Hickory Creek Watershed Planning Group

Hickory Creek Watershed Plan

Executive Summary

Hickory Creek Watershed Planning Group Steering Committee

Village of Frankfort
Village of Homer Glen
City of Joliet
Village of Mokena
Village of New Lenox
Village of Orland Park
Village of Tinley Park
Forest Preserve District of Will County
Will County
Illinois Sierra Club
Chicago Metropolitan Agency for Planning

Acknowledgements

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The Hickory Creek Watershed Planning Group Steering Committee is comprised of staff from the Villages of Frankfort, Homer Glen, Mokena, New Lenox, Orland Park, and Tinley Park, as well as the City of Joliet, Will County and the Will County Stormwater Management Planning Committee, the Forest Preserve District of Will County, the Illinois Sierra Club, and the Chicago Metropolitan Agency for Planning, along with citizen representation. Among many other members of the Hickory Creek Watershed Planning Group, the Joliet Park District, Frankfort Square Park District, Prairie Rivers Network, the Army Corps of Engineers, the Natural Resources Conservation Service, a number of private consultants, and the Illinois Department of Natural Resources deserve special thanks for the expertise they provided.

Plan Highlights

The purpose of this plan is to protect and restore Hickory Creek and its main tributaries (Spring Creek, Marley Creek, Union Ditch, and Frankfort Tributary). Water pollution, low quality habitat, and poor aesthetics — not to mention flooding — are all challenges along different stream reaches. To combat these problems, this plan proposes a number of on-the-ground projects to restore stream conditions, ranging from modifying dams to stabilizing eroding stream banks and replanting vegetation. To protect Hickory Creek and its tributaries from being degraded more in the future, it is critical to make changes to local policies, the most important being to expand the use of "green infrastructure" techniques. Undertaking these projects and policies will have many benefits for residents and local governments, including reducing flood risk, enhancing aesthetics, and improving water quality.

Projects to address problems in the watershed

The watershed plan identifies 30 projects that could reasonably be begun, and in many cases finished, within five years. The locations of the projects are shown in the map below. Project types include:

- **Managing runoff in developed areas**
  - Approximately half of the watershed has been developed, and in some neighborhoods, stormwater management devices are not as good as they could be, or even up to current standards. Therefore the plan recommends retrofitting these devices with best management practices (BMPs).
- **Managing runoff in agricultural areas**
  - Farmers are already using good techniques to control fertilizer overuse and soil erosion, but these have not been enough to reduce erosion and nutrient runoff. The plan proposes two pilot projects to encourage using wetlands and an innovative technology called a "bioreactor" to treat farm runoff.
- **Directly restoring streams**
  - Dams can negatively affect streams, and those on Hickory and Spring Creeks have outlived their original uses. The plan proposes modifying these dams to reduce their negative effects.
  - In many places, stream banks are eroding and the stream bottom is being scoured excessively. Besides sending soil downstream, erosion can threaten bridge footings, water and sewer lines, etc. The plan would stabilize stream banks where erosion is worst.
  - Hickory Creek and its tributaries have been affected by decades of injury, such as excessive build-up of sediment and historic attempts to straighten the creek. The plan proposes restoring three of the worst affected stretches of the creek.
  - Taking care of the land immediately around streams is a critical part of protecting and improving them. This plan recommends planting new buffers around the stream with quality vegetation in strategic areas.

Policies

Local governments have a vision of how they aspire to grow, shape community character, and protect natural resources within their borders, as expressed through their comprehensive plans and ordinances. To ascertain how well local policies are protecting the streams, the Hickory Creek plan reviewed existing comprehensive plans, local ordinances, and environmental programs. The plan finds that while these are often effective in protecting natural resources and promoting quality of life in the watershed, in other cases improvements are needed. Important improvements include the following:

- Commit to protecting a "green infrastructure" network, shown in the map on pp. 16-17. This can be done in many ways, including taking a more sensitive approach to development.
- Use the ordinance review sheet in the plan appendix to make specific upgrades, especially to encourage or require the wider use of improved stormwater management and to improve standards for the maintenance of natural areas in subdivisions.
- Establish a program for inspecting existing septic systems upon resale of homes.
- Develop local programs to reduce the use of road salt.
- Add nutrient removal processes to wastewater treatment plants .
- Support the flood control project being undertaken by the Illinois Department of Natural Resources and the City of Joliet at the downstream ends of Hickory and Spring Creeks.
- Finally, institute a policy as part of the formal capital improvement programs of communities to incorporate "green" designs. This structured way of looking for added value in conventional projects is an inexpensive way of improving conditions over time.

Plan Implementation

To implement the policy recommendations, staff and elected officials from each community, with assistance as available, would establish an appropriate course of action to institute ordinances or new programs within the next five years. The projects would go through normal capital improvement programs, aided by grant funding. The general recommendation is for each local government with proposed projects in its area to begin a project each year. Ultimately, however, a critical part of assuring sustained work to protect and improve Hickory Creek is to form a "Friends of Hickory Creek" (or similarly named) group, broadening the existing Hickory Creek Watershed Planning Group. With stable sources of funding and a part-time coordinator position, the group would undertake all-important education and outreach activities to residents of the watershed.

Value of the Plan

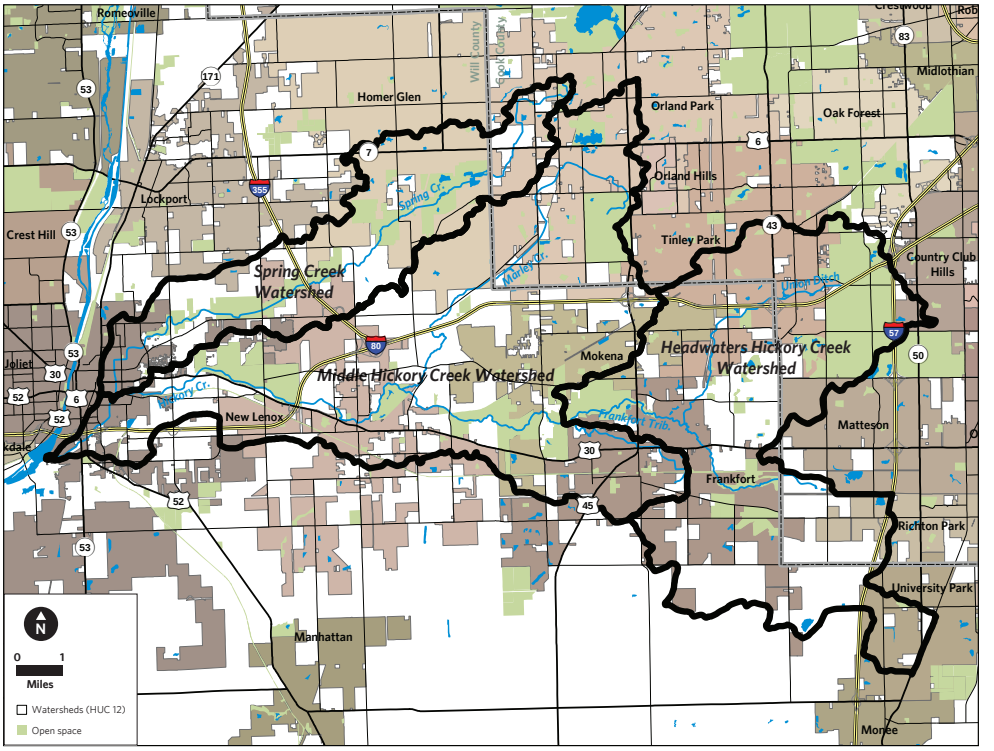
Stakeholders will see several benefits from the plan for Hickory Creek. The plan identifies concrete projects and policies to enhance community quality of life by improving aesthetics, reducing flood risk, and boosting water quality. Also, since permit requirements for municipal separate storm sewer systems (MS4s) are growing more stringent, implementing the plan will help meet those permit requirements. Meeting the education requirements of the permit could likely be done at least cost if each community helps cover the work of the coordinator (mentioned above), who would handle education through the entire watershed. By pointing out that problems affecting the streams originate from many places, furthermore, the plan helps coordinate regulatory programs that would otherwise be aimed only at a few sources. The plan takes a broad view of watershed management, identifying habitat improvements and other activities that may be needed to meet goals for the beneficial use of the streams.

Introduction

Hickory Creek flows into the Des Plaines River just downstream from the Brandon Road Lock and Dam in Joliet, having coursed perhaps 28 miles from its headwaters east of Frankfort through varied neighborhoods and forest preserves or parks, being joined along the way by Marley Creek, Spring Creek, and Union Ditch as major tributaries. The lower stream segment is a three-mile channelized stretch with concrete walls in an older neighborhood of Joliet. Although canoes do ply the stream and anglers catch smallmouth below its riffles, Hickory Creek is not a stream with a large recreational user base. But among stream ecologists in the Chicago area, it has considerable fame. As Dr. David Bardack of the University of Illinois noted, "Hickory Creek has attained the status of a classic biological study area. It has shaped the understanding of ecologists of the basic principles of stream faunal succession."[1]

The watershed is home to streamside Illinois Nature Preserves with a host of rare plants and animals. The Forest Preserve District of Will County has made giant strides in protecting the land immediately around the stream network, most recently with the greenway it has established along Spring Creek. Park districts have protected significant areas, as has the Forest Preserve District of Cook County. About 15 percent of the watershed is in some form of protected open space. Hickory Creek is also a substantially urbanized

Location of Hickory Creek watershed



1 Quoted in Joel Greenberg & Bill Eyring, The Lessons of Hickory Creek (unpubished manuscript)

Basic watershed data (all values for 2010 unless otherwise noted)

SIZE OF WATERSHED	109 square miles (69,805 acres)
MUNICIPALITIES IN WATERSHED	Frankfort, Homer Glen, Joliet, Mokena, New Lenox, Orland Park, Tinley Park*
POPULATION IN WATERSHED	149,083
UNINCORPORATED POPULATION AND AREA	48,078 people; 26,898 acres
LAND IN URBAN USE	31,258 acres / 45%
LAND THAT IS PROTECTED OPEN SPACE	9,778 acres / 14%
LAND THAT IS IN AGRICULTURE	17,788 acres / 25%
LAND THAT IS PRIVATELY HELD WETLAND, FOREST, OR GRASSLAND	10,410 acres / 15%
NEW DEVELOPMENT ENVISIONED IN MUNICIPAL COMPREHENSIVE PLANS	15,323 acres / 50% more than current
IMPERVIOUSNESS (2001)	12% (Spring Creek), 22% (Middle Hickory Creek), 18% (Headwaters)
AREA OF WETLAND IN WATERSHED (2005)	3,095 acres / 4.4%
LENGTH OF STREAM NETWORK	28 miles mainstem, 57 miles whole perennial stream network
WASTEWATER TREATMENT PLANTS	9 publicly-owned plants, 9.32 mgd current flow
DOMINANT SOILS	Silt loam or silty clay loam, Hydrologic Soil Groups C and D
AVERAGE SLOPE	7.9 ft/mi above Pilcher Park dam, 14.8 ft/mi below

* Plus small portions of Country Club Hills, Lockport, Matteson, Orland Hills, Richton Park, and University Park

watershed, with about half of its 109 square miles developed. Nevertheless, a fairly large amount of undeveloped land remains outside of protected areas, much within the potential growth areas of New Lenox, Frankfort, Homer Glen, and Joliet. Furthermore, nine wastewater treatment plants serve the basin and discharge into Hickory Creek or one of its tributaries.

The Hickory Creek Watershed Planning Group (HCWPG), a stakeholder group composed of local government representatives, resource agencies, advocates, and others, developed this plan for Hickory Creek and its tributaries. The collaborative effort undertaken by the HCWPG belies its origins in something much less so: litigation over the proposed expansion of a municipal wastewater treatment plant in the watershed and disagreement over the adequacy of an environmental document (the anti-degradation analysis) used to support the expansion. While the legal question was resolved by the courts,[2] a later settlement between municipal representatives and environmental advocates pointed to a collaborative watershed planning process as a way to identify and address water quality problems in the Hickory Creek system without resorting to any further legal action.

2 *Illinois Environmental Protection Agency v. Illinois Pollution Control Board*, 386 Ill. App. 3d 375 (3d Dist. 2008).

Why a watershed plan is needed

Certain portions of Hickory Creek and its tributaries have impairments to their "beneficial uses" under the federal Clean Water Act. These uses are aquatic life support and primary contact recreation — in other words, some stream segments are biologically unhealthy, while others are not safe to swim in. The state has therefore placed Hickory Creek and several tributaries on the Illinois "303(d) list" of impaired waters,[3] a formal acknowledgment of water quality concerns. The major impairments are chemical pollution, contamination by fecal bacteria, and physical damage to the stream environment. The fundamental purpose of the watershed plan is to evaluate and recommend the best measures to help restore the beneficial uses in Hickory Creek, with the long-term goal of improving conditions enough that Hickory Creek and its tributaries can be removed from the 303(d) list.

Erosion is severe at several locations in the lower reaches of Hickory and Spring Creeks, including this site on Spring Creek just west of Briggs Street. Bank erosion causes the suspension of sediment, reducing water clarity and injuring aquatic organisms. In extreme cases like this, erosion can also threaten water, sewer, and roadway infrastructure near the stream.

3 The state is required to produce this list every two years under the Clean Water Act; the name of the report comes from the section of the Clean Water Act (303(d)) that requires it. The list can be found at available at **http://www.epa.state.il.us/water/tmdl/303d-list.html**.

Conditions along the stream

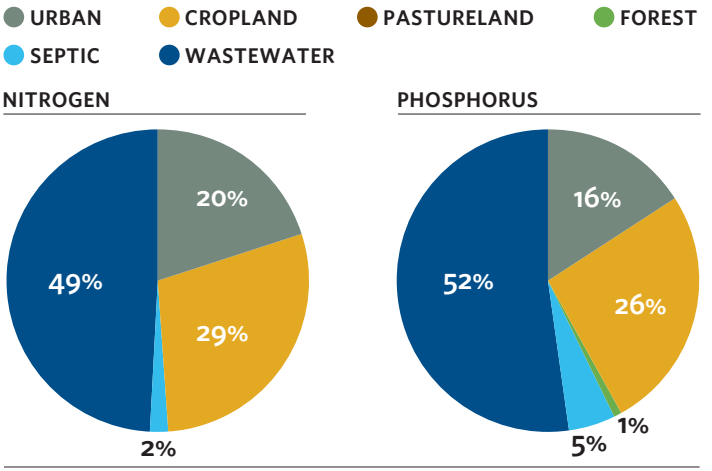
Water chemistry

In general, samples collected over the past decade confirm several problems with water chemistry in the streams. Chloride is elevated in Hickory Creek and in Union Ditch, likely because of road salt application. Fecal coliform, an indicator for fecal bacterial contamination, has been found to be quite high wherever it has been measured, but it is not possible to determine the sources. Because fecal coliform is elevated regardless of whether the stream is high or low, it is likely that both washoff from the land surface during rainstorms as well as untreated sources like septic systems or illicit sewer connections are contributing. Furthermore, suspended sediment concentrations spike periodically in lower Hickory Creek. Sediment is thought to originate from erosion on farm fields and from areas where streams are eroding. Finally, nitrogen and phosphorus (nutrient) concentrations are generally high. On the other hand, chlorophyll *a* is only moderately high. (Chlorophyll *a* is a measure of the amount of algae present, which indicates whether algae growth is occurring in response to nutrients). Nutrients come from a number of sources, primarily wastewater treatment plants, failing septic tanks, and runoff from farm fields, as well as a few other sources.

Dissolved oxygen levels appear to be low on Spring Creek, probably because of oxygen demand in sediment, but levels appear to be within healthy ranges in Union Ditch, Hickory Creek, and Marley Creek. However, it is possible that better data, particularly continuous monitoring of dissolved oxygen, would show concentrations to be below healthy levels. Silver, zinc, and manganese had been identified as being potential causes of impairment on the 2008 303(d) list, but further review suggests that observed concentrations of these metals are not particularly concerning; indeed, they may not have been listed properly. Findings of impairment by ammonia nitrogen appear to be based on very old data, and recently collected samples did not exceed water quality criteria.

WATER CHEMISTRY CONCERNS	PRIMARY SOURCES	LOCATION WHERE A CONCERN
Chloride	Road salt	Hickory Creek, Union Ditch
Fecal coliform	Potentially many: failing septic systems, pet waste, illicit sewer connections, etc.	Lower Hickory Creek, but most likely several sources upstream
Dissolved oxygen	Sediment oxygen demand	Spring Creek
Phosphorus	Wastewater treatment plants, septic systems, farm runoff	Lower Hickory Creek, but most likely several sources upstream
Nitrogen	Wastewater treatment plants, septic systems, farm and urban runoff	Lower Hickory Creek, but most likely several sources upstream
Suspended sediments	Farm and urban runoff, stream bank erosion	Lower Hickory Creek

Estimated sources of nutrients in the Hickory Creek watershed, percent of annual load



Source: Geosyntec

An important part of watershed planning is to determine the correct load *targets* — in other words, how much chloride, for example, should be allowed to enter the stream? And if chloride is higher than the target, what is the needed *load reduction*? A simplified method developed by USEPA called the "load duration curve" approach was used to compute the targets and needed load reductions for total phosphorus, total nitrogen, total suspended sediment, fecal coliform, and chloride. These estimates suggest that relatively high load reductions are needed for nutrients, sediment, and fecal coliform. Thus, it is necessary to implement projects and policies that would achieve the load reductions.

	EXISTING LOAD	ALLOWABLE LOAD	LOAD REDUCTION NEEDED
TOTAL PHOSPHORUS (LB/YR)*	45,777	12,2213	33,557
TOTAL NITROGEN (LB/YR)	717,495	414,832	302,663
TOTAL SUSPENDED SOLIDS (TONS/YR)	13,766	9,777	6,681
FECAL COLIFORM (TRILLIONS OF COLONIES/YR)	2,705	147	2,558
CHLORIDE (LB/YR)**	36,144,705	84,281,274	0

* See full plan for additional details. Assumes the ecoregional criteria define target concentrations in stream.
** Upstream reaches need chloride reduction, but not stream network as a whole.

Physical characteristics

Conditions vary considerably along the creek, but some generalizations can be made:

Hickory Creek in Joliet

The far downstream portions of Hickory Creek and Spring Creek have been heavily altered through the construction of concrete walls and widening for flood control purposes.

Spring Creek Dam at Draper Avenue, Joliet

Dams can be found on Hickory Creek at Pilcher Park and on Spring Creek near its confluence with Hickory Creek, and these likely prevent movement by fish and aquatic insects.

Straightened channel, Union Ditch at 191st Street, Tinley Park

The upper portions of the tributaries have been channelized and a portion of Spring Creek and the East Branch of Marley Creek have significant silt build-up.

Hickory Creek at Hickory Creek Barrens Forest Preserve

The middle reaches of Hickory Creek show better stream conditions than other segments, including habitat important for fish and aquatic insects.

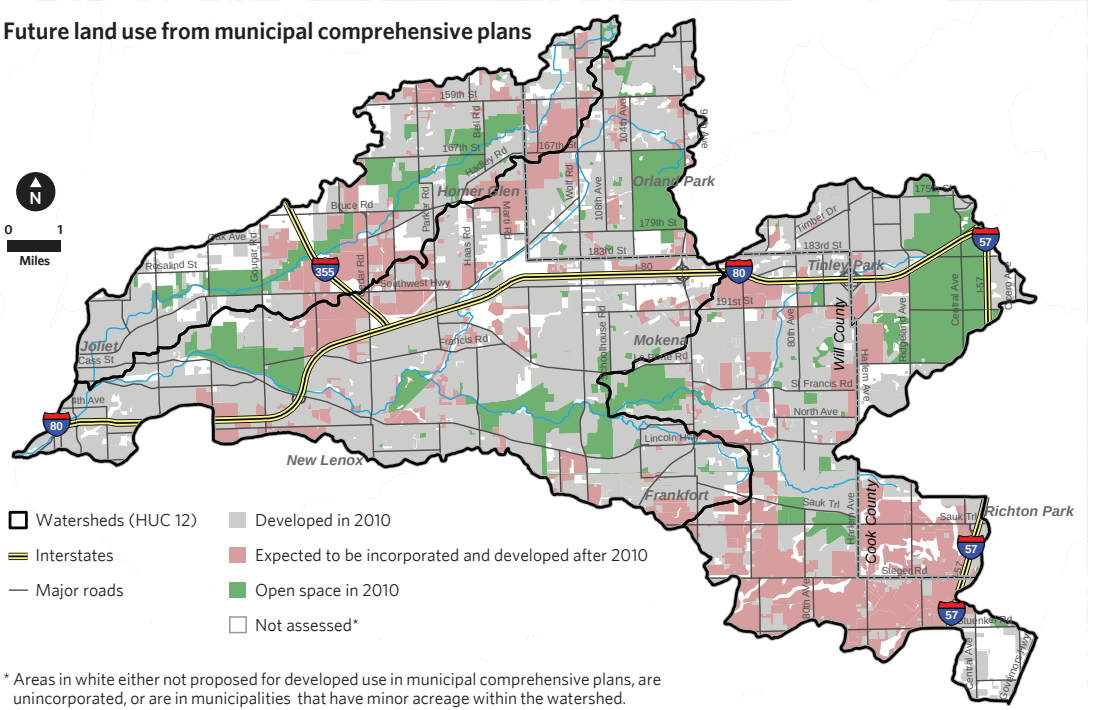
Many places along the creeks, as well as upland areas, have seen decades of degradation by stream channelization, the spread of invasive species, and many other factors. In addition, debris and trash have accumulated in several reaches of Hickory Creek, which contribute to overbank flooding.

Trash and Debris Accumulation and Channel Modification, Frankfort Tributary

Vision and Policy to Shape Future Conditions

Much of the watershed has been developed (45%) or is in protected open space (14%), but a substantial area remains, approximately 17,500 acres, that is not wetland and that is outside the flood zone. Moreover, municipal comprehensive plans suggest that communities intend to build out most of this remaining area in the future – about 15,000 acres. This was determined by making a composite of the future land use maps in the municipal comprehensive plans in the watershed. The most significant growth areas are in the I-355 corridor in the Spring Creek watershed and in the area east of Frankfort near I-57 in the headwaters. This growth in population and jobs will be associated with increased wastewater flow. A major strategy of this plan, therefore, is to protect Hickory Creek and tributaries by making sure that future growth occurs according to the best possible local standards for stormwater, subdivision design, and so forth. At the same time, several municipalities are built-out or are nearly so. In those areas, it is important to try to make sure that redevelopment improves conditions, for example by changing out older, traditional infrastructure with *green infrastructure*.

Future land use from municipal comprehensive plans



* Areas in white either not proposed for developed use in municipal comprehensive plans, are unincorporated, or are in municipalities that have minor acreage within the watershed.

	DEVELOPED AREA, ACRES	**WASTEWATER FLOW,** MILLIONS OF GALLONS PER DAY
CURRENT (2010)	31,258	9.32
FUTURE (2040)	46,581	16.28

Local comprehensive plans and ordinances were reviewed to determine the level of protection they offer a number of factors were considered in this review, including flood protection, the potential for cost savings over time, quality of life benefits. The results suggest that, in many respects, the plans and ordinances in the watershed are strong, but that in a few areas they need improvement. To help focus the efforts of stakeholders on the most important changes, the Hickory Creek Watershed Plan identifies priorities for changing policy and planning within the watershed. Most of the recommendations within this section of the plan fall to local governments, and would be implemented by revising local plans and ordinances or establishing new programs, supported by additional studies if needed. It is anticipated that the majority of this work could begin in 2011–2012, taking perhaps one to five years to complete and adopt.

Individual local governments are not on their own in revising their plans and ordinances. CMAP can make assistance available to committed municipalities through its Local Technical Assistance program, and consultants may be able to help. Furthermore, the Hickory Creek Watershed Planning Group can offer support. For one, municipalities that have already implemented ordinances can help guide those that have not. For another, achieving more uniformity across the watershed will help prevent the common complaint that one municipality's standards are "unfairly" higher than those of another municipality close by.

General recommendations for comprehensive plans

Comprehensive plans are the foundation of community's future, showing how they aspire to grow, invest in public infrastructure, shape community character, and protect natural resources within their borders. They can also help meet a number of important watershed protection objectives:

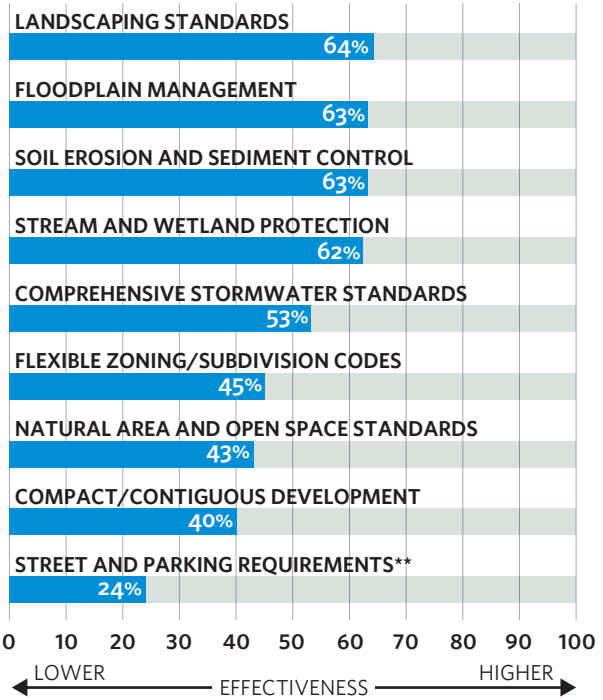
- Protecting natural resources and open space;
- Promoting green infrastructure approaches to manage precipitation and runoff;
- Promoting efficient, compact development patterns;
- Promoting efficient street and parking lot designs that minimize impervious surfaces.

Several local governments in the watershed have established a strong policy basis for water and natural resource protection. Some municipalities also have adopted special plans that specifically address water resources and/or green infrastructure. While there are several standout plans that cover parts of the watershed, protection and restoration of Hickory Creek ultimately requires the implementation of advanced approaches throughout the watershed. As a result, communities with plans lacking such approaches are encouraged to consider relevant elements of the plans of their neighboring communities to update or amend their current plans to better embrace watershed protection opportunities.

General recommendations for local ordinances

Ordinances can give local governments the legal framework necessary to achieve their water and natural resources goals. With assistance from municipal staff, a review of relevant municipal and county stormwater, subdivision, zoning, and related development ordinances was performed as part of the watershed planning process. To facilitate this review, a 70-question checklist was developed using a combination of local, regional, and national ordinances and resources.

Effectiveness of local ordinances at achieving environmental goals*



* This chart shows proportion of ordinance provisions in Hickory Creek communities that meet the recommended guidlines in the review checklist.

** For impervious area reduction

Source: Chicago Metropolitan Agency for Planning, Cowhey Gudmundson Leder, Ltd.

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

In most ordinance categories, there are at least two or three communities with advanced standards that could be used as models for other communities seeking to upgrade their own standards. Overall, though, the subdivision and zoning codes offer little recognition to flexible and innovative design practices such as natural landscaping and permeable paving (generally referred to as "green infrastructure" or "low impact development"). It may be possible to utilize such approaches, but developers will generally need to proceed with variances or go through planned development procedures. The ordinances have few requirements for water quality, and they do not provide incentives for protecting water quality. Nor are ordinances that reduce impervious surfaces by promoting compact development or *livable communities*, or that permit narrower streets and reduced parking requirements, prevalent in the watershed.

ORDINANCE CATEGORY	POSITIVE MODELS FOR THE WATERSHED
Landscaping Standards	Frankfort
Floodplain Management	New Lenox
Soil Erosion and Sediment Control	Frankfort
Stream and Wetland Protection	Joliet
Comprehensive Stormwater Standards	Will County (Unincorporated ordinance)
Flexible Zoning/ Subdivision Codes	Homer Glen
Natural Area and Open Space Standards	Homer Glen/Will County
Compact/Contiguous Development	Orland Park
Street and Parking Requirements *	Mokena/Tinley Park

***For impervious area reduction.**

Communities should try to change their ordinances to reflect the concerns noted above. One of the best ways to do so is to consider relevant elements of the ordinances of neighboring watershed communities and amend ordinances to better support the protection of Hickory Creek and its tributaries. The ordinance checklist developed for this plan can help guide staff efforts, as can a number of other references provided in the full plan. A helpful way of approaching the task is to hold an ordinance review roundtable with senior staff from a particular community, where objections and potential challenges can be recognized and addressed. For example, the fire department my feel that allowing narrower street standards conflicts with lane width requirements for fire trucks, while village engineers may be concerned about maintenance needs for green infrastructure.

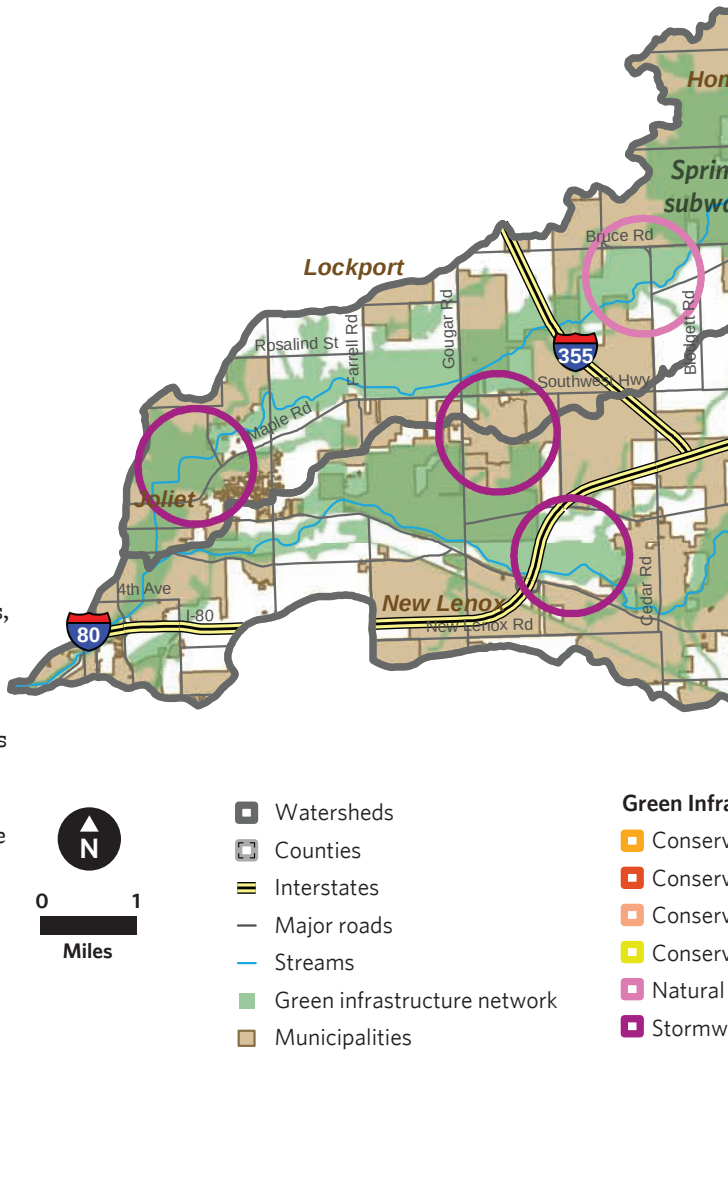
Priority Planning and Policy Recommendations

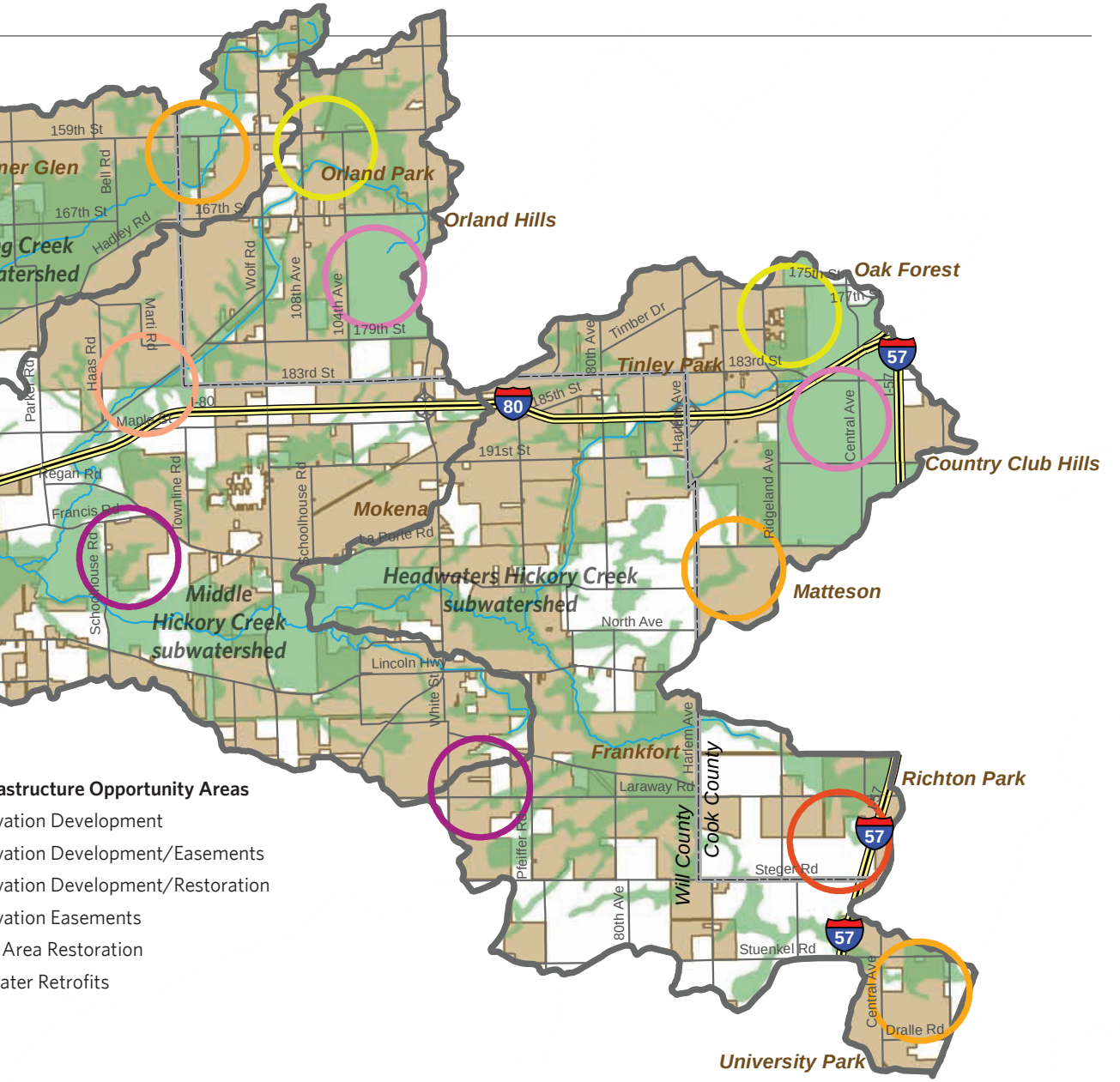
While the review of plans and ordinances revealed many opportunities for improvement, there is a real need to focus on the most important and most achievable strategies, as follows.

Green Infrastructure Network

Green infrastructure at the watershed scale is a network of protected land and water that yields benefits that often go unrecognized, such as helping store floodwater and limiting flood risk, protecting wildlife, cleansing water, and many others. Because of the importance of this green infrastructure network, the Hickory Creek plan identifies a set of critical corridors for local stakeholders to protect that is not limited by artificial political boundaries and that helps integrate the individual planning efforts of each municipality. It is important to realize that the green infrastructure network need not be established only through the acquisition of natural areas, but through an array of integrated protection strategies. These would include, in addition to land acquisition, ecological restoration, greenway and trail connections, private conservation easements, protective land use planning and zoning, conservation development, BMP retrofits, and farmland preservation. Local governments and open space protection organizations are encouraged to adopt the Hickory Creek green infrastructure network map as part of their comprehensive plan updates, as well as implement the various green infrastructure policies and programs recommended in Hickory Creek Watershed Plan.

Recommended green infrastructure network





astructure Opportunity Areas

vation Development

vation Development/Easements

vation Development/Restoration

vation Easements

Area Restoration

ater Retrofits

Green Infrastructure for Site Design and Stormwater Management

Green infrastructure at the site or neighborhood scale is any site design or stormwater management technique or with the primary goal of preserving, restoring, or mimicking natural hydrology and water quality. These techniques target infiltrating and retaining more runoff on-site and improving the quality of the runoff that does leave the site. Green infrastructure practices typically involve infiltration and water quality improvement in addition to the detention facilities already required. The general recommendation is for local governments within the watershed to require, or at least encourage, the wider use of green infrastructure practices in new development and redevelopment in their jurisdictions, by altering their ordinances to reflect this goal.

It is worth pointing out several significant benefits of green infrastructure:

- Recent experience suggests that green infrastructure designs like permeable paving often have longer lives than traditional designs and, hence, lower life-cycle costs. Similarly, clustered conservation design subdivisions have been shown to have significantly lower infrastructure costs than conventional subdivisions.
- By providing greater ordinance flexibility and removing existing barriers to preferred "green infrastructure" designs, developers are more likely to willingly implement innovative designs. These creative designs may have significant marketing advantages over conventional development.
- A strong case can be made that preservation of natural resources — through green infrastructure designs, conservation development, and open space and greenway preservation — can enhance community character and quality of life. This, in turn, can attract desirable businesses and sustainable residential development.

Savings from green infrastructure

The municipal comprehensive plans suggest that watershed communities intend to develop another 7,800 acres of single family housing, which represents about 20,000 housing units at the median lot size in the watershed. If green infrastructure were used in all new development, the savings might be as follows:

	PER LOT	TOTAL
SAVINGS BY DEVELOPERS	$3,301	$66.3 million
SAVINGS BY LOCAL GOVERNMENTS OVER 10 YEARS, PRESENT VALUE	$218	$4.4 million
SAVINGS BY HOMEOWNERS OVER 10 YEARS, PRESENT VALUE	$1,099	$22.1 million

The Green Values calculator (http://greenvalues.cnt.org/) was used to make these estimates. The website allows different scenarios to be tested. For this example, it was assumed that rain gardens, native landscaping, additional trees, and swales would be used in new developments. The savings depend on a number of factors, including lot size, which can be explored using the calculator.

Integration of Green Infrastructure into Rehabilitation and Replacement Projects

Much of the watershed is already developed and there will be substantial demands for the rehabilitation and replacement of public infrastructure and facilities over time. These infrastructure needs should be routinely evaluated for opportunities to replace traditional gray infrastructure with green infrastructure that can help to solve existing stormwater quantity and quality problems. Communities that embrace green infrastructure for retrofit and replacement projects, as well as public facilities like police and fire stations, will serve as role models for the type of development they want to see in their communities. At the same time these projects may create a unique sense of place that could provide the community with a marketing advantage in attracting desirable development as the current recession eases. Lastly, the communities will realize cost-savings due to longer life cycles of green technology. As examples:

A. During roadway resurfacing or sidewalk/curb work, it might be relatively inexpensive to install improved catch basins.

B. Work on roads with open drainage or room in the right-of-way also present opportunities to direct runoff into small wetland treatment areas or rain gardens and bio-swales.

C. Parking lot resurfacing or reconstruction may provide an opportunity to direct runoff to pervious areas, particularly filter strips and bio-infiltration areas rather than into the storm sewer system.

D. Permeable paving should be investigated as an option to conventional paving where pavement is being replaced in parking lots and low-traffic local roads.

The plan recommendation is for communities to institute a policy as part of the formal capital improvement program to incorporate green infrastructure designs. The detailed project recommendations included in this plan (short-term implementation plan below) are only examples of projects that should be implemented within the watershed. Therefore, watershed communities should implement the example and other similar projects over a reasonable schedule and fully integrate green infrastructure concepts into their existing infrastructure rehabilitation and replacement programs. To facilitate the implementation of this recommendation, watershed communities are encouraged to collaborate on the development of a consistent and structured mechanism to guide this process.

A.

B.

C.

D.

Incentives for Effective Stormwater Management

Incentives for using green infrastructure practices should be included in local stormwater management programs. Under current stormwater ordinances, many kinds of gray infrastructure are still required even if alternative green infrastructure is used on-site. Similarly, many green infrastructure practices are able to retain runoff on-site, at least temporarily. These practices, such as the storage provided in the gravel base layer under a permeable parking lot, should reduce the detention required under current ordinances. Therefore, elimination of redundant stormwater controls incentivizes green infrastructure practices by allowing reduction of the size and length of storm sewers and the size of detention. Conservation design approaches that emphasize the use of a range of green infrastructure practices are sometimes incentivized with density bonuses, allowing the developer more lots or square footage of commercial development as a trade-off for advanced designs that exceed minimum standards. Municipalities and the County are encouraged to revise their ordinances or develop programs to permit appropriate cost savings for projects that incorporate green infrastructure.

Livable Communities

An important way to protect Hickory Creek has less to do with drainage engineering and more to do with planning. Under a "livable communities" approach to local planning, municipalities specifically encourage development to be designed so that it is walkable and planned in such a way that residents can readily use public transit for many trips if they choose to do so. This means that more development would be located near transit and somewhat more compact than in the past. Furthermore, municipalities can also encourage redevelopment on underutilized sites, although this must be balanced with the need to protect community character. The benefit to Hickory Creek is that the amount of land developed per new household is reduced, meaning that stormwater runoff will also be reduced.

Many of the comprehensive plans in the watersheds have been updated fairly recently. Nearly all of the plans recognize the importance of a mix of land uses, particularly the preservation of density and redevelopment in downtown areas and several of the plans go a step further and embrace various forms of compact, contiguous development, as important themes of their plans. Additionally, several of the reviewed land use plans specifically address reducing impervious surfaces through better urban

The problem with imperviousness

Almost every study that has investigated the issue has indicated that increasing imperviousness in a watershed is correlated with a decline in stream quality, as measured by any number of parameters. However, it is possible to reduce the effects of imperviousness by literally "disconnecting" it, so that roofs drain to rain gardens or roadway drainage leads into swales. One of the most important things that green infrastructure does is prevent runoff from directly entering streams and lakes. Another major approach to reducing imperviousness is simply to build more compactly, putting the remaining land under permanent protection.

design. In many cases, though, ordinances have not been updated to reflect these plans' visions of future growth and design. Municipalities should be encouraged to make these recommended improvements to their comprehensive plans and implementing ordinance improvements, specifically to encourage and require compact/contiguous development and impervious area reduction strategies.

Municipal Wastewater Treatment

Wastewater treatment plants in the watershed are run very well, with high operating standards and few numeric effluent violations for regulated pollutants. However, these discharges are estimated to contribute approximately half of the nutrient load (total nitrogen and total phosphorus) in Hickory Creek, as nutrient removal processes are not included in most plants. Phosphorus removal processes should be implemented at expansion, during major renovation projects, or at the time of permit renewal, and nitrogen removal processes should be considered equally important. The future loading analysis demonstrated that even with a near-doubling of discharge flows, the nutrient loads from the WWTPs could be reduced by 13 – 56 percent for total nitrogen and 46 – 73 percent for total phosphorus by implementing conventional nutrient removal processes.

Upcoming wastewater projects

The Village of Mokena will be implementing biological phosphorus and nitrogen removal processes as part of its upcoming wastewater treatment plant expansion. The expanded facility is expected to be operational by 2013. The Village of New Lenox has also agreed to implement phosphorus removal processes in conjunction with its plant expansion/permit renewal at New Lenox STP #1.

New Lenox #1 plant

In addition to the implementation of improved nutrient removal, wastewater dischargers (mostly municipalities) should implement non-point source pollutant control projects and make the policy changes recommended elsewhere in this plan. Wastewater treatment plants are also encouraged to incorporate constructed wetlands as a polishing process so that final effluent receives the added benefits of total phosphorus and total nitrogen reductions. Municipalities should institute indoor water conservation programs to reduce wastewater volumes or continue promotion of such programs if they have already begun. Similarly, they should continue to aggressively pursue inflow and infiltration reduction.

Septic System Inspections

Septic systems located within the watershed appear to be producing nutrient loads and possibly pathogens that enter surface waters flowing into Hickory Creek or its tributaries. All septic systems will eventually fail, especially if they are not maintained, resulting in insufficiently treated wastewater leaving the site. For areas where connections to a municipal collection system are not practical, it is recommended that the municipalities and/or the county consider adopting ordinance language to require the inspection of existing septic systems. A practical timing mechanism for these inspections would be when a property is sold. The key elements of the ordinance revisions should be:

1) inspections are initiated by a tangible timing mechanism, such as a property sale;

2) existing septic systems are inspected to ensure that the system is functioning properly and is sized appropriately based on number of occupants, as represented by the number of bedrooms and/or use;

3) site soils are suitable for the installed system; and

4) the relationship of existing systems to other systems will not have a negative cumulative effect on public health or water resources.

Stream and Natural Area Maintenance and Restoration

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

The recommendation for the Hickory Creek watershed is that communities should work cooperatively with park districts, the Forest Preserve District, and private land owners in the long-term ecological management of stream corridors, wetlands, and upland natural areas. In particular, watershed communities should work cooperatively with the Will County Stormwater Committee to implement a regular stream maintenance program that balances improved conveyance with habitat considerations.

Chloride Reduction Program

The preferred approach for addressing chloride loading within the watershed is through source reduction, which can be separated into two components to target chloride loadings from roadway deicing activities and from commercial and residential sources. The watershed communities should review their own deicing practices and seek to improve them, with the expectation of reducing salt application and saving money. The watershed communities should also collaboratively develop an education and outreach program targeted at commercial applicators of deicing products within the watershed. Elements of the program should be to:

1) determine the products and typical application rates and approaches currently being used and

2) identify and disseminate information on alternative products and approaches that reduce chloride loading within the watershed, but are effective for snow and ice removal.

Savings on salt

In the winter of 2008-2009, the Village of New Lenox began to employ alternative deicing products and approaches, including the use of salt brine and organic deicer for pre-treatment prior to winter storm event. Analysis of data provided by New Lenox indicates that the village reduced chloride application by approximately 655,000 pounds, or 19 percent.

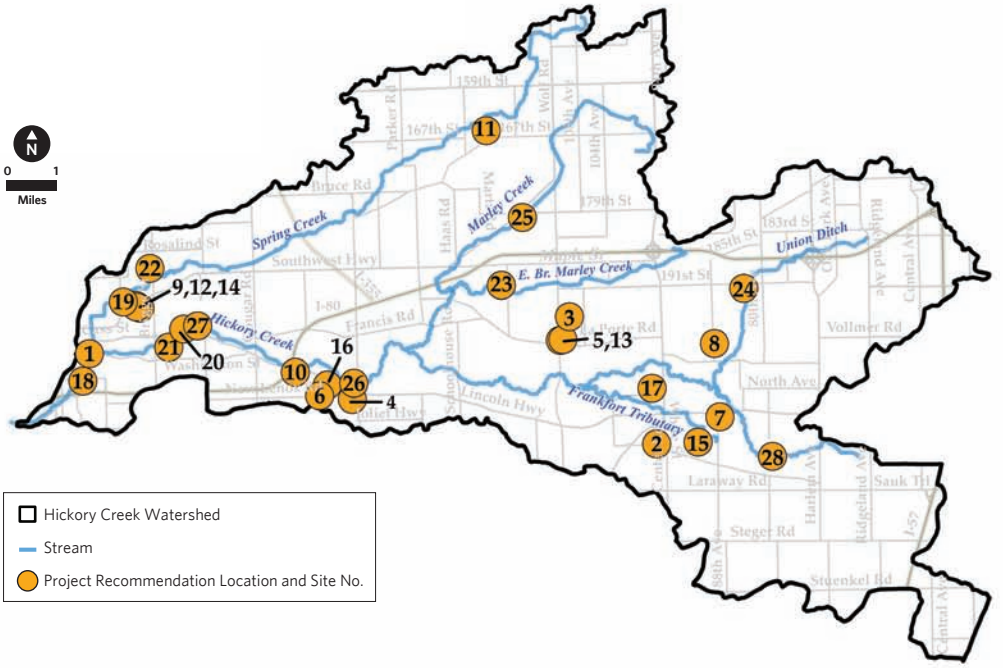
Short-Term Implementation Plan

Based on the findings of the watershed assessment and reconnaissance conducted during the development of this watershed plan, numerous opportunities were identified to implement projects throughout the watershed with the goal of protecting and restoring Hickory Creek and its tributaries. Three kinds of projects are proposed:

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

The short-term implementation plan is not intended to exhaustively list every potential project, but rather proposes representative projects that could reasonably be implemented within the next five years. These proposed projects can also be seen as *examples* that stakeholders should utilize to conceptualize other similar projects in the watershed. Many of the recommended projects are located on public properties, and a public entity, such as a village or park district, is identified as the project lead or champion. Projects on public properties have a higher likelihood of being implemented within the timeframe of the short-term implementation plan. Additionally, many of the projects are located in areas where, with proper signage, the general public can learn about the benefits of the projects.

Project recommendation locations for Hickory Creek Watershed



Urban Stormwater Infrastructure Retrofits

Many of the recommended projects include urban stormwater controls, since approximately half of the watershed has been developed. In the developed part of the watershed, stormwater is generally routed directly from impervious surfaces to stormwater collection and conveyance systems with minimal opportunity for water quality treatment or stormwater volume reductions. The recommended urban retrofit projects (Projects No. 1 through 18) are intended to provide examples of projects that should be implemented in urban areas to allow for pollutant removal or stormwater volume reductions. The types of retrofit projects recommended in the plan include: filtration, permeable pavement, bioretention, vegetated swales (conveyance), detention basin, and b uilding retrofits.

Eroding Channel, Silver Cross Hospital, Joliet

Stream Channel and Riparian Corridor Restoration

1. Dam Modification

Dams can significantly alter the physical, chemical and biological characteristics of a stream The effects of dams on the stream corridor often include barriers to fish passage, disruption of in-stream sediment transport processes, accumulation of sediment and associated pollutants (e.g., various metals, phosphorus, etc.) in the dam impoundments, changes in water temperature, and highly variable dissolved oxygen levels creating adverse conditions for aquatic organisms. Often the original use of the dam is no longer justified and the current owners are responsible for maintenance of the structures and the associated liability. Dam modification projects are often complex, long-term projects that require extensive collaboration between the landowner, permitting agencies, the general public, and other stakeholders. Recommendations for the modification of two dams (Projects No. 19 and 20) are provided in the plan to improve and restore Spring Creek and Hickory Creek.

Dam on Hickory Creek at Pilcher Park

2. Stream Channel Protection

Instability of stream channels was observed in numerous locations during the watershed reconnaissance effort. This evidence included portions of the stream channels with variable degrees of stream bank erosion, ranging from moderate to severe. These eroding stream banks and degrading (i.e. downcutting) stream channels can be a significant source of sediment and sediment-bound nutrients. Eroding stream banks and degrading channels can also detrimentally affect property and infrastructure. Two project recommendations stream bank stabilization are provided in the plan (Projects No. 21 and 22).

Severe erosion threatening roadway, Hickory Creek at Hillcrest Road

3. Stream and Wetland Restoration

One of the objectives of the watershed reconnaissance effort was to identify opportunities within the watershed for stream restoration. The primary method for identifying these opportunities was through the physical stream characteristic assessment. From this assessment, a few stream segments stood out as having relatively degraded physical stream characteristics in several of the assessment categories. Opportunities for associated wetland restoration activities were also identified and are reflected in the project recommendations. Stream restoration project recommendations (Projects No. 23 through 25) were identified in segments in Union Ditch, East Branch of Marley Creek and Marley Creek.

East Branch of Marley Creek at Townline Road, Mokena, a candidate for full stream restoration

4. Buffer Establishment

Riparian buffers are vegetated areas next to streams that protect the waterbody from nonpoint source pollution, provide bank stabilization, and provide aquatic and wildlife habitat. Ideally riparian buffers should be composed of native vegetation including grasses or trees, or both. Along many reaches of the stream channels within in the Hickory Creek watershed, the riparian corridor has been impacted by human activities. Three project recommendations (Projects No. 26 through 28) are for the establishment of riparian buffers along Hickory Creek.

Buffer establishment needed in western portion of Pilcher Park

Agricultural Best Management Practices

Approximately one quarter of the watershed area remains as agricultural land, and this land is estimated to be a significant contributor of nutrients and sediment to the Hickory Creek watershed. Therefore, practices that reduce pollutant contributions from agricultural areas are an important element in the restoration and protection of Hickory Creek and its tributaries. A wide-variety of agricultural best management practices exist and much of the agricultural land within the Hickory Creek watershed is managed using some of these practices (e.g., no-till). However, opportunities were identified to implement two practices not commonly used in the watershed, or northeastern Illinois These practices are constructed wetlands and denitrifying bioreactors. Two demonstration-scale project recommendations (Projects No. 29 and 30) for these practices are provided in the plan.

Education and Outreach

1. Cultivate an Adult Volunteer Group and Hire a Watershed Coordinator

Probably the only way to assure sustained work to protect and improve Hickory Creek is to form a "Friends of Hickory Creek" (or similarly named) group with stable sources of funding. In fact, an active and effective citizen group is more important to improving Hickory Creek than anything else. Given the existing volunteer programs within the watershed, the Friends of Hickory Creek could help most by generating more interest in volunteering, and especially encouraging new site stewards (advanced volunteers with some working knowledge of restoration who can lead teams of other volunteers) to come forward. Partly this can be done by helping to market the volunteer program. While a spirit of volunteerism needs to animate a Friends of Hickory Creek group, a paid staff person or an organization — the watershed coordinator — will still be needed to get work done. Most other successful watershed groups have hired at least a part-time coordinator, generally funded through a combination of grants and membership dues.

2. Forge Connections with Institutions Working at The K-12 Level

True long-term improvement of Hickory Creek (and any other environmental asset) requires teaching youth to care about it and protect it. It may be possible to develop specific projects or workdays to improve Hickory Creek or upland areas that students could "plug into." The Boy Scouts have at least two relevant merit badges — Soil and Water Conservation and Environmental Science — the requirements of which are already being fulfilled through projects with the FPDWC. Similarly, the Girl Scouts have interest projects such as "Eco-Action" which could call for local volunteer work by girls in the program.

3. Forge Connections with Research Institutions and Post-Secondary Education

Hickory Creek has been the setting for ecological research for almost a century. As noted earlier in this plan, Hickory Creek is a "classic biological study area." In line with that status, the Hickory Creek group should seek to build connections with research institutions so that the knowledge of scientists can enrich volunteer stewards, while scientific understanding can be given practical application through engaged research. Hickory Creek is a good candidate for a BioBlitz — part contest, part festival, part educational event, and part scientific endeavor, a BioBlitz brings together scientists in a race against time to see how many species they can count in a 24-hour biological survey of a natural area.

4. Collaborate with Recreational User Groups to Protect and Restore Hickory Creek

Hickory Creek is fairly small and does not see many recreational boaters, but canoeists and kayakers do use it. The lower reaches of Hickory Creek have Class II and III rapids in high water, making it a fairly rare treat for whitewater enthusiasts in the Chicago area. The Prairie State Canoeists or Illinois Paddling Council may have members who are willing to become volunteers in the Friends of Hickory Creek group proposed above. Anglers are another group that may have an interest in protecting and restoring the stream. Fishing does have some organized interests, such as the Illinois Smallmouth Alliance, which besides advocacy also provides small grants for conservation projects that support smallmouth.

5. Establish a Sense of Place along Hickory Creek

People will only feel a protective affection for a place, in this case a watershed, if they know when they are in that place, what that place is, and why it is special. Giving the Hickory Creek watershed and the stream itself a higher profile will be a long-term effort, involving the sustained work of the adult volunteer group recommended above as well as by major landowners in the watershed. To that end, The Center for Neighborhood Technology and Joel Greenberg have drafted a text called *The Lessons of Hickory Creek*, an exciting and informative history of the Hickory Creek area. The work awaits final editing and conclusions. Its publication could be accomplished with participation by the Will County Historical Museum. Similarly, several of the extensive forest preserve holdings along Hickory Creek were obtained as part of early flood control projects. This history, along with information about the landforms thereby protected, could be the core of interpretive signage within the forest preserves that do not have it.

6. Facilitate Peer-to-Peer Exchanges for Local Elected Officials

The HCWPG has had success in engaging senior staff from local governments, including municipalities, county departments, the FPDWC, and park districts. It has not focused as much on engaging elected officials directly, but this will be crucial in implementing the plan. An appropriate way to start would be presentations to a meeting of the relevant Council of Governments (COGs), either by one of the mayors or village presidents, or by staff involved in developing the plan. The relevant COGs include the Southwest Conference of Mayors, the Will County Governmental League, and the South Suburban Mayors and Managers Association.

7. Education for MS4 Requirements and to Support Ordinance Changes

The 1987 amendments to the Clean Water Act brought urban drainage under the NPDES program, thereby regulating "municipal separate stormsewer systems" (or MS4s) as point sources. The small MS4 stormwater management program requires six minimum control measures, among which is engaging public education and outreach regarding stormwater quality. It seems logical that this required public outreach should be done on a watershed wide basis, for example by the "Friends of Hickory Creek" group and its paid watershed coordinator. Then each municipality could sponsor these education efforts without having to carry out its own outreach program, while the watershed-wide education program could be expected to be more effective than one done for individual communities.

Plan Implementation and Monitoring

Implementation Schedule and Milestones

While developing a watershed plan is a critical step in the watershed management process, the plan is of little use for the protection and restoration of Hickory Creek and its tributaries unless the recommendations in the plan are implemented. The overall implementation timeframe for many of the recommendations in this plan is five years, with the expectation that the watershed plan would be revisited in 2016.

For the recommendations related to comprehensive plans and ordinances, the expectation is that staff and elected officials from each community, with assistance from CMAP or consultants, would establish an appropriate course of action for their community to integrate the policy recommendations within the next five years. Additionally, the implementation of the recommended education-related programs will be greatly assisted by hiring at least a part-time watershed coordinator. The expectation, again, is that many of the recommended programs should be implemented within five years. The short-term implementation plan provides a set of tangible, on-the-ground projects that should be implemented with the recommended five-year timeframe, with a few exceptions. Measurable milestones for the implementation of the various plan elements are provided in the plan.

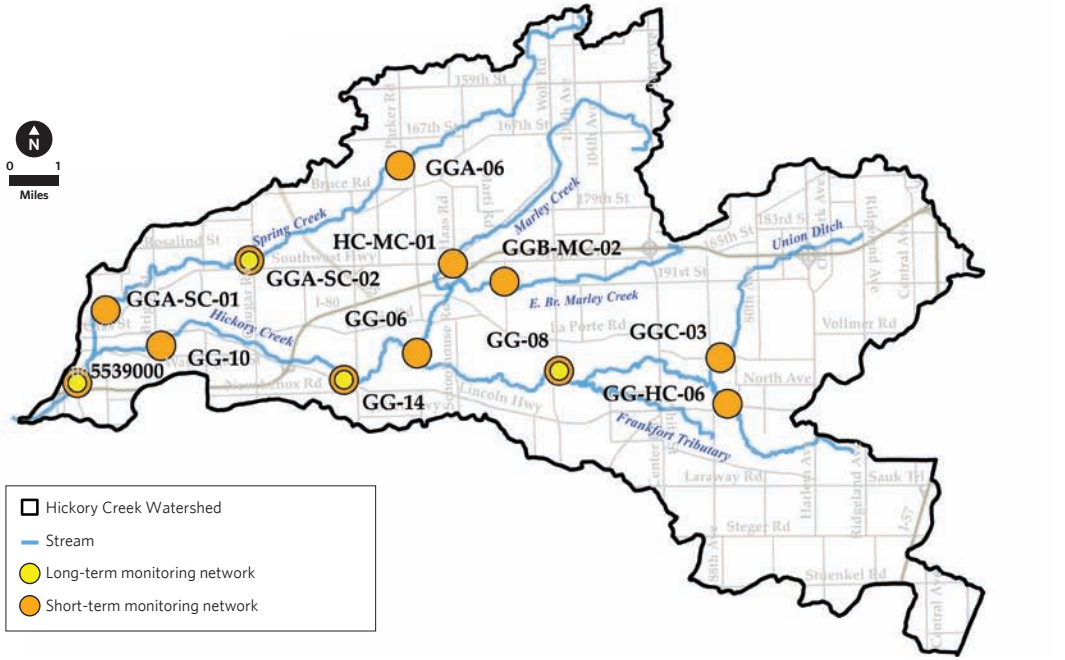
Monitoring Plan

Unlike many other watersheds of a size similar to the Hickory Creek watershed, a relatively large amount of physical, chemical, and biological data exist for the watershed. However, many of the data were collected either at limited locations, over short time periods, or for very specific purposes such as evaluating conditions upstream and downstream of wastewater treatment plant discharges. Less attention has been paid to following a sample design that would maximize information about conditions in the stream network as a whole.

Additional monitoring within Hickory Creek and its tributaries is recommended to assess in-stream conditions more accurately, improving both the temporal and spatial representativeness of the data. This will allow decision-makers within the watershed to determine long-term trends and to improve characterization of different sources of pollutants in the watershed. To accomplish this, a two-part monitoring plan is recommended:

1. **Short term.** An intensive monitoring and assessment effort would be conducted over an approximately one-year period to establish a watershed-wide baseline condition near the onset of plan implementation and to evaluate stream conditions at a finer resolution, making it possible to identify more accurately portions of the stream with elevated pollutant loading or other impaired conditions.
2. **Long term.** The long term monitoring plan is meant to collect data to allow assessment of stream conditions as they change over time. The combined data from the long-term and short-term monitoring plans would allow watershed stakeholders to evaluate indicators within the watershed to gage watershed improvements over the longer term.

Recommended monitoring networks for Hickory Creek Watershed



Achievement of Needed Load Reductions

In an effort to evaluate the effectiveness of the plan, the estimated actual load reductions from the recommended projects and policies were compared to the load reductions estimated to be needed. For nutrients and sediment, the comparisons were performed based on whether in-stream flows were expected to be dominated by point sources or non-point sources. The comparisons indicate that, through implementation of the recommended measures to address point source contributions of nutrients (WWTP improvements and reducing septic system failure rates), significant progress can made be toward achieving the needed load reductions under the point source dominated flow regimes.

Under the nonpoint source dominated flow regimes, the comparisons indicate that measures in addition to those presented in the short-term implementation plan are required to make significant progress toward achieving the needed load reductions. The relatively high load reductions needed for nutrients and sediment present a challenge to achieving the targets through the implementation of a limited number of projects in the short term. These findings further support the vision and policy recommendations intended to address pollutant contributions in the longer term.

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Photo shows the dam on Hickory Creek at Pilcher Park. The plan proposes to study this dam and modify it to restore the natural functions of the creek, including fish passage, sediment transport, and water quality. See discussion of Project #20 in full plan.

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