each is expected to change classification from Impacted to Non-Supporting. Predicted commercial/retail and residential development in the southern portion of the watershed (SMUs 1 & 8) and commercial/retail/office development along the I-355 corridor in the southwest portion of the watershed (SMUs 18 & 20) are the potential causes of increased impervious cover.

SMUs 4, 5, 13, and 17 are ranked as moderately vulnerable to predicted land use changes. SMUs 4 and 5 are approaching a classification change while SMUs 13 and 17 are expected to see between 5% and 10% change in impervious cover. Predicted residential development in areas that are currently agricultural will most affect SMUs 4, 5, and 17 while commercial/retail development is expected to affect SMU 13. The remaining SMUs are less vulnerable to predicted future land use changes.

The results of this analysis clearly point to the potential negative impacts of traditional residential and commercial/retail development. It will be important to consider developing these areas using Conservation/Low Impact Design standards that incorporate the most effective and reliable Stormwater Treatment Train practices whereby stormwater is routed through various Management Measures prior to being released from the development site.

Long Run Creek Watershed

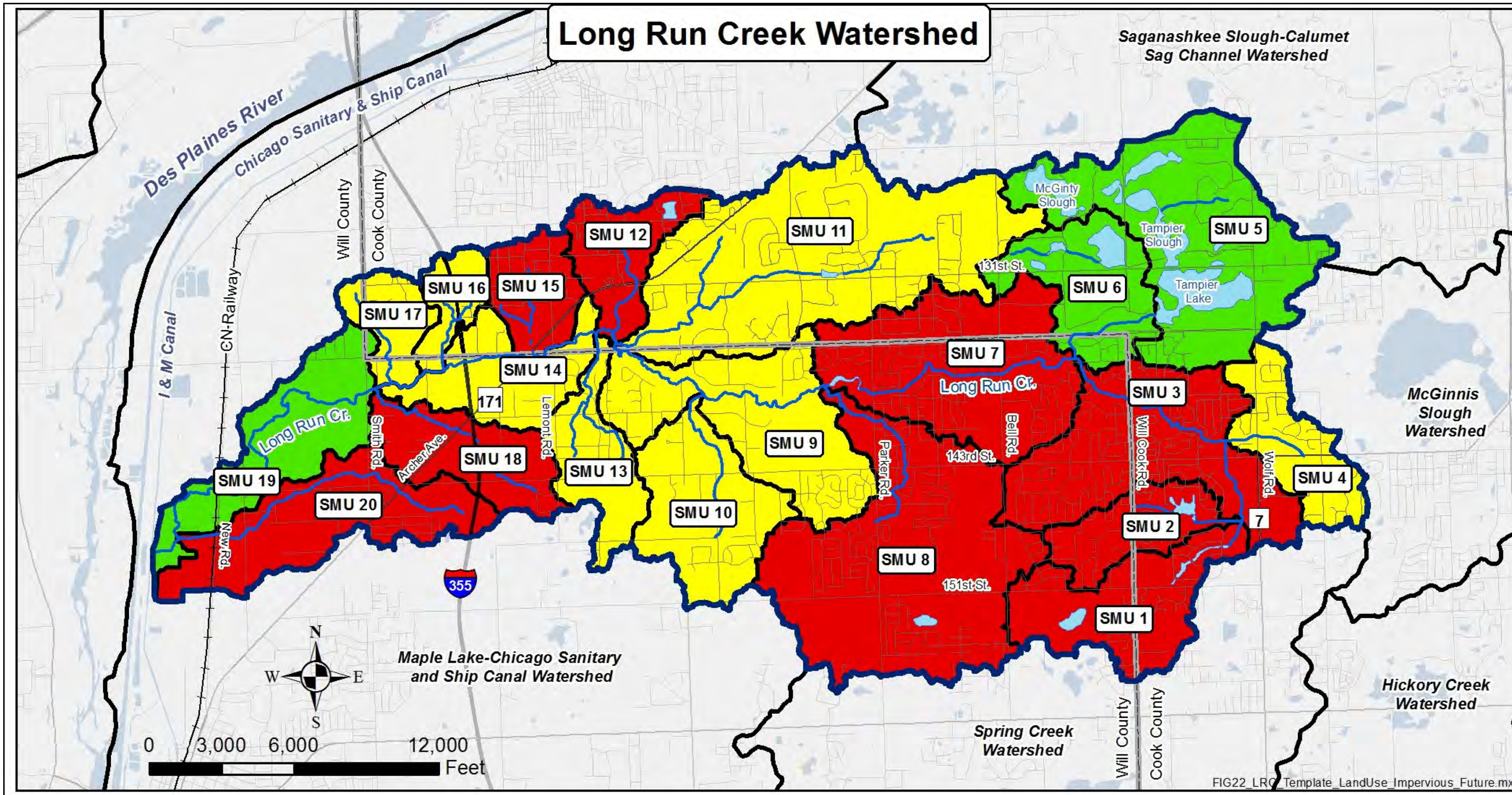


Fig. 22: Predicted Future Impervious Cover Classification by SMU

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Predicted Impervious Cover by SMU

- Sensitive (0 to 10% Impervious)
- Impacted (10 to 25% Impervious)
- Non-Supporting (25 to 100% Impervious)

Data Sources:
AES Land Use
EPA

Applied Ecological Services, Inc.™

Figure 22

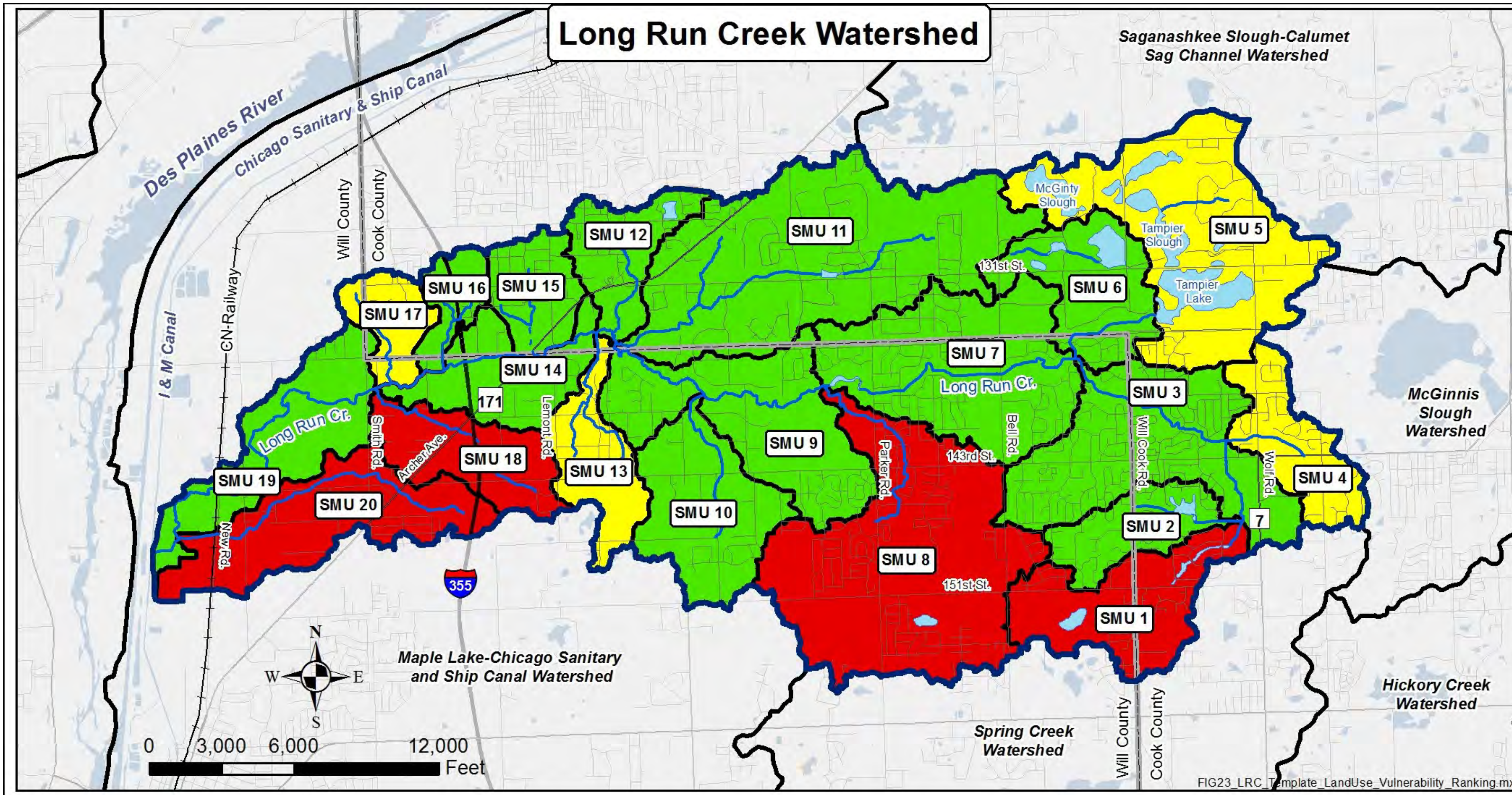


Fig. 23: Vulnerability Ranking of SMUs based on Predicted Future Land Use/Land Cover Changes

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Vulnerability Ranking

- High
- Medium
- Low

Data Sources:
AES Land Use
EPA

Applied Ecological Services, Inc.™

Figure 23

3.11 OPEN SPACE INVENTORY, PRIORITIZATION, & GREEN INFRASTRUCTURE NETWORK

A major component of watershed planning includes an examination of open space to determine how it best fits into a "Green Infrastructure Network". Green infrastructure is best defined as an interconnected network of natural areas and other open space that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife (Benedict, 2006). Natural features such as stream corridors, wetlands, floodplain, woodlands, and grassland are the primary components of green infrastructure. Working lands such as farms and partially developed areas including parks, ball fields, golf courses, school grounds, detention basins, large residential parcels, and any residential lot that includes a stream corridor are also considered components of a Green Infrastructure Network. A three step process was used to create a parcel-based Green Infrastructure Network for Long Run Creek watershed:

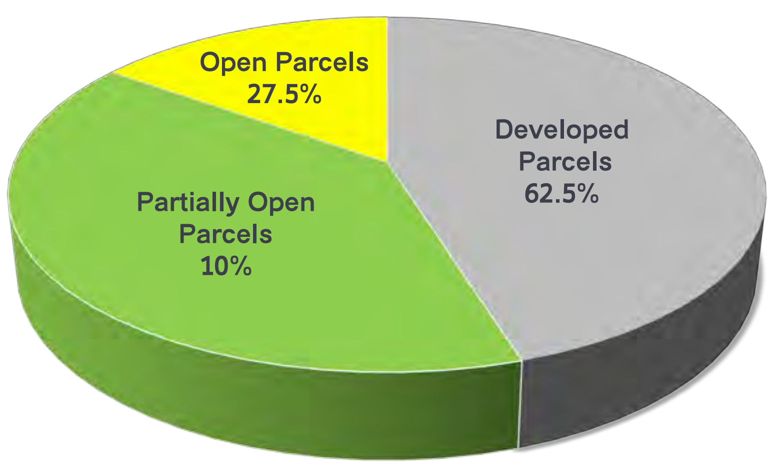
Step 1: All parcels of land in the watershed were categorized as open space, partially open space, or developed.
Step 2: All open and partially open parcels were prioritized based on a set of criteria important to green infrastructure.
Step 3: Prioritized open and partially open parcels were configured to form a Green Infrastructure Network.

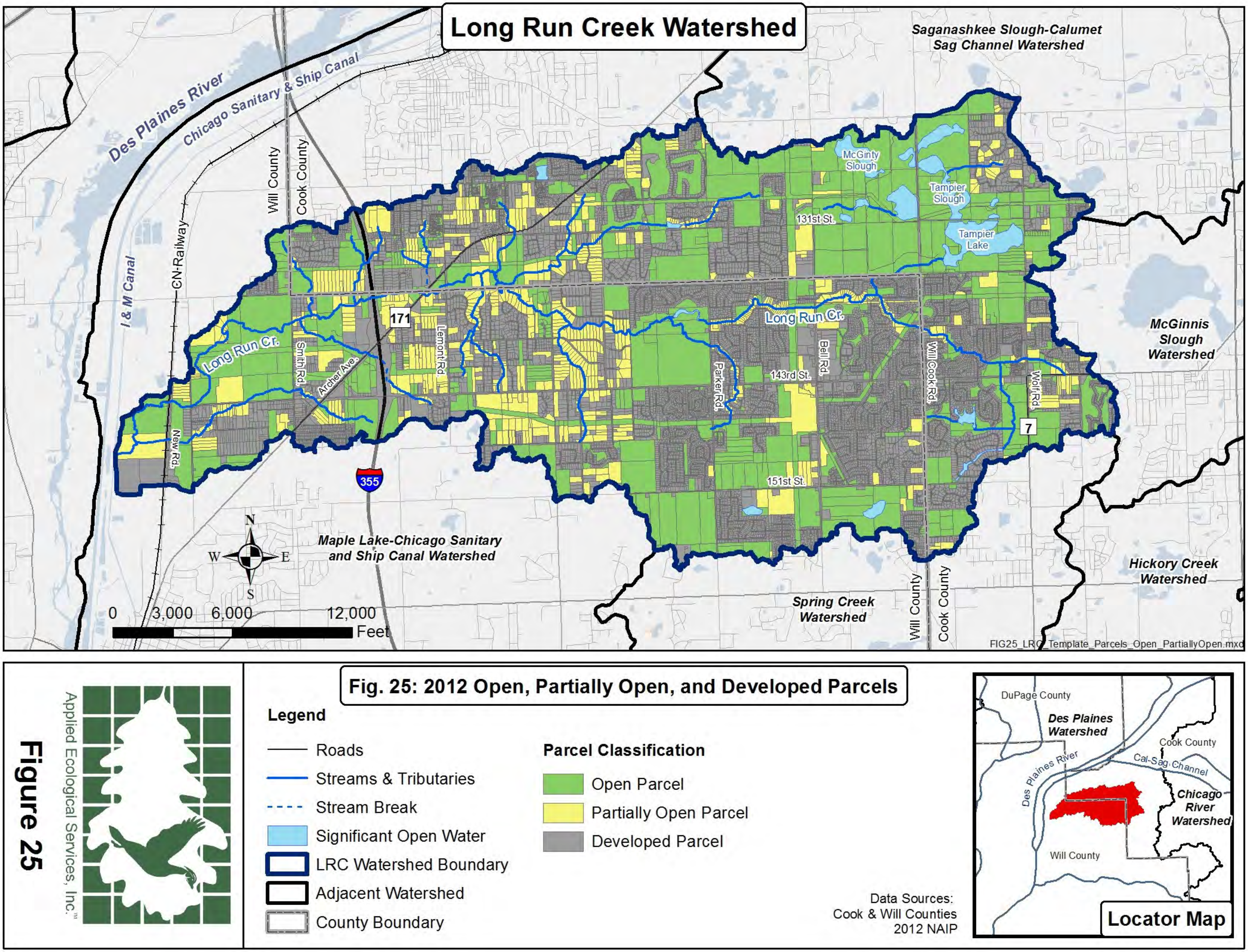
For this watershed plan, an "open space" parcel is generally defined as any parcel that is not developed such as a nature preserve or agricultural field. "Partially open" parcels have been developed to some extent, but the parcels still offer potential green infrastructure opportunities. Examples of partially open parcels include school grounds and residential lots generally greater than two to three acres with minimal development. Parcels that are mostly built out such as commercial/retail areas and roads are considered "developed." Public versus private and protected versus unprotected status of open and partially open space parcels are other important green infrastructure attributes that are discussed in more detail below.

Open, Partially Open, & Developed Parcels

Step 1 in creating a Green Infrastructure Network was completed by categorizing all parcels in the watershed as "open," "partially open," or "developed." Figures 24 and 25 summarize and depict Step 1 results used to develop the Green Infrastructure Network. Open space parcels comprise approximately 6,637 acres or 39.7% of the watershed. Parcels range from less than 1 acre to 157 acres with an 8.3-acre average. Partially open parcels make up another 2,528 acres or 15.1% of the watershed. Parcels range from less than 1 acre to 72 acres with a 2.8-acre average. Developed parcels account for the remaining 7,549 acres or 45.2% of the watershed. Most open and partially open parcels are located on golf courses, agricultural land, John J. Duffy Preserve, ComEd utility easements and larger residential lots.

Figure 24. Distribution of open, partially open, and developed parcels.

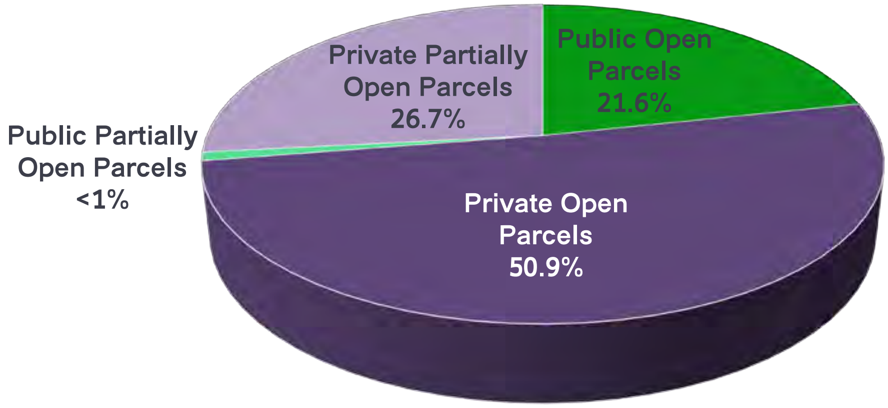



Long Run Creek Watershed
Saganashkee Slough-Calumet Sag Channel Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Will County
Cook County
McGinty Slough
Tampier Slough
Tampier Lake
131st St.
143rd St.
151st St.
Long Run Cr.
Smith Rd.
Archer Ave.
Lemont Rd.
Parker Rd.
Bell Rd.
Will Cook Rd.
Wolf Rd.
New Rd.
171
7
355
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
0 3,000 6,000 12,000 Feet
FIG25_LRC_Template_Parcels_Open_PartiallyOpen.mxd
Fig. 25: 2012 Open, Partially Open, and Developed Parcels
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Parcel Classification
Open Parcel
Partially Open Parcel
Developed Parcel
Data Sources:
Cook & Will Counties
2012 NAIP
DuPage County
Des Plaines Watershed
Des Plaines River
Cal-Sag Channel
Chicago River Watershed
Locator Map
Applied Ecological Services, Inc.™
Figure 25

Public/Private Ownership of Open and Partially Open Parcels

The public or private ownership of each open and partially open parcel was determined from available parcel data. Developed parcels are not included in this summary. Publicly owned parcels include those owned by state, county, township, or municipal government or school districts. Public open and partially open parcels account for 21.6% and <1% of the open and partially open acreage respectively (Figures 26 & 28). Private ownership types include homeowners/business associations, commercial, residential, agricultural, golf clubs, etc. Private open parcels comprise 50.9% of the open and partially open acreage whereas private partially open parcels comprise 26.7% (Figures 26 & 28). Public open and partially open parcels are owned by county forest preserves, IDNR, municipalities, and townships.

Figure 26. Distribution of private and public open and partially open parcels.

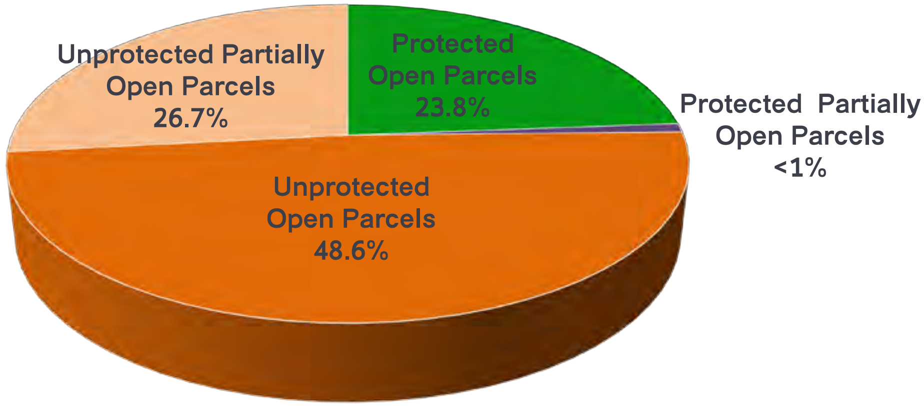


Protected Status of Open and Partially Open Parcels

Preservation of open space is critical to maintaining and expanding green infrastructure and is an important component of sustaining water quality, hydrological processes, ecological function, and the general quality of life for both wildlife and people. Without preservation, open space can be converted to other less desirable land uses in the future. Protected open and partially open parcels account for about 24% of the open and partially open parcel acreage in the watershed while unprotected open and partially open parcels account for the remaining 76% (Figures 27 & 29). Most protected open or partially open parcels are owned by state, county, township, homeowner association, or municipal government.

The most critical unprotected open and partially open parcels include golf courses and the undeveloped agricultural areas in the central, southern, and eastern portions of the watershed. Many of these areas are currently open space connected or adjacent to other green infrastructure. Aside from the December 2013 purchase of Woodbine Golf Course by Homer Glen, it is not likely that other golf courses will change land uses in the future but most of the agricultural areas will likely be developed to mostly residential. Future development that incorporates conservation design and/or Stormwater Treatment Train systems will be extremely important in these areas to improve water quality and reduce stormwater runoff volume to an already stressed Long Run Creek

Figure 27. Distribution of protected and unprotected open and partially open parcels.



SECTION 3.0

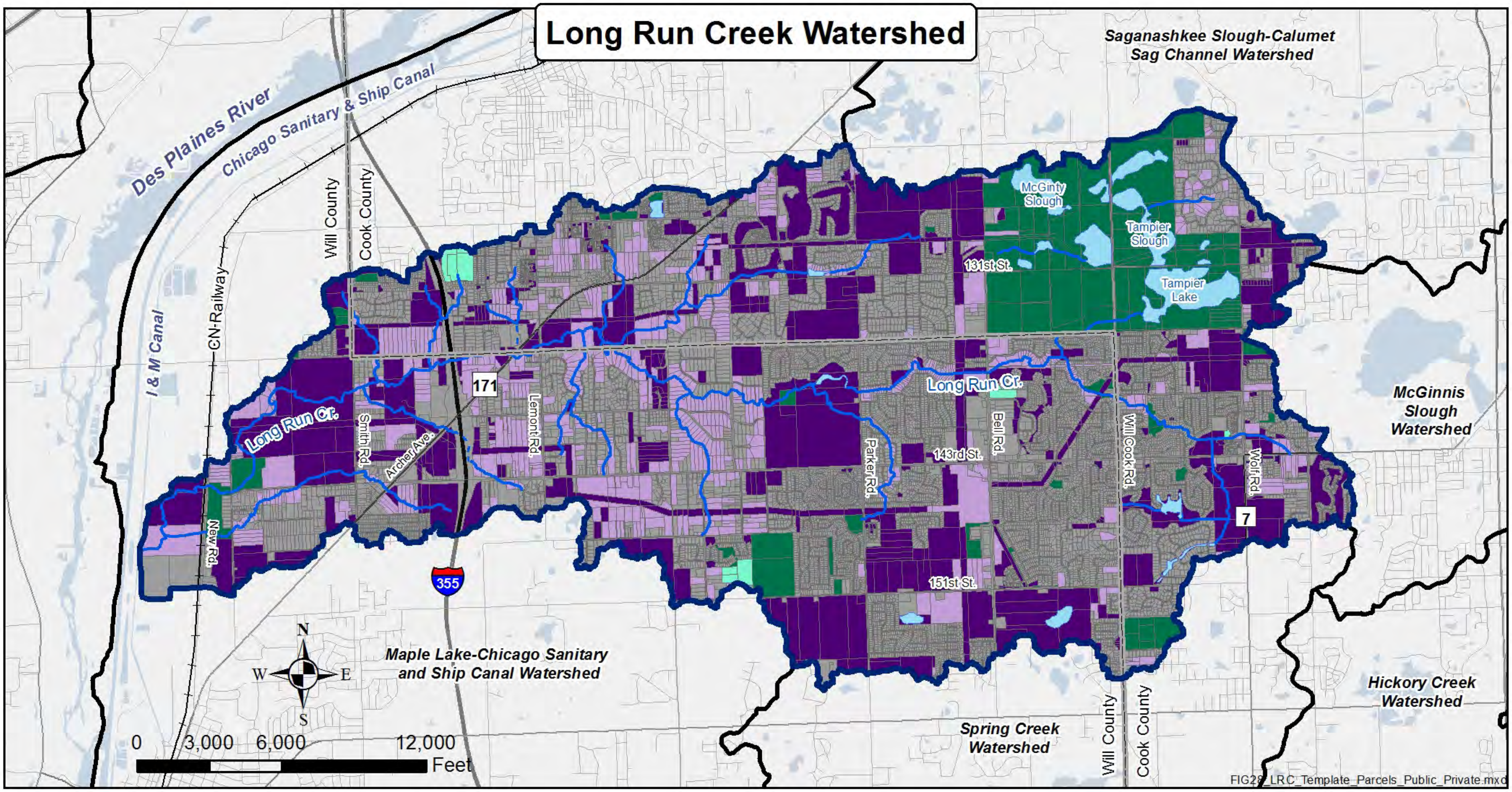


Figure 28

Applied Ecological Services, Inc.™

Fig. 28: Public versus Private Ownership of Open and Partially Open Parcels

Legend

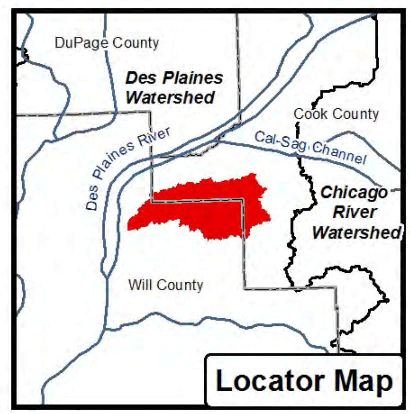
- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Open Parcel
- Public
- Private

Partially Open Parcel
- Public
- Private

Developed Parcel
- Public or Private

Data Sources:
Cook & Will Counties
2012 NAIP



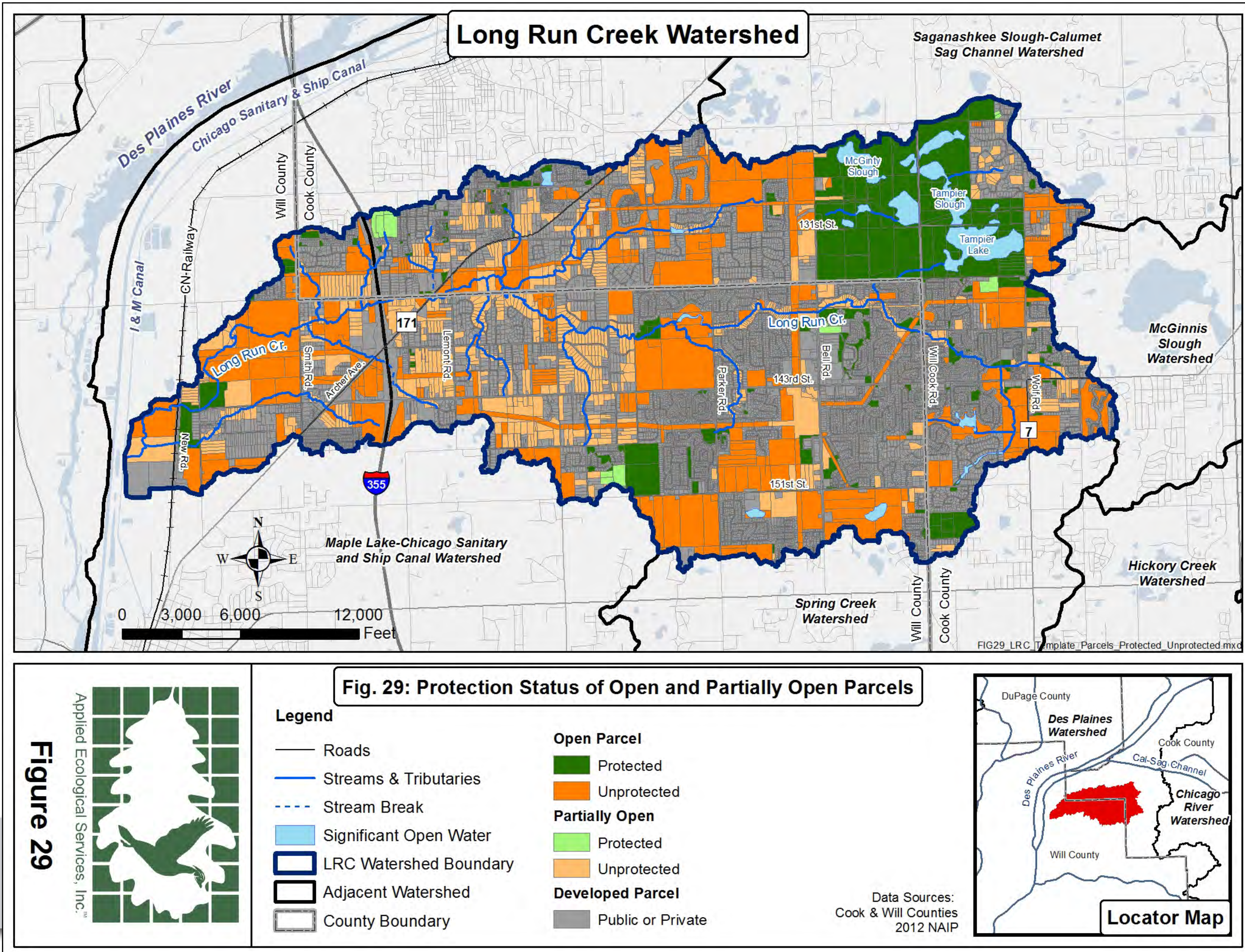


Fig. 29: Protection Status of Open and Partially Open Parcels

Open Space Parcel Prioritization

Step 2 in creating a Green Infrastructure Network for Long Run Creek watershed was completed by prioritizing open and partially open parcels. For this step, 11 prioritization criteria important to green infrastructure were examined via a GIS analysis (Table 11). If an open or partially open parcel met a criterion it received one point. If the parcel did not meet that criterion, it did not receive a point. This process was repeated for each open and partially open parcel and for all criteria. The prioritization process was not completed for developed parcels. The total points received for each parcel were summed to determine parcel prioritization within the Green Infrastructure Network- parcels with the highest number of points being more important to green infrastructure than parcels that met fewer criteria.

The combined possible total of points any one parcel could accumulate was 11 (11 of 11 total criteria met). The highest actual total value received by a parcel in the weighting process was 9 (having met 9 of the 11 criteria). After completion of the prioritization, parcels were categorized as "High Priority," "Medium Priority," or "Low Priority" based on point totals. Parcels meeting 6-9 of the criteria were designated High Priority for inclusion into the Green Infrastructure Network while parcels meeting 4-5 criteria were designated Medium Priority. Parcels with a combined value of 1-3 were categorized as Low Priority but were not necessarily excluded from the Green Infrastructure Network based on their location or position as linking parcels.

Figure 30 depicts the results of the parcel prioritization. There is no obvious correlation between High Priority green infrastructure parcels and their relation to Long Run Creek and its tributaries. What is obvious is that many High Priority parcels are large and include forest preserves, nature preserves, golf courses, and agricultural land. Many of the Medium Priority parcels abut High Priority parcels or intersect a stream or wetland. Low Priority parcels are generally smaller, found along streams in heavily developed areas, isolated from other natural features, and include many ComEd utility corridors.

Table 11. Criteria used to prioritize parcels for a Green Infrastructure Network.

Green Infrastructure Criteria
1. Open or partially open parcels that intersect FEMA 100-year floodplain
2. Open or partially open parcels within 0.5-miles of any headwater stream
3. Open or partially open parcels that intersect a wetland
4. Open or partially open parcels within the groundwater recharge area to Long Run Seep
5. Open or partially open parcels equal to or greater than 10 acres
6. Open or partially open parcels that are within 100 feet of a stream or significant open water
7. Open or partially open parcels in a "Highly or Moderately Vulnerable" Land Use/Land Cover SMU
8. Open or partially open parcels adjacent to or including private or public protected open space
9. Open or partially open parcels included in Forest Preserve District of Will County resource plan
10. Open or partially open parcels that intersect existing trails
11. Open or partially open parcels that include or intersect an "Important Natural Area"

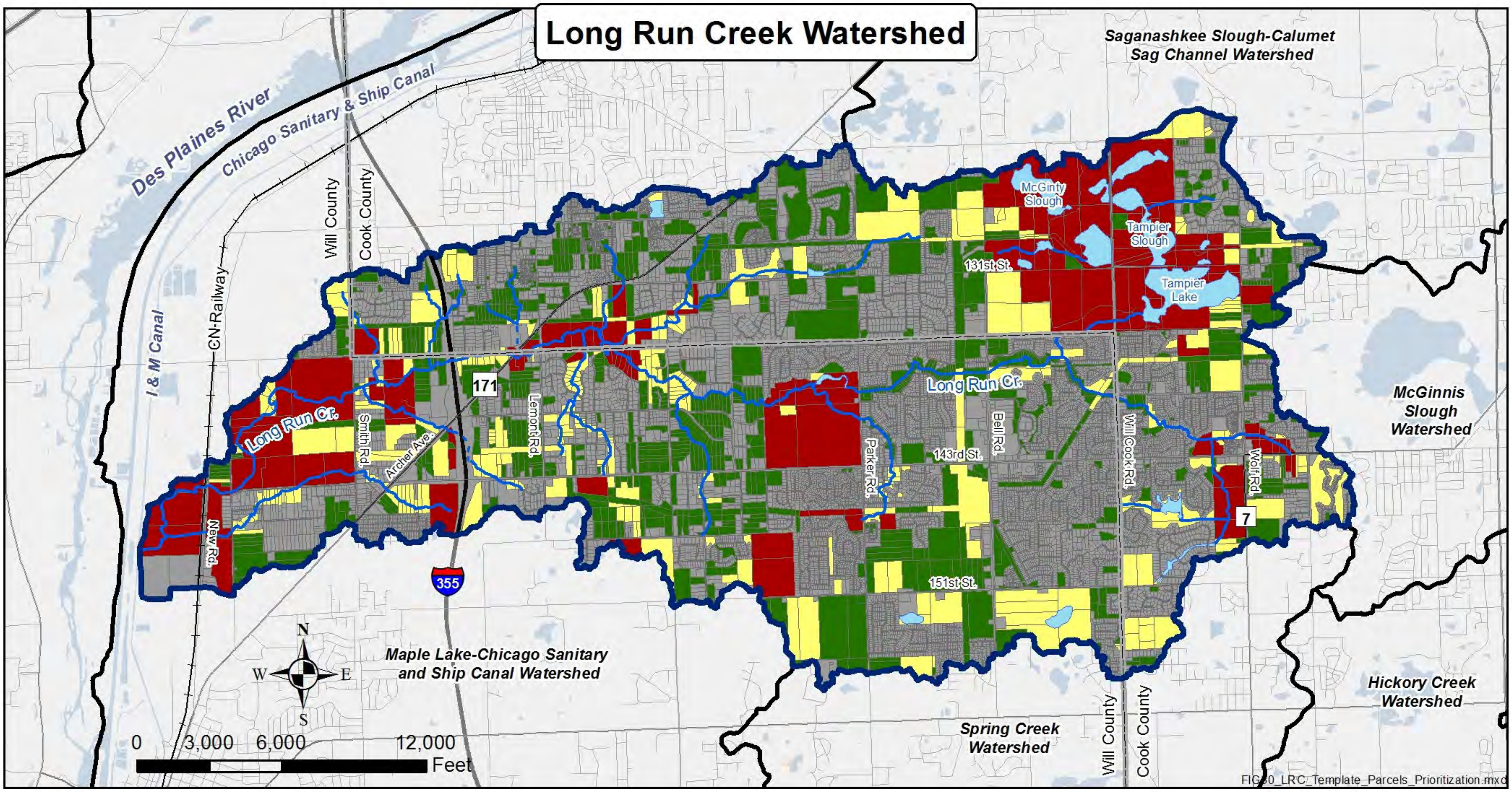


Fig. 30: Open Space Parcel Prioritization

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Parcel Prioritization Points

- 1 - 3 Low Priority
- 4 - 5 Medium Priority
- 6 - 9 High Priority
- Developed Parcel

Data Sources:
Cook & Will Counties

Applied Ecological Services, Inc.™

Figure 30

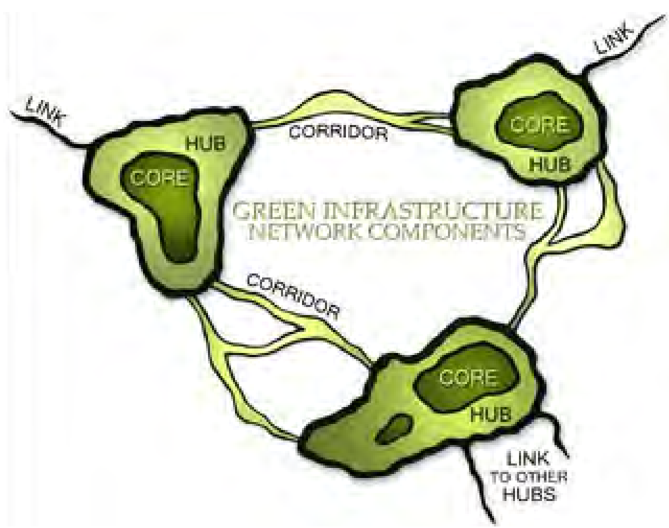
Green Infrastructure Network

The final step (Step 3) in creating a Green Infrastructure Network for Long Run Creek watershed involves laying out the network by incorporating: 1) prioritized open space results from Steps 1 & 2, 2) information gathered during the watershed resource field inventory conducted by AES in fall 2012, and 3) stakeholder recommendations. County and region-wide green infrastructure plans generally focus on natural features such as stream corridors, wetlands, floodplain, buffers, and other natural components. The Green Infrastructure Network created for Long Run Creek watershed captures all the natural components and other green infrastructure such as recreational parks, large residential lots, school grounds, and golf courses at the parcel level. Parcel level green infrastructure planning is important because land purchases, acquisitions, and land use changes almost always occur at the parcel level. A Green Infrastructure Network for Long Run Creek watershed is illustrated on Figure 32.

Perhaps the most important aspect of green infrastructure planning is that it helps communities identify and prioritize conservation opportunities and plan development in ways that optimize the use of land to meet the needs of people and nature (Benedict, 2006). Green infrastructure planning provides a framework for future growth that identifies areas not suitable for development, areas suitable for development but which should incorporate conservation/low impact design standards, and areas that do not affect green infrastructure.

A Green Infrastructure Network is a connected system of *Hubs* and linking *Corridors* (Figure 31). Hubs generally consist of the largest and least fragmented areas such as John J. Duffy Preserve, Long Run Seep Nature Preserve, several agricultural areas, and the eight golf courses. Corridors are generally formed by smaller private/unprotected parcels along developed reaches of Long Run Creek and tributaries. Corridors are extremely important because they provide biological conduits between hubs. However, most parcels forming corridors are not ideal green infrastructure until residents, businesses, and farmers embrace the idea of managing stream corridors. Unique to Long Run Creek watershed is a diverse system of ComEd utility corridors. Several of these corridors are being used for trails in Homer Glen but many opportunities exist to expand trails to the western half of the watershed. The Action Plan section of this report contains recommendations for implementing the Green Infrastructure Network.

Figure 31. Green Infrastructure components



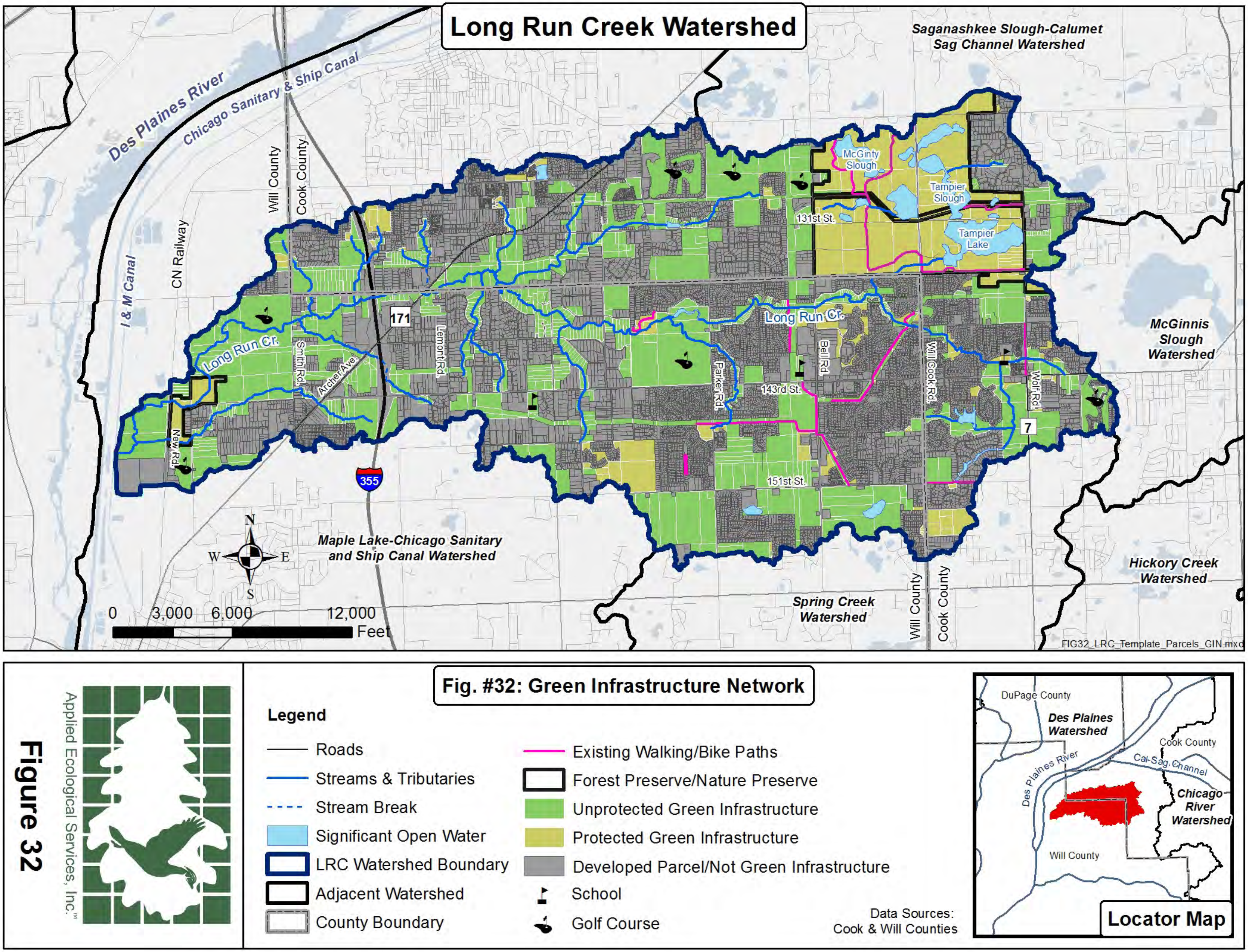

Long Run Creek Watershed
Saganashkee Slough-Calumet Sag Channel Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN Railway
Will County
Cook County
McGinty Slough
Tampier Slough
Tampier Lake
131st St.
Long Run Cr.
171
Smith Rd.
Archer Ave.
Lemont Rd.
Parker Rd.
Bell Rd.
143rd St.
Will Cook Rd.
Wolf Rd.
7
New Rd.
151st St.
355
McGinnis Slough Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Spring Creek Watershed
Hickory Creek Watershed
0 3,000 6,000 12,000 Feet
FIG32_LRC_Template_Parcels_GIN.mxd
Fig. #32: Green Infrastructure Network
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Existing Walking/Bike Paths
Forest Preserve/Nature Preserve
Unprotected Green Infrastructure
Protected Green Infrastructure
Developed Parcel/Not Green Infrastructure
School
Golf Course
Data Sources: Cook & Will Counties
DuPage County
Des Plaines Watershed
Des Plaines River
Cal-Sag Channel
Chicago River Watershed
Will County
Locator Map
Applied Ecological Services, Inc.

Figure 32

3.12 IMPORTANT NATURAL AREAS

For this watershed plan, "Important Natural Areas" include protected prairie, wetland, and woodlands within forest and nature preserves, high quality stream reaches, and large wetland complexes that are important to wildlife or provide exceptional flood storage (Table 12; Figure 33). Many of these areas often provide high quality habitat for and harbor uncommon or even threatened and endangered (T&E) species. Important Natural Areas also provide large greenway corridors that interconnect land and waterways, support native species, maintain natural ecological processes, and contribute to the health and quality of life for communities and people. Several Important Natural Areas are located in the watershed including 1 forest preserve, 1 nature preserve, 1 township-owned open space parcel, 12 important wetland complexes, and 2 private natural areas.

Table 12. Important Natural Area summary data.

Natural Area	Size (ac or lf)	Description
Forest Preserve District of Cook County		
John J. Duffy Preserve	1,614 ac	Large public preserve comprised of young growth and older growth woodlands, prairie, wetland sloughs, and lakes.
Illinois Department of Natural Resources		
Long Run Seep Nature Preserve	89 ac	A seep, fen, wet-mesic floodplain forest, and dry-mesic woodland plant communities are found on the site as well as the main channel of Long Run Creek and a tributary. The site also harbors the federal and state endangered Hine's Emerald Dragonfly.
Wetland Complexes		
12 Individual Complexes	450.5 ac	12 individual wetland complexes are found in the watershed that, although dominated by invasive species, provide excellent stormwater storage locations, wildlife corridors and green infrastructure connections.
Homer Township Open Space		
Homer Glen Marsh on LRC	10 ac	Parcel owned by Homer Township within larger wetland complex.
Orland Park Open Lands		
Arbor Lake Park	60 ac	Land owned by Orland Park that contains old field, prairie, woodland, and fishing ponds.
Long Run Creek Park	8.8 ac	Land owned by Orland Park that contains a riparian corridor along LRC with a park and naturalized fishing pond.
Private Natural Areas		
Enchanted Estate	55 ac	Private estate harboring old growth oak woodland and restored prairie communities. A section of LRC is located at the north end.
Private Woodland	30 ac	Private land harboring high quality dry-mesic woodland.
High Quality Stream		
Long Run Creek	11,760 lf	High quality portion of Long Run Creek extending from Old Oak Golf Course to I & M Canal with good riffle-pool development, low to no bank erosion, good aquatic substrate, and naturally meandering.

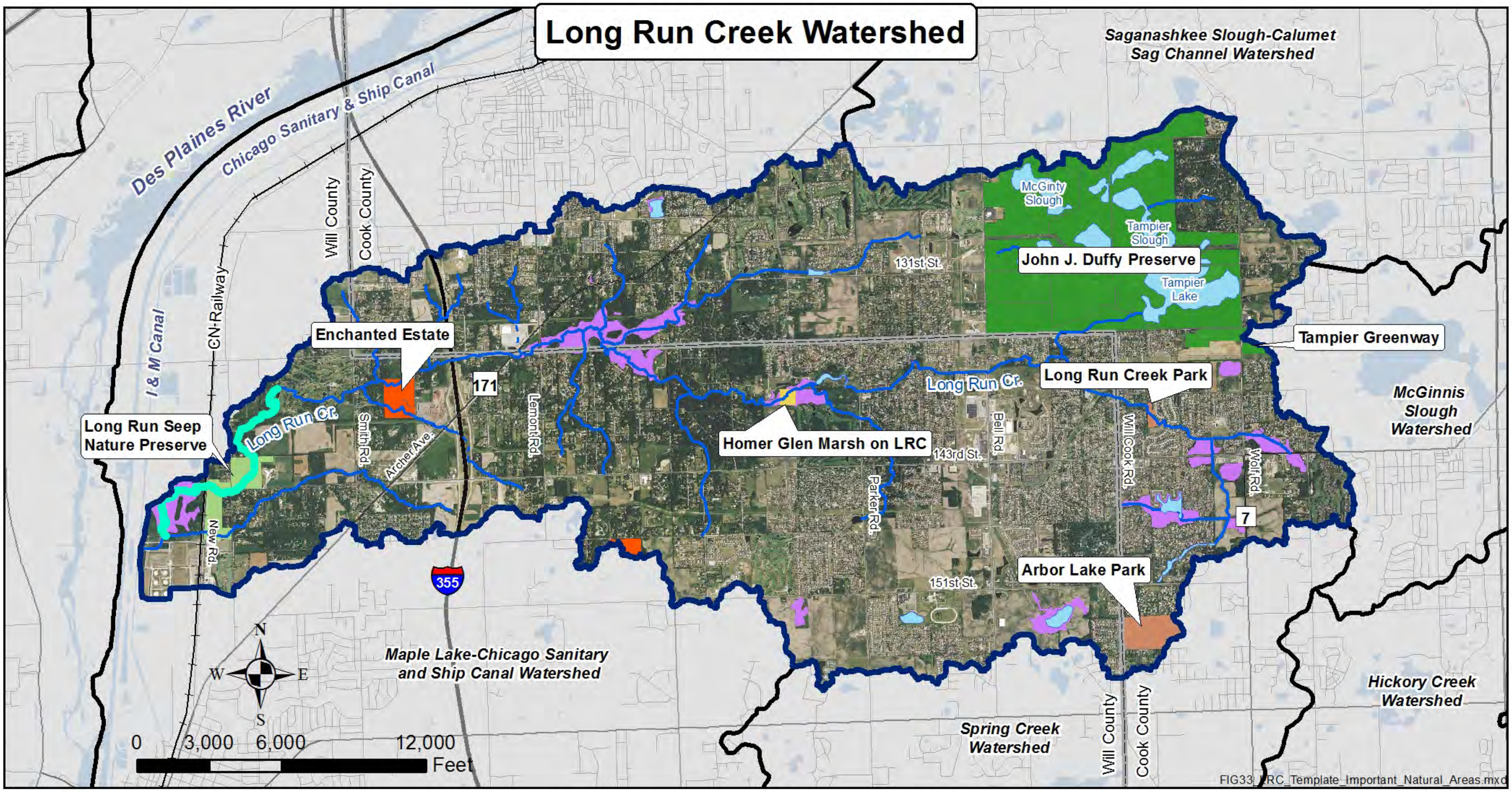


Figure 33

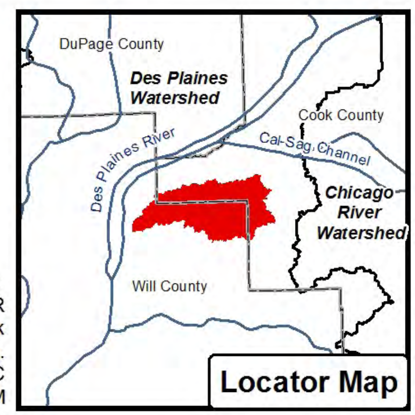
Applied Ecological Services, Inc.™

Fig. 33: Important Natural Areas

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary
- High Quality Stream
- Private Natural Areas
- Village of Orland Park Open Space
- Homer Township Open Space
- Important Wetland Complex
- Forest Preserve District of Cook County
- IDNR Nature Preserve

Data Sources:
IDNR
Orland Park
Homer Twp.
FPDCC
AECOM



Forest Preserves

The watershed planning area has 1,614 acres of land within John J. Duffy Preserve which is owned and managed by the Forest Preserve District of Cook County (FPDCC) (Table 12; Figure 33). The preserve is part of the Cal-Sag Valley, an area that formed over 10,000 years ago by the draining of a glacial lake. Today, the preserve contains a variety of natural habitats including young growth and older growth woodlands, prairie, wetland sloughs, and lakes. A slough is a wetland within a channel or series of shallow lakes that flows at least periodically. McGinty Slough and Tampier Slough are found in the northwest and east portions of the preserve, respectively, and are surrounded by several other unnamed sloughs. McGinty Slough and Tampier Slough are two of the largest wetlands in the Chicagoland region and provide for a bird watcher's paradise during spring and fall migrations when thousands of shorebirds, egrets, and waterfowl stop over. In fact, over 300 bird species have been spotted in and around John J. Duffy Preserve.

McGinty Slough

Tampier Lake is a 160 acre, human created lake, found in the southeast portion of John J. Duffy Preserve. This area was historically a series of shallow sloughs which were excavated out of peat creating a series of ponds in 1958 when the FPDCC purchased the surrounding property (IEPA, 2010). In 1962, the FPDCC dug a number of channels around the proposed lake area and a dam was constructed on a tributary of Long Run Creek creating a 75-acre lake. A three foot cap was

Tampier Slough

Fishing at Tampier Lake

added to the dam in 1964 to raise lake levels and create the 160 acre lake seen today.

Tampier Lake is used heavily for human recreation. The Sag Valley Trail runs along the south side of Tampier Lake and north/south along McGinty Slough. This trail is popular for hiking, horseback riding, and bird watching. A parking/picnic area and fishing access is found on the west side of the lake. Tampier Lake Boating Center is located on the east side of the lake. This center provides boat and canoe rentals and has a boat launch ramp. Tampier Lake is known as a premier fishing location for walleye, northern pike, channel catfish, sunfish, crappie, and largemouth bass. In addition, state endangered Ospreys, a large bird of prey that lives and breeds near wetland and lakes, is known to nest at Tampier Lake. It should also be noted that Tampier Greenway forms a connection between John J. Duffy Preserve and McGinnis Slough to the southeast. This site contains picnic areas surrounded by prairie and shrubland.

Woodland/savanna restoration at Long Run Seep

Nature Preserves

Long Run Seep is an 89-acre IDNR-Illinois Nature Preserves Commission (INPC) owned and managed site in the far western end of the watershed (Table 12; Figure 33). The original portion of the preserve between New Road and High Road was dedicated in 1990. A 40+ acre addition and buffer was added in 2004 east of High Road. Seep, fen, wet-mesic floodplain forest, and dry-mesic woodland plant communities are found on the site as well as the main channel of Long Run Creek and a tributary known locally as South Ditch. Of these communities, it is the seep and fen formed at the base of the Des Plaines River valley bluffs, that provide cold calcareous groundwater that supports many conservative plants such as spotted touch-me-not (*Impatiens capensis*), tussock sedge (*Carex stricta*), skunk cabbage (*Symplocarpus foetidus*), marsh marigold (*Caltha palustris*) shrub nannyberry (*Viburnum lentago*), grass of parnassus (*Parnassia glauca*), great Angelica (*Angelica atropurpurea*), Kalm's lobelia (*Lobelia kalmia*), and Riddell's goldenrod (*Solidago riddellii*).

Threatened and endangered (T&E) plant species found in the preserve include beaked spike rush (*Eleocharis rostellata*), grass pink orchid (*Calopogon tuberosa*), and slender bog arrow grass (*Triglochin palustris*). Four exotic plants, purple loosestrife (*Lythrum salicaria*), glossy buckthorn (*Rhamnus frangula*), reed canary grass (*Phalaris arundinacea*), and common reed (*Phragmites australis*) threaten the seep and fen communities despite efforts by INPC to cut and/or herbicide these invasives.

The addition east of High Road contains a dry-mesic oak woodland/savanna along a high quality reach of Long Run Creek. The dry-mesic woodland/savanna was cleared of invasive woody species in 2009. Future restoration efforts will be aimed at keeping invasive woody species under control and improving the condition of small seeps and fens along Long Run Creek.

Long Run Seep provides critical habitat for the Hine's Emerald Dragonfly (HED), a federal and state listed endangered species. Recent studies have documented HED larval habitat and recruitment in Long Run Seep (Soluk and Worthington, 2010). The HED is defined by its brilliant emerald-green eyes and dark brown and metallic green body, with yellow stripes on its sides (USFWS, 2006). Today, the HED is only found in a few locations in four states: Illinois, Michigan, Missouri, and Wisconsin. Its preferred habitat is calcareous spring-fed

Hine's Emerald Dragonfly
Source: Dan Kirk

marshes, seeps, fens, and sedge meadows overlaying dolomite bedrock such as that found at Long Run Seep. The HED relies on the unique water quality features of calcareous seeps where the female lays eggs that later emerge into nymphs that live in the seeps for up to 4 years before becoming a flying adult dragonfly. Habitat destruction/fragmentation, invasive species, contaminated water, and changes in groundwater hydrology are the primary threats to the species. All of these destructive forces are at play in the surface and groundwater drainage area to Long Run Seep. Future mitigation dollars from land use impacts to HED habitat such as mining, chemical spills, etc. should be limited to managing and restoring HED habitat or used to fund projects that support groundwater recharge to HED habitat. The USFWS also recommends establishment of a monitoring plan to estimate HED population size and population dynamics on an annual basis and conduct population augmentation via captive-rearing (USFWS, 2013).

Perhaps the most difficult conservation issue is the negative impact of changing groundwater quantities and quality as it relates to HED habitat and breeding areas. In 2012, INPC petitioned Illinois EPA to designate the groundwater recharge area to Long Run Seep Nature Preserve as a Class III Special Resource Groundwater Classification. Class III designation allows an area to be subjected to special water quality standards and if an impact to a protected nature preserve's groundwater resource can be shown, the Office of the Illinois Attorney General can immediately cease the source activity of the impact. A Regional Groundwater Contribution Area (GCA) was developed by the Illinois State Geological Survey (ISGS) as part of the Class III petition by INPC. The GCA extends east and south of the preserve covering a vast 26,543 acres or 41.5 square miles. The GCA is mapped and described in more detail in Section 3.14. Aside from potential future policy related to the Class III Special Resource Groundwater Classification area, it is recommended that all development activities occurring within the GCA such as residential and commercial development, road construction and maintenance, landfills, mining, municipal and private wells, and other activities that increase impervious cover/reduce groundwater recharge be subjected to additional layers of review.

Wetland complex off 127th Street

Wetland Complexes

Twelve large wetland complexes accounting for 450.5 acres were identified in the watershed as being important for stormwater storage, wildlife corridors, and/or green infrastructure connections (Table 12; Figure 33). It is important to note however that most of these wetlands are relatively low quality from an ecological point of view because they are dominated by several invasive species including purple loosestrife (*Lythrum salicaria*), common and glossy buckthorn (*Rhamnus sp.*), reed canary grass (*Phalaris arundinacea*), and common reed (*Phragmites australis*). The largest of these wetland complexes are found at the far west end of the watershed on land owned by Hanson Material Services, Inc., along Long Run Creek on mostly private land, and scattered within agricultural areas and tributaries to Long Run Creek in the west half of the watershed. Most of these wetlands are considered "Jurisdictional" by the Army Corps of Engineers thereby ensuring there preservation in the future.

Homer Glen Marsh and Long Run Creek

Homer Township Open Space

Homer Township currently has an Open Space program that was established in 1999. The Open Space Land Stewardship Committee that is leading this effort is dedicated towards preservation of the natural environment, scenic resources, geological features, and historic sites. The township currently owns a 10-acre parcel within a larger wetland complex that was donated by Illinois American in 2004 (Table 12; Figure 33). The site is largely dominated by invasive reed canary grass (*Phalaris arundinacea*) and also includes a section of Long Run Creek. This site presents excellent restoration possibilities that are explored in later sections of this plan.

Village of Orland Park Open Lands

The Village of Orland Park has an Open Lands Commission assigned to help preserve open space via purchase of land from an Open Land fund financed through a voter approved referendum that was passed in 2000. The Open Lands Commission believes in several objectives: preservation of sensitive environmental areas, linking open spaces, wildlife habitat, and preserving the overall landscape. Orland Park currently owns two sites in the watershed (Table 12; Figure 33). The first is a 60+ acre parcel in the far southeast corner of the watershed called Arbor Lake Park. The site is comprised of old field, prairie, wetlands, ponds, and woodlands. Amenities at the site include walking/bike path, picnic areas, and fishing. The second site includes nearly 9 natural and recreation acres along Long Run Creek between Will-Cook and Wolf Roads.

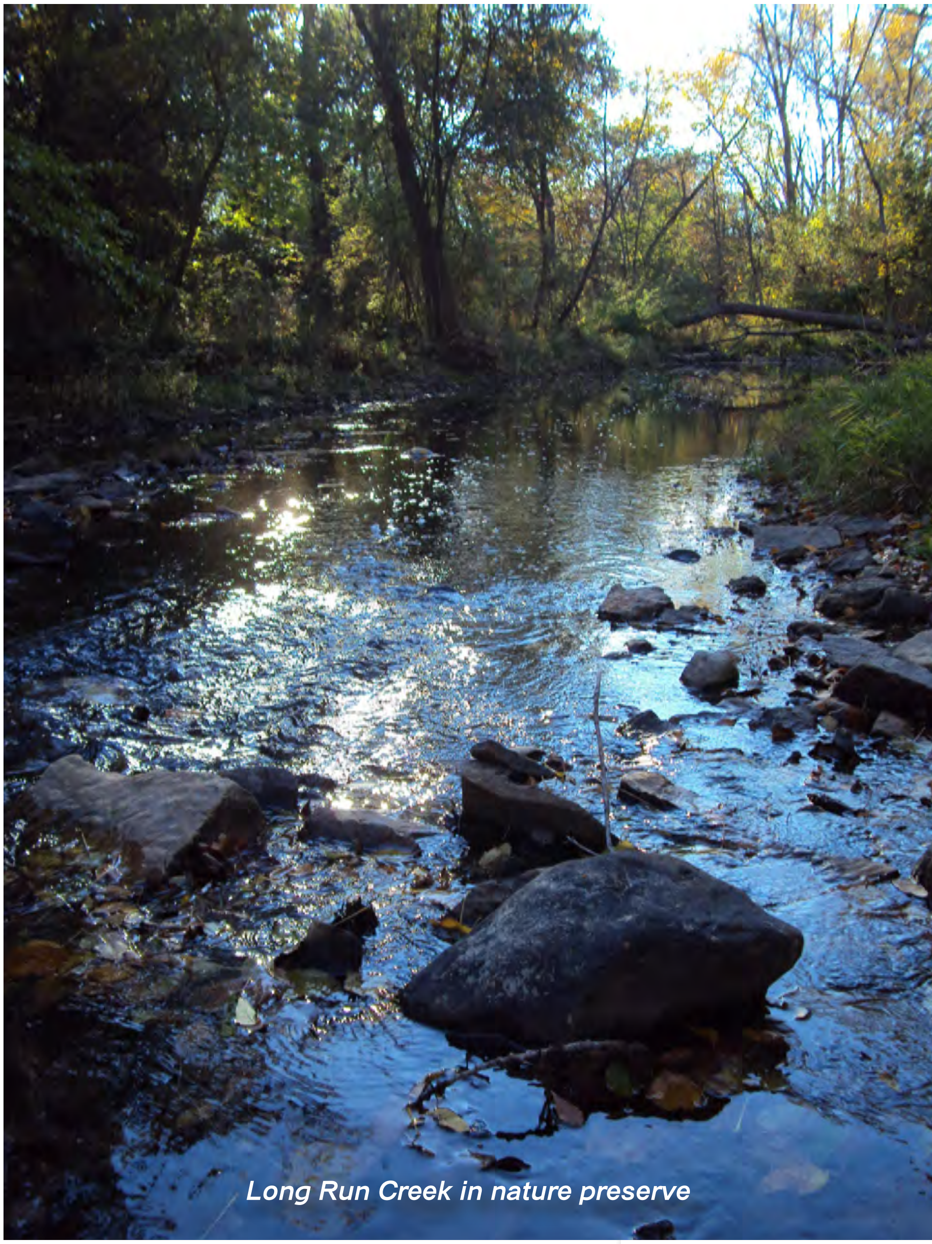
Private Natural Areas

Two additional natural areas are worth mentioning (Table 12; Figure 33). The first is the Enchanted Estate, a 55-acre venue located in Lockport. The estate holds weddings, socials, and corporate events. Aside from the manicured areas with ponds and waterfalls, there are acres of restored prairie and remnant old growth oak woodland/savanna. Long Run Creek also flows across the north end of the estate. The second site includes an average to high quality dry-mesic woodland complex surrounded by farmland on the south side of 147th Street along the southern boundary of Long Run Creek watershed.

High Quality Streams

An 11,760-linear foot (2.2-mile) reach of Long Run Creek extending from the west end of Big Run Golf Club and then south and west to approximately the I & M Canal is considered high quality (Table 12; Figure 33). In general, this entire reach exhibits good riffle-pool development, has minimal bank erosion, provides good aquatic substrate and habitat, and is naturally meandering. The first third of this reach is located on private land west and south of Big Run Golf Club. The second third is located within Long Run Seep Nature Preserve. There, dolomite is close to the surface providing stabile substrate and good riffle-pool complexes. The final third of the reach flows through land owned by Hanson Material Services, Inc. There, the stream gradient is flat enabling the stream to meander through the existing wetland complex.

Village of Orland Park Open Lands


Long Run Creek in nature preserve

3.13 WATERSHED DRAINAGE SYSTEM

3.13.1 LONG RUN CREEK HYDROLOGY & FLOW

Understanding changes in stream hydrology and flow patterns over time is important to understanding impacts of changes in climate and land use on the physical characteristics of a stream and the biological communities it supports. Via a grant provided by IDNR's C2000 program, Integrated Lakes Management, Inc. (ILM) was hired by the Village of Homer Glen in 2006 to conduct a physical and biological survey of Long Run Creek and provide a summary report (ILM, 2007). The resulting report includes a brief summary documenting changes in hydrology and flows in Long Run Creek over time. The following paragraphs are paraphrased from ILM's report.

Accurate stream flow monitoring is generally only available after 1950 for the Lower Des Plaines watershed. Long Run Creek has a stream flow-gaging station, installed in 1951, which is located on the west side of Lemont Road. Between 1951 and 1970, the 7-day annual low flow was frequently zero (i.e. the stream went to dryness for seven days at the gaging station) whereas current low flows are about 1 cubic foot per second (cfs). This increase is attributed to the conveyance of stormwater from impervious areas and the addition of treated wastewater discharge from two locations in the watershed: Derby Meadows and Chickasaw Hills waste water treatment plants.

The phrase "flow regime" is meant to convey profiling of flow conditions across a range of normal and extreme conditions. Stream systems function as import/export communities and thus flow will affect the physical characteristics of the stream, habitat, and biology. Extremes of flow and substrate will determine what types of invertebrates and fish can sustain themselves in different sectors of the stream. Further changes will potentially have a negative impact on fish, invertebrates, algae, and plants which can colonize the stream. In general Long Run Creek has gone from being an intermittent flow system to one with more sustained flows, thus supporting a sustained-flow community of life.

USGS gaging station off Lemont Road
Source: Integrated Lakes Management

The Illinois Department of Natural Resources (IDNR) conducted an assessment for the Lower Des Plaines River in 2000 to identify statistical trends for normal flows, high flows and for drought conditions in various stream systems. Via this study, IDNR produced a flow duration curve for Long Run Creek that reveals flows of eight cubic feet per second occurring about 50% of the time and one cubic feet per second occurring at least 80% of the time. The conclusion is that the percentage of increase in flow since 1960 is high in Long Run Creek. Since 1980, the character of Long Run Creek has been altered by a steady and consistent pattern of higher flows that IDNR claims will significantly impact flooding that occurs during rain events.

3.13.2 LONG RUN CREEK & TRIBUTARIES

The main stem of Long Run Creek is the primary stream draining Long Run Creek watershed. Fifteen (15) tributary streams are also found in the watershed (Table 13; Figure 34). Long Run Creek alone is over 12.5 linear miles in length while the tributaries account for another 20.2 linear miles.

Long Run Creek officially begins as a ditch in an agricultural field in the southeast portion of the watershed just east of a series of created detention basins in Silo Ridge residential subdivision. From there, the stream flows north for close to a mile among several large wetland complexes before joining a tributary stream north of 143rd Street then flowing west through residential subdivisions in Orland Park. The stream continues to flow west through channelized reaches among mostly residential subdivisions in Homer Glen west of Will-Cook Road until reaching Parker Road. West of Parker Road, the stream meanders through a large wetland complex north of Old Oak Country club before flowing through low density residential development between Hickory Avenue to the north and Spring Creek Road to the south. Long Run Creek joins several small tributaries within another large wetland complex then continues west through mostly residential areas before entering Big Run Golf Club west of Smith Road. The stream turns southwest after exiting Big Run where it is higher gradient, naturally meandering, and flows through Long Run Creek Nature Preserve and land owned by Hanson Material Services, Inc. and Chevron prior to joining the Illinois and Michigan (I & M) Canal.

Table 13. Summary of Long Run Creek and tributary reaches and length.

Stream or Tributary Name	Abbreviation	Number of Reaches	Stream Length Assessed (ft)	Stream Length Assessed (mi)
Long Run Creek	LRC	14	66,089	12.5
Tributary A	TribA	1	4,004	0.8
Tributary B	TribB	2	3,563	0.7
Tributary C	TribC	2	4,844	0.9
Tributary D	TribD	2	9,518	1.8
Tributary E	TribE	2	7,229	1.4
Tributary F	TribF	4	18,579	3.5
Tributary G	TribG	1	4,539	0.9
Tributary H	TribH	2	10,308	1.9
Tributary I	TribI	2	4,387	0.8
Tributary J	TribJ	2	6,454	1.2
Tributary K	TribK	1	4,674	0.9
Tributary L	TribL	2	7,407	1.4
Tributary M	TribM	3	14,690	2.8
Tributary N	TribN	1	2,960	0.6
Tributary O	TribO	1	3,265	0.6
Totals		**42**	**172,510**	**32.7**

Note: Illinois EPA does not monitor to the level of detail included in this plan. A localized waterbody code system was developed for this plan and therefore, the codes used are not found in the Illinois EPA's *Illinois Integrated Water Quality Report and Section 303d List*.

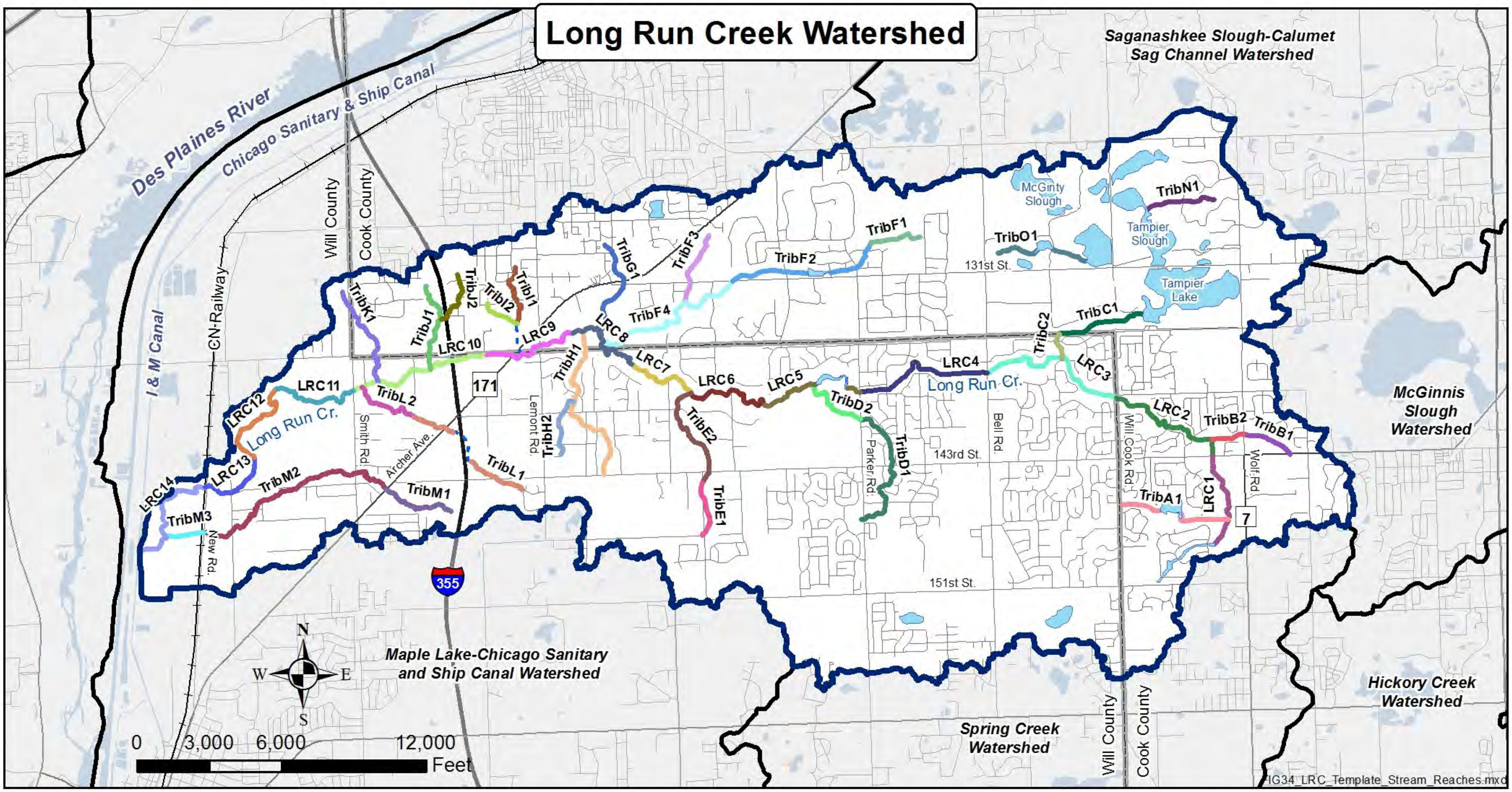


Fig. 34: Coded Stream Reaches

Legend

- LRC1 Stream Reach
- Stream Break
- Roads
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

LRC = Long Run Creek
Trib A - M = Tributary to Long Run Creek
Trib N - O = Tributary to Slough

Data Sources:
AES 2012 Stream Inventory

Applied Ecological Services, Inc.™

Figure 34

In fall 2012, Applied Ecological Services, Inc. (AES) completed a field inventory of Long Run Creek and its tributaries. All streams and tributaries were assessed based on divisions into "Stream Reaches" (Table 13; Figure 34). Reaches are defined as stream segments having similar hydraulic, geomorphic, riparian condition, and adjacent land use characteristics. Methodology included walking all or portions of the stream and tributary reaches, collecting measurements, taking photos, and noting channel, streambank, and riparian corridor conditions on Stream Inventory/BMP Data Forms. AES also reviewed and incorporated results of a 2007 Long Run Creek Profile report completed by Integrated Lakes Management (ILM, 2007).

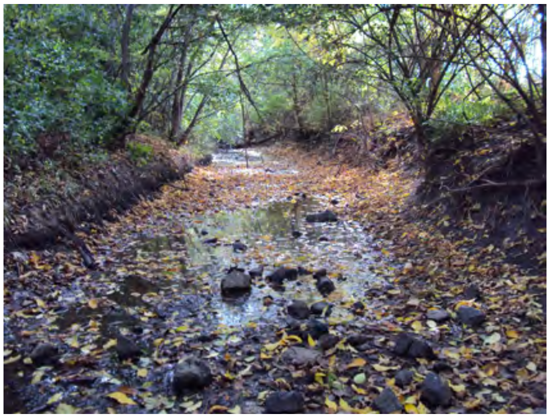
Numerous municipal stormwater point discharges were also encountered during the inventory but were not surveyed due to time and budget constraints. However, two NPDES wastewater treatment plant point sources were documented. Detailed notes were also recorded related to potential Management Measure recommendations and their corresponding priority for eventual inclusion into the Action Plan section of this report. Results of the inventory including completed data sheets, photos, and maps of each stream reach can be found in Appendix B.

Long Run Creek

Long Run Creek (Reach Code LRC) was divided into 14 distinct "Stream Reaches" beginning at the headwaters near Silo Ridge residential subdivision and ending at the I & M Canal (Table 13; Figure 34).

Long Run Creek Reach 1 (LRC1) begins in an agricultural area just east of Silo Ridge residential subdivision and continues north for 4,207 linear feet to 143rd Street. This reach is highly channelized, exhibits low quality pools and riffles, has moderate streambank erosion, and moderate to high sediment accumulation along the channel bottom. The immediate riparian area consists of a narrow band of invasive grasses, trees, and shrubs surrounded by agricultural land.

Long Run Creek Reaches 2, 3, and 4 (LRC2, LRC3, & LRC4) are similar. Reach 2 begins at 143rd Street and continues northwest for 5,787 linear feet to Will-Cook Road. Reach 3 is 7,031 linear feet between Will-Cook Road and Bell Road. Reach 4 continues west for 6,119 linear feet to Parker Road. All of these reaches are highly channelized with somewhat poor riffle-pool development and moderate streambank erosion. Sediment accumulation is only moderate but the riparian area is in poor condition as it is narrow and dominated by invasive shrubs and trees through mostly residential areas in Orland Park and Homer Glen. Problematic debris blockages are not common in these reaches. In addition, Orland Park owns a 10-acre parcel along Long Run Creek with preserved and restored vegetation and a park west of Long Run Drive in Reach 2. It is also important to note that Derby Meadows Wastewater Treatment Plant discharges to Long Run Creek Reach 3 west of Will-Cook Road. Chickasaw Wastewater Treatment Plan discharges to Reach 4 just east of Parker Road. Both wastewater treatment plants are Illinois EPA National Pollution Discharge Elimination (NPDES) permitted point discharges.



LRC Reach 2

Long Run Creek Reach 5 (LRC5) flows west for 3,123 linear feet through a wetland complex to approximately the end of Dublin Drive at Erin Hills residential subdivision. The upper portion of Long Run Creek is dammed creating a 1-acre impoundment. Downstream from the dam, Long Run Creek is moderately channelized and downcut into the surrounding

Dam/impoundment along LRC Reach 5

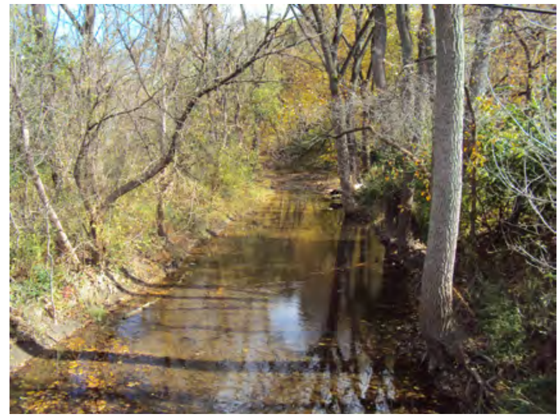
SECTION 3.0

wetland by several feet, thereby disconnecting the stream hydrologically from the surrounding wetland/floodplain. In addition, streambank erosion is on average moderate with areas exhibiting severe erosion and sediment accumulation is high along the channel bottom. Homer Township owns a 10-acre parcel at the downstream end of this reach. This reach also presents excellent restoration and floodplain connection opportunities.

LRC Reach 5

Long Run Creek Reaches 6 & 7 (LRC6 & LRC7) continue west for 4,219 linear feet and 3,259 linear feet respectively through low density residential development between Hickory Avenue to the north and Spring Creek/Creek View Roads to the south. These reaches are naturally meandering with average quality riffle-pool development, low to moderate streambank erosion, and low to moderate levels of sediment deposition. The riparian area along these reach is low quality because several residential lawns back up to the stream while other riparian areas are dominated by invasive shrubs. A unique feature of Reach 7 is the "braided" nature of the stream through a large wetland complex where the stream separates into several branches that wind through the wetland then rejoin at the downstream end of the wetland.

Long Run Creek Reaches 8, 9, and 10 (LRC8, LRC9, & LRC10) exhibit similar characteristics. Reach 8 flows for 4,359 linear feet from approximately the end of Creek View Drive to several hundred feet east of Lemont Street. Reach 9 then continues another 4,360 linear feet under Lemont Street and Archer Avenue (Route 171). Reach 10 (LRC7) extends another 6,436 linear feet while flowing west under Illinois Interstate 355 and ends at Smith Road. These reaches are naturally meandering with moderate quality riffle-pool development and moderate to highly eroded streambanks. The riparian areas are moderate quality as they consist mostly of natural but overgrown floodplain forest and areas of residential lawn. In addition, a portion of Long Run Creek at the northwest intersection of 135th Street and Archer Avenue is being rerouted to accommodate construction being implemented to widen the road and solve constant and reoccurring flooding issues.



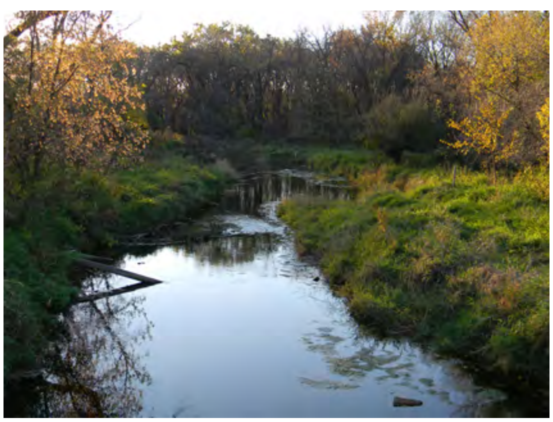
LRC Reach 10

The 11th reach of Long Run Creek (LRC11) flows west for 3,938 linear feet through Big Run Golf Club. This reach is naturally meandering but streambanks on average are highly eroded. The riparian area is also in poor ecological condition because much alteration has been done to accommodate the needs of the golf course. Reach 11 presents many opportunities to stabilize stream banks and restore riparian areas.

LRC Reach 11

Long Run Creek Reaches 12, 13, and 14 (LRC12, LRC13, LRC14) make up the remaining length of stream prior to Long Run Creek entering the I & M Canal. Reach 12 flows to the southwest for 4,669 linear feet after existing Big Run Golf Club and ends at Long Run Creek Nature Preserve. Reach 13 flows south then west for 3,130 linear feet through the nature preserve before flowing under New Road where it becomes Reach 14 as it winds through a wetland complex for 5,450 linear feet on land owned by Hanson Material Services, Inc. and Chevron. All of these reaches are generally considered higher quality because they naturally meander through open space that is at least moderate quality. Bank erosion is low to moderate among these reaches and substrate is stabile because it consists of cobble, boulders, and shallow limestone bedrock.

LRC Reach 13



LRC Reach 14

Tributary Streams

Fifteen (15) tributary streams are found in the watershed (Table 13; Figure 34). Thirteen (13) of these tributaries flow directly into Long Run Creek. The remaining two tributaries flow to slough areas within John J. Duffy Preserve. A brief description of each tributary stream is included below.

Tributary A (TribA): This tributary flows for 4,004 linear feet east from Will-Cook Road where it then passes through a large wetland complex on its way to Long Run Creek Reach 1.

Tributary B (TribB): This 3,562-linear foot tributary flows west though a channelized drainage ditch and large wetland complex prior to joining Long Run Creek Reach 2 just north of 143rd Street.

Tributary C (TribC): Tributary C begins at the dam/spillway at Tampier Lake and flows west for 3,714 linear feet through John J. Duffy Preserve then south for another 1,130 linear feet through a residential subdivision before entering Long Run Creek Reach 3.

Tributary D (TribD): This tributary flows north and on the east side of Parker Road through primarily residential areas prior to joining Long Run Creek Reach 5. The tributary is 9,517 linear feet long. Portions of this tributary's banks are highly eroded.

Tributary E (TribE): Tributary E begins at 147th Street and flows north for 7,229 linear feet before entering Long Run Creek Reach 6. This tributary is primarily surrounded by low density residential development.

Tributary F (TribF): This tributary is 16,209 linear feet making it the second longest tributary in the watershed. It begins in an agricultural area north of 131st Street and flows west through residential areas and a golf course prior to joining Reach 8 of Long Run Creek. A small secondary tributary also joins Tributary F east of the intersection of Archer Avenue and 131st Street. The upper reaches of Tributary F are highly channelized.

Tributary F near 131st Street

Tributary G (TribG): Tributary G begins at a detention basin and flows south for 4,539 linear feet before joining Long Run Creek Reach 8.

Tributary H (TribH): This tributary begins at 143rd Street and flows north for 7,631 linear feet through low density residential development prior to joining Long Run Reach 8. There is also a small secondary tributary that joins Tributary H on its west side just north of 130th Street.

Tributary I (TribI): Tributary I consists of two small tributaries totaling 4,386 linear feet that join just north of a commercial/retail center at the northwest corner of Archer Avenue and 135th Street. After joining, the tributary is apparently piped south under the commercial/retail center to Long Run Creek Reach 9. Portions of this tributary's banks are highly eroded.

Tributary J (TribJ): Two small tributaries that both originate at detention basins come together just west of Illinois Interstate 355 before flowing south to Long Run Creek Reach 10. Combined this tributary is 6,454 linear feet in length. Portions of this tributary's banks are highly eroded.

Tributary K (TribK): This tributary flows south for 4,674 linear feet through low density residential areas then joins Long Run Creek Reach 10 east of Smith Road. All of the banks along this tributary are highly eroded.

Tributary L (TribL): Tributary L begins south of 143rd Street and flows northwest under Illinois Interstate 355 and continues northwest along commercial and low density residential development prior to joining Long Run Creek at the end of Reach 10.

Tributary M west of High Road

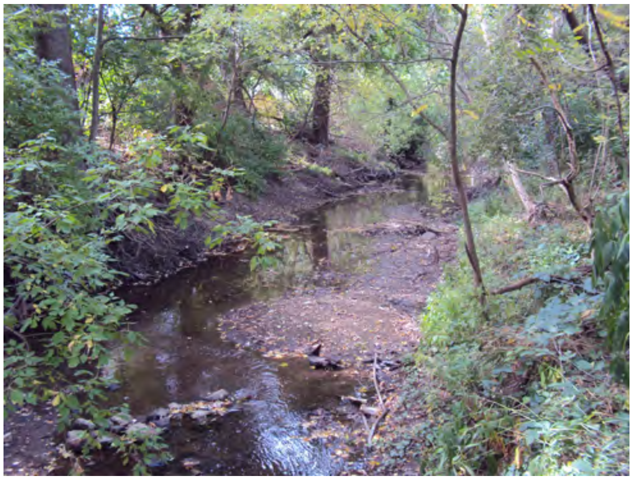
Tributary M (TribM): Tributary M is the longest in the watershed at 14,689 linear feet. This tributary is also known locally as South Ditch. It drains a large subwatershed area in the far southwest corner of the watershed prior to joining Long Run Creek Reach 14 just east of Long Run Creek's confluence with the I & M Canal. Most of the streambanks along this tributary are highly eroded.

Tributary N (TribN): This tributary begins in a residential subdivision in the far northeast corner of the watershed and flows west for 2,960 linear feet before entering Tampier Slough within John J. Duffy Preserve.

Tributary O (TribO): Tributary O is located entirely within John J. Duffy Preserve. It flows east for 3,265 linear feet and through a large wetland complex and then to an unnamed slough.

Stream Channelization

Naturally meandering streams generally provide riffles and pools that benefit the system by providing various habitats while oxygenating the water during low flow or summer heat. Channelized or ditched streams are often void of or have low quality riffles and pools. Berms are also common along channelized streams where landowners spoiled soils excavated from the channel. These spoil piles often inhibit natural flooding into adjacent floodplains.



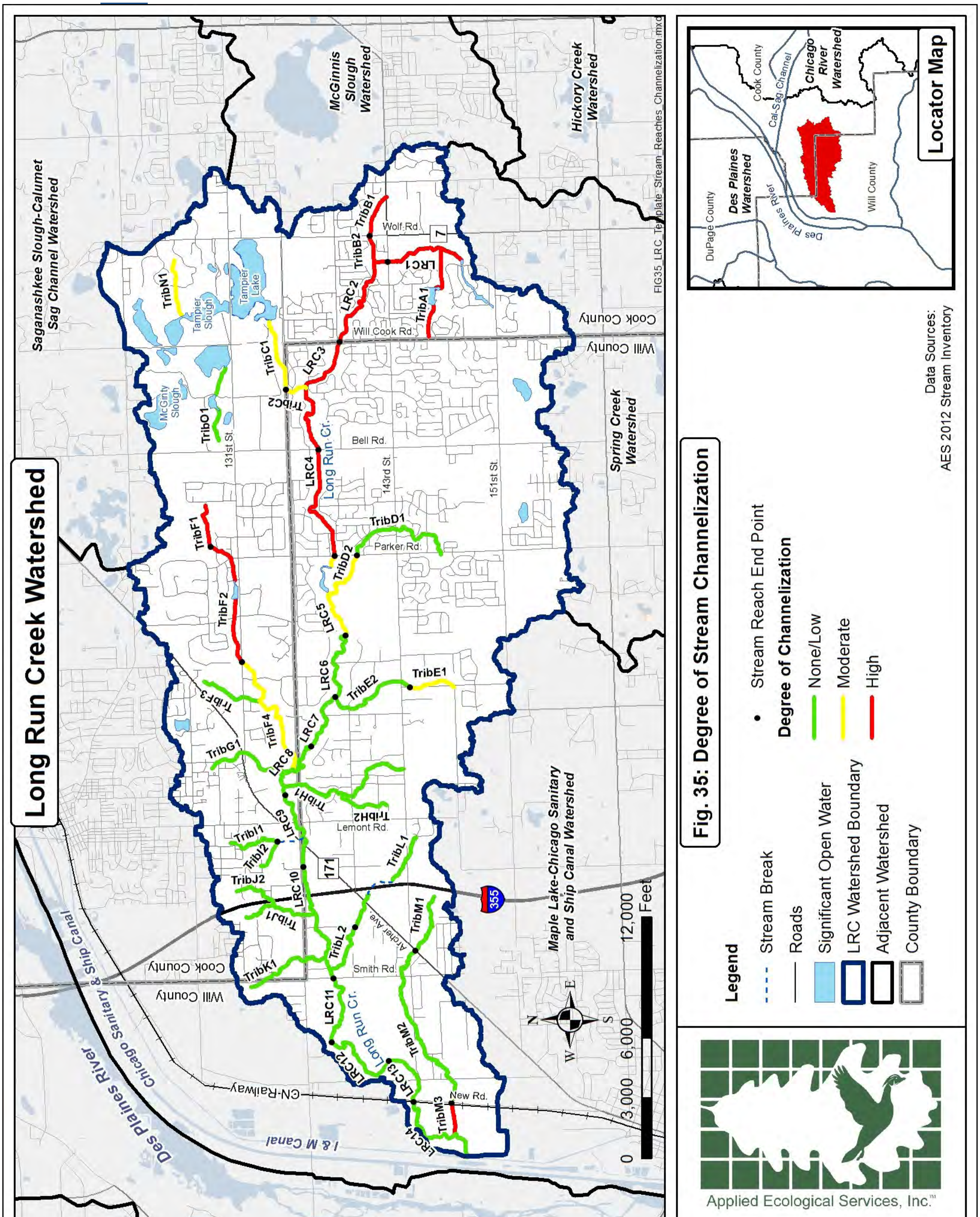
Channelization along LRC Reach 4

Each stream reach in the watershed was characterized as either having none or low channelization (highly sinuous, no human disturbance), moderate channelization (some sinuosity but altered), or highly channelized (straightened by humans) (Table 14; Figure 35). According to the stream inventory, 67% (115,826 lf) of stream and tributary length is naturally meandering; approximately 14% (24,060 lf) is moderately channelized; 19% (32,624 lf) is highly channelized. The most severe channelization is found along Long Run Creek east of Parker Road and along the upper reaches of Tributary F where agricultural ditching practices were once common.

Channelized areas present opportunities for Management Measure projects such as artificial riffle and pool restoration and regrading or breaking of adjacent spoil piles for reconnection of the stream to adjacent floodplains. The Action Plan section of this report addresses opportunities for improving many of the channelized stream reaches.

Table 14. Summary of stream and tributary channelization.

Stream or Tributary Name	Abbreviation	Stream Length Assessed (ft)	None or Low Channelization		Moderate Channelization		High Channelization	
			(feet)	(%)	(feet)	(%)	(feet)	(%)
Long Run Creek	LRC	66,089	39,820	60	3,123	5	23,144	35
Tributary A	TribA	4,004	4,004	100	0	0	0	0
Tributary B	TribB	3,563	3,563	100	0	0	0	0
Tributary C	TribC	4,844	0	0	4,844	100	0	0
Tributary D	TribD	9,518	6,301	66	3,216	34	0	0
Tributary E	TribE	7,229	4,824	67	2,405	33	0	0
Tributary F	TribF	18,579	3,192	17	7,511	41	7,876	42
Tributary G	TribG	4,539	4,539	100	0	0	0	0
Tributary H	TribH	10,308	10,308	100	0	0	0	0
Tributary I	TribI	4,387	4,387	100	0	0	0	0
Tributary J	TribJ	6,454	6,454	100	0	0	0	0
Tributary K	TribK	4,674	4,674	100	0	0	0	0
Tributary L	TribL	7,407	7,407	100	0	0	0	0
Tributary M	TribM	14,690	13,087	89	0	0	1,603	11
Tributary N	TribN	2,960	0	0	2,960	100	0	0
Tributary O	TribO	3,265	3,265	100	0	0	0	0
Totals		**172,510**	**115,826**	**67**	**24,060**	**14**	**32,624**	**19**


Long Run Creek Watershed
Fig. 35: Degree of Stream Channelization
Legend
Stream Break
Roads
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Stream Reach End Point
Degree of Channelization
None/Low
Moderate
High
Data Sources:
AES 2012 Stream Inventory
Locator Map
Des Plaines Watershed
Chicago River Watershed
Cal-Sag Channel
Des Plaines River
DuPage County
Cook County
Will County
Applied Ecological Services, Inc.™
Figure 35
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Long Run Cr.
Tampier Lake
Tampier Slough
McGinty Slough
Wolf Rd.
Will Cook Rd.
Bell Rd.
131st St.
143rd St.
151st St.
Parker Rd.
Lemont Rd.
Archer Ave.
Smith Rd.
New Rd.
Cook County
Will County
LRC1
LRC2
LRC3
LRC4
LRC5
LRC6
LRC7
LRC8
LRC9
LRC10
LRC11
LRC12
LRC13
LRC14
TribA1
TribB1
TribB2
TribC1
TribC2
TribD1
TribD2
TribE1
TribE2
TribF1
TribF2
TribF3
TribF4
TribG1
TribH1
TribH2
TribI1
TribI2
TribJ1
TribJ2
TribK1
TribL1
TribL2
TribM1
TribM2
TribM3
TribN1
TribO1
7
171
355
0 3,000 6,000 12,000 Feet
N E S W
FIG35_LRC_Template_Stream_Reaches_Channelization.mxd

Streambank Erosion

Unnatural streambank erosion generally results following an instability in flow rate or volume in the stream channel, human alteration such as channelization, or change in streambank vegetation. Resulting sediment accumulation and transportation downstream can cause significant water quality problems. Streambank erosion is moderate on average throughout the watershed and is a reflection of increased impervious cover and stormwater runoff. Watershed pollutant loading data (see Section 4.2) indicates that streambank erosion is one of the leading causes of sedimentation.

Highly eroded streambank along LRC Reach 5

The location and severity of streambank erosion in the watershed is summarized in Table 15 and depicted on Figure 36. Approximately 35% (60,129 lf) of the total stream and tributary length exhibits no or low bank erosion while moderate erosion is occurring along 45% (77,461 lf) of streambanks. Highly eroded streambanks are most common in the far western portion of the watershed accounting for 20% (34,920 lf) of the total stream length. Many highly eroded reaches are considered "Critical Areas" because they are actively contributing significant sediment loads downstream.

All highly eroded and some moderately eroded streambanks provide excellent opportunities for streambank stabilization projects. The Action Plan section of this report addresses and prioritizes opportunities for reducing streambank erosion.

Table 15. Summary of stream and tributary bank erosion.

Stream or Tributary Name	Abbreviation	Stream Length Assessed (ft)	None or Low Erosion		Moderate Erosion		High Erosion	
			(feet)	(%)	(feet)	(%)	(feet)	(%)
Long Run Creek	LRC	66,089	11,840	18%	45,950	70%	8,299	12%
Tributary A	TribA	4,004	4,004	100%	0	0%	0	0%
Tributary B	TribB	3,563	3,563	100%	0	0%	0	0%
Tributary C	TribC	4,844	4,844	100%	0	0%	0	0%
Tributary D	TribD	9,518	0	0%	6,302	66%	3,216	34%
Tributary E	TribE	7,229	2,405	33%	4,824	67%	0	0%
Tributary F	TribF	18,579	18,579	100%	0	0%	0	0%
Tributary G	TribG	4,539	0	0%	4,539	100%	0	0%
Tributary H	TribH	10,308	2,677	26%	7,631	74%	0	0%
Tributary I	TribI	4,387	0	0%	2,771	63%	1,616	37%
Tributary J	TribJ	6,454	0	0%	2,425	38%	4,029	62%
Tributary K	TribK	4,674	0	0%	0	0%	4,674	100%
Tributary L	TribL	7,407	4,388	59%	3,019	41%	0	0%
Tributary M	TribM	14,690	1,604	11%	0	0%	13,086	89%
Tributary N	TribN	2,960	2,960	100%	0	0%	0	0%
Tributary O	TribO	3,265	3,265	100%	0	0%	0	0%
Totals		**172,510**	**60,129**	**35%**	**77,461**	**45%**	**34,920**	**20%**

SECTION 3.0

Long Run Creek Watershed

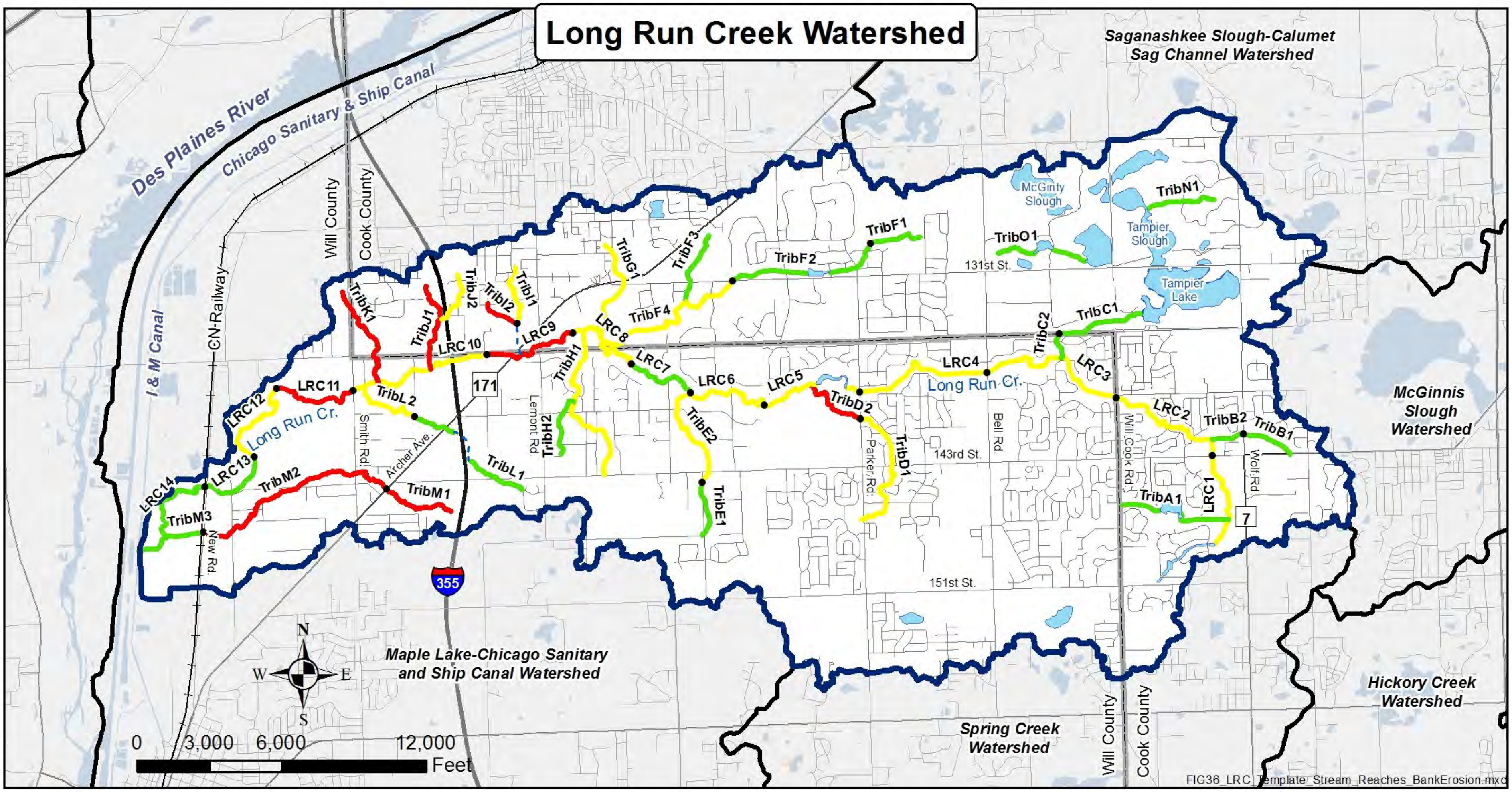


Fig. 36: Degree of Streambank Erosion

Legend

- Stream Break
- Roads
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

- Stream Reach End Point

Degree of Streambank Erosion

- Low
- Moderate
- High

Data Sources:
AES 2012 Stream Inventory

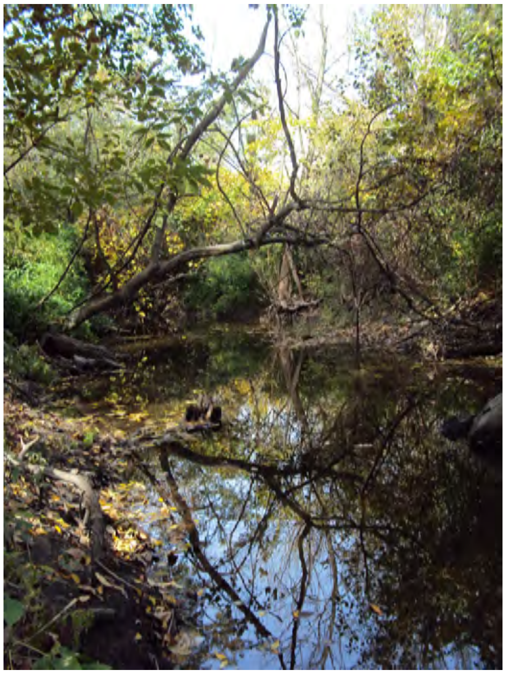
Applied Ecological Services, Inc.™

Figure 36

Riparian Area Condition

Riparian areas buffer streams by filtering pollutants, providing beneficial wildlife habitat, and connecting green infrastructure. Riparian areas along streams and tributaries were assessed during the stream inventory by noting the "Condition" as it relates to function and quality of plant communities present. Areas in "Good" condition connect hydrologically with streams and tributaries during flood events and have remnant or restored wetland plant communities. "Average" condition riparian areas retain some hydrological connection to the adjacent stream with somewhat degraded plant communities. Areas in "Poor" condition are usually found along channelized streams that have been heavily farmed in the past causing degraded plant communities to establish.

The location and condition of riparian areas in the watershed is summarized in Table 16 and Figure 37. Approximately 63% of the riparian areas are at least "Moderate" quality and are found in the western half of the watershed and within John J. Duffy Preserve. The remaining 37% of riparian areas are in "Poor" condition and found in the eastern half of the watershed; these correlate closely with stream reaches that are highly channelized. There are no riparian areas that are in "Good" condition. Invasive species including common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), common buckthorn (*Rhamnus cathartica*), and box elder (*Acer negundo*) contribute most to degraded conditions. Fortunately, ecological restoration helps eradicate these species and encourages native plant establishment. The Action Plan lists and prioritizes opportunities for improving riparian areas.



Degraded riparian area at LRC Reach 3

Table 16. Summary of stream and tributary area riparian condition.

Stream or Tributary Name	Abbreviation	Stream Length Assessed (ft)	Good Condition		Average Condition		Poor Condition	
			(feet)	(%)	(feet)	(%)	(feet)	(%)
Long Run Creek	LRC	66,089	0	0	31,663	48	34,424	52
Tributary A	TribA	4,004	0	0	0	0%	4,004	100
Tributary B	TribB	3,563	0	0	0	0%	3,563	100
Tributary C	TribC	4,844	0	0	3,714	77	1,130	23
Tributary D	TribD	9,518	0	0	6,302	66	3,216	34
Tributary E	TribE	7,229	0	0	4,824	67	2,405	33
Tributary F	TribF	18,579	0	0	10,703	58	7,876	42
Tributary G	TribG	4,539	0	0	4,539	100	0	0
Tributary H	TribH	10,308	0	0	10,308	100	0	0
Tributary I	TribI	4,387	0	0	4,387	100	0	0
Tributary J	TribJ	6,454	0	0	4,029	62	2,425	38
Tributary K	TribK	4,674	0	0	0	0%	4,674	100
Tributary L	TribL	7,407	0	0	7,407	100	0	0
Tributary M	TribM	14,690	0	0	14,690	100	0	0
Tributary N	TribN	2,960	0	0	2,960	100	0	0
Tributary O	TribO	3,265	0	0	3,265	100	0	0
Totals		**172,510**	**0**	**0**	**108,792**	**63**	**63,718**	**37**

SECTION 3.0

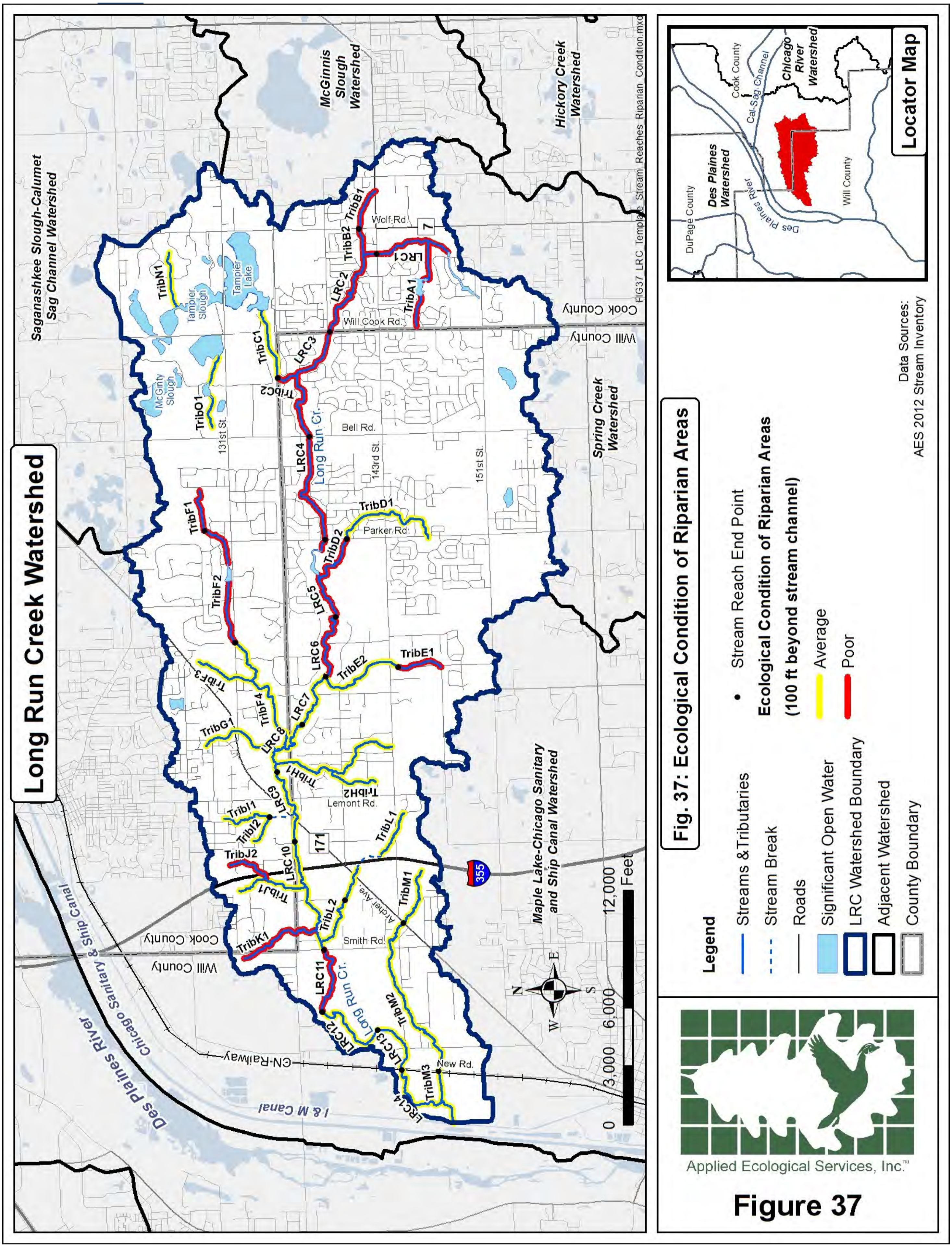


Fig. 37: Ecological Condition of Riparian Areas

Figure 37

3.13.3 DETENTION BASINS

Ecologically designed basin at Erin Hills Subdivision

Over the past 30+ years, the drainage system in Long Run Creek watershed has changed from farmland driven drain tiles, channels, and ditches to one that is driven by runoff from developed areas. Planners and engineers quickly realized the benefits of storing stormwater runoff in detention basins near development. A detention basin is a human-made structure for the temporary storage of stormwater runoff with a controlled release rate. For example, the required controlled release rate for basins in the Will County portion of the watershed is regulated by the Will County Stormwater Ordinance at 0.04 cfs/acre for the 2-year frequency rain event. Detention basins can also provide excellent wildlife habitat and improve water quality if designed with the proper configuration, slopes, and water depths then planted with native prairie and wetland vegetation. Today, detention basins capture runoff from at least 50% of the watershed making the quality and quantity of water leaving these basins critically important to the health of Long Run Creek.

Detention basins can be designed and constructed as wet bottom, wetland bottom, or dry bottom and planted with various types of natural or manicured vegetation. Wet and wetland bottom basins typically hold water that is controlled by the elevation of the outlet structure. This design promotes water quality treatment and supports wildlife. Wet bottom basins are usually greater than 3 feet deep and do not have emergent vegetation throughout whereas wetland bottom detention basins are shallow enough to be dominated by emergent wetland plants. Dry bottom basins are designed to drain completely after temporarily storing stormwater following rain events. They can be planted to either turf grasses or naturalized with native species.

Long Run Creek watershed has 185 known detention basins (Figure 38). Applied Ecological Services, Inc. completed a basic assessment of each detention basin in fall 2012. Assessment methodology included a visit to each site and collection of data relevant to existing conditions. Detailed notes were recorded related to existing ecological/water quality improvement condition and potential retrofit Management Measures for eventual inclusion into the Action Plan section of this report. Results of the inventory and detailed summaries of each detention basin can be found in Appendix B. The inventory resulted in 77 dry bottom with turf slopes, 79 wet /wetland bottom with turf slopes, 26 naturalized wet/wetland bottom, and 3 naturalized dry bottom basins (Figure 38).

Of the 185 basins, only 20 (11%) likely provide "Good" ecological and water quality benefits while 40 basins (22%) likely provide "Average" benefits. The remaining 125 basins (69%) likely provide "Poor" ecological and water quality benefits because most were designed simply to meet stormwater storage volume requirements. Designs that also improve water quality and wildlife habitat were not necessarily considered because they are not required under local and federal regulations. Will and Counties require that Best Management Practices (BMPs) such as detention basins be part of permitted developments to provide green infrastructure, sustainability, minimize human intervention, and to treat stormwater as a multiple use resource. However, other than required volume and release rates, detailed examples and standardized specifications are not provided leaving a great deal of ambiguity regarding what is actually required.

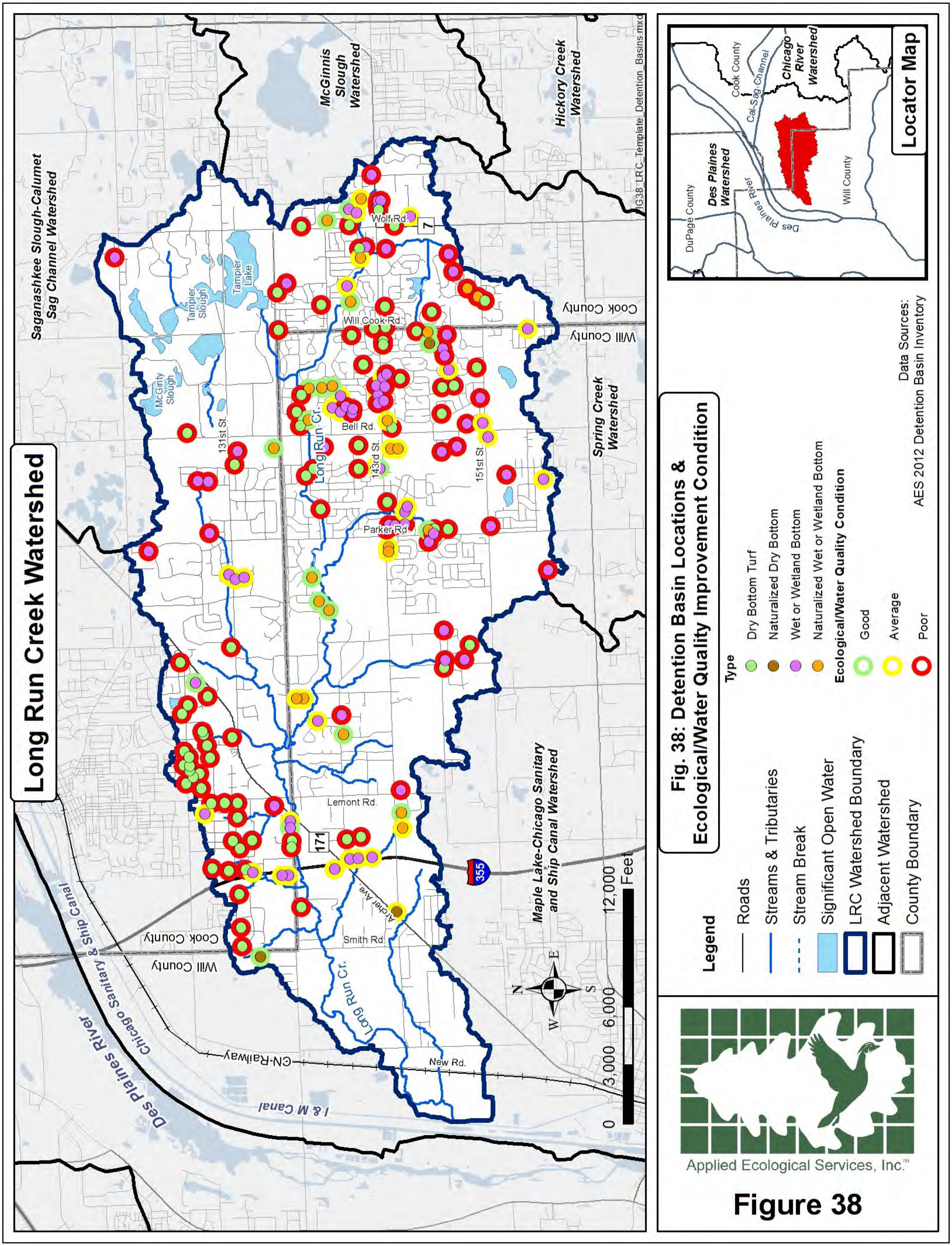
The majority of dry bottom detention basins are located within the Village limits of Lemont and Homer Glen. Of the 80 dry bottom basins in the watershed 77 are planted with turf grass that provides little to no water quality benefits, wildlife habitat, or infiltration to replenish groundwater. Dry bottom basins planted with turf grass hold water for shorter periods following rain events and infiltrate less water compared to dry bottom basins naturalized with deep rooted vegetation such as the naturalized basin at Bambrick Park in Lemont. In addition, many of the dry bottom basins are constructed with either concrete low flow channels that run directly from the inlet to the outlet or have outlet drains flush with the

Naturalized dry bottom detention at Bambrick Park, Lemont area

Typical dry bottom basin w/concrete channel behind Aldi, Lemont

Typical wet bottom detention with turf slopes at Shadow Ridge Estates, Palos Park bottom of the basin. In these cases, polluted stormwater runoff following smaller rain events travels directly through the basin without being stored, treated, or infiltrated. These designs should be avoided in the future. Many of the dry bottom basins in the watershed present excellent retrofit opportunities. Most dry bottom basins are relatively easy to naturalize with native plantings and concrete structures and drains can be manipulated to store and infiltrate water as desired.

Wet and wetland bottom detention basins are also common in the watershed and concentrated in Homer Glen and Orland Park. Individual development sites tend to have basins that are all similarly planted. For example, most wet and wetland bottom basins in a development are planted with either turf grass along the basin slopes or are naturalized with native vegetation along the slopes and emergent edge. Basins planted with turf grass were designed with aesthetics in mind and not necessarily the potential water quality and habitat benefits. Because of this, most homeowner and business associations will likely disapprove of installing water quality retrofits such as native plant buffers unless they can be designed to look formal and need minimal maintenance. Twenty six (26) of the 105 wet and wetland bottom detention basins in the watershed are naturalized with native vegetation. Most of these are located in Homer Glen. Like most dry bottom basins, the side slopes and emergent areas of wet and wetland bottom basins can be retrofitted with native vegetation relatively easily.


Long Run Creek Watershed
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Tampier Slough
Tampier Lake
McGinty Slough
131st St.
143rd St.
151st St.
Wolf Rd.
Will Cook Rd.
Bell Rd.
Parker Rd.
Lemont Rd.
Smith Rd.
New Rd.
Archer Ave.
Long Run Cr.
Cook County
Will County
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN Railway
7
171
355
0 3,000 6,000 12,000 Feet
N
S
E
W
Locator Map
DuPage County
Des Plaines Watershed
Des Plaines River
Cook County
Cal-Sag Channel
Chicago River Watershed
Will County
Fig. 38: Detention Basin Locations & Ecological/Water Quality Improvement Condition
Type
Dry Bottom Turf
Naturalized Dry Bottom
Wet or Wetland Bottom
Naturalized Wet or Wetland Bottom
Ecological/Water Quality Condition
Good
Average
Poor
Data Sources:
AES 2012 Detention Basin Inventory
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Applied Ecological Services, Inc.™
Figure 38

3.13.4
TAMPIER LAKE

Dam at southwest end of Tampier Lake

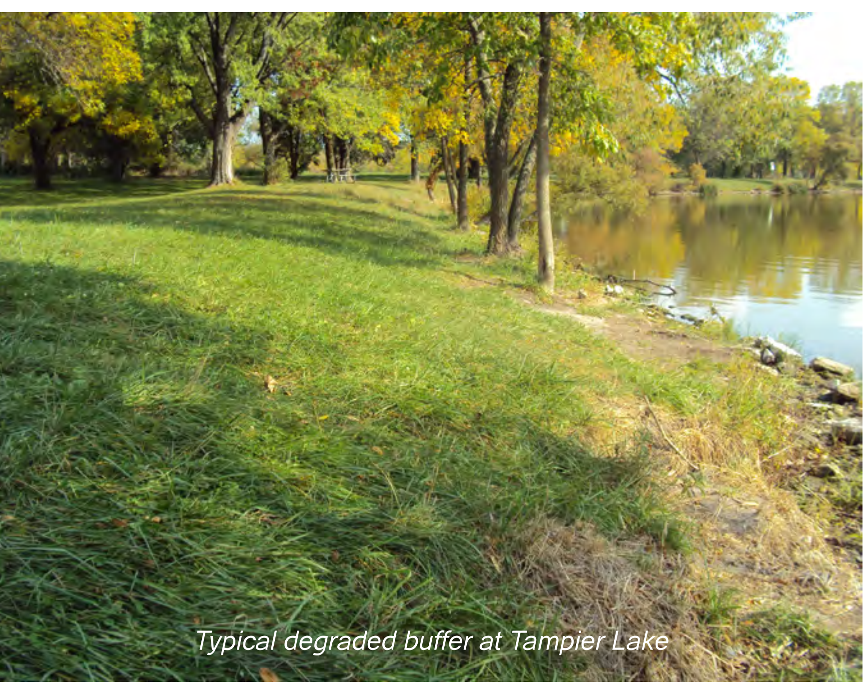
Tampier Lake is a 160-acre eutrophic (fertile), human created lake, found in the southeast portion of John J. Duffy Preserve and is considered the only true lake in Long Run Creek watershed. The maximum depth of the lake is 16 feet with an average depth of 6 feet. 1,577 acres of mostly forest/shrubland/grassland, medium density residential in Palos Park, open water sloughs, and row crop agricultural land within Subwatershed Management Unit 5 (see Section 3.8) drain to the lake. The area now containing the lake was historically a series of shallow sloughs which were excavated out of peat around 1958 when the Forest Preserve District of Cook County (FPDCC) purchased the surrounding property (IEPA, 2010). In 1962, the FPDCC dug a number of channels around the proposed lake and a dam was constructed on a tributary of Long Run Creek creating a 75-acre lake. A three foot cap was later added to the dam in 1964 to raise lake levels and create the footprint of the lake as seen today. The open water area extending north under the 131st Street bridge is referred to as Tampier Slough.

Aerial image of Tampier Lake within John J. Duffy Preserve. Source: Google Maps.

SECTION 3.0

Lotus plants at Tampier Lake

Cove at Tampier Lake



Typical degraded buffer at Tampier Lake

Tampier Lake and surrounding preserve are used heavily by humans for recreation. The Sag Valley Trail runs along the south side of Tampier Lake and is popular for hiking, horseback riding, and bird watching. A parking/picnic area and fishing access is found on the west side of the lake in an area called Tampier Lake-West. Tampier Lake Boating Center is located on the east side of the lake and provides boat and canoe rentals and also a boat launch. Tampier Lake is known locally for it fishery and waterfowl populations. Walleye, northern pike, channel catfish, sunfish, crappie, and largemouth bass are common catches in the Lake. Waterfowl are highly abundant, especially during spring and fall migration. The state endangered Ospreys, a large bird of prey that lives and breeds near wetlands and lakes, is known to nest at Tampier Lake. In addition, the lake supports a population of a relatively uncommon emergent plant called lotus (*Nelumbo lutea*).

The most comprehensive study of Tampier Lake was conducted in 2010 by Illinois EPA-Bureau of Water as part of a Total Maximum Daily Load (TMDL) report for the lake (IEPA, 2010). A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The report was generated because Tampier Lake (IEPA code RGZO) was listed by Illinois EPA as "Impaired" (303(d) listed) in Illinois EPA's Integrated Water Quality Report issued in March 2008. It is also listed as impaired in the most recent 2012 Illinois EPA report. Tampier Lake is listed for impairment of *Aesthetic Quality* due to total suspended solids (TSS), aquatic plants, aquatic algae, and total phosphorus (TP) originating from multiple sources including waterfowl and runoff from forest/grassland/ parkland, agriculture, and urban areas. A more detailed discussion of water quality issues impacting Tampier Lake can be found in Section 4.0.

Illinois EPA's 2010 TMDL report lists various external and internal Management Measures that can be implemented to potentially reduce non-point sources of pollution, particularly phosphorus. These include:

1. Filter strips
2. Riparian buffers
3. Wetlands
4. Nutrient management
5. In-lake management measures

The condition of the shoreline and buffer around much of the western and northern portions of Tampier Lake within park areas is degraded. Installing riparian buffers around much of this area is perhaps the best short term project that might result in significant pollutant load reductions to the lake. Installation of native plant buffers would increase infiltration of surrounding runoff, stabilize eroded shoreline areas, improve habitat, and even deter geese from feeding and defecating along the shoreline. Trails and fishing access areas could also be incorporated into buffer designs.

Restored buffer at Morton Arboretum

Noteworthy- Tampier Lake TMDL

It is important to note that the Illinois EPA clearly states in their 2010 TMDL report for Tampier Lake that all programs discussed in the "Implementation Plan" section are voluntary. In other words, entities with jurisdiction in portions of Tampier Lake's subwatershed including Palos Park, Orland Park, Palos Township, Orland Township, and the Forest Preserve District of Cook County are not required to implement projects recommended by Illinois EPA in their 2010 TMDL report or the Long Run Creek Watershed-Based Plan.

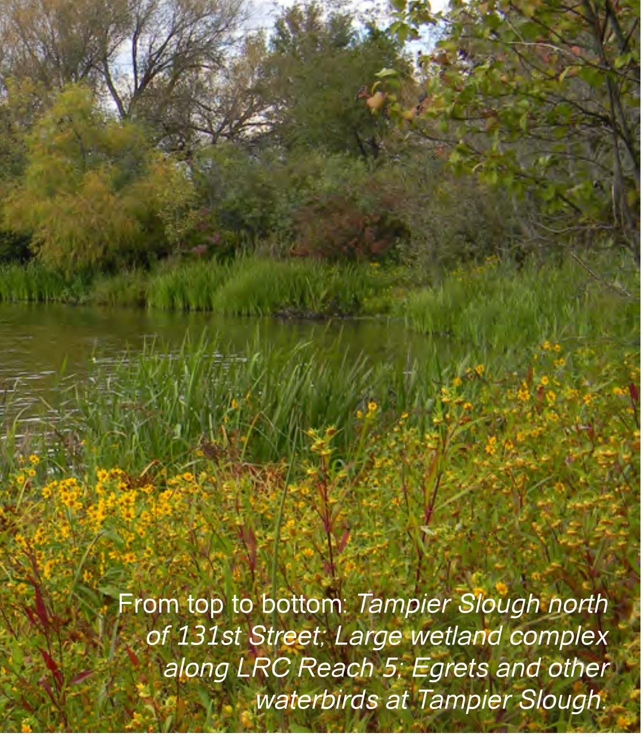
SECTION 3.0

3.13.5 WETLANDS & POTENTIAL WETLAND RESTORATION SITES

A diverse network of wetlands remained intact in Long Run Creek watershed until the late 1830s when European settlers began to alter significant portions of the watershed's natural hydrology and wetland processes. Where it was feasible, sedge meadow, wet prairie, and marsh communities were drained, streams channelized, and existing vegetation cleared to farm the rich soils. There were approximately 3,312 acres of wetlands in the watershed prior to European settlement based on the most up to date hydric soils mapping provided by the USDA Natural Resources Conservation Service (NRCS). According to existing wetland inventories, about 1,191 acres or 36% of the pre-European settlement wetlands remain (Figure 39). A more detailed discussion of important natural area wetlands can be found in Section 3.12.

Functional wetlands do more for water quality improvement and flood reduction than any other natural resource. In addition, intact wetlands typically provide habitat for a wide variety of plant and animal species. They also provide groundwater recharge, filter sediments and nutrients, and slowly discharge to streams thereby maintaining water levels in streams during drought periods. General wetland information and mapping is available for Long Run Creek watershed via the United States Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI). Applied Ecological Services, Inc. updated the NWI wetland boundaries and noted the location of wetlands not included in the NWI during a field inventory of the watershed conducted in fall 2012. The wetland data collected during the field inventory was used to map and describe the existing wetlands in the watershed and to help locate potential wetland restoration sites.

Most of the smaller wetlands that were scattered about the watershed and most of the remaining wetlands along Long Run Creek and tributaries were drained or degraded by farming practices at some point in the last 150 years to the extent that hydrology has changed and invasive species such as purple loosestrife (*Lythrum salicaria*), common and glossy buckthorn (*Rhamnus sp.*), reed canary grass (*Phalaris arundinacea*), and common reed (*Phragmites*



From top to bottom: *Tampier Slough north of 131st Street; Large wetland complex along LRC Reach 5; Egrets and other waterbirds at Tampier Slough.*

australis) now dominate. Twelve large wetland complexes accounting for about 450 acres remain in areas surrounding Long Run Creek and several tributaries. These wetlands were identified in the watershed as being important for stormwater storage, wildlife corridors, and/or green infrastructure connections.

Some of the largest and higher quality wetland areas are found at McGinty Slough, Tampier Slough, and various other unnamed sloughs in John J. Duffy Preserve. These shallow, swamp-like wetlands are among the largest in the region and provide ample habitat for shorebirds, egrets, herons, ducks, and other waterbirds during spring and fall migrations.

The highest quality wetland in the watershed is found at Long Run Seep Nature Preserve. There seeps and fen wetlands formed at the base of the Des Plaines River valley bluffs provide cold calcareous groundwater that supports many conservative and rare plants. The seeps also provide critical habitat for the Hine's Emerald Dragonfly (HED), a federal and state listed endangered species.

Noteworthy- Wetland Protection

Wetlands connected to "Waters of the United States" are protected in Will and Cook Counties by the U.S. Army Corps of Engineers (USACE)-Chicago District via section 404 of the Clean Water Act. The USACE will generally require an Individual Permit (IP) for modifications to high quality wetlands although most high quality wetlands are generally considered unmitigatable. In rare cases where mitigation is allowed, as much as a 5:1 mitigation ratio is required. Additionally, high quality wetlands located within developed areas require a 100-foot buffer to aid in protection. Mitigation for impacts to low quality wetlands is set at a 1.5:1 ratio.

The USACE does not have jurisdiction over "Isolated Wetlands." Counties and municipalities have jurisdiction over isolated wetlands via countywide ordinances. However, these ordinances do not prevent the net loss of isolated wetlands. It is recommended that local municipalities and counties pass local ordinances to protect isolated wetlands.

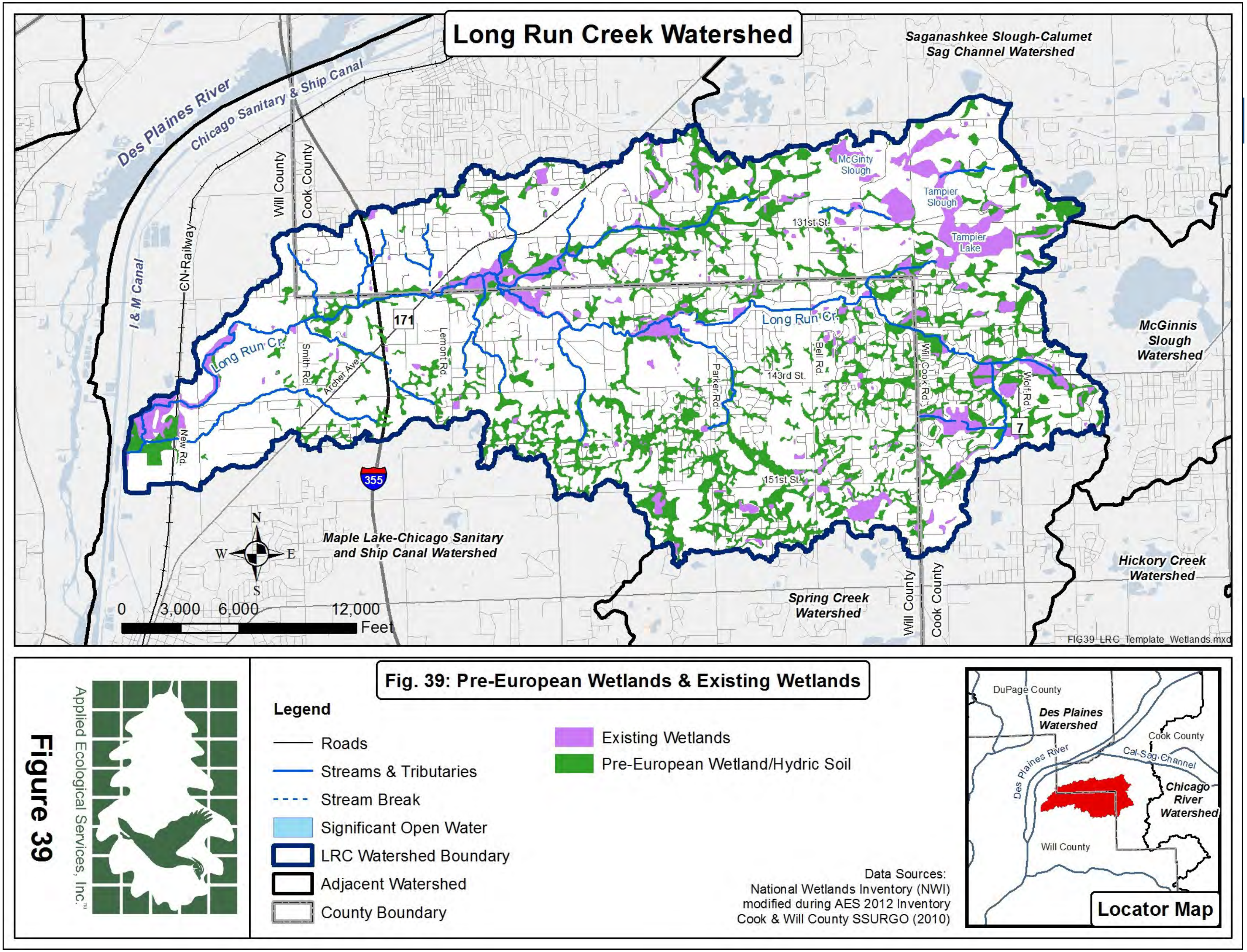


Fig. 39: Pre-European Wetlands & Existing Wetlands

Potential Wetland Restoration Sites

Wetland restoration projects are among the most beneficial in the context of improving watershed health. Wetlands are vitally important because they improve basic environmental functions such as storing floodwaters, increasing biodiversity, creating green infrastructure, and improving water quality. The wetland restoration process involves returning hydrology (water) and vegetation to soils that once supported wetlands but no longer do because of human impacts such as tile and ditch draining and/or filling. Potential wetland restoration sites were identified using a Geographic Information Systems (GIS) exercise whereby sites were selected that include at least 3 acres of drained hydric soils located on an open or partially open parcel where no wetlands currently exist.

The GIS exercise resulted in 116 sites meeting the above criteria. However, the extent of development in Long Run Creek watershed limits the number and size of potential wetland restoration sites. Of the original 116 sites, only 30 (accounting for 545 acres) were determined to be potentially feasible or have at least limited feasibility after careful review of each site using 2012 aerial photography, open space inventory results, existing (2012) land use, and field visits where appropriate (Table 17; Figure 40). Of the 30 sites, 23 are "Potentially Feasible," and 7 have "Limited Feasibility." Most of the potentially feasible sites are located on large blocks of undeveloped land such as agricultural fields. Sites with limited feasibility are generally smaller and more closely associated with nearby development. Most of the sites that were eliminated were found in partially open areas where the proximity of existing development simply would not allow for wetland restoration. It is important to note that a feasibility study beyond the scope of this project will need to be completed prior to the planning and implementation of any potential wetland restoration. In addition, potential wetland restoration sites located within ComEd right-of-ways may not be feasible if the restoration affects access to structures or creates standing water conditions.

A detailed summary of wetland restoration recommendations is included and prioritized in the Action Plan section of this report. Site #s 1, 2, 3, 8, 9, 13, 14, 16, 17, 18, 19, 21, and 22 are among the highest priority because of their location, size, or potential to remediate watershed problems and/or potential as wetland mitigation banks. Municipalities should strongly consider "Conservation Design" that incorporates wetland restoration on parcels slated for future development and parks. Another potential option is to restore wetlands as part of a wetland mitigation bank. In this case, wetlands are restored on private or public land and must meet certain performance criteria before they become "fully certified." Following certification, developers are able to buy wetland mitigation credits from the wetland bank for wetland impacts occurring elsewhere in the watershed. A fully certified acre of restored wetland can sell between $40 and $100 thousand dollars. Although this may seem like an enormous expense to a developer, it is often cheaper than going through a long permitting process to impact wetlands and provide mitigation on the development site. It is also possible that in the future Illinois EPA may require more strict nutrient policies for wastewater treatment plants. Wetland banks may provide an opportunity for plant owners to buy "water quality trading credits."

Potential wetland restoration opportunity at Site 16.
Source: Google Maps

SECTION 3.0

Table 17. Size, feasibility, and existing condition of potential wetland restoration sites.

Map ID #	Area (ac)	Feasibility	Existing Condition
1	14.7	Potentially Feasible	Located on private agricultural land at northeast corner of Will-Cook Rd. and 151st St. Area is slated for future residential development.
2	23.4	Potentially Feasible	Located on private agricultural land in far southeast corner of watershed
3	24.0	Potentially Feasible	Two sites on private agricultural land at headwaters of Long Run Creek
4	4.8	Limited Feasibility	Located on private residential lot
5	4.9	Potentially Feasible	Located at northeast corner of Long Run Creek and Wolf Road on private land within floodplain in Orland Township
6	5.3	Potentially Feasible	Northern portion located within Tampier Lake Greenway; southern portion located within ComEd utility easement
7	11.1	Limited Feasibility	Located on private agricultural land split by ComEd utility easement
8	9.5	Potentially Feasible	Located on private agricultural land east of Tampier Lake
9	9.3	Potentially Feasible	Located on private agricultural land east of Tampier Lake
10	7.5	Potentially Feasible	Located at northeast end of Tampier Lake. Area is split between John J. Duffy Preserve, ComEd utility easement and private agricultural land
11	5.2	Potentially Feasible	Located at northeast end of Tampier Lake within John J. Duffy Preserve
12	5.6	Potentially Feasible	Located in floodplain area surrounded by residential development
13	40.7	Potentially Feasible	Located within John J. Duffy Preserve
14	25.9	Potentially Feasible	Series of sites surrounding existing wetland complex on private agricultural land at southeast corner of Bell Rd. and 151st St. Area is slated for future commercial & residential development.
15	10.1	Potentially Feasible	Located on private agricultural land and ComEd utility easement
16	84.0	Potentially Feasible	Large site located primarily on private
17	74.6	Potentially Feasible	Two locations located on private
18	26.7	Potentially Feasible	Located on Homer Glen open space (formerly Woodbine Golf Course) at headwaters of Tributary D
19	21.8	Potentially Feasible	Series of locations on private agricultural land
20	10.5	Limited Feasibility	Located on private agricultural land and ComEd utility easement. Site is situated between Gleneagles Country Club and Bell Road.
21	25.2	Potentially Feasible	Located on private agricultural land at headwaters of Tributary F. Area is slated for future “Conservation Development” by Village of Lemont.
22	30.1	Potentially Feasible	Series of locations on private agricultural land. Area is slated for future “Conservation Development” by Village of Lemont.
23	7.2	Potentially Feasible	Located on private agricultural land
24	4.4	Limited Feasibility	Located on private agricultural/pasture land (Honeyman Farms) at headwaters of Tributary H
25	31.4	Potentially Feasible	Located on private lots surrounding Long Run Creek; most of south portion is located on Narnia Estate
26	6.7	Limited Feasibility	Located primarily within ComEd utility easement
27	3.9	Potentially Feasible	Located on private agricultural land
28	5.2	Limited Feasibility	Located on private agricultural area along I-355 corridor at headwaters of Tributary M (South Ditch)
29	3.6	Potentially Feasible	Located on private agricultural land; could benefit flooding problems on Big Run Golf Course
30	8.0	Limited Feasibility	North half located on Big Run Golf Course; south half within ComEd utility easement and private agricultural/pasture land

Note: A feasibility study will need to be completed prior to the planning and restoration of any potential wetland restoration.

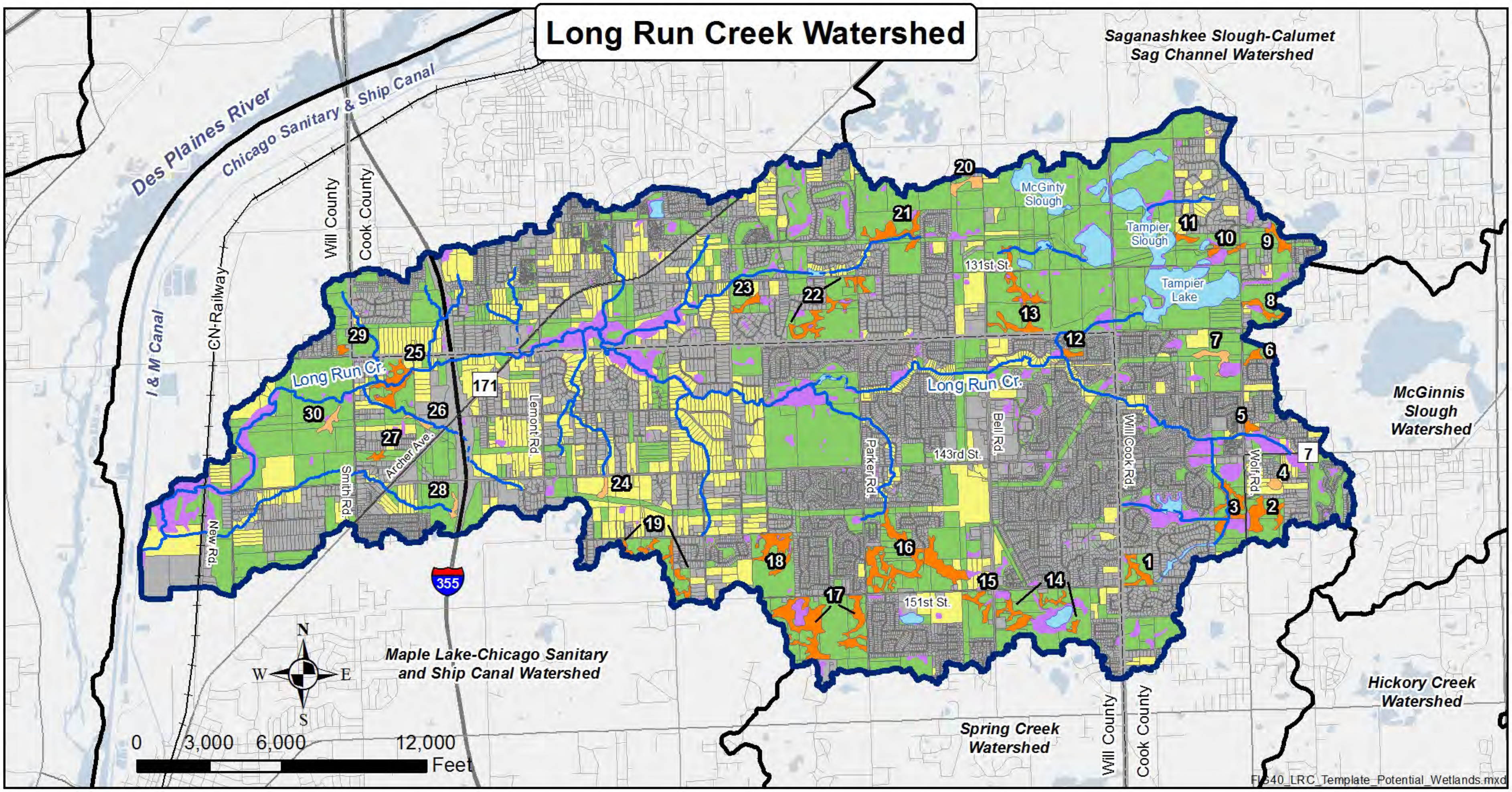


Figure 40

Applied Ecological Services, Inc.™

Fig. 40: Potential Wetland Restoration Sites

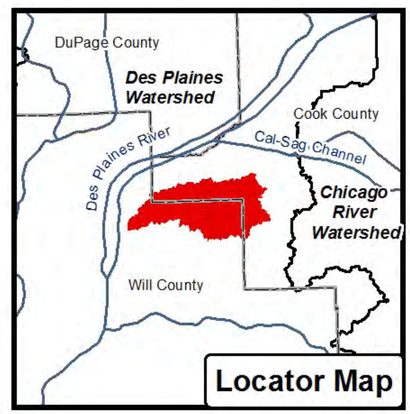
Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary
- Existing Wetlands
- Open Parcel
- Partially Open Parcel
- Developed Parcel

Wetland Restoration Site Feasibility

- Limited Feasibility
- Potentially Feasible

Data Sources:
National Wetlands Inventory (NWI)
modified during AES 2012 Inventory
Cook & Will County SSURGO (2010)



High water sign near Long Run Creek

3.13.6 FLOODPLAIN & FLOOD PROBLEM AREAS

FEMA 100-Year Floodplain

Functional floodplains along stream and river corridors perform a variety of green infrastructure benefits such as flood storage, water quality improvement, passive recreation, and wildlife habitat. The most important function however is the capacity of the floodplain to hold water following significant rain events to minimize flooding downstream. The 100-year floodplain is defined by the Federal Emergency Management Agency (FEMA) as the area that would be inundated during a flood event that has a one percent chance of occurring in any given year (100-year flood). 100-year floods can and do occur more frequently, however the 100-year flood has become the accepted national standard for floodplain regulatory and flood insurance purposes and was developed in part to guide floodplain development to lessen the damaging effects of floods.

The 100-year floodplain also includes the floodway. The floodway is the portion of the stream or river channel that comprises the adjacent land areas that must be reserved to discharge the 100-year flood without increasing the water surface. Figure 41 depicts the 100-year floodplain and floodway in relation to a hypothetical stream channel.

As expected, the mapped floodplain in the watershed closely follows Long Run Creek and its tributaries. Figure 42 depicts the 100-year floodplain which occupies 1,152 acres or about 7% of the watershed. The most extensive floodplain areas are associated with larger wetland complexes along Long Run Creek such as west of Wolf Road, between Parker Road and Cedar Road, between King Road and Lemont Road, through Big Run Golf Course, and the area west of New Road.

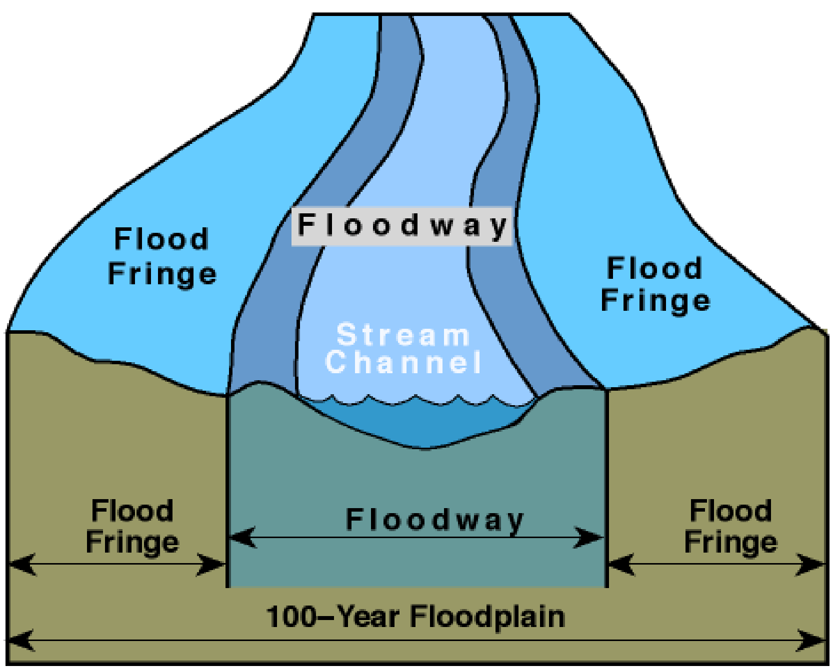


Figure 41. 100-year floodplain and floodway depiction.

Documented Flood Problem Areas

For this report, a Flood Problem Area (FPA) is defined as a location where documented flooding can or does cause structural damage or other problems such as flooding roads. Information about the location and condition of documented FPAs was obtained from the "Long Run Creek Watershed Plan" created by Long Run Creek Watershed Planning Committee in 2001 (LRCWPC, 2001) and from information provided by watershed stakeholders.

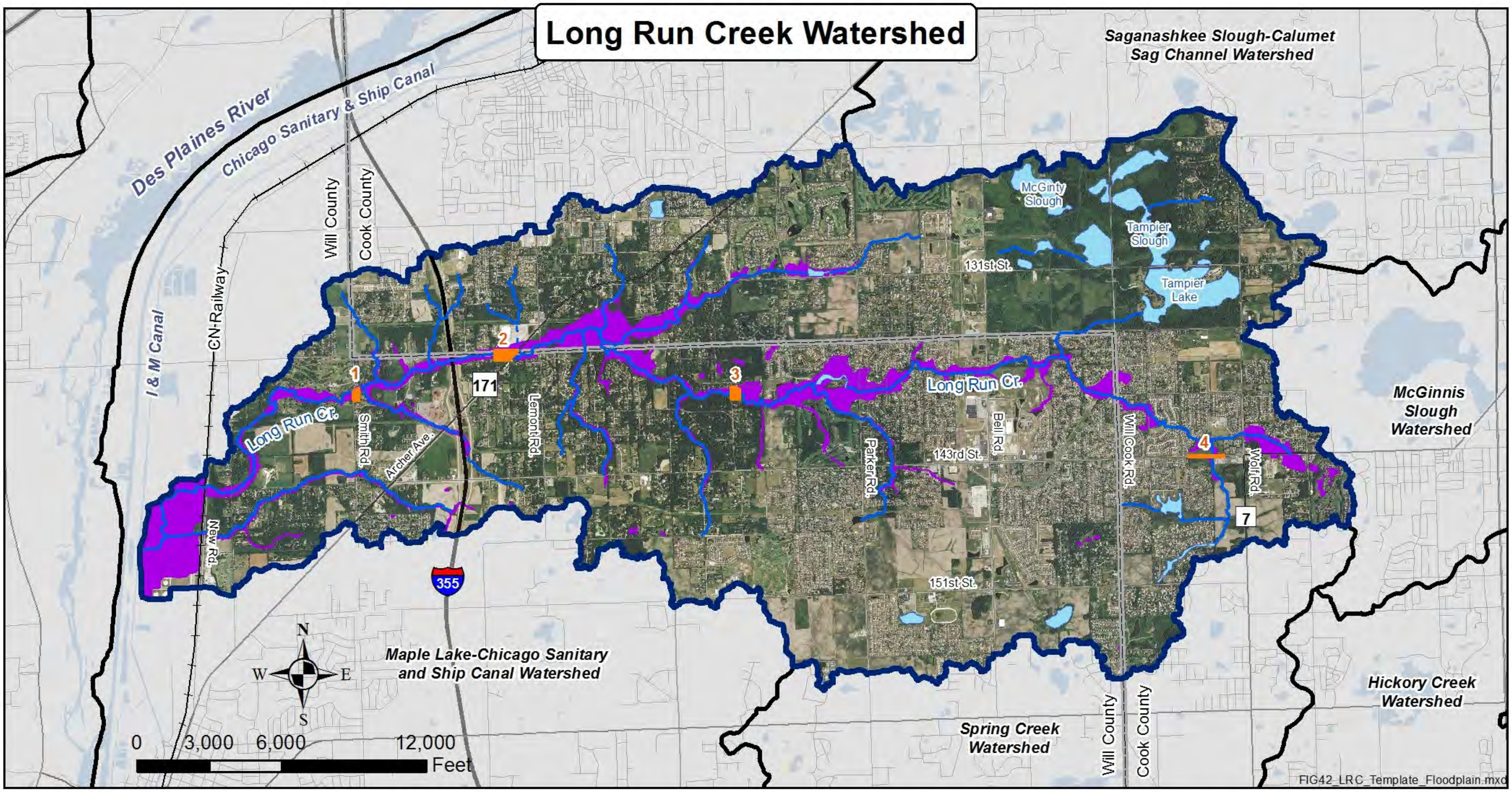


Fig. 42: FEMA 100-Year Floodplain and Flood Problem Areas

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary
- Documented Flood Problem Areas
- FEMA 100-Year Floodplain

Data Sources:
Will County (2004)
FEMA (Cook County, 2012)

Applied Ecological Services, Inc.™

Figure 42

Four documented FPAs were identified in Long Run Creek watershed (Figure 42). Information about each FPA is included in Table 18. FPA #1 is located at the southeast corner of Long Run Creek and Smith Road. There, a residential home and small business building occasionally flood when Long Run Creek overtops its banks. Flooding at this location appears to be the result of development that occurred within the 100-year floodplain. There are no obvious mitigation opportunities at this site other than to flood proof individual structures.

FPA #2 is located at the intersection of 135th Street and Archer Avenue. The roads in this area are located relatively low within the 100-year floodplain. During high water events, Long Run Creek overtops its banks and floods the roads. A project was begun in fall 2012 via Will County Department of Highways to implement improvements along 135th Street including the relocation of Long Run Creek. The project was completed in late summer 2013. The relocation is necessary to improve traffic safety at the intersection of 135th Street and Archer Avenue. The new stream channel is designed to improve aquatic habitat for a variety of wildlife species by including riffles and wetland vegetation along the riparian areas. It is not yet known if the project will alleviate flooding in the area.

FPA #3 is located at the northeast and southeast corners of Long Run Creek's intersection with Cedar Road within Homer Glen. Residential homes on the north and south side of Long Run Creek are located in or near the 100-year floodplain and are known to flood on occasion. Flood mitigation opportunities at this site include flood proofing of individual structures and potential flood storage projects upstream such as that located within a large wetland complex south of Erin Hills Subdivision.

FPA #4 is located along 143rd Street and west of Wolf Road within Orland Park. There, water overtops 143rd Street during high water events when the surrounding wetland complex becomes inundated. It appears that the road floods because its elevation in this location is within the floodplain. The obvious mitigation opportunity is to raise the elevation of 143rd Street and possibly the culvert size where Long Run Creek passes under 143rd.

Table 18. Documented Flood Problem Areas.

Flood Problem Area #	Type of Flooding	Location/Description	Potential Mitigation Measures
1	Overbank-Residential Homes	Southeast corner of Long Run Creek and Smith Road	Flood proof individual structures
2*	Overbank-Roads	Intersection of 135th Street and Archer Avenue	Improve 135th Street and relocate a portion of Long Run Creek
3	Overbank-Residential Homes	Northeast and southeast corners of Long Run Creek's intersection with Cedar Road	Flood proof individual structures and/or implement flood storage project upstream in wetland complex south of Erin Hills Subdivision
4	Wetland Inundation-Roads	Along 143rd Street and west of Wolf Road	Raise the elevation of 143rd Street and possibly the culvert size where Long Run Creek passes under 143rd

* Project was implemented in 2013 but flood reduction benefits are not yet known.

3.14 GROUNDWATER AQUIFERS, RECHARGE, & COMMUNITY WATER SUPPLY

Groundwater Aquifers

Groundwater is water that saturates small spaces between sand, gravel, silt, clay particles, or crevices in underground rocks. Groundwater is found in aquifers or underground formations that provide readily available quantities of water to wells, springs, or streams. Groundwater sources available to Northeastern Illinois are found in shallow aquifer units and deep aquifer units (Figure 43). The shallow aquifers are found in unconsolidated sand and gravels within the Quaternary Unit. An impermeable layer of bedrock separates the shallow aquifers from the deep aquifers found in layers of sandstone within the Ancell Unit, Ironton-Galesville Unit, and Mt. Simon Unit. Both shallow and deep aquifers are tapped and used by residences, farms, or entire communities.

Groundwater modeling studies conducted for the 11-county Northeastern Illinois Regional Water Supply Planning area by the Illinois State Water Survey (ISWS) (ISWS, 2012) suggests that by 2005 groundwater drawdown levels in the Ancell and Ironton-Galesville aquifer Units fell by 500 feet and over 1,100 feet respectively in northern Will County/Long Run Creek watershed area since pumping began in the 1860s. These deep aquifer Units are the principal deep aquifers in the region. Modeling also suggests that drawdown will reach 800 feet in the Ancell Unit and over 1,500 feet in the Galesville Unit by 2050 (Figure 44). Ultimately, groundwater models suggest that additional drawdown, reduction in stream base flow, and changes in the quality of groundwater from deep wells are all possible in the future (ISWS, 2012).

Groundwater modeling studies conducted for the 11-county Northeastern Illinois Regional Water Supply Planning area by the Illinois State Water Survey (ISWS) (ISWS, 2012) suggests that by 2005 groundwater drawdown levels in the Ancell and Ironton-Galesville aquifer Units fell by 500 feet and over 1,100 feet respectively in northern Will County/Long Run Creek watershed area since pumping began in the 1860s. These deep aquifer Units are the principal deep aquifers in the region. Modeling also suggests that drawdown will reach 800 feet in the Ancell Unit and over 1,500 feet in the Galesville Unit by 2050 (Figure 44). Ultimately, groundwater models suggest that additional drawdown, reduction in stream base flow, and changes in the quality of groundwater from deep wells are all possible in the future (ISWS, 2012).

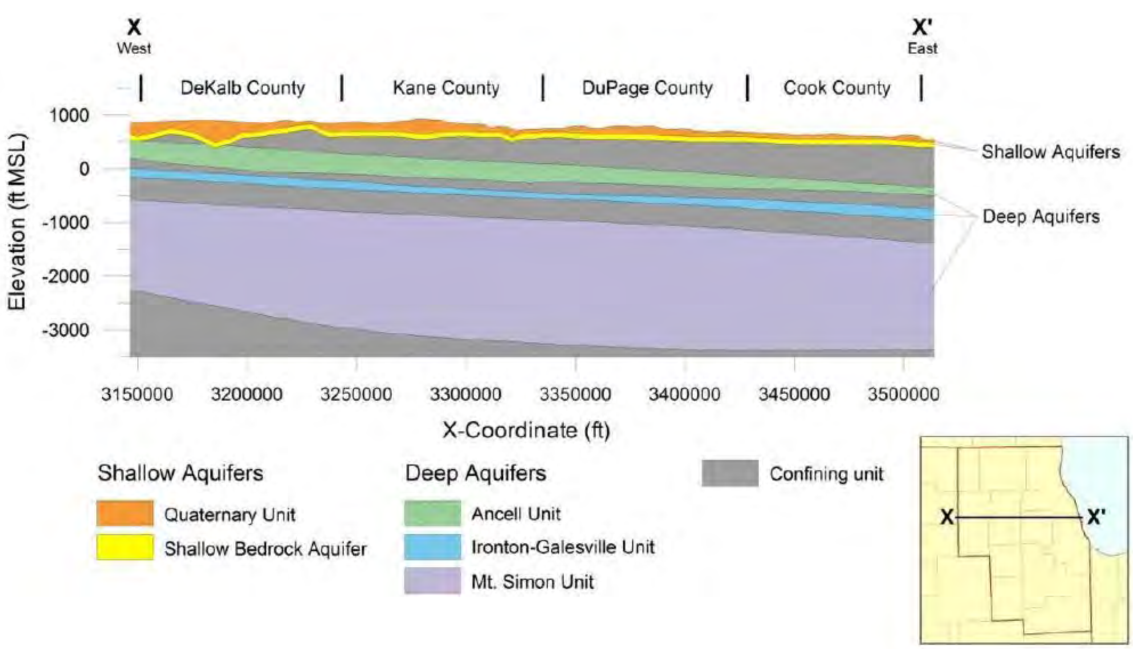
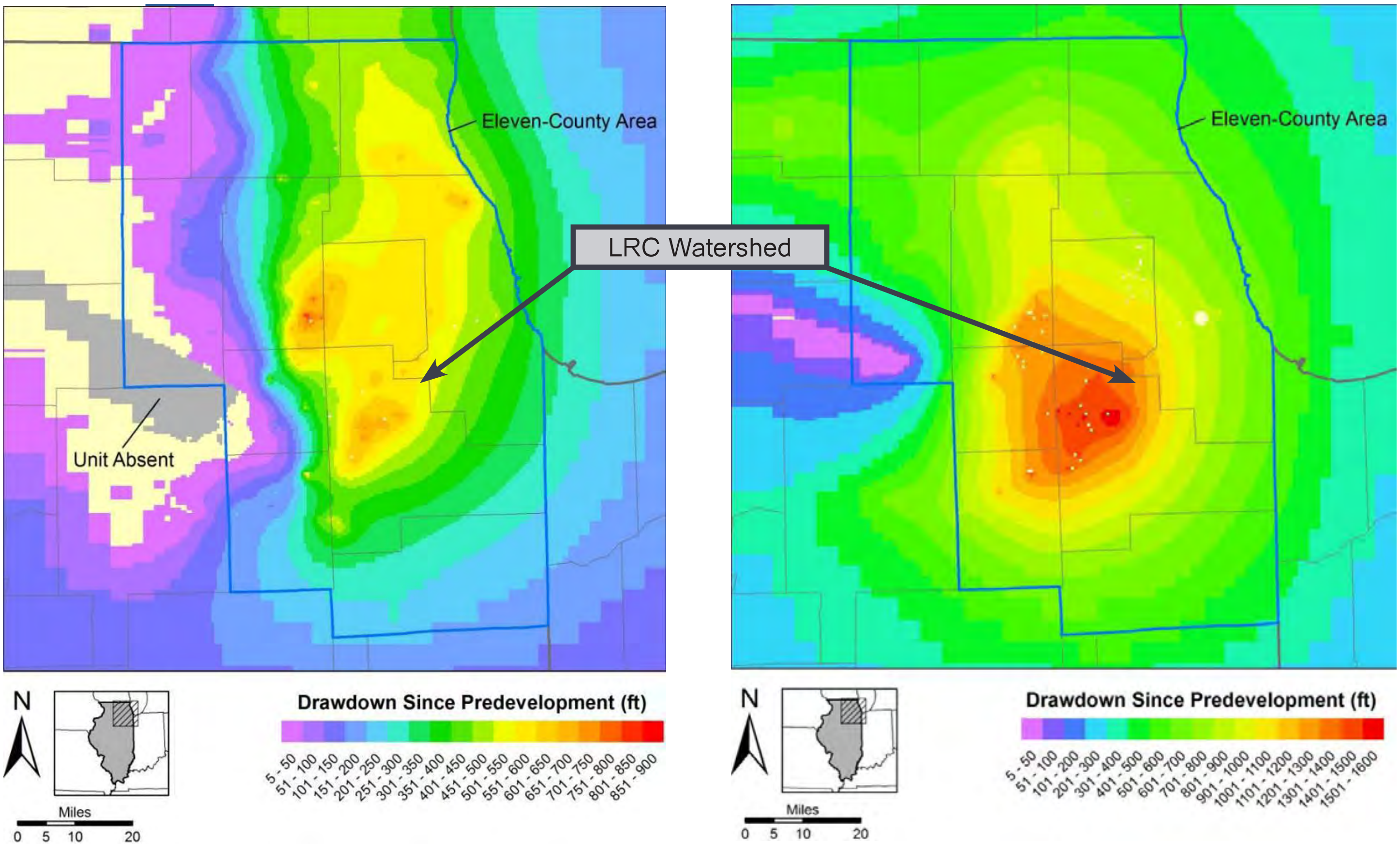
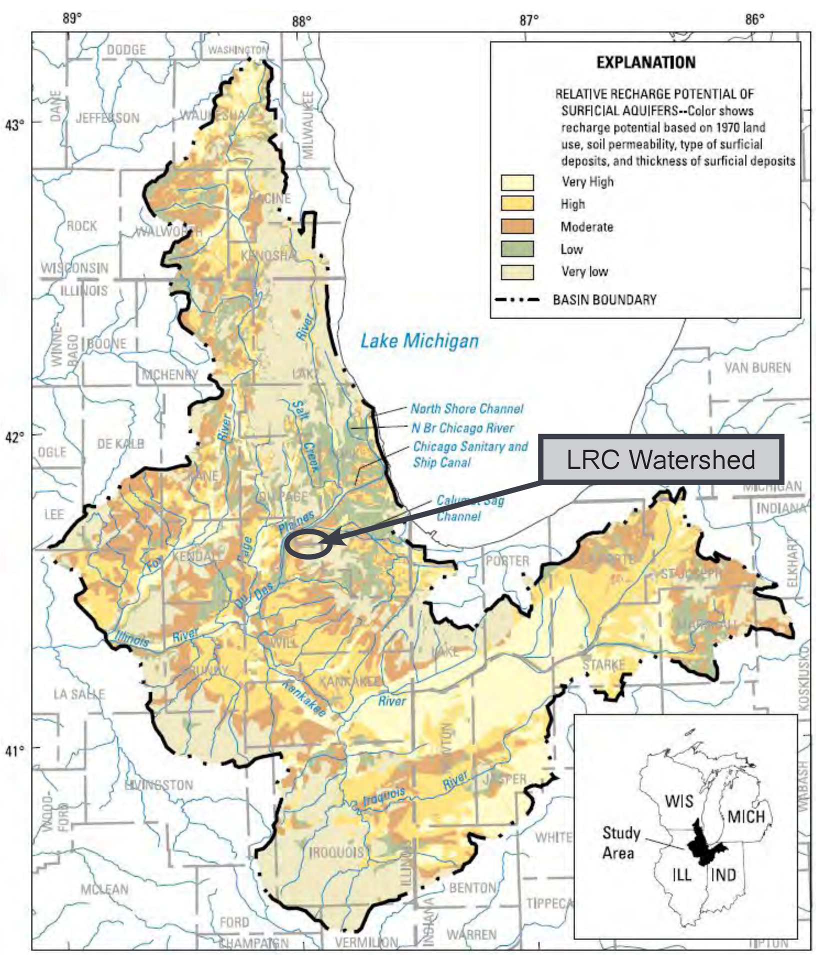


Figure 43. Northeastern Illinois deep and shallow aquifer units. Source: ISWS 2012.



Above: Figure 44. Year 2050 modeled groundwater drawdown in the Ancell Unit (left) and Ironton-Galesville Unit (right). Source: ISWS 2012.**Below: Figure 45.** Groundwater recharge potential. Source: USGS 2000.



Groundwater Recharge

Groundwater aquifer recharge is the process by which precipitation reaches and re-supplies the groundwater aquifers. Conversely, groundwater discharge occurs when groundwater water seeps out though permeable soils to low areas such as stream channels and wetlands. In 2000 the United States Geological Survey (USGS) developed a groundwater recharge model for the Upper Illinois River Basin (USGS, 2000). The model suggests the west half of Long Run Creek watershed has moderate to high recharge potential while the east half has low recharge potential (Figure 45). The implication is relatively straight forward; traditional existing and future development in the west half of the watershed reduces groundwater recharge to shallow aquifers due to the effect of impervious surfaces. This is why it is critical for future development and redevelopment to incorporate practices that better infiltrate stormwater.

Long Run Seep Nature Preserve Groundwater Recharge Area

Long Run Seep is an 89-acre Illinois Nature Preserve located in the far western side of the watershed along the Des Plaines River valley bluffs. The preserve harbors rare seep and fen communities that supply cold calcareous groundwater that provides critical habitat for the Hine's Emerald Dragonfly (HED), a federal and state listed endangered species. Both the HED and its habitat, including the groundwater recharge area and surface water drainage area to the preserve, are protected under the Illinois Natural Areas Preservation Act. Until recently, the estimated groundwater recharge area supplying Long Run Seep was not known.

In 2012, Illinois Nature Preserves Commission (INPC) petitioned Illinois EPA to designate the groundwater recharge area to Long Run Seep Nature Preserve as a Class III Special Resource Groundwater Classification. Class III designation allows an area to be subjected to special water quality standards and if an impact to a protected nature preserve's groundwater resource can be shown, the Office of the Illinois Attorney General can immediately cease the source activity of the impact. INPC's petition process involves enlisting help from the Illinois State Geological Survey (ISGS) to compile a Special Resource Groundwater report entitled "*Selected Scientific and Technical Information about Long Run Seep Nature Preserve* (ISGS, 2012)." In this report, ISGS identifies a Regional Groundwater Contribution Area (GCA) and Adjusted Surface Water Area (ASWA) to Long Run Seep Nature Preserve.

The GCA and ASWA are combined to form a Final GCA. The Final GCA extends east covering the southern 2/3 of Long Run Creek watershed and south into several adjacent watersheds (Figure 46). The total area is a vast 26,543 acres or 41.5 square miles. Note: The Final GCA is not considered a Class III area until it is designated as such by Illinois EPA.

It is still extremely important that future development and redevelopment within the Final GCA to Long Run Seep Nature Preserve incorporate practices that better clean and infiltrate stormwater that recharges to the shallow aquifers. Future mitigation dollars from impacts to HED habitat such as mining, chemical spills, etc. should be limited to managing and restoring HED habitat or used to fund projects that support groundwater recharge within the Final GCA. There is also the issue of private and public community water supply wells located within the Final GCA (Figure 46) and how these wells form cones of depression that might affect groundwater supply to Long Run Seep Nature Preserve. It is possible that future action could be taken against owners of wells that are determined to negatively affect the HED and its habitat. This would likely lead to an increased need for Lake Michigan water.

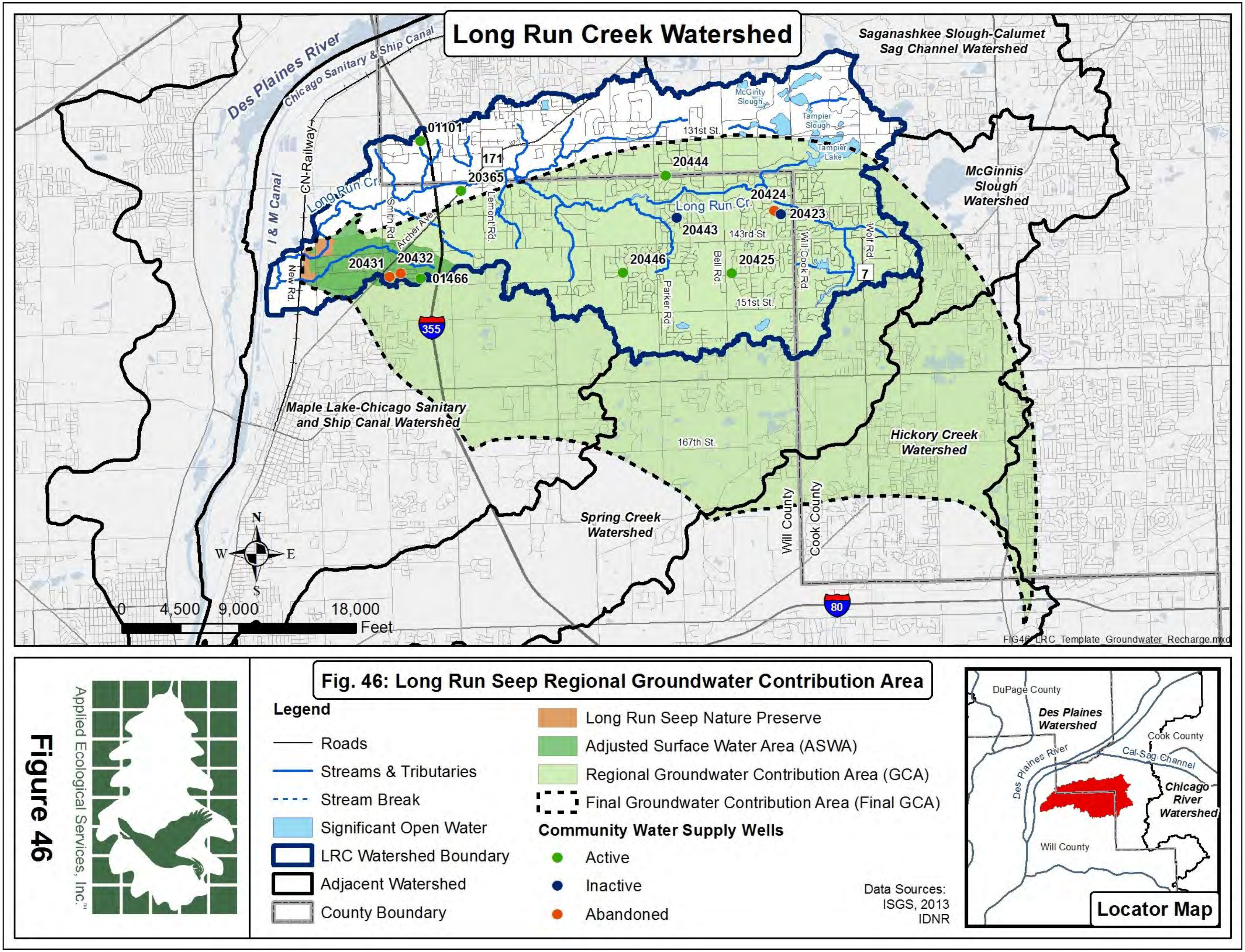


Fig. 46: Long Run Seep Regional Groundwater Contribution Area

Community Water Supply

Groundwater is an essential resource to much of south Cook County and northern Will County as underlying aquifers provide the drinking water supply for many people. The Village of Lemont's water supply comes primarily from deep wells. Lockport's water comes from both deep and shallow wells. Orland Park, Palos Park, and the eastern half of Homer Glen obtain most of their water from Lake Michigan. One interesting fact is that Palos Park obtains over 90% of its water from Lake Michigan but that as much as 65% of residents use old wells for watering purposes (personal communication with Palos Park Public Works). The western half of Homer Glen and most unincorporated areas in the watershed get water from private wells. Eleven (11) community water supply wells are located within Long Run Creek watershed but only six are active (Table 19; Figure 46). It is important to note that future development projects that include infiltration best management practices will mostly benefit the shallow aquifers and not deep aquifers.

In addition, it is likely that future groundwater wells will be proposed and the only way to determine the impacts of the pumping on Hine's Emerald Dragonfly critical habitat within Long Run Seep Nature Preserve would be via a groundwater model. Once a model is run, the location of the pumping can be tested at the proposed location and alternate locations can be recommended if needed to minimize impacts.

Table 19. Community water supply wells within Long Run Creek watershed.

Well ID	Facility	Depth (ft)	Status	Aquifer Status
01101	Lemont	1,675	Active	Confined
20365	Busy Bee MHP	100	Active	Confined
20431	Lockport HTS SNDST	220	Abandoned	Confined
20432	Lockport HTS SNDST	265	Abandoned	Confined
01466	Lockport	400	Active	Confined
20446	IL American-Homer Glen	320	Active	Confined
20444	IL American – Homer Township	360	Active	Confined
20443	IL American Chickasaw	325	Inactive	Confined
20425	IL American –Homer Township	408	Active	Confined
20424	IL American – Homer Township	410	Abandoned	Confined
20423	IL American – Derby Meadows	403	Inactive	Confined

Source: Illinois State Water Survey

3.15 WASTEWATER TREATMENT PLANTS & SEPTIC SYSTEMS

Wastewater Treatment Plants

There are two National Pollution Discharge Elimination System (NPDES) permitted wastewater treatment plant (WWTP) discharges to Long Run Creek. Studies conducted by Integrated Lakes Management (ILM, 2007) and Baetis Environmental Services, Inc. (Baetis, 2005) point to these two discharges as a cause of nutrient enrichment in Long Run Creek. Illinois American Water Company owns Chickasaw Hills WWTP which discharges under NPDES Permit No. IL0031984 to Long Run Creek just east of Parker Road. It currently has a designed average flow of 0.70 million gallons per day (MGD) and design maximum flow of 1.75 MGD. The plant's current treatment consists of screening, two-stage activated sludge, chlorine disinfection, post aeration, excess flow treatment, aerobic digestion, and gravity sludge thickening.

The existing Chickasaw Hills WWTP is currently running above capacity (0.91 MGD: 2005-2012 data) and this coupled with expected growth in the area lead to the conclusion by Illinois American Water Company to expand the plant so that current and future residents have adequate sewage treatment. In April 2009, The Chicago Metropolitan Agency for Planning (CMAP) approved a plant expansion request for the Chickasaw Hill WWTP. The proposed facility would discharge 1.27 MGD with a designed maximum 4.37 MGD. The proposed expansion includes a nitrifying treatment removal system that will employ ultra-violet radiation disinfection therefore eliminating the need for chlorine. It will also use screening, activated sludge (oxidation ditches), final clarifiers, phosphorus removal, post aeration, excess

Chickasaw Hills Waste Water Treatment Plant facility east of Parker Road. Source: Google.

flow treatment, aerobic digestion, and gravity sludge thickening. The upgraded treatment process is expected to significantly reduce nutrients and eliminate chlorine from entering Long Run Creek. It is also important to note however that Homer Glen reviewed the plant expansion plan and determined that other actions can be taken to reduce the loading to the plant such as rerouting wastewater from several areas to a Metropolitan Water Reclamation District of Greater Chicago (MWRD) facility or the recently expanded Oak Creek plant. It was also determined by Homer Glen that future development serviced by Chickasaw Hills WWTP would be limited

Chickasaw Hills WWTP is currently required to monitor carbonaceous biochemical oxygen demand (CBOD), suspended solids, pH, fecal coliform, dissolved oxygen, chlorine residual, and ammonia nitrogen. Post expansion monitoring will include the addition of phosphorus and total nitrogen. Both the existing and proposed NPDES permit standards for Chickasaw Hills WWTP are included in Table 20.

Table 20. Existing and proposed NPDES permit limits for the Chickasaw Hills WWTP.

	Load Limits - lbs/day		Concentration Limits - mg/L	
WWTP/Parameter	**Monthly Ave. (lbs/day)**	**Daily Max. (lbs/day)**	**Monthly Ave. (mg/L)**	**Daily Max. (mg/L)**
Chickasaw Hills WWTP (Existing): 0.70 MGD ave. & 1.75 MGD max.				
CBOD	58 (146)	117 (292)	10	20
Suspended Solids	70 (175)	140 (350)	12	24
pH	Shall be in the range of 6 to 9 Standard Units			
Fecal Coliform	Monthly mean 200 per 100 mL (May through October); 400 per 100mL			
Dissolved Oxygen	Monthly average 5.5 mg/L (August-February); weekly average 6.0 mg/L (March-July) & 4.0 mg/L (August-February); daily min. 5.0 mg/L (March-July) & 3.5 mg/L (August-February)			
Chlorine Residual	-	-	-	0.05
Ammonia Nitrogen				
April-October	8.8 (22)	18 (44)	1.5	3.0
November-February	23 (58)	47 (117)	4.0	8.0
March	23 (57)	47 (117)	3.9	8.0
Chickasaw Hills WWTP (Proposed): 1.27 MGD ave. & 4.37 MGD max.				
CBOD	106 (364)	212 (729)	10	20
Suspended Solids	127 (437)	254 (875)	12	24
pH	Shall be in the range of 6 to 9 Standard Units			
Fecal Coliform	Monthly mean 200 per 100 mL (May through October); 400 per 100mL			
Dissolved Oxygen	Monthly average 5.5 mg/L (August-February); weekly average 6.0 mg/L (March-July) & 4.5 mg/L (August-February); daily min. 5.0 mg/L (March-July) & 4.5 mg/L (August-February)			
Ammonia Nitrogen				
April-October	15 (51)	32 (109)	1.4	3.0
June-August	3.2(11)/8.5(29) wk	19 (66)	0.3/0.8wk ave.	1.8
November-February	31 (106)	50 (171)	2.9	4.7
March	15 (51)	34 (117)	1.4	3.2
Phosphorus	11 (36)		1.0	
Total Nitrogen	Monitoring only			

NPDES Permit No. IL0031984; Values in ( ) are limits based on design maximum flow (DMF).

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Derby Meadows Waste Water Treatment Plant facility. Source: Google.

The second WWTP, Derby Meadows, is also owned by Illinois American Water Company. This facility discharges under NPDES Permit No. IL0045993 to Long Run Creek west of Will-Cook Road. It has a designed average flow of 0.9 MGD and design maximum flow of 2.655 MGD. The plant discharges 0.66 MGD based on data from 2005-2012. The plant's current treatment consists of screening, grit removal, activated sludge, clarification, chlorination, aerobic digestion, and sludge dewatering. Derby Meadows WWTP is required to monitor CBOD, suspended solids, pH, fecal coliform, dissolved oxygen, chlorine residual, and ammonia nitrogen (Table 21). Phosphorus monitoring is not currently required.

The water quality and pollutant loading sections of this report (Sections 4.1 & 4.2) contain detailed summaries of water quality monitoring results for the two WWTPs and contribution to overall pollutant loading in the watershed.

Table 21. NPDES permit limits for Derby Meadows WWTP.

	Load Limits - lbs/day		Concentration Limits - mg/L	
WWTP/Parameter	Monthly Ave. (lbs/day)	Daily Max. (lbs/day)	Monthly Ave. (mg/L)	Daily Max. (mg/L)
Chickasaw Hills WWTP (Existing): 0.9 MGD ave. & 2.655 MGD max.				
CBOD	75 (221)	150 (443)	10	20
Suspended Solids	90 (266)	180 (531)	12	24
pH	Shall be in the range of 6 to 9 Standard Units			
Fecal Coliform	Monthly mean 200 per 100 mL (May through October)			
Dissolved Oxygen	Monthly average 5.5 mg/L (August-February); weekly average 6.0 mg/L (March-July) & 4.0 mg/L (August-February); daily min. 5.0 mg/L (March-July) & 3.5 mg/L (August-February)			
Chlorine Residual	-	-	-	0.05
Ammonia Nitrogen				
April-October	11 (31)	23 (66)	1.4	3.0
November-February	30 (89)	60 (177)	4.0	8.0
March	24 (71)	60 (177)	3.2	8.0

NPDES Permit No. IL0045993; Values in ( ) are limits based on design maximum flow (DMF).

Septic Systems

Septic systems are common within Long Run Creek watershed, especially in some older municipal developments and most unincorporated areas. When septic systems are not maintained and fail they pose real threats to groundwater and surface water quality, especially when they are located near streams or other water bodies. Failing septic systems can contribute high levels of nutrients (phosphorus and nitrogen) and bacteria (fecal coliform) to the environment. The failure rate of septic systems in the watershed is unknown. However, literature sources from USEPA indicate a failure rate of between 2% and 5%.

The 1990 U.S. Census provides the most recent data related to number and type of sewage disposal systems serving households. It is difficult, however to accurately extrapolate this data to Long Run Creek watershed. What the census does provide is the number of households that do not use public sewer for each township in the watershed (Table 22). This information suggests that Lockport, Homer, and Lemont Townships have the highest percentage of households on septic systems.

The Will County sewage treatment and disposal ordinance includes a requirement to maintain a service contract and have routine inspections and sampling completed at least every six months. A 1997 survey conducted by Will County revealed that 67% percent of septic systems surveyed were in violation of at least one ordinance standard because of lack of maintenance and/or inadequate sizing. The Cook County Department of Public Health inspects septic systems to ensure that they are designed and operating properly. Failure to comply by homeowners results in prosecution.

The United States Environmental Protection Agency (USEPA) provides an excellent guide for septic system owners called "A Homeowner's Guide to Septic Systems" (USEPA, 2005). The guide makes it clear that septic system maintenance is the responsibility of the owner. The guide also explains how septic systems work, why and how they should be maintained, and what makes a system fail. Septic system owners or those proposing to install new systems are encouraged to regularly maintain septic systems and seek guidance from Will or Cook County as needed.

Table 22. Number and percent of households by township using septic systems in 1990.

Township	Households per Township	% of Households on Septic
DuPage	17,472	2.5
Lockport	10,878	11.3
Homer	6,355	35.7
Lemont	4,012	24.7
Palos	19,213	6.8
Orland	23,207	3.9

Source: 1990 U.S. Census

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4.0 WATER QUALITY & POLLUTANT MODELING ASSESSMENT

4.1 WATER QUALITY

The primary goal of this watershed plan is to guide efforts to protect and restore surface water quality in Long Run Creek watershed. Section 305(b) of the Federal Clean Water Act requires Illinois and all other states to submit to the USEPA a biennial report of the quality of the state's surface and groundwater resources called the *Illinois Integrated Water Quality Report and Section 303(d) List*. These reports must also describe how Illinois waters meet or do not meet water quality standards specific to each "Designated Use" as defined by the Illinois Pollution Control Board (IPCB). When a waterbody is determined to be impaired, Illinois EPA must list potential causes and sources for impairment in the 303(d) impaired waters list. There are seven "Designated Uses" in Illinois; Illinois EPA has assigned five of these uses to Long Run Creek and Tampier Lake: *Aquatic Life, Fish Consumption, Primary Contact, Secondary Contact, and Aesthetic Quality*.

According to Illinois EPA's most recent 2012 *Integrated Water Quality Report and Section 303(d) List*, Long Run Creek (IEPA Segment Code: ILGHE-01) is "Fully Supporting" for *Aquatic Life* (Table 23). It is important to note however that Long Run Creek was last studied by Illinois EPA in 1997. More recent data suggests moderate impairment.

Tampier Lake (IEPA Code: ILRGZO) is "Fully Supporting" for *Aquatic Life* but "Not Supporting" (impaired) for *Aesthetic Quality* caused by total suspended solids (TSS), total phosphorus (TP), aquatic plants, and aquatic algae (Table 23). The sources of impairment are identified as agriculture, waterfowl, urban runoff/storm sewer; and runoff from forest/grassland/parkland. Other "Designated Uses" for Tampier Lake were not assessed. Illinois EPA completed a Total Maximum Daily Load

(TMDL) report for Tampier Lake in March 2010 which is discussed in more detail below.

A variety of chemical and biological monitoring stations have been sampled in recent years in an attempt to document the baseline conditions of Long Run Creek. Table 24 lists all known water quality and biological data collected in the watershed while Figure 47 depicts the location of each monitoring station where the data was collected.

Macroinvertebrate, fish, and mussel data are examined in the *Biological Monitoring* subsection. Biological data suggests that Long Run Creek is moderately impaired but is still a "Fair" quality aquatic resource. Nutrients (nitrogen and phosphorus) and suspended solids are specifically examined under the *Water Quality Monitoring* subsection as these were identified via monitoring as the primary causes of water quality impairment in the watershed. Water chemistry sampling indicates that Long Run Creek has elevated levels of phosphorus, nitrogen, and total suspended solids that exceed recommended standards. Phosphorus exceeds recommended levels in Tampier Lake. As expected, data from wastewater treatment plant (WWTP) outfalls reveals high levels of phosphorus and nitrogen.

Table 23. Illinois EPA Designated Uses and impairments for Long Run Creek and Tampier Lake.

Designated Use	Use Attainment	Impaired?	Cause of Impairment	Source of Impairment
Long Run Creek: ILGHE01				
Aquatic Life	Fully Supporting	No	None	None
Fish Consumption	Not Assessed	-	-	-
Primary Contact	Not Assessed	-	-	-
Secondary Contact	Not Assessed	-	-	-
Aesthetic Quality	Not Assessed	-	-	-
Tampier Lake: ILRGZO				
Aquatic Life	Fully Supporting	No	None	None
Fish Consumption	Not Assessed	-	-	-
Primary Contact	Not Assessed	-	-	-
Secondary Contact	Not Assessed	-	-	-
Aesthetic Quality	Not Supporting	Yes	Total Suspended Solids; Total Phosphorus; Aquatic Plants; Aquatic Algae	Agriculture; Waterfowl; Urban Runoff/Storm Sewer; Runoff from Forest/Grassland/Parkland

Source: 2012 Illinois EPA 303(d) list

Table 24. List of chemical and biological surface water monitoring stations.

*Station	Date(s) Collected	Sampling Entity & Location(s)	Parameters & Purpose
Chemical Monitoring Stations			
AES-1	October 14, 2012 & January 30, 2013	Applied Ecological Services, Inc. (AES) sampled at Long Run Creek near confluence with I & M Canal	Chemical and turbidity samples collected to establish post storm event
AES-2 &3	October 10, 2012	Applied Ecological Services, Inc. (AES) sampled at Chickasaw Hills & Derby Meadows WWTP outfalls	Chemical samples collected to measure WWTP discharge
ILM-LRC; ILM-SD	Quarterly from April 2007 to October 2008	Integrated Lakes Management, Inc. (ILM) sampled at Long Run Creek and Tributary M (South Ditch) within Long Run Seep Nature Preserve	Chemical samples collected to establish baseline
ILM-Wells 1-9	Quarterly from April 2007 to October 2008	Integrated Lakes Management, Inc. (ILM) sampled at nine groundwater wells within Long Run Seep at Long Run Seep Nature Preserve	Chemical samples collected to define contributing aquifer to Long Run Seep
IEPA GHE-01	1997	Illinois EPA sampled Long Run Creek at High Rd. as part of Facility Related Stream Survey program	Chemical samples as part of Facility Related Stream Survey Program
RGZO 1-3	1992-2010	Illinois EPA sampled Tampier at three locations as port of Ambient Lake Monitoring Program (ALMP)	Chemical samples as part of Ambient Lakes Monitoring Program (ALMP)
Biological Monitoring Stations			
ILM- BS2, 5, 7, 10, 12, 13, 14, 15, USGS	July to August 2006	Integrated Lakes Management, Inc. (ILM) sampled at eight Bioscout Stations along Long Run Creek. Support was given by John G. Shedd Aquarium.	Mussel, fish, and macroinvertebrates collected to provide baseline data
LR1-4	2005	Baetis Environmental Services, Inc. sampled at four locations along Long Run Creek	Macroinvertebrate samples collected to assess the effects WWTPs on benthic life
R0209501; R0209502	R0209501: 1998-2001; R0209501: 1998-2000	RiverWatch volunteers sampled at two locations along Long Run Creek	Macroinvertebrates collected to establish baseline data through time
USGS	2001	United States Geological Survey (USGS) at Smith Rd. on Long Run Creek	Fish sampled to establish baseline
IDNR GHE-01	1983, 1997	Illinois Department of Natural Resources (IDNR) sampled at High Rd. on Long Run Creek	Fish sampled to establish baseline
CFM	1955, 1995	Chicago Field Museum sampled at Smith Road on Long Run Creek	Fish sampled to establish baseline

*Station= Internal code assigned to a sample site by the agency or entity collecting the data.

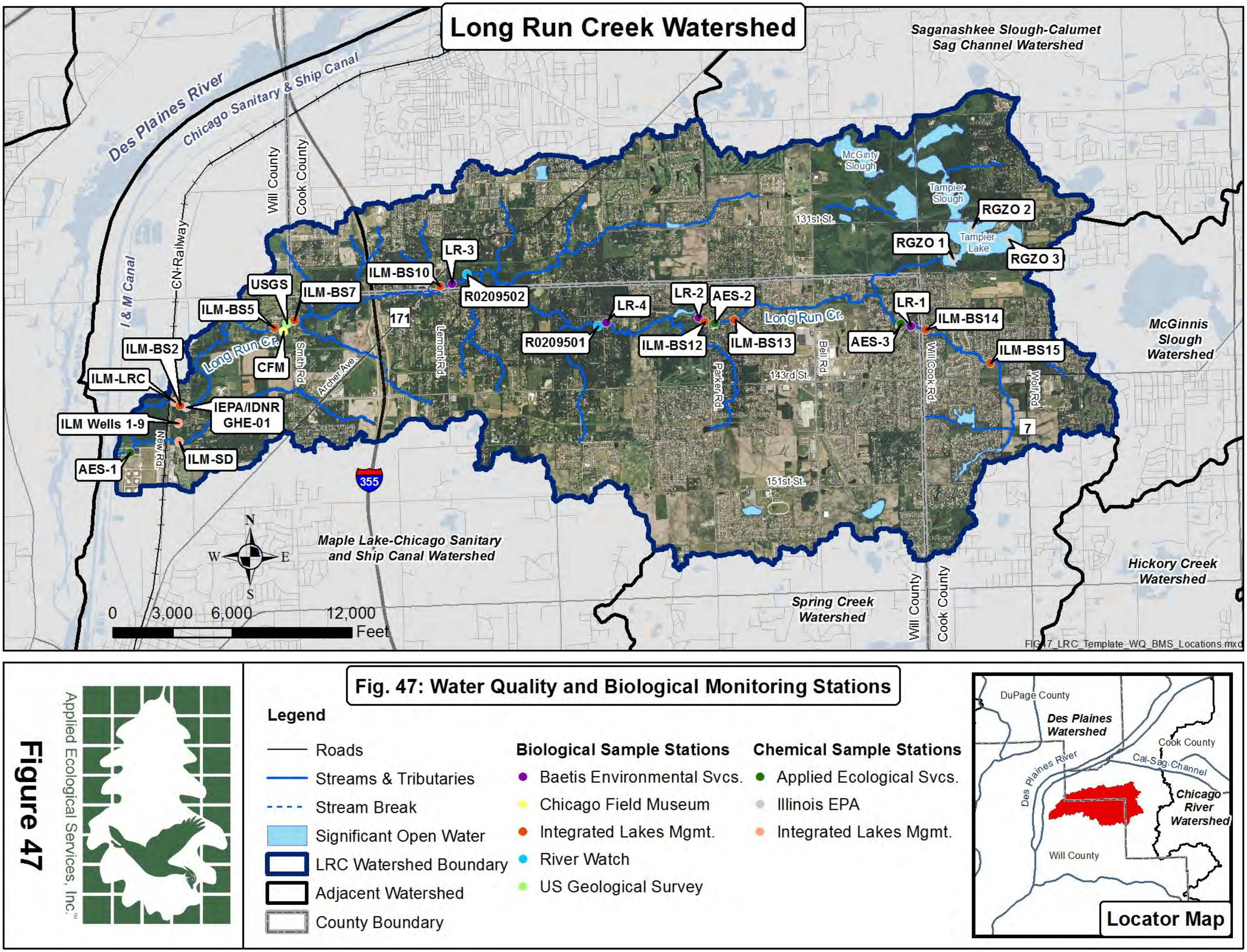


Fig. 47: Water Quality and Biological Monitoring Stations

Figure 47

Biological Monitoring

Biological data provides the primary basis for determining the level of *Aquatic Life* support in streams and is a major source of information for Illinois EPA's *Illinois Integrated Water Quality Report and Section 303(d) List*. Illinois EPA utilizes two indices based on aquatic macroinvertebrate and fish communities in streams. The Macroinvertebrate Biotic Index (MBI) and fish Index of Biotic Integrity (fIBI) are used to evaluate water quality and biological health and to detect and understand change in biological systems that result from the actions of human society. The Illinois EPA currently uses MBI and fIBI data to determine the *Aquatic Life* support status of streams as shown in Table 25. In addition, the Illinois Department of Natural Resources (IDNR) uses a "Mussel Resource Value" to rate the value of the biotic community.

Caddisfly larvae found in LRC

Macroinvertebrate Community Monitoring

Integrated Lakes Management, Inc., Baetis Environmental, Inc., and RiverWatch volunteers monitored the macroinvertebrate community at fifteen locations along Long Run Creek between 1998 and 2006 (Table 26; Figure 47). Aquatic macroinvertebrates are insects that spend all or a portion of their life span in water. Macroinvertebrate Biotic Index scores (MBI) were also calculated (Table 26). The MBI is designed to rate water quality using the pollution tolerance of macroinvertebrates and human impacts as an estimate of the degree and extent of organic pollution and disturbance in streams. The Illinois EPA has determined that a MBI score less than 5.9 indicates a stream is not "Fully Supporting" *Aquatic Life*. Overall, macroinvertebrate data for Long Run Creek indicates that there is moderate impairment but that the resource quality is "fair."

Macroinvertebrate studies conducted by ILM (ILM, 2007) and Baetis Environmental (Baetis, 2005) were conducted in part to examine the effects of the Derby Meadows and Chickasaw Hills WWTPs since both discharge effluent into Long Run Creek. ILM's study found significantly high numbers of bloodworms immediately downstream from Chickasaw Hills WWTP. Bloodworms are an indicator of poor water quality. Also, more pollution tolerant species were found downstream than upstream of the Chickasaw plant. Baetis Environmental found no obvious water quality impairments overall but did find evidence of nutrient enrichment just downstream of the two WWTPs that tends to diminish with downstream distance.

Table 25. Illinois EPA indicators of *Aquatic Life* impairment using MBI and fIBI scores.

Biological Indicator	Score		
MBI	> 8.9	5.9 < MBI < 8.9	5.9
fIBI	20	20 < fIBI< 41	41
Impairment Status - Use Support - Resource Quality			
Impairment Status	Severe Impairment	Moderate Impairment	No Impairment
Designated Use Support	Not Supporting	Not Supporting	Fully Supporting
Resource Quality	Poor	Fair	Good

Source: 2012 *Illinois Integrated Water Quality Report and Section 303(d) List*

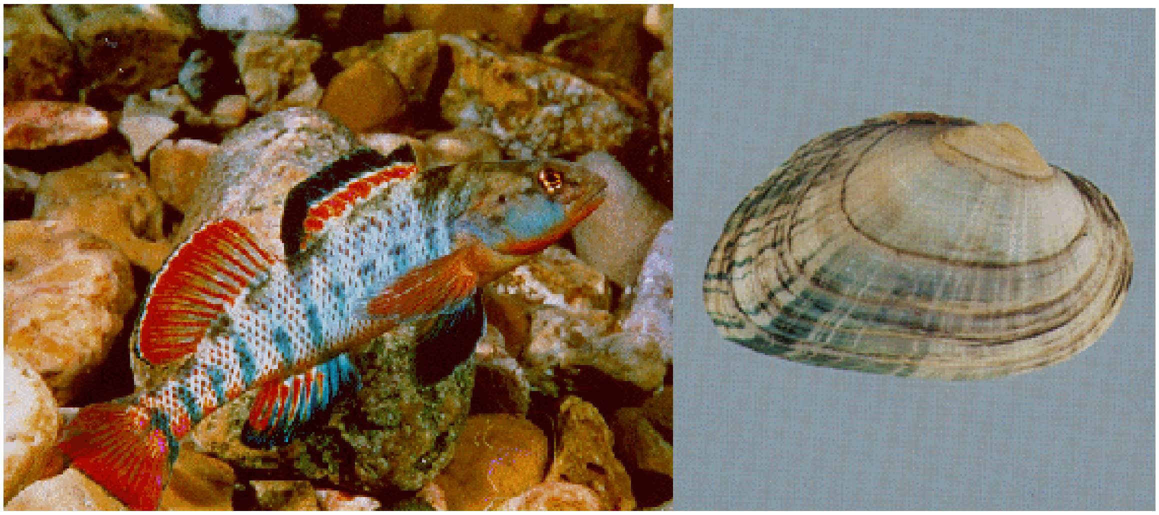
Table 26. Macroinvertebrate Biotic Index (MBI) summary data.

Station	Year	Stream & Location	MBI Score	Resource Quality
Baetis Environmental Services				
LR1	2005	LRC	5.9	Fair
LR2	2005	LRC	5.8	Fair
LR3	2005	LRC	4.2	Very Good
LR4	2005	LRC @ Cedar Rd.	5.8	Fair
Illinois RiverWatch				
R0209501	1996	LRC @ Cedar Rd.	7.85	Fair
R0209501	1997	LRC @ Cedar Rd.	7.74	Fair
R0209501	1998	LRC @ Cedar Rd.	6.51	Fair
R0209501	1999	LRC @ Cedar Rd.	6.11	Fair
R0209501	2000	LRC @ Cedar Rd.	6.18	Fair
R0209501	2001	LRC @ Cedar Rd.	5.48	Good
R0209502	1998	LRC @ Lemont Rd.	6.26	Fair
R0209502	1999	LRC @ Lemont Rd.	5.27	Good
R0209502	2000	LRC @ Lemont Rd.	5.41	Good
Integrated Lakes Management				
ILM-BS2	2006	LRC @ New Rd.	6.36	Fair
ILM-BS3	2006	LRC @ Nature Preserve	Not calculated	Not evaluated
ILM-BS5	2006	LRC @ Big Run Golf Course	4.83	Good
ILM-BS7	2006	LRC @ Smith Road	5.48	Good
ILM-BS12	2006	LRC @ Parker Road	7.33	Fair
ILM-BS13	2006	LRC @ Hiawatha	5.42	Good
ILM-BS14	2006	LRC @ 139th St.	6.19	Fair
ILM-BS15	2006	LRC @ Long Run Dr.	6.16	Fair
ILM-USGS	2006	LRC @ Lemont Road	6.16	Fair

Fish Community Monitoring

The fIBI assesses biological health and water quality through several attributes of fish communities found in streams. These attributes fall into such categories as species richness and composition, trophic composition, and fish abundance and condition. After data from sampling stations has been collected, values for the metrics are compared to high quality reference conditions and a rating is assigned to each metric. The sum of these ratings gives a total fIBI score for the site. The Illinois EPA uses fIBI scores to determine *Aquatic Life* impairments and has determined that a score less than 41 indicates a stream is not "Fully Supporting" *Aquatic Life*.

Available fish community data for Long Run Creek was collected by the Chicago Field Museum in 1955 and 1995, Illinois DNR in 1983 and 1997, USGS in 2001, and ILM in 2006 (Table 24; Figure 47). Unfortunately, fIBI scores were not calculated for any of these studies. But, some information related to the quality of the fish community can be derived by examining species lists. Twelve species were documented near Smith Road in 1955. Between seven and nine species were found in 1983, 1995, 1997, and 2001 studies. In contrast, ILM found 15 species in 2006 but most were pollution tolerant.



Left: *Rainbow darters were once found in LRC near Smith Road. Source: IDNR.* **Right:** *Endangered Slippershell mussel once found in LRC. Source: Ohio Department of Natural Resources*

The Field Museum's data indicates that sensitive species including mottled sculpin (*Cottus bairdii*), rainbow darters (*Etheostoma caeruleum*), fantail darters (*Etheostoma flabellare*), creek chubsuckers (*Erimyzon oblongus*), and stonecat catfish (*Noturus sp.*) were present in Long Run Creek near Smith Road in 1955. The absence of these species in more recent surveys is suggestive of progressive deterioration of the water quality and habitat of the stream. Mottled sculpin and rainbow darters for example are indicative of stream systems with high water clarity, significant contributions of water from highly oxygenated spring fed sources, and riffle habitats.

The stream as it currently exists has a significant silt load and it is likely to experience the influence of WWTP effluent during low flow episodes when nutrient concentrations rise. As a result, conservative species have been replaced by more pollution tolerant species. The overall condition of the stream system based upon fish assemblage is "poor" (ILM, 2006). The best biology in the system occurs near Long Run Seep Nature Preserve.

Mussel Community Monitoring

The most recent mussel survey data for Long Run Creek was conducted by ILM with support from John G. Shedd Aquarium in 2006 (ILM, 2006) (Table 24; Figure 47). Six locations were surveyed using protocols developed by Illinois Department of Natural Resources. A relic shell for the Illinois State Threatened slippershell mussel (*Alasmidonta viridis*) was the most significant find near New Road. Several relic shells of this species were also found near Lemont Road. Also near Lemont Road were two common species: giant floater (*Pyganodon grandis*), and white heelsplitter (*Lasmigona complanata*). Other relics found include those for cylinder (*Anodontoides ferussacianus*) and creek heelsplitter (*Lasmigona compressa*). Live specimens were found for fat mucket (*Lampsilis siliquoidea*), giant floater, and lilliput (*Toxolasma parvus*). An abundance of exotic Asiatic clams (*Corbicula fluminea*) were also recorded near New Road.

A "Mussel Resource Value" has been developed by the IDNR and was used to rate the value of the biotic community based upon the quality and quantity of mussel species present. To summarize, the general mussel assemblage in Long Run Creek is poor and the stream resource is graded as "restricted" or "limited."

Water Chemistry Monitoring

Long Run Creek

The Illinois EPA does not list Long Run Creek as being impaired for any "Designated Uses" according to the 2012 *Integrated Water Quality Report and Section 303(d) List* (Table 23). Illinois EPA's most recent data collection for Long Run Creek, however, is from 1997. The watershed has undergone drastic changes in land use since 1997. More recent water quality data for Long Run Creek indicates moderate overall impairment from elevated total phosphorus, total nitrogen, and total suspended solids (sediment).

Elevated phosphorus and nitrogen levels are a problem under the right conditions and can lead to a chain of undesirable events in streams and lakes such as accelerated plant growth, algae blooms, low dissolved oxygen, and death of some aquatic organisms. High suspended sediment levels are problematic when light penetration is reduced, oxygen levels decrease, fish and macroinvertebrate gills are clogged, visual needs of aquatic organisms are reduced, and when sediment settles to the bottom.

A search for available water chemistry data for Long Run Creek resulted in only one known study conducted by Integrated Lakes Management, Inc.(ILM) at station ILM-LRC where ILM sampled quarterly during base flow conditions from April 2007 to October 2008 (Table 27; Figure 47). To supplement ILM's data, Applied Ecological Services, Inc. (AES) collected water chemistry samples from station AES-1 at Long Run Creek after a 1.0+ inch storm event on October 14, 2012. AES collected the sample just prior to water levels cresting at about 1.2 feet/18 cfs (based on USGS gage station at Lemont Ave.) in order to capture the first flush of pollutants (Figure 48). This sample was collected near Long Run Creek's confluence with the I & M Canal (Table 27; Figure 47) in an attempt to capture a snapshot of water quality near the point where water leaves the watershed. AES collected turbidity readings using a turbidity tube during base flow conditions on September 28 and October 10, 2012, and on October 14, 2012 following a 1.0+ inch storm event. A fourth turbidity measurement was collected following

AES staff collecting water quality samples along LRC

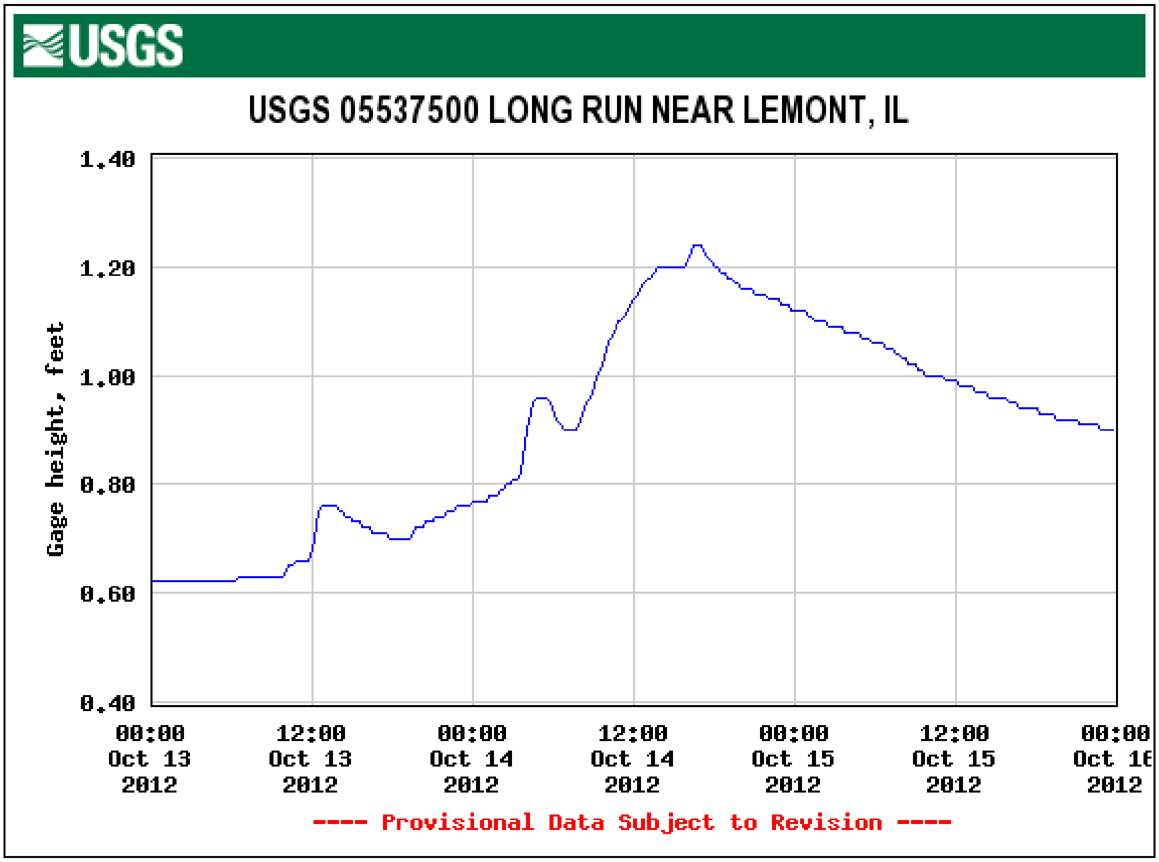


Figure 48. USGS gage station at Lemont Rd. used to time October 14, 2012 water chemistry sample.

a 2.5+ inch storm event on January 30, 2013.

AES's water samples were collected using Illinois EPA protocol then taken to a certified laboratory and tested for total phosphorus, nitrate, nitrite, ammonia nitrogen, total Kjeldahl nitrogen, total suspended solids, pH, conductivity, and biological oxygen demand. Turbidity was sampled in the field using a turbidity tube. AES and ILM water chemistry results are summarized in Table 27.

ILM and AES's water chemistry data results found no *statistical, numerical*, or Illinois EPA General Use guideline exceedances for dissolved oxygen, pH, chloride, ammonia-nitrogen, biological oxygen demand, or conductivity. Total phosphorus and total nitrogen levels exceeded the recommended USEPA Ecoregion VI guideline (USEPA, 2000) of 0.0725 mg/l and 2.461 mg/l respectively during ILM's base flow sampling and during AES's post storm event sampling. AES also found total suspended solid levels exceeding the USGS Ecoregion VI guideline (USGS, 2006) of <19 mg/l. Total suspended solid levels were approximately 50 mg/l when averaged over base flow, after a 1.0+ inch storm event, and following a 2.5+ inch storm event. It is interesting to note that total suspended solids were low (<10 mg/l) at base flow and following a 1.0+ inch rain event but around 200 mg/l following a 2.0+ inch storm event that occurred on January 31, 2013 when water levels rose to about 4.5 feet/275cfs based on the USGS gage station at Lemont Ave. This seems to demonstrate that total suspended solids are only a problem following storm events that exceed about 2.0 inches with the source of this sediment originating primarily from eroding streambanks.

To summarize water quality data in Long Run Creek, a 64.4% decrease in total phosphorus and 58.1% decrease in total nitrogen are needed to reach target levels based on recommended *numeric* criteria proposed by USEPA (USEPA, 2000). A 62% or greater decrease in total suspended solids (TSS) is needed to reach target levels based on USGS *numeric* standards. Section 5.0 of this report includes detailed information related to developing pollutant load reduction/impairment targets for Long Run Creek and addressing "Critical Areas" to reach these targets.

Table 27. ILM and AES water chemistry data summary for stations on Long Run Creek.

Parameter	Statistical, Numerical, or General Use Guidelines	Station (Date)		Average
		AES-1 (10/14/12)	ILM-LRC (2007/2008)	
Dissolved Oxygen (DO)	>5.0 mg/l*	-	11.5 mg/l	11.5 mg/l
pH	>6.5 or <9.0*	7.96	8.3	8.25
Chloride	<500 mg/l*	383 mg/l	180 mg/l	221 mg/l
Total Phosphorus (TP)	<0.0725 mg/l**	0.37 mg/l	0.23 mg/l	0.2036 mg/l
Total Nitrogen (TN)	<2.461 mg/l**	14.97 mg/l	3.59 mg/l	5.872 mg/l
Ammonia-Nitrogen	<15 mg/l*	0.2 mg/l	0.41 mg/l	0.37 mg/l
Total Suspended Solids (TSS)/ Turbidity	<19 mg/l***	6 mg/l ~50 mg/l****	-	 ~50 mg/l****
Bio. Oxygen Demand (BOD)	<5.0 mg/l*	4.5 mg/l	-	4.5 mg/l
Conductivity	<1,667 µmhos/cm	1,191 µmhos/cm	1,066 µmhos/cm	1,091 µmhos/cm

-Cells highlighted in red exceed recommended statistical, numerical, or General Use guidelines
* Illinois EPA General Use Standard
** Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion VI (USEPA 2000)
*** Present and Reference Concentrations and Yields of Suspended Sediment in Streams in the Great Lakes Region and Adjacent Areas (USGS 2006)
**** AES converted & averaged NTU to approximate TSS from turbidity readings collected on October 10, & 14, 2012 & January 30, 2013.

NOTEWORTHY - Numeric Water Quality Standards

USEPA expects states to establish *numeric* water quality standards for nutrients (phosphorus and nitrogen) in lakes and streams. Currently, Illinois EPA has a numeric phosphorus standard for lakes and is working on developing nutrient criteria for streams. To date, Illinois EPA has not developed *numeric* standards for turbidity/total suspended solids (TSS) in streams. *Numeric* criteria has been proposed by USEPA (USEPA, 2000) for nutrients based on a reference stream method for the Corn Belt and Northern Great Plains Ecoregion (Ecoregion VI) which includes Long Run Creek watershed. The values presented in this document generally represent nutrient levels that protect against adverse effects of nutrient overenrichment. The USGS has published a document outlining recommended *numeric* criteria for sediment in streams for Ecoregion VI (USGS, 2006). These criteria are used in this report to assess the quality of Long Run Creek and tributaries to develop pollution reduction targets and measure future successes, even though Illinois EPA has not adopted these criteria as standards.

Illinois EPA and others have developed *statistical* guidelines for various pollutants other than nutrients and suspended sediment. Illinois also provides General Use water quality standards that apply to almost all waters and are intended to protect aquatic life, wildlife, agriculture, primary contact, secondary contact, and most industrial uses. *Statistical* guidelines and General Use water quality guidelines are also used in this report as a means to measure impairment and to determine pollutant reduction needs in Long Run Creek watershed.

Tampier Lake

The Illinois EPA determined that Tampier Lake is impaired for not meeting all of its "Designated Uses" according to recent (2008, 2010, & 2012) *Integrated Water Quality Report and Section 303(d) Lists* (Table 28). Tampier Lake is not supporting for *Aesthetic Quality* caused by total suspended solids, total phosphorus, aquatic plants, and aquatic algae. The sources of impairment are identified as agriculture, waterfowl, urban runoff/storm sewer; and runoff from forest/grassland/parkland. Other "Designated Uses" for Tampier Lake were not assessed by Illinois EPA.

Extensive water quality sampling data has been conducted at Tampier Lake via Illinois EPA's Ambient Lake Monitoring Program (ALMP). ALMP collected multiple samples at three locations (RGZO1-3) (Table 28; Figure 47) from May-October in 1992, 2001, 2006, and 2010. Data was obtained from 2001, 2006, and 2010 ALMP monitoring stations via Illinois EPA's Storage and Retrieval (STORET) database and averaged for each water quality parameter (Table 28). The 1992 data is considered outdated and therefore is not included in the averages.

First, data from 2001, 2006, and 2010 indicates that total suspended solids are not problematic in Tampier Lake as documented by Illinois EPA. Illinois does not have a *numeric* standard for total suspended solids and literature indicates levels less than 30 mg/l are not problematic. Total phosphorus is on average 0.073 mg/l in Tampier Lake, exceeding the 0.05 mg/l *numeric* Illinois General Use standard for lakes.

In March 2010 Illinois EPA completed a Total Maximum Daily Load (TMDL) study for Tampier Lake focusing on phosphorus (IEPA, 2010). Illinois EPA has established *numeric* standards for total phosphorus but not for total suspended solids, aquatic plants, and aquatic algae. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. TMDL goals for Tampier Lake include developing a TMDL, describing the necessary elements of the TMDL, developing an implementation plan for each TMDL, and gaining public acceptance of the process.

Illinois EPA used ALMP data from 1992, 2001, and 2006 to establish a total phosphorus concentration of 0.085 mg/l for Tampier Lake. This is slightly higher than 0.073 mg/l when averaging in 2010 data but still higher that the 0.05 mg/l standard. Illinois EPA estimates that the total phosphorus load generated from Tampier Lake's surrounding watershed and internal cycling is 2.7 lbs/day under existing conditions. So, a 51% reduction in total phosphorus load (TMDL: 1.3 lbs/day phosphorus allowed) to Tampier Lake is needed to comply with the water quality standard of 0.05 mg/l. It is important to note however that 59% of the allowable phosphorus load was allocated to internal sources according to Illinois EPA while 41% of the allowable phosphorus load is allocated to external sources. Mitigating for internal sources of phosphorus is difficult and not recommended as a viable option in this plan. However, much of the external source of phosphorus can be reduced with Management Measures such as lake buffers, wetland restoration, etc. Section 6.0 of this report includes additional information related to implementation of Management Measure projects to address "Critical Areas" to reach phosphorus targets.

Table 28. Illinois EPA: ALMP (2001, 2006, & 2010) water quality data for Tampier Lake.

Parameter	Statistical, Numerical, or General Use Guideline	IEPA ALMP (2001, 2006, 2010 ave.)
Chloride	<500 mg/l*	75.0 mg/l
Total Nitrogen (TN)	No applicable standard	1.161 mg/l
Total Phosphorus (TP)	<0.05 mg/l*	0.073/0.085*** mg/l
Total Suspended Solids (TSS)	<30 mg/l**	20.1 mg/l
Turbidity	<20 NTU	15.5 NTU
Conductivity	<1,667 µmhos/cm**	579.4 µmhos/cm
Temperature (F)	<90 F*	69.3 F
pH	>6.5 or <9.0*	7.7
Secchi Depth	>18 in. (eutrophic status)**	24.5 in.
Dissolved Oxygen	>5.0 mg/l*	7.6 mg/l

Cells highlighted in red exceed recommended statistical, numerical, or General Use guideline
* IEPA General Use Standard; **Other literature values; ***Phosphorus average from 1992, 2001, & 2006 TMDL (IEPA, 2010)

Wastewater Treatment Plants

There are two National Pollution Discharge Elimination System (NPDES) permitted wastewater treatment plant (WWTP) discharges to Long Run Creek. Illinois American Water Company owns and operates both plants. Chickasaw Hills WWTP discharges under NPDES Permit No. IL0031984 east of Parker Road. Derby Meadows WWTP discharges to Long Run Creek under NPDES Permit No. IL0045993 west of Will-Cook Road. Each plant is required to monitor chlorine residual, biological oxygen demand, fecal coliform, ammonia nitrogen, suspended solids, pH, and dissolved oxygen. The plants are not required to monitor total nitrogen or total phosphorus as neither is regulated. Additionally, neither plant is required to meet the 1.0 mg/l phosphorus effluent limit established by Illinois EPA on February 2, 2006 for any plant that undergoes upgrades which results in effluent exceeding 1.0 MGD (35 Ill. Adm. Code 304.123 (g)). In October, 2012, effluent samples were collected from the two WWTPs in an attempt to get a snapshot of total nitrogen and total phosphorus. This data is also important for generating nutrient loading as discussed in Section 4.0.

Chickasaw Hills WWTP met all NPDES load limit requirements when averaging effluent monitoring data from January 2005 to July 2012 (Table 29). This data was obtained via a FOIA request from USEPA. A close look at the raw data also reveals very few daily compliance issues. As stated earlier, Chickasaw Hills WWTP is not required to monitor total nitrogen or total phosphorus. Effluent sampling by AES in October 2012 found total nitrogen levels at 33.22 mg/l and total phosphorus levels at 3.45 mg/l. These levels are high but fall within typical levels for WWTP effluent based on literature (IEPA, 2009).

Derby Meadows WWTP also met all NPDES load limit requirements when averaging effluent monitoring data from January 2005 to July 2012 (Table 30). The plant had very few daily compliance issues. Like Chickasaw Hill WWTP, Derby Meadows WWTP is not required to monitor total nitrogen or total phosphorus. Effluent sampling by AES in October 2012 found total nitrogen levels at 21.44 mg/l and total phosphorus levels at 5.02 mg/l. These levels are high but fall within typical levels based on literature (IEPA, 2009).

Table 29. Chickasaw Hills WWTP effluent water quality (January 2005 to July 2012).

Parameter	NPDES Requirement	Chickasaw Hills WWTP
Chlorine Residual	0.05 mg/l daily max.	No exceedances
BOD	146 lbs/day mo. ave. 10 mg/l mo. ave.	30.0 lbs/day 4.0 mg/l
Fecal Coliform	≤200/100 mL mo. mean	9.7/100 mL
Ammonia Nitrogen (April-Oct.)	22 lbs/day mo. ave. 1.5 mg/l mo. ave	3.7 lbs/day 0.5 mg/l
Ammonia Nitrogen (Nov.-Feb.)	58 lbs/day mo. ave. 4.0 mg/l mo. ave.	7.1 lbs/day 0.8 mg/l
Ammonia Nitrogen (March)	57 lbs/day mo. ave. 3.9 mg/l mo. ave	5.9 lbs/day 0.7 mg/l
Total Nitrogen (TN)	Not applicable	*33.22 mg/l
Total Phosphorus (TP)	Not applicable	*3.45 mg/l
Total Suspended Solids (TSS)	175 lbs/day mo. ave. 12 mg/l mo. ave	28.5 lbs/day 3.7 mg/l
pH	>6.0 or <9.0	7.3
Dissolved Oxygen	>6.0/4.0 mg/l wk. ave.	6.8 mg/l

* Data collected via one-time effluent sampling by AES on October 10, 2012.

Table 30. Derby Meadows WWTP effluent water quality (January 2005 to July 2012).

Parameter	NPDES Requirement	Derby Meadows
Chlorine Residue	0.05 mg/l daily max.	No exceedances
BOD	221 lbs/day mo. ave. 10 mg/l mo. ave.	16.5 lbs/day 3.2 mg/l
Fecal Coliform	≤200/100 mL mo. mean	1.2/100 mL
Ammonia Nitrogen (April-Oct.)	31 lbs/day mo. ave. 1.4 mg/l mo. ave.	4.3 lbs/day 1.1 mg/l
Ammonia Nitrogen (Nov.-Feb.)	89 lbs/day mo. ave. 4.0 mg/l mo. ave.	7.6 lbs/day 1.2 mg/l
Ammonia Nitrogen (March)	71 lbs/day 3.2 mg/l mo. ave.	3.5 lbs/day 0.5 mg/l
Total Nitrogen (TN)	Not applicable	*21.44 mg/l
Total Phosphorus (TP)	Not applicable	*5.02 mg/l
Total Suspended Solids (TSS)	266 lbs/day mo. ave. 12 mg/l mo. ave	11.9 lbs/day 2.2 mg/l
pH	>6.0 or <9.0	7.2
Dissolved Oxygen	>6.0/4.0 mg/l wk. ave.	7.4 mg/l

* Data collected via one-time effluent sampling by AES on October 10, 2012.

SECTION 4.0

4.2 POLLUTANT LOADING ANALYSIS

The USEPA modeling tool called STEPL (Spreadsheet Tool to Estimate Pollutant Loads) was used to estimate the existing nonpoint source load of nutrients (nitrogen & phosphorus) and sediment from Long Run Creek watershed as a whole and by individual Subwatershed Management Unit (SMU). The model uses land use/cover category types, precipitation, soils information, existing best management practices, and other data input information. The model outputs average annual pollutant load for each of the land use/cover types. The results of this analysis combined with known outfall information from two wastewater treatment plants (WWTP) was used to estimate the total watershed load for nitrogen, phosphorus, and sediment and to identify and map pollutant load "Hot Spot" SMUs. It is important to note that STEPL is not a calibrated model.

The results of the STEPL model run at the watershed scale combined with point source WWTP loading indicates that Long Run Creek watershed produces 206,408 lbs/yr of nitrogen, 42,068 lbs/yr of phosphorus, and 9,550 tons/yr of sediment (Table 32; Figure 49).

Chickasaw Hills and Derby Meadows WWTPs contribute the highest nutrient (nitrogen and phosphorus) loading in Long Run Creek watershed (Table 31 & Table 32). Annual nitrogen and phosphorus loading from Chickasaw Hills WWTP is estimated at 91,960 lbs/yr and 9,550 lbs/yr respectively. Loading from Derby Meadows WWTP is approximately 43,045 lbs/yr for nitrogen and 10,079 lbs/yr for phosphorus. The WWTPs combined to produce 135,005 lbs/yr of nitrogen and 19,629 lbs/yr phosphorus. This accounts for about 65% of the total annual load for nitrogen and 56% of the total annual load for phosphorus. The annual load for total suspended solids/ sediment (TSS) from the treatments plants is low compared to other sources.

Urban land uses contribute the second highest load of nitrogen (43,954 lbs/yr: 21%) and phosphorus (6,878 lbs/yr: 19.7%) and third highest load of sediment (799 t/yr: 8%). Urban land is expected to be a significant pollutant contributor since it makes up more than 50% of the watershed. Streambank erosion contributes the highest sediment load (7,848 tons/yr: 82%) to Long Run Creek and also contributes significantly to nitrogen (12,558 lbs/yr: 6%) and phosphorus (4,835 lbs/yr: 13.9%) loading. Remaining agricultural cropland in the watershed contributes the third highest nitrogen load (13,264 lbs/yr: 6%), fourth highest phosphorus load (2,994 lbs/ yr: 8.6%), and second highest sediment load (881 t/yr: 9%). As expected, the STEPL model suggests that very few pollutants originate from pastureland, forest/grassland/ and water/ wetland. Complete STEPL Model results can be found in Appendix D.

Table 31. Estimated annual pollutant load from wastewater treatment plants.

Wastewater Treatment Plant	Flow MGD	Concentration (mg/l)			Pollutant Load		
		TN (mg/l)	TP (mg/l)	TSS (mg/l)	TN Load (lbs/yr)	TP Load (lbs/yr)	TSS (t/yr)
Chickasaw Hills	0.91	33.22	3.45	3.7	91,960	9,550	5.1
Derby Meadows	0.66	21.44	5.02	2.2	43,045	10,079	2.2
Total	**1.57**	**54.66**	**8.47**	**5.9**	**135,005**	**19,629**	**7.3**

Average daily flow (MGD) × average concentration (mg/l) × 3,042 (L-d-lb/gal-y-mg) = average annual load (lb-t/y)

Table 32. Estimated existing (2012) annual pollutant load by source at the watershed scale.

STEPL Source	N Load (lbs/yr)	% of Total Load	P Load (lbs/yr)	% of Total Load	Sediment (tons/yr)	% of Total Load
Urban	43,954	21.3	6,878	19.7	799	8.4
Cropland	13,264	6.4	2,994	8.6	881	9.2
Pastureland	669	0.3	58	0.02	8	0.08
Forest & Grassland	647	0.3	319	0.9	14	0.1
Water/Wetland	311	0.02	155	0.4	<1	0.01
Streambank Erosion	12,558	6.1	4,835	13.9	7,848	82.2
*Wastewater	135,005	65.4	19,629	56.3	7.3	0.08
Total	**206,408**	**100**	**34,868**	**100**	**9,550**	**100**

*Not included in STEPL model

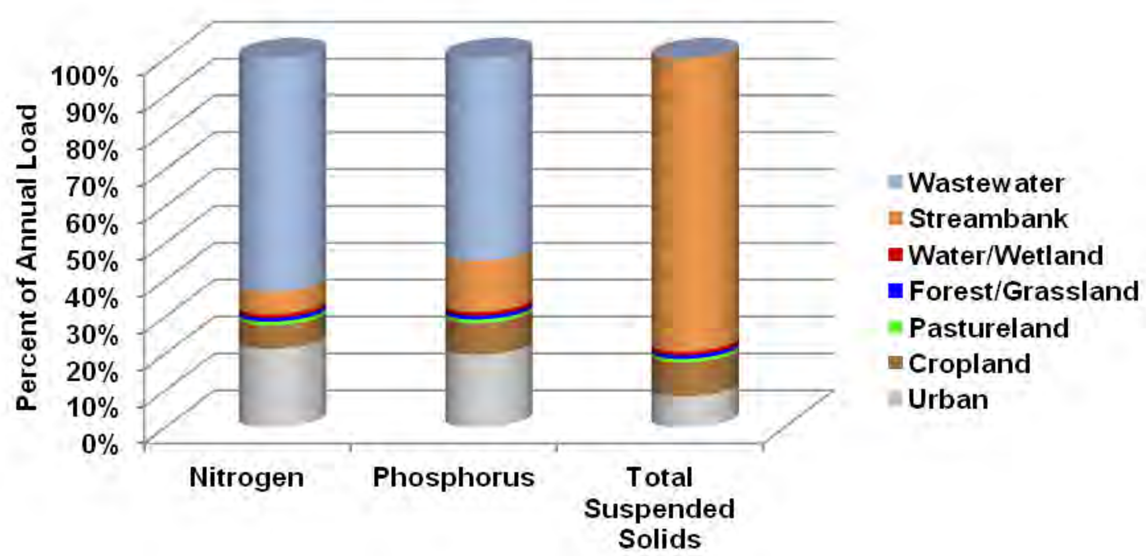


Figure 49. Estimated percent contributions to existing (2012) pollutant load by source.

The results of the STEPL model were also analyzed for nonpoint source pollutant loads at the Subwatershed Management Unit (SMU) scale. **This analysis does not incorporate point sources from the two WWTPs.** This allows for a more refined breakdown of nonpoint pollutant sources and leads to the identification of pollutant load "Hot Spots". Hot Spot SMUs were selected by examining pollutant load concentration (load/acre) for each pollutant. Next, pollutant concentrations exceeding the 75% quartile and 50% quartile were calculated resulting in "High Concentration" and "Moderate Concentration" nonpoint source pollutant load Hot Spot SMUs. Any SMU exhibiting pollutant load concentrations below the 50% quartile contribute a "Low Concentration" of pollutants relative to other SMUs. Table 33 and Figure 50 depict and summarize the results of the SMU scale pollutant loading analysis. Five of the 20 SMUs comprising Long Run Creek watershed are considered "High Concentration" pollutant load Hot Spots for nitrogen, phosphorus, and sediment based on STEPL modeling. Eight SMUs are considered "Moderate Concentration" pollutant load Hot Spots for various combinations of nitrogen, phosphorus, and sediment. The remaining seven SMUs contribute "Low Concentrations" based on modeling.

Table 33. Pollutant load "Hot Spot" SMUs.

Hot Spot SMU*	Size (acres)	N Load (lbs/yr)	N Load (lbs/yr)/ acre	P Load (lbs/yr)	P Load (lbs/yr)/ acre	Sediment Load (t/yr)	Sediment Load (t/yr)/ acre
High Concentration Hot Spot SMUs							
SMU 14	549	3,249	5.92	771	1.40	670	1.22
SMU 15	362	2,106	5.81	497	1.37	453	1.25
SMU 16	215	1,437	6.68	380	1.77	392	1.82
SMU 17	281	2,058	7.32	609	2.16	737	2.62
SMU 20	907	7,313	8.06	1,924	2.12	1,943	2.14
Moderate Concentration Hot Spot SMUs							
SMU 3	1,218	-	-	1,147	0.94	607	0.50
SMU 7	1,291	-	-	-	-	574	0.44
SMU 8	1,969	9,577	4.86	1,965	1.00	1,071	0.54
SMU 9	1,037	-	-	-	-	453	0.44
SMU 10	773	3,451	4.47	654	0.85	-	-
SMU 13	446	2,118	4.75	436	0.98	228	0.51
SMU 18	545	2,448	4.49	-	-	-	-
SMU 19	780	3,646	4.68	1,924	2.12	1,943	1.12

High Concentration Hot Spot SMUs exceed the 75% quartile: N=5.10 lbs/yr/acre, P=1.23lbs/yr/acre, Sediment= 1.15 t/yr/acre
Moderate Concentration Hot Spot SMUs exceed the 50% quartile: N=4.41 lbs/yr/acre, P=0.83lbs/yr/acre, Sediment= 0.44 t/yr/acre

A brief summary of "High Concentration" pollutant loading Hot Spots follows:

- SMU 14 comprises 549 acres. Nonpoint source pollutants in this SMU originate in part for a relatively high concentration of residential development but primarily due to moderate and severe bank erosion along Long Run Creek. Eroded sediment carries with it attached nitrogen and phosphorus.

- Pollutants coming from SMU 15 originate primarily from commercial, residential, and moderately to highly eroded streambanks along Tributary I.

- SMU 16 is relatively small (215 acres) compared to other SMUs in the watershed but contributes pollutants at high concentrations from mostly transportation (roads), residential areas, and moderate to highly eroded streambanks along Tributary J.

- SMU 17 is also small (281 acres) but contributes pollutants at high concentrations from highly eroded streambanks along Tributary K.

- SMU 20 drains Tributary M (South Ditch) in the far southwest corner of the watershed. This SMU is large (907 acres) and has a high concentration of pollutants from cropland and highly eroded streambanks along Tributary M.

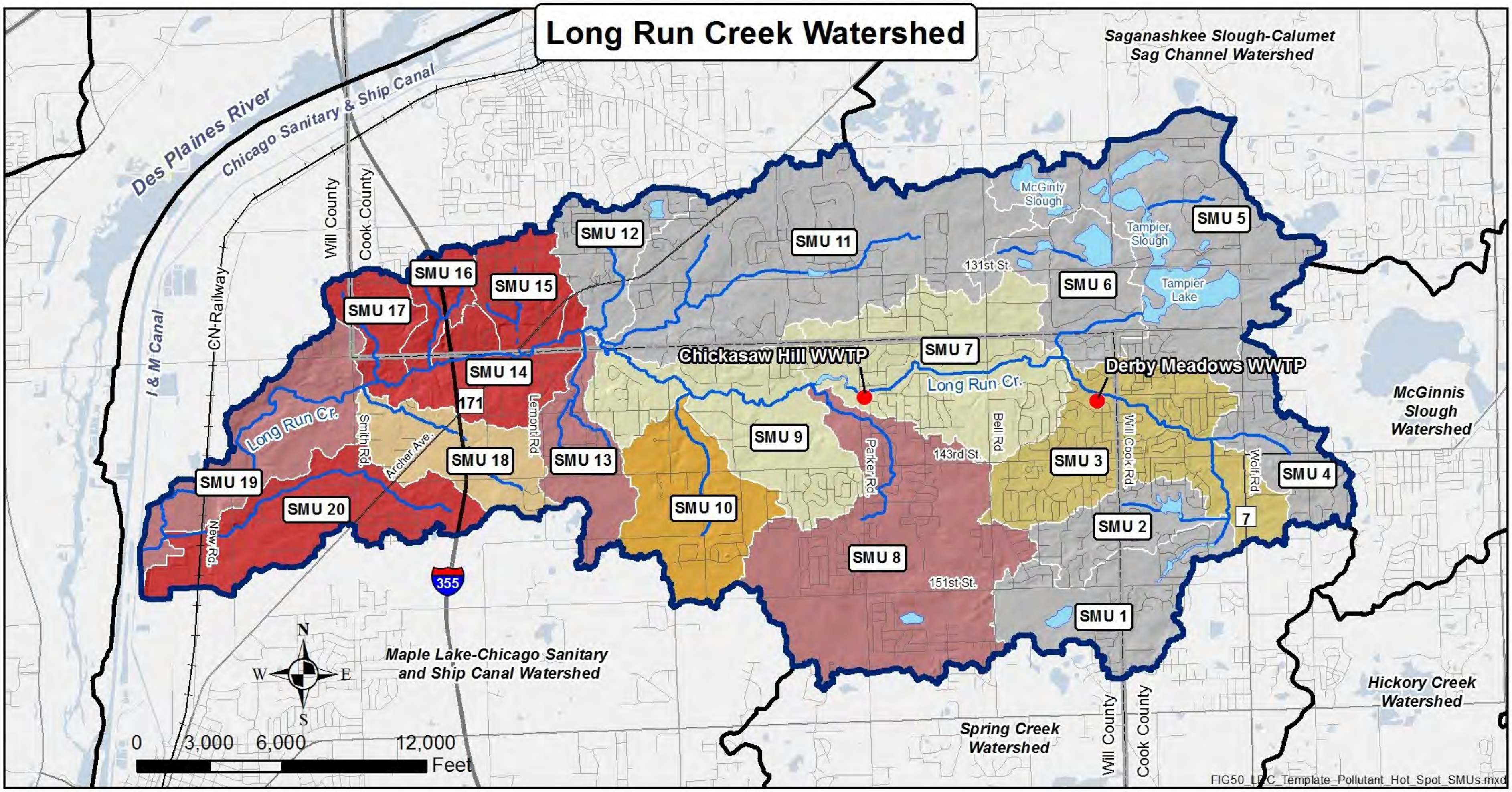


Figure 50

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Fig. 50: Nonpoint Source Pollutant Loading "Hot Spot" SMUs

Legend

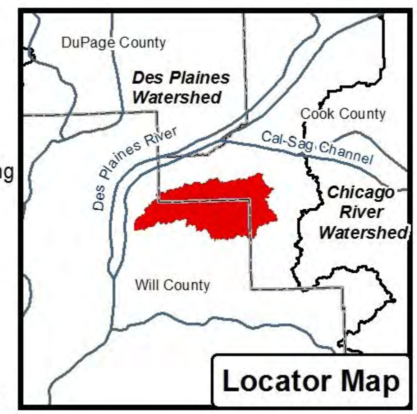
- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Pollutant Load Hot Spot SMUs

- High Concentration - Nitrogen, Phosphorus, Sediment Loading
- Moderate Concentration - Nitrogen, Phosphorus, Sediment Loading
- Moderate Concentration - Nitrogen, Phosphorus Loading
- Moderate Concentration - Phosphorus, Sediment Loading
- Moderate Concentration - Nitrogen Loading
- Moderate Concentration - Sediment Loading
- Low Concentrations

* Note: WWTP data is not included in this analysis.

Data Sources: AES



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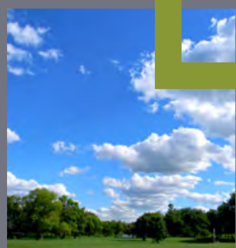


5.0 CAUSES & SOURCES OF IMPAIRMENT & REDUCTION TARGETS

5.1 CAUSES & SOURCES OF IMPAIRMENT

According to Illinois EPA's most recent 2012 *Integrated Water Quality Report and Section 303(d) List*, Long Run Creek (IEPA Segment Code: ILGHE-01) is "Fully Supporting" for *Aquatic Life*, the stream's only Illinois EPA assigned Designated Use. It is important to note however that Long Run Creek was last studied by Illinois EPA in 1997. More recent data suggests moderate impairment caused primarily from wastewater treatment plant nutrient loading, streambank erosion, and channel modification in the upper reaches.

Tampier Lake (IEPA Code: ILRGZO) is "Fully Supporting" for *Aquatic Life* but "Not Supporting" (impaired) for *Aesthetic Quality* caused by total suspended solids (TSS), total phosphorus (TP), aquatic plants, and aquatic algae. The sources of impairment are identified as agriculture, waterfowl, urban runoff/storm sewer; and runoff from forest/grassland/parkland.

There are also non-water quality related impairments in the watershed such as habitat degradation, loss of open space, hydrologic and flow changes, reduced groundwater infiltration, and structural flood damage. Many different causes and sources are related to these impairments.

Table 34 summarizes all *known* or *potential* causes and sources of watershed impairment as documented by Illinois EPA, items identified via Applied Ecological Service's watershed resource inventory, and input from Long Run Creek Watershed Planning Committee (LRCWPC) stakeholders who met during the planning process to discuss impairments.

Table 34. *Known* and *potential* causes and sources of watershed impairment.

Illinois EPA or other Impairment	Cause of Impairment	Known or Potential Source of Impairment
Long Run Creek		
Water Quality: Aquatic Life	Nutrients- *known impairment:* (Phosphorus & Nitrogen)	Wastewater treatment plants; Streambank erosion; Agricultural row crop runoff; Residential, Ag, and commercial lawn fertilizer; Failing septic systems; Inadequate policy; Level of landowner education; Livestock & horse farm operations (manure); Tree service operations (mulch leachate)
Water Quality: Aquatic Life	Sediment- *known impairment* (Total Suspended Solids/turbidity)	Streambank erosion; Construction sites & utility corridor work; Existing & future urban runoff; Agricultural row crop runoff
Water Quality: Aquatic Life	Chlorides (salinity)- *potential impairment*	Deicing operations on roads & other pavement; Inadequate policy; Level of public education
Water Quality: Aquatic Life	Low dissolved oxygen- *potential impairment*	Heated stormwater runoff from urban areas; Lack of natural riffles in upper stream reaches Tree service operations (mulch leachate)
Water Quality: Aquatic Life, Primary and Secondary Contact	Petroleum hydrocarbons (oil & grease)- *potential impairment*	CN Railway derailments; Trucking cargo spills along major roads; General gas station, urban, and highway runoff; Illicit dumping
Habitat Degradation	Invasive/non-native plant species in riparian and other natural areas- *known impairment*	Spread from existing and introduced populations; Level of public education
Habitat Degradation	Loss and fragmentation of open space/natural habitat due to development & groundwater changes- *known impairment*	Inadequate protection policy; Lack of land acquisition funds; Pre-existing land development agreements; Traditional development design; Streambank, channel, and riparian area modification; Lack of appropriate land management; Lack of restoration and maintenance funds; Wetland loss
Hydrologic and Flow Changes in Long Run Creek	Impervious surfaces- *known impairment*	Water treatment plant effluent; Low head dams/impoundments; Existing & future urban runoff; Wetland loss
Aquifer Drawdown	Reduced infiltration & human use- *known impairment*	Wells; Existing and future urban impervious surfaces; Inadequate protection policy; Level of public education; Wetland loss
Structural Flood Damage	Encroachment in 100-year floodplain- *known impairment*	Poor detention basin design & function; Existing and future urban impervious surfaces; Channelized streams; Wetland loss; Debris jams in streams; Agricultural drain tiles
Tampier Lake		
Aesthetic Quality	Total Suspended Solids, Total Phosphorus, aquatic plants, aquatic algae- *known impairment*	Agriculture; Waterfowl; Urban runoff/storm sewer; Forest/grassland/parkland runoff

5.2 CRITICAL AREAS, MANAGEMENT MEASURES & ESTIMATED IMPAIRMENT REDUCTIONS

For this watershed plan a "Critical Area" is best described as a location in the watershed where existing or potential future causes and sources of an impairment or existing function are significantly worse than other areas of the watershed. Seven Critical Area types were identified in Long Run Creek watershed and include:

1. wastewater treatment plants with elevated nutrients in effluent;
2. highly degraded stream reaches;
3. highly degraded riparian areas and lake buffers;
4. large drained wetland complexes;
5. poorly designed/functional detention basins or detention needs;
6. large agricultural areas; and
7. green infrastructure protection areas.

Short descriptions of each Critical Area type are included below. Table 35 includes summaries of the current condition at each Critical Area (by type) and recommended Management Measures with estimated nutrient and sediment load reductions expected. The list of Critical Areas is derived from a comprehensive list of measures found in the Action Plan section of this report. Figure 51 maps the location of each Critical Area.

Pollutant load reduction is evaluated for the majority of the Critical Area Management Measures based on efficiency calculations developed for the USEPA's Region 5 Model. This model uses "Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual" (MDEQ, 1999) to provide estimates of nutrient and sediment load reductions from the implementation of *agricultural* Management Measures. Estimate of nutrient and sediment load reduction from implementation of *urban* Management Measures is based on efficiency calculations developed by Illinois EPA. Illinois EPA pollutant load reduction worksheets for each Critical Area Management Measure are located in Appendix D.

Critical Wastewater Treatment Plants

There are two National Pollution Discharge Elimination System (NPDES) permitted wastewater treatment plant (WWTP) discharges to Long Run Creek (Figure 51). The first is Chickasaw Hills WWTP located east of Parker Road. The second is Derby Meadows WWTP located west of Will-Cook Road. Both are owned and operated by Illinois American Water Company. These plants are considered Critical Areas because combined they contribute over 65% of the total nitrogen loading and over 56% of the total phosphorus loading to Long Run Creek based on water quality sampling and modeling data. The best recommendation for these plants is to upgrade with facilities that reduce nutrients in effluent water so that phosphorus is less than 1.0 mg/l and nitrogen is less than 5.5 mg/l. Section 3.15 includes a detailed discussion about wastewater treatment plants.

Critical Stream Reaches

Critical stream reaches are those with highly eroded streambanks and/or highly degraded channel conditions that are a major source of total suspended solids (sediment) carrying attached phosphorus and nitrogen. Streambank stabilization using bioengineering and installation of artificial riffles in Critical Area stream reaches will greatly reduce sediment and nutrient transport downstream while improving habitat and increasing oxygen levels. Six stream reaches (LRC5, LRC9, LRC11, TribF1, TribM1, and TribM2) totaling 26,789 linear feet were identified as Critical Areas. Section 3.13 includes a complete summary of streams and tributaries in the watershed.

Critical Riparian Areas & Lake Buffers

Critical riparian areas and lake buffers are select locations adjacent to stream reaches and lakes that are in poor ecological condition or areas lacking a buffer but with excellent ecological restoration and remediation potential to improve water quality and habitat conditions. Four riparian areas (LRC2, LRC11, TribF1, and TribN1) totaling 14,966 linear feet and a section of shoreline along Tampier Lake totaling 9,650 linear feet are considered Critical Areas. It is important to note that the 2,960 linear foot riparian corridor along Tributary N Reach 1 (TribN1) and the 9,650 linear foot buffer recommendation along Tampier Lake are located in the subwatershed to Tampier Lake, a TMDL waterbody. Section 3.13 includes a full summary of the riparian areas in the watershed.

Critical Wetland Restoration Sites

Critical wetlands restoration sites are generally associated with large areas that were historically wetland prior to European settlement in the 1830s but were drained for agricultural purposes. Many of these historic wetlands can be restored by breaking existing drain tiles and planting with native vegetation. Wetland restorations are among the most recommended projects to improve water quality, reduce flooding, and improve wildlife habitat. Critical Area status was assigned based on location, size, and restoration potential. In addition, all "potentially feasible" wetland restoration sites within the subwatershed to Tampier Lake are considered Critical Areas because of the Lake's TMDL status. There are 13 critical wetland restoration areas totaling 355 acres. A detailed summary of the extent of drained wetlands and potential wetland restoration opportunities in the watershed is included in Section 3.13.

Critical Detention Basins

Critical detention basins are generally defined as existing basins that provide poor ecological and water quality benefits in areas where these attributes are needed. One site was also identified where detention is needed to improve water quality runoff from Homer Tree Service where large mulch piles are stored. Over time, mulch piles begin to decompose, releasing a dark brown organic liquid. This liquid, or leachate, may contain high levels of tannins, organic acids, and other contaminants. Due to its potentially acidic nature, leachate from wood material can degrade the quality of nearby water sources by reducing the pH, mobilizing metals within the soil, lowering the level of dissolved oxygen in surface water, and may also contain nutrients and organic material. This in turn can kill fish and other aquatic organisms, and impair wildlife habitats (PA Department of Environmental Protection, 2003).

Twenty two (22) detention basins meet the criteria of a Critical Area based of their location, function, and size. Many of the Critical Area detention basin retrofit recommendations are located at the headwaters of tributaries to Long Run Creek and along Reach 3 and 4 of Long Run Creek where opportunities exist to enhance existing detention along the floodplain. Three detention basin retrofit opportunities within Tampier Lake's subwatershed were also considered Critical Areas due to the potential to remove pollutants prior to water making its way to the lake. The most common recommendation is to naturalize basins with native vegetation that are currently turf grass to provide better water quality improvement, greater infiltration of water, and wildlife habitat. A summary of the detention basins in the watershed is included in Section 3.13.

Critical Agricultural Land

It is well documented that agricultural land is a significant contributor of nutrients and sediment in watersheds. According to modeling, agricultural areas contribute between 6% and 8% of the nutrient load and nearly 10% of the sediment load in the watershed. There are currently 2,011 acres of row crop/hay land and 101 acres of land used to raise livestock in Long Run Creek watershed. Fifteen (15) agricultural areas totaling 1,306 acres were identified as Critical Areas based on their size and/or location in the watershed. The extent of existing row crop erosion and nutrient reduction practices in the watershed is not well known beyond the observed grassed swales and waste (manure) management for livestock areas is minimal. Critical agricultural lands are those for which application of agricultural measures would reduce pollutant loading. Practices explored in this plan include conservation tillage (no till) for crop land and manure management on livestock operations.

Critical Green Infrastructure Protection Areas

Chicago Metropolitan Agency for Planning (CMAP) defines a "Protection Area" as an area that represents subsections of a watershed that have valuable characteristics; valuable either in the sense that (1) they contain resources and characteristics that may need to be protected and/or (2) property ownership or land use characteristics make the subsection a strong candidate for action (CMAP 2007). Information obtained from predicted future land use data, location of large undeveloped parcels within the proposed Class III Groundwater Recharge Area, and green infrastructure sections of this plan led to identification of 19 critical green infrastructure protection areas totaling 2,686 acres. Most of the green infrastructure protection areas in the eastern half of the watershed are essentially undeveloped parcels located on existing agricultural land where future development is predicted. The implementation of conservation or low impact development designs in these areas will help protect the future health of the watershed as development continues.

Many of the protection area recommendations in the western half of the watershed occur on parcels that the Forest Preserve District of Will County (FPDWC) has identified in their 1996 Preservation Plan. With these parcels identified, FPDWC can respond to proposals in the event that someone wants to develop the parcels and information can then be passed along to municipalities and other interested parties. In addition, the FPDWC occasionally receives inquiries from landowners wishing to sell their properties to the FPDWC. If it is determined that the land is in an area that is worthy of protection, then the FPDWC will consider the offer to purchase.

It is also important to note that Sites GI 3, GI 4, and GI 5 in Orland Park are part of a court ordered settlement in the 1990s that among other items set density minimums for the land and may limit the conservation or low impact development designs that can be used. Site GI 2, also in Orland Park, is zoned for single family residential but the more sensitive portions have been set aside for future dedication to the Forest Preserve District of Cook County.

Table 35. Critical Areas, existing conditions, recommended Management Measures, & estimated nutrient and sediment load reductions.

Critical Area	Existing Condition/Description	Recommended Critical Area Management Measure	Nutrient & Sediment Load Reduction
Wastewater Treatment Plants			
Chickasaw Hills WWTP	WWTP facility with effluent measuring 33.22 mg/l (91,960 lb/yr) total nitrogen and 3.45 mg/l (9,550 lbs/yr) total phosphorus	*Implement plant upgrades for total nitrogen (<5.5 mg/l) and total phosphorus (< 1.0 mg/l (goal = 0.6 mg/l) removal benefits	TN= 76,735 lbs/yr TP= 7,889 lbs/yr TSS= na
Derby Meadows WWTP	WWTP facility with effluent measuring 21.44 mg/l (43,045 lb/yr) total nitrogen and 5.02 mg/l (10,079 lbs/yr) total phosphorus	*Implement plant upgrades for total nitrogen (<5.5 mg/l) and total phosphorus (< 1.0 mg/l (goal = 0.6 mg/l) removal benefits	TN= 33,002 lbs/yr TP= 8,874 lbs/yr TSS= na
Stream Reaches			
Long Run Creek Reach 5 (LRC5)	3,123 lf of stream on private and public (Homer Twp) land with moderately to highly eroded streambanks and moderate channelization	Restore streambanks using bioengineering techniques and improve channel using riffles; install grade control at downstream end to help reconnect stream to adjacent floodplain	TN= 311 lbs/yr TP= 155 lbs/yr TSS= 155 tons/yr
Long Run Creek Reach 9 (LRC9)	4,360 lf of stream on private residential land with highly eroded streambanks	Restore streambanks using bioengineering techniques	TN= 1,067 lbs/yr TP= 534 lbs/yr TSS= 534 tons/yr
Long Run Creek Reach 11 (LRC11)	3,938 lf of stream on Big Run Golf Course with highly eroded streambanks	Restore streambanks using bioengineering techniques; combine with Critical Riparian Area Project along LRC11.	TN= 964 lbs/yr TP= 482 lbs/yr TSS= 482 tons/yr
Tributary F Reach 1 (TribF1)	2,281 lf of headwater stream on private agricultural land that is highly channelized and actively eroding caused by water from detentions in new subdivision upstream	Create bed and streambanks using bioengineering techniques; combine with Critical Riparian Area project TribF1.	TN= 10 lbs/yr TP= 5 lbs/yr TSS= 5 tons/yr
Tributary M Reach 1 (TribM1)	3,292 lf of headwater stream on private land with highly eroded streambanks; tributary flows through Long Run Seep Nature Preserve	Restore streambanks using bioengineering techniques and use of grade controls in channel	TN= 806 lbs/yr TP= 403/yr TSS= 403 tons/yr
Tributary M Reach 2 (TribM2)	9,794 lf of stream on private land with highly eroded streambanks; tributary flows through Long Run Seep Nature Preserve	Restore streambanks using bioengineering techniques and use of grade controls in channel	TN= 2,396 lbs/yr TP= 1,199 lbs/yr TSS= 1,199 tons/yr
Riparian Areas & Lake Buffers			
Along Long Run Creek Reach 2 (LRC2)	5,787 lf of highly degraded riparian area on private & public (Orland Park Open Lands) land along Long Run Creek Reach 2 (LRC2)	Remove invasive woody species and restore degraded riparian area using a natural ecological restoration approach	TN= 330 lbs/yr TP= 52 lbs/yr TSS= 15 tons/yr

Critical Area	Existing Condition/Description	Recommended Critical Area Management Measure	Nutrient & Sediment Load Reduction
Along Long Run Creek Reach 11 (LRC11)	3,938 lf of narrow/degraded riparian area along Long Run Creek Reach 11 (LRC11) within Big Run Golf Course	Restore degraded riparian area using a natural ecological restoration approach; combine with Critical Stream Reach project LRC11.	TN=11 lbs/yr TP= 8 lbs/yr TSS= 1 tons/yr
Along Tributary F Reach 1 (TribF1)	2,281 lf of stream with no riparian buffer through private agricultural area along Tributary F Reach 1 (TribF1)	Create riparian buffer through agricultural area using a natural ecological restoration approach; combine with Critical Stream Reach project TribF1.	TN=58 lbs/yr TP= 5 lbs/yr TSS= 3.5 tons/yr
Tributary N Reach 1 (TribN1)	2,960 lf along Tributary N Reach 1 (TribN1) draining to Tampier Slough/Lake with poor riparian buffer	Restore degraded riparian area using a natural ecological restoration approach	TN=190 lbs/yr TP= 30 lbs/yr TSS= 9 tons/yr
Along Tampier Lake	9,650 lf along the west and north portions of Tampier Lake with poor buffer consisting mostly of mowed turf grass	Install 30 foot wide natural buffer along 9,650 lf to filter pollutants and discourage waterfowl use along shoreline	TN=4 lbs/yr TP= 3 lbs/yr TSS= 0.5 tons/yr
Wetland Restoration Sites			
W1, W2 , W3, & W14	14.7 acres (W1), 23.4 acres (W2), 24 acres (W3), and 25.9 acres (W14) of drained wetlands on private agricultural land at headwaters and along Long Run Creek Reach 1 (LRC1); areas are slated for future residential development	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	TN= 144 lbs/yr TP= 52 lbs/yr TSS= 52 tons/yr
W8 & W9	9.5 acres (W8) and 9.3 acres (W9) of drained wetlands on private agricultural land east/northeast of & draining to Tampier Lake	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	TN= 6 lbs/yr TP= 8 lbs/yr TSS= 8 tons/yr
W10 & W11	7.5 acres (W10) and 5.3 acres (W11) of drained wetlands north/northeast of Tampier Lake primarily on FPDCC land	Restore wetlands	TN= 54 lbs/yr TP= 16 lbs/yr TSS= 6 tons/yr
W16 & W17	84 acres (W16) and 74.6 acres (W17) of drained wetlands primarily on private agricultural land at headwaters of Tributary D); areas are slated for future residential development	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	TN= 318 lbs/yr TP= 73 lbs/yr TSS= 36 tons/yr
W19	21.8 acres of drained wetland primarily on private agricultural land at headwaters of Tributary E; area is slated for future residential development	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	TN= 66 lbs/yr TP= 15 lbs/yr TSS= 7.5 tons/yr
W21 & W22	25.2 acres (W21) and 30.1 acres (W22) of drained wetlands primarily on private agricultural land at headwaters of Tributary F; areas are slated to be Conservation Development by Village of Lemont	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	TN= 420 lbs/yr TP= 94 lbs/yr TSS= 49 tons/yr

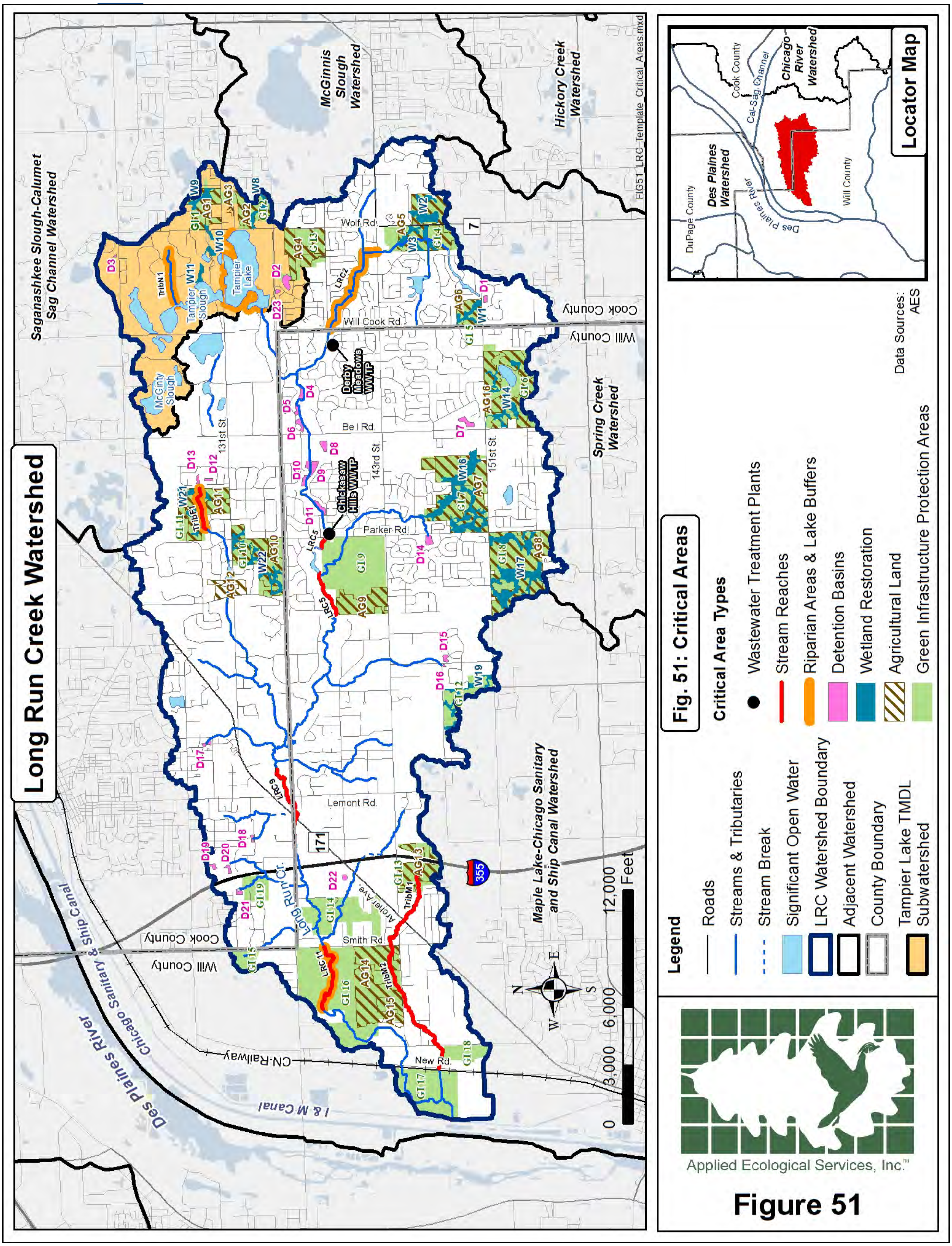
Critical Area	Existing Condition/Description	Recommended Critical Area Management Measure	Nutrient & Sediment Load Reduction
Detention Basins			
D1	1.3 acre dry bottom turf grass detention at headwaters of Long Run Creek Reach 1 (LRC1)	Naturalize basin with native vegetation and determine if outlets can be raised to create wetland detention	TN= 72 lbs/yr TP= 8 lbs/yr TSS= 3.5 tons/yr
D2	5.4 acre wet bottom turf grass lined detention servicing residential subdivision; basin is located in Tampier Lake TMDL subwatershed	Retrofit slopes and emergent zones with native vegetation to create wetland detention	TN= 81 lbs/yr TP= 9 lbs/yr TSS= 4 tons/yr
D3	0.3 acre wet bottom turf grass lined detention basin servicing Shadow Ridge Estates Subdivision; basin is located in Tampier Lake TMDL subwatershed	Retrofit slopes and emergent zones with native vegetation to create wetland detention	TN= 36 lbs/yr TP= 11 lbs/yr TSS= 3.5 tons/yr
D4, D5, & D6	12 acres of dry bottom turf grass detention in three separate areas within floodplain along Long Run Creek Reach 4 (LRC4)	Selectively break berms along stream and naturalize detention areas with native vegetation.	TN= 2,373 lbs/yr TP= 224 lbs/yr TSS= 225 tons/yr
D7	4.5 acre wet bottom turf grass lined detention basin in common area of ComEd utility with adjacent trails	Retrofit slopes and emergent zones with native vegetation to create wetland detention; create fishing access; incorporate design into surrounding open space and trails	TN= 240 lbs/yr TP= 26 lbs/yr TSS= 15.5 tons/yr
D8	3.0 acre wet bottom turf grass lined detention basin servicing Menards	Retrofit slopes and emergent zones with native vegetation to create wetland detention and to create green infrastructure along ComEd Utility corridor	TN= 336 lbs/yr TP= 46 lbs/yr TSS= 37 tons/yr
D9, D10, & D11	11.6 acres of dry bottom turf grass detention in three separate areas within floodplain along Long Run Creek Reach 3 (LRC3)	Selectively break berms along stream and naturalize detention areas with native vegetation. Note: This project may not be feasible due to platting and flood concerns.	TN= 1,780 lbs/yr TP= 168 lbs/yr TSS= 169 tons/yr
D12 & D13	Two wet bottom turf grass lined detentions totaling 2.5 acres servicing Glens of Connemara Subdivision at headwaters of Tributary F; eroded channel has formed in agricultural field as a result of detention outlets	Retrofit slopes and emergent zones with native vegetation to create wetland detention	TN= 90 lbs/yr TP= 27 lbs/yr TSS= 9 tons/yr
D14	3.8 acre wet bottom turf grass lined detention basin at Culver Memorial Park (Homer Twp); forms headwaters of Tributary D	Retrofit slopes and emergent zones with native vegetation to create wetland detention; create fishing and trail access; study potential to put restrictor on basin outlet	TN= 846 lbs/yr TP= 92 lbs/yr TSS= 46 tons/yr
D15	1.9 acre wet bottom turf grass lined detention basin servicing Woodbine West Estates Subdivision; basin is located at headwaters of Tributary E	Retrofit slopes and emergent zones with native vegetation to create wetland detention	TN= 90 lbs/yr TP= 11 lbs/yr TSS= 4.5 tons/yr
D16	0.4 acre dry bottom turf grass basin with concrete channel from inlet to outlet; basin services Stadtler Ridge Subdivision and is at headwaters of Tributary E	Retrofit basin by breaking/disrupting channel and planting with native vegetation	TN= 47 lbs/yr TP= 5 lbs/yr TSS= 2.5 tons/yr

Critical Area	Existing Condition/Description	Recommended Critical Area Management Measure	Nutrient & Sediment Load Reduction
D17	1.5 acre dry bottom turf grass detention basin servicing Ashbury Woods Subdivision; basin is located at headwaters of Tributary G	Raise bottom outlet elevations and plant with native vegetation to create wetland bottom detention that also forms green infrastructure connection to Tributary G	TN= 36 lbs/yr TP= 18 lbs/yr TSS= 6 tons/yr
D18	1.0 acre dry bottom turf grass detention basin servicing residential subdivision; basin is located at headwaters of Tributary I; eroded channel has formed at outlet	Raise bottom outlet elevations and plant with native vegetation to create wetland bottom detention that also forms green infrastructure connection to Tributary I	TN= 60 lbs/yr TP= 11 lbs/yr TSS= 3.5 tons/yr
D19 & D20	Two 1.7 acre dry bottom turf grass detentions servicing Lemont Park District facility at headwaters of Tributary J; eroded channel has formed at outlet of 9I	Raise bottom outlet elevations and plant with native vegetation to create wetland bottom detentions that also forms natural green infrastructure connection to Tributary J	TN= 60 lbs/yr TP= 20 lbs/yr TSS= 13.5 tons/yr
D21	1.5 acre dry bottom detention basin servicing Mayfair Estates Subdivision; basin is located at headwaters of Tributary J	Raise bottom outlet elevations and plant with native vegetation to create wetland bottom detentions that also forms natural green infrastructure connection to Tributary J	TN= 36 lbs/yr TP= 11 lbs/yr TSS= 3.5 tons/yr
D22	50 acres owned by Homer Tree Service; mulch piles are stored here with no detention	Create wetland detention basin(s) to treat runoff	TN= 210 lbs/yr TP= 29 lbs/yr TSS= 23 tons/yr
D23	0.9 acre dry bottom detention basin servicing adjacent subdivision. Basin is comprised of mown turf and has a concrete low flow channel from inlet to outlet; basin drains north to Tampier Lake	Disrupt concrete channel and retrofit basin with native vegetation to create wetland bottom detention	TN= 18 lbs/yr TP= 5 lbs/yr TSS= 2 tons/yr
Agricultural Land			
AG1 & AG2	48 acres (AG1) and 51 acres (AG2) of agricultural land in row crop production; land is located in Tampier Lake TMDL subwatershed	Implement conservation tillage (no till) with filter strips	TN= 456 lbs/yr TP= 233 lbs/yr TSS= 163 tons/yr
AG3	2 acre livestock area with approximately 12 sheep; land is located in Tampier Lake TMDL subwatershed	Implement manure management system to reduce nutrient and sediment runoff to Tampier Lake.	TN= 28 lbs/yr TP= 3 lbs/yr TSS= na
AG4	66 acres of agricultural land in row crop production; land is partially in Tampier Lake TMDL subwatershed	Implement conservation tillage (no till) with filter strips	TN= 296 lbs/yr TP= 151 lbs/yr TSS= 105 tons/yr
AG5, AG6, & AG16	130 acres (AG5), 31 acres (AG6), and 146 acres (AG16) of agricultural land in row crop production along and at headwaters of Long Run Creek Reach 1 (LRC1)	Implement conservation tillage (no till) with filter strips	TN= 1,320 lbs/yr TP= 277 lbs/yr TSS= 460 tons/yr
AG7 & AG8	229 acres (AG7) and 228 acres (AG8) of agricultural land in row crop production at headwaters of Tributary D	Implement conservation tillage (no till) with filter strips	TN= 1,796 lbs/yr TP= 916 lbs/yr TSS= 615 tons/yr

Critical Area	Existing Condition/Description	Recommended Critical Area Management Measure	Nutrient & Sediment Load Reduction
AG9	59 acres of agricultural land is row crop production along Long Run Creek Reach 5 (LRC5)	Implement conservation tillage (not till) with filter strips	TN= 265 lbs/yr TP= 135 lbs/yr TSS= 94 tons/yr
AG10 & AG12	106 acres (AG10) and 20 acres (AG12) of agricultural land is row crop production along Tributary F	Implement conservation tillage (no till) with filter strips	TN= 366 lbs/yr TP= 186 lbs/yr TSS= 131 tons/yr
AG11	94 acres of agricultural land is row crop production at headwaters of Tributary F	Implement conservation tillage (no till) with filter strips	TN= 407 lbs/yr TP= 207 lbs/yr TSS= 143 tons/yr
AG13	63 acres of agricultural land is row crop production at headwaters of Tributary M	Implement conservation tillage (no till) with filter strips	TN= 282 lbs/yr TP= 144 lbs/yr TSS= 100 tons/yr
AG14	157 acres of agricultural land is row crop production adjacent to Long Run Creek Reach 11 (LRC11), Tributary M, and Long Run Seep Nature Preserve	Implement conservation tillage (no till) with filter strips	TN= 640 lbs/yr TP= 327 lbs/yr TSS= 221 tons/yr
AG15	22 acre horse farm with approximately 24 horses; area is adjacent to and drains to Long Run Seep Nature Preserve	Implement manure management system to reduce nutrient runoff	TN= 371 lbs/yr TP= 46 lbs/yr TSS= na
Green Infrastructure Protection Areas			
GI 1, GI 2, GI 3	59 acres (GI1), 70 acres (GI2), 100 acres (GI3) on private agricultural parcels in Tampier Lake TMDL subwatershed; parcels are slated for future residential development	Incorporate Conservation Design standards into future development plans. Note: GI3 has set density minimums in Orland Park	Pollutant reduction cannot be assessed via modeling
GI 4, GI 5, GI 6	163 acres (GI4), 36 acres (GI5), 209 acres (GI6) on private agriculture parcels along and at headwaters of Long Run Creek Reach 1 (LRC1); parcels are slated for future residential and commercial development	Incorporate Conservation Design standards into future development plans. Note: GI4 & GI5 have set density minimums in Orland Park	Pollutant reduction cannot be assessed via modeling
GI 7 & GI 8	231 acres (GI7) and 238 acres (GI8) on private agricultural parcels at headwaters of Tributary D (TribD); most parcels are slated for future residential development	Incorporate Conservation Design standards into future development plans	Pollutant reduction cannot be assessed via modeling
GI 9	275 acres encompassing Old Oak Country Club and private agricultural parcels along Long Run Creek Reach 5 (LRC5); parcels are included in FPDWC 1996 Preservation Plan	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future	Pollutant reduction cannot be assessed via modeling

Critical Area	Existing Condition/Description	Recommended Critical Area Management Measure	Nutrient & Sediment Load Reduction
GI 10 & GI 11	143 acres (GI10) and 121 acres (GI12) on private agricultural parcels along Tributary F (TribF); parcels are slated to be Conservation Development by Lemont	Incorporate Conservation Design standards into future development plans	Pollutant reduction cannot be assessed via modeling
GI 12 &GI 13	71 acres (GI12) and 85 acres (GI13) on private agricultural parcels at headwaters of Tributary E (TribE) and Tributary M (TribM); parcels are slated for future residential and business development	Incorporate Conservation Design standards into future development plans	Pollutant reduction cannot be assessed via modeling
GI 14	143 acres on private residential and agricultural parcels along Long Run Creek Reach 10 (LRC10) and Tributary L (TribL); parcels are included in FPDWC 1996 Preservation Plan	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future	Pollutant reduction cannot be assessed via modeling
GI 15	30 acres on private open space parcels at headwaters of Tributary K (TribK); parcels are adjacent to Bambrick Park	Village of Lemont acquire and protect parcels as extension of Bambrick Park	Pollutant reduction cannot be assessed via modeling
GI 6 & GI 18	484 acres (GI16) and 40 acres (GI18) encompassing Big Run Golf Course, private agricultural parcels, Lockport Golf & Recreation Club; parcels are included in FPDWC 1996 Preservation Plan and generally surround Long Run Seep Nature Preserve	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future	Pollutant reduction cannot be assessed via modeling
G I17	149 acres (GI17) encompassing Parcels owned by Hanson Material Service and Chevron along Long Run Creek Reach 14 (LRC14) and Tributary M (TribM); parcels are included in FPDWC 1996 Preservation Plan and are adjacent to Long Run Seep Nature Preserve	Hanson Material Service and Chevron protect and restore or enhance habitat on parcels for Federally endangered Hine's Emerald Dragonfly	Pollutant reduction is not applicable
GI 19	39 acres on private residential, woodland, and agricultural parcel along headwaters of Tributary J1 (TribJ1); parcel is slated to become residential with 0-2 du/acre.	Incorporate Conservation Design standards into future development plans to preserve tributary and woodland corridor	Pollutant reduction cannot be assessed via modeling

*WWTP upgrades after February 2, 2006 shall meet 1.0 mg/l total phosphorus monthly averages (35 Ill. Adm. Code 304.123 (g); total nitrogen levels could be reduced to about 5.5 mg/l using BNR technology (CMAP 2008).



Long Run Creek Watershed
Fig. 51: Critical Areas
Critical Area Types
Wastewater Treatment Plants
Stream Reaches
Riparian Areas & Lake Buffers
Detention Basins
Wetland Restoration
Agricultural Land
Green Infrastructure Protection Areas
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Tampier Lake TMDL Subwatershed
Locator Map
Des Plaines Watershed
Chicago River Watershed
DuPage County
Cook County
Will County
Des Plaines River
Cal-Sag Channel
Data Sources: AES
Applied Ecological Services, Inc.
Figure 51
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
Tampier Lake
Tampier Slough
McGinty Slough
Derby Meadows WWTP
Chickasaw Hills WWTP
Long Run Cr.
Wolf Rd.
Will Cook Rd.
Bell Rd.
Parker Rd.
Lemont Rd.
Smith Rd.
New Rd.
Archer Ave.
131st St.
143rd St.
151st St.
CN Railway
Cook County
Will County
0 3,000 6,000 12,000 Feet
FIG51_LRC_Template_Critical_Areas.mxd

5.3 WATERSHED IMPAIRMENT REDUCTION TARGETS

Establishing "Impairment Reduction Targets" is important because these targets provide a means to measure how implementation of Management Measures at Critical Areas is expected to reduce watershed impairments over time. Table 36 summarizes the basis for *known* impairments and reduction targets. Reduction targets listed in Table 36 are based on documented information, modeling results, professional judgment, and/or water quality standards and criteria set by the Illinois Pollution Control Board (IPCB, 2011), USEPA (2000), and USGS (2006). It is important to note that the assumption is made that percent decrease in sample concentration (mg/l) needed correlates to the percent reduction in annual load (lbs/yr or tons/yr) for phosphorus, nitrogen, and sediment reduction targets. In addition, Table 36 summarizing the load reduction of phosphorus, nitrogen, and total suspended solids (sediment) expected from addressing Critical Areas.

Watershed-Wide Reduction Targets for Phosphorus, Nitrogen, and Suspended Solids

Watershed-wide nitrogen and phosphorus reduction targets could be attained by addressing Critical Areas alone according to the pollutant reduction calculations. It is interesting to note that 53% of nitrogen and 47% of phosphorus reduction needs could come from upgrades to the two wastewater treatment plants alone. The total suspended solids (sediment) reduction target was not met. However, approximately 5,561 lbs/yr of sediment or 58% could be removed by addressing Critical Areas. This is only 360 lbs/yr or 4% short of the sediment reduction target. Weekly street sweeping alone could remove an additional 147 tons/yr.

Additional watershed-wide reduction targets were established for habitat degradation, hydrologic flow changes, groundwater infiltration, and structural flood problems. Habitat degradation and hydrologic flow change targets could be met by implementing riparian area restoration and by restoring wetlands. Groundwater infiltration targets could be met primarily by preserving open space and incorporating infiltration practices into new and redevelopment. Each of the four structural flood problem areas can be addressed on a case by case basis to meet targets.

Tampier Lake Phosphorus TMDL Reduction Target

In summary, 48% or 0.5 lbs/day (182 lbs/yr) of phosphorus reduction from external subwatershed sources is needed to achieve the TMDL according to Illinois EPA's 2010 TMDL report for Tampier Lake. The TMDL report also states that an additional 53% or 0.8 lbs/day (292 lbs/yr) phosphorus reduction is needed from internal lake sources. Several Critical Areas in Tampier Lake's subwatershed were identified during Applied Ecological Services's (AES) field investigation in fall 2012. Management Measure opportunities identified to reduce phosphorus are included below. Pollutant reduction modeling for these potential Management Measures indicates that greater than 182 lbs/yr of phosphorus can be reduced from external sources thereby meeting the TMDL target.

- 9,650 linear foot buffer opportunity around the north portion of Tampier Lake
- Over 100 potential wetland restoration acres in agricultural land east of Tampier Lake
- Measures for 2-acre livestock area just east of Tampier Lake
- 2,960 linear foot buffer improvement opportunity along Tributary N to Tampier Slough
- Three potential detention basin retrofits

IEPA's 2010 TMDL report lists potential opportunities for internal phosphorus reduction in Tampier Lake such as aerator installation, aluminum treatments, and dredging. All of these options are costly and not generally feasible. Therefore, they are not recommended in this watershed plan.

Table 36. Basis for known impairments, reduction targets, & impairment reduction from Critical Areas.

Impairment: Cause of Impairment	Basis for Impairment	Reduction Target	Reduction from Critical Area	Target Attainable?
Watershed-Wide Reduction Targets				
Water Quality/Aquatic Life: Phosphorus in Long Run Creek	34,868 lbs/yr of phosphorus loading based on STEPL model & wastewater treatment plant loading; 0.2036 mg/l total phosphorus in LRC water quality samples	>**64.4% or 22,455 lbs/yr reduction in phosphorus** loading to achieve 0.0725 mg/l total phosphorus USEPA numeric criteria for streams in Ecoregion VI	16,763 lbs/yr or 48% reduction from wastewater treatment plant upgrades	
			2,778 lbs/yr or 8% reduction from critical stream reaches	
			98 lbs/yr or 1% reduction from critical riparian & lake buffers	
			310 lbs/yr or 1% reduction from critical wetland restorations	
			750 lbs/yr or 2% reduction from critical detention basin retrofits & creation	
			3,028 lbs/yr or 9% reduction from critical agricultural land	
TOTAL			**23,727 lbs/yr or 68% total phosphorus reduction from all Critical Areas**	**Yes**
Water Quality/Aquatic Life: Nitrogen in Long Run Creek	206,408 lbs/yr of total nitrogen loading based on STEPL model & wastewater treatment plant loading; 5.872 mg/l total nitrogen in LRC water quality samples	>**58.1% or 119,923 lbs/yr reduction in nitrogen** loading to achieve 2.461 mg/l total nitrogen USEPA numeric criteria for streams in Ecoregion VI	108,737 lbs/yr or 53% reduction from wastewater treatment plant upgrades	
			5,581 lbs/yr or 3% reduction from critical stream reaches	
			593 lbs/yr or 1% reduction from critical riparian & lake buffers	
			1,292 lbs/yr or 1% reduction from critical wetland restorations	
			6,411 lbs/yr or 3% reduction from critical detention basin retrofits & creation	
			6,227 lbs/yr or 3% reduction from critical agricultural land	
TOTAL			**128,841 lbs/yr or 62% total nitrogen reduction from all Critical Areas**	**Yes**
Water Quality/Aquatic Life: Total suspended solids (sediment) in Long Run Creek	9,550 tons/yr of sediment loading based on STEPL model & wastewater treatment plant loading; 50 mg/l total suspended solids in LRC water quality samples	>**62% or 5,921 tons/yr reduction in sediment** loading to achieve 19 mg/l total suspended solids based on USGS numeric criteria in Great Lakes Region	2,778 tons/yr or 29% reduction from critical stream reaches	
			28.5 tons/yr or 1% reduction from critical riparian areas	
			153 tons/yr or 2% sediment from critical wetland restorations	
			571 tons/yr or 6% reduction from critical detention basin retrofits & creation	
			2,030 tons/yr or 22% reduction from critical agricultural land	
TOTAL			**5,561 tons/yr or 58% sediment reduction from all Critical Areas**	**No****

Impairment: Cause of Impairment	Basis for Impairment	Reduction Target	Reduction from Critical Area	Target Attainable?
Habitat Degradation: Invasive/non-native plant species in riparian areas	63,718 linear feet along riparian areas are currently in poor condition	**12,750 linear feet or 20%** of riparian areas ecologically restored14,968	14,968 linear feet or 23% of riparian areas restored at critical riparian areas	Yes
Habitat Degradation: Hydrologic and flow changes in Long Run Creek	Increase in flow regime over time as documented via the flow-gaging station at Lemont Road; 2,121 acres (36%) of wetlands lost since pre-settlement	**13 critical wetlands restored** accounting for 355 acres	355 critical wetland acres restored	Yes
Aquifer Drawdown: Reduced infiltration & human use	Illinois State Water Survey Data showing 500 foot drawdown by 2005 and 800 foot drawdown by 2050 in shallow aquifers	**>50% preservation of open space and infiltration measures recommended** in all new and redevelopment	>50% preservation of open space and infiltration measures used if developed using Conservation or Low Impact Design	Yes**
Structural Flood Damage: Structures in 100-year floodplain	4 structural flood problem areas	**4 or 100%** structural flood problem areas addressed	Not Applicable*	Yes**
Tampier Lake Reduction Targets; Note: a TMDL for phosphorus has been established for Tampier Lake (IEPA 2010)				
Aesthetic Quality-Tampier Lake: Phosphorus	2.7 lbs/day (985 lbs/yr) of phosphorus loading to Tampier Lake from the surrounding watershed and internal cycling based on TMDL study conducted by Illinois EPA in 2010; 0.085 mg/l total phosphorus in water samples from 1992, 2001, and 2006	**48% or 0.5 lbs/day (182 lbs/yr) reduction from external watershed sources** to achieve 0.05 mg/l total phosphorus Illinois EPA numeric standard. Note: an additional 52% or 0.8 lbs/day (292 lbs/yr) reduction is needed from internal sources; there are no viable internal reduction options recommended.	3 lbs/yr or 1% from critical lake buffers 30 lbs/yr or 3% reduction from critical riparian areas 24 lbs/yr or 2% reduction from critical wetland restorations 20 lbs/day or 2% reduction from critical detention basin retrofits 289 lbs/yr or 29% reduction from critical agricultural land	
TOTAL			**366 lbs/yr or >100% phosphorus reduction from all Critical Areas**	**Yes**

* Addressed in Action Plan section of report
**Target will be met if additional Action Plan recommendations are implemented

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SECTION 6.0

6.0 MANAGEMENT MEASURES ACTION PLAN

Earlier sections of this plan summarized Long Run Creek watershed's characteristics and identified causes and sources of watershed impairment. This section includes an "Action Plan" developed to provide stakeholders with recommended "Management Measures" (Best Management Practices) to specifically address plan goals at general and site specific scales. The Action Plan is divided into two subsections:

- *Programmatic Measures*: general remedial, preventive, and policy watershed-wide Management Measures that can be applied across the watershed by various stakeholders.
- *Site Specific Measures*: actual locations where Management Measure projects can be implemented to improve surface and groundwater quality, green infrastructure, and flooding.

The recommended programmatic and site specific Management Measures provide a solid foundation for protecting and improving watershed conditions but should be updated as projects are completed or other opportunities arise. Lead implementation stakeholders are encouraged to organize partnerships with key stakeholders and develop various funding arrangements to help delegate and implement the recommended actions. The key stakeholders in the watershed are listed in Table 37. Detailed descriptions and responsibilities of each stakeholder are found in Appendix E. **Note: all recommendations in this Section are for guidance only and not required by any federal, state, or local agency.**

Table 37. Key Long Run Creek watershed stakeholders/partners.

Key Watershed Stakeholder/Partner	Acronym/Abbreviation
City of Lockport	Lockport
Commonwealth Edison Company	ComEd
Enbridge, Inc.	Enbridge
Forest Preserve District of Cook County	FPDCC
Forest Preserve District of Will County	FPDWC
Lower Des Plaines Ecosystem Partnership	LDPEP
Golf Courses	GC
Hanson Material Service	HMS
Homer Township Highway Department	Homer Twp
Illinois, Cook County, and Will County Dept. of Transportation	DOTs
Illinois Department of Natural Resources	IDNR
Illinois Nature Preserves Commission	INPC
Illinois Environmental Protection Agency	Illinois EPA
Lemont Township & Highway Department	Lemont Twp
Long Run Creek Watershed Planning Committee	LRCWPC
US Fish & Wildlife Service	USFWS
Village of Homer Glen	Homer Glen
Village of Lemont	Lemont
Village of Orland Park	Orland Park
Village of Palos Park	Palos Park
Will County Planning & Zoning Commission	WCPZC
Will County Stormwater Management Planning Committee	WCSMPC
Will-South Cook Soil and Water Conservation District	SWCD

6.1 PROGRAMMATIC MANAGEMENT MEASURES ACTION PLAN

Numerous types of programmatic Management Measures are recommended to address watershed objectives for each plan goal. The following pages include recommended measures that are applicable throughout the watershed and information needed to facilitate implementation of specific actions. A brief summary of the general programmatic measure types is included below:

Policy: Local, state, and federal government can help prevent watershed impairments in various ways through policy but specifically by adopting and/or supporting (via a resolution) the Long Run Creek watershed plan, implementing green infrastructure policy, requiring conservation developments, protecting groundwater, reducing road salt usage and lawn fertilizers, requiring natural detention basins, and allowing use of native vegetation/landscaping.

Non-Structural: This includes a broad group of practices that prevent impairment through maintenance and management of Management Measures or programs that are ongoing in nature and designed to control pollutants at their source. Such programs include the Audubon Cooperative Sanctuary Program (ACSP) for golf courses, many of the agricultural programs available to farmers, and street sweeping.

Structural: This includes a broad group of practices that prevent impairment via installation of in-the-ground measures. This plan focuses on implementation of naturalized stormwater measures/retrofits, permeable paving, vegetated filter strips/buffers, natural area restoration, wetland restoration, wastewater treatment plant upgrades, and use of rainwater harvesting devices.

Educational: Outreach is important to educate the public related to environmental impacts of daily activities and to build support for watershed planning and projects. Topics typically addressed include land management, pet waste management, lawn fertilizer use, good housekeeping, etc.

6.1.1 POLICY RECOMMENDATIONS

Various recommendations are made throughout this report related to how local governments can improve the condition of Long Run Creek watershed through policy. Policy recommendations focus on improving watershed conditions by preserving green infrastructure, protecting groundwater, minimizing road salts, minimizing lawn fertilizer, sustainable management of stormwater, and allowances for native landscaping. To be successful, the Long Run Creek Watershed-Based Plan would need to be adopted and/or supported by local communities. The process of creating and implementing policy changes can be complex and time consuming. And, although there are numerous possible policy recommendations for the watershed, the following policy recommendations are considered the most important and highest priority for implementation.

Plan Adoption and/or Support & Implementation Policy Recommendations

- Watershed Partners adopt and/or support (via a resolution) the Long Run Creek Watershed-Based Plan and incorporate plan goals, objectives, and recommended actions into comprehensive plans and ordinances.

Green Infrastructure Network Policy Recommendations

- Each municipality consider incorporating the identified Green Infrastructure Network (GIN) into comprehensive plans and development review maps.
- Utilize tools such as protection overlays, setbacks, open space zoning, conservation easements, conservation and/or low impact development, etc. in municipal comprehensive plans and zoning ordinances to protect environmentally sensitive areas on identified Green Infrastructure Network parcels.
- Utilize tools such as Development Impact Fees, Stormwater Utility Taxes, Special Service Area (SSA) Taxes, etc. to help fund future management of green infrastructure components where new and redevelopment occurs.
- Encourage developers to protect sensitive natural areas, restore degraded natural areas and streams, then donate all natural areas and naturalized stormwater management systems to a public agency or conservation organization for long term management with dedicated funding such as Development Impact Fees, Stormwater Utility Taxes, Special Service Area (SSA) Taxes, etc. In general, it is not recommended that these features be turned over to HOA's to manage.
- Establish incentives for developers who propose sustainable or innovative approaches to preserving green infrastructure and using naturalized stormwater treatment trains.
- Consider limiting mitigation for all wetlands lost to development to occur within the watershed.

Groundwater Policy Recommendations

- Encourage extensive stormwater management practices that clean and infiltrate water in all new and redevelopment occurring within the Class III Groundwater Contribution Area (GCA) to Long Run Seep Nature Preserve.
- Limit future mitigation dollars from impacts to Hine's Emerald Dragonfly (HED) habitat such as mining, chemical spills, etc. to managing and restoring HED habitat or to fund projects that support groundwater recharge within the Class III GCA to Long Run Seep Nature Preserve.
- Limit impervious cover within new and redevelopments occurring within Subwatershed Management Units 1, 8, 18, and 20 which are ranked as highly vulnerable to future impervious cover.

Road Salt Policy Recommendations

- Each municipality/township consider supplementing existing programs with deicing best management practices such as utilizing alternative deicing chemicals, anti-icing or pretreatment, controlling the amount and rate of spreading, controlling the timing of application, utilizing proper application equipment, and educating/training deicing employees.

Lawn Fertilizer Policy Recommendations

- Municipalities/townships extend phosphorus regulation to all non-commercial applicators, consider soil testing pre-application, or ban out-right.

Stormwater Management Facility Policy Recommendations

- Allow new development and redevelopment to use stormwater management facilities that serve multiple functions including storage, water quality benefits, infiltration, and wildlife habitat.
- Consider reduced runoff volume from new and retrofitted detention basins.

Native Landscaping/Natural Area Restoration

- Allow native landscaping within local ordinances.
- Ensure local "weed control" ordinances do not discourage or prohibit native landscaping.
- Include short and long term management with performance standards for restored natural areas and stormwater features within new and redevelopment.

6.1.2 DRY & WET BOTTOM DETENTION BASIN DESIGN/RETROFITS, ESTABLISHMENT, & MAINTENANCE

Detention basins are best described as human made depressions for the temporary storage of stormwater runoff with controlled release following a rain event. There are over 185 detention basins in Long Run Creek watershed and most are associated with residential and commercial development. Many of the existing dry bottom basins are designed with low flow concrete channels, outlets that sit flush with the basin bottom, and are planted with turf grass. Most existing wet bottom basins are essentially ponds planted with turf grass along the slopes. These attributes do not promote good infiltration, water quality improvement, or wildlife habitat capabilities.

Studies conducted by several credible entities over the past two decades reveal the benefits of detention basins that serve multiple functions. According to USEPA, properly designed dry bottom infiltration basins reduce total suspended solids (sediment) by 75%, total phosphorus by 65%, and total nitrogen by 60%. Wet bottom basins designed to have wetland characteristics reduce total suspended solids (sediment) by 77.5%, total phosphorus by 44% and total nitrogen by 20%.

Detention Basin Recommendations

Future detention basin design within the watershed should consist of naturalized basins that serve multiple functions, including appropriate water storage, water quality improvement, natural aesthetics, and wildlife habitat. There are also a large number of opportunities to retrofit existing dry or wet bottom detention basins by incorporating minor engineering changes and naturalizing with native vegetation. Site specific retrofit opportunities are identified in the Site Specific Action Plan. Policy should also be considered for using properly designed basins affecting groundwater recharge to critical Hine's Emerald Dragonfly habitat. Location, design, establishment, and long term maintenance recommendations for naturalized detention basins are included below. Note: requirements of the Will and Cook County Stormwater Ordinances

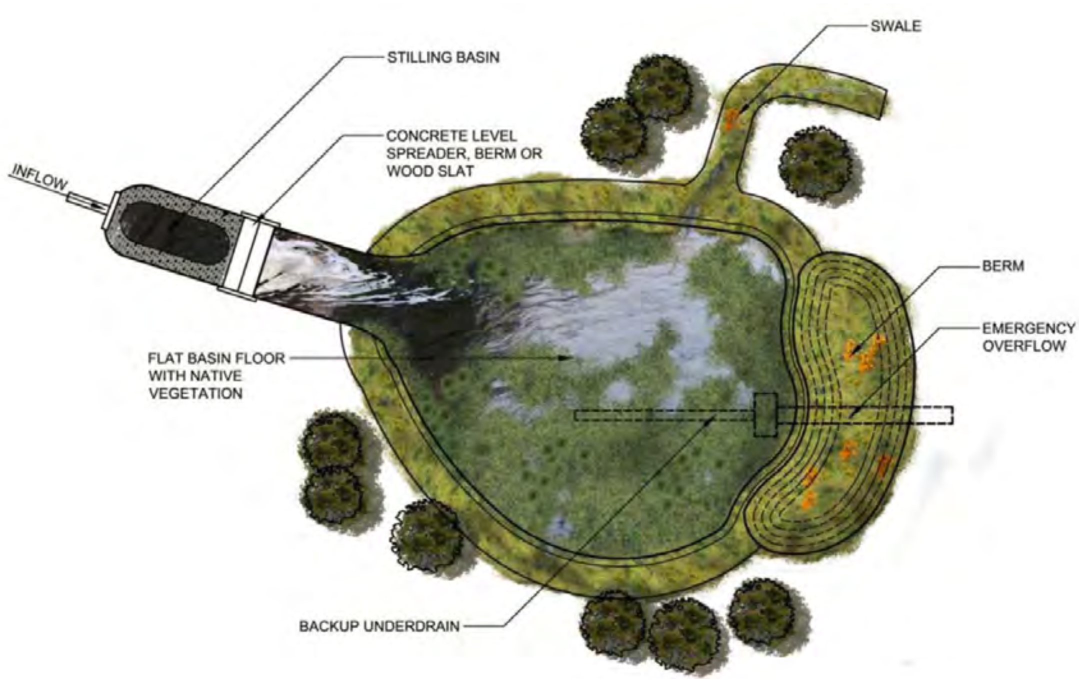


Figure 52. Naturalized dry bottom infiltration basin design.

such as volume and release rates will apply to the design recommendations included below.

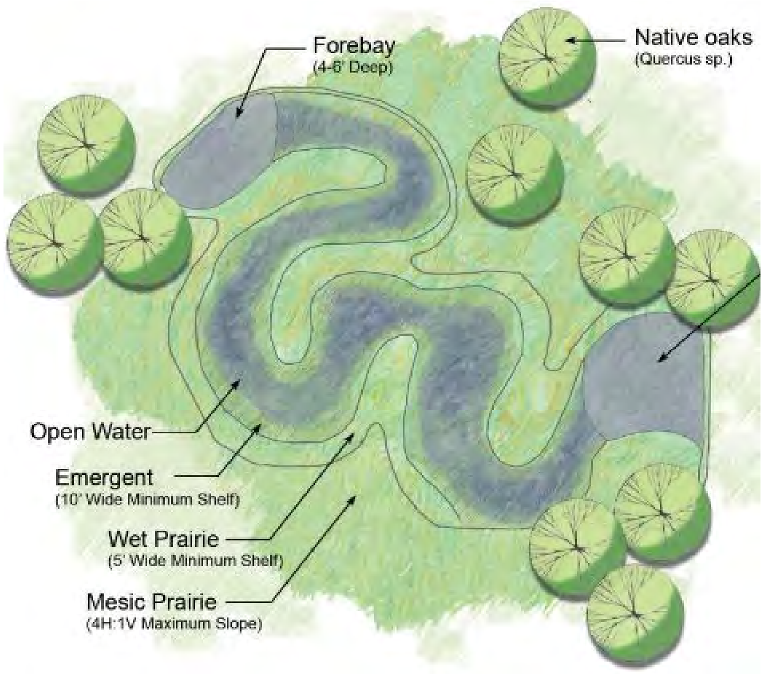


Figure 53. Naturalized wet bottom detention basin design.

Detention Location Recommendations

- Naturalized detention basins should be restricted to natural depressions or drained hydric soil areas and adjacent to other existing green infrastructure in an attempt to aesthetically fit and blend into the landscape. Use of existing isolated wetlands for detention should be evaluated on a case by case basis.
- Basins should not be constructed in any average to high quality ecological community.
- Outlets from detentions should not enter sensitive ecological areas.

Detention Design Recommendations

- One appropriately sized, large detention basin should be constructed across multiple development sites rather than constructing several smaller basins.
- Side slopes should be no steeper than 4H:1V, at least 25 feet wide, planted to native mesic prairie, and stabilized with erosion control blanket. Native oak trees (*Quercus sp.*) and other fire-tolerant species should be the only tree species planted on the side slopes.
- Dry bottom basins should be planted to mesic or wet-mesic prairie depending on site conditions.
- A minimum 5-foot wide shelf planted to native wet prairie and stabilized with erosion control blanket should be constructed above the normal water level in wet and wetland bottom basins. This area should be designed to inundate after every 0.5 inch rain event or greater.
- A minimum 10-foot wide shelf planted with native emergent plugs should extend from the normal water level to 2 feet below normal water level in wet and wetland bottom basins.
- Permanent pools in wet and wetland bottom basins should be at least 4 feet deep.
- Irregular islands and peninsulas should be constructed in wet and wetland bottom basins to slow the movement of water through the basin. They should be planted to native mesic or wet prairie depending on elevation above normal water level.
- A 4-6 foot deep forebay should be built at inlet(s) of wet/wetland bottom basins to capture sediment; a 4-6 foot deep micropool should be constructed at the outlet to prevent clogging.

Short Term (3 Years) Native Vegetation Establishment Recommendations

In most cases, the developer or owner should be responsible for implementing short term management of detention basins and other natural areas to meet a set of performance standards. Generally speaking, three years of management is needed to establish native plant communities within detention basins. Measures needed include mowing during the first two growing seasons following seeding to reduce annual and biennial weeds. Spot herbiciding is also needed to eliminate problematic non-native/invasive species such as thistle, reed canary grass, common reed, purple loosestrife, and emerging cottonwood, willow, buckthorn, and box elder saplings. In addition, the inlet and outlet structures should be checked for erosion and clogging during every site visit. Table 38 includes a three year schedule appropriate to establish native plantings around naturalized detention basins.

Long Term (3 Years +) Native Vegetation Maintenance Recommendations

Long term management of most detention basins associated with development should be the responsibility of the homeowner or business association or local municipality. Often, these groups lack the knowledge and funding to implement long term management of natural areas resulting in the decline of these areas over time. Future developers should be encouraged to donate naturalized detention basins and other natural areas to a local municipality or conservation organization for long term management who receive funding via a Special Service Area (SSA) tax. Table 39 includes a cyclical long term schedule appropriate to maintain native vegetation around detention basins.

Table 38. Three-year vegetation establishment schedule for naturalized detention basins.

Year 1 Establishment Recommendations
Mow prairie areas to a height of 6-12 inches in May, July, and September.
Spot herbicide non-native/invasive species throughout site in late May and again in August/September. Target thistle, reed canary grass, common reed, purple loosestrife, and all emerging woody saplings.
Check for clogging and erosion control at inlet and outlet structures during every site visit.
Year 2 Establishment Recommendations
Mow prairie areas to a height of 12 inches in June and August.
Spot herbicide non-native/invasive species throughout site in May and again in August/September. Target thistle, reed canary grass, common reed, purple loosestrife, and all emerging woody saplings.
Plant additional emergent plugs if needed and reseed any failed areas in fall.
Check for clogging and erosion control at inlet and outlet structures during every site visit.
Year 3 Establishment Recommendations
Spot herbicide non-native/invasive species throughout site in May and again in August/September. Target thistle, reed canary grass, common reed, purple loosestrife, and all emerging woody saplings.
Check for clogging and erosion control at inlet and outlet structures during every site visit.

Table 39. Three year cyclical long term maintenance schedule for naturalized detention basins.

Year 1 of 3 Year Maintenance Cycle
Conduct controlled burn in early spring. Mow to height of 12 inches in November if burning is restricted.
Spot herbicide problematic non-native/invasive species throughout site in mid August. Specifically target thistle, reed canary grass, common reed, and emerging woody saplings such as willow, cottonwood, buckthorn, and box elder.
Check for clogging and erosion control at inlet and outlet structures during every site visit.
Year 2 of 3 Year Maintenance Cycle
Spot herbicide problematic non-native/invasive species throughout site in August. Specifically target thistle, reed canary grass, common reed, and emerging woody saplings such as willow, cottonwood, buckthorn, and box elder.
Mow prairie areas to a height of 6-12 inches in November.
Check for clogging and erosion control at inlet and outlet structures during every site visit.
Year 3 of 3 Year Maintenance Cycle
Spot herbicide problematic non-native/invasive species in August. Specifically target thistle, reed canary grass, common reed, and emerging woody saplings. Cutting & herbiciding stumps of some woody saplings may also be needed.
Check for clogging and erosion control at inlet and outlet structures during every site visit.

6.1.3 RAIN GARDENS


Rain garden adjacent to single family home

Rain gardens have become a popular new way of creating a perennial garden that cleans and infiltrates stormwater runoff from rooftops and sump pump discharges. A rain garden is a small shallow depression that is typically planted with deep rooted native wetland vegetation. These small gardens can be installed in a variety of locations but work best when located in existing depressional areas or near gutters and sump pump outlets. Not only do rain gardens clean and infiltrate water, they also provide food and shelter for many birds, butterflies, and insects.

Rain Garden Recommendations

Education programs in the watershed should focus on teaching residents and businesses the beneficial uses of rain gardens. Local governments in the watershed should also install demonstration rain gardens as a way for the general public to better understand their application. Local governments and Will-South Cook Soil and Water Conservation District (SWCD) could hold rain garden training seminars and potentially provide partial funding to residents and businesses that install rain gardens.

6.1.4 VEGETATED SWALES (BIOSWALES)

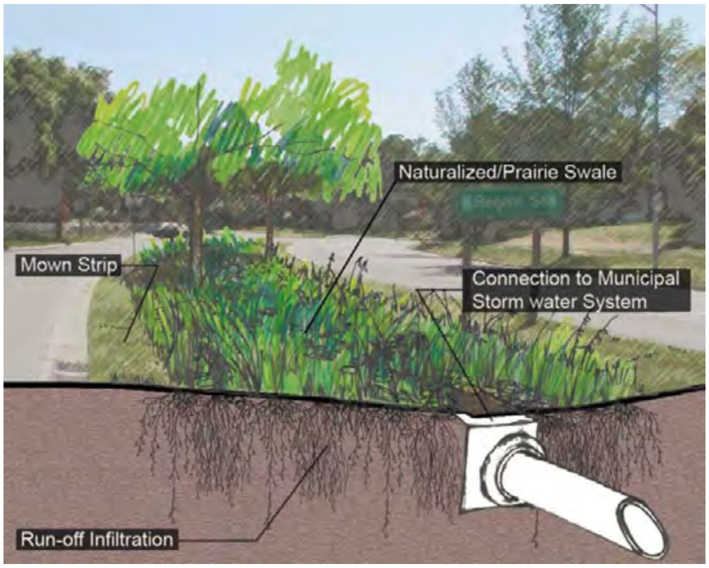
Vegetated swales, also known as bioswales, are designed to convey water and can be modified slightly to capture and treat stormwater for the watershed. Vegetated swales are designed to remove suspended solids and other pollutants from stormwater running through the length of the swale. The type of vegetation can dramatically affect the functionality of the swale. Turf grass is not recommended because it removes less suspended solids than native plants. In addition, vegetated swales can add aesthetic features along a roadway or trail. They can be planted with wetland plants or a mixture of rocks and plant materials can be used to provide interest.

Swales can be designed as either wet or dry swales. Dry swales include an underdrain system that allows filtered water to move quickly through the stormwater treatment train. Wet swales retain water in small wetland like basins along the swale. Wet swales act as shallow, narrow wetland treatment systems and are often used in areas with poor soil infiltration or high water tables.

Water quality is improved by filtration through engineered soils in dry swales and through sediment accumulation and biological systems in wet swales. According to USEPA, vegetated swales reduce total suspended solids (sediment) by 65%, total phosphorus by 25%, and total nitrogen by 10%.

Vegetated Swale Recommendations

Vegetated swales should be used to replace pipes or curbs in new and redevelopment where feasible. Swales can easily be integrated into various urban fabrics with curb cuts for water to access them from roadways, or they can be added between existing lots or in the grassy parkways between roads and sidewalks. Typically swales are used in lower density settings where infiltration might be maximized. Dry swales should be used for smaller development areas with small drainages. Wet swales should be used along larger roadways, small parking areas, and commercial developments.



Dry vegetated swale rendering

6.1.5 PERVIOUS PAVEMENT

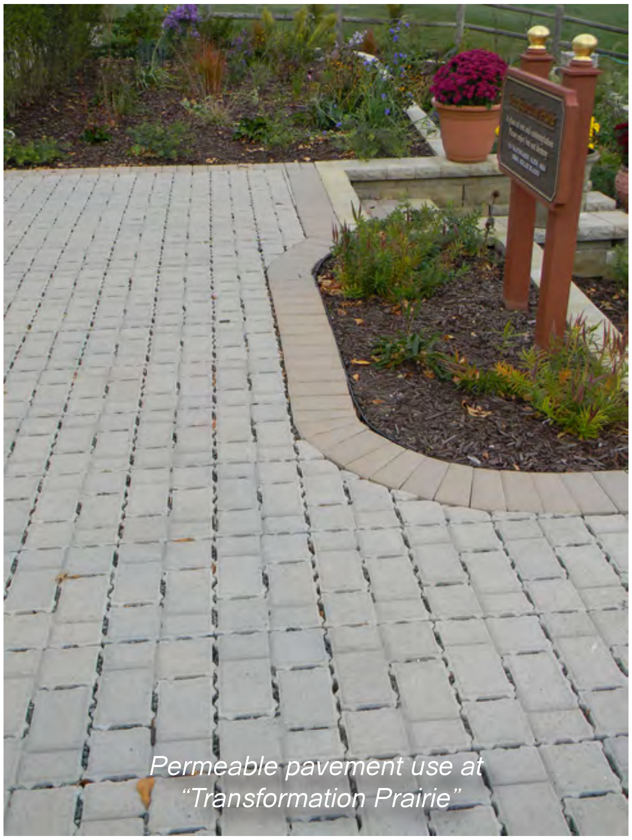
Pervious pavement is also referred to as porous or permeable pavement. Areas that are paved with pervious pavement produce less stormwater runoff than conventionally paved areas. These areas allow for infiltration of the water by allowing water that falls on the surface to flow to a storage gallery through holes in the pavement.

Traditionally, the quantity and quality of water running off pavement surfaces, together with buildings, are the primary reason for stormwater treatment. Pervious pavements reduce runoff rates and volumes and can be used in almost every capacity in which traditional asphalt, concrete, or pavers are used.

Pervious pavement captures first flush rainfall events and allows water to percolate into the ground. Pervious pavement treats stormwater through soil biology and chemistry as the water slowly infiltrates. Groundwater and aquifers are recharged and water that might otherwise go directly to streams will slowly infiltrate, reducing flooding and peak flow rates entering drainage channels. Studies documented by USEPA show that properly designed and maintained pervious pavements reduce total suspended solids (sediment) by 90%, total phosphorus by 65%, and total nitrogen by 85%.

Pervious Pavement Recommendations

Future development and redevelopment in Long Run Creek watershed should consider the use of pervious pavement. Policy recommendations should also be considered for using these products in groundwater recharge areas to critical Hine's Emerald Dragonfly habitat. Permeable pavement can be used in a variety of settings including parking lots, parking aprons, private roads, fire lanes, residential driveways, sidewalks, and bike paths. It is important to note that there are limitations to using pervious pavement based on subsoil composition and they do require annual maintenance to remain effective over time.



Permeable pavement use at "Transformation Prairie"

6.1.6 VEGETATED FILTER STRIPS

Vegetated filter strips are shallowly sloped vegetated surfaces that remove suspended sediment, and nutrients from sheet flow stormwater that runs across the surface. This Management Measure is often referred to as a buffer strip. The type of vegetation can dramatically affect the functionality of the filter strip. Filter strips can either be planted or can be comprised of existing vegetation. Turf grass is not recommended as it removes less total suspended solids than filter strips planted with native vegetation.

The wider they are the more effective filter strips are because the amount of time water has for interception/ interaction with the plants and soil within the filter strip is increased. When installed and functioning properly, the USEPA has documented that filter strips can reduce total suspended solids (sediment) by 73%, total phosphorus by 45%, and total nitrogen by 40%.

Vegetated Filter Strip Recommendations

Vegetated filter strips work in a variety of locations. Vegetated filter strips in rural and urban areas should be installed along streams, lakes, or ponds. Additionally, they can be used adjacent to buildings and parking lots that sheet drain. The water would then pass through the vegetated filter strip and into a waterway, such as a vegetated swale, stream, lake, pond, or other stormwater feature.

Filter strip along municipal building in Algonquin, Illinois

6.1.7 NATURAL AREA RESTORATION & NATIVE LANDSCAPING

Natural area restoration and native landscaping are essentially one in the same but at different scales. Natural area restoration involves transforming a degraded natural area into one that exhibits better ecological health and is typically done on larger sites such as nature/forest preserves. Native landscaping is done at smaller scales around homes or businesses and is often formal in appearance. Both require the use of native plants to create environments that mimic historic landscapes such as prairie, woodland, and wetland. Native plants are defied as indigenous, terrestrial or aquatic plant species that evolved naturally in an ecosystem. The use of native plants in natural area or native landscaping is well documented. They adapt well to environmental conditions, reduce erosion, improve water quality, promote water infiltration, do not need fertilizer, provide wildlife food and habitat, and have minimal maintenance costs.

Several environmental agencies support the use of native plants including Illinois Nature Preserves Commission (INPC), Illinois Department of Natural Resources (IDNR), Forest Preserve District of Will County (FPDWC), Forest Preserve District of Cook County (FPDCC), South Cook-Will County Soil and Water Conservation District (SWCD), U.S. Department of Agriculture (USDA) Natural Resource Conservation Program (NRCS), National Wildlife Federation (NWF), and Conservation Foundation (CF).

Natural Area Restoration/ Native Landscaping Recommendations

Large residential lots with existing natural components such as oak woodlands and wetlands and golf courses provide many of the best opportunities for natural area restoration and native landscaping at a larger scale. Homeowners interested in restoring natural areas or implementing native landscaping can find guidance through the agencies listed above or by contacting a local

Native landscaping near residential home

ecological consulting company. Backyard habitats can be certified through the National Wildlife Federation's Certified Wildlife Habitat program or Conservation Foundation's Conservation@Home program.

There are seven golf courses in the watershed that comprise over 700 acres. Several courses are situated in unique and sensitive areas along Long Run Creek or its tributaries within the identified Green Infrastructure Network. However, most courses could improve their function as green infrastructure by implementing natural area restoration into existing designs. The Audubon Cooperative Sanctuary Program (ACSP) is an education and certification program that helps golf courses protect the environment by providing guidance for outreach and education, resource management, water quality and conservation, and wildlife habitat management. A golf course becomes certified under the program when implementing and documenting recommended environmental management practices. Annual program membership fees are $200.

6.1.8 WETLAND RESTORATION

Over 2,000 acres or 64% of the historic wetlands in Long Run Creek watershed have been lost to farming and other development practices since European settlement in the 1830s. Wetlands are essential for water quality improvement and flood reduction in any watershed and also provide habitat for a wide variety of plant and animal species.

Over 500 acres of drained wetland was discovered in areas of the watershed where wetland restoration might be possible but many of these areas are located on land that is currently in agricultural production and slated for future residential development. The wetland restoration process involves returning hydrology (water) and vegetation to soils that once supported wetlands. The USEPA estimates that wetland restoration projects can reduce suspended solids (sediment) by 77.5%, total phosphorus by 44%, and total nitrogen by 20%.

Wetland restoration at Carrington Reserve Conservation Development in West Dundee, Illinois

Wetland Restoration Recommendations

Municipalities should strongly consider requiring "Conservation Design" that incorporates wetland restoration on parcels slated for future development. Another potential option is to restore wetlands as part of a wetland mitigation bank where wetlands are restored on private land and become "fully certified." Then, developers are able to buy wetland mitigation credits from the wetland bank for wetland impacts occurring elsewhere in the watershed. It is also possible that in the future, Illinois EPA may require more strict nutrient policies for wastewater treatment plants. Wetland banks may provide an opportunity for plant owners to buy "water quality trading credits." The Site Specific Action Plan section of this report identified sites where wetland restoration might be feasible.

6.1.9 STREET SWEEPING

Street sweeping is often overlooked as a Management Measure option to reduce pollutant loading in watersheds. With over 900 acres of roads accounting for about 5% of the watershed, municipal street sweeping programs could significantly reduce non-point source pollutants from urban areas in Long Run Creek watershed. Street sweeping works because pollutants such as sediment, trash, road salt, oils, nutrients, and metals that would otherwise wash into stormsewers and streams following rain events are gathered and disposed of properly. The USEPA and Center for Watershed Protection report similar pollutant removal efficiencies for street sweeping; weekly street sweeping can remove between 9% and 16% of sediment and between 3% and 6% of nitrogen and phosphorus. This is equivalent to removing about 147 tons/year sediment and 88 lbs/yr phosphorus and nitrogen from the 900 acres of roads in the watershed.

Street Sweeping Recommendations

It is likely that several if not all of the municipalities in the watershed already implement street sweeping to some degree. The frequency of street sweeping is a matter of time and budget and should be determined by each municipality. Weekly street sweeping would provide the best results but annual (12 month) bi-weekly sweeping is cited as being sufficient in most cases.

Routine street sweeping is an effective Management Measure. Source: USGS.

6.1.10 STREAM & RIPARIAN AREA RESTORATION & MAINTENANCE

Streambank erosion and channelization is a leading problem in Long Run Creek watershed. Stream surveys reveal that about 20% (34,920 linear feet) of stream length in the watershed is highly eroded and 19% (32,624 linear feet) is highly channelized. Pollutant modeling indicates that nearly 7,900 tons/yr of sediment or 82% of sediment loading comes from eroded streambanks. In addition, riparian areas adjacent to streams are suffering as 37% are in poor ecological condition.

Stream and riparian area restoration is one of the best Management Measures that can be implemented to improve degraded stream and riparian area conditions. This work involves improvements to a stream channel using artificial pool-riffle complexes, streambank stabilization using a combination of bioengineering with native vegetation and hard armoring with rock if needed, and adjacent riparian area improvements via removal of non-native vegetation and replacement with native species. These practices are typically done together as a way to improve water quality by reducing sediment transport, increasing oxygen, and improving habitat. The USEPA reports that as much as 90% of sediment, phosphorus, and nitrogen can be reduced following stream restoration. The downside to stream restoration is that it is technical and expensive. Stream restoration projects include detailed construction plans, often complicated permitting, and construction that must be done by a qualified contractor.

With so many individual landowners with parcels intersecting Long Run Creek and its tributaries, routine maintenance of stream systems is challenging. In many cases, landowners simply do not have the knowledge or are not physically capable of maintaining streams on their property. Stream maintenance includes an ongoing program to remove blockages caused by accumulated sediment, fallen trees, etc. and is a cost effective way to prevent flooding and streambank erosion.

Stream & Riparian Area Recommendations

There are many opportunities to implement stream and riparian area restoration in the watershed. These opportunities are identified in the Site Specific Action Plan. As far as stream maintenance goes, the Lake County Stormwater Management Commission (LCSMC) is a leader in the Chicago land area when it comes to managing stormwater and has developed an excellent guide for riparian owners called "Riparian Area Management: A Citizen's Guide." This short flyer can be found on Lake County's website and is intended to educate landowners about debris removal and riparian landscaping. It is also important to note that not all debris in streams is harmful. The American Fisheries Society has created a short document called "Stream Obstruction Removal Guidelines" which is meant to clarify the appropriate ways to maintain obstructions in streams to preserve fish habitat.

Stream restoration project in Barrington IL

6.1.11 SEPTIC SYSTEM MAINTENANCE

Septic systems are common in older residential developments and many unincorporated areas of Long Run Creek watershed. When septic systems are not maintained and fail they can contribute high levels of nutrients and bacteria to the surrounding environment. Literature sources from USEPA indicate a general septic system failure rate of between 2% and 5%.

Septic System Recommendations

Septic owners in Will County should become compliant with the Will County sewage treatment and disposal ordinance and have routine inspections and sampling completed at least every six months. Septic owners in Cook County should contact the Cook County Department of Public Health who will inspect septic systems to ensure that they are designed and operating properly. In addition, the United States Environmental Protection Agency (USEPA) provides an excellent guide for septic system owners called "A Homeowner's Guide to Septic Systems (USEPA, 2005)." The guide explains how septic systems work, why and how they should be maintained, and what makes a system fail.

6.1.12 AGRICULTURAL MANAGEMENT PRACTICES

Long Run Creek watershed experienced rapid urban growth in the 1990s & 2000s as agricultural areas were converted to residential developments and businesses. Despite this growth, agricultural land still comprises over 2,000 acres or about 12% of the watershed. Pollutant loading estimates using USEPA's STEPL model point to agricultural land as a contributor of nutrients and sediment in runoff. Fortunately, there are numerous agricultural measures and funding sources that can be used by farmers. Many recommended programs are offered through the South Cook-Will County Soil and Water Conservation District (SWCD), U.S. Department of Agriculture (USDA) Natural Resource Conservation Program (NRCS), and Farm Service Agency (FSA).

Mr. Scott Ristau (Illinois EPA Bureau of Water) requested on April 17, 2013 that Applied Ecological Services, Inc. (AES) complete a site specific inventory of agricultural Best Management Practices (BMPs) that have been implemented over the past five years in Long Run Creek watershed in association with NRCS and Farm Service Agency (FSA) funding programs. In response, AES filed a FOIA request to Ms. Phyllis Wade (Program Management Specialist-Business Service Division of NRCS) by e-mail on June 7, 2013. AES was instructed by Ms. Wade to redirect the request to Mr. Deryl Richardson (National FOIA/PA Officer-NRCS). AES submitted a FOIA request letter to Mr. Richardson on July 29, 2013. Since submitting the letter, AES has not received any official response. AES last followed up on the FOIA request on September 16, 2013.

Environmental Quality Incentive Program (EQIP)

The NRCS's Environmental Quality Incentive Program (EQIP) is a voluntary conservation program that provides financial assistance to individuals/entities to address soil, water, air, plant, animal and other related natural resource concerns on their land. EQIP offers financial and technical help to assist participants to install or implement structural and management practices on eligible agricultural land.

"Conservation Tillage" (no till) is a land management option within the EQIP program and is the leading recommendation for farmers in Long Run Creek watershed (see Site Specific Action Plan). With conservation tillage, the land is left undisturbed from harvest through planting, preserving a canopy of crop residue on the surface to protect the soil from erosion. Along with soil conservation benefits, high fuel prices are driving a switch to conservation tillage for many farmers. Eliminating tillage passes reduces both fuel and labor expenses. $15/ac is offered to farmers through the NRCS's EQIP program.

Wetland Reserve Program (WRP)

The Wetlands Reserve Program (WRP) is a voluntary program offering farmers the opportunity to protect, restore, enhance, and protect wetlands on their property. The NRCS provides technical and financial support to help landowners with their wetland restoration efforts. The goal of NRCS is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

Conservation Tillage (no till) farming. Source: farmprogress.com.

Landowners who choose to participate in WRP may sell a conservation easement or enter into a cost-share restoration agreement with NRCS to restore and protect wetlands. The program offers landowners three options: permanent easements, 30-year easements, and restoration cost-share agreements with a minimum of 10-years duration. Landowners and NRCS then develop a plan for the restoration and maintenance of the wetland. As a requirement of the program, landowners voluntarily limit future use of the land, yet retain private ownership.

Grass waterway on highly erodible agricultural land. Source: NRCS.

Grassland Reserve Program (GRP)

The Grassland Reserve Program (GRP) is a voluntary conservation program that emphasizes support for working grazing operations, enhancement of plant and animal biodiversity, and protection of grassland under threat of conversion to other uses. Participating farmers voluntarily limit future development and cropping uses of the land while retaining the right to conduct common grazing practices and operations related to the production of forage and seeding, subject to certain restrictions during nesting seasons of bird species that are in significant decline or are protected under Federal or State law. A grazing management plan is required for participants.

Conservation Reserve Program (CRP)

The Conservation Reserve Program (CRP) is a land conservation program administered by the Farm Service Agency (FSA). In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species such as native prairie grasses that will improve environmental health and quality. Contracts for land enrolled in CRP are 10-15 years in length. The long-term goal of the program is to re-establish valuable land cover to help improve

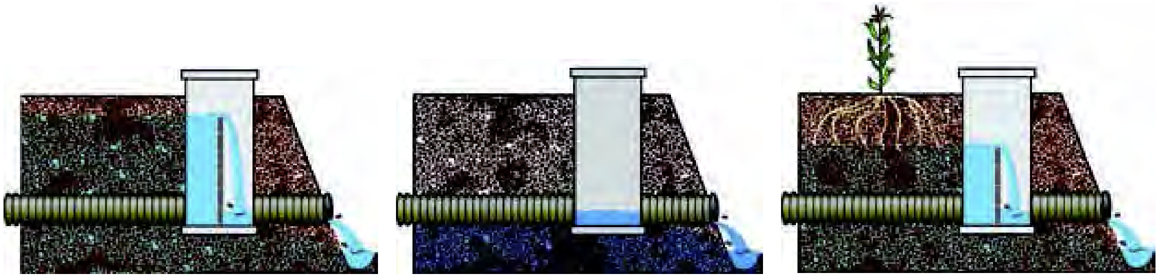


Figure 54. Use of tile control to raise water table after harvest (left), drawdown prior to seeding (middle), and raised again in midsummer (right) (Source: Purdue University)

water quality, prevent soil erosion, and reduce loss of wildlife habitat.

Wildlife Habitat Incentive Program (WHIP)

The Wildlife Habitat Incentive Program (WHIP) is a voluntary program for landowners who want to develop and improve wildlife habitat primarily on private lands. It provides both technical assistance and cost share payments to help native fish and wildlife species, reduce impacts of invasive species, and improve aquatic wildlife habitat.

Participants work with NRCS to prepare a wildlife habitat development plan in consultation with the local conservation district. The plan describes the participant's goals for improving wildlife habitat, includes a list of practices and a schedule for installing them, and details the steps necessary to maintain the habitat for the life of the agreement. NRCS and the participant enter into a cost-share agreement for wildlife habitat development that lasts from 5 to 10 years.

Subsurface (Tile) Drainage Best Management Practices

Subsurface drain tiles are a commonly used practice by farmers to help lower the water table of poorly drained fields and/or wet areas within fields. Unfortunately, nitrogen and phosphorus often find their way into tiles through cracks and macropores in the soil. The tiles then carry these nutrients to local streams. Management of the water table through control structures at drain tile outlets is a promising approach to reduce the amount of nutrients that exit the tile lines. This is accomplished by adjusting the control structure so that the water table rises after harvest to limit drainage during the off-season. The water table can then be lowered a few weeks prior to planting in spring. The water table can also be raised in midsummer to store water for crops.

Waste (Manure) Management

Livestock production within the agricultural industry is a producer of waste materials that need management. These wastes include primarily manure from livestock. The NRCS has produced the “Agricultural Waste Management Field Handbook (AWMFH)” to provide specific guidance for planning, designing, and managing systems where agricultural wastes are involved. It can help assist agricultural producers in organizing a comprehensive plan that results in the integration of waste management into overall farm operations. Material in this handbook covers a wide range of activities from incorporating available manure nutrients into crop nutrient budgets to proper disposal of waste materials that do not lend themselves to resource recycling.

6.1.13 RAINWATER HARVESTING & RE-USE

Water harvesting and re-use via rain barrels and cisterns are important options to decrease the amount of stormwater runoff in a watershed. It is a simple, economical solution that can be done by any homeowner or business. On most homes and buildings, the water from roofs flows into downspouts and then onto streets, parking areas, or into stormsewers. Disconnecting the downspouts and using either rain barrels or cisterns for re-use later can reduce the flood levels in local streams.

Rain barrel adjacent to residential home. Source: Rainbarrelsource.com.

Water re-use differs based on the type of storage and water treatment. A rain barrel is typically attached to a downspout and collects water for irrigation purposes. In many areas, residential irrigation can account for almost 50 percent of residential water consumption. Re-using water is a great way of minimizing water use and lowering water bills.

A cistern also stores water from rooftop runoff to be used later. However a cistern is often larger, sealed, and the water can be filtered for a wider variety of uses. With appropriate sanitation treatments, water from cisterns can even be reused for toilets, housecleaning, showers, hand washing, and dish washing. Cistern water, without any sanitation, can be used for lawn and garden watering, irrigation, car washing, and window cleaning.

The primary purpose of rain barrels and cisterns is water storage. Rain barrels typically store 55 gallons each. Cisterns can store greater amounts. Rain barrels and cisterns also reduce water demand in the summer months by reducing the potable water used for irrigation or other household uses.

Rainwater Harvesting & Reuse Recommendations

Education programs in the watershed should focus on teaching residents and businesses the beneficial uses of rain barrels and cisterns. Local governments in the watershed should aim to install demonstration rain barrels as a way for the public to better engage in their use around residential homes. Local governments and conservation organizations such as the Lower Des Plaines Ecosystem Partnership (LDPEP), Long Run Creek Watershed Planning Committee (LRCWPC), and Will-South Cook Soil and Water Conservation District (SWCD) should sponsor programs where residents and businesses can purchase rain barrels.

6.1.14 CONSERVATION & LOW IMPACT DEVELOPMENT

"Conservation or Low Impact Design" facilitates development density needs while preserving the most valuable natural features and ecological functions of a site. It does this by reducing lot size, especially lot width thereby reducing the amount of roads and infrastructure (Figure 55). The open space is typically preserved or restored natural

Figure 55. Conservation/Low Impact development design

areas that are integrated with newer natural stormwater features and recreational trails. The open space allows the residents to feel like they have larger lots because most of the lots adjoin the open space system. “Conservation/ Low Impact Design” is also known as cluster or open space design.

Such flexibility is intended to retain or increase the development rights of the property owner and the number of occupancy units permitted by the underlying zoning designation, while encouraging environmentally responsible development. “Conservation/Low Impact Design” is most appropriate in areas having natural and open space resources to be protected and preserved such as floodplains, groundwater recharge areas, wetlands, woodlands, streams, wildlife habitat, etc. It can also be used to preserve and integrate agricultural uses into the land pattern. The approach first takes into account the natural landscape and ecology of a development site rather than determining design features on the basis of pre-established density criteria.

Conservation /Low Impact Development Recommendations

There are several opportunities to implement “Conservation/Low Impact Design” into future development sites in the watershed. These opportunities are identified in the Site Specific Action Plan. The steps included below are generally followed when designing the layout of a development site using conservation or low impact design:

Figure 56. Stormwater Treatment Train within Conservation Development.

Step 1: Identify all natural resources, conservation areas, open space areas, physical features, and scenic areas and preserve and protect these areas from any negative impacts generated as a result of the development.

Step 2: Locate building sites to take advantage of open space and scenic views by requiring smaller lot sizes or cluster housing as well as to protect the development rights of the property owner and the number of occupancy units permitted by the underlying zoning of the property.

Step 3: Design the transportation system to provide access to building sites and to allow movement throughout the site and onto adjoining lands; roads should not traverse sensitive natural areas.

Step 4: Prepare engineering plans which indicate how each building site can be served by essential public utilities

6.1.15 GREEN INFRASTRUCTURE PLANNING

A green infrastructure network provides communities with a tool to identify and prioritize land use or conservation opportunities and plan development that benefits both people and nature by providing a framework for future growth. It identifies areas not suitable for development, areas suitable for development but that should incorporate conservation or low impact design standards, and areas that do not affect green infrastructure. Park Districts, Forest Preserve Districts, and IDNR can use green infrastructure plans for trail routing, open space linkages, and natural area restoration decisions. Residents can use green infrastructure recommendations to reduce runoff from their properties and to see how their properties fit into the larger network. A Green Infrastructure Network for the watershed was developed in Section 3.11.

Green Infrastructure Network *implementation* has several actions:

- Protect specific unprotected green infrastructure parcels through acquisition, regulation, and/or incentives.
- Incorporate conservation or low impact design standards on green infrastructure parcels where development is planned.
- Limit future subdivision of green infrastructure parcels.
- Implement long term management of green infrastructure.

Green Infrastructure Recommendations

A Green Infrastructure Network can only be realized by coordinated planning efforts of local municipalities, park districts, developers, and private land owners. Stakeholders should follow the recommended process below to initiate and implement the Green Infrastructure Network for Long Run Creek watershed.

1. Include all green infrastructure parcels in updated community comprehensive plans and development review maps.
2. Utilize tools such as protection overlays, setbacks, open space zoning, conservation easements, conservation and/or low impact development, etc. on all green infrastructure parcels.
3. Utilize tools such as Development Impact Fees, Stormwater Utility Taxes, Special Service Area (SSA) Taxes, etc. to help fund future management of green infrastructure components where new and redevelopment occurs.
4. Identify important unprotected green infrastructure parcels not suited for development then protect and implement long term management.
5. Work with private land owners along stream/tributary corridors to manage their land for green infrastructure benefits.
6. Use the Green Infrastructure Network to identify new trails and trail connections.

6.1.16 GROUNDWATER MODELING

It is likely that future groundwater wells will be proposed in the watershed and the only way to determine the impacts of the pumping on Hine's Emerald Dragonfly critical habitat within Long Run Seep Nature Preserve would be via a groundwater model. It is recommended that a groundwater model be used prior to installing new wells to test proposed pumping impacts and propose alternatives if needed to minimize impacts.

6.2 SITE SPECIFIC MANAGEMENT MEASURES ACTION PLAN

Site Specific Management Measure (Best Management Practice [BMP]) recommendations made in this section of the report are backed by findings from the watershed field inventory, overall watershed resource inventory, and input from stakeholders. In general, the recommendations address sites where watershed problems and opportunities can best be addressed to achieve watershed goals and objectives. The Site Specific Management Measures Action Plan is organized by the jurisdiction in which recommendations are located making it easy for users to identify the location of project sites and corresponding project details. It is important to note that project implementation is voluntary and there is no penalty or reduction in future grant opportunities for not following recommendations. Site Specific Management Measures were identified within the following jurisdictional boundaries and are included in the Action Plan:

- Du Page Township
- FPDCC
- Homer Glen
- Homer Township
- IDNR
- Lemont
- Lemont Township
- Lockport
- Lockport Township
- Orland Park
- Orland Township
- Palos Park
- Palos Township

Management Measure categories in the Site Specific Management Measures Action Plan include:

- Detention Basin Retrofits & Maintenance
- Wetland Restoration
- Streambank & Channel Restoration
- Riparian Area & Lake Buffer Restoration & Maintenance
- Green Infrastructure Protection Areas
- Agricultural Management Practices
- Wastewater Treatment Plant Upgrades
- Other Management Measures

Descriptions and location maps for each Management Measure category follow. Table 42 includes useful project details such as site ID#, Location, Units (size/length), Owner, Existing Condition, Management Measure Recommendation, Pollutant Load Reduction Efficiency, Priority, Responsible Entity, Sources of Technical Assistance, Cost Estimate, and Implementation Schedule.

Project importance, technical and financial needs, cost, feasibility, and ownership type were taken into consideration when prioritizing and scheduling Management Measures for implementation. High, Medium, or Low Priority was assigned to each recommendation. "Critical Areas" as discussed in Section 5.2 are all High Priority and highlighted in red on project category maps and the Action Plan table. For this watershed plan a "Critical Area" is best described as a location in the watershed where existing or potential future causes and sources of an impairment or existing function are significantly worse than other areas of the watershed. Implementation schedule varies greatly with each project but is generally based on the short term (1-10 years) for High Priority/ Critical Area projects and 10-20+ years for medium and low priority projects. Maintenance projects are ongoing.

The Site Specific Management Measures Action Plan is designed to be used in one of two ways.

Method 1: The user should find the respective jurisdictional boundary (listed alphabetically in Table 42) then identify the Management Measure category of interest within that boundary. A Site ID# can be found in the first column under each recommendation that corresponds to the Site ID# on a map (Figures 57-63) associated with each category.

Method 2: The user should go to the page(s) summarizing the Management Measure category of interest then locate the corresponding map and Site ID# of the site specific recommendations for that category. Next, the user should go to Table 42 and locate the jurisdiction where the project is located, then go to the project category and Site ID# for details about the project.

Pollutant Load Reduction Estimates

Where applicable, pollutant load reductions and/or estimates for total suspended solids (TSS), nitrogen (TN), and phosphorus (TP) were evaluated for each recommended Management Measure based on efficiency calculations developed for the USEPA's Region 5 Model. This model uses "Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual" (MDEQ, 1999) to provide estimates of sediment and nutrient load reductions from the implementation of *agricultural* Measures. Estimate of sediment and nutrient load reduction from implementation of *urban* Measures is based on efficiency calculations developed by Illinois EPA.

Estimates of pollutant load reduction using the Region 5 Model are measured in weight/year (tons/yr for total suspended solids and lbs/yr for nitrogen and phosphorus). The model was generally used to calculate weight of pollutant reductions for all recommended High Priority-Critical Areas where calculation of such data is applicable. In summary, pollutant reductions were calculated for 20 detention basin retrofit, creation, & maintenance projects, 13 wetland restoration projects, 6 streambank & channel restoration projects, 5 riparian area & lake buffer restoration & maintenance projects, 15 agricultural management projects, and 2 wastewater treatment plant upgrade projects. Spreadsheets used to determine pollutant load reductions can be found in Appendix D.

Estimated *percent* removal of total suspended solids, nitrogen, and phosphorus are included in the Action Plan table for most medium and low priority projects and those projects where calculation of pollutant weight reduction is beyond the scope of this project. The percent removal efficiencies were based on various Management Measures included in the Region 5 Model as shown in Table 40.

Watershed-Wide Summary of Action Recommendations

All Site Specific Management Measures, Education Plan (Section 7.0), and Monitoring Plan (Section 9.1) recommendation information is condensed by Category in Table 41. This information provides a watershed-wide summary of the "Total Units" (size/length), "Total Cost," and "Total Estimate of Pollutant Load Reduction" if all the recommendations in the Site Specific Management Measures Action Plan, Education Plan, and Monitoring Plan are implemented. Key points include:

- 6,636 acres of ecological restoration with a total cost of $31,734,000.
- 121,478 linear feet of streambank restoration and riparian/lake buffer restoration costing $4,868,000.
- 179 acres of yearly maintenance related to detention basins and streams costing $250,250/year.
- 5,561 tons/year of total suspended solids (TSS) would potentially be reduced each year and be within 360 tons (4%) of the Reduction Target identified in Section 5.3.
- 128,841 pounds/year of nitrogen (TN) would potentially be reduced each year exceeding 119,923 pounds/year Reduction Target identified in Section 5.3
- 23,727 pounds/year of phosphorus (TP) would potentially be reduced each year, exceeding the 22,455 pounds/year Reduction Target indentified in Section 5.3.
- Education programs will cost more than $35,000 to implement (see Section 7.0).
- A monitoring plan will cost $60,000 every five years to implement (see Section 9.1).

Table 40. Region 5 Model percent pollutant removal efficiencies for various Management Measures.

Management Measures	TSS	TN	TP
Vegetated Filter Strips	73%	40%	45%
Wet Pond/Detention	60%	35%	45%
Wetland Detention	77.5%	20%	44%
Dry Detention	57.5%	30%	26%
Infiltration Basin	75%	60%	65%
Streambank/Lake Shoreline Stabilization	90%	90%	90%
Weekly Street Sweeping	16%	6%	6%
Porous Pavement	90%	85%	65%
Manure Waste Management	na	80%	90%

Table 41. Watershed-wide summary of Management Measures recommended for implementation.

Management Measure Category	Total Units (size/length)	Total Cost	Estimated Load Reduction* TSS (t/yr)	TN (lbs/yr)	TP (lbs/yr)
Detention Basin Retrofits & Maintenance*					
Retrofits (prairie buffers, emergent plantings, etc.)	149.9 acres	$2,167,000	548	6,201	721
Maintenance (burning, mowing, invasives, brushing)	178.75 acres	$168,250/yr	na	na	na
Wetland Restoration*	495 acres	$5,998,000	153	1,292	310
Streambank & Channel Restoration*	57,382 lf	$4,212,000	2,778	5,581	2,778
Riparian & Lake Buffer Restoration & Maintenance*					
Riparian Areas	54,446 lf (62 ac)	$546,000	28.5	589	95
Lake Buffers	9,650 lf (6.6 ac)	$110,000	0.5	4	3
Maintenance (burning, invasive control, brushing)	64,069 lf	$67,000/yr	na	na	na
Green Infrastructure Protection Areas**	2,686 acres	na	na	na	na
Agricultural Management Practices**					
Conservation Tillage (no till) Farming	1,282 acres	na	2,030	5,828	2,979
Waste (manure) Management	24 acres	$5,000/yr	na	399	49
Wastewater Treatment Plant Upgrades	12 acres	$23,569,000	na	108,737	16,763
Other Management Measures**					
2 Bioswales	4 acres	$183,000	na	na	na
2 Rain Gardens	2,250 sq. ft.	$10,000	na	na	na
1 Stormwater Storage	2 acres	$75,000	na	na	na
Rough Area Retrofits at 4 Golf Courses	155 acres	$440,000	na	na	na
Natural Area work at Homer Glen site	40 acres	$120,000	na	na	na
Vegetation Management at Long Run Seep Nature Preserve	89 acres	$10,000/yr	na	na	na
Management Plan for John J. Duffy Forest Preserve	1,614 acres	$25,000	na	na	na
Management Plan for Arbor Lake Preserve	60 acres	$10,000	na	na	na
Naturalized detention basin at Homer Tree Service mulch site	50 acres	$75,000	23	210	29
Information & Education Plan	Entire Plan	>$35,000	na	na	na
Water Quality Monitoring Plan	Entire Plan	60K/5 Years	na	na	na
TOTALS	6,636 acres	$31,734,000	5,561 tons/yr	128,841 lbs/yr	23,727 lbs/yr
	179 ac, 64,069 lf maintenance	$250,250/yr			
	121,478 lf	$4,868,000			
	Other	$938,000			
	Education	>$35,000			
	Monitoring	$60,000/5yr			

* Pollutant load reduction calculated for applicable High Priority-Critical projects only.

* * Pollutant load reductions were not or could not be calculated using STEPL or other modeling.

6.2.1 DETENTION BASIN RETROFITS & MAINTENANCE RECOMMENDATIONS

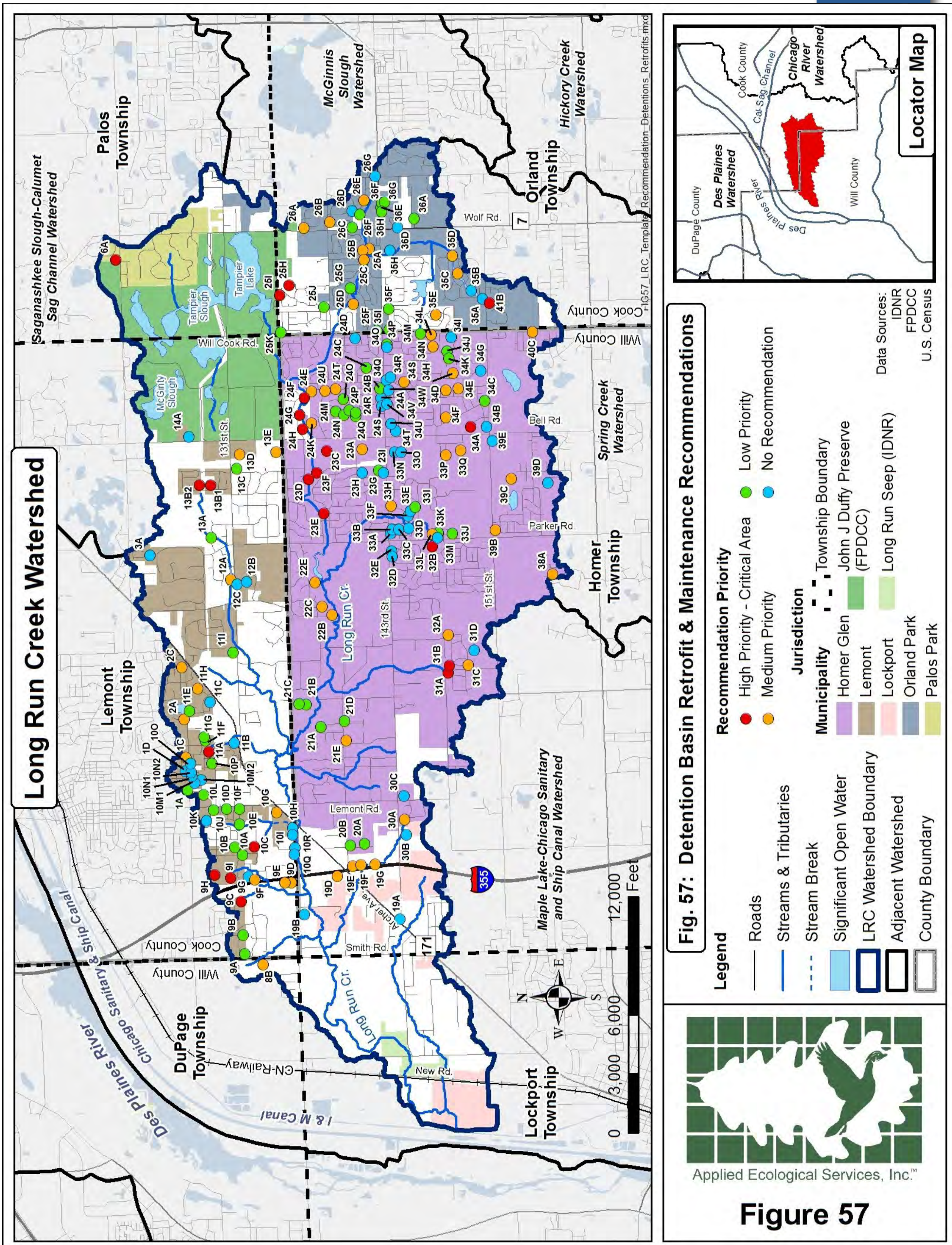
A vast number of detention basin retrofit projects were identified in Long Run Creek watershed because much of the watershed is already developed and detention basins are currently in place. However, most detention basins provide little in the way of water quality improvement, infiltration capability, and wildlife habitat. In the future it is recommended that new standards for detention basins be implemented in local and county development ordinances (see Section 6.1.2). Applied Ecological Services, Inc. (AES) conducted an inventory of 185 detention basins in fall of 2012. The results of the detention basin inventory are summarized in Section 3.13. Detailed field investigation datasheets and maps can be found in Appendix B.

The condition of detention basins in the watershed varies. Seventy seven (77) dry bottom turf grass, 79 wet or wetland bottom w/turf grass slopes, 3 naturalized dry bottom, and 26 naturalized wet or wetland bottom basins were assessed. Of the 185 basins, only 20 (11%) likely provide "Good" ecological and water quality benefits while 40 basins (22%) likely provide "Average" benefits. The remaining 125 basins (69%) are likely "Poor" at providing ecological and water quality benefits.

The majority of dry bottom detention basins are located within the municipalities of Lemont and Homer Glen. Of the 80 dry bottom basins in the watershed 77 are planted with turf grass. In addition, many of the dry bottom basins are constructed with either concrete low flow channels that run directly from the inlet to the outlet or have outlet drains flush with the bottom of the basin. Many wet and wetland bottom basins are found in Homer Glen and Orland Park. Many of the dry, wet, and wetland bottom basins in the watershed present excellent retrofit opportunities. Most would be relatively easy to naturalize with native plantings and concrete structures and drains in dry basins can be manipulated to store and infiltrate water as desired.

All recommended detention basin retrofits and/or maintenance recommendations are shown on Figure 57 by priority and Site ID# which correspond with the ID# used in the field investigation. Details about each recommendation can be found in the Action Plan Table (Table 42) within the appropriate jurisdictional boundary. All of the High priority recommendations are considered "Critical Areas." Many of these are publicly owned basins and other private basins with significant problems or good opportunities; funding and implementation are usually easier on public land or where major problems/opportunities exist. Low or Medium priority is generally assigned to smaller private basins and those with fewer problems or maintenance needs. In addition, there are many detention basins with no retrofit or maintenance recommendations. In some cases, basins are assigned higher priority based on location and/or ability to treat polluted stormwater runoff in the Tampier Lake TMDL subwatershed or other pollutant hotspot.

Critical Area detention basin retrofit opportunity at Culver Memorial Park



Applied Ecological Services, Inc.™
Figure 57

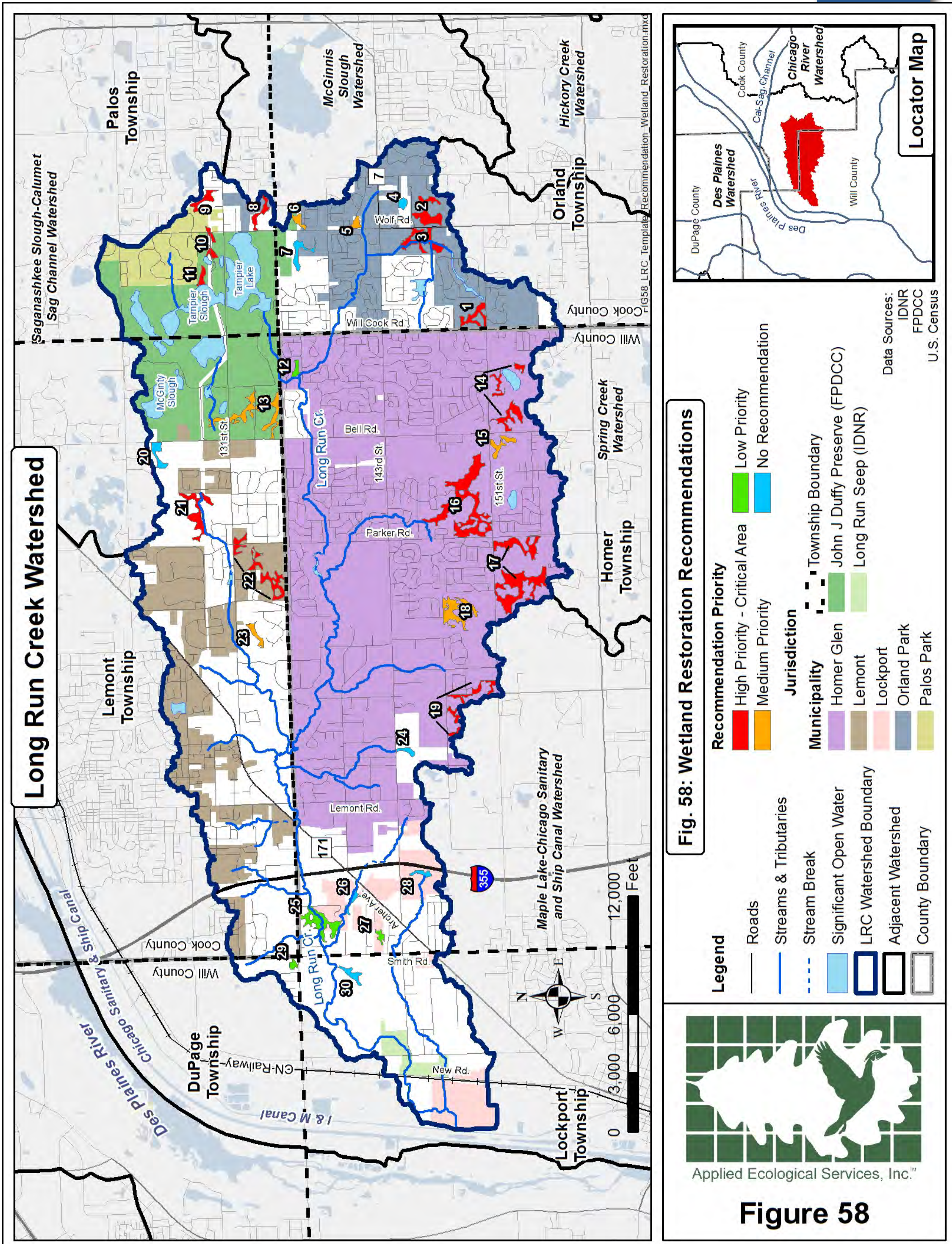
6.2.2 WETLAND RESTORATION RECOMMENDATIONS

Wetland restoration is the process of bringing back historic wetlands in areas where they have been drained. This section does not include enhancement and maintenance for existing wetlands. Restoration can be important for mitigation purposes or done simply to benefit basic environmental functions that historic wetlands once served. Improvement in water quality is the greatest benefit provided by wetland restoration. Other benefits include reducing flood volumes/rates and improved habitat to increase plant and wildlife biodiversity. The wetland restoration process is generally the same for all sites. First a study must be completed to determine if restoration at the site is actually feasible. If it is, a design plan is developed, permits obtained, then the project is implemented by breaking existing drain tiles and/or regrading soils to attain proper hydrology to support wetland vegetation. Planting with native wetland species is the next step followed by short and long term maintenance and monitoring to ensure establishment.

Wetland restoration sites were identified in Section 3.13.5 using a GIS exercise and specific criteria determined to be essential for restoration of a functional and beneficial wetland. The initial analysis resulted in 116 sites meeting these criteria. However, only 23 of these sites were determined to be "potentially feasible" and 7 are considered to have only "limited feasibility" based on careful review of each site using recent aerial photography, open space inventory results, existing land use, and field inspections where appropriate.

Figure 58 includes the location of all "potentially feasible" wetland restoration sites by site priority and site ID#. The site ID#s match those used in Section 3.13.5. Wetland restoration sites that were determined to have only "limited feasibility" are not included in the Action Plan. Details about each recommendation can be found in the Action Plan Table (Table 42) within the appropriate jurisdictional boundary. In general, large sites on agricultural land, sites on public land, and sites within the identified Green Infrastructure Network are higher priority than smaller sites and those on private land. In addition, sites within the Tampier Lake TMDL subwatershed are all High priority.

Example wetland restoration at AES wetland mitigation site


Long Run Creek Watershed
Fig. 58: Wetland Restoration Recommendations
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Recommendation Priority
High Priority - Critical Area
Medium Priority
Low Priority
No Recommendation
Jurisdiction
Municipality
Homer Glen
Lemont
Lockport
Orland Park
Palos Park
Township Boundary
John J Duffy Preserve (FPDCC)
Long Run Seep (IDNR)
Data Sources:
IDNR
FPDCC
U.S. Census
Locator Map
DuPage County
Cook County
Will County
Des Plaines Watershed
Chicago River Watershed
Cal-Sag Channel
Des Plaines River
Applied Ecological Services, Inc.™
Figure 58
Palos Township
Lemont Township
DuPage Township
Lockport Township
Homer Township
Orland Township
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
Cook County
Will County
Tampier Slough
Tampier Lake
McGinty Slough
Long Run Cr.
Wolf Rd.
Will Cook Rd.
Bell Rd.
143rd St.
131st St.
151st St.
Parker Rd.
Lemont Rd.
Archer Ave.
Smith Rd.
New Rd.
CN-Railway
171
355
0 3,000 6,000 12,000 Feet
FIG58_LRC_Template_Recommendation_Wetland_Restoration.mxd

TOP: Example AES stream restoration in Barrington Illinois. BOTTOM: Potential stream project at Big Run Golf Course.

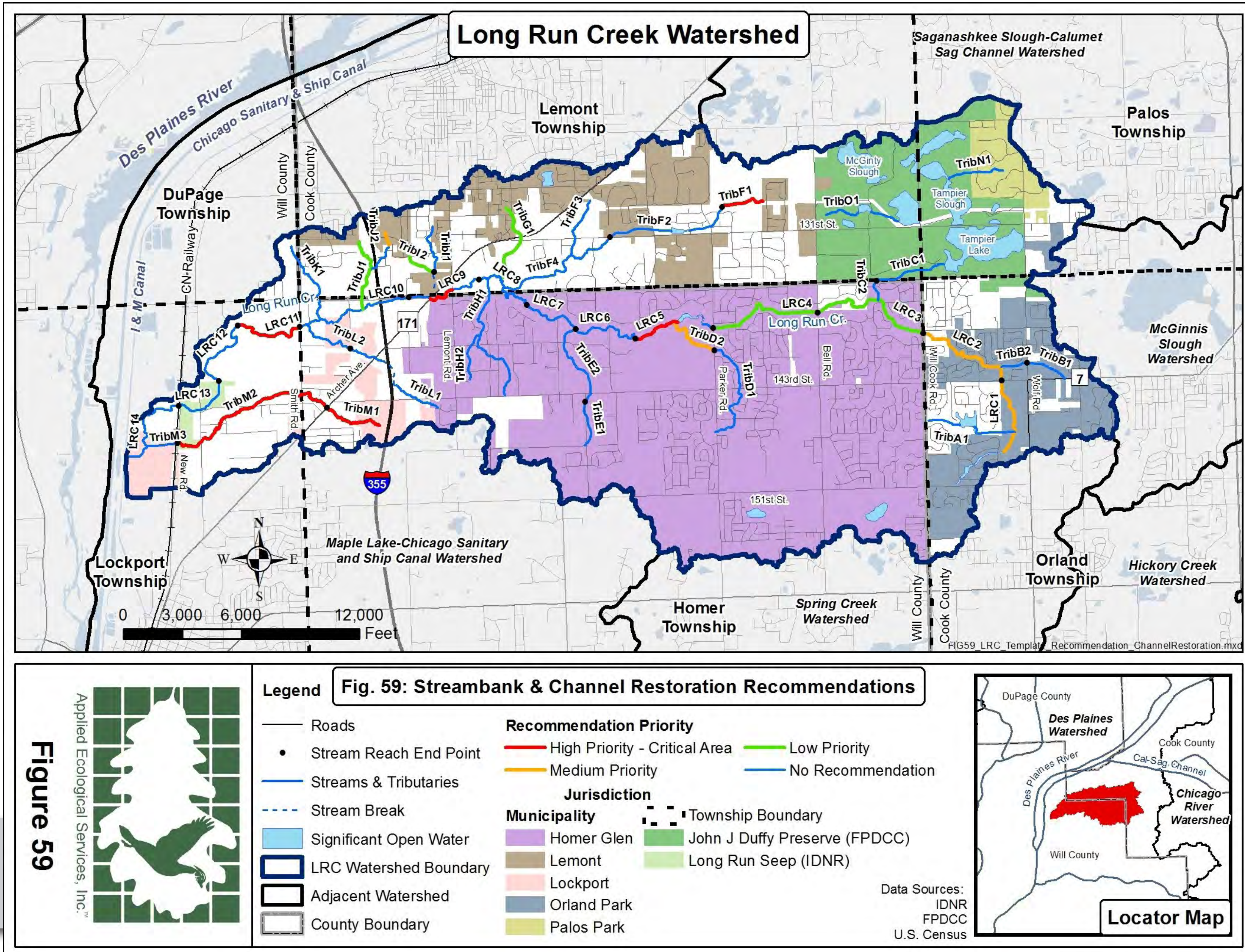
6.2.3 STREAMBANK & CHANNEL RESTORATION RECOMMENDATIONS

Applied Ecological Services, Inc. (AES) completed a general inventory of Long Run Creek and its tributaries in fall of 2012. All streams and tributaries were assessed based on divisions into "Stream Reaches". Forty two (42) stream reaches were assessed accounting for 172,510 linear feet or 32.7 linear miles. Detailed notes were recorded for each stream reach related to potential Management Measure recommendations such as improving streambank and channel conditions and maintaining these reaches long term. The results of the stream inventory are summarized in Section 3.13; detailed field investigation datasheets can be found in Appendix B.

The condition of stream reaches in the watershed varies. According to the stream inventory, 67% of stream and tributary length is naturally meandering; 14% is moderately channelized; 19% is highly channelized. Approximately 35% of stream and tributary lengths exhibit no or minimal bank erosion; moderate erosion is occurring along 45% of streambanks; 20% of streambanks are highly eroded.

Most stream restoration projects include at least one of the following three water quality and habitat improvement components; 1) removal of existing invasive vegetation including trees and shrubs from the streambanks followed by; 2) stabilized streambanks using bioengineering, regrading of banks, and installation of native vegetation; and 3) restored riffles/grade controls in the stream channel to simulate conditions found in naturally meandering streams.

Figure 59 shows the location of all potential streambank/channel restoration projects by reach ID# and priority while Table 42 lists project details about each recommendation within the appropriate jurisdictional boundary. Potential streambank and channel restoration projects on public land and reaches exhibiting severe problems on private land are generally assigned as higher priority for implementation. Medium and Low priority was generally assigned to stream reaches exhibiting only minor problems. Recommendations are not made for stream reaches where restoration is not needed.


Long Run Creek Watershed
Saganashkee Slough-Calumet Sag Channel Watershed
Lemont Township
Palos Township
DuPage Township
Lockport Township
Homer Township
Orland Township
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Will County
Cook County
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
McGinty Slough
Tampier Slough
Tampier Lake
131st St.
143rd St.
151st St.
Bell Rd.
Parker Rd.
Lemont Rd.
Will Cook Rd.
Wolf Rd.
Smith Rd.
New Rd.
Archer Ave.
171
355
7
Long Run Cr.
TribN1
TribO1
TribF1
TribF2
TribF3
TribF4
TribG1
TribI1
TribI2
TribJ1
TribJ2
TribK1
TribL1
TribL2
TribM1
TribM2
TribM3
TribH1
TribH2
TribE1
TribE2
TribD1
TribD2
TribC1
TribC2
TribB1
TribB2
TribA1
LRC1
LRC2
LRC3
LRC4
LRC5
LRC6
LRC7
LRC8
LRC9
LRC10
LRC11
LRC12
LRC 13
LRC14
N
S
E
W
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3,000
6,000
12,000
Feet
FIG59_LRC_Template_Recommendation_ChannelRestoration.mxd
Figure 59
Applied Ecological Services, Inc.™
Legend
Fig. 59: Streambank & Channel Restoration Recommendations
Roads
Stream Reach End Point
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Recommendation Priority
High Priority - Critical Area
Medium Priority
Low Priority
No Recommendation
Jurisdiction
Municipality
Homer Glen
Lemont
Lockport
Orland Park
Palos Park
Township Boundary
John J Duffy Preserve (FPDCC)
Long Run Seep (IDNR)
Data Sources:
IDNR
FPDCC
U.S. Census
DuPage County
Des Plaines Watershed
Cook County
Cal-Sag Channel
Des Plaines River
Chicago River Watershed
Will County
Locator Map

6.2.4 RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE RECOMMENDATIONS

Applied Ecological Services, Inc. (AES) completed a general inventory of the riparian areas along stream and tributary reaches in Long Run Creek watershed as well as the buffer around Tampier Lake in fall of 2012. Riparian and lake buffer areas were assessed by noting the "Condition" as it relates to function and quality of ecological communities present. Field notes also included potential recommendations such as ecological restoration and maintenance. The results of the inventory are summarized in Section 3.13; detailed field investigation datasheets can be found in Appendix B.

Approximately 63% of the riparian areas are at least "Moderate" quality and are found in the western half of the watershed and within John J. Duffy Preserve. The remaining 37% of riparian areas are in "Poor" condition. There are no riparian areas that are in "Good" condition. Invasive species including common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), common buckthorn (*Rhamnus cathartica*), and box elder (*Acer negundo*) contribute most to degraded conditions. In addition, it was found that over 9,000 linear feet of buffer along Tampier Lake is in poor condition.

Riparian area and lake buffer restoration and/or maintenance projects generally focus on converting degraded ecological communities into higher quality communities that function to store and filter stormwater while also providing excellent wildlife habitat. The restoration process usually includes removal of invasive trees, shrubs, and herbaceous vegetation such as turf grass followed by planting with native vegetation. Short and long term maintenance then follows and is critically important in the development process and to maintain restored conditions.

Figure 60 shows the location of all recommended riparian area and lake buffer restoration and maintenance projects by ID# and priority while Table 42 lists project details related to each recommendation within the appropriate jurisdictional boundary. Large scale projects located on public land are generally assigned as higher priority for implementation whereas smaller privately owned areas are Medium and Low priority. In addition, sites within the Tampier Lake TMDL subwatershed are all High priority.

TOP LEFT: Degraded riparian buffer along Long Run Creek Reach 2 (LRC2). BOTTOM LEFT: Example of AES riparian restoration.

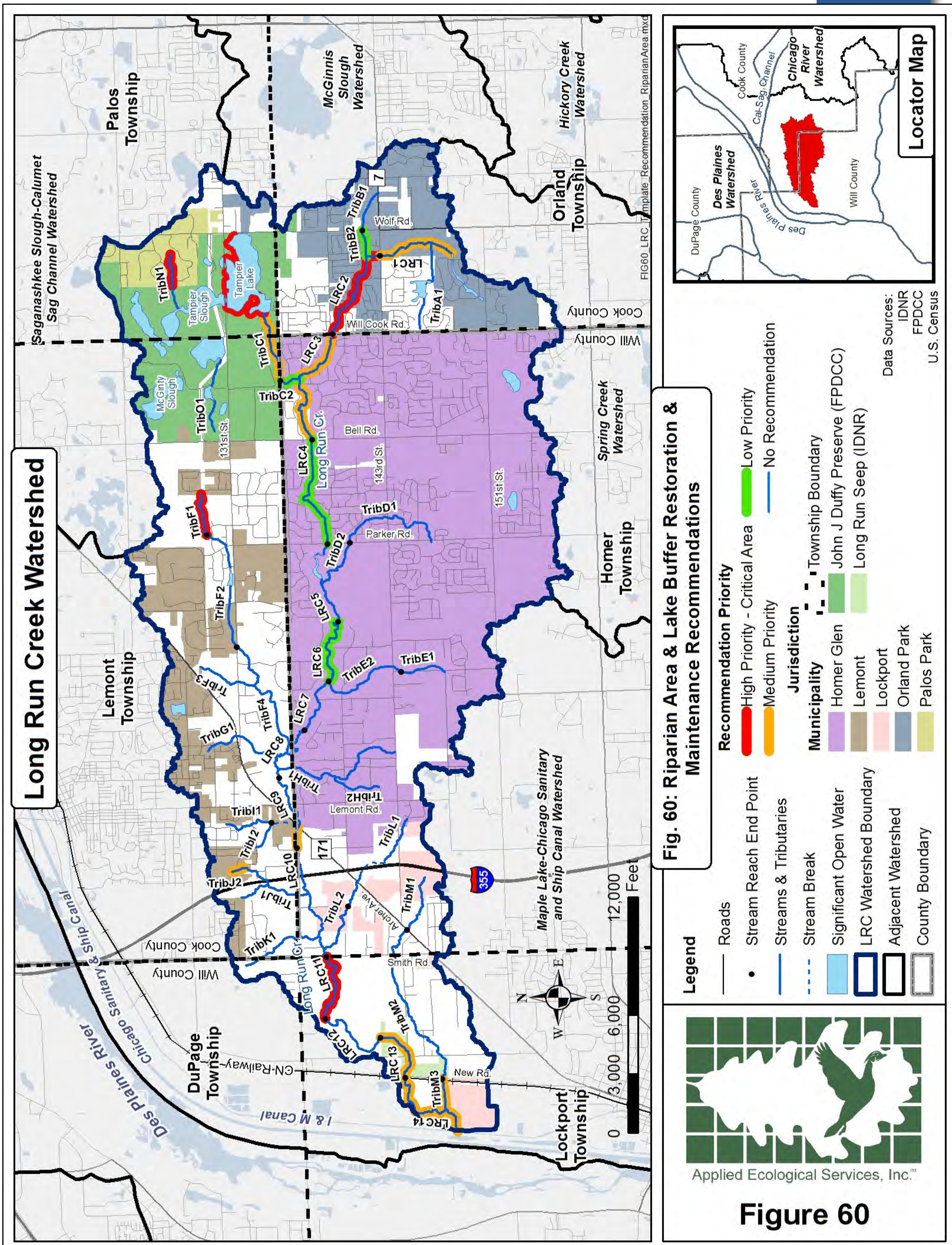


Fig. 60: Riparian Area & Lake Buffer Restoration & Maintenance Recommendations

Figure 60

Aerial of Green Infrastructure Protection Area 4 (left) at headwaters of LRC and Area 17 (right) on HMS property

6.2.5 GREEN INFRASTRUCTURE PROTECTION AREA RECOMMENDATIONS

Green Infrastructure Protection Areas are best described as large, unprotected parcels of land that are currently undeveloped with no plans for future development or similar parcels where future development is planned. The significance is that these parcels are situated in environmentally sensitive or important green infrastructure areas where protecting and restoring or developing using "Conservation Design" or "Low Impact" standards would best benefit watershed conditions. Information obtained from predicted future land use data, location of large undeveloped parcels within the proposed Class III Groundwater Recharge Area, and green infrastructure sections of this plan led to identification of 19 Green Infrastructure Protection Areas totaling 2,686 acres.

Most of the Green Infrastructure Protection Areas in the eastern half of the watershed are undeveloped parcels located on existing agricultural land where future development is predicted. Many of the protection area recommendations in the western half of the watershed occur on parcels that the Forest Preserve District of Will County (FPDWC) has identified in their 1996 Preservation Plan. Hanson Material Service and Chevron also own large natural areas surrounding Long Run Creek near the confluence with the I & M Canal.

Figure 61 shows the location of all 19 Green Infrastructure Protection Areas by site ID# while Table 42 includes action recommendations for each. All 18 sites are considered High Priority-Critical Areas. Cost estimates and schedules for implementing recommendations for these areas is not included due to the difficulty in determining how or if each site will be protected or developed. In addition, pollutant reduction estimates cannot be determined for these areas.

West portion of Green Infrastructure Protection Area 9

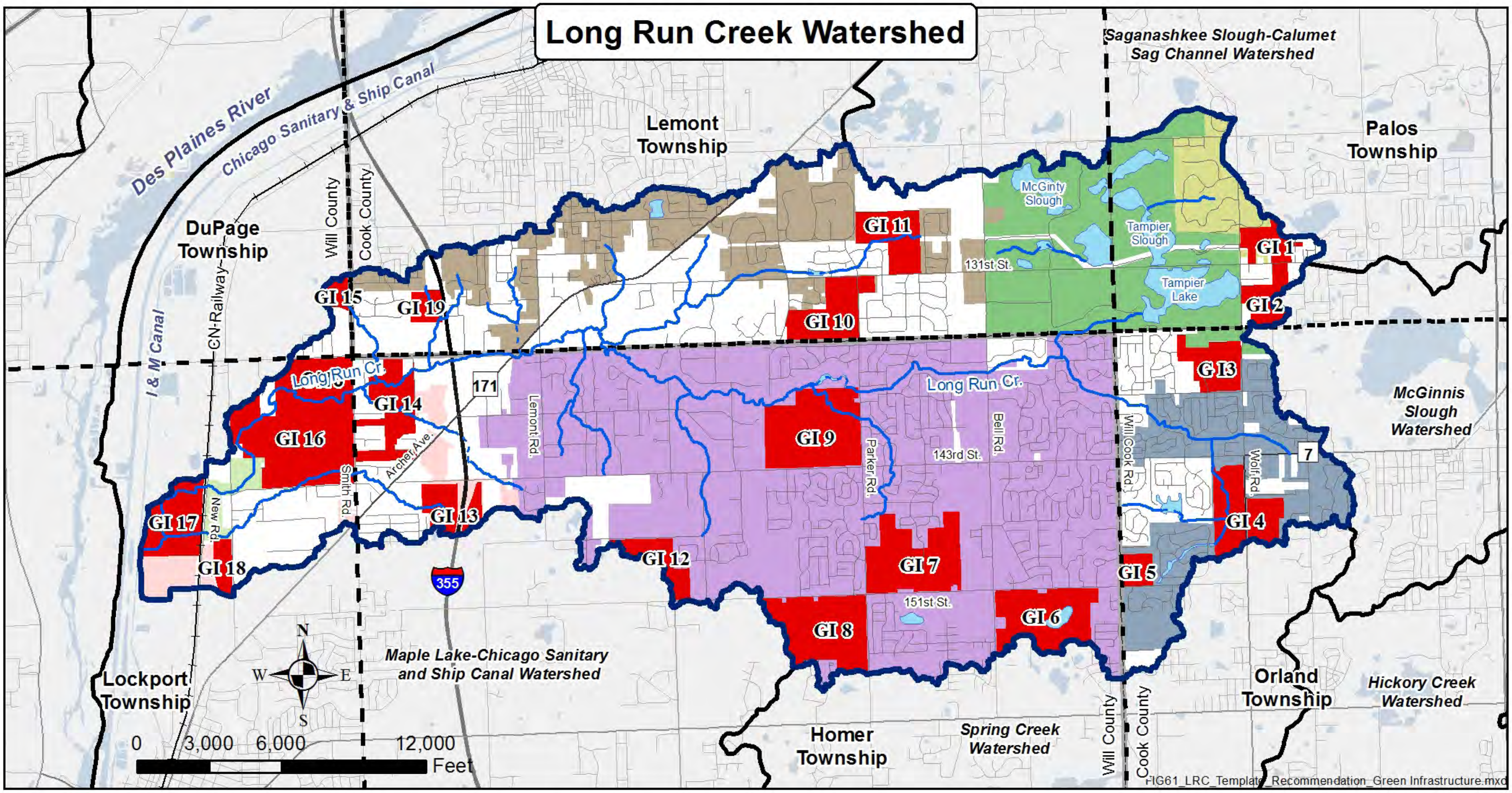


Figure 61

Applied Ecological Services, Inc.™

Fig. 61: Green Infrastructure Protection Area Recommendations

Legend

- Roads
- Streams & Tributaries
- Stream Break
- Significant Open Water
- LRC Watershed Boundary
- Adjacent Watershed
- County Boundary

Recommendation Priority

- High Priority - Critical Area

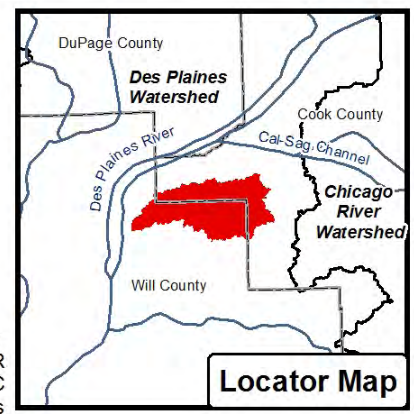
Jurisdiction

Municipality

- Homer Glen
- Lemont
- Lockport
- Orland Park
- Palos Park

- Township Boundary
- John J Duffy Preserve (FPDCC)
- Long Run Seep (IDNR)

Data Sources:
IDNR
FPDCC
U.S. Census



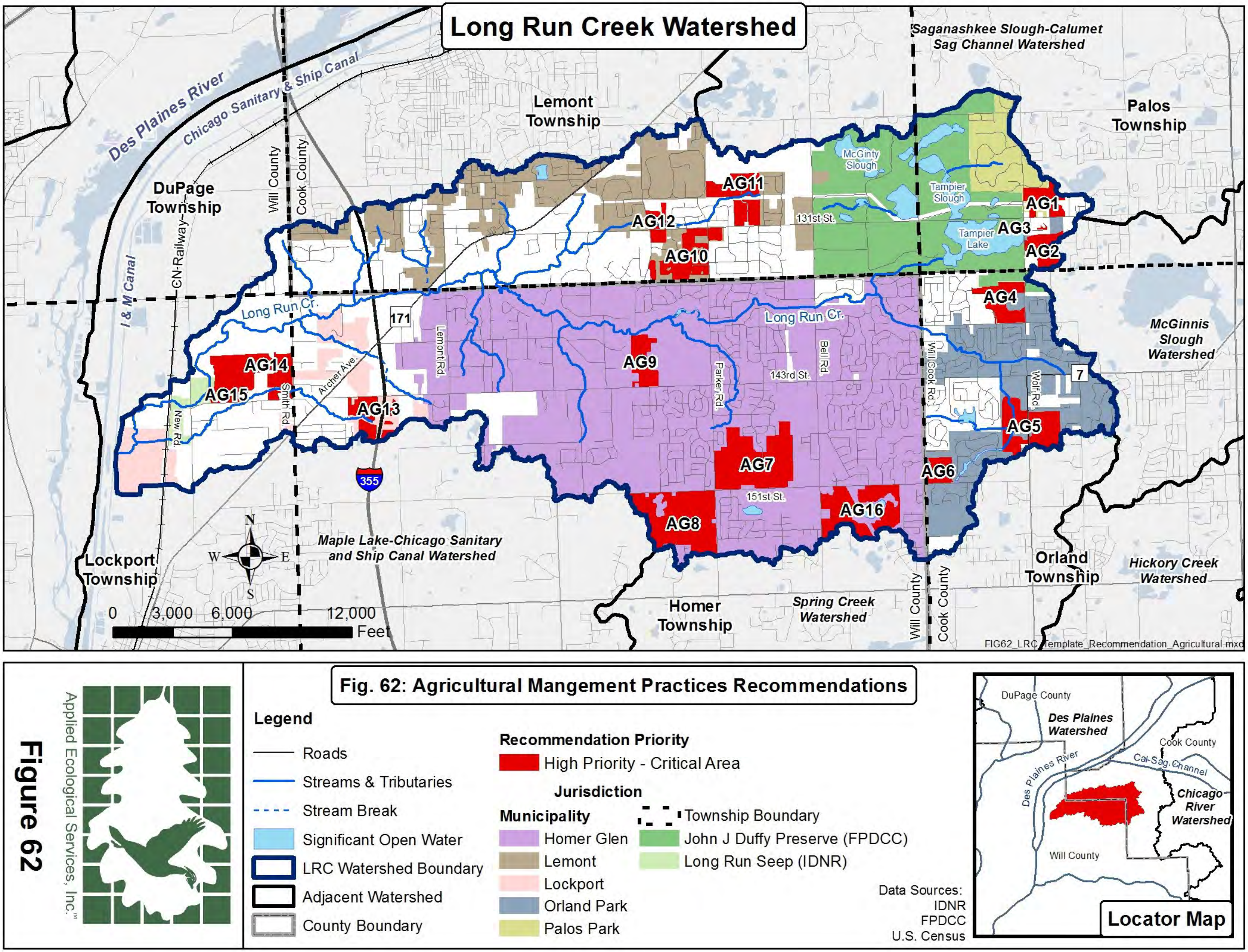
6.2.6 AGRICULTURAL MANAGEMENT PRACTICE RECOMMENDATIONS

Row crop farming and livestock operations were common in Long Run Creek watershed until the 1990s when residential and commercial development increased and replaced much of the agricultural land. By 2012, agricultural row crops/hay operations were reduced to about 2,111 acres or 12% of the watershed. Livestock operations accounted for about 100 acres or less than 1% of the watershed in 2012. Row crop farmland is spread out with the largest tracts remaining in the south central portion of the watershed. Many of these areas are slated for future residential and commercial development.

Agricultural land can be a significant contributor of nutrients and sediment to local streams when practices such as filter strips, grass swales, "Conservation Tillage" (no till) farming, and waste (manure) management are not in place. Observations made during Applied Ecological Service's, field inventory in fall 2012 indicate that practices such as grassed swales are in place but that conservation tillage, filter strips, and manure management are not common practices. Pollutant load modeling estimates show that agricultural land in Long Run Creek watershed contributes between 6% and 8% of the nutrient load and about 10% of the sediment load. Although these pollutant load contributions are not significant, the use of conservation tillage on larger fields and manure management on select livestock operations could potentially reduce phosphorus loading by 3,026 lbs/yr, nitrogen loading by 5,932 lbs/yr, and sediment loading by 2,069 tons/yr.

Thirteen (13) row crop areas and 2 livestock operations totaling 1,306 acres were identified as High Priority-Critical Areas for potential nutrient and sediment reduction based on their size and/or location in the watershed. If agricultural management practices are used in these areas pollutant loading could be reduced. Practices recommended include conservation tillage and filter strips for row crop land and waste (manure) management on livestock operations. Figure 62 shows the location of all 15 sites by ID# while Table 42 includes action recommendations for each. Note: cost estimates for implementing conservation tillage are not included because the costs are largely dependent on a farmer's available equipment.

Examples of conservation tillage (no till) farming (left, Source: NRCS) and manure management at horse farm (inset right, Source: thehorse.com).


Long Run Creek Watershed
Saganashkee Slough-Calumet Sag Channel Watershed
Palos Township
Lemont Township
DuPage Township
Lockport Township
Homer Township
Orland Township
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Will County
Cook County
McGinnis Slough Watershed
Hickory Creek Watershed
Spring Creek Watershed
Maple Lake-Chicago Sanitary and Ship Canal Watershed
McGinty Slough
Tampier Slough
Tampier Lake
131st St.
143rd St.
151st St.
Bell Rd.
Parker Rd.
Lemont Rd.
Will Cook Rd.
Wolf Rd.
Smith Rd.
New Rd.
Archer Ave.
Long Run Cr.
171
355
7
AG1
AG2
AG3
AG4
AG5
AG6
AG7
AG8
AG9
AG10
AG11
AG12
AG13
AG14
AG15
AG16
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W
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6,000
12,000
Feet
FIG62_LRC_Template_Recommendation_Agricultural.mxd
Fig. 62: Agricultural Mangement Practices Recommendations
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Recommendation Priority
High Priority - Critical Area
Jurisdiction
Municipality
Homer Glen
Lemont
Lockport
Orland Park
Palos Park
Township Boundary
John J Duffy Preserve (FPDCC)
Long Run Seep (IDNR)
Data Sources:
IDNR
FPDCC
U.S. Census
Locator Map
DuPage County
Des Plaines Watershed
Cook County
Cal-Sag Channel
Des Plaines River
Chicago River Watershed
Will County
Applied Ecological Services, Inc.™

Figure 62

6.2.7 WASTEWATER TREATMENT PLANT UPGRADE RECOMMENDATIONS

There are two National Pollution Discharge Elimination System (NPDES) permitted wastewater treatment plant (WWTP) discharges to Long Run Creek located in Homer Glen. Both plants are owned and operated by Illinois American Water Company. According to water quality sampling and modeling, Chickasaw Hills and Derby Meadows WWTPs contribute the highest nutrient (nitrogen and phosphorus) loading in Long Run Creek watershed. Annual nitrogen and phosphorus loading from Chickasaw Hills WWTP is estimated at 91,960 lbs/yr and 9,550 lbs/yr respectively. Loading from Derby Meadows WWTP is approximately 43,045 lbs/yr for nitrogen and 10,079 lbs/yr for phosphorus. The WWTPs combine to produce 135,005 lbs/yr of nitrogen and 19,629 lbs/yr phosphorus which accounts for about 65% of the total annual load for nitrogen and 56% of the total annual load for phosphorus.

Homer Glen has the opportunity to collaborate with Illinois EPA and create/enforce a nutrient loading ordinance for the two WWTPs if desired. Future WWTP upgrades utilizing nutrient removal technologies are an obvious choice to reduce nutrient loading. Literature suggests that with upgrades, total phosphorus in plant effluent can be reduced to below 1.0 mg/l while total nitrogen can be reduced to less than 5.5 mg/l. These would be significant improvements over the existing phosphorus and nitrogen concentrations currently found in WWTP effluent. It is important to note that beginning in 2009, preliminary discussions and approvals took place for the potential expansion of the Chickasaw Hills WWTP. The plant expansion would include redundancy equipment such as backup pumps, parallel oxidation ditches, and multiple clarifiers, as well as a sludge handling facility. Table 42 includes specific action recommendations for both treatment plants and both are considered High Priority-Critical Areas.

Any future expansion to the Chickasaw Hills or Derby Meadows WWTPs should include phosphorus and nitrogen removal technologies. In addition, there may be an opportunity for WWTPs to participate in water quality trading. The concept is fairly straight forward; the WWTPs could purchase water quality credits from water quality improvement projects built elsewhere in the watershed. This is not a viable option currently but may become necessary in the future if Illinois EPA enforces more strict nutrient loading rates. It might also be an option for WWTPs to fund water quality improvement projects as a way of offsetting nutrient loading and would likely be cheaper in the long run than upgrading facilities.

6.2.8 OTHER MANAGEMENT RECOMMENDATIONS

While completing the general inventory of Long Run Creek watershed, Applied Ecological Services, Inc. (AES) noted potential Management Measure projects that fit under miscellaneous other categories. Detailed field investigation datasheets for these projects can be found in Appendix B. Figure 63 shows the

Site # 1 bioswale opportunity

location of all "Other Management Measure" recommendations by ID# while Table 42 lists details about each recommendation within the appropriate jurisdictional boundary.

Potential projects include:

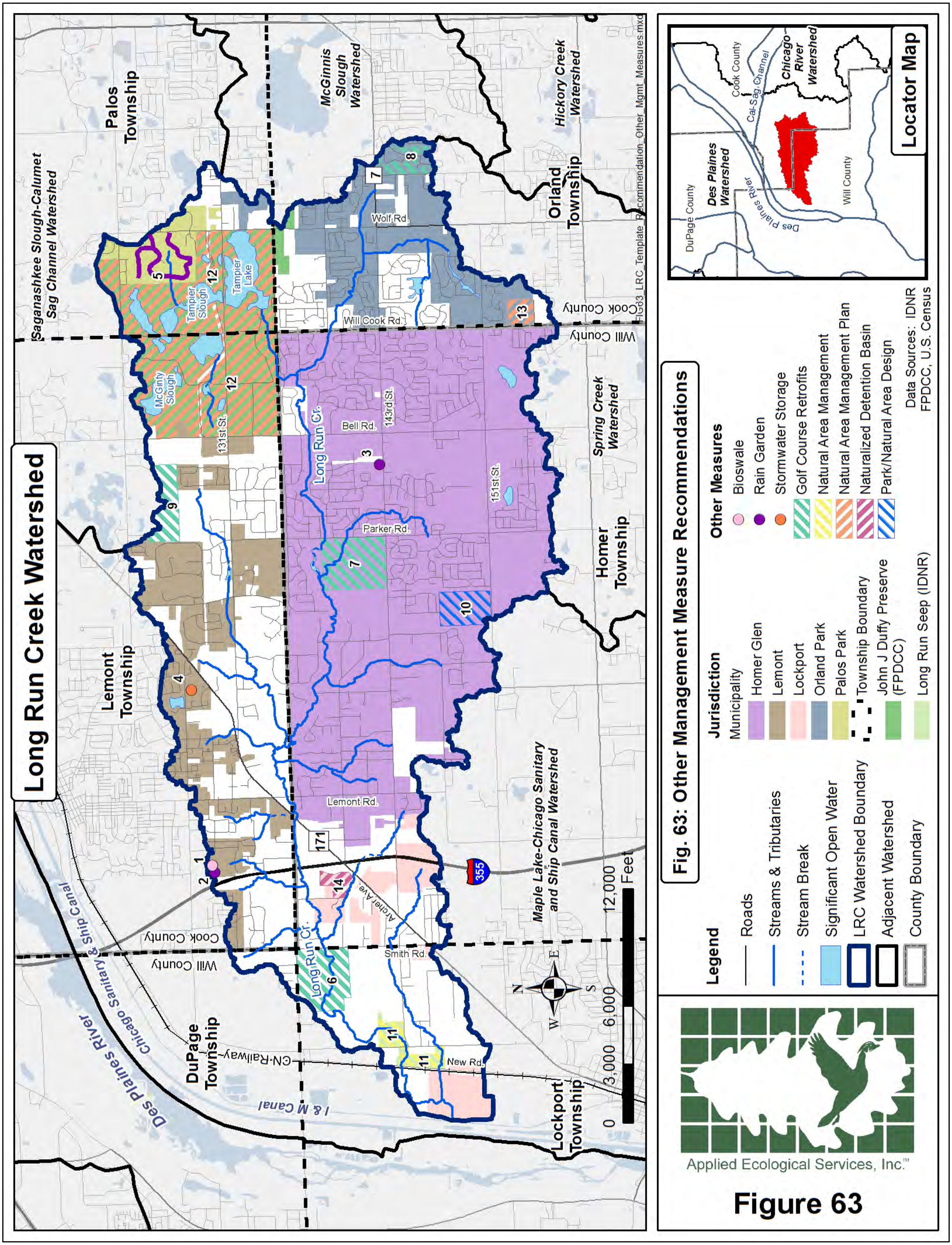
1. Bioswale retrofit opportunities at Lemont Park District's "The Core" parking lot.
2. Rain garden opportunity at Lemont Park District's "The Core" entrance.
3. Rain garden opportunity at Gooding Grove School.
4. Potential regional stormwater storage area on south side of 127th Street.
5. Roadside bioswale opportunities at residential subdivision in Palos Park.
6. Rough and pond naturalization opportunities at Big Run Golf Club.
7. Rough and pond naturalization opportunities at Old Oak Country Club.
8. Rough and pond naturalization opportunities at Crystal Tree Golf & Country Club.
9. Rough and pond naturalization opportunities at Glen Eagles Country Club.
10. Open space, wetland restoration, pond naturalization opportunities at Homer Glen purchase site (formerly Woodbine Golf Course).
11. Long term vegetation management at Long Run Seep Nature Preserve.
12. Natural Resource Inventory (NRI) and Management Plan for John J. Duffy Preserve.
13. Natural Area Management Plan for Orland Park's "Arbor Lake" preserve.
14. Naturalized detention basin opportunity at Homer Tree Service mulch processing site.

TOP LEFT: Site # 2 rain garden opportunity at Lemont Park District's "The Core." BOTTOM LEFT: Site # 3 potential rain garden at Gooding Grove School.

TOP: Site # 4 potential stormwater storage area S. of 127th. Source: Google Maps.
BOTTOM: Site # 5 roadside bioswale opportunity in Palos Park.

TOP: Site # 6 potential rough restoration at Big Run Golf Club.
BOTTOM Site 10 open space restoration at Homer Glen purchase.

SECTION 6.0



Long Run Creek Watershed
Fig. 63: Other Management Measure Recommendations
Legend
Roads
Streams & Tributaries
Stream Break
Significant Open Water
LRC Watershed Boundary
Adjacent Watershed
County Boundary
Jurisdiction
Municipality
Homer Glen
Lemont
Lockport
Orland Park
Palos Park
Township Boundary
John J Duffy Preserve (FPDCC)
Long Run Seep (IDNR)
Other Measures
Bioswale
Rain Garden
Stormwater Storage
Golf Course Retrofits
Natural Area Management
Natural Area Management Plan
Naturalized Detention Basin
Park/Natural Area Design
Data Sources: IDNR
FPDCC, U.S. Census
Locator Map
DuPage County
Des Plaines Watershed
Des Plaines River
Cook County
Cal-Sag Channel
Chicago River Watershed
Will County
Palos Township
Saganashkee Slough-Calumet Sag Channel Watershed
McGinnis Slough Watershed
Hickory Creek Watershed
Orland Township
Homer Township
Spring Creek Watershed
Lemont Township
Maple Lake-Chicago Sanitary and Ship Canal Watershed
DuPage Township
Lockport Township
Des Plaines River
Chicago Sanitary & Ship Canal
I & M Canal
CN-Railway
Tampier Slough
Tampier Lake
McGinty Slough
Long Run Cr.
Wolf Rd.
Will Cook Rd.
Bell Rd.
143rd St.
131st St.
151st St.
Parker Rd.
Lemont Rd.
Archer Ave.
Smith Rd.
New Rd.
171
355
Cook County
Will County
0 3,000 6,000 12,000 Feet
N E S W
Fig63_LRC_Template_Recommendation_Other_Mgmt_Measures.mxd
Applied Ecological Services, Inc.™
Figure 63

6.2.9 SITE SPECIFIC MANAGEMENT MEASURES ACTION PLAN TABLE

Table 42. Site Specific Management Measures Action Plan.

DU PAGE TOWNSHIP

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
8B	Bambrick Park	2.75 acres	Citgo & Lemont (public)	Existing naturalized dry bottom detention basin in good ecological condition within Bambrick Park.	Implement long term maintenance program to preserve condition of naturalized basin.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Citgo & Lemont	Ecological Consultant/ Contractor	$2,000/year maintenance	Ongoing
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
29	NW corner of Smith Rd. & 135th St.	3.6 acres	Private agricultural land	3.6-acre drained wetland area on agricultural land north of Big Run Golf Course which floods after heavy rain events.	Restore wetland by breaking drain tiles if necessary and revegetating with native plants. Wetland restoration could reduce flood problems on Big Run Golf Course to south.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Private owner & Big Run Golf Course	USACE; NRCS; Ecological Consultant/ Contractor	$54,000 to design and implement wetland restoration	10-20+ Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI15	W of Smith Rd.	30 acres	Private land	30 acres on private open space parcels at headwaters of Tributary K (TribK); parcels are adjacent to Bambrick Park to south.	Village of Lemont acquire and protect parcels as extension of Bambrick Park.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Lemont	Du Page Twp	The cost for acquiring & protecting parcels cannot be determined	If/when parcels become available for purchase

FOREST PRESERVE DISTRICT OF COOK COUNTY

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
6	Tampier Lake Greenway & ComEd Corridor	5.3 acres	FPDCC & ComED (Public & Private)	5.3-acre drained wetland complex located primarily in Tampier Lake Greenway and extending onto ComEd corridor.	Restore hydrology by breaking drain tiles if necessary and revegetate with native vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	FPDCC & ComEd	FPDCC	$53,000 to design and implement wetland restoration	10-20+ Years
10 & 11	John J. Duffy Preserve NE of Tampier Lake	12.7 acres	FPDCC & ComED (Public & Private)	7.5 acres (10) and 5.2 acres (11) of drained wetlands north/northeast of Tampier Lake primarily on FPDCC land and Com Ed. Sites are within Tampier Lake TMDL subwatershed.	Restore hydrology by breaking drain tiles if necessary and revegetate with native vegetation.	TN= 54 lbs/yr TP= 16 lbs/yr TSS= 6 tons/yr	High: Critical Area	FPDCC & ComEd	FPDCC	$175,000 to design and implement wetland restoration	1-10 Years
13	John J. Duffy Preserve W of Tampier Lake	40.7 acres	FPDCC (Public)	40.7 acres of drained wetland on west end of John J. Duffy Preserve.	Restore hydrology by breaking drain tiles if necessary and revegetate with native vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	FPDCC	FPDCC	$407,000 to design and implement wetland restoration	10-20+ Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
TribC1: Tributary C Reach 1	Tampier Lake to South end of FPDCC property	3,714 linear feet	FPDCC (Public)	3,714-lf reach with a degraded riparian buffer dominated by invasive shrubs and trees.	Restore buffer along stream reach by removing invasive woody species and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	FPDCC	FPDCC	$60,000 to restore riparian buffer; $3,000/yr maintenance	10-20+ Years
Tampier Lake	Along Tampier Lake	9,650 linear feet	FPDCC (Public)	9,650 lf along the west and north portions of Tampier Lake with poor buffer consisting mostly of mown turf grass. Note: Tampier Lake is a TMDL waterbody.	Install 30 foot wide (minimum) native plant buffer & emergent plants along 9,650 lf to filter pollutants and discourage waterfowl use along shoreline.	Filter Strip: TN=4 lbs/yr TP= 3 lbs/yr TSS= 0.5 tons/yr	High: Critical Area	FPDCC	FPDCC	$110,000 to restore lake buffer; $3,000/yr maintenance	1-10 Years
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
12	John J. Duffy Preserve	1,614 acres	FPDCC (Public)	Large preserve with variety of upland and wetland ecological communities in varying degrees of health. FPDCC staff indicate that very little ecological management is occurring at the preserve.	Complete a Natural Resource Inventory (NRI) and Ecological Management Plan for the preserve.	na	Medium	FPDCC	Ecological Consultant	$25,000 to complete NRI/ Management Plan	1-10 Years

HOMER GLEN

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
20A, 20B	Along Cokes Rd.	1.3 acres	Residential HOA (private)	Two existing dry bottom detention basins with mown turf grass within small subdivision along Cokes Rd. Swales drain to basins.	Design and implement project to remove turf grass and revegetate with native vegetation then maintain indefinitely.		Low	Residential HOA	Ecological Consultant/ Contractor	$14,000 to design and install prairie vegetation; $2,000/ year maintenance	10-20+ Years
21A	Skender Rd.	0.9 acres	Residential HOA (private)	Existing partially wetland bottom detention basin with mown turf grass slopes. Wetland area is dominated by cattail and invasive common reed grass (Phragmites australis).	Design and implement project to remove turf grass and revegetate with native vegetation, eradicate invasive common reed grass then maintain indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$10,000 to design and install prairie vegetation; $1,000/ year maintenance	10-20+ Years
21B, 21C	Long Run Estates Subdivision	1.0 acres	Developer/ Residential HOA (private)	Two existing naturalized wetland bottom detention basins that appear incomplete within residential subdivision.	Reseed basins and maintain indefinitely when construction resumes at subdivision.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Developer/ Residential HOA	General Contractor & Ecological Contractor	$10,000 to reseed with prairie vegetation; $1,000/ year maintenance	When development resumes
21D	Christina Ln.	0.7 acres	Resident (private)	Existing partially wetland bottom detention basin with population of invasive common reed grass (Phragmites australis). Basin is also being used as chicken coup.	Control invasive common reed grass via herbicide treatments and remove chickens from basin.	na	Low	Resident	none	$500/year maintenance	na
21E	Chicory Trl.	0.4 acres	Residential HOA (private)	Existing naturalized wetland bottom detention basin servicing subdivision. The basin is overgrown and does not appear to be maintained. Basin is also located at headwaters of small unnamed tributary.	Implement management to improve condition of basin.	na	Medium	Residential HOA	Ecological Contractor	$500/year maintenance	Ongoing
22B, 22C, 22E	Erin Hills Subdivision	4.3 acres	Residential HOA (private)	Three existing naturalized wet and wetland bottom detention basins servicing Erin Hills Subdivision. All are generally in good condition.	Implement management program to maintain existing condition.	na	Medium	Residential HOA	Ecological Contractor	$3,000/year maintenance	Ongoing
23A	Homer Town Square	1.1 acres	Business Association (private)	Existing dry bottom detention basin with mown turf grass; several outlet structures are located flush with basin bottom.	Design and implement project to raise elevation of outlets and naturalize basin with native vegetation to create a wetland bottom basin.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Business Association	Ecological Consultant/ Contractor	$20,000 to design and install wetland bottom & raise outlets; $2,000/yr maintenance	10-20+ Years
23C	Menards	3.0 acres	Business Association (private)	Existing large wet bottom turf grass-lined detention basin servicing Menards.	Design and implement project to retrofit slopes and emergent zones with native vegetation to create wetland detention and to create green infrastructure along ComEd Utility corridor.	Wetland Det.: TN= 336 lbs/yr TP= 46 lbs/yr TSS= 37 tons/ yr	High: Critical Area	Business Association	Ecological Consultant/ Contractor	$45,000 to design and install native vegetation; $2,000/ year maintenance	1-10 Years
23D, 23E, 23F	Beaver Lake Dr. & Creek Side Dr.	11.6 acres	Individual Residents (private)	Existing dry bottom turf grass detention in three separate areas within floodplain along Long Run Creek Reach 3 (LRC3). Note: the Village will reconstruct outlets and clean low flow gutters for two areas in spring 2014.	Design, permit, and implement project to selectively break berms along stream and naturalize detention areas with native vegetation. Maintain indefinitely. Note: This project may not be feasible due to platting and flood concerns.	Wetland Det.: TN= 1,780 lbs/ yr TP= 168 lbs/yr TSS=169 tons/ yr	High: Critical Area	Homeowners, Homer Glen	USACE; Homer Glen; Engineer; Ecological Consultant	$30,000 to design and permit; $132,000 to implement; $5,000/ year maintenance	10-20+ Years
23G	St. Bernard's Parish	0.9 acres	Church (private)	Existing wet bottom basin servicing church. Site slopes are mown turf.	Design and implement project to retrofit slopes and emergent zones with native vegetation to create wetland detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Church	Ecological Consultant/ Contractor	$15,000 to design and install native vegetation; $1,000/ year maintenance	10-20+ Years
24B	Goodings Grove Unit 3 (W of Pheasant)	2.2 acres	Goodings Grove Unit 3 (private)	Large existing wet bottom detention basin with mown turf grass side slopes.	Design and implement project to retrofit slopes and emergent zones with native vegetation to create wetland detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Goodings Grove Unit 3 Residential HOA	Ecological Consultant/ Contractor	$33,000 to design and install native vegetation; $2,000/ year maintenance	10-20+ Years

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
24C	Langcaster West	0.3 acres	Residential HOA (private)	Small dry bottom turf grass detention with on outlet that sits flush with basin bottom.	Design and implement project to raise outlet and create naturalized detention basin using native vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$6,000 to raise outlet and install native vegetation; $500/ year maintenance	10-20+ Years
24E, 24K, 24T, 24U	Goodings Grove Units 4 & 5	8.2 acres	Goodings Grove Units 4 & 5 (private)	Four existing naturalized wet and wetland bottom detention basins in good ecological condition.	Implement management program to maintain current condition.	na	Medium	Goodings Grove Units 4 & 5 Business Association(s)	Ecological Consultant/ Contractor	$5,000/year maintenance	Ongoing
24O, 24P, 24R	Goodings Grove Unit 2 (E of Greystone Dr.)	3.8 acres	Goodings Grove Unit 2 (private)	Three existing wet bottom detention basins lined with mown turf grass; invasive willow lines several basins; geese are an obvious problem.	Install native vegetation buffers and maintain/control willow along basin edges.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Low	Goodings Grove Unit 2 Business Association	Ecological Consultant/ Contractor	$40,000 to install native vegetation buffers; $3,000/year maintenance	10-20+ Years
24M, 24N, 24Q	Goodings Grove Unit 1 (E of Greystone Dr.)	5.6 acres	Goodings Grove Unit 1 (private)	Three existing wet bottom detentions servicing Home Depot & future development. Basins have mown turf grass slopes and invasive common reed grass (Phragmites australis) and willow along edge. Geese appear to be a problem.	Install native vegetation buffers and maintain/control willow and common reed along basin edges.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Low	Goodings Grove Unit 1 Business Association	Ecological Consultant/ Contractor	$60,000 to install native vegetation buffers; $4,000/year maintenance	10-20+ Years
31A	Stadtler Ridge Subdivision	0.4 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass and a concrete low flow channel between the inlet and outlet. Basin is also at headwaters of Tributary E.	Design and implement project to break/ disrupt concrete channel and install native prairie vegetation throughout basin.	Wetland Det.: TN= 47 lbs/yr TP= 5 lbs/yr TSS= 2.5 tons/ yr	High: Critical Area	Residential HOA	Engineer; Ecological Consultant/ Contractor	$18,000 to design, disrupt channel, & install native vegetation; $1,000/ year maintenance	1-10 Years
31B	Woodbine West Estates	1.9 acres	Residential HOA (private)	Existing large wet bottom detention basin with mown turf grass slopes servicing Woodbine Estates Subdivision. Basin is also at headwaters of Tributary E.	Design and implement project to retrofit side slopes and emergent zone with native vegetation to create wetland detention thereby improving water quality released into Tributary E.	Wetland Det.: TN= 90 lbs/yr TP= 11 lbs/yr TSS= 4.5 tons/ yr	High: Critical Area	Residential HOA	Ecological Consultant/ Contractor	$30,000 to design and install native vegetation; $2,000/ year maintenance	1-10 Years
31C, 32A	Woodbine West Estates	4.4 acres	Residential HOA (private)	Two existing large wet bottom detention basins with mown turf grass slopes servicing Woodbine Estates Subdivision.	Design and implement project to retrofit side slopes and emergent zones with native vegetation to create wetland detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$66,000 to design and install native vegetation; $3,000/ year maintenance	1-10 Years
33H	Cedar Creek Ct.	0.4 acres	unknown	Existing dry bottom basin with mown turf and concrete channel between inlet and outlet.	Design and implement project to remove concrete channel and replace with wetland swale; install native prairie vegetation throughout remainder of basin.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Unknown	Engineer; Ecological Consultant/ Contractor	$20,000 to design and install project; $1,000/year maintenance	10-20+ Years
33I	Oakwood Dr.	0.4 acres	unknown	Existing dry bottom basin with mown turf and narrow/eroded channel between inlet and outlet.	Design and implement project to stabilize eroded swale; install native prairie vegetation throughout remainder of basin.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Unknown	Engineer; Ecological Consultant/ Contractor	$15,000 to design and install project; $1,000/year maintenance	10-20+ Years
33J	ATT Office Building (private)	0.6 acres	ATT	Existing dry bottom basin with mown turf grass.	Retrofit basin with native vegetation to improve water quality and infiltration.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	ATT	Ecological Consultant/ Contractor	$7,000 to install native vegetation; $1,000/year maintenance	10-20+ Years
33K	Amberfield Subdivision (S of Clover Ln.)	1.4 acres	Residential HOA (private)	Existing dry bottom detention basin with mown old field vegetation.	Revegetate basin with native prairie vegetation and maintain indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$15,000 to install native prairie vegetation; $2,000/ year maintenance	10-20+ Years
33L	Amberfield Subdivision (N of Clover Ln.)	1.3 acres	Residential HOA (private)	Existing wetland bottom detention basin that is generally in good ecological condition.	Implement management program to maintain current condition.	na	Medium	Residential HOA	Ecological Consultant/ Contractor	$1,000/year maintenance	Ongoing

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
33P, 33Q	Founders Crossing	4.1 acres	Homer Glen (public)	Two existing wet bottom detention basins with mown turf grass slopes and lined by cattail along the emergent edge. Both basins back up to ComEd utility corridor.	Design and implement project to naturalize basin side slopes and emergent zone with native vegetation to increase water quality and connect green infrastructure along utility corridor.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Homer Glen	Homer Glen; Ecological Consultant/ Contractor	$61,500 to design and install native vegetation; $3,000/year maintenance	10-20+ Years
34A	Kingston Hills	4.5 acres	Residential HOA (private)	Existing large wet bottom turf grass lined detention basin in common area of development and adjacent to ComEd utility corridor.	Excellent large scale demonstration opportunity to retrofit slopes and emergent zones with native vegetation to create wetland detention; create fishing access; incorporate design into surrounding open space and trails; then maintain indefinitely.	Wetland Det.: TN= 240 lbs/yr TP= 26 lbs/yr TSS=15.5 tons/yr	High: Critical Area	Residential HOA	Homer Glen; ComEd; Ecological Consultant/ Contractor	$120,000 to design and install native vegetation, fishing access, and trails; $3,000/year maintenance	1-10 Years
34C	Kingston Hills	2.0 acres	Residential HOA (private)	Existing wet bottom detention basin with mown turf slopes; algae was abundant during site visit.	Design and implement project to naturalize basin with native vegetation along the side slopes and emergent zone and maintain indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$21,000 to design and install native vegetation; $2,000/year maintenance	10-20+ Years
34D, 34E	Pheasant Ln.	3.5 acres	Residential HOA/ Builder (private)	Two existing dry bottom detention basins with mown turf slopes located in unfinished portion of development. Basins abut green infrastructure to the east and south.	Retrofit basins using native vegetation as development resumes in subdivision as a means to improve water quality and extend green infrastructure.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Builder	Ecological Consultant/ Contractor	$37,000 to retrofit basins with native vegetation; $3,000/year maintenance	When development resumes
34F	Kingston Hills	1.5 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass and series of low flow concrete channels between inlets and outlet.	Design and implement project to break/ disrupt concrete channels and install native vegetation to create wetland detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$30,000 to design and install; $2,000/year maintenance	10-20+ Years
34H	Woodcrest Ave.	2.0 acres	Residential HOA (private)	Existing wet bottom detention basin with mown turf grass on west side; east side abuts green infrastructure. Some shoreline erosion is also present.	Design and implement project to regrade eroded portions of shoreline, then convert turf grass portion of basin buffer to native vegetation to improve water quality and connect green infrastructure.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$40,000 to regrade and install native vegetation; $2,000/year maintenance	10-20+ Years
34J, 34K	Rambling Rd.	1.2 acres	Residential HOA (private)	Two wet bottom turf grass lined detention basins in older residential subdivision.	Retrofit basins by installing native vegetation along side slopes and emergent zones to create wetland detention for water quality and wildlife purposes.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$18,000 to install native vegetation; $2,000/year maintenance	10-20+ Years
34L, 34N	Annunciation of the Mother of God Byzantine Catholic Parish	2.7 acres	Church	Series of naturalized (native vegetation) detention basins in good ecological condition. Detention west of church is known as "Transformation Prairie".	Implement maintenance program to keep invasive herbaceous and woody species under control and to maintain quality of native vegetation.	na	Medium	Church	Ecological Consultant/ Contractor	$2,000/year maintenance	Ongoing
34M	Pine View Hills	0.2 acres	Residential HOA (private)	Small dry bottom detention basin with mown turf grass and low flow concrete channel between inlet and outlet.	Design and implement project to break/ disrupt concrete channel then naturalize basin with native vegetation to create wetland detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Engineer; Ecological Consultant/ Contractor	$10,000 to disrupt concrete channel and plant native vegetation; $500/year maintenance	10-20+ Years
34P	N. of Glen Dr. East	0.7 acres	Residential HOA (private)	Dry bottom detention basin with mown turf; cobble channel runs from inlet to outlet.	Remove cobble channel and plant basin with native vegetation to become wetland bottom basin.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Engineer; Ecological Consultant/ Contractor	$12,000 to remove cobble channel and install native vegetation; $500/year maintenance	10-20+ Years
38A	Marian Village	3.3 acres	Residential HOA (private)	Large wet bottom detention basin with mown turf slopes and rip-rap edge of shoreline; algae was abundant during site visit.	Design and implement project to naturalize the detention buffer and emergent zone with native vegetation; install aerator; maintain indefinitely.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Medium	Residential HOA	Pond Management Company; Ecological Consultant/ Contractor	$52,500 to design and install native vegetation; $3,000 to install aerator, $3,000/ year maintenance	10-20+ Years

SECTION 6.0

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
39B	Meadowview Estates	2.0 acres	Residential HOA (private)	Existing wetland bottom detention basin dominated by invasive common reed, cottonwood, and willow along the edge; algae was a problem during the site visit; buffer is mown turf grass.	Implement project to eradicate invasive species and naturalize pond buffer with native species; maintain indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Pond Management Company; Ecological Consultant/ Contractor	$40,000 to remove invasives and install native vegetation; $3,000 to install aerator, $2,000/year maintenance	10-20+ Years
39C	Horse Track south of 151st St.	2.0 acres	Private Resident	Existing wet bottom basin/pond surrounded mostly by turf grass; algae was abundant during site visit, geese usage was heavy during site visit.	Design and implement project to naturalize the detention buffer and emergent zone with native vegetation to reduce goose usage; install aerator; maintain indefinitely.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Medium	Private Resident	Pond Management Company; Ecological Consultant/ Contractor	$30,000 to design and install native vegetation; $3,000 to install aerator, $2,000/year maintenance	10-20+ Years
40C	Country Woods	1.7 acres	Residential HOA (private)	Existing wetland bottom detention basin lined with various invasive species; buffer is mowed turf grass.	Eradicate invasive species and retrofit basin buffer with native prairie vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$5,000 to control invasives; $25,500 to install native vegetation; $2,000/ year maintenance	10-20+ Years
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
12	N of Lady Bar Ln.	5.6 acres	Residential HOA (private)	5.6 acre drained wetland located within LRC floodplain at confluence of LRC Reach 3 and Trib. C Reach 2.	Restore wetland/floodplain function of site by restoring hydrology and planting with wetland vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA; Homer Glen	Homer Glen; Engineer; Ecological Consultant	$84,000 to design/ permit/install/ maintain wetland	10-20+ Years
14	SE of Bell Rd. & 151st St.	25.9 acres	Private agricultural land	25.9 acres of drained wetlands surrounding existing wetland area on private agricultural land at headwaters and along Long Run Creek Reach 1 (LRC1); area is slated for future residential and commercial development.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	Wetland Det.: TN= 42 lbs/yr TP= 15 lbs/yr TSS= 15 tons/yr	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$442,500 to design/ permit/install/ maintain wetland	As new development occurs
15	SW of Bell Rd. & 151st St.	10.1 acres	Private agricultural land & ComEd	10.1 acres of drained wetlands surrounding an existing oak woodland on private agricultural land and ComEd Corridor; area is slated for future office space.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$151,500 to design/ permit/install/ maintain wetland	As new development occurs
16	NE of Parker Rd. & 151st St.	84 acres	Private agricultural land	84 acres of drained wetlands at headwater of Trib. D on private agricultural land; area is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	Wetland Det.: TN= 169 lbs/yr TP= 39 lbs/yr TSS= 19 tons/yr	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$840,000 to design/ permit/install/ maintain wetland	As new development occurs
17	NW of Parker Rd. & 151st St.	74.6 acres	Private agricultural land	74.6 acres of drained wetlands on private agricultural land; area is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	Wetland Det.: TN= 149 lbs/yr TP= 34 lbs/yr TSS= 17 tons/yr	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$746,000 to design/ permit/install/ maintain wetland	As new development occurs
18	N of 151st St (formerly Woodbine GC)	26.7 acres	Homer Glen (Pubic)	Until December 2012, site was Woodbine Golf Course. Homer Glen purchased the site with the intent to convert the golf course to parkland and the club house to the Village Hall.	Incorporate wetland restoration/ existing pond wetland retrofits into future park designs on north portion of parcel with surrounding prairie and trails. Also see "Other Management Measures" #10	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium to High based on how feasible	Homer Glen	$133,500 to design/permit/ install/ maintain wetland	USACE, NRCS/ SWCD; Illinois EPA, Ecological and Park Designers	As new park design and development occurs

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19	NW of 147th St. & Crème Rd.	21.8 acres	Private agricultural land	21.8 acres of drained wetland on private agricultural land at headwaters of Tributary E; area is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation	Wetland Det.: TN= 66 lbs/yr TP= 15 lbs/yr TSS= 7.5 tons/yr	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$327,000 to design/permit/ install/ maintain wetland	As new development occurs
STREAMBANK & CHANNEL RESTORATION (See Figure 59)											
Technical and Financial Assistance Needs: Stream restorations are complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration. The project becomes more complex in areas that flow through several governing bodies or multiple private residences. Technical and financial assistance associated with stream maintenance is generally low for minor tasks such as removing debris.											
LRC 3: Long Run Creek Reach 3	Will-Cook Rd. to Lady Bar Ln.	2,200 linear feet	Mostly private residential lots	Approximately 2,200 lf at upstream end of reach that is highly channelized, moderately eroded with some highly eroded sections, and with poor riffle-pool development. Reach is bordered by mostly residential land. Note: Portions of reach are in Homer Twp.	Design, permit, and implement project to selectively stabilize highly eroded areas using bioengineering techniques and install up to five artificial riffles within the stream channel.	Streambank Stabilization: TN= 90% TP= 90% TSS= 90%	Low	Private Owners	USACE, IDNR, Ecological Consultant/ Contractor	$100,000 to design, permit, and implement stabilization and artificial riffles	10-20+ Years
LRC 4: Long Run Creek Reach 4	Bell Rd. to Parker Rd.	7,031 linear feet	Mostly private residential lots	7,031 lf of stream that is highly channelized, moderately eroded with some highly eroded sections, and with poor riffle-pool development. Reach is bordered by mostly residential land.	Design, permit, and implement project to selectively stabilize highly eroded areas using bioengineering techniques and install up to fifteen artificial riffles within the stream channel.	Streambank Stabilization: TN= 90% TP= 90% TSS= 90%	Low	Private Owners	USACE, IDNR, Ecological Consultant/ Contractor	$200,000 to design, permit, and implement stabilization and artificial riffles	10-20+ Years
LRC 5: Long Run Creek Reach 5	Erin Ln. to Dublin Dr.	2,250 linear feet	Homer Twp	2,250-lf section of LRC Reach 5 owned by Homer Township. The stream is moderately channelized, with moderate to highly eroded streambanks, high sediment accumulation, and exhibits poor riffle-pool development. The downcut channel disconnects the stream from the floodplain.	Design, permit, and implement project to restore streambanks using bioengineering techniques and improve channel using riffles; install grade control(s) at downstream end to reconnect stream to adjacent floodplain after heavy rain events.	Streambank Stabilization: TN= 311 lbs/ yr TP= 155 lbs/ yr TSS=155 tons/yr	High: Critical Area	Homer Twp, Homer Glen	Will County; USACE; IDNR; Ecological Consultant/ Contractor	$300,000 to design, permit, and implement stabilization and floodplain connection	1-10 Years
LRC 9: Long Run Creek Reach 9	Lemont Rd. to Archer Rd.	1,000 linear feet	Private residential	1,000-lf section of LRC Reach 9 within residential area that has highly eroded streambanks.	Design, permit, and implement project to restore streambanks using bioengineering techniques.	Streambank Stabilization: TN= 1,067 lbs/yr TP= 534 lbs/ yr TSS=534 tons/yr	High: Critical Area	Private Owners	Will County; USACE; IDNR; Ecological Consultant/ Contractor	$150,000 to design, permit, and implement stabilization	1-10 Years
TribD2: Tributary D Reach 2	Parker Rd. to LRC Reach 5 within Old Oak Country Club	3,216 linear feet	Old Oak Country Club (private)	3,216 lf of stream at Old Oak Country Club that exhibits moderate channelization, highly eroded streambanks and poor riffle-pool development.	Design, permit, and implement project to stabilize highly eroded streambanks using bioengineering techniques and install up to six artificial riffles within the stream channel.	Streambank Stabilization: TN= 90% TP= 90% TSS= 90%	Medium	Old Oak Country Club	Will County; USACE, IDNR; Ecological Consultant/ Contractor	$385,000 to design, permit, and implement stabilization and artificial riffles	10-20+ Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
LRC 3: Long Run Creek Reach 3	Will-Cook Rd. to Lady Bar Ln.	2,200 linear feet	Mostly private residential lots	Approximately 2,200 lf at upstream end of reach with a degraded riparian buffer dominated by invasive shrubs and trees.	Restore buffer along stream reach by removing invasive woody species and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Private Owners	Ecological Consultant/ Contractor	$25,000 to restore riparian buffer; $2,000/yr maintenance	10-20+ Years
LRC 4: Long Run Creek Reach 4	Bell Rd. to Parker Rd.	7,031 linear feet	Mostly private residential lots	Over 7,000 lf of stream reach with a degraded riparian buffer dominated by invasive shrubs and trees.	Restore buffer along stream reach by removing invasive woody species and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Private Owners	Ecological Consultant/ Contractor	$65,000 to restore riparian buffer; $5,000/yr maintenance	10-20+ Years

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LRC 6: Long Run Creek Reach 6	Dublin Dr. to King Rd.	4,220 linear feet	Mostly private residential lots	4,220 lf of stream reach with a degraded riparian buffer dominated by invasive shrubs, trees, and manicured turf grass.	Restore buffer along stream reach by removing invasive woody species and turf grass and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Private Owners	Ecological Consultant/ Contractor	$40,000 to restore riparian buffer; $3,000/yr maintenance	10-20+ Years
LRC 9: Long Run Creek Reach 9	Lemont Rd. to Archer Rd.	1,000 linear feet	Private residential	1,000-lf section of LRC Reach 9 within residential area with a degraded riparian area dominated by invasive trees and shrubs and manicured turf grass.	Restore buffer along stream reach by removing invasive woody species and turf grass and planting native vegetation. Note: project could be combined with High Priority-Critical Area stream bank/channel restoration.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Private Owners	Ecological Consultant/ Contractor	$15,000 to restore riparian buffer; $2,000/yr maintenance	1-10 Years
TribC2: Tributary C Reach 2	FPDCC boundary to Long Run Creek	1,130 linear feet	Private residential lots	1,130 lf of stream bordered primarily by residential lots and degraded buffer of turf grass.	Restore buffer along stream reach by removing turf grass and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Private Owners	Ecological Consultant/ Contractor	$10,000 to restore riparian buffer; $2,000/yr maintenance	10-20+ Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI6	SE corner of Bell Rd. & 151st St.	209 acres	Private agricultural land	209 acres on private agriculture parcels that are slated for future residential & commercial development. Area is headwaters of Tributary D.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI7	NE corner of 151st St. & Parker Rd.	231 acres	Private agricultural land	231 acres on private agriculture parcels at headwaters of Tributary D that are slated for future residential and park development.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI8	SW corner of 151st St. & Parker Rd.	238 acres	Private agricultural land	238 acres on private agriculture parcels at headwaters of Tributary D that are slated for future residential development.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI9	Old Oak Country Club & adjacent Ag. parcels	275 acres	Old Oak Country Club & Private ag. land	275 acres encompassing Old Oak Country Club and private agricultural parcels to west along Long Run Creek Reach 5 (LRC5). Note: parcels are included in FPDWC 1996 Preservation Plan.	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	FPDWC	Homer Glen	The cost for acquiring & protecting parcels cannot be determined	If/when parcels become available for purchase
GI12	Between 147th St. & 151st St.; W of Marilyn Ln	71 acres	Private agricultural land	71 acres on private agricultural parcels at headwaters of Tributary E (TribE). Parcels are slated for future residential development.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Homer Glen	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG7	NE corner of 151st St. & Parker Rd.	229 acres	Private agricultural land	229 acres of agricultural land in row crop production at headwaters of Tributary D.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 898 lbs/yr TP= 458 lbs/yr TSS=307 tons/yr	High: Critical Area	Existing Farmer	NRCS/SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually

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AG8	SW corner of 151st St. & Parker Rd.	228 acres	Private agricultural land	228 acres of agricultural land in row crop production near the headwaters of Tributary D.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 898 lbs/yr TP= 458 lbs/yr TSS=307 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG9	NE of Cedar Rd. & 143rd St.	59 acres	Private agricultural land	59 acres of agricultural land in row crop production along the south side of Long Run Creek Reach 5 (LRC5).	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 265 lbs/yr TP= 135 lbs/yr TSS= 94 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
WASTEWATER TREATMENT PLANT UPGRADES											
Technical and Financial Assistance Needs: Technical and financial assistance needed to upgrade waste water treatment plants is high due primarily to the technical aspects of engineering design and construction implement costs.											
Derby Meadows WWTP	Derby Dr.	6 acres	Illinois American Water Co. (private)	WWTP facility with effluent measuring 21.44 mg/l (43,045 lbs/ yr) total nitrogen and 5.02 mg/l (10,079 lbs/yr) total phosphorus.	Implement plant upgrades that include nutrient removal technologies for total nitrogen (<5.5 mg/l) and total phosphorus (< 1.0 mg/l (goal = 0.6 mg/l).	Nutrient Tech: TN=33,002lbs/yr TP= 8,874 lbs/yr TSS= na	High: Critical Area	Illinois American Water Co.	Illinois EPA; Homer Glen	$13,569,000 to design and construct based on 2009 preliminary plan/ approval	1-10 Years
Chickasaw Hills WWTP	Parker Rd.	6 acres	Illinois American Water Co. (private)	WWTP facility with effluent measuring 33.22 mg/l (91,960 lbs/ yr) total nitrogen and 3.45 mg/l (9,550 lbs/yr) total phosphorus.	Implement plant upgrades that include nutrient removal technologies for total nitrogen (<5.5 mg/l) and total phosphorus (< 1.0 mg/l (goal = 0.6 mg/l).	Nutrient Tech: TN=76,735lbs/yr TP= 7,889 lbs/yr TSS= na	High: Critical Area	Illinois American Water Co.	Illinois EPA; Homer Glen	$10,000,000 to design and construct	1-10 Years
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
3	Goodings Grove School	2,000 square feet	Gooding Grove School	Existing depressional area south of parking lot with mowed turf grass and manhole outlet.	This would be a good project demonstration area to raise manhole elevations and plant with native vegetation to create a rain garden adjacent to parking lot.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Homer Glen; Ecological Consultant	Engineer; Ecological Consultant	$4,000 to raise outlets and install native vegetation (plugs)	1-10 Years
7	Old Oak Country Club	50 acres	Old Oak Golf Course (private)	Approximately 50 acres on golf course that are currently rough areas and maintained as mowed turf grass.	Opportunity to enroll in Audubon Cooperative Sanctuary Program (ACSP) and establish low stature prairie buffers in roughs and around pond features.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Old Oak Country Club	Ecological Consultant	$150,000 to design and install prairie on 50 acres	10-20+ Years
10	N of 151st St (formerly Woodbine GC)	102 acres	Homer Glen (Pubic)	Until December 2012, site was Woodbine Golf Course. Homer Glen purchased the site with the intent to convert the golf course to parkland and the club house to the Village Hall.	Incorporate natural area restoration with interpretive trails into portions of park's open space. Also see "Wetland Restoration" #18	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium to High based on how feasible	Homer Glen	Ecological and Park Design Consultants	$120,000 to design and install prairie and wetland on 40+ acres	As new park design and development occurs

SECTION 6.0

HOMER TOWNSHIP

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
19D, 19E, 19F, 19G	Along I-355 Corridor	9.8 acres	Illinois DOT (private)	Four existing wetland bottom detention basins along I-355 corridor with populations of highly invasive common reed grass (Phragmites australis).	Control common reed grass populations using herbicide treatments.	na	Medium	Illinois DOT	Ecological Consultant/ Contractor	$10,000/year maintenance	Ongoing
24F, 24G, 24H	Along Brook Dr.	7.0 acres	Individual Residents (private)	Existing dry bottom turf grass detention in three separate areas within floodplain along Long Run Creek Reach 4 (LRC4).	Design, permit, and implement project to selectively break berms along stream and naturalize detention areas with native vegetation. Maintain indefinitely.	Wetland Det.: TN= 2,373 lbs/yr TP= 224 lbs/yr TSS= 225 tons/yr	High: Critical Area	Homeowners, Homer Twp	Homer Twp; Engineer; Ecological Consultant	$20,000 to design and permit; $85,000 to implement; $3,000/year maintenance	1-10 Years
32B	Culver Memorial Park	3.8 acres	Homer Twp (public)	One existing large wet bottom detention basin with mown turf grass slopes. Basin is located at headwaters of Tributary D.	Design and implement project to install native vegetation along side slopes and emergent zone; create walking path with interpretive signage; install fishing access pads; maintain indefinitely. Study potential to install restrictor on outlet.	Wetland Det.: TN= 846 lbs/yr TP= 92 lbs/yr TSS= 46 tons/yr	High: Critical Area	Homer Twp	Engineer; Ecological Consultant/ Contractor	$80,000 to design and install vegetation, trails, fishing access; $3,000/year maintenance	1-10 Years
34S	Goreham Field Park	1.9 acres	Homer Twp (public)	Older dry bottom detention basin with mown turf within park.	Good demonstration area to create wetland detention by regarding, installing new inlet/outlet structures, and planting with native vegetation. Interpretive signage could also be installed.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Homer Twp	Homer Twp; Engineer; Ecological Consultant	$45,000 to design and install wetland detention; $2,000/ year maintenance	1-10 Years
STREAMBANK & CHANNEL RESTORATION (See Figure 59)											
Technical and Financial Assistance Needs: Stream restorations are complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration. The project becomes more complex in areas that flow through several governing bodies or multiple private residences. Technical and financial assistance associated with stream maintenance is generally low for minor tasks such as removing debris.											
LRC 3: Long Run Creek Reach 3	Lady Bar Ln. to Bell Rd.	2,000 linear feet	Mostly private residential lots	Approximately 2,000 lf at downstream end of reach that is highly channelized, moderately eroded with some highly eroded sections, and with poor riffle-pool development. Reach is bordered by mostly residential land.	Design, permit, and implement project to selectively stabilize highly eroded areas using bioengineering techniques and install up to five artificial riffles within the stream channel.	Streambank Stabilization: TN= 90% TP= 90% TSS= 90%	Low	Private Owners	Homer TWP; USACE, IDNR; Ecological Consultant/ Contractor	$100,000 to design, permit, and implement stabilization and artificial riffles	10-20+ Years
TribM1: Tributary M Reach 1	I-355 to Archer Ave.	3,292 linear feet	Private agricultural land	3,292 lf of stream with highly eroded banks located primarily on private agricultural land.	Design, permit, and implement project to selectively stabilize highly eroded areas using bioengineering techniques.	Streambank Stabilization: TN= 806 lbs/yr TP= 403/yr TSS=403 tons/yr	High: Critical Area	Private Owners	NRCS/SWCD; USACE, IDNR; Ecological Consultant/ Contractor	$350,000 to design, permit, and implement stabilization and artificial riffles	1-10 Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
LRC 3: Long Run Creek Reach 3	Lady Bar Ln. to Bell Rd.	2,000 linear feet	Mostly private residential lots	Approximately 2,000 lf at downstream end of reach with a degraded riparian buffer dominated by invasive shrubs and trees.	Restore buffer along stream reach by removing invasive woody species and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Private Owners	Homer Twp; Ecological Consultant/ Contractor	$23,000 to restore riparian buffer; $2,000/yr maintenance	10-20+ Years
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
14	Homer Tree Service Mulch Processing Area	50 acres	Homer Tree Service (private)	Homer Tree Service mulch processing area that currently does not have stormwater detention.	Create wetland detention basin(s) to store and treat stormwater runoff from mulch processing area.	TN= 210 lbs/yr TP= 29 lbs/yr TSS= 23 tons/yr	High: Critical Area	Homer Tree Service	IEPA; Engineer; Ecological Consultant	$75,000 to design and create detention	1-10 Years

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
LRC 13: Long Run Creek Reach 13	Long Run Seep Nature Preserve	3,130 lf	IDNR-NPC (Public)	3,130 lf of high quality stream located within Long Run Seep Nature Preserve. The Nature Preserves Commission has been implementing ongoing riparian area restoration work.	Continue to implement maintenance work along the riparian area.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	IDNR & Nature Preserves Commission	None	$20,000/year maintenance	Ongoing
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
11	Long Run Seep Nature Preserve	89 acres	IDNR	IDNR nature preserve harboring the federally endangered Hine's Emerald Dragonfly, and various ecological communities that are threatened by invasive species.	Implement annual management of natural areas using ecological restoration approaches to ultimately improve habitat requirements for Hine's Emerald Dragonfly.	na	Medium	IDNR-Illinois Nature Preserves Commission	Ecological Consultant	$10,000/year management	Ongoing

LEMONT

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
1A	Silver Crossing Pro. Building; N of 127th Street & E of Hillview Dr	0.2 acres	Business (private)	Existing dry bottom detention basin with mown turf grass adjacent to business parking lot; low drainage area north of parking area.	Design and implement project to remove turf grass and revegetate dry bottom basin with native prairie vegetation; retrofit depression north of lot to a rain garden feature; maintain both indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Business Association	NRCS; Ecological Consultant/ Contractor	$6,000 to design and install prairie vegetation & rain garden; $1,000/ year maintenance	10-20+ Years
1C	NW corner of. 127th Street & Covington Drive	0.4 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass north of 127th Street.	Design and implement project to remove turf grass and revegetate with native prairie vegetation then maintain indefinitely. Project would be a good demonstration and highly visible to public.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Residential HOA	Ecological Consultant/ Contractor; Lemont	$6,000 to design and install prairie vegetation; $1,000/year maintenance	10-20+ Years
2A	Amber Terrace Subdivision; NW corner of 127th Street & Amber Dr.	0.6 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass servicing Amber Terrace Subdivision.	Design and implement project to remove turf grass and revegetate with native prairie vegetation then maintain indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Residential HOA	Ecological Consultant/ Contractor; Lemont	$7,000 to design and install prairie vegetation; $1,000/year maintenance	10-20+ Years
2C	Abby Oaks Subdivision; S of Notre Dame Dr.	1.3 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass servicing Abby Oaks Subdivision.	Design and implement project to remove turf grass and revegetate with native prairie vegetation then maintain indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Residential HOA	Ecological Consultant/ Contractor; Lemont	$12,000 to design and install prairie vegetation; $2,000/year maintenance	10-20+ Years
9A & 9B	9A: SE corner of Pasture Dr. & Smith Rd. 9B: S of Pasture Dr.	4.0 acres	Residential HOA (private)	Two existing dry bottom detention basins with mown turf grass within residential subdivision.	Design and implement project to remove turf grass and revegetate with native prairie vegetation then maintain indefinitely. Alter concrete channel in basin north of road.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor; Lemont	$45,000 to design and install prairie vegetation & alter concrete channel; $3,000/yr maintenance	10-20+ Years
9C	Mayfair Estates Subdivision; SE of Stoneybrook Dr. & Klappa Dr.	1.5 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass. Basin has several outlets flush with basin bottom. Basin is also at headwaters of Trib. J.	Design and implement project to create wetland bottom detention by removing turf grass, raising outlet elevations, and revegetating with native prairie and wetland plants.	Wetland Det.: TN= 36 lbs/yr TP= 11 lbs/yr TSS= 3.5 tons/yr	High: Critical Area	Residential HOA	Ecological Consultant/ Contractor; Lemont	$25,000 to design and install wetland bottom & raise outlets; $2,000/yr maintenance	1-10 Years
9H, 9I	Lemont PD Core Athletic Complex on Timberline Dr.	3.5	Lemont (public)	Two existing dry bottom turf grass detentions servicing Lemont Park District facility at headwaters of Tributary J; eroded channel has formed at outlet of 9I.	Design and implement project to raise bottom outlet elevations and plant with native vegetation to create wetland bottom detentions that also forms green infrastructure connection to Tributary J.	Wetland Det.: TN= 60 lbs/yr TP= 20 lbs/yr TSS=13.5 tons/yr	High: Critical Area	Lemont	Ecological Consultant/ Contractor	$60,000 to design and install wetland bottom & raise outlets; $3,000/yr maintenance	1-10 Years
10A, 10B	S of Deer Ln. & E of Acorn St. in subdivision	0.7 acres	Residential HOA (private)	Two existing dry bottom basins with mown turf grass and concrete channels running from inlets to outlets.	Design and implement project to disconnect concrete channels, remove turf grass, and install native vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$14,000 to disconnect concrete channel and install native vegetation; $1,000/yr maintenance	10-20+ Years
10C	Between of Acorn St. and 132nd St. in subdivision	0.9 acres	Residential HOA (private)	Existing dry bottom turf grass detention basin servicing residential subdivision; basin is located at headwaters of Tributary I; eroded channel has formed at outlet.	Raise bottom outlet elevations and plant with native vegetation to create wetland bottom detention that also forms green infrastructure connection to Tributary I	Wetland Det.: TN= 60 lbs/yr TP= 11 lbs/yr TSS= 3.5 tons/yr	High: Critical Area	Residential HOA	Ecological Consultant/ Contractor	$18,000 to design and install wetland bottom & raise outlets; $2,000/yr maintenance	1-10 Years
10D, 10E, 10F	Along Arbor Dr. in Harpers Grove Subdivision	2.1 acres	Residential HOA (private)	Three existing dry bottom turf grass detention basins servicing residential subdivision.	Design and implement project to remove turf grass and revegetate with native prairie vegetation then maintain indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$21,000 to design and install native vegetation; $2,000/yr maintenance	10-20+ Years
10G	Shopping Center off Archer Ave.; NW of Archer Ave. & State St.	1.5 acres	Business Association (private)	Existing wet bottom detention basin with mown turf grass slopes servicing portion of adjacent shopping center.	Design and implement project to remove turf grass and revegetate side slopes with native vegetation. Also establish emergent plant shelf.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Business Association	Ecological Consultant/ Contractor	$22,500 to design and install native vegetation; $2,000/yr maintenance	10-20+ Years

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
10J	SW corner of Munster Rd. & State St.	0.9 acres	private	Existing dry bottom turf grass detention with concrete channel running from inlet to outlet.	Design and implement project to disconnect concrete channel, remove turf grass, and retrofit with native vegetation.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Owner	Ecological Consultant/ Contractor	$16,000 to design and install native vegetation & disconnect channel; $2,000/ yr maintenance	10-20+ Years
10L	Lemont Village Square on E side of State St.	1.4 acres	Business Association (private)	Existing dry bottom turf grass detention with concrete channels running from inlets to outlets.	Design and implement project to disconnect concrete channels, remove turf grass, and retrofit with native vegetation.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Business Association	Ecological Consultant/ Contractor	$25,000 to design and install native vegetation & disconnect channels; $2,000/yr maintenance	10-20+ Years
10P	Prairie Knoll Townhomes between 128th St. & 129th St.	0.7 acres	Residential HOA (private)	One existing dry bottom basin with mown turf grass. Several outlet structures are located flush with the bottom of the basin.	Design and implement project to raise outlets and plant with native prairie and wetland vegetation to create a wetland bottom detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$10,000 to raise outlets and plant native vegetation; $1,000 yr/maintenance	10-20+ Years
11A	Ashbury Woods Subdivision: NW of 129th St. & Ashbury Dr.	1.5 acres	Residential HOA (private)	Existing dry bottom turf grass detention basin servicing Ashbury Woods Subdivision; basin is located at headwaters of Tributary G	Design and implement project to raise bottom outlet elevations and plant with native vegetation to create wetland bottom detention that also forms green infrastructure connection to Tributary G	Wetland Det.: TN= 36 lbs/yr TP= 18 lbs/yr TSS= 6 tons/ yr	High: Critical Area	Residential HOA	Ecological Consultant/ Contractor	$25,000 to raise outlets and plant native vegetation; $2,000 yr/maintenance	1-10+ Years
11E	SE corner of 127th St. & Marian Dr.	0.8 acres	Residential HOA (private)	Existing dry bottom detention with mown turf grass. A concrete channel is directed from an inlet to an outlet on the basin bottom.	Design and implement project to disable concrete channel, raise outlet structure, and plant basin with native vegetation.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$12,000 to raise outlet, disable concrete channel, and plant native vegetation; $1,000 yr/maintenance	10-20+ Years
11F, 11G	Krystyna Crossing Sub.; S end of Kystyna Crossing	0.7 acres	Residential HOA (private)	Two existing dry bottom basins with mown turf grass. One basin has low flow concrete channels. Both basins are situated adjacent to green infrastructure area to south.	Design and implement project to disable concrete channels and plant with native vegetation to improve green infrastructure connection.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$10,000 to disable concrete channel and plant native vegetation; $1,000 yr/ maintenance	10-20+ Years
11H	Undeveloped Subdivision between Archer Ave. & 127th St.	0.4 acres	Owner (private)	Existing naturalized wetland bottom detention basin with good compliment of native vegetation.	Maintain existing vegetation.	na	Medium	Owner	Ecological Consultant/ Contractor	$1,000/yr maintenance	Ongoing
11I	NW of 131st St. & Magdalena Dr. in Subdivision	0.5 acres	Residential HOA (private)	Existing dry bottom basin with mown turf grass and a low flow concrete channel running from the inlet to outlet.	Design and implement project to disconnect concrete channel and install native vegetation to replace turf grass.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$8,000 to disable channel and install native vegetation; $1,000/yr maintenance	10-20+ Years
13B1, 13B2	Glens of Connemara Sub. between Kinsale Ct. & Lismore Ln.	2.5 acres	Residential HOA (private)	Two wet bottom turf grass lined detentions totaling 2.5 acres and servicing Glens of Connemara Subdivision located at headwaters of Tributary F; an eroded channel has formed in agricultural field to west as a result of detention outlets.	Retrofit slopes and emergent zones with native vegetation to create wetland detention. Also incorporate limestone fishing pads for aesthetics and to limit trampling of shoreline vegetation.	Wetland Det.: TN= 90 lbs/yr TP= 27 lbs/yr TSS= 9 tons/ yr	High: Critical Area	Residential HOA	Ecological Consultant/ Contractor	$50,000 to design and install native vegetation and fishing pads; $2,000/yr maintenance	1-10 Years
13D	Lemont HS Sports Complex; SW of 131St St. & Bell Rd.	1.6 acres	Lemont School District	Existing wet bottom detention basin with rock toe that services primarily the athletic field parking area.	The site provides a good demonstration area to naturalize the basin side slopes with native vegetation and install emergent plants along the shoreline.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Lemont School District	Lemont; NRCS; Ecological Consultant/ Contractor	$15,000 to design and install native vegetation; $2,000/yr maintenance	10-20+ Years
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
22	SW of 131st St. & Parker Rd.	30.1 acres	Private agricultural land	30.1 acres of drained wetlands on private agricultural land at headwaters of Tributary F; areas are slated to be Conservation Development by Village of Lemont.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation.	Wetland Det.: TN= 231 lbs/ yr TP= 52 lbs/yr TSS= 27 tons/yr	High: Critical Area	Future Developer; Lemont	USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$451,500 to design/permit/ install/ maintain wetland	As new development occurs

SECTION 6.0

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
STREAMBANK & CHANNEL RESTORATION (See Figure 59)											
Technical and Financial Assistance Needs: Stream restorations are complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration. The project becomes more complex in areas that flow through several governing bodies or multiple private residences. Technical and financial assistance associated with stream maintenance is generally low for minor tasks such as removing debris.											
TribJ2: Tributary J Reach 2	Centennial Park to Tributary J Reach 1	2,425 linear feet	Lemont Park District (Public)	First 200 lf of stream reach exhibits moderate to highly eroded banks due to excess water coming from detention basins in park to north.	Stabilize streambanks using bioengineering techniques.	Streambank: STN=90% TP= 90% TSS= 90%	Medium	Lemont Park District	Lemont; USACE; Ecological Consultant/ Contractor	$45,000 to design, permit, and implement streambank stabilization	10-20+ Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
TribJ2: Tributary J Reach 2	Centennial Park to Tributary J Reach 1	2,425 linear feet	Lemont Park District (Public)	First 200 lf of stream reach has a poor buffer dominated by invasive woody species.	Restore riparian area by removing invasive woody species and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Lemont Park District	Lemont; Ecological Consultant/ Contractor	$10,000 to restore buffer; $1,000/yr maintenance	10-20+ Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI10	SW corner of Parker Rd. & 131st St.	143 acres	Private agricultural land	143 acres on private agricultural parcels along Tributary F (TribF). Note: parcels are slated to be Conservation Development by Lemont.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Lemont	Cook County; USACE; NRCS/ SWCD; IEPA; Eco. Consultant	Cost for implementing a Conservation Development cannot be determined	As new development occurs
GI19	E of Valley View Dr. & W of I355	39 acres	Private agricultural/ residential land	39 acres on private residential, woodland, and agricultural parcel along headwaters of Tributary J1 (TribJ1); parcel is slated to become residential with 0-2 du/acre.	Incorporate Conservation Design standards into future development plans to preserve tributary and woodland corridor.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Lemont	Cook County; USACE; NRCS/ SWCD; IEPA; Eco. Consultant	Cost for implementing a Conservation Development cannot be determined	As new development occurs
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG10	SW corner of Parker Rd. & 131st St.	106 acres	Private agricultural land	106 acres of agricultural land in row crop production along Tributary F.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 307 lbs/yr TP= 156 lbs/yr TSS=110 tons/ yr	High: Critical Area	Existing Farmer	NRCS/SWCD	Cost for implementing conservation tillage depends on available equipment and crop type	Annually
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
1	Lemont Park District's "The Core" parking lot	1,500 square feet	Lemont Park District	Existing depressed parking lot swales with mowed turf grass and manhole outlets that are flush with the swale bottom.	This would be a good project demonstration area to raise manhole elevations and plant with native vegetation to create parking lot bioswales.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Lemont Park District	Engineer; Ecological Consultant	$8,000 to raise outlets and install native vegetation (plugs)	1-10 Years
2	Lemont Park District's "The Core" entrance	250 square feet	Lemont Park District	Existing depressed area at building entrance with mowed turf grass and manhole outlet.	This would be a good project demonstration area to raise manhole elevations, regrade, and plant with native vegetation to create rain garden.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Lemont Park District	Engineer; Ecological Consultant	$6,000 to raise outlet, regrade, and install native vegetation (plugs)	1-10 Years
4	South of 127th St.	2.0 acres	Private	Large undeveloped depressional area south of 127th street that is currently mowed to the extent possible.	This area could be acquired and made to be a naturalized stormwater storage area to alleviate flood problems and act as wetland detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Private Owner	Lemont; Engineer; Ecological Consultant	$75,000 to acquire area and convert to naturalized detention	10-20+ Years

LEMONT TOWNSHIP

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
9D, 9E, 9F	Along I-355 Corridor	2.8 acres	Illinois DOT (private)	Three existing wet bottom detention basins along I-355 corridor with populations of highly invasive common reed grass (Phragmites australis).	Control common reed grass populations using herbicide treatments	na	Medium	Illinois DOT	Ecological Consultant/ Contractor	$5,000/year maintenance	Ongoing
12A	Fox Hills Estates	3.3 acres	Residential HOA (private)	Large wet bottom detention basin online with Trib. F. Geese are heavily utilizing the mown turf areas surrounding the basin and may be contributing to algae problems.	Install native prairie buffer and emergent plant shelf to deter geese and provide water quality benefits as well as improve green infrastructure quality.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$27,000 to design and install native prairie buffer and emergent plants; $3,000/yr maintenance	10-20+ Years
13A	Silver Fox Dr. in Subdivision	0.7 acres	Residential HOA (private)	Small wet bottom detention basin with mown turf grass online with Trib. F. Basin is choked with algae.	Install native prairie buffer and emergent plants to help remove nutrients and clear up algae.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Ecological Consultant/ Contractor	$10,000 to install buffer and emergent plants; $1,000/yr maintenance	10-20+ Years
13C	Fox Pointe Subdivision	0.6 acres	Residential HOA (private)	Dry bottom basin with mown turf grass and a low flow concrete channel running from inlet to outlet.	Disconnect concrete channel, remove turf grass, and install native vegetation.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$10,000 to disable channel and install native vegetation; $1,000/yr maintenance	10-20+ Years
13E	Christ Community Church	0.5 acres	Church (private)	Existing naturalized wet bottom basin servicing church. Basin has some native vegetation but much of basin buffer is a failed planting.	Replant basin buffer and supplement emergent plants along shoreline.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Church	Ecological Consultant/ Contractor	$7,000 to reinstall native prairie buffer and supplement emergent plants; $1,000/yr maintenance	1-10 Years
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
21	NW of 131st St. & Waterford Dr.	25.2	Private agricultural land	25.2 acres of drained wetlands on private agricultural land at headwaters of Tributary F; areas are slated to be Conservation Development by Village of Lemont.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation.	Wetland Det.: TN= 189 lbs/yr TP= 42 lbs/yr TSS= 22 tons/yr	High: Critical Area	Future Developer; Lemont	USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$378,000 to design/ permit/install/ maintain wetland	As new development occurs
23	Between 131st St. & Hawthorne Dr.	7.2 acres	Private agricultural land	7.2-acre drained wetland complex on private agricultural land and adjacent to Tributary F. Site is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using areas as wetland detention & mitigation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Future Developer; Lemont TWP	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$108,000 to design/ permit/install/ maintain wetland	As new development occurs
STREAMBANK & CHANNEL RESTORATION (See Figure 59)											
Technical and Financial Assistance Needs: Stream restorations are complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration. The project becomes more complex in areas that flow through several governing bodies or multiple private residences. Technical and financial assistance associated with stream maintenance is generally low for minor tasks such as removing debris.											
TribF1: Tributary F Reach 1	NW of 131st St. & Waterford Dr.	2,281 linear feet	Private agricultural land	2,281 lf of eroded stream channel through agricultural area formed by water exiting new detention basins in development to east.	Create a meandering stream channel in agricultural area using bioengineering techniques. Note: combine with Critical Riparian Area project TribF1.	Streambank Stabilization: TN=58 lbs/yr TP= 5 lbs/yr TSS= 3.5 tons/yr	High: Critical Area	Private Owners	NRCS/SWCD; USACE; Ecological Consultant/ Contractor	$275,000 to design, permit, and implement stream channel creation	1-10 Years

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
TribG1: Tributary G Reach 1	129th St. to Long Run Creek Reach 8	4,539 linear feet	Various private land owners	4,539 lf of stream channel with moderately eroded banks; several streambank sections are highly eroded.	Stabilize highly eroded streambank sections using bioengineering techniques.	Streambank Stabilization: TN=90% TP= 90% TSS= 90%	Low	Private Owners	Lemont Twp; USACE; Ecological Consultant/ Contractor	$150,000 to design, permit, and implement streambank stabilization	10-20+ Years
TribI2: Tributary I Reach 2	132nd St. to Tributary I Reach 1	1,618 linear feet	Various private residential owners	1,618 lf of stream where the banks have become highly eroded due to excess water originating from a detention basin north of 132nd St.	Stabilize highly eroded streambanks using bioengineering techniques.	Streambank Stabilization: TN=90% TP= 90% TSS= 90%	Low	Private Owners	Lemont Twp; USACE; Ecological Consultant/ Contractor	$200,000 to design, permit, and implement streambank stabilization	10-20+ Years
TribJ1: Tributary J Reach 1	Existing detention to Tributary J Reach 2	4,029 linear feet	Various private residential owners	4,029 lf of stream where sections of bank have become highly eroded due to excess water originating from a detention basin at the headwaters.	Stabilize highly eroded streambank sections using bioengineering techniques.	Streambank Stabilization: TN=90% TP= 90% TSS= 90%	Low	Private Owners	Lemont Twp; USACE; Ecological Consultant/ Contractor	$175,000 to design, permit, and implement streambank stabilization	10-20+ Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
TribF1: Tributary F Reach 1	NW of 131st St. & Waterford Dr.	2,281 linear feet	Private agricultural land	2,281 lf of stream channel through agricultural area with no buffer.	Create 30-foot (minimum) riparian buffer along stream. Note: combine with Critical Stream Reach project TribF1.	Filter Strip: TN=58 lbs/yr TP= 5 lbs/yr TSS= 3.5 tons/yr	High: Critical Area	Private Owners	NRCS/SWCD Conservation Reserve Program	$8,000 to restore buffer; $1,000/yr maintenance	1-10 Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI11	NW of Waterford Dr. & 131st St.	121 acres	Private agricultural land	121 acres on private agricultural parcels along Tributary F (TribF). Note: parcels are slated to be Conservation Development by Lemont.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Lemont Twp; Lemont	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG11	NW of Waterford Dr. & 131st St.	94 acres	Private agricultural land	94 acres of agricultural land in row crop production at headwaters of Tributary F.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 407 lbs/yr TP= 207 lbs/yr TSS=143 tons/yr	High: Critical Area	Existing Farmer	NRCS/SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG12	NE corner of Derby Rd. & 131st St.	20 acres	Private agricultural land	20 acres of agricultural land in row crop production at headwaters of Tributary F.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 59 lbs/yr TP= 30 lbs/yr TSS=21 tons/yr	High: Critical Area	Existing Farmer	NRCS/SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
9	Glen Eagles Country Club	25 acres	Glen Eagles CC (Private)	Approximately 25 acres on south end of golf course that are currently rough areas and maintained as mowed turf grass.	Opportunity to enroll in Audubon Cooperative Sanctuary Program (ACSP) and establish low stature prairie buffers in roughs and around ponds.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Glen Eagles Country Club	Ecological Consultant	$75,000 to design and install prairie on 25 acres	10-20+ Years

LOCKPORT

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
30A	Stately Oaks Subdivision	1.0 acres	Residential HOA (private)	Existing wetland bottom detention basin with areas of remnant sedge meadow; invasive herbaceous and woody shrub/ trees are abundant. Basin is also at headwaters of Tributary L.	Implement maintenance program to control invasive species and protect the remnant sedge meadow.	Wetland Det.: TSS = 77.5% TN = 205 TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$1,000/year maintenance	Ongoing
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
25	Between Smith Rd. & Basham Ave.	31.4 acres	Residential (Private)	31.4 acres of drained wetlands along Long Run Creek and Trib. L on primarily private residential land.	Restore hydrology and plant native vegetation.	Wetland Det.: TSS = 77.5% TN = 205 TP = 44%	Low	Residents	Ecological Consultant/ Contractor	$310,000 to design/ permit/install/ maintain wetland	10-20+ Years
27	Between 141st St. & Tameling Dr.	3.9 acres	Private agricultural land	3.9 acres of drained wetlands on private agricultural land that is slated for future residential development.	Incorporate wetland restoration into future development plans by using area as wetland detention.	Wetland Det.: TSS = 77.5% TN = 205 TP = 44%	Low	Future developer; Lockport	Ecological Consultant/ Contractor	$58,500 to design/ permit/install/ maintain wetland	As new development occurs
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
TribM3: Tributary M Reach 3	New Rd. to Long Run Creek	1,603 linear feet	Chevron (private)	1,603 lf of stream with degraded riparian comprised on invasive shrubs and trees.	Restore degraded riparian area by removing invasive woody species.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Chevron	Ecological Consultant/ Contractor	$25,000 to remove invasive woody species; $2,000/yr maintenance	1-10 Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI13	Along I-355	85 acres	Private agricultural land	85 acres on private agricultural parcels at headwaters of Tributary M (TribM). Parcels are slated for future business park development	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	FPDWC	Lockport	The cost for acquiring & protecting parcels cannot be determined	If/when parcels become available for purchase
GI14	Between Archer Ave. & 135th St.	143 acres	Private residential & agricultural land	143 acres on private residential and agricultural parcels along Long Run Creek Reach 10 (LRC10) and Tributary L (TribL). Note: parcels are included in FPDWC 1996 Preservation Plan.	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Lockport	Will County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI17	W of New Rd.	Approx. 75 acres	Chevron (private)	Approximately 75 acres encompassing the southern portion of GI17. Parcels are owned by Chevron and are situated along along Long Run Creek Reach 14 (LRC14) and Tributary M (TribM). Note: parcels are included in FPDWC 1996 Preservation Plan and are adjacent to Long Run Seep Nature Preserve.	Chevron protect and restore or enhance habitat on parcels for Federally endangered Hine's Emerald Dragonfly.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Chevron	USFWS; USACE; IDNR; Ecological Consultant	The cost for restoring the parcel cannot be determined	1-10 Years

SECTION 6.0

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
GI18	Between New Rd. & High Rd.	40 acres	Golf Course (private)	40 acres within Lockport Golf & Recreation Club. Note: parcels are included in FPDWC 1996 Preservation Plan and generally surround Long Run Seep Nature Preserve.	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Lockport Golf & Recreation Club	Lockport; Lockport Twp	The cost for acquiring and restoring the parcel cannot be determined	If/when parcels become available for purchase
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG13	Along I-355	63 acres	Private agricultural land	63 acres of agricultural land in row crop production at headwaters of Tributary M.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 282 lbs/yr TP= 144 lbs/yr TSS=100 tons/yr	High: Critical Area	Existing Farmer	NRCS/SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
6	Big Run Golf Course	50 acres	Golf Course (private)	Approximately 50 acres on golf course that are currently rough areas and maintained as mowed turf grass. Many of these areas exist among remnant oak savannas/woodlands.	Excellent opportunity to enroll in Audubon Cooperative Sanctuary Program (ACSP) and establish low stature savanna and prairie buffers in roughs and around pond features.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Big Run Golf Course	Ecological Consultant	$150,000 to design and install savanna and prairie on 50 acres	10-20+ Years

LOCKPORT TOWNSHIP

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
STREAMBANK & CHANNEL RESTORATION (See Figure 59)											
Technical and Financial Assistance Needs: Stream restorations are complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration. The project becomes more complex in areas that flow through several governing bodies or multiple private residences. Technical and financial assistance associated with stream maintenance is generally low for minor tasks such as removing debris.											
LRC 11: Long Run Creek Reach 11	Big Run Golf Course	3,938 linear feet	Big Run Golf Course (private)	3,938 lf of stream at Big Run Golf Course that exhibits highly eroded streambanks and poor riffle-pool development.	Design, permit, and implement project to stabilize highly eroded streambanks using bioengineering techniques and install up to eight artificial riffles within the stream channel. Note: combine project with Critical Riparian Area Project along LRC11.	Streambank Stabilization: TN= 964 lbs/yr TP= 482 lbs/yr TSS=482 tons/yr	High: Critical Aera	Big Run Golf Course	USACE, IDNR; Ecological Consultant/ Contractor	$450,000 to design, permit, and implement stabilization and artificial riffles	1-10 Years
TribM2: Tributary M Reach 2	Archer Ave. to Long Run Seep Nature Preserve	9,794 linear feet	Various private land	9,794 lf of stream with highly eroded banks located primarily on private residential lots.	Design, permit, and implement project to selectively stabilize highly eroded areas using bioengineering techniques.	Streambank Stabilization: TN= 2,396 lbs/yr TP= 1,199 lbs/yr TSS=1,199 tons/yr	High: Critical Area	Private Owners	NRCS/ SWCD; Lockport Twp; USACE, IDNR; Ecological Consultant/ Contractor	$1,000,000 to design, permit, and implement stabilization and artificial riffles	1-20 Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
LRC11: Long Run Creek Reach 11	Big Run Golf Course	3,938 linear feet	Big Run Golf Course (private)	3,938 lf of narrow/degraded riparian area along Long Run Creek Reach 11 (LRC11) within Big Run Golf Course. Degraded conditions are caused primarily by existing turf grass up to the stream.	Restore degraded riparian area by removing turf grass and restoring a 30-foot (minimum) native plant buffer. Note: combine with Critical Stream Reach project LRC11.	Filter Strip: TN=11 lbs/yr TP= 8 lbs/yr TSS= 1 tons/yr	High: Critical Area	Big Run Golf Course	Ecological Consultant/ Contractor	$40,000 to restore riparian buffer; $3,000/yr maintenance	1-10 Years
LRC14: Long Run Creek Reach 14	West of New Rd.	5,450 linear feet	Hanson Material Service	5,450 lf of a meandering stream with somewhat degraded floodplain dominated by invasive woody species.	Restore floodplain area to wet savanna by selectively removing invasive woody species.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Hanson Material Service	Ecological Consultant/ Contractor; USFWS	$100,000 to remove invasive woody species; $10,000/yr maintenance	1-10 Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI16	Big Run Golf Course & Ag. parcels to south.	484 acres	Private agricultural land	484 acres encompassing Big Run Golf Course and private agricultural parcels to south. Note: parcels are included in FPDWC 1996 Preservation Plan and generally surround Long Run Seep Nature Preserve to the east and north.	FPDWC or other entity acquire and protect parcels should they become available for purchase in the future.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	FPDWC	Lockport Twp	The cost for acquiring & protecting parcels cannot be determined	If/when parcels become available for purchase
GI17	W of New Rd.	Approx. 75 acres	Hanson Material Service (private)	Approximately 75 acres encompassing the northern portion of GI17. Parcel is owned by Hanson Material Service and is situated along Long Run Creek Reach 14 (LRC14). Note: parcels are included in FPDWC 1996 Preservation Plan and are adjacent to Long Run Seep Nature Preserve.	Hanson Material Service protect and restore or enhance habitat on parcel for Federally endangered Hine's Emerald Dragonfly	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Hanson Material Service	USFWS; USACE; IDNR; Ecological Consultant	The cost for protecting & restoring the parcel cannot be determined	1-10 Years

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate Cost Estimate	Implementation Schedule (Years)
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG14	NW of Smith Rd. & 143rd St.	157 acres	Private agricultural land	157 acres of agricultural land in row crop production adjacent to Long Run Creek Reach 11 (LRC11). Tributary M. and Long Run Seep Nature Preserve.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 640 lbs/yr TP= 327 lbs/yr TSS=221 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG15	NE of High Rd. & 143rd St.	22 acres	Private agricultural land	22-acre livestock area with approximately 24 horses. Area is adjacent to and drains to Long Run Creek Reach 13 (LRC13) within Long Run Seep Nature Preserve.	Implement manure management system to reduce nutrient and sediment runoff to Long Run Creek and Long Run Seep Nature Preserve.	Manure Manage: TN= 371 lbs/yr TP= 46 lbs/yr TSS= na	High: Critical Area	Existing Livestock Farmer	NRCS/ SWCD	$4,000/yr	Annually

ORLAND PARK

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
25A	Compton Ct.	1.4 acres	Residential HOA (private)	Existing wet bottom detention basin with mown turf slopes servicing adjacent multifamily subdivision. Basin drains to adjacent wetlands.	Design and implement project to naturalize basin side slopes and emergent edge with native vegetation to improve water quality and extend green infrastructure. Maintain indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$21,000 to install buffer and emergent plants; $2,000/year maintenance	10-20+ Years
25B	Centennial School	2.7 acres	Orland Park (public)	Existing large dry bottom detention basin with mown turf throughout and located adjacent to Long Run Creek.	Design and implement project to naturalize basin with native vegetation. Project would extend green infrastructure along LRC and would be a good demonstration project on the school grounds.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Orland Park	Orland Park; SWCD; Ecological Consultant/ Contractor	$28,500 to retrofit basin with native vegetation; $2,000/ year maintenance	10-20+ Years
25C	Creek Crossing Dr.	1.7 acres	Orland Park (public)	Existing wet bottom detention basin with natural but weedy side slopes located along Long Run Creek and servicing adjacent subdivision.	Design and implement project to create native vegetation buffer and emergent zone to increase water quality and green infrastructure connection.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Orland Park	Ecological Consultant/ Contractor	$25,500 to install buffer and emergent plants; $2,000/year maintenance	10-20+ Years
25D	Long Run Creek Park	2.7 acres	Orland Park (public)	Existing wet bottom detention basin with prairie buffer in good condition but with some maintenance needs.	Implement a maintenance program to maintain condition of basin.	na	Medium	Orland Park	Ecological Consultant	$2,000/year maintenance	Ongoing
25F	Long Run Creek Condominiums	0.5 acres	Residential HOA (private)	Existing dry bottom basin with mown turf grass and concrete low-flow channels between inlets and outlet.	Design and implement project to disrupt or remove concrete channels and plant to native vegetation to improve water quality and infiltration.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Residential HOA	Orland Park; Ecological Consultant/ Contractor	$10,000 to disrupt concrete channels & install native vegetation; $1,000/ year maintenance	10-20+ Years
25G	Preston Dr. "Preston Pond"	0.4 acres	Orland Park (public)	Existing wetland bottom detention basin with mown turf side slopes. Basin is noted in the Orland Park Basin Best Practices report completed by V3 Companies in 2011.	Retrofit side slopes with native prairie vegetation and maintain basin indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Orland Park	Orland Park; Ecological Consultant/ Contractor	$5,000 to install prairie buffer; $500/ year maintenance	10-20+ Years
26A	Spring & Mayflower Ln.	1.1 acres	Orland Park	Existing dry bottom detention basin with mown turn grass servicing adjacent subdivision. Basin is located adjacent to FPDCC owned land.	Design and implement project to naturalize basin with native vegetation to improve water quality, increase infiltration, and extend green infrastructure adjacent to FPDCC land.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Medium	Orland Park	FPDCC; Ecological Consultant/ Contractor	$11,500 to install native vegetation; $1,000/year maintenance	10-20+ Years
26B	Bunratty Estates	0.7 acres	Orland Park	Existing naturalized wetland bottom detention basin with good compliment of native species on bottom; side slopes are dominated by weedy vegetation.	Replant side slopes with native prairie vegetation and maintain basin indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Orland Park	Ecological Consultant/ Contractor	$5,000 to install native prairie buffer; $500/year maintenance	1-10 Years
26C	Bunratty Estates	0.4 acres	Orland Park	Existing dry bottom detention basin with mown turn grass servicing Bunratty subdivision.	Design and implement project to naturalize basin with native vegetation to improve water quality and increase infiltration.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Orland Park	Ecological Consultant/ Contractor	$4,000 to install native vegetation; $500/year maintenance	10-20+ Years
26E	Along Arbor Ridge Dr.	0.7 acres	Orland Park (public)	Existing wetland bottom detention known locally as "Persimmon Meadow Pond". The basin sideslopes are natural but consist almost entirely of non-native species. This basin is noted in the Orland Park Basin Best Practices report completed by V3 Companies in 2011.	Retrofit side slopes with native prairie vegetation and maintain basin indefinitely.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Medium	Orland Park	Ecological Consultant/ Contractor	$7,500 to install native prairie buffer; $1,000/year maintenance	10-20+ Years
26F	Along Arbor Ridge Dr.	0.6 acres	Orland Park	Existing wet bottom detention basin with natural shoreline and mown turf grass side slopes.	Retrofit side slopes with native prairie vegetation and maintain basin indefinitely.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Low	Orland Park	Ecological Consultant/ Contractor	$6,500 to install native prairie buffer; $750/year maintenance	10-20+ Years

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
35C, 35D	Silo Ridge Subdivision	3.4 acres	Residential HOA (private)	Two existing wet bottom detention basins located at the headwaters of Long Run Creek; basins have stone or turf grass shoreline.	Retrofit pond buffers and emergent zone with native vegetation to minimize goose usage and filter lawn fertilizers.	Wet Pond Det.: TSS = 60% TN = 35% TP = 45%	Medium	Residential HOA	Ecological Consultant/ Contractor	$55,000 to design and install native vegetation; $2,000/ year maintenance	10-20+ Years
35F	Kindercare	0.5 acres	Business (private)	Existing dry bottom detention basin with mown turf grass.	Design and implement project to naturalize basin with native vegetation to improve water quality and increase infiltration.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Business	Ecological Consultant/ Contractor	$5,000 to install native vegetation; $500/year maintenance	10-20+ Years
35I	Pinewood Plaza	0.2 acres	Business (private)	Existing small dry bottom detention basin with mown turf grass and no outlet.	Design and implement project to naturalize basin with native vegetation to improve water quality and increase infiltration.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Business	Ecological Consultant/ Contractor	$3,000 to install native vegetation; $500/year maintenance	10-20+ Years
36A	Royal Oaks	0.8 acres	Orland Park	Existing wetland bottom detention basin with various native wetland and prairie plants but lacking maintenance.	Improve buffer with additional native vegetation and maintain entire basin indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Orland Park	Ecological Consultant/ Contractor	$8,000 to improve buffer with native vegetation; $1,000/ year maintenance	10-20+ Years
36E, 36F, 36G, 36H	Deer Haven Subdivision	1.5 acres	Orland Park & Developer (public)	Three wet bottom and one dry bottom detention basin with mown turf grass in recently developed Deer Haven subdivision.	Retrofit detentions with native vegetation in the emergent zone and buffers and maintain indefinitely.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Orland Park & Developer	Orland Park Ecological Consultant/ Contractor	$30,000 to design and install native vegetation; $2,000/ year maintenance	Prior to completion/ Village sign off
41B	Arbor Point	1.3 acres	Orland Park	Existing dry bottom turf grass detention at headwaters of Long Run Creek.	Naturalize basin with native vegetation and determine if outlets can be raised to create wetland detention	TN= 72 lbs/yr TP= 8 lbs/yr TSS= 3.5 tons/yr	High: Critical Area	Orland Park	Orland Park Engineer; Ecological Consultant/ Contractor	$20,000 to design and install native vegetation and alter outlets; $2,000/year maintenance	1-10 Years
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
1	NW corner of 151st St. & Will-Cook Rd.	14.7 acres	Private agricultural land	14.7 acres of drained wetlands on private agricultural land at headwaters of Long Run Creek; parcel is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using area as wetland detention & mitigation.	Wetland Det.: TN= 24 lbs/yr TP= 9 lbs/yr TSS= 9 tons/yr	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$220,500 to design/ permit/install/ maintain wetland	As new development occurs
2	SE corner of Royal Oaks Ln. & Wolf Rd.	23.4 acres	Private agricultural land	23.5 acres of drained wetlands on private agricultural land at headwaters of Long Run Creek; parcel is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using area as wetland detention & mitigation.	Wetland Det.: TN= 39 lbs/yr TP= 14 lbs/yr TSS= 14 tons/yr	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$351,000 to design/ permit/install/ maintain wetland	As new development occurs
3	W of Wolf Rd.	24 acres	Private agricultural land	24 acres of drained wetlands on private agricultural land at headwaters of Long Run Creek; parcel is slated for future residential development.	Incorporate wetland restoration into future Conservation Development plans by using area as wetland detention & mitigation.	Wetland Det.: TN= 39 lbs/yr TP= 14 lbs/yr TSS= 14 tons/yr	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$375,000 to design/ permit/install/ maintain wetland	As new development occurs
STREAMBANK & CHANNEL RESTORATION (See Figure 59)											
Technical and Financial Assistance Needs: Stream restorations are complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration. The project becomes more complex in areas that flow through several governing bodies or multiple private residences. Technical and financial assistance associated with stream maintenance is generally low for minor tasks such as removing debris.											
LRC 1: Long Run Creek Reach 1	Silo Ridge Rd. to 143rd St.	4,207 linear feet	Private agricultural land	4,207 lf of headwater stream that is highly channelized, moderately eroded, has high sediment accumulation, and poor riffle-pool development.	Design and install up to eight artificial riffles within the stream channel.	Not Applicable	Medium	Private Owner	NRCS/SWCD	$32,000 to design and install eight artificial riffles	10-20+ Years

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
LRC 2: Long Run Creek Reach 2	143rd St. to Will-Cook Rd.	5,787 linear feet	Private residential & Orland Park PD (Public)	5,787 lf of stream that is highly channelized, moderately eroded with some highly eroded areas, and poor riffle-pool development.	Design, permit, and implement project to selectively stabilize highly eroded areas using bioengineering techniques and install up to ten artificial riffles within the stream channel.	Streambank Stabilization: TN= 90% TP= 90% TSS= 90%	Medium	Private Owners & Orland Park	USACE, IDNR, Ecological Consultant/ Contractor	$300,000 to design, permit, and implement stabilization and artificial riffles	10-20+ Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
LRC 1: Long Run Creek Reach 1	Silo Ridge Rd. to 143rd St.	4,207 linear feet	Private agricultural land	4,207 lf of headwater stream with a relatively narrow/poor quality buffer dominated by invasive species.	Restore a 50-foot wide (minimum) buffer along stream by removing invasive vegetation and planting native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Medium	Private Owner	NRCS/SWCD Conservation Reserve Program	$30,000 to restore riparian buffer; $1,000/yr maintenance	10-20+ Years
LRC 2: Long Run Creek Reach 2	143rd St. to Will-Cook Rd.	5,787 linear feet	Private residential & Orland Park PD (Public)	5,787 lf of highly degraded riparian area on private & public (Orland Park Open Lands) land along Long Run Creek Reach 2 (LRC2). Invasive shrubs and trees are causing the majority of the problems.	Remove invasive woody species and restore degraded riparian area using native vegetation.	Filter Strip: TN= 330 lbs/yr TP= 52 lbs/yr TSS= 15 tons/ yr	High: Critical Area	Private Owners & Orland Park	Ecological Consultant/ Contractor	$50,000 to restore riparian buffer; $3,000/yr maintenance	1-10 Years
TribB2: Tributary B Reach 2	Wolf Rd. to Long Run Creek	1,370 linear feet	Residential HOA (private)	1,370 lf of degraded riparian area along stream within residential area. Invasive shrubs and trees are the biggest problem.	Remove invasive woody species and restore degraded riparian area using native vegetation.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Residential HOA	Ecological Consultant/ Contractor	$20,000 to restore riparian buffer; $2,000/yr maintenance	10-20+ Years
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI2	SE of Wolf Rd. & 131st St.	70 acres	Private agricultural land	70 acres on private agriculture parcels that are slated for future residential development. Note: parcels are located in Tampier Lake TMDL subwatershed. Note: parcel is zoned as single family residential with sensitive areas set assize for dedication to Forest Preserve District of Cook County.	Incorporate Conservation Design standards into future development plans to the extent feasible based on current residential zoning.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI3	SW of Wolf Rd. & 135th St.	100 acres	Private agricultural land	100 acres on private agriculture parcels that are slated for future residential development. Note: parcels are partially located in Tampier Lake TMDL subwatershed. Note: parcel has set density minimums.	Incorporate Conservation Design standards into future development plans to the extent feasible based on set density minimums.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI4	E and W of Wolf Rd. at headwaters of Long Run Creek	163 acres	Private agricultural land	163 acres on private agriculture parcels at headwaters of Long Run Creek Reach 1 (LRCR1). Parcels are slated for future residential development. Note: parcel has set density minimums.	Incorporate Conservation Design standards into future development plans to the extent feasible based on set density minimums.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
GI5	NE corner of 151st St. & Will-Cook Rd.	36 acres	Private agricultural land	36 acres on private agriculture land near headwaters of Long Run Creek Reach 1 (LRCR1). Parcel is slated for future residential development. Note: parcel has set density minimums.	Incorporate Conservation Design standards into future development plans to the extent feasible based on set density minimums.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Orland Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG2	SE of Wolf Rd. & 131st St.	51 acres	Private agricultural land	51 acres of agricultural land in row crop production. Note: land is located in Tampier Lake TMDL subwatershed.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 233 lbs/yr TP= 119 lbs/yr TSS= 83 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG4	SW of Wolf Rd. & 135th St.	66 acres	Private agricultural land	66 acres of agricultural land in row crop production. Land is partially located within Tampier Lake TMDL subwatershed.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 296 lbs/yr TP= 151 lbs/yr TSS=105 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG5	E and W of Wolf Rd. at headwaters of Long Run Creek	130 acres	Private agricultural land	130 acres of agricultural land in row crop production at headwaters of Long Run Creek Reach 1 (LRC1).	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 554 lbs/yr TP= 116 lbs/yr TSS=193 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG6	NE corner of 151st St. & Will-Cook Rd.	31 acres	Private agricultural land	31 acres of agricultural land in row crop production at headwaters of Long Run Creek Reach 1 (LRC1).	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 132 lbs/yr TP= 28 lbs/yr TSS=46 tons/yr	High: Critical Area	Existing Farmer	NRCS/ SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
8	Crystal Tree Golf & Country Club	30 acres	Golf Course (private)	Approximately 30 acres on golf course that are currently rough areas and maintained as mowed turf grass.	Opportunity to enroll in Audubon Cooperative Sanctuary Program (ACSP) and establish low stature prairie buffers in roughs and around pond features.	Filter Strip: TN= 40% TP= 45% TSS= 73%	Low	Crystal Tree Golf & Country Club	Ecological Consultant	$90,000 to design and install savanna and prairie on 30 acres	10-20+ Years
13	Arbor Lake Preserve	60 acres	Orland Park	60 acre preserve with variety of upland and wetland ecological communities in varying degrees of health.	Complete a Natural Area Management Plan for the preserve.	na	Low	Orland Park	Ecological Consultant	$10,000 to complete Management Plan	1-10 Years

ORLAND TOWNSHIP

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
25H	Minetz Ct.	5.4 acres	Residential HOA (private)	Existing large wet bottom detention basin with mown turf grass buffer and emergent edge dominated by invasive species. Basin is located in Tampier Lake TMDL subwatershed.	Design and implement plan to create prairie buffer, eradicate invasives from emergent edge, and plant native emergent plants to improve water quality and create wildlife and fish habitat.	Wetland Det.: TN= 81 lbs/yr TP= 9 lbs/yr TSS= 4 tons/yr	High: Critical Area	Residential HOA	SWCD; IEPA; Ecological Consultant/ Contractor	$81,000 to design & install native vegetation; $3,000/ year maintenance	1-10 Years
25I	135th & McCabe	0.9 acres	Residential HOA (private)	Existing dry bottom detention basin servicing adjacent subdivision. Basin is comprised of mown turf and has a concrete low flow channel from inlet to outlet; basin drains north to Tampier Lake.	Design and implement project to disrupt concrete channel and retrofit basin with native vegetation to create wetland bottom detention.	Wetland Det.: TN= 18 lbs/yr TP= 5 lbs/yr TSS= 2 tons/yr	High: Critical Area	Residential HOA	SWCD; IEPA; Ecological Consultant/ Contractor	$18,000 to disrupt concrete channels & install native vegetation; $1,000/ year maintenance	1-10 Years
25J	Stagecoach & McCabe	0.7 acres	unknown	Existing dry bottom detention basin consisting of mown turf grass.	Design and implement project to retrofit basin with native vegetation to improve water quality and infiltration. Maintain indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Unknown	Ecological Consultant/ Contractor	$7,500 to design and install native vegetation; $500/year maintenance	10-20+ Years
25K	Orland Trail Subdivision	0.6 acres	Residential HOA (private)	Existing dry bottom detention with mown turf grass throughout.	Naturalize basin with native vegetation to improve water quality and infiltration; maintain indefinitely.	Dry Detention: TSS = 57.5% TN = 30% TP = 26%	Low	Residential HOA	Ecological Consultant/ Contractor	$6,500 to design and install native vegetation; $500/year maintenance	10-20+ Years
35E	Maplecreek Dr.	0.9 acres	Residential HOA (private)	Existing dry bottom detention basin with mown turf grass and a low flow concrete channel between the inlet and outlet.	Design and implement project to disrupt concrete channel and retrofit basin with native vegetation to create wetland bottom detention.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Residential HOA	Ecological Consultant/ Contractor	$18,000 to disrupt concrete channels & install native vegetation; $1,000/ year maintenance	10-20+ Years
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
5	NE corner of LRC & Wolf Rd.	4.9 acres	Unknown	4.9 acre area within the floodplain of LRC that consist of mown turf grass.	Stop mowing program, break drain tiles if present & regrade then revegetate with native wetland species.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Medium	Unknown	Orland TWP; Drain Tile Service; Ecological Consultant	$50,000 to design and implement project.	10-20+ Years

SECTION 6.0

PALOS PARK											
ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
DETENTION BASIN RETROFITS & MAINTENANCE (See Figure 57)											
Technical and Financial Assistance Needs: Technical assistance needed to implement detention basin retrofits is relatively low while financial assistance needs are moderate. Private landowners will need the greatest assistance.											
6A	Shadow Ridge Estates Subdivision	0.3 acres	Residential HOA (private)	Existing wet bottom turf grass-lined detention basin servicing Shadow Ridge Estates Subdivision; basin is located in Tampier Lake TMDL subwatershed.	Design and implement project to install a native prairie vegetation buffer, install native emergent plants along shoreline, and maintain indefinitely.	Wetland Det.: TN = 36 lbs/yr TP= 11 lbs/yr TSS=3.5 tons/yr	High: Critical Area	Residential HOA	Ecological Consultant/ Contractor; Palos Park	$5,000 to design and install prairie buffer and emergent plants; $500/year maintenance	1-10 Years
RIPARIAN AREA & LAKE BUFFER RESTORATION & MAINTENANCE (See Figure 60)											
Technical and Financial Assistance Needs: Technical assistance needed to implement riparian area & lake buffer restoration and maintenance is moderate at first because an environmental consultant is usually hired to complete a plan and implement the work. However, costs can be greatly reduced over time if municipal or park district staff complete some restoration and most of the long term maintenance in house. Private landowners will need the greatest assistance.											
TribN1: Tributary N Reach 1	W of Wolf Rd. to FPDCC property	2,960 linear feet	Private agricultural land	1,200-lf upstream section of stream reach with degraded buffer comprised of residential lawns and invasive woody species. Note: reach is in Tampier Lake TMDL subwatershed.	Restore a 50-foot wide (minimum) buffer along stream by removing invasive vegetation and planting native vegetation.	Filter Strip: TN=190 lbs/yr TP= 30 lbs/yr TSS= 9 tons/yr	High: Critical Area	Palos Park; Private Owners	IEPA: Ecological Contractor	$25,000 to restore riparian buffer; $2,000/yr maintenance	1-10 Years
OTHER MANAGEMENT MEASURES (See Figure 63)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement these projects varies depending on complexity.											
5	Roadside swales along Ramsgate & Old Creek Rd	4.0 acres	Palos Park/ Private Owners	Approximately 4 acres of roadside swales that are currently mowed turf grass. Note: swales are located in Tampier Lake TMDL subwatershed.	Create roadside bioswales by removing turf grass and planting native vegetation.	Wetland Det.: TSS = 77.5% TN = 20% TP = 44%	Low	Palos Park; Private Owners	Engineer; Ecological Consultant	$175,000 to design project and install native vegetation	10-20+ Years

PALOS TOWNSHIP

ID#	Location	Units (size/ length)	Owner (public or private)	Existing Condition	Management Measure Recommendation	Pollutant Reduction Efficiency	Priority	Responsible Entity	Sources of Technical Assistance	Cost Estimate	Implementation Schedule (Years)
WETLAND RESTORATION (See Figure 58)											
Technical and Financial Assistance Needs: Wetland restoration projects are typically complex and require high technical and financial assistance needs to protect land, design, construct, monitor, and maintain the restoration.											
8	SE of Wolf Rd. & Frances Ln.	9.5 acres	Private agricultural land	9.5 acres of drained wetlands on private agricultural land slated for future residential development. Site is located in Tampier Lake TMDL subwatershed.	Incorporate wetland restoration into future Conservation Development plans by using area as wetland detention & mitigation.	Wetland Det.: TN= 3 lbs/yr TP= 4 lbs/yr TSS= 4 tons/yr	High: Critical Area	Future Developer; Orland Twp/ Park	USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$142,500 to design/ permit/install/ maintain wetland	As new development occurs
9	NE of Wolf Rd. & 131st St.	9.3 acres	Private agricultural land	9.3 acres of drained wetlands on private agricultural land slated for future residential development. Site is located in Tampier Lake TMDL subwatershed.	Incorporate wetland restoration into future Conservation Development plans by using area as wetland detention & mitigation.	Wetland Det.: TN= 3 lbs/yr TP= 4 lbs/yr TSS= 4 tons/yr	High: Critical Area	Future Developer; Orland Twp/ Park	USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	$139,500 to design/ permit/install/ maintain wetland	As new development occurs
GREEN INFRASTRUCTURE PROTECTION AREAS (See Figure 61)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to protect open space or implement conservation/low impact development is high because of land, design/permitting, and construction costs.											
GI1	NE of Wolf Rd. & 131st St.	59 acres	Private agricultural land	59 acres on private agriculture parcels that are slated for future residential development. Note: parcels are located in Tampier Lake TMDL subwatershed.	Incorporate Conservation Design standards into future development plans.	Pollutant reduction cannot be assessed via modeling	High: Critical Area	Future Developer; Orland Twp/ Park	Cook County; USACE; NRCS/ SWCD; Illinois EPA; Ecological Consultant	The cost for implementing a Conservation Development cannot be determined	As new development occurs
AGRICULTURAL MANAGEMENT PRACTICES (See Figure 62)											
Technical and Financial Assistance Needs: Technical and financial assistance needed to implement farm management practices is relatively low because the NRCS provides much of this information and provides matching funds.											
AG1	NE of Wolf Rd. & 131st St.	48 acres	Private agricultural land	48 acres of agricultural land in row crop production. Note: land is located in Tampier Lake TMDL subwatershed.	Enroll in NRCS/SWCD Environmental Quality Incentive Program (EQIP) and implement conservation tillage (no till) with filter strips.	No Till w/Filters: TN= 223 lbs/yr TP= 114 lbs/yr TSS= 80 tons/yr	High: Critical Area	Existing Farmer	NRCS/SWCD	The cost for implementing conservation tillage depends on available equipment and crop type	Annually
AG3	Between 131st St. & Frances Ln.	2 acres	Private land	2-acre livestock area with approximately 12 sheep. Note: land is located in Tampier Lake TMDL subwatershed.	Implement manure management system to reduce nutrient and sediment runoff to Tampier Lake	Manure Manage: TN= 28 lbs/yr TP= 3 lbs/yr TSS= na	High: Critical Area	Existing Livestock Farmer	NRCS/SWCD	$1,000/yr	Annually

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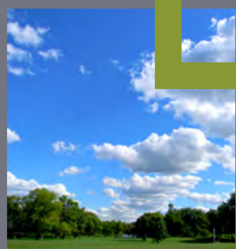
SECTION 7.0

7.0 INFORMATION & EDUCATION PLAN



The health of the Long Run Creek watershed faces challenges and threats from proposed land use changes, increasing nutrient loads, streambank erosion and channelization, a depleting groundwater supply, invasive species, poor land management practices and problematic flooding. At the root of these challenges and threats is that key audiences lack the necessary knowledge and tools to make informed decisions and adopt positive behaviors to mitigate such threats and challenges. Since a significant amount of Long Run Creek watershed is held as private property, any efforts to improve water quality or increase groundwater recharge must include significant education and outreach efforts to those landowners and key stakeholders.

This Information and Education (I & E) Plan is intended to spark interest in and provide stakeholders a better understanding of Long Run Creek watershed, and then promote and initiate the recommendations of the Long Run Creek Watershed-Based Plan. This I & E Plan will serve as an outline or agenda for outreach that will support accomplishment of the long-term goals and objectives of the Watershed-Based Plan.

Through this I & E Plan, the LRCWPC will:

"Improve education and inspire behavior changes to promote and preserve the health of Long Run Creek watershed"

Municipal staffs, elected officials and other key stakeholders will have tools at their disposal to establish watershed-based practices and engrain them into their respective activities and procedures. Developers will follow guidelines that consider watershed health; and residents in the Long Run Creek watershed will be actively involved in protecting and restoring Long Run Creek and its tributaries. They will become aware of the creek's location and needs and adopt specific behaviors to improve its health. Through these changes in behaviors, the threats and challenges in the watershed will decrease, water quality will improve and the overall health of the watershed will improve.

Thorough public information and stakeholder education efforts will ultimately inspire local residents and community members to adopt recommended behaviors. The cumulative actions of individuals and communities watershed-wide can accomplish the goals of the watershed plan. In a region dependent upon groundwater supply for water services, watershed health is of primary importance for the people of Long Run Creek watershed. When people begin to understand the issues related to water quality and natural resource protection, they begin to change their behaviors and activities, thereby improving the overall health of the watershed.

Information & Education Process

A successful I & E Plan will raise awareness of watershed issues and problems among key stakeholders and targeted audiences. However, LRCWPC cannot assume that audiences will actually adopt desired behaviors with education alone. As such, this I & E Plan incorporates standard behavior change theory (as presented by Doug Mckenzie-Mohr, http://www.cbsm.com) so that education efforts directly result in positive actions.

The Village of Lemont, on behalf of the Long Run Creek Watershed Plan Committee (LRCWPC), applied for and received a grant from the Hine's Emerald Dragonfly Habitat Conservation Plan Project Funding (administered by Hanson Material Service) to engage an environmental communications firm with experience writing and implementing education and outreach plans. This firm, Bluestem Communications (formerly Biodiversity Project), applied their experience and expertise to develop this I & E Plan in cooperation with Applied Ecological Services, Inc. (AES) by completing the following steps:

- Facilitated three interactive LRCWPC planning meetings; activities included surveys, collective brainstorming with the recommendations of the watershed plan always at the forefront;
- Developed education objectives and activities that reflect the months of collective brainstorming and planning with this group;
- Worked with the LRCWPC to confirm feasibility and effectiveness of the education objectives and activities.

Further, Bluestem Communications is leading the implementation of a selected demonstration action/campaign identified in this I & E Plan to test the effectiveness of the activity and jump start implementation of projects that address the goals of the Watershed-Based Plan. The LRCWPC selected the demonstration project from the prioritized activities in this I & E Plan. The pilot project will test "Who owns the Creek?" campaign activity listed under Objective 1: Build a sense of community around Long Run Creek and the watershed. For the pilot project, Bluestem Communications will create an attractive distributable flyer that will be mailed to targeted neighborhoods in Homer Township. A follow-up survey will be sent to the same addresses one month later to test the effectiveness of the flyer. The projected outcome of the flyer will be that residents can define the term watershed, know the physical boundaries of Long Run Creek watershed and understand the benefits/consequences of living so close to a creek. The pilot project will be implemented in spring 2014.

To develop the primary education objectives that will help improve the health of Long Run Creek watershed, Bluestem Communications and AES analyzed the list of challenges and threats identified and explained in Section 3 of this Watershed-Based Plan. For each existing threat, the following questions were asked:

- Who can affect this issue?
- What actions can people do to address it?
- What do people need to know before they can take action?

From the complete list of identified challenges and threats, we identified big-picture objectives that, if addressed, would likewise address all the specific threats. During a LRCWPC meeting, partners participated in a group effort to prioritize the long list of potential activities. They also took ownership of these activities so they could be seamlessly added to their internal organizational work plans. The list of activities has also been divided into three broad timeline categories: Phase I, Phase II, and Phase III. Some activities have also been designated as "Ongoing" or "Annual."

The full list of objectives and activities can be found in Table 45. This table includes the following components:

- Goals and objectives
- Target audiences to be reached
- Action or campaign
- Package (vehicle) for reaching audiences
- Priority/schedule
- Lead and supporting organizations
- Expected outcome/behavior change
- Estimated cost
- Indicators of success

A major component of the I & E Plan is educating key stakeholder groups about the completion of this watershed plan and its availability as a resource. By promoting the Watershed-Based Plan on the Partnership website (www.lowerdesplaines.org), at municipality and planning commission meetings, one-on-one with key stakeholders and to the general public, these important recommendations for the future health of Long Run Creek watershed will be accessible to all. To that end, professionally designed, printed and bound copies of the report will be shared with key watershed stakeholders. The Executive Summary will also be printed for distribution to as many stakeholders in the watershed as possible.

Target Audiences

Long Run Creek watershed straddles Will and Cook Counties and includes the municipalities of Homer Glen, Lemont, Orland Park, Lockport, and Palos Park. Townships include Homer Township, Orland Township, Palos Township, Lemont Township, and Lockport Township. The Forest Preserve District of Cook County and Illinois Department of Natural Resources also have large holdings within the watershed. The estimated population of the watershed in 2012 was over 42,000, with expected growth to over 62,000 by 2040. The watershed is heavily developed, or slated to be developed, with residential use. Much of the land immediately adjacent to Long Run Creek and its tributaries is in private ownership. To effect positive behavior changes, several audiences within the watershed must be reached, including:

- Municipal staff and elected officials;
- Developers;
- Students;
- Homeowners associations;
- Residents throughout the watershed; and
- Residents with property adjacent to the Long Run Creek or its tributaries.

Through research and activities with the LRCWPC, it was found that most community members in the watershed area feel a connection to their neighborhood or community association. The neighborhoods tend to be upper middle class and well taken care of, but Long Run Creek and its tributaries have been a confounding factor in many communities. Messages such as "this is your place" are likely to resonate with this audience. Further, if residents understand how the creek *enhances* their property, they will be willing to make changes.

Landscaping best management practices appear to be a major obstacle to a healthy creek; rooted in the practices of landscaping companies. Homeowners need to be educated on what is and is not proper landscaping related to protecting green infrastructure along creeks and relay this to their landscapers.

Many newer homeowners' associations in the area have conservation easements in place on their communal open space; as opposed to older subdivisions where residential lots back up to and/or include the creek. In the instances of new residential developments, it is important for the local municipality to require Development Impact Fees and/or Special Service Area Taxes that will fund the management of conservation easements in perpetuity. And, if possible, the local municipality should work with the developer to gain ownership of conservation easements so that the municipality can hire the appropriate ecological management company to manage the easements. In cases where the Homeowners Association (HOA) is in ownership of conservation easements, it is important to help HOAs understand how to maintain natural areas and provide them with a list of appropriate ecological contractors. Otherwise HOAs tend to hire formal landscaping companies who often do not know how to manage natural areas.

Decision-makers are an important audience as they control long-term actions that can impact all the other audiences. Members of the LRCWPC and homeowners can both be messengers to reach the decision-maker audience.

Education and Outreach Objectives

Implementation of this I & E Plan will achieve the following objectives:

- **Objective 1:** Build a sense of community around Long Run Creek and the watershed.
- **Objective 2:** Connect residents to decision-makers and experts with knowledge about water issues, such as pollution and problematic flooding, and their potential solutions.
- **Objective 3:** Educate watershed stakeholders on ways to improve water quality and reduce problematic flooding in Long Run Creek and its tributaries (such as improving detention basins and reducing erosion and channelization).
- **Objective 4:** Educate watershed

stakeholders on ways to preserve groundwater supply to serve future demands for water supply, and to benefit known endangered species in the watershed, such as the Hine's emerald dragonfly.

- **Objective 5:** Educate municipalities about ways to promote responsible development and best management practices in their communities.

The I & E Plan matrix (Table 45) outlines several activities or campaigns that can be implemented to achieve the objectives noted above. To help the LRCWPC implement such activities or campaigns, the following resources (Tables 43 and 44) have been compiled either as other successful campaign examples, or as inspiration for ways to implement the activities identified in the I & E Plan table.

Table 43. Activities/campaigns or tools to use to help make activities/campaigns successful.

Activity/Campaign Examples	Activity/Campaign Tools and Resources
"Don't feed the storm drain!"	Free storm drain stencil kits with directions. http://www.prairierivers.org/Projects/VolunteerOpportunities/eNewz/stencil.html
General Watershed Education	http://www.friendsofthefoxriver.org/media/docs/welcometoyourwatershed.pdf
Student and Citizen Monitoring	National Great Rivers Research and Education Center (http://www.ngrrec.org/): stream monitoring manual, kit supply lists, monitoring guidelines, identification keys, biotic index calculator, etc. Assistance with incorporating stream projects into school programs.
Native Plants	Lists of Illinois native species: www.wildflower.org/collections
Flooding	How to prepare for flooding and what you can do to prevent it http://www.ready.gov/floods
Green Infrastructure	Chicago Wilderness Green Infrastructure Vision and data: http://www.cmap.illinois.gov/green-infrastructure
	Sustainable Watershed Action Teams (SWAT): http://www.chicagowilderness.org/what-we-do/protecting-green-infrastructure/
River Cleanups	American Rivers: http://www.americanrivers.org/take-action/cleanup/
	Chicago Wilderness: http://www.chicagowilderness.org/who-we-are/corporate-council/day-of-service/

Table 44. Local events throughout the watershed at which plan activities could be implemented.

Municipality	Event Names	Month/Season
Homer Glen	Homer Harvest Days	May, June, September, October
	Homer Glen Land Day	
	Stargazing at Trantina Farm	
	Farmers Market – Saturdays	
	Homer Glen's Earth Day/Arbor Day	
	Homer Fest	
	Creek Clean Up Day	
Lemont	Environmental Advisory Commission Spring & Fall Recycling event	Spring & Fall
	Heritage Commission Trail Clean-up & Green-up	Spring & Fall
	Farmers Markets (Tuesdays, Sept. – Oct. 8am-1pm)	September
	Lemont Street Fair	
	Family Science Night	
	Nightmare on Lemont Street	October
	LEAC's Fall Recycling Event	
	Lemont Park District's Fall Fest	
	Halloween Hoedown	
	Fall Into Family Fun	November
	Lemont Park District's Shop Til You Drop	
	Hometown Holiday	December
	Lemont Park District's 5th Annual 5K	
	Lemont Park District's Breakfast with Santa	
	Lemont Park District's Family New Years Eve Day Bash	
Lockport	Farmers Markets (Mondays, Sept. – Oct.)	September
	Heritage Fest	
	Founders Club Pumpkin 5K	
	Park District Silver and Gold Fish Fry	
	Pumpkins in the Park at Dellwood Park	October
	Octoberfest	
	Fall Book Fair	
	District 91 Band Fall Concert	
	Extreme Adult Scavenger Hunt	
	Christmas in the Square	November
	Annual Christmas Tea	December
	Jingle Bell 5K Race	
	Brunch with Santa	
Orland Park	The Great Pumpkin Party	September
	Turkey Shoot	November
	Turkey Trot	
	Holiday Festival and Tree Lighting Ceremony	December
	Polar Express	
Palos Park	Fall Festival at the Farm	September
	Autumn in the Park Festival	
	Monster Mash	October
	Turkey Trot	November
	Village Tree Lighting	December

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Table 45. Information and Education Plan Matrix.

Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Objective 1: Build a sense of community around Long Run Creek and the watershed.						
Primary Activities						
Inform audiences that a watershed plan has been developed for Long Run Creek watershed; how it benefits the community; and how they can be involved	All residents, developers and municipal decision-makers	• PowerPoint slides for presentations at municipality meetings, planning commission meetings and town halls, etc. • User friendly Executive Summary of the full report for easy distribution • Final watershed plan and recommended actions called out on the Lower Des Plaines River Ecosystem Partnership website • Press release announcing completed plan distributed to press in all municipalities in the watershed	Immediately following plan completion Phase I	Lockport Homer Glen HTHD	The majority of the public in the watershed have excellent knowledge of the watershed conditions, what behaviors they can adopt to improve its health and who to contact to get involved and implement projects. The public also begins to alter every day activities leading to watershed improvement.	Printing: $15 per color copy ($3,000 for 200 copies)
PILOT PROJECT: *"Who owns the Creek?"* Campaign to educate residents about the benefits and consequences of living in a watershed and how their actions affect the long-term health of the Creek	All residents	• Long Run Creek watershed signage along roads to mark watershed boundaries; informational signage defining the watershed and its benefits in public places, like municipal buildings, community centers, libraries and parks • "This is your creek" map of the watershed showing water areas with recognizable landmarks so people can place their homes in the context of the watershed; explains what a watershed is and how they are tied to the creek. Also demonstrate where flooding is natural in the region. • "This is your Creek" fliers in water bills with map and information about the importance of keeping Long Run Creek healthy/using less water	Phase I	HTHD	Residents can define the term watershed, know the physical boundaries of Long Run Creek watershed and understand the benefits/ consequences of living so close to a creek. Residents form a community around the creek.	Signage: $2,000 (20 signs in black and white) Maps: $100 if created and printed by resident (no designed fee) Fliers: print and design $1,500
Survey residents to determine current knowledge about watershed, creek location, water quality, problematic flooding issues and attitude toward the creek and community	All residents	Short survey to be distributed in any or all of the following ways (could be created in SurveyMonkey): • paper copies at in-person events where Management Measure demonstrations are set up or educational materials are distributed; distribute at municipal halls • electronic copies sent via email to partners' email lists • electronic copies posted on municipality websites • shared via newsletters and social media	Phase II	Lockport Homer Glen HTHD	Participants are aware of the watershed location, issues facing Long Run Creek and the existence of a watershed plan. Baseline data is obtained about public attitudes and knowledge.	SurveyMonkey: $204/year or $17/ month Paper surveys: $150

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Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Additional Activities						
Develop a geocache hunt to introduce residents to the creek in their area	All residents	Using the website Geocaching.com, develop a GPS-based scavenger hunt that takes participants to key spots throughout the watershed. Stops could include: • replicable examples of rain gardens or rain barrels • places that have used native plants • spots where the creek is healthy • spots where the creek needs restoration At each stop, participants will find information about the watershed, best management practices or actions they can take	Phase III	Undecided	Residents can define the term watershed, know the physical boundaries of the Long Run Creek watershed and understand the benefits/consequences of living so close to a Creek. Residents understand how the Creek can look when it is restored and actions they can take to help restore it. Residents form a community around the Creek.	$700 for membership and supplies (caches, ziplocks bags, storage containers, log books)
Develop and implement a watershed monitoring program with local biology/ life science teachers and students in high schools in Homer Glen, Lemont, Lockport, Orland Park and Palos Park	Students	Partners point interested teachers to the Monitoring Plan section of the watershed plan to incorporate creek monitoring into existing lessons. Component could include: • monitoring manual • kit supply lists and/or actual kits • monitoring guidelines • identification keys • sample curricula Data shared with partners and groups like Illinois River Watch	Phase II	HTHD	By understanding how ecological restoration and habitat improvement benefits the watershed, students develop an invested interest in watershed protection.	Testing kits, curricula copies, monitoring guidelines and ID cards ($150/classroom)
Offer "Volunteer Days" related to stewardship activities in the watershed to the general public.	All residents, students	Offer "Volunteer Days" for people to remove invasive species from natural areas, survey wildlife, or clean up litter from streams. Volunteer days could be planned in conjunction with Chicago Wilderness' annual Day of Service (every fall) or with American Rivers National River Cleanup Day. Promote cleanups through: • press release • social media • flyers in public places • community groups	Phase II	HTHD	By interacting with the natural areas within the watershed, people develop an invested interest in watershed protection and understand what they can do to be part of the solution. People feel connected to their community.	$500 per event: tools, gloves, bags, advertising
"Don't feed the storm drain" Campaign to educate residents on what storm drains do, where the water goes, and how they should be treated/ maintained	All residents	• Storm drain stenciling program with local youth groups/ scouts/4H clubs who volunteer to mark storm drains in their community • Template newsletter articles municipalities and partners can publish online or in print form about the function of storm drains and how they relate to water quality	Phase III	Township & Municipality	Understanding how storm drains function and where the water goes will decrease the amount of waste materials and debris that enter the water system through the drains.	$600 for design and print of stenciling kit
Develop student project opportunities for high schools or college, boy scouts/girl scouts top service projects, etc.	Students	Offer ecological restoration and wildlife habitat project opportunities for students. Promote through: • press release • social media • flyers in public places • community groups	As requested by students or scout leaders or Phase III	Undecided	By understanding how ecological restoration and habitat improvement benefits the watershed, students develop an invested interest in watershed protection.	$500 per student

Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Objective 2: Connect residents to decision-makers and experts with knowledge about water issues, like pollution and problematic flooding, and potential solutions.						
Primary Activities						
Maintain the existing Long Run Creek watershed information sharing website and link to partner websites	All Stakeholders	Maintain existing Lower Des Plaines Ecosystem Partnership website to keep people informed about watershed issues and opportunities. Perform technical and content updates as necessary.	Ongoing Phase I	LDPEP	Website users have information related to the watershed including potential and ongoing projects, watershed problems & opportunities, unique features, funding opportunities, and a calendar of upcoming events. An electronic copy of the watershed plan is located on the website.	No Cost
Additional Activities						
Annual tour of watershed by elected officials, municipal staff and others who are interested in seeing restoration progress, success stories, green infrastructure development, protection areas, or failed projects	Elected officials, municipal staff, developers	Watershed experts lead a half day hour tour of sites around Long Run Creek watershed that demonstrate successes, potential problems or great opportunities. Provide an opportunity for elected officials, municipal staff and developers to interact and learn from local champions and green infrastructure experts.	Annual Phase II	LDPEP	By seeing first-hand how beautiful, effective and cost effective green infrastructure practices and smart development can be, more developers will use these practices and more elected officials and municipal staff will incorporate them into local ordinances. Development and permits decision-making will be better informed.	Bus rental: $180 Promotional Flier: $500 for print and design
Demonstrate Management Measures at public events.	All residents	Host tables or exhibit booths at existing public events like farmer's markets, community festivals and school fairs. Volunteers and/or municipal staff distribute watershed information (like the "This is your Creek" piece explained above) and demonstrate actions homeowners can take. Feature: • tips • how-to guides • resources • material lists • locations to get materials Implement demonstration projects, or highlight existing case studies within the watershed that promote the benefits of watershed protection and best management practices.	Phase II	Undecided	Residents understand the importance of maintaining a healthy Long Run Creek watershed, groundwater recharge and quality, can identify behaviors they can change to improve the watershed and begin to change everyday activities. Residents form a community around the creek.	Printed guide/material: $750 Event registration: $200/ event
Host potluck-style community meetings about the creek and watershed called "Come *grill* us about your Creek!" Residents will meet and greet with each other and decision-makers/water experts to talk informally about watershed issues like flooding, property erosion, runoff, native plants, etc.	All residents	Seasonal "grill us" events held at community centers, subdivision common spaces or public parks. Residents bring own items to grill and event sponsors provide ice cream for dessert. Community leaders, ecologists, forest preserve and park staff, etc. are on-hand to demonstrate Management Measures, and answer watershed questions. Event is promoted through: • press releases • website and social media posts • e-mails to list serves • flyers in public areas (community centers, libraries, etc.)	Phase III	Undecided	Potluck attendees build relationships with community leaders and watershed experts. Community leaders get direct feedback from residents on watershed problem areas and planning priorities. Residents understand the importance of maintaining a healthy Long Run Creek watershed, groundwater recharge and quality and begin to change everyday activities. Residents form a community around the creek.	Ice cream/event set up: $250 per event (cost of ice cream, serving supplies, spoons, bowls, table clothes – based on 75 attendees)

Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Objective 3: Educate watershed stakeholders on ways to improve water quality in Long Run Creek and its tributaries and reduce problematic flooding (like improving detention basins and reducing erosion and channelization).						
Primary Activities						

Educate the general public on the benefits of ecological/natural area restoration and management	All residents	• Offer outdoor workshops at existing ecological restoration sites to help the general public and homeowners understand how removing non-native species and replacing with native vegetation and streambank stabilization benefits the watershed.
		• Work with nurseries and home improvement stores to distribute educational information to encourage shoppers to buy native plants.
		• Also invite native plant nursery specialists and/ or representatives from *Conservation@Home* or the National Wildlife Federation-Backyard Wildlife Habitat Certification Program to help the general public identify and choose appropriate native plants and trees for use in home landscaping and where to purchase them.
		• Promote the *Conservation@Home* program and/or the National Wildlife Federation's *Certified Wildlife Habitat* program to homeowners at events (like those listed under Objective 2 above), at nurseries and home improvement stores and through promotional avenues like:
		  • newsletters
		  • municipal websites
		  • social media
		  • flyers shared at parks, community centers, etc.
		  • through HOAs and community groups
		• Homeowners who earn certification place plaques in yards, showcasing their commitment to their neighbors
			Once every five years
			
			Phase I
				LDPEP	The general public and homeowners become more aware of the use of native plants and their benefits in ecological restoration. When visiting a nursery, homeowners are able to identify native plants or go to nurseries or plant sales that specialize in native plants. Homeowners certify backyard restorations under *Conservation@Home* or the National Wildlife Federation-Backyard Wildlife Habitat Certification Program. Importantly, these certifications encourage neighbors to take similar actions.	Not Determined

Teach residents the difference between natural flooding and problematic flooding in a watershed	All residents	• Develop and distribute materials to identify areas where flooding will and should occur along the creek and tributaries in the watershed. • Use the "This is your Creek" map to show where flooding is natural so people can adjust expectations and take actions to reduce the problematic areas. • Suggest green infrastructure practices that can reduce the problematic flooding. • Conduct personalized site meetings with landowners to develop options to mitigate for flooding. FEMA offers flooding preparedness information at www.ready.gov/floods	As requested by landowners Phase I	Homer Glen	By understanding the difference between natural flooding and problematic flooding, residents can change behaviors to reduce problematic flooding and adjust their expectations during the rainy season. Homeowners in flood prone areas understand and keep an eye on future planning upstream to ensure flood problems do not increase.	Design and printing of informational materials: $500

Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Teach residents about the pollution coming from the local water treatment plants	All residents	• Develop and distribute materials to help residents understand that the two water treatment plants within the watershed are currently the biggest polluters in the watershed, producing more than 50% of the nitrogen and phosphorus problem. • Educational materials could also include a postcard or petition campaign to encourage upgrades to the plants. • Residents would sign the petition or postcard and send to either local elected officials or the water treatment plant operators/owners.	Phase I	Homer Glen	Residents understand where pollution comes from in their watershed. Local municipalities put pressure on the water treatment plants to upgrade their facilities or develop and enforce a nutrient loading ordinance to reduce the pollution.	Design and printing of postcard plus distribution: $2,000
Fertilizer campaign that encourages residents to use less fertilizer, use phosphorus-free fertilizer, and perform soil tests before fertilizing	All residents	Communicate to a wider variety of landowners the negative impacts of using fertilizer high in phosphorus through: • news media • press releases • website • updates • social media posts Organizations who implement this activity would promote soil testing available through NRCS and connect them with resources for landowners to determine if phosphorus is needed on lawns.	Publicize annually and soil testing as requested Phase I	Homer Glen NRCS	Residents fertilizer less often and only fertilize because a soil test indicated it was necessary. Those who do fertilize begin to use fertilizer with appropriate phosphorus content thereby reducing phosphorus loading into the creek, tributaries, and storm drains.	Soil testing kits, average cost of kits $15-$20 per kit; overall cost $2,500
Additional Activities						
"Your land just got smaller" campaign on stream bank erosion and how to properly prevent it	Residents with properties along the creek or tributaries; HOAs	Develop materials that explain how our collective actions can increase erosion along the creek and tributaries. Highlight how eroding stream banks impair water quality and shrink the size of our land. Spread campaign information: • at in-person events • on flyers posted at community centers, parks, etc. • in newsletter articles • on websites and social media • through HOA lists Encourage homeowners to plant native plants, install buffer areas and otherwise take action to reduce erosion.	Phase II	LRCWPC	Residents in Long Run Creek watershed proactively reduce erosion from their property by changing their landscaping methods along the creek and tributary banks.	$500 for flier print and design
Encourage communities to retrofit detention basins with native vegetation to improve water quality, habitat, and groundwater infiltration	HOAs, developers, municipal staff	Produce distributable information piece about the long-term benefits of improving basins and recommendations for moving forward, including: • sample naturalized detention plans • material list • possible costs and long-term savings • qualified contractors list, etc. Include explanation of why groundwater recharge is important for their water supplies and the health of local endangered species Hine's emerald dragonfly	Phase II	Homer Glen	HOAs and developers update their failing detention basins following recommendations outlined in the Long Run Creek Watershed-Based Plan, thus increasing groundwater recharge, wildlife habitat and water quality. Municipal staff have information needed to encourage retrofits in their communities.	$200 for information piece (if designed and printed by resident and no designer fee)

Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Implement a rain barrels campaign to encourage residents to install rain barrels in their yards	All residents	• Host "Make and Take" rain barrel events as either stand-alone workshops or in conjunction with the events listed in Objective 2 above. Participants would pay a nominal fee to build their own rain barrels and learn how to install them. This can be paired with rain barrel painting or kids events. • Provide easy instructions on how to use/install rain barrels • Promote the economic and environmental benefits of using rain barrels through avenues like newsletters, websites, social media, etc. • Partner with home improvement stores/nurseries to provide discounts on rain barrels through municipal programs	Phase III	Undecided	Residents install rain barrels and use the collected water to care for their yards, reducing water consumption and reducing runoff from impervious surfaces in neighborhoods.	Supplies for rain barrel painting: $175 Rain barrel kit supplies: $5,000 (will be made back from fees)
Adopt-An-Inlet Program	All residents, HOAs	Develop and distribute an instructional guide about the proper care and maintenance of inlets. Content could include: • what an inlet is • why it is important • how it works • how improperly maintained inlets can cause flooding, etc. Provide tips for residents on how to keep debris like leaves, grass clippings and branches from blocking inlets. Share with residents through: • events listed in Objective 2 above • websites • municipal mailings • mail to established HOAs • presentations at HOA meetings	Phase III	Undecided	Residents with detention basins that contain inlets in their yards and HOAs with inlets in their shared property prevent blocked inlets by implementing basic maintenance practices.	Design and printing of instructional guide: $500
Design and implement a campaign to keep lawn debris out of the creek	Residents with properties along the creek or tributaries; HOAs	• Produce a graphic chart of landscape rules in each municipality; distribute to HOAs and/or individual homeowners so they know what they should be doing; include facts about why debris should not go in the creek bed • Develop and distribute seasonal information on yard waste disposal methods (i.e. Spring: pruned branches and mulch; Summer: grass clippings; Fall: leaves); distribute via newsletters, website and social media posts, in-person events • Produce and distribute calendar stickers for homeowners to put on their calendars to mark lawn debris/leaf pickup days • Organize neighborhood creek clean-ups/creek restoration days for residents on their own or for HOAs; people volunteer along creek banks in their neighborhood • Develop an Adopt-a-Creek program for HOAs to care for their portion of creek with recommended actions, possible timelines for actions, etc.	Phase II	Homer Glen	Residents with properties along the creek or tributaries stop dumping yard waste like branches, mulch, leaves and grass clippings into the creek, thus reducing clogged waterways and nutrient levels in the water.	graphic chart design: $500 calendar stickers: print and design: $850 Clean up days: $500 per event (as listed above)

Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Encourage residents to talk to landscape companies about creek-friendly actions, like not putting debris in the creek, reducing fertilizer use and using native plants along the banks	Residents who hire landscapers	• Develop and distribute materials to educate residents about the importance of keeping debris out of the creek and tributaries and using native plants. Distribute through HOAs, newsletters, websites, and partnerships with community groups like garden clubs. • Remind residents that they have authority over how their landscapers dispose of yard waste on their property and what kinds of plants they use. Encourage residents to talk to their landscapers about these issues. • Provide sample landscape plans that include native plants that residents could replicate in their yards. Post sample plans on websites and share through social media and newsletters.	Phase II	Homer Glen	Residents take control over the impact their landscaping decisions have on the health of the watershed by directing their landscape companies to keep debris out of the creek and tributaries and to use less fertilizer. More homeowners incorporate native plants into their landscaping.	Design and printing of educational materials: $600 Sample landscaping plans print and design: $750
Objective 4: Educate watershed stakeholders on ways to preserve groundwater supply to serve future demands for water supply, and to benefit known endangered species in the watershed, such as the Hine's emerald dragonfly.						
Primary Activities						
Promote water infiltration practices (not just conveyance) in development and redevelopment projects among municipality permitting departments and developers	Developers, municipalities	• Develop educational information about proposed Class III groundwater restrictions and depleting groundwater supplies to explain the urgency for promoting stormwater infiltration. • Develop example language municipalities could adopt as ordinances, with examples of permitting language and lists of preferred practices. Municipalities would adopt ordinances and share preferred practices through permitting offices.	Phase I	Homer Glen	Municipalities adopt water infiltration practices as part of their development plans, permits and ordinances. Developers follow recommended practices in new and retrofitted developments. More stormwater is absorbed into the ground, increasing supplies, reducing problematic flooding and benefitting the HED	Educational materials (if printed) – print and design: $500
Install educational signage near existing Management Measures and intersections near the creek	All residents	• Design and install signs at key points along major roads in the watershed that inform drivers and passengers that they are "Entering Long Run Creek Watershed". The signs should also contain a website or contact person. • Additional signs highlight places where Management Measures and conservation development have made a difference for the watershed. Lockport Prairie has great sign examples that can be duplicated.	Phase I	HTHD	Thousands of drivers/passengers see Long Run Creek watershed signage when entering the watershed. This sparks enough interest for many individuals to search municipal sites where they will find links to the LDPEP website home page. The website will provide all relevant information about the watershed including an electronic copy of the plan and schedule of upcoming events.	$5,000 for five signs
Additional Activities						
Promote rain gardens as a beautiful way to increase ground water supplies, protect the endangered Hine's emerald dragonfly and attract native wildlife	All residents	• Host how-to workshops for residents, teaching about the value of rain gardens, dispelling myths and providing plant lists and plant kits and sample design plans. • Organize a rain garden tour a year after workshop to showcase participants' rain gardens and to trouble shoot. • Partner with nurseries to have rain garden-appropriate plant sales with sample design schematics for how the plants could be used and care instructions. Develop educational brochure/ educational kiosks at nurseries.	Phase II	LDPEP	Residents learn about the value of rain gardens and are able to decipher common rain garden myths from the truth. Residents plant rain gardens in their yards.	Supplies for workshops (including plants) $3,500 per event Print and design of brochures: $3,000 at 5 nurseries

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Education Action or Campaign	Target Audience	Package (vehicles and pathways for reaching audiences)	Priority/ Schedule	Lead and Supporting Organizations	Outcomes/Behavior Change	Estimated Cost
Public campaign to encourage less water use in shower, when watering the lawn and when brushing teeth	All residents	Develop and distribute information about wasteful water consumption with easy tips for reducing water use. Include information about dwindling groundwater supplies and about the Hine's emerald dragonfly. Information could be distributed through: • websites and social media • newsletters (electronic and printed) • flyers posted in public places • flyers distributed at events People could pledge to take shorter showers in-person at any of the events listed above in Objective 2. Educational materials could be distributed with shower timers to help people fulfill their pledge to take shorter showers.	Phase III	Undecided	Residents understand the link between their actions and groundwater supplies and the health of their community's endangered HED. People take shorter showers, use less water on their lawns and when brushing their teeth.	$400 for 350 custom shower timers from bulk sites $1,000 for Design and printing
Objective 5: Educate municipalities about ways to promote responsible development and best management practices in their communities						
Connect municipal staff and elected officials to resources about green infrastructure, need for responsible development, proposed Class III groundwater restrictions and depleting groundwater supplies	Municipalities	• Develop and distribute sample permitting language and lists of preferred practices • Share sample ordinance that municipalities could adopt • Share case studies of conservation developments • Attend planning commission meetings and give feedback • Present at planning, municipal and other decision-maker meetings • Share sample funding structures for how some communities have paid for infrastructure changes (i.e. Champaign, IL) • Share GIS data and maps from the Long Run Creek Planning process to aid municipalities in making planning decisions • Encourage partnership with green infrastructure groups and resources like the Chicago Wilderness Green Infrastructure Vision and Sustainable Watershed Action Teams (SWAT)	Phase I	Homer Glen HTHD	Municipalities adopt green infrastructure practices as part of their development plans, permits and ordinances. Developers follow recommended practices in new and retrofitted developments. More stormwater is infiltrated, water quality is improved, problematic flooding is reduced, and wildlife habitat is preserved	n/a

Abbreviation	Entity
LDPEP	Lower Des Plaines Ecosystem Partnership
HTHD	Homer Township Highway Department
NRCS	National Resources Conservation Service
LRCWPC	Long Run Creek Watershed Planning Committee

8.0 PLAN IMPLEMENTATION

8.1 PLAN IMPLEMENTATION ROLES & COORDINATION/ RESPONSIBILITIES

Identification of responsible entities for implementation of Management Measure recommendations was first mentioned in the Action Plan section of this report. These entities are key stakeholders that will be responsible in some way for sharing the responsibility required to implement the Watershed-Based Plan. However, no single stakeholder has the financial or technical resources to implement the plan alone. Rather, it will require working together and using the strengths of individual stakeholders to successfully implement this plan. Key stakeholders are listed in Table 46. Appendix E includes additional information about each stakeholder and possible roles.

There are several important first steps that the Long Run Creek Watershed Planning Committee (LRCWPC) partners will need to accomplish prior to plan implementation.

1. Watershed partners are encouraged to adopt and/or support (via a resolution) the Long Run Creek Watershed-Based Plan.
2. The partners will need to recruit “champions” within each municipality and other stakeholder groups to form a Watershed Implementation Committee that actively implements the Watershed-Based Plan and conducts progress evaluations.
3. The watershed partners may also need to hire and fund a Watershed Implementation Coordinator or find an employee internally to follow through on plan implementation.

Table 46. Key Long Run Creek watershed stakeholders/partners.

Key Watershed Stakeholder/Partner	Acronym/Abbreviation
City of Lockport	Lockport
Commonwealth Edison Company	ComEd
Enbridge, Inc.	Enbridge
Forest Preserve District of Cook County	FPDCC
Forest Preserve District of Will County	FPDWC
Lower Des Plaines Ecosystem Partnership	LDPEP
Golf Courses	GC
Hanson Material Service	HMS
Homer Township Highway Department	Homer Twp
Illinois, Cook County, and Will County Dept. of Transportation	DOTs
Illinois Department of Natural Resources	IDNR
Illinois Nature Preserves Commission	INPC
Illinois Environmental Protection Agency	Illinois EPA
Lemont Township & Highway Department	Lemont Twp
Long Run Creek Watershed Planning Committee	LRCWPC
US Fish & Wildlife Service	USFWS
Village of Homer Glen	Homer Glen
Village of Lemont	Lemont
Village of Orland Park	Orland Park
Village of Palos Park	Palos Park
Will County Planning & Zoning Commission	WCPZC
Will County Stormwater Management Planning Committee	WCSMPC
Will-South Cook Soil and Water Conservation District	SWCD

8.2 IMPLEMENTATION SCHEDULE

The Watershed Implementation Committee should try to meet at least quarterly each year to guide the implementation of the Long Run Creek Watershed-Based Plan. The development of an implementation schedule is important in the watershed planning process because it provides a timeline for when each recommended Management Measure should be implemented in relation to others. High Priority Critical Area projects, for example, are generally scheduled for implementation in the short term. A schedule also helps organize project implementation evenly over a given time period, allowing reasonable time availability for developing funding sources and opportunities.

For this plan, each "Site Specific Management Measure" recommendation located in the Management Measures Action Plan (see Section 6.0) contains a column with a recommended "Implementation Schedule" based on the short term (1-10 years) for High Priority Critical Areas and 10-20+ years for medium and low priority project recommendations. Other recommendations such as maintenance activities have ongoing or as needed schedules. Some projects that are high priority could be recommended for long term implementation based on selected practices, available funds, technical assistance needs, and time frame. In addition, the "Information & Education" plan (see Section 7.0) is designed to be completed over three phases spanning five years. Finally, the "Monitoring Plan" is designed to be conducted and evaluated every five years to determine if progress is being made toward achieving plan goals and objectives.

8.3 FUNDING SOURCES

Opportunities to secure funds for watershed improvement projects are widespread due to the variety and diversity of Management Measure recommendations found in the Action Plan. Public and private organizations that administer various conservation and environmental programs are often eager to form partnerships and leverage funds for land preservation, restoration, and environmental education. In this way, funds invested by partners in Long Run Creek watershed can be doubled or tripled, although actual dollar amounts are difficult to measure. A list of potential funding programs and opportunities is included in Appendix F. The list was developed by Applied Ecological Services, Inc. (AES) through involvement in other watershed and ecological studies.

Funds generally fall into two relatively distinct categories. The first includes existing grant programs, funded by a public agency or by other sources. These funds are granted following an application process. The IEPA Nonpoint Source Management Program (Section 319 Grants) is an example: an applicant will submit a grant application to the program, and, if the proposed project meets the required criteria and if the funds appropriated have not been exhausted, a grant may be awarded.

The second category, one that can provide greater leverage, might be called "money to be found." The key to this money is to recognize that any given project may have multiple benefits. It is important to note and explore all of the potential project benefits from the perspective of potential partners and to then engage those partners. Partners may wish to become involved because they believe the project will achieve their objectives, even if they have little interest in the specific objectives of the Watershed-Based Plan.

It is not uncommon for an exciting and innovative project to attract funds that can be allocated at the discretion of project partners. When representatives of interested organizations gather to talk about a proposed project, they are often willing to commit discretionary funds simply because the proposed project is attractive, is a priority, is a networking opportunity, or will help the agency achieve its mission. In this way, a new partnership is assembled.

Leveraging and Partnerships

It is critically important to recognize that no one program has been identified that will simply match the overall investment of the Long Run Creek watershed partners in implementing the Watershed-Based Plan. Rather, partnerships are most likely to be developed in the context of individual and specific land preservation, restoration, or education projects that are recommended in the Plan. Partners attracted to one acquisition may not have an interest in another located elsewhere for jurisdictional, programmatic, or fiscal reasons.

Almost any land or water quality improvement project ultimately requires the support of those who live nearby if it is to be successful over the long term. Local neighborhood associations, homeowner associations, and similar groups interested in protecting water resources, open space, preventing development, or protecting wildlife habitat and scenic vistas, make the best partners for specific projects. Those organizations ought to be contacted in the context of specific individual projects.

It is equally important to note that the development of partnerships that will leverage funding or goodwill can be, and typically is, a time-consuming process. In many cases, it takes more time and effort to develop partnerships that will leverage support for a project than it does to negotiate with the landowners for use or acquisition of the property. Each protection or restoration project will be different; each will raise different ecological, political and financial issues, and each will in all likelihood attract different partners. It is also likely that the process will not be fully replicable. That is, each jurisdiction or partner will have a different process and different requirements.

In short, a key task in leveraging additional funds is to assign responsibility to specific staff or for developing relationships with individual agencies and organizations, recognizing that the funding opportunities might not be readily apparent. With some exceptions, it will not be adequate simply to write a proposal or submit an application; more often, funding will follow a concerted effort to seek out and engage specific partners for specific projects, fitting those projects to the interests of the agencies and organizations. Successful partnerships are almost always the result of one or two enthusiastic individuals or "champions" who believe that engagement in this process is in the interests of their agency. There is an old adage in private fundraising: people give to other people, not to causes. The same thing is true with partnerships using public funds.

Partnerships are also possible, and probably necessary, that will leverage assets other than money. By entering into partnerships with some agencies, organizations, or even neighborhood groups, a stakeholder will leverage valuable goodwill, and relationships that have the potential to lead to funds and other support, including political support, from secondary sources.

9.0 MEASURING PLAN PROGRESS & SUCCESS

A monitoring plan and evaluation component is an essential step in the watershed planning process to evaluate plan implementation progress over time. This watershed plan includes two monitoring/ evaluation components:

1. The "Water Quality Monitoring Plan" includes methods and locations where monitoring should occur and a set of criteria (indicators & targets) used to determine whether impairment reduction targets and other watershed improvement objectives are being achieved over time.

2. "Report Cards" for each plan goal were developed that include interim, measurable milestones linked to evaluation criteria that can be evaluated by the planning committee over time.

9.1 WATER QUALITY MONITORING PLAN & EVALUATION CRITERIA

Background Information

Available water quality data collected within Long Run Creek watershed is summarized in Section 4.1. The most recent chemical water quality data for Long Run Creek was collected in 2012 by Applied Ecological Services, Inc. (AES) as part of this planning effort. Other recent data includes that collected by Integrated Lakes Management, Inc. (ILM) in 2007 and 2008. The Illinois EPA has not sampled Long Run Creek since 1997 but is actively monitoring water quality in Tampier Lake. As recently as

2012, Long Run Creek was not 303(d) listed and fully supports "*Aquatic Life*" Designated Use according to Illinois EPA. More recent data, however, suggest moderate impairment to Long Run Creek via elevated phosphorus, nitrogen, and total suspended solid levels. Tampier Lake appears on the Illinois EPA's 303(d) impaired waters list in 2012. Illinois EPA lists total suspended solids (TSS), phosphorus, aquatic plants, and aquatic algae as the causes of impairment to the "*Aesthetic Quality*" Designated Use of the lake. As a result, Illinois EPA completed a Total Maximum Daily Load (TMDL) study/report for Tampier Lake in March 2010.

The following monitoring plan recommendations should be implemented to measure changes in watershed impairments related primarily to water quality. Water quality monitoring is performed by first collecting physical, chemical, biological, and/or social indicator data. This data is then compared to criteria (indicators & targets) related to established water quality objectives.

The water quality monitoring plan is designed to; 1) capture snapshots of water quality within Long Run Creek, various tributaries to Long Run Creek, and Tampier Lake through time; 2) assess changes in water quality following implementation of Management Measures, and 3) assess the public's social behavior related to water quality issues. **It is important that all future monitoring be completed using protocol and methods used by the Illinois EPA for QAQC purposes.** Illinois EPA Quality Assurance Project Plans (QAPPs) and Standard Operating Procedures (SOPs) can be found at http://www.epa.state.il.us/water/water-quality/methodology/index.html.

Monitoring Plan Implementation

Procedures by which physical, chemical, and biological monitoring data should be collected in the watershed, recommended monitoring locations, monitoring entity, monitoring frequency, and expected costs are outlined in Table 47. Figure 64 includes the location of all existing and new recommended monitoring locations. Note: monitoring locations related to individual Management Measures are not described as this monitoring will come later when projects are implemented.

Physical and Chemical Monitoring Methods & Recommendations

Physical and chemical monitoring of water can be time consuming and expensive depending on the complexity of the monitoring program. Usually the budget and/or personnel available for monitoring limit the amount of data that can be collected. Therefore, the monitoring program should be developed to maximize the usable data given the available funding and personnel. Any monitoring program should be flexible and subject to change to collect additional information or use newer equipment or technology when available.

Streams and Seeps

Many different parameters can be included in physical monitoring of water quality in streams and seeps. Measurements of temperature, pH, conductivity, dissolved oxygen, and turbidity should be collected in the field for any monitoring done on Long Run Creek, tributaries, or seeps at Long Run Seep Nature Preserve using portable instruments. The measurements can then be recorded on data sheets in the field or the units can be taken back to the lab and the data downloaded.

Chemical parameters tested for in streams and seeps should generally include those outlined in Table 48. Unlike physical monitoring, chemical monitoring requires grab samples be collected and taken to certified labs for analysis. Future chemical monitoring in Long Run Creek, tributaries, and seeps should include 5-10 samples at each location measured during base flow and again after significant (1.5 inches) storm events then compared to target water quality values.

Table 47. Recommended water quality and biological monitoring programs/locations.

Waterbody/ Location	Monitoring Entity/Program	Monitoring Location (See Figure 64)	Monitoring Frequency	Parameters Tested	Cost to Implement
Existing Recommended Monitoring Programs					
Long Run Creek	Illinois EPA/ IDNR Facility Related Stream Survey Program	1 site off High Rd. (IEPA # GHE-01)	Every 5 years	Physical; Chemical; Biological	Not Applicable
Tampier Lake	Illinois EPA Ambient Lakes Monitoring Program	3 sites on Tampier Lake (IEPA # RGZO 1-3)	Every 5 Years	Physical; Chemical	Not Applicable
New Recommended Monitoring Programs					
Long Run Creek, Trib M, Trib F	Long Run Creek Watershed Planning Committee	5 sites: LRC & Trib M (High Rd.), Trib F (Maple Ave.), LRC (Cedar Rd. & Will-Cook Rd.)	Every five years	Chemical	$10,000 each 5-year cycle
Derby Meadows & Chickasaw Hills WWTPs	Illinois American-Waste Water Treatment Plants	2 Outfalls to Long Run Creek	One time per month	Chemical (Nitrogen & Phosphorus)	$6,000 per year
Long Run Creek	Illinois RiverWatch	3 sites: Long Run Creek (High Rd., Cedar Rd., & Will-Cook Rd.)	Every five years	(Macroinverts)	Not Applicable
Long Run Seep Nature Preserve	Private Consultant and/ or Illinois DNR	Seeps/springs at Long Run Seep Nature Preserve	Every five years minimum	Chemical; Discharge; Biological (HED)	$20,000 every 5-year cycle
Individual	Stakeholder in cooperation with Environmental Consultants	Varies: Specific to each measure	Pre and post project	Physical, Chemical, and Biological	$5,000 for each measure

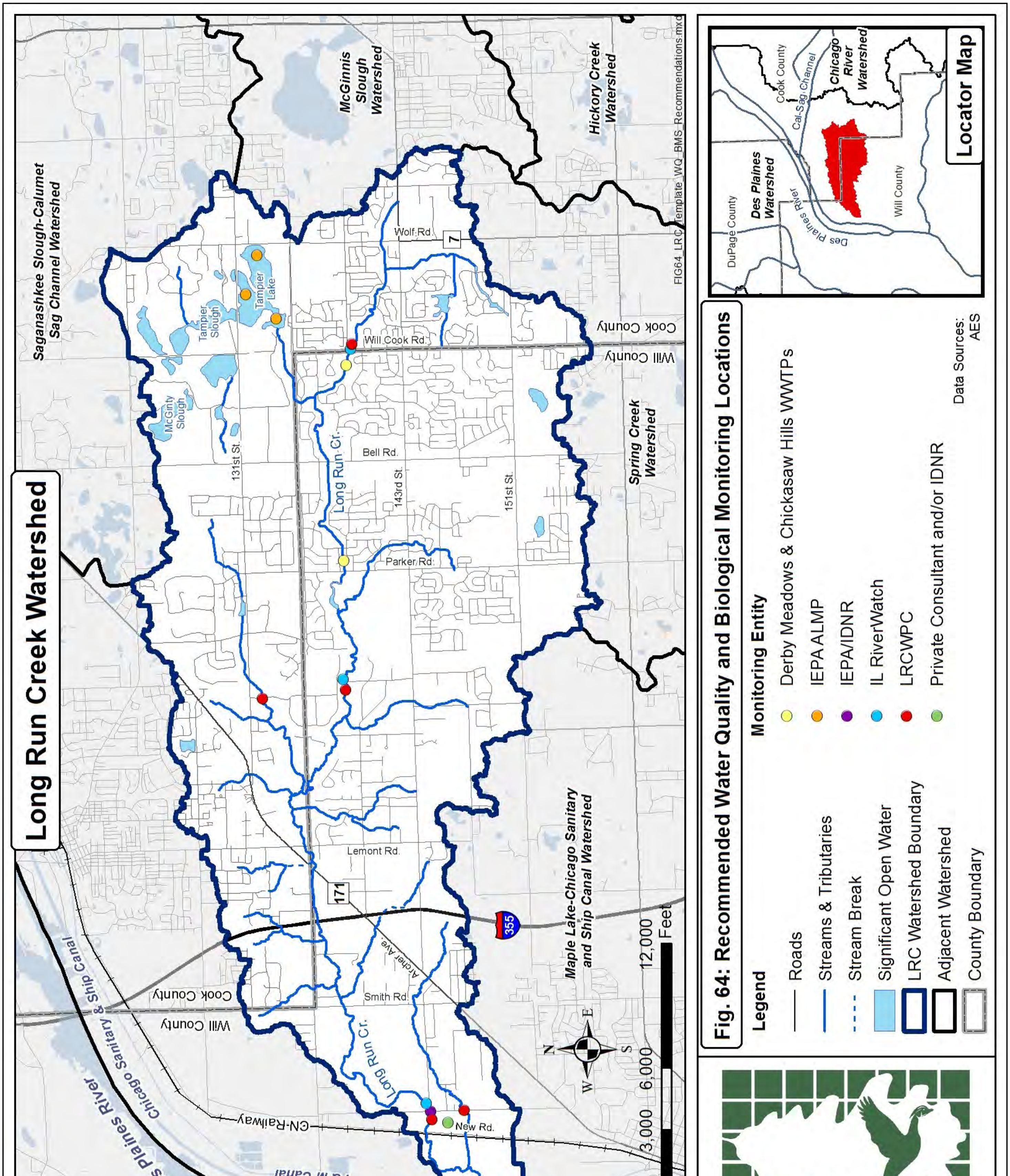

Fig. 64: Recommended Water Quality and Biological Monitoring Locations

Figure 64

It is also important to obtain discharge calculations when monitoring pollutant loading in streams. Fortunately, a USGS gage station is currently located on Long Run Creek at Lemont Rd. The gage station is able to measure the vertical height of the gage and stream flow throughout time. Flow can then be inferred from gage height readings. Real time data for the gage station at Lemont Road can be found at http://waterdata.usgs.gov/usa/nwis/rt and should be used to accurately time post storm event sampling by striving to collect samples as the water levels in Long Run Creek are rising but prior to cresting. Future monitoring of discharge from seeps at Long Run Seep Nature Preserve will be important to better understand the conditions needed by Hine's Emerald Dragon fly larval populations.

It is crucial to collect representative water samples using careful handling procedures. Unrepresentative samples or samples contaminated during collection or handling are often useless. The collected samples should be submitted for analysis to a laboratory certified by the National Environmental Laboratory Accreditation Conference (NELAC). Alternatively, money can be saved by having one of the Long Run Creek Watershed Planning Committee partners analyze samples using a municipal water treatment plant lab if it has the proper certification. Generally, the laboratory will work closely with the monitoring entity to assure that the samples are collected in the proper containers with preservatives for the parameter of interest. The laboratory usually provides the containers, ice chests for transport, labels, and chain-of-custody forms to the client as part of their service.

Table 48. Physical & chemical stream monitoring parameters, collection, and handling procedures.

Parameter	Statistical, Numerical, or General Use Guideline	Container	Volume	Preservative	Max. Hold Time
Physical Parameters Measured in Field					
pH	>6.5 or <9.0	These parameters are measured in the field			
Conductivity	<1,667 µmhos/cm				
Dissolved Oxygen	>5.0 mg/l				
Temperature	<90 F				
Turbidity	<14 NTU				
Chemical & Physical Parameters Analyzed in Lab					
Total Suspended Solids	<12 mg/l	Plastic	32 oz	Cool 4° C	7 days
Biochemical Oxygen Demand	<5.0 mg/l	Plastic	32 oz	Cool 4° C	48 hours
Nitrate-Nitrite Nitrogen	<15.0 mg/l	Plastic	4 oz	Cool 4° C 20% Sulfuric Acid	28 days
Total Kjeldahl Nitrogen*		Plastic	32 oz	Cool 4° C 20% Sulfuric Acid	28 days
Total Phosphorus	<0.0725 mg/l: Streams <0.05 mg/l: Lakes	Plastic	4 oz	Cool 4° C 20% Sulfuric Acid	28 days
Chloride	<500 mg/l	Plastic	32 oz	Cool 4° C	28 days

* TKN measures organic nitrogen and ammonia-nitrogen in the sample. TKN + nitrate-nitrogen equal total nitrogen of the sample.

Two new recommended chemical monitoring programs are recommended for Long Run Creek Watershed (Table 47). The first and most important monitoring effort should be implemented as a cooperative effort between the LRCWPC partners and occur every 5 years at five separate stream locations as shown on Figure 64. Monitoring at these key locations will yield data over time that will help indicate if pollutants in the watershed are being reduced to target levels, are staying the same, or increasing.

The second recommended chemical monitoring effort should be conducted by Illinois American Water Company at their Derby Meadows and Chickasaw Hills WWTPs. It has been determined via this watershed study that combined, these treatment plants contribute to over 65% of the total nitrogen loading and over 56% of the total phosphorus loading. However, the Illinois EPA does not require or regulate monitoring for total nitrogen and total phosphorus via the NPDES permits that are currently in place. By monitoring these two parameters once a month at effluent outfalls, Illinois American could better understand their contribution of pollutants in the watershed and leverage interest in plant upgrades and work with stakeholders to reduce pollutant loading.

Lakes

Most water quality samples related to pollutant loading are obtained from streams because the data provides estimates of pollutant loading following storm events. In lakes however, the water is usually slow to cycle through the system and different techniques are needed to assess water quality. In addition to collecting many of the parameters included in Table 48, biologists and limnologists often use "productivity" of a lake to assess its health. Productivity is measured via the Trophic State Index (TSI), an index that uses phosphorus and chlorophyll concentrations as the primary means to assess lake health. The state of Illinois set the standard for Total Phosphorus (TP) at 0.05 mg/l for lakes. When phosphorus levels exceed 0.05 mg/l, lake-wide algal blooms can occur leading to decreased water clarity, decreased light penetration, and increased total suspended solids.

The work required to collect physical and chemical data and develop TSI values for Tampier Lake is currently being done by Illinois EPA under the Ambient Lakes Monitoring Program (ALMP). This monitoring should continue in the future on a five year cycle and be used to determine if established TMDL limits are being met.

Biological Monitoring Methods and Recommendations

The Illinois EPA uses biological data for determining "Aquatic Life" Use Attainment in streams because fish and macroinvertebrates are relatively easy to sample/identify and reflect specific and predictable responses to human induced changes to the landscape, stream habitat, and water quality.

Two indices have been developed that measure water quality using fish and macroinvertebrates - fish Index of Biotic Integrity (fIBI) and Macroinvertebrate Biotic Index (MBI). These indices are best applied prior to a project such as a stream restoration to obtain baseline data and again following restoration to measure the success of the project. Or, they can be conducted simply to assess resource quality in a stream or tributary reach.

It is also important to note that monitoring recommendations in Table 47 include monitoring Hine's Emerald Dragonfly (HED) populations at Long Run Seep Nature Preserve at least every 5 years to understand larval populations in particular but also, in combination with chemical and discharge monitoring, to gain a better idea of the requirements needed to sustain the HED population. Population augmentation via captive-rearing should also be explored as recommended by USFWS.

Fish Index of Biotic Integrity (fIBI)

The fIBI is designed to assess water quality and biological health directly through several attributes of fish communities in streams. After the fish have been collected using electrofishing equipment and identified, the data is used to evaluate 12 metrics and a rating is assigned to each metric based on whether it deviates strongly from, somewhat from, or closely approximates the expected values found in a high quality reference stream reach. The sum of these ratings gives a total IBI score for the site. The best possible IBI score is 60. The Illinois EPA has determined that a score less than 41 indicates a stream is not fully supporting for "Aquatic Life" (Table 49). A manual for calculating IBI scores for streams in Illinois is available from Illinois DNR.

The only ongoing analysis of fIBI values is included as part of the Illinois EPA/ Illinois DNR Facility Related Stream Survey Program that was last implemented in 1997 but that should occur every five years in the watershed. No additional ongoing fIBI

Biologists collecting fish in stream. Source: www.state.nj.us.

monitoring recommendations are made due to high costs. Where possible however, fish sampling and calculation of fIBI values should be built into future stream restoration projects.

Macroinvertebrate Biotic Index (MBI)

The MBI is designed to rate water quality using aquatic macroinvertebrate taxa tolerance to degree and extent of organic pollution in streams. The MBI is calculated by taking an average of tolerance ratings weighted by the number of individuals in the sample. The Illinois EPA has determined that an MBI score greater than 5.9 indicates a stream is not fully supporting "Aquatic Life" (Table 49). A manual for collecting and calculating MBI scores for streams is available from Illinois EPA. Two new recommended chemical monitoring programs are recommended for Long Run Creek Watershed (Table 47).

Under the Illinois RiverWatch program, macroinvertebrates at two sites on Long Run Creek (Cedar Rd. & Lemont Rd.) were analyzed between 1998 and 2001. It is recommended that future monitoring by RiverWatch occur at three different sites every five years in order to capture data that better reflects the impact of pollutants originating from WWTPs (Table 47; Figure 64).

Table 49. Illinois EPA indicators of aquatic life impairment using MBI and fIBI scores.

Biological Indicator	MBI and fIBI Scores		
MBI	> 8.9	5.9 < MBI < 8.9	≤ 5.9
fIBI	≤ 20	20 < IBI< 41	≥ 41
Impairment Status - Use Support - Resource Quality			
Impairment Status	Severe Impairment	Moderate Impairment	No Impairment
Designated Use Support	Not Supporting	Not Supporting	Fully Supporting
Resource Quality	Poor	Fair	Good

Source: Integrated Water Quality Report (2010).

Habitat Monitoring Methods and Recommendations

Stream habitat assessments comprise a major component of physical water quality monitoring. Many habitat assessment methods are available for assessing streams such as those developed by Illinois DNR and Ohio EPA. The Qualitative Habitat Evaluation Index (QHEI) developed by the Ohio EPA is a quick, accurate, and straightforward analysis with dependable and repeatable results found to correlate well with biological integrity of streams in the Midwest. The QHEI is also used by the Illinois EPA to assess "*Aquatic Life*" Use Attainment in streams. It is composed of six criteria that are scored individually then summed to provide the total QHEI score. The best possible score is 100. QHEI scores from hundreds of stream segments indicate that habitat values greater than 60 generally support average quality warm-water fauna. Scores greater than 80 typify pristine habitat conditions that have the ability to support exceptional warm-water fauna (Ohio EPA 1999). Areas with habitat scores lower than 60 may support warm-water fauna but usually exhibit significant degradation. Table 50 summarizes QHEI score classifications. Stream restoration projects should strive to create conditions that produce QHEI scores of at least 60.

The index should be used on any stream reach and on stream restoration projects to document improvements. Prior to stream restoration, a QHEI evaluation should be completed by the project ecologist or engineer. A follow-up QHEI for comparison purposes should be conducted by the same ecologist/engineer at least 2-4 years following project implementation after plant material grows and in-stream structures have had time to perform. QHEI forms and a narrative explaining how to use the index can be located on the web at http://rock.geo.csuohio.edu/norp/qhei.htm.

Social Indicators of Water Quality

Quantifying social indicators of success in a watershed planning initiative is difficult. It is subjective to a large degree and complaints about poor conditions are often heard rather than compliments on improvements. The Great Lakes Regional Water Program (GLRWP), a leading organization that addresses water quality research, education, and outreach in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, defines social indicators as standards of comparison that describe the context, capacity, skills, knowledge, values, beliefs, and behaviors of individuals, households, organizations, and communities at various geographic scales. The GLRWP suggests that social indicators used in water quality management plans and outreach efforts are effective for several reasons including:

- Help watershed committee evaluate projects related to education and outreach;
- Help support improvement of water quality projects by identifying why certain groups install Management Measures while other groups do not;
- Measure changes that take place within grant and project timelines;
- Help watershed committee with information on policy, demographics, and other social factors that may impact water quality;
- Measure outcomes of water quality programs not currently examined.

GLRWP has developed a Social Indicators Data Management and Analysis Tool (SIDMA) to assist watershed stakeholders with consistent measures of social change by organizing, analyzing, and visualizing social indicators related to non-point source (NPS) management efforts. Detailed information about GLRWP's social indicator tool can be found at: http://35.8.121.111/si/Home.aspx.

Table 50. QHEI score classes and characteristics.

QHEI	Class	Usual Characteristics
80-100	Excellent	Comparable to pristine conditions; exceptional assemblage of habitat types; sufficient riparian zone
60-79	Good	Impacts to riparian zone
30-59	Fair	Impacts to riparian zone; channelization; most in-stream habitat gone
0-29	Poor	All aspects of habitat in degraded state

Figure 65. Steps to measure social indicators.

To summarize, the SIDMA tool uses a seven step process to measure social indicators as shown in Figure 65.

Several potential social indicators could be evaluated by the LRCWPC using different strategies to assess changes in water quality. For example, surveys, public meetings, and establishment of interest groups can give an indication of the public feelings about the water quality in the watershed. It is important to involve the public in the water quality improvement process at an early stage through public meetings delineating the plans for improvement and how it is going to be monitored. Table 51 includes a list of potential social indicators and measures that can be used by the watershed committee to evaluate the social changes related to water quality issues.

Table 51. Social indicators and measures to understand behavior toward watershed issues.

Social Indicator	Measure
Media Coverage	• # of radio broadcasts related to watershed protection • # of newspaper articles related to watershed protection • # of press releases relate to watershed protection • # of social media posts related to watershed protection
Resident Awareness	• # of residents who are aware a watershed plan exists • % of residents who know where water from their property drains • # of residents who attend municipal meetings • # of residents participating in Geocaching within the watershed • # of residents attending "Volunteer Days" and workshops • # of HOAs that manage natural areas appropriately • # of informational flyers distributed per given time period
Watershed Management Activities	• # of watershed signage along roads • # of schools helping implement the watershed monitoring plan • # of residents that perform ecological restoration on their properties • # of stream miles cleaned up per year • # of Green Infrastructure Parcels protected during development • # of linear feet or miles of trails created or maintained each year • # of watershed partners who adopt the watershed management plan

Monitoring social indicators in the watershed will be the responsibility of the LRCWPC. On-line internet surveys are among the most popular method to gauge social behavior. A survey should be developed that identifies residents' perceptions of water quality problems and protection strategies. Citizens that respond to the survey should be given a chance to donate a small amount of money ($1 for example) to a non-profit environmental group. Then thank you letters should be sent to those that responded, while those that did not respond should be sent a second survey. The results of the survey can be used to develop appropriate media, citizen awareness, and watershed management activities to improve social behavior.

Water Quality Evaluation Criteria

Water quality criteria (expressed as measurable indicators & targets) have been developed so that water quality objectives can be evaluated over time. The criteria are designed to be compared against data gathered from the Monitoring Plan and other data then analyzed to determine the success of the watershed plan in terms of protecting and improving water quality. These criteria also support an adaptive management approach by providing ways to reevaluate the implementation process if adequate progress is not being made toward achieving water quality objectives.

Section 2 of this plan includes a water quality goal (Goal 3) with eleven objectives. Criteria are selected for each water quality objective to determine whether components of the water quality goal are being met (Table 52). Criteria are based on Illinois EPA water quality criteria, data analysis, reference conditions, literature values, and/or expert examination. Criteria are also designed to address potential or known sources of water quality impairment identified in Section 5. Future evaluation of the criteria will allow the LRCWPC to gage plan implementation success or determine if there is a need for adaptive management. Note: evaluation criteria are included for the water quality goal only; criteria for other plan goals are examined within the appropriate progress evaluation "Report Cards" in Subsection 9.2.

Table 52. Set of criteria related to the water quality goal and objectives.

GOAL 3: Improve Surface Water Quality to Meet Applicable Standards.	
Water Quality Objective	**Criteria: Indicators and Targets**
1) Incorporate nutrient removal technologies into future upgrades for Derby Meadows & Chickasaw Hills WWTPs that reduce effluent TP to <1.0 mg/l and total nitrogen to <5.5 mg/l.	• *Chemical Water Quality Standards:* <1.0 mg/l TP and <5.5 mg/l TN in effluent based on average of monthly water quality samples.
2) Stabilize 26,789 linear feet of highly eroded streambank located along six "High Priority-Critical Area" stream reaches.	• *Number of Restored Streambank Reaches:* All six "High Priority-Critical Area" stream reach restoration projects implemented. • *Chemical & Physical Water Quality Standards:* <19 mg/l TSS, <0.0725 mg/l TP, and <2.461 mg/l TN in stream water quality samples. • *Biotic Indexes:* Macroinvertebrate and fish communities achieve at least "Fair" resource quality based on MBI & fIBI scores respectively. • *Social Indicator:* >50% of surveyed residents know that streambank erosion is a problem in the watershed and support streambank stabilization efforts.
3) Restore 14,966 linear feet of buffer along four "High Priority-Critical Area" riparian areas.	• *Number of Riparian Restorations:* All four "High Priority-Critical Area" riparian areas are restored. • *Chemical & Physical Water Quality Standards:* <19 mg/l TSS, <0.0725 mg/l TP, and <2.461 mg/l TN in stream water quality samples. • *Social Indicator:* >50% of surveyed residents know importance of restoring riparian areas.
4) Install a vegetated buffer along 9,650 linear feet of Tampier Lake shoreline at "High Priority-Critical Area."	• *Linear Feet of Lake Buffer Restoration:* At least 75% (7,237 lf) of buffer restored. • *Chemical & Physical Water Quality Standards:* <0.05 mg/l TP in lake water quality samples. • *Trophic State Index:* Trophic State does not exceed "Eutrophic" in Tampier Lake. • *Social Indicator:* >50% of surveyed lake users recognize the importance of having a natural buffer around the lake.
5) Restore 355 acres of wetland at thirteen "High Priority-Critical Area" wetland restoration sites.	• *Number of Wetland Restorations:* At least 6 of 13 "High-Priority-Critical Area" wetland restoration projects are implemented. • *Social Indicator:* >50% of surveyed residents know the importance of wetlands and support wetland restoration projects.
6) Retrofit 21 "High Priority-Critical Area" detention basins.	• *# of Detention Basin Retrofits:* >75% (16 of 21) "High Priority-Critical Area" detention basins are retrofitted. • *Social Indicator:* >50% of surveyed stakeholders understand the water quality and habitat benefits created by retrofitting detention basins with native vegetation.
7) Implement conservation tillage (no till) farming practices on 13 sites (1,282 acres) identified as "High Priority-Critical Area" cropland.	• *# of Sites in No Till:* Greater than 641 acres (>50%) of "High Priority-Critical Area" cropland in no till. • *Social Indicator:* >75% of farmers know the importance of no till farming for reducing pollutants to Long Run Creek.
8) Implement manure reduction practices on two sites (24 acres) identified as "High Priority-Critical Area" livestock operations.	• *# of Sites under Manure Management:* Two sites identified as "High Priority-Critical Area" livestock operations follow manure management plans. • *Social Indicator:* 100% of farmers know the importance of manure management for reducing pollutants to Long Run Creek.
9) Decrease the use of phosphorus in agricultural, commercial, and residential fertilizing based on soil testing and Illinois Phosphorus Law.	• *Chemical Water Quality Standards:* <0.0751 mg/l TP in streams and <0.05 mg/l TP in Tampier Lake based on water quality samples. • *Social Indicator:* >25% of surveyed residents, farmers, and businesses know the current phosphorus level of their lawns and apply phosphorus based on these levels.
10) Identify all septic systems in violation of county ordinance requirements and implement maintenance or adequate sizing.	• *% of Septic Violations Addressed:* >50% of septic system violations are addressed per year. • *Social Indicator:* >75% of surveyed residents and businesses understand the importance of maintaining septic systems for improved water quality.
11) All municipalities in the watershed implement a minimum bi-weekly street sweeping program.	• *# of Municipalities with Programs:* >75% of municipalities implement at least bi-weekly street sweeping program. • *Social Indicator:* >75% of surveyed residents understand why tax dollars are spent on street sweeping to improve water quality.

9.2 GOAL MILESTONES/ IMPLEMENTATION & PROGRESS EVALUATION "REPORT CARDS"

Milestones are essential when determining if Management Measures are being implemented and how effective they are at achieving plan goals over given time periods. Tracking milestones allows for adaptive management whereby periodic plan updates and changes can be made if milestones are not being met.

Watersheds are complex systems with varying degrees of interaction and interconnection between physical, chemical, biological, hydrological, habitat, and social characteristics. Criteria that reflect these characteristics may be used as a measure of watershed health. Goals and objectives in the watershed plan determine which criteria should be monitored to evaluate the success of the watershed plan.

A successful watershed plan involves volunteer stakeholder participation to get projects completed, and must include a feedback mechanism to measure progress toward meeting goals. Watershed "Report Cards," developed specifically for each goal in this plan, provide this information. Each Report Card provides:

1. Summaries of current conditions for each goal to set the stage for what efforts are needed
2. Most important performance criteria related to goal objectives (see Section 2.0)
3. Milestones for various time frames (short term milestones were developed by LRCWPC)
4. Monitoring needs and efforts required to evaluate milestones
5. Remedial actions to take if milestones are not met
6. Notes section

Report Cards were developed for each of the six plan goals and are located at the end of this section. The milestones are based on "Short Term" (1-10 years; 2014-2024), "Medium Term" (10-20 years; 2024-2034), and "Long Term" (20+ years; 2034+) objectives. Grades for each milestone term should be calculated using the following scale: 80%-100% of milestones met = A; 60%-79% of milestones met = B; 40%-59% of milestones met = C; and < 40% of milestones met = failed.

Report Cards should be used to identify and track plan implementation to ensure that progress is being made towards achieving the plan goals and to make corrections as necessary. Lack of progress could be demonstrated in factors such as monitoring that shows no improvement, new environmental problems, lack of technical assistance, or lack of funds. In these cases the Report Card user should explain why other factors resulted in milestones not being met in the notes section of the Report Card.

Early on in the plan implementation process, the Long Run Creek Watershed Planning Committee (LRCWPC) should assign or hire a Watershed Implementation Coordinator to update the committee on plan implementation progress by way of the Report Cards. If needed, adaptive management should be implemented accordingly by referencing the adaptive management recommendations on each Report Card then developing a strategy to either change the milestone(s) or decide how to implement projects or actions to achieve the milestone(s).

Report Cards can be evaluated at any time. However, it is recommended that they be evaluated every five years to determine if sufficient progress is being made toward achieving milestones or if adaptive management is needed.

Goal 1 Report Card

Manage natural and cultural components of the identified Green Infrastructure Network.

Historic and Current Condition:

- The historic landscape was a mix of prairie, savanna, and marsh prior to European settlement in the 1830s.
- In 2012, residential areas were most common (7,231 acres; 44.4%) followed by agricultural (2,011 acres; 12%).
- The largest change of a land use/land cover is predicted to occur on agricultural land (-1,581 acres; -78%) in the next 30 years.
- A parcel level inventory found that open space comprises over 9,100 acres or nearly 54% of the watershed.
- 17 Important Natural Areas are found in the watershed; John J. Duffy Preserve is the largest at 1,614 acres.
- Future development patters will likely continue to degrade watershed conditions if Green Infrastructure is not protected.

Criteria/Targets to Meet Goal Objectives:

- All 5 municipalities incorporate Green Infrastructure Plan into Comprehensive Plans and development review maps.
- 100% of developments on "Critical Green Infrastructure Protection Areas" use Conservation/Low Impact Design.
- All 5 publically owned Important Natural Areas have/implement management plans.
- At least 5 of 7 golf courses within the Green Infrastructure Network incorporate natural landscaping.
- 3.0 miles of new trails are created that extend and connect within the Green Infrastructure Network.
- >50% of land owners along Long Run Creek and tribs take steps to manage land for green infrastructure benefits.

Goal/Objective Milestones:		**Grade**
1-10 Yrs: (Short)	1) Green Infrastructure Network is incorporated into 4 of 5 municipal Comp Plans & development reviews. 2) >50% of developments on "Critical Green Infrastructure Protection Areas" follow plan recommendations. 3) Management plans developed/implemented at John J. Duffy Preserve & Long Run Seep Nature Preserve. 4) 5 of 7 golf courses incorporates natural landscaping. 5) 1.0 mile of new trails is created. 6) Surveys show >30% of residents along LRC & tribs understand how their actions affect the watershed.	
10-20 Yrs: (Medium)	1) 75% of developments on "Critical Green Infrastructure Protection Areas" follow plan recommendations. 2) Management plans are developed/implemented at Homer Glen Marsh, Arbor Lake Park, and LRC Park. 3) 1.0 mile of new trails is created 4) Surveys show that >40% of residents along LRC & tribs begin to manage land for green infrastructure.	
20+ Yrs (Long)	1) 100% of developments on "Critical Green Infrastructure Protection Area" follow plan recommendations. 2) 1.0 mile of new trails is created. 3) Surveys show that >50% of residents along LRC & tribs begin to manage land for green infrastructure.	

Monitoring Needs/Efforts:

- Track number of communities that incorporate Green Infrastructure Network into Comp Plans and development reviews.
- Track developments on "Critical Green Infrastructure Protection Areas" that incorporate Conservation/Low Impact Design.
- Track number of management plans that are created & implemented on public natural areas.
- Track number and type of natural landscaping incorporated at golf courses.
- Track miles of new trails created in the watershed.
- Conduct surveys of residents along LRC & tributaries asking about their understanding of watershed issues practices used.

Remedial Actions:

- Meet with municipalities that do not include the Green Infrastructure Network in Comp Plans and development reviews.
- Investigate via FOIA reasons/decisions that were made for developments that did not incorporate GI recommendations.
- Determine limits of funding where management plans are not developed/implemented on public natural areas.
- Meet with golf course representatives to discuss possible low cost natural landscaping options.
- Meet with Com Ed and other owners of large open spaces to discuss possible trails.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 2 Report Card

Improve groundwater recharge to benefit public water supply and federally designated Hine's Emerald Dragonfly critical habitat.

Current Conditions:

- Aquifers found beneath Long Run Creek watershed consists of the deep Ancell Unit, Ironton-Galesville Unit, and Mt. Simon Unit. Shallow groundwater is found in the Quaternary Unit. Deep and Shallow aquifers are tapped for public use.
- There are currently seven active community groundwater wells in the watershed.
- ISWS studies suggest 800-1,500 foot drawdowns in deep aquifers by 2050.
- Endangered Hine's Emerald Dragonfly habitat in seeps at Long Run Seep Nature Preserve is threatened by contaminated groundwater and hydrology changes.
- In 2012, Illinois Nature Preserves Commission (INPC) petitioned Illinois EPA to designate the Groundwater Contribution Area to Long Run Seep Nature Preserve as a Class III Special Resource Groundwater Classification.
- "Traditional" development over the past 20 years generally did not incorporate groundwater infiltration practices.

Criteria/Targets to Meet Goal Objectives:

- 100% of HED mitigation dollars go towards projects that support Hine's Emerald Dragonfly critical habitat.
- 100% of developments located within the proposed Class III GCA incorporate stormwater infiltration practices.
- All municipalities adopt/support policy requiring developments to use infiltration within the proposed Class III GCA.
- A monitoring plan for Hine's Emerald Dragonfly is implemented at least every 5 years.
- 100% of new groundwater wells are modeled to predict impacts to Hine's Emerald Dragonfly critical habitat.

Goal/Objective Milestones:		**Grade**
1-10 Yrs: (Short)	1) 100% of HED mitigation dollars go toward improving HED critical habitat. 2) >75% of developments within the proposed Class III GCA incorporate stormwater infiltration practices. 3) All municipalities adopt policy requiring developments in Class III GCA to include stormwater infiltration 4) A monitoring plan for Hine's Emerald Dragonfly is implemented. 5) All new groundwater wells are modeled to determine impacts to Hine's Emerald Dragonfly critical habitat.	
10-20 Yrs: (Medium)	1) 100% of HED mitigation dollars go toward improving HED critical habitat. 2) 100% of developments within the proposed Class III GCA incorporate stormwater infiltration practices. 3) A monitoring plan for Hine's Emerald Dragonfly is implemented. 4) All new groundwater wells are modeled to determine impacts to Hine's Emerald Dragonfly critical habitat	
20+ Yrs: (Long)	1) 100% of HED mitigation dollars go toward improving HED critical habitat. 2) 100% of developments within the proposed Class III GCA incorporate stormwater infiltration practices. 3) A monitoring plan for Hine's Emerald Dragonfly is implemented. 4) All new groundwater wells are modeled to determine impacts to Hine's Emerald Dragonfly critical habitat.	

Monitoring Needs/Efforts:

- Track any impacts to HED critical habitat and where mitigation dollars are appropriated.
- Track development that uses stormwater infiltration when located within the proposed Class III GCA.
- Track number of municipalities that adopt policy requiring developments Class III GCA to include stormwater infiltration.
- Track monitoring efforts for Hine's Emerald Dragonfly.

Remedial Actions:

- Conduct FOIA requests to determine where HED impact mitigation dollars where appropriated and why.
- Conduct FOIA requests when developments in the Class III GCA do not incorporate stormwater infiltration practices.
- Meet with municipalities to review policy changes related to developments in Class III GCA.
- Determine limits of funding when an HED monitoring plan is not implemented.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 3 Report Card

Improve surface water quality to meet applicable standards.

Current Conditions:

- According to Illinois EPA (2012 Integrated Report), Long Run Creek is “Fully Supporting” for *Aquatic Life*. However, recent data suggests moderate impairment via high total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS).
- The majority of pollutants are originating from two WWTP’s (TP & TN) and streambank erosion (TSS).
- Biological data suggests that Long Run Creek is moderately impaired but is still a “Fair” quality aquatic resource.
- According to Illinois EPA (2012 Integrated Report), Tampier Lake is “Fully Supporting” for *Aquatic Life* but “Not Supporting” for *Aesthetic Quality* caused by TSS, TP, aquatic plants, and aquatic algae.
- Illinois EPA completed a Total Maximum Daily Load (TMDL) for Tampier Lake in 2010.

Criteria/Targets to Meet Goal Objectives:

- WWTP upgrades reduce TP to <1.0 mg/l and TN to <5.5 mg/l TN in effluent.
- All six (26,789 lf) “High Priority-Critical Area” stream reaches restored.
- All four (14,966 lf) “High Priority-Critical Area” riparian areas restored.
- At least 50% (4,500 lf) of Tampier Lake “High Priority-Critical Area” buffer restored.
- At least 6 of 13 (50%) “High Priority-Critical Area” wetlands restored.
- At least 16 of 21 (75%) “High Priority-Critical Area” detention basins retrofitted.
- At least 641 acres (50%) identified as “High Priority-Critical Area” cropland uses conservation tillage (no till) farming.
- Two sites (24 acres) identified as “High Priority-Critical Area” livestock operations follow manure management plans.
- At least 25% of surveyed farmers, businesses, and residents use phosphorus levels based on soil testing and IL law.
- At least 50% of septic system violations are addressed each year.
- At least 4 of 5 (80%) municipalities implement a minimum bi-weekly street sweeping program.

Goal/Objective Milestones:		**Grade**
1-10 Yrs: (Short)	1) One of two WWTP’s receive upgrades that reduce TP to <1.0 mg/l and TN to <5.5 mg/l TN. 2) At least two of six “High Priority-Critical Area” stream reaches is restored. 3) At least two of four “High Priority-Critical Area” riparian areas are restored. 4) At least 25% (2,400 lf) of buffer is restored along Tampier Lake shoreline. 5) At least 3 of 13 “High Priority-Critical Area” wetlands are restored. 6) At least 5 of 21 “High Priority-Critical Area” detention basins are retrofitted. 7) At least 256 acres (40%) of “High Priority-Critical Area” cropland is in no till. 8) Both “High Priority-Critical Area” livestock operations sites follow manure management plans. 9) At least 10% of surveyed farmers, businesses, & residents apply phosphorus based on soil testing & IL law. 10) At least 50% of septic system violations are addressed each year. 11) At least 2 of 5 (40%) municipalities implement a minimum bi-weekly street sweeping program.	
10-20 Yrs: (Medium)	1) Both WWTPs receive upgrades that reduce TP to <1.0 mg/l and TN to <5.5 mg/l TN. 2) At least three of six “High Priority-Critical Area” stream reaches are restored. 3) At least three of four “High Priority-Critical Area” riparian areas are restored. 4) At least 50% (4,500 lf) of buffer is restored along Tampier Lake shoreline. 5) At least 4 of 13 “High Priority-Critical Area” wetlands are restored. 6) At least 10 of 21 “High Priority-Critical Area” detention basins are retrofitted. 7) At least 50% (641 acres) of “High Priority-Critical Area” cropland is in no till. 8) At least 20% of surveyed farmers, businesses, & residents apply phosphorus based on soil testing & IL law. 9) At least 50% of septic system violations are addressed each year. 10) At least 4 of 5 (80%) municipalities implement a minimum bi-weekly street sweeping program.	
20+ Yrs: (Long)	1) All six “High Priority-Critical Area” stream reaches are restored. 2) All four “High Priority-Critical Area” riparian areas are restored. 3) At least 6 of 13 (50%) “High Priority-Critical Area” wetlands are restored. 4) At least 16 of 21 (75%) “High Priority-Critical Area” detention basins are retrofitted. 5) At least 25% of surveyed farmers, businesses, and residents apply fertilizer based on soil testing & IL law. 6) At least 50% of septic system violations are addressed each year.	

Monitoring Needs/Efforts:
- Track WWTP upgrades and monitoring results via FOIA requests.
- Track stream, riparian area, and Tampier Lake buffer restoration projects.
- Track wetland restoration project implementation and success.
- Track detention basin retrofit project implementation and success.
- Track acres of cropland in no till farming.
- Track manure management plan implementation.
- Conduct surveys of farmers, businesses, and residents to assess phosphorus use in fertilizers.
- Track septic system violations versus repairs via county records.
- Track municipalities that implement a street sweeping program.
- Monitor water quality in LRC and Tampier Lake per the “Monitoring Plan” in this report.

Remedial Actions:
- Contact Illinois EPA regarding potential to help fund WWTP upgrades.
- Locate Illinois EPA 319 grants that are being submitted for recommended stream, riparian, buffer, wetland, and detention basin projects and determine success rate.
- NRCS contact farmers to determine why they are not implementing no till or manure management practices.
- Contact Will/Cook Counties to determine why failing septic systems are not being addressed.
- Contact municipalities to determine why funding will not allow for street sweeping.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 4 Report Card

Create and/or update county and local policy to protect watershed resources.

Current Policy and Regulations:

- Land development is regulated by Will and Cook County Stormwater Ordinances.
- Other entities with watershed jurisdictional or technical advisory roles include the USACE, USFWS and IDNR, and the Will/ Cook County Soil and Water Conservation District (SWCD).
- Most municipalities do not provide additional watershed protection beyond existing county stormwater ordinances.
- The Illinois EPA Bureau of Water regulates wastewater and stormwater discharges to streams and lakes via NPDES.

Criteria/Targets to Meet Goal Objectives:

- All 5 municipalities adopt or support (via a resolution) the Long Run Creek Watershed-Based Plan.
- All 5 municipalities update comp plans and zoning ordinances to include tools such as conservation/low impact design standards for all "High Priority-Critical Area" Green Infrastructure Protection Areas.
- All 5 municipalities develop funding sources for developments within the Green Infrastructure Network.
- All 5 municipalities encourage developers to protect and restore natural areas then donate these areas to appropriate long term manager with dedicated SSA funding.
- All 5 municipalities recommend infiltration practices within developments located w/in the proposed Class III GCA
- All 5 municipalities promote wetlands lost via development to be mitigated for within Long Run Creek Watershed.
- All 5 municipalities allow for native landscaping in local ordinances.
- At least 25% of surveyed stakeholders apply phosphorus only according to soil testing and IL law.

Goal/Objective Milestones:		Grade
1-10 Yrs: (Short)	1) At least 4 of 5 municipalities in the watershed adopt/support the Long Run Creek Watershed-Based Plan. 2) At least 4 of 5 municipalities include conservation/low impact design standards for all GIN areas. 3) At least 2 of 5 municipalities develop funding for developments in the GI Network. 4) At least 2 of 5 municipalities encourage developers to restore natural areas and donate with SSA funding 5) At least 3 of 5 municipalities recommend infiltration within developments in the Class III GCA. 6) At least 3 of 5 municipalities promote wetland mitigation to occur within Long Run Creek watershed. 7) All 5 municipalities allow for native landscaping in local ordinances. 8) At least 15% of surveyed stakeholders apply phosphorus based on soil testing and IL law.	
10-20 Yrs: (Medium)	1) All 5 municipalities in the watershed adopt the Long Run Creek Watershed-Based Plan. 2) All 5 municipalities include conservation/low impact design standards for all GI areas. 3) All 5 municipalities develop funding for developments in the GI Network. 4) All 5 municipalities encourage developers to restore natural areas and done with SSA funding. 5) All 5 municipalities recommend infiltration within developments in the Class III GCA. 6) All 5 municipalities promote wetland mitigation to occur within Long Run Creek watershed. 7) At least 20% of surveyed stakeholders apply phosphorus based on soil testing and IL law.	
20+ Yrs: (Long)	1) All five municipalities (100%) promote wetland mitigation within Long Run Creek watershed. 2) All five municipalities (100%) allow for native landscaping in local ordinances. 3) At least 25% of surveyed stakeholders apply phosphorus based on soil testing and IL law.	

Monitoring Needs/Efforts:

- Track number of municipalities that adopt the Long Run Creek Watershed-Based Plan and develop ordinances to allow native landscaping and protect GI via conservation and/or low impact development and Special Service Area (SSA) taxes.
- Track infiltration practices used within developments located within the Class III GCA.
- Track wetland losses from development and where mitigation occurs.
- Create and distribute stakeholder survey related to phosphorus use.

Remedial Actions:

- Meet with municipalities who do not adopt the plan and recommended policies to help them better understand the benefits of following GI recommendations, requiring SSA's, mitigating for wetland losses, etc.
- Work with NRCS to offer free soil testing related to phosphorus use if surveys indicate no positive change.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 5 Report Card

Manage and mitigate for existing and future structural flood problems.

Current Condition:

- Four documented Flood Problem Areas (FPAs) were identified. FPA #1 is overbank flooding of residential homes located at the southeast corner of Long Run Creek and Smith Road. FPA #2 is overbank flooding of the 135th St. located at the intersection of 135th Street and Archer Avenue. FPA #3 is overbank flooding of residential homes located at the northeast and southeast corners of Long Run Creek's intersection with Cedar Road within Homer Glen. FPA #4 is wetland inundation of 143rd St. located along 143rd Street and west of Wolf Road within Orland Park.
- FEMA's 100-year floodplain occupies 1,152 acres or 7% of the watershed along Long Run Creek and several tributaries.

Criteria/Targets to Meet Goal Objectives:

- At least 3 of 6 (50%) "High Priority-Critical Area" detention basins retrofitted along LRC Reaches 3 & 4.
- >50% of future developments in Subwatershed Management Units 1, 8, 18, & 20 include impervious reduction measures.
- All four (100%) structural Flood Problem Areas (FPAs) are addressed.
- Limited development is allowed within FEMA's 100-year floodplain.
- At least 200 homeowners or businesses receive tax incentives for using stormwater infiltration, harvesting/reuse technology.

Goal/Objective Milestones:		**Grade**
1-10 Yrs: (Short)	1) At least 2 of 6 "High Priority-Critical Area" detention basins retrofitted along LRC Reaches 3 & 4. 2) At least 25% of future developments in SMUs 1, 8, 18, & 20 include impervious reduction measures. 3) At least 2 of 4 structural Flood Problem Areas are addressed. 4) Limited development occurs within FEMA's 100-year floodplain. 5) At least 100 homeowners or businesses use stormwater infiltration, harvesting/reuse technology.	
10-20 Yrs: (Medium)	1) At least 3 of 6 "High Priority-Critical Area" detention basins retrofitted along LRC Reaches 3 & 4. 2) At least 50% of future developments in SMUs 1, 8, 18, & 20 include impervious reduction measures. 3) All four 4 structural Flood Problem Areas are addressed. 4) Limited development occurs within FEMA's 100-year floodplain. 5) At least 150 homeowners or business use stormwater infiltration, harvesting/reuse technology.	
20+ Yrs: (Long)	1) All 4 structural Flood Problem Areas addressed. 2) At least 200 homeowners or business use stormwater infiltration, harvesting/reuse technology.	

Monitoring Needs/Efforts:

- Track number of "High Priority-Critical Area" detention retrofits along LRC Reaches 3 and 4.
- Track number and type of impervious reduction measures included in future development within SMUs 1, 8, 18, & 20.
- Track number of developments that are allowed within FEMA's 100-year floodplain.
- Track number of homeowners or businesses that use stormwater infiltration, harvesting/reuse technology.

Remedial Actions:

- Meet with municipalities to determine lack of interest or funding for detention retrofits along LRC Reaches 3 and 4.
- Meet with municipalities that do not encourage impervious reduction measures in SMUs 1, 8, 18, & 20.
- Conduct follow-up visits to Flood Problem Area sites during flood events to determine if additional remedial work is needed.
- Meet with municipalities that allow development within FEMA's 100-year floodplain.
- Meet with municipalities to encourage tax incentives for using stormwater infiltration, harvesting, or reuse technology.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

Goal 6 Report Card

Implement watershed educational opportunities.

Current Condition:

- The health of Long Run Creek watershed faces challenges and threats from proposed land use changes, increasing nutrient loads, streambank erosion and channelization, a depleting groundwater supply, invasive species, poor land management, and problematic flooding. At the root of these challenges and threats is that key audiences lack the necessary knowledge and tools to make informed decisions and adopt positive behaviors to mitigate such threats and challenges. Since a significant amount of the watershed is held as private property, any efforts to improve water quality or increase groundwater recharge will need to include significant education and outreach efforts to those landowners and stakeholders.
- This watershed plan includes an Information and Education (I & E) Plan intended to spark interest in and provide stakeholders a better understanding of the watershed, and then promote and initiate the recommendations in the watershed plan.

Criteria/Targets to Meet Goal Objectives:

- LRCWPC initiates all Phase I recommendations & two Phase II & III recommendations under Objective 1 in the I & E Plan.
- LRCWPC initiates all Phase I recommendations & one Phase II & III recommendation under Objective 2 in the I & E Plan.
- LRCWPC initiates two Phase I recommendations & two Phase II & III recommendations under Objective 3 in the I & E Plan.
- LRCWPC initiates one Phase I recommendation & one Phase II & III recommendation under Objective 4 in the I & E Plan.
- LRCWPC initiates one Phase I recommendation under Objective 4 in the I & E Plan.
- LRCWPC initiates at least one Phase II & III recommendation under Objectives 1-5 annually during long term (20+ years)

Goal/Objective Milestones:		**Grade**
1-10 Yrs: (Short)	1) LRCWPC initiates all Phase I recommendations under Objective 1 in the I & E Plan. 2) LRCWPC initiates all Phase I recommendations under Objective 2 in the I & E Plan. 3) LRCWPC initiates two Phase I recommendations under Objective 3 in the I & E Plan. 4) LRCWPC initiates one Phase I recommendation under Objective 4 in the I & E Plan. 5) LRCWPC initiates one Phase I recommendation under Objective 5 in the I & E Plan.	
10-20 Yrs: (Medium)	1) LRCWPC initiates two Phase II & III recommendations under Objective 1 in the I & E Plan. 2) LRCWPC initiates one Phase II & III recommendation under Objective 2 in the I & E Plan. 3) LRCWPC initiates two Phase II & III recommendations under Objective 3 in the I & E Plan. 4) LRCWPC initiates one Phase II & III recommendation under Objective 4 in the I & E Plan.	
20+ Yrs: (Long)	1) LRCWPC initiates at least one Phase II & III recommendation under Objectives 1-5 annually.	

Monitoring Needs/Efforts:

- Track number of Phase I, II, and III recommendations under Objectives 1-5 (outlined in I & E Plan) initiated each year by LRCWPC partners.

Remedial Actions:

- LRCWPC partners discuss implementation of education campaigns during future planning meetings to ensure that efforts are initiated.

Notes:

Grade Evaluation: 80%-100% met = A; 60%-79% met = B; 40%-59% met = C; and < 40% = failed.

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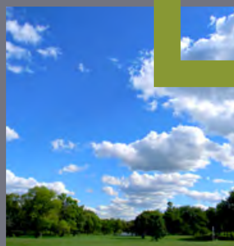

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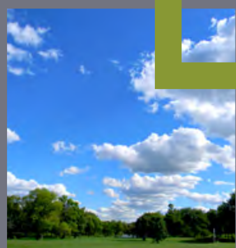

11.0 GLOSSARY OF TERMS

100-year floodplain: A 100-year flood is a flood that has a 1-percent chance of being equaled or exceeded in any given year. A base flood may also be referred to as a 100-year storm and the area inundated during the base flood is called the 100-year floodplain.

303(d) Impaired Waters: The Federal Clean Water Act requires states to submit a list of impaired waters to the USEPA for review and approval using water quality assessment data from the Section 305(b) Water Quality Report. States are then required to develop total maximum daily load analyses (TMDLs) for waterbodies on the 303(d) list.

305(b): The Illinois 305(b) report is a water quality assessment of the state's surface and groundwater resources that is compiled by the IEPA as a report to the USEPA as required under Section 305(b) of the Clean Water Act.

ADID wetlands: Wetlands that were identified through the Advanced Identification (ADID) process. Completed in 1992, the ADID process sought to identify wetlands that should be protected because of their high functional value. The three primary functions evaluated were:

1. Ecological value based on wildlife habitat quality and plant species diversity;
2. Hydrologic functions such as stormwater storage value and/or shoreline/bank stabilization value; and
3. Water quality values such as sediment/toxicant retention and/or nutrient removal/transformation function.

Applied Ecological Services Inc. (AES): A broad-based ecological consulting, contracting, and restoration firm that was founded in 1978. The company consists of consulting ecologists, engineers, landscape architects, planners, and contracting staff. The mission of AES is to bring wise ecological decisions to all land use activities.

Aquatic habitat: Structures such as stream substrate, woody debris, aquatic vegetation, and overhanging vegetation that is important to the survival of fish and macroinvertebrates.

Aquifer: A layer of permeable rock, sand, or gravel through which ground water flows, containing enough water to supply wells and springs.

Base flow: The flow that a perennially flowing stream reduces to during the dry season. It is often supported by groundwater seepage into the channel.

Bedrock: The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Best Management Practices (BMPs): See Management Measures

Biodiversity: The variety of organisms (plants, animals and other life forms) that includes the totality of genes, species and ecosystems in a region.

Bioengineering (or Soil Bioengineering): Techniques for stabilizing eroding or slumping stream banks that rely on the use of plants and plant materials such as live willow posts, brush layering, coconut logs and other "greener" or "softer" techniques. This is in contrast to techniques that rely on creating "hard" edges with riprap, concrete and sheet piling (metal and plastic).

Bio-infiltration: Excavated depressional areas where stormwater runoff is directed and allowed to infiltrate back into groundwater rather than allowing to runoff. Infiltration areas are planted with appropriate vegetation.

Center for Watershed Protection (CWP): Non-profit 501(c)3 corporation founded in 1992 that provides local governments, activists, and watershed organizations around the country with the technical tools for protecting some of the nation's most precious natural resources such as streams, lakes and rivers.

Certified Municipalities: A municipality that is certified to enforce the provisions of local stormwater ordinances. The municipality's designated Enforcement Officer enforces the provisions in the Ordinance.

Channelized stream: A stream that has been artificially straightened, deepened, or widened to accommodate increased stormwater flows, to increase the amount of adjacent land that can be developed or used for urban development, agriculture or for navigation purposes

Clean Water Act (CWA): The CWA is the basic framework for federal water pollution control and has been amended in subsequent years to focus on controlling toxics and improving water quality in areas where compliance with nationwide minimum discharge standards is insufficient to meet the CWA's water quality goals.

Conservation development: A development designed to protect open space and natural resources for people and wildlife while at the same time allowing building to continue. Conservation design developments designate half or more of the buildable land area as undivided permanent open space.

Conservation easement: The transfer of land use rights without the transfer of land ownership. Conservation easements can be attractive to property owners who do not want to sell their land now, but would support perpetual protection from further development. Conservation easements can be donated or purchased.

Debris jam: Natural and man-made debris in a stream channel including leaves, logs, lumber, trash and sediment.

Designated Use: Appropriate uses are identified by taking into consideration the use and value of the water body for public water supply, for protection of fish, shellfish, and wildlife, and for recreational, agricultural, industrial, and navigational purposes. In designating uses for a water body, States and Tribes examine the suitability of a water body for the uses based on the physical, chemical, and biological characteristics of the water body, its geographical setting and scenic qualities, and economic considerations

Detention basin: A man-made structure for the temporary storage of stormwater runoff with controlled release during or immediately following a storm.

Digital Elevation Model (DEM): Regularly spaced grid of elevation points used to produce elevation maps.

Discharge (streamflow): The volume of water passing through a channel during a given time, usually measured in cubic feet per second.

Dissolved oxygen (DO): The amount of oxygen in water, usually measured in milligrams/liter.

Downcutting: The action of a stream to deepen itself, often as a result of channelization.

Ecology: The scientific study between living organisms and their interactions with their natural or developed environment, other organisms, and their abiotic environment.

Ecosystem: An ecological community together with its environment, functioning as a unit.

Erosion: Displacement of soil particles on the land surface due to water or wind action.

European settlement: A period in the early 1800s when European settlers moved across the United States in search of better lives. During this movement, much of the historical communities were altered for farming and other types of development.

Eutrophic: A waterbody having a high level of biological productivity. A typical eutrophic waterbody either has many aquatic plants and is clear or has few plants and is less clear. Both situations have potential to support many fish and wildlife.

Federal Emergency Management Agency (FEMA): Government agency within the Department of Homeland Security that responds to, plans for, recovers from, and mitigates against disasters/emergencies, both natural and man-made.

Fee-in-lieu: Defined by the USACE and EPA as a payment "to a natural resource management entity for implementation of either specific or general wetland or other aquatic resource development projects" for projects that "do not typically provide compensatory mitigation in advance of project impacts."

Fen: Peat-forming wetlands that receive nutrients from sources other than precipitation: usually from upslope sources through drainage from surrounding mineral soils and from groundwater movement. Fens are characterized by their water chemistry which is neutral or alkaline with relatively high dissolved mineral levels.

Filamentous algae: Simple one-celled or multi-celled organisms (usually aquatic) capable of photosynthesis that are an indicator of high nutrient levels in the water column.

Filter strip: A long narrow portion of vegetation used to retard water flow and collect sediment for the protection of watercourses, reservoirs or adjacent properties.

Flash hydrology/flooding: A quickly rising and falling overflow of water in stream channels that is usually the result of increased amounts of impervious surface in the watershed.

Flood problem area (FPA): One or more buildings, roads or other infrastructure in one location that are repeatedly damaged by flooding.

Flow Regime: The pattern of flow variability for a particular river or region.

Floodplain (100-year): Land adjoining the channel of a river, stream, watercourse, lake or wetland that has been or may be inundated by floodwater during periods of high water that exceed normal bank-full elevations. The 100-year floodplain has a probability of 1% chance per year of being flooded.

Floodproofing: Any combination of structural and non-structural additions, changes or adjustments to structures or property which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and contents.

Floodway: The floodway is the portion of the stream or river channel that includes the adjacent land areas that must be reserved to discharge the 100-year flood without increasing the water surface.

Geographic Information System (GIS): A computer-based approach to interpreting maps and images and applying them to problem-solving.

Geology: The scientific study of the structure of the Earth or another planet, especially its rocks, soil, and minerals, and its history and origins.

Global Positioning System (GPS): Satellite mapping system that enables locators and mapping to be created via satellite.

Green infrastructure network: An interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands, farms, and forests of conservation value; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life.

Greenways: A protected linear open space area that is either landscaped or left in its natural condition. It may follow a natural feature of the landscape such as a river or stream, or it may occur along an unused railway line or some other right of way. Greenways also provide wildlife corridors and recreational trails.

Groundwater recharge: Primary mechanism for aquifer replenishment which ensures future sources of groundwater for commercial and residential use.

Headwaters: Upper reaches of streams and tributaries in a watershed.

HUC Code: A hydrologic unit code (HUC) that refers to the division and subdivision of U.S. watersheds. The hydrologic units are arranged or nested within each other, from the largest geographic area (regions) to the smallest geographic area (cataloging units).

Hydraulic and Hydrologic modeling: Engineering analysis that predicts expected flood flows and flood elevations based on land characteristics and rainfall events.

Hydraulic structures: Low head dams, weirs, bridges, levees, and any other structures along the course of the river.

Hydric soil: Soil units that are wet frequently enough to periodically produce anaerobic conditions, thereby influencing the species composition or growth, or both, of plants on those soils.

Hydrologic Soil Groups (HSG): Soils are classified by the Natural Resource Conservation Service into four Hydrologic Soil Groups based on the soil's runoff potential. The four Hydrologic Soils Groups are A, B, C and D. A's generally have the smallest runoff potential and D's the greatest.

Hydrology: The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Hydrophytic vegetation: Plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; one of the indicators of a wetland.

Illinois Department of Natural Resources (IDNR): A government agency established to manage, protect and sustain Illinois' natural and cultural resources; provide resource-compatible recreational opportunities and to promote natural resource-related issues for the public's safety and education.

Illinois Department of Transportation (IDOT): The Illinois Department of Transportation focuses primarily on the state's policies, goals and objectives for Illinois' transportation system and provides an overview of the department's direction for the future.

Illinois Environmental Protection Agency (IEPA): Government agency established to safeguard environmental quality, consistent with the social and economic needs of the State, so as to protect health, welfare, property and the quality of life.

Illinois Natural Areas Inventory (INAI): A survey conducted by the Illinois Department of Natural Resources to catalogue high quality natural areas, threatened and endangered species and unique plant, animal and geologic communities for the purpose of maintaining biodiversity.

Illinois Nature Preserves: State-protected areas that are provided the highest level of legal protection, and have management plans in place.

Illinois Pollution Control Board (IPCB): An independent agency created in 1970 by the Environmental Protection Act. The Board is responsible for adopting Illinois' environmental regulations and deciding contested environmental cases.

Impervious Cover Model: Simple urban stream classification model based on impervious cover and stream quality. The classification system contains three stream categories, based on the percentage of impervious cover that predicts the existing and future quality of streams based on the measurable change in impervious cover. The three categories include sensitive, impacted, and non-supporting.

Impervious cover/surface: An area covered with solid material or that is compacted to the point where water cannot infiltrate underlying soils (e.g. parking lots, roads, houses, patios, swimming pools, tennis courts, etc.). Stormwater runoff velocity and volume can increase in areas covered by impervious surfaces.

Incised channel: A stream that has degraded and cut its bed into the valley bottom; indicates accelerated and often destructive erosion.

Index of Biotic Integrity (IBI): An index used to evaluate the heath of a stream based on the fish community present.

Infiltration: Portion of rainfall or surface runoff that moves downward into the subsurface soil.

Invasive vegetation/plant: Plant species that are not native to an area and tend to out-compete native species and dominate an area (e.g. European buckthorn or garlic mustard).

Low Impact Development: Comprehensive land planning and engineering design approach with a goal of maintaining and enhancing the pre-development hydrologic regime of urban and developing watersheds.

Macroinvertebrate (aquatic): Invertebrates that can be seen by the unaided eye (macro). Most benthic invertebrates in flowing water are aquatic insects or the aquatic stage of insects, such as stonefly nymphs, mayfly nymphs, caddisfly larvae, dragonfly nymphs and midge larvae. They also include such things as clams and worms. The presence of benthic macroinvertebrates that are intolerant of pollutants is a good indicator of good water quality.

Macroinvertebrate Biotic Index (MBI): Method used to rate water quality using macroinvertebrate taxa tolerance to organic pollution in streams.

Management Measures: Also known as Best Management Practices (BMPs) are non-structural practices such as site planning and design aimed to reduce stormwater runoff and avoid adverse development impacts - or structural practices that are designed to store or treat stormwater runoff to mitigate flood damage and reduce pollution. Some BMPs used in urban areas may include stormwater detention ponds, restored wetlands, vegetative filter strips, porous pavement, silt fences and biotechnical streambank stabilization.

Marsh: An area of soft, wet, low-lying land, characterized by grassy vegetation and often forming a transition zone between water and land.

Meander (stream): A sinuous channel form in flatter river grades formed by the erosion on one side of the channel (pools) and deposition on the other (point bars).

Mitigation: Measures taken to eliminate or minimize damage from development activities, such as construction in wetlands or Regulatory Floodplain filling, by replacement of the resource.

Moraine (terminal): A ridge-like accumulation of till and other types of drift that was produced at the outer margin or farthest advance, of a retracting glacier.

Municipal Separate Stormwater Systems (MS4's): A system that transports or holds stormwater, such as catch basins, curbs, gutters, ditches, man-made channels, pipes, tunnels, and or/storm drains before discharging into local waterbodies.

National Pollutant Discharge Elimination System (NPDES Phase II): Clean Water Act law requiring smaller communities and public entities that own and operate a Municipal Separate Storm Sewer System (MS4) to apply and obtain an NPDES permit for stormwater discharges. Permittees at a minimum must develop, implement, and enforce a stormwater program designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable. The stormwater management program must include these six minimum control measures:

1. Public education and outreach on stormwater impacts

2. Public involvement/participation

3. Illicit discharge detection and elimination

4. Construction site stormwater runoff control

5. Post-construction stormwater management in new development and redevelopment

6. Pollution prevention/good housekeeping for municipal operations

National Wetland Inventory (NWI): U.S. Fish and Wildlife Service study that provides information on the characteristics, extent, and status of U.S. wetlands and deepwater habitats and other wildlife habitats.

Native Landscaping: A landscape that contains plants or plant communities that are indigenous to a particular region.

Native vegetation/plants: Plant species that have historically been found in an area.

Nitrogen: A colorless, odorless unreactive gas that forms about 78% of the earth's atmosphere. The availability of nitrogen in soil is important for ecosystem processes.

Natural community/area: an assemblage of plants and animals interacting with one another in a particular ecosystem.

No-net-loss: A policy for wetland protection to stem the tide of continued wetland losses. The policy has generated requirements for wetland mitigation so that permitted losses due to filling and other alterations are replaced and the net quality wetland acreage remains the same.

Nonpoint source pollution (NPS pollution): Refers to pollutants that accumulate in waterbodies from a variety of sources including runoff from the land, impervious surfaces, the drainage system and deposition of air pollutants.

Nutrients: Substances needed for the growth of aquatic plants and animals such as phosphorous and nitrogen. The addition of too many nutrients (such as from sewage dumping and over fertilization) will cause problems in the aquatic ecosystem through excess algae growth and other nuisance vegetation.

Open space parcel: Any parcel of land that is not developed and is often set aside for conservation or recreation purposes

Partially open parcel: Parcels that have been developed to some extent, but still offer some opportunities for open space and Best Management Practice (BMP) implementation.

Phosphorus: A nonmetallic element that occurs widely in many combined forms especially as inorganic phosphates in minerals, soils, natural waters, bones, and teeth and as organic phosphates in all living cells.

Point source pollution: Refers to discharges from a single source such as an outfall pipe conveying wastewater from an industrial plant or wastewater treatment facility.

Policy: A high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body.

Pollutant load: The amount of any pollutant deposited into waterbodies from point source discharges, combined sewer overflows, and/or stormwater runoff.

Pool: A location in an active stream channel usually located on the outside bends of meanders, where the water is deepest and has reduced current velocities.

Prairie: A type of grassland characterized by low annual moisture and rich black soil characteristics.

Preventative measures: Actions that reduce the likelihood that new watershed problems such as flooding or pollution will arise, or that those existing problems will worsen. Preventative techniques generally target new development in the watershed and are geared toward protecting existing resources and preventing degradation.

Programmatic Action: A series of steps to be carried out or goals to be accomplished.

Protection Area: Chicago Metropolitan Agency for Planning (CMAP) defines a "Protection Area" as an area that represents subsections of a watershed that have valuable characteristics; valuable either in the sense that (1) they contain resources and characteristics that may need to be protected and/or (2) property ownership or land use characteristics make the subsection a strong candidate for action (CMAP 2007).

Rain gage station: Point along a stream where the amount of water flowing in an open channel is measured. The USGS makes most streamflow measurements by current meter. A current meter is an instrument used to measure the velocity of flowing water. By placing a current meter at a point in a stream and counting the number of revolutions of the rotor during a measured interval of time, the velocity of water at that point is determined.

Rainwater Harvesting: The accumulation and storing of rainwater for reuse before it reaches an aquifer.

Regulatory floodplain: Regulatory Floodplains may be either riverine or non-riverine depressional areas. Projecting the base flood elevation onto the best available topography delineates floodplain boundaries. A floodprone area is Regulatory Floodplain if it meets any of the following descriptions:

1. Any riverine area inundated by the base flood where there is at least 640 acres of tributary drainage area.

2. Any non-riverine area with a storage volume of 0.75 acre-foot or more when inundated by the base flood.

3. Any area indicated as a Special Flood Hazard Area on the FEMA Flood Insurance Rate Map expected to be inundated by the base flood located using best available topography.

Regulatory floodway: The channel, including on-stream lakes, and that portion of the Regulatory Floodplain adjacent to a stream or channel as designated by the Illinois Department of Natural Resources-Office of Water Resources, which is needed to store and convey the existing and anticipated future 100-year frequency flood discharge with no more that a 0.1 foot increase in stage due to the loss of flood conveyance or storage, and no more than a 10% increase in velocities. Where interpretation is needed to determine the exact location of the Regulatory Floodway boundary, the IDNR-OWR should be contacted for the interpretation.

Remnant: a small fragmented portion of the former dominant vegetation or landscape which once covered the area before being cleared for human land use.

Retrofit: Refers to modification to improve problems with existing stormwater control structures such as detention basins and conveyance systems such as ditches and stormsewers. These structures were originally designed to improve drainage and reduce flood risk, but they can also be retrofitted to improve water quality.

Ridge: A line connecting the highest points along a landscape and separating drainage basins or small-scale drainage systems from one another.

Riffle: Shallow rapids, usually located at the crossover in a meander of the active channel.

Riparian: Referring to the riverside or riverine environment next to the stream channel, e.g., riparian, or streamside, vegetation.

Runoff: The portion of rain or snow that does not percolate into the ground and is discharged into streams by flowing over the ground instead.

Savanna: A type of woodland characterized by open spacing between its trees and by intervening grassland.

Sediment: Soil particles that have been transported from their natural location by wind or water action.

Sedimentation: The process that deposits soils, debris and other materials either on other ground surfaces or in bodies of water or watercourses.

Seep: A moist or wet place where groundwater reaches the earth's surface from an underground aquifer.

Socioeconomics: Field of study that examines social and economic factors to better understand how the combination of both influences something.

Special Service Area (SSA) Tax: Special taxing districts in municipalities that are established by ordinance, often at the request of developers of new housing subdivisions, in order to pass on the costs of the streets, landscaping, water lines, and sewer systems to homeowners who reside within.

Stakeholders: Individuals, organizations, or enterprises that have an interest or a share in a project. (see also Watershed Stakeholders).

Stormsewershed: An area of land whose stormwater drains into a common storm sewer system.

SECTION 11.0

Stormwater management: A set of actions taken to control stormwater runoff with the objectives of providing controlled surface drainage, flood control and pollutant reduction in runoff.

Stream corridor: The area of land that runs parallel to a stream.

Stream monitoring: Chemical, biological and physical monitoring used to identify the causes and sources of pollution in the river and to determine the needs for reduction in pollutant loads, streambank stabilization, debris removal and habitat improvement.

Stream reach: A stream segment having fairly homogenous hydraulic, geomorphic and riparian cover and land use characteristics (such as all ditched agriculture or all natural and wooded). Reaches generally should not exceed 2,000 feet in length.

Streambank stabilization: Techniques used for stabilizing eroding streambanks.

Substrate (stream): The composition of the bottom of a stream such as clay, silt or sand.

Subwatershed: Any drainage basin within a larger drainage basin or watershed.

Subwatershed Management Unit (SMU): Small unit of a watershed or subwatershed that is delineated and used in watershed planning efforts because the effects of impervious cover are easily measured, there is less chance for confounding pollutant sources, boundaries have fewer political jurisdictions, and monitoring/mapping assessments can be done in a relatively short amount of time.

Swale: A vegetated channel, ditch or low-lying or depressional tract of land that is periodically inundated by conveying stormwater from one point to another. Swales are often used in natural drainage systems instead of stormsewers.

Threatened and Endangered Species (T&E): An “endangered” species is one that is in danger of extinction throughout all or a significant portion of its range. A “threatened” species is one that is likely to become endangered in the foreseeable future.

Till: A heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders deposited directly by and underneath a glacier without stratification.

Topography: The relative elevations of a landscape describing the configuration of its surface. Study and depiction (such as charts or maps) of the distribution, relative positions, and elevations of natural and man-made features of a particular landscape.

Total Maximum Daily Load (TMDL): A TMDL is the highest amount of a particular pollutant discharge a waterbody can handle safely per day.

Total suspended solids (TSS): The organic and inorganic material suspended in the water column and greater than 0.45 micron in size.

Treatment Train: Several Management Measures/Best Management Practices (BMPs) used together to improve water quality, infiltration and reduce sedimentation.

Trophic State Index (TSI): Trophic State is a measure of the degree of plant material in a body of water. It is usually measured using one of several indices (TSI) of algal weight (biomass): water transparency (Secchi Depth), algal chlorophyll, and total phosphorus.

Turbidity: Refers to the clarity of the water, which is a function of how much material including sediment is suspended in the water.

United States Army Corps of Engineers (USACE): Federal group of civilian and military engineers and scientists that provide services to the nation including planning, designing, building and operating water resources and other Civil Works projects. These also include navigation, flood control, environmental protection, and disaster response.

United States Environmental Protection Agency Section 319 (Section 319): Section 319 of the Clean Water Act encourages and funds nonpoint source pollution control projects (any indirect pollution, like runoff, stormwater discharge, road salt, sediment, etc.) or NPS reduction at the source.

United States Geological Survey (USGS): Government agency established in 1879 with the responsibility to serve the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

Urban runoff: Water from rain or snow events that runs over surfaces such as streets, lawns, parking lots and directly into storm sewers before entering the river rather than infiltrating the land upon which it falls.

USDA TR55 Document: A single event rainfall-runoff hydrologic model designed for small watersheds and developed by the USDA, NRCS, and EPA.

Vegetated buffer: An area of vegetated land to be left open adjacent to drainageways, wetlands, lakes, ponds or other such surface waters for the purpose of eliminating or minimizing adverse impacts to such areas from adjacent land areas.

Vegetated swale: An open channel drainageway used along residential streets and highways to convey stormwater and filter pollutants in lieu of conventional storm sewers.

Velocity (of water in a stream): The distance that water can travel in a given direction during a period of time expressed in feet per second.

Wastewater Treatment: Process that modifies wastewater characteristics such as its biological oxygen demand (BOD), chemical oxygen demand (COD), pH, etc. in order to meet effluent or water discharge standards.

Water Chemistry: The nature of dissolved materials (e.g. chlorides or phosphates) in water.

Waters of the United States (WOUS): For the purpose of this Ordinance the term Waters of the United States refers to those water bodies and wetland areas that are under the U. S. Army Corps of Engineers jurisdiction.

Watershed: An area confined by topographic divides that drains to a given stream or river. The land area above a given point on a waterbody (river, stream, lake, wetland) that contributes runoff to that point is considered the watershed.

Watershed Based Plan: A document that provides assessment and management information for geographically defined watershed, including the analysis, actions, participants, and resources related to development and implementation of the plan.

Watershed partner(s): Key watershed stakeholders who take an active role in the watershed management planning process and implementing the watershed plan.

Watershed Vulnerability Analysis: Rapid planning tool for application to watersheds and subwatersheds that estimates future and impervious cover and provides guidance on factors that might alter the initial classification or diagnosis of a watershed or subwatershed.

Wet meadow/sedge meadow: A type of wetland away from stream or river influence with water made available by general drainage and consisting of non-woody vegetation growing in saturated or occasionally flooded soils.

Wetland: A wetland is considered a subset of the definition of the Waters of the United States. Wetlands are land that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, under normal conditions, a prevalence of vegetation adapted for life in saturated soil conditions (known as hydrophytic vegetation). A wetland is identified based upon the three attributes: 1) hydrology, 2) hydric soils and 3) hydrophytic vegetation.

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