1. Introduction

1.1 Purpose

The Lower DuPage River Watershed Plan serves as a first step in addressing water quality impairments and preventing further degradation within the watershed. This plan identifies stakeholders, problems, solutions and funding sources to improve water quality within the Lower DuPage River watershed.

1.2 Watershed Overview and Location

The DuPage River, consisting of the East and West Branches as well as the Lower DuPage, is the largest tributary to the Des Plaines River Basin, covering 353 square miles. The Lower DuPage River watershed covers 168 square miles and encompasses portions of 14 municipalities. The majority of the watershed is within Will County, although portions of the watershed are also in DuPage, Grundy, and Kendall Counties. There are 166 stream miles within the watershed.

Figure 1-1: Location map showing the Lower DuPage River watershed in north east Illinois

This watershed is unique in that it is not a true headwater stream; the Lower DuPage begins at the joining of two other rivers. The Upper DuPage River watershed, that of the East and West Branches combined, is highly urbanized and therefore exerts great influence over the downstream water quality of the Lower DuPage. The watershed is also unique in that the Illinois Environmental Protection Agency (IEPA) includes a portion of the Illinois and Michigan Canal, a manmade canal originally built for the transport of goods from Lake Michigan to the Mississippi River, as a part of the watershed.

The Lower DuPage River begins at the confluence of the East and West Branches DuPage River, at the border of DuPage and Wheatland Townships on public properties owned by the Naperville Park District and the Forest Preserve District of Will County, called the DuPage River Confluence Preserve. The river travels southwest through portions of Naperville and Bolingbrook before joining with Spring Brook east of Plainfield Naperville Road and north of Boughton Road in Naperville. The Lily Cache is another major

tributary of the Lower DuPage, originating in Darien and Woodridge and flowing southwest through Bolingbrook and Plainfield before meeting the main stem in Joliet, north of Caton Farm Road and west of Interstate 55. Mink Creek is a tributary located in the middle section of the watershed, originating in unincorporated Will County, flowing through portions of Romeoville and Rockdale before flowing into the Lily Cache in Plainfield, north of Joliet Road (Route 30) and west of Interstate 55.

Rock Run Creek is the tributary south of Mink Creek, originates in Crest Hill and flows southwest through Joliet and unincorporated Will County before meeting the Illinois and Michigan Canal, south of Mound Road and east of Interstate 55 in unincorporated Will County. The portion of the Illinois and Michigan Canal that is within the Lower DuPage River watershed originates where the Canal separates from the Des Plaines River in Joliet, east of Brandon Road and south of Railroad Street (Route 6) and follows southwest through portions of Joliet, Channahon and unincorporated Will County before flowing into the main stem.

South of where the Lily Cache flows into the main stem, the river flows south through portions of Joliet, Shorewood, Channahon, Minooka and unincorporated Will County before flowing into the Des Plaines River north of Walnut Lane and east of the Illinois and Michigan Canal Trail near the border of Kendall and Will Counties in the Illinois Department of Natural Resources' (IDNR) Illinois and Michigan Canal State Park. The Channahon Dam is located 0.5 miles upstream from the confluence. Another dam within the watershed is the Hammel Woods Dam in the Hammel Woods Forest Preserve in Shorewood.

There are many other smaller tributaries, which by incorporating natural drainage divides, are the basis for the 12 subwatersheds. The creation of the subwatersheds was done in order to separate the watershed into more manageable units and to better identify specific impairments. The subwatersheds also take into account a previous subwatershed delineation by IDNR, the *Strategic Sub-Watershed Identification Process: maximizing Benefits of Ecosystem Management DuPage River Coalition* completed in 2005. This report divides the Lower DuPage watershed into over 40 subwatersheds, which was deemed too many for the purposes of this plan. However, IDNR's subwatersheds were only combined to create the 12 subwatersheds in this plan; they were not divided. The 12 subwatersheds are numbered from north to south.

The United States Geological Survey (USGS) divides the country into local drainage basins called Watershed Hydrologic Unit Code or HUCs. The HUC for the Lower DuPage is 0712000408. The IEPA uses Assessment Unit Identification (AUID) codes to identify waterbody segments and lakes. The following AUIDs are found in the watershed:

Table 1-1: Assessment Unit Identification Codes for Stream Segments and Lakes

Waterbody Name	AUID	AUID Size	Units
DuPage River	IL_GB-01	8	Miles
DuPage River	IL_GB-11	9.81	Miles
DuPage River	IL_GB-16	10.39	Miles
Illinois and Michigan Canal	IL_GBA	5.17	Miles
Lily Cache Creek	IL_GBE-01	7.56	Miles
Lily Cache Creek	IL_GBE-02	9.56	Miles

Mink Creek	IL_GBEA	5.64	Miles
Rock Run	IL_GBAA-01	9.63	Miles
Spring Brook	IL_GBKA	1.87	Miles
Spring Brook	IL_GBKA-01	3.55	Miles
Arbor	IL_RGZI	14.7	Acres
Big Heritage	IL_SGJ	5	Acres
Joliet Junior College	IL_WGZX	11	Acres
Renwick Lake East	IL_WGI	330	Acres

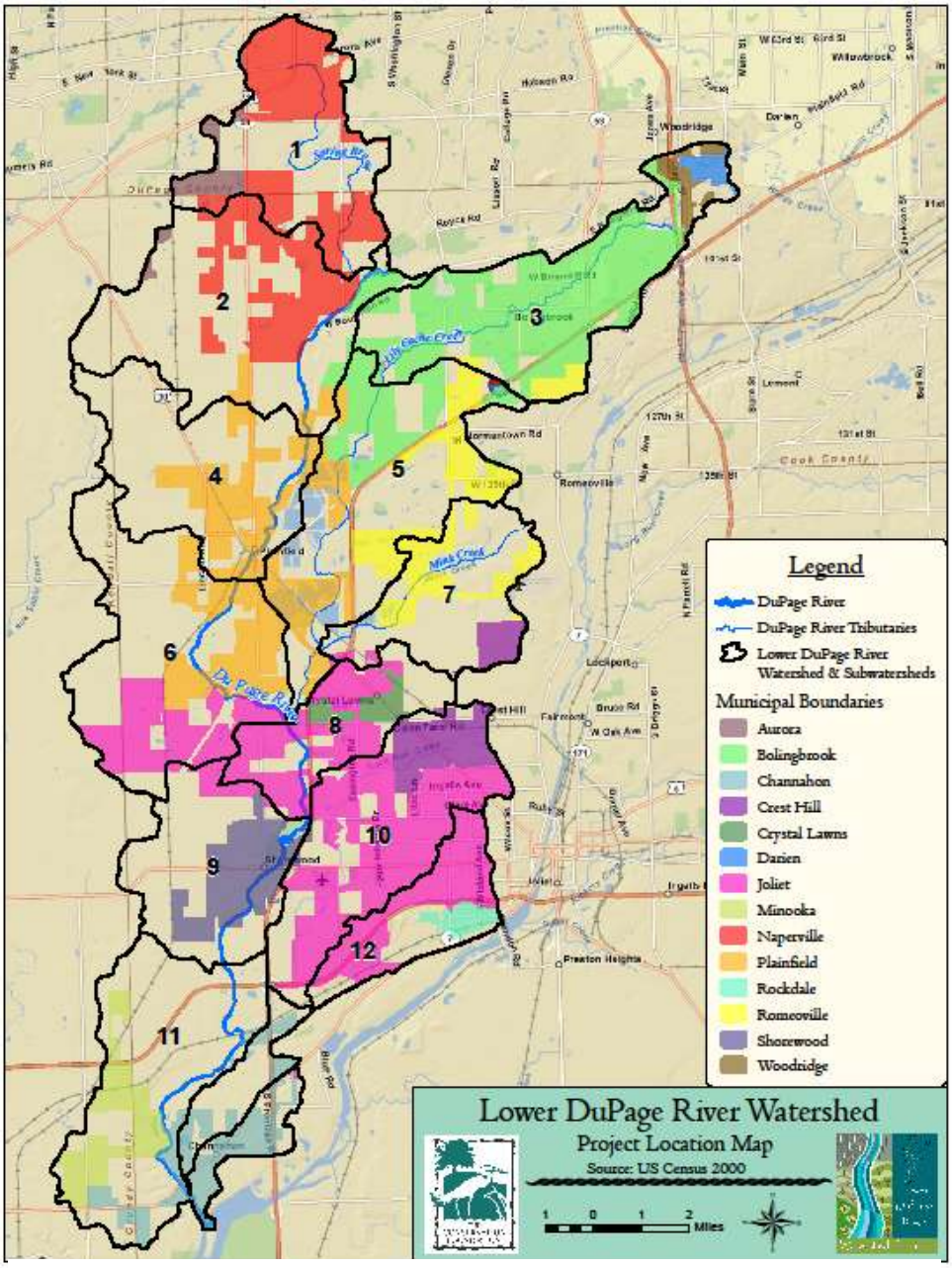

Figure 1-2: The Lower DuPage River Watershed divided into 12 subwatersheds and with municipal areas shown

The primary land uses in the watershed are agriculture and residential, covering approximately 30% of the watershed area each. Public land in the watershed is owned and managed by a variety of different entities, mostly the Forest Preserve District of Will County and various park districts. Public lands in the watershed include the DuPage River Park (Naperville Park District); Springbrook Prairie (Forest Preserve District of DuPage County); Riverview Farmstead, Lake Renwick, Hammel Woods, O'Hara Woods and McKinley Woods (Forest Preserve District of Will County); Community Park and Remington Lakes (Bolingbrook Park District); Settlers' Park and Electric Park (west) (Village of Plainfield); Electric Park (east), Eaton Preserve, Riverview Park, Mather Woods, Renwick Community Park, Vintage Harvest Park, Streams Recreation Center, Riverwalk Park, Van Horn Woods, Riverside Parkway and Sunset Parkway (Plainfield Park District); West Shore Park, Little Coyote Park, Gabrielson/Oakwood Park, Shorewood Park and Seil Road Park (Village of Shorewood); Community Park and Chanooka Canoe Launch (Channahon Park District, the canoe launch is a partnership with the Villages of Minooka and Channahon); and Channahon State Park (Illinois Department of Natural Resources).

There are four segments that are listed as impaired, or not meeting their designated uses, including the entire main stem and the upper segment of the Lily Cache (IL_GBE-01). Total maximum daily loads (TMDLs) are currently being developed by IEPA for all three mainstem segments: silver for the lower mainstem segment (IL_GB-01), chloride and fecal coliform for the middle main stem segment (IL_GB-11), and dissolved oxygen and fecal coliform for upper mainstem segment (IL_GB-16).

1.3 Importance to the Reader

This watershed plan will serve as a large first step towards improving water quality. The plan will identify current and future problems in the watershed and propose possible solutions. Means of implementing the solutions will be examined as well in order to leave the reader with as complete a resource as possible.

Through the voluntary participation of members of the community that are concerned about water quality and desire concrete plan to improve the situation, the stakeholders determined that the overall goal of the Lower DuPage River Watershed Coalition (Coalition), the stakeholder group, is to protect and manage watershed health as measured by chemical, physical and biological integrity and through education and communication.

1.4 Project Background

A watershed plan for the Lower DuPage had not been created in the past. The entire DuPage River watershed has been examined by IEPA and IDNR, as detailed in Integrated Reports and the SSIP. However, there is a need for a more detailed and in depth study of a manageable subwatershed. The Conservation Foundation (TCF) applied for Clean Water Act Section 319 funds to complete a watershed plan for the Lower DuPage in 2008. Funding was not received under this grant. However, CMAP subsequently approached TCF with funds for the project provided by IEPA through Section 604b of the Clean Water Act and the American Recovery and Reinvestment Act of 2009.

The Conservation Foundation has a strong background in watershed planning, having completed watershed plans for the Upper DuPage, Aux Sable Creek, Tyler Creek and Big Rock Creek previously. We have also participated in numerous watershed groups and ecosystem partnerships including Blackberry Creek, Mazon Creek, the Upper DuPage Ecosystem Partnership, the Fox River Ecosystem Partnership, the Lower Des Plaines Ecosystem Partnership and the Prairie Parkland Ecosystem Partnership. Local buy in and support for watershed protection and enhancement is critical for success in any watershed as well as having professional staff to coordinate, organize and provide technical support throughout the planning and implementation process.

In order to accomplish things efficiently and effectively, the Coalition has organized a Steering Committee to make decisions and provide overall direction for the plan. The Steering Committee consists of representatives from all stakeholder groups willing to participate, including governmental representatives, wastewater treatment plants, and the environmental community. A Technical Committee has also been selected to support the Coalition through technical information. The Technical Committee is composed of the consultant, V3 Companies, who has completed the pollutant load analysis.

The plan is subject to criteria required by the U.S. EPA and CMAP as detailed below:

Nine minimum elements of watershed plan and section of this plan where addressed

Element Section

(a) An identification of the causes and sources that need to be controlled to achieve pollutant load reductions estimated in this plan;

(b) An estimate of the load reductions expected for the management measures described under (c) below;

(c) A description of the nonpoint source management measures that will need to be implemented to achieve the load reductions estimated under (b) above;

(d) An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan;

(e) An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented;

(f) A schedule for implementing the nonpoint source management measures identified in this plan;

(g) A description of interim, measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented;

(h) A set of 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; and

(i) A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item (h) above.

B-MAG outline for a locally developed watershed plan

1. Inventorying and Assessment (more detailed than the State plan drawing on local information)
    a. Describe sources of water quality degradation;
    b. Identify current land uses;

c. Assess existing local regulations; and,

d. Describe and/or quantify existing protections such as NPDES permits, Phase II plans, existing ordinances, CRP and CREP acreage, etc.

2. Estimation of Future Needs and Concerns

a. Estimate twenty-year (or different time period, as appropriate to the planning area) growth patterns and land uses;

b. Estimate expected changes in sources of degradation in water quality ; and,

c. Identify funding, site-specific projects, policy changes and other resources needed to continue and expand (if necessary) protection programs.

3. A Vision For The Watershed

a. Outline issues and opportunities, incorporating local communities' comprehensive and other plans;

b. A vision for wastewater treatment and water supply and possibly other infrastructure;

c. A vision for land use; and,

d. A vision for protection and/or restoration of water quality.

4. Plan for Implementing the Vision

a. Identify a plan for protection and/or restoration of water quality;

b. Identify steps needed to achieve surface water quality protections;

c. Identify steps needed to protect groundwater quality;

d. Estimate pollutant reductions that will be achieved through implementing protections;

e. Identify tools that could be used to achieve these goals;

f. Identify monitoring and enforcement tools for use by state and local officials;

g. Identify the amount of funding and technical assistance needed to implement the watershed plan, possible funding and technical assistance sources, site-specific projects, policy changes, and steps to secure the needed resources;

h. Identify ways to ensure consistency with local communities' plans; and,

i. Set a schedule for implementing the actions identified in steps a. through h.

5. Metrics for Evaluation

a. Identify interim, measurable milestones for determining whether the action steps above are being implemented;

b. Criteria to determine whether pollutant reductions are occurring and progress is being made toward water quality goals; and,

c. A monitoring and evaluation plan to evaluate the effectiveness of the Watershed Plan and its implementation.

1.5 Goals Vision Statement

As stated previously, the overall goal of the Coalition is to protect and manage watershed health as measured by chemical, physical and biological integrity and through education and communication. The Coalition also created goals under each subtopic: biological, chemical, physical and education and outreach.

Biological

- Protect natural resources
- Restore stream health
    - Identify pollutants and sources and how the pollutants affect stream biology

    - Use the Index of Biotic Integrity (IBI) as a baseline indicator of watershed health
- Establish and protect buffers and greenway corridors through the creation of a prioritized map based on quality, restoration potential and other factors
- Protect and restore streambanks and floodplain
- Identify areas for modification/improvements: riffle/pool sequences, shoreline stabilization, reconnection with floodplain (list of potential restoration projects)
- Identify existing open space, potential open space areas for protection, acquisition, easements, parks/recreation
- Reduce eutrophication

Chemical

- Attain data necessary to assess and monitor stream quality
    - Develop and implement a monitoring and analysis program
    - Identify monitoring parameters
    - Establish baseline levels and ongoing program
    - Continue data collection and analysis to measure achievement (monitoring program)

Physical

- Improve recreational opportunities, access and awareness
    - Develop a watershed map identifying stream access points
    - Promote signs identifying natural resources in the watershed
- Reduce flooding and flood damage
    - Identify land for potential conservation easements
    - Identify stream stabilization and restoration projects
    - Ensure that wetland and floodplain maps are accessible
- Reduce erosion
    - Promote native vegetation for streambank stabilization and restoration
    - Promote BMPs to reduce runoff velocity
    - Conduct landowner outreach
    - Look for partner agencies to maximize efforts

Education, Outreach and Communication

- Enhance stewardship in the watershed through education, outreach and communication
    - Extend outreach to the watershed by identifying stakeholders and their interests in the watershed, contacting them and encouraging and measuring participation for the duration of the project
    - Education will be accomplished during the project through the creation of a watershed map, brochure, webpage, and meetings regarding key issues

1.6 Watershed Roles and Responsibilities

List of stakeholders and abbreviations

Chicago Metropolitan Agency for Planning www.cmap.illinois.gov

The Chicago Metropolitan Agency for Planning (CMAP), formerly the Northern Illinois Planning Commission (NIPC), is the regional planning agency in northeast Illinois and is the grantor of the funds for this project. CMAP has experience in watershed planning in the region including writing the Guidance for Developing Watershed Action Plans in Illinois at the request of IEPA in 2007 and serving on the Basinwide Management Advisory Group in 2004, which developed regional criteria for watershed plans. CMAP has a series of model ordinances for stormwater management, soil erosion and sediment control, streams and wetlands, and floodplains for local government use. CMAP can also assist local government in applying for state and federal funding for watershed based projects.

Corporate Landowners

Corporate Landowners, commercial and industrial landowners, can have a large impact on water quality. Although there is not a large land use of commercial or industrial in the watershed, some of these parcels are adjacent to the river, influencing river habitat, floodplain and with runoff discharging directly into the river. A variety of BMPs are available to address these concerns. As commercial and industrial land use continues to develop, BMPs can be integrated into the design and help preserve some of the natural features of the watershed.

County Departments of Transportation/Highway Departments

DuPage County Division of Transportation www.co.dupage.il.us/dot/index.cfm

Kendal County Highway Department www.co.kendall.il.us/highway/

Will County Department of Highways www.willcountyillinois.com/

The county departments of transportation and highway departments are responsible for all county roads, bridges, culverts, and drainage in the Right of Way. They are also responsible for long range planning, maintenance, and coordination for maintenance related projects.

County Forest Preserve Districts

Forest Preserve District of DuPage County www.dupageforest.com/

Kendall County Forest Preserve District www.co.kendall.il.us/forest_preserve/index.htm

Forest Preserve District of Will County www.reconnectwithnature.org/

The local forest preserve districts, the Forest Preserve District of DuPage County, the Kendall County Forest Preserve District and the Forest Preserve District of Will County, acquire and maintain forests and

other open space areas as well as provide educational programming and recreational opportunities to citizens.

County Soil and Water Conservation Districts

Kane DuPage Soil and Water Conservation District (KDSWCD) www.kanedupageswcd.org/

Kendall County Soil and Water Conservation District www.kendallswcd.org/

Will South Cook Soil and Water Conservation District www.will-scookswcd.org/

The local soil and water conservation districts provide resources, technical assistance, and education opportunities to protect and promote the conservation of soil, water and other natural resources. The Kane DuPage SWCD reviews plans and conducts site visits on behalf of IEPA and the U.S. Army Corps of Engineers. The Kendall and Will County SWCDs perform soil erosion and sediment control inspections on behalf of IEPA. The SWCDs can also provide funding assistance to various project that meet certain criteria.

Federal Emergency Management Agency http://www.fema.gov/

The Federal Emergency Management Agency (FEMA) responsible for protecting, preparing, responding to, and recovering from disasters including natural disasters, acts of terrorism and other man-made disasters. FEMA is also in charge of administering the flood mapping and flood insurance programs. FEMA's primary role in the watershed is floodplain and floodway mapping.

Illinois Department of Agriculture

The Illinois Department of Agriculture (IDA) is an advocate for the Illinois agriculture industry and provides the necessary regulatory functions to benefit consumers, the agriculture industry, and natural resources.

Illinois Department of Natural Resources

The Illinois Department of Natural Resources (IDNR) is a state agency that is responsible for the protection, maintenance, and sustainability of all state owned natural and cultural resources. IDNR may offer grants and technical assistance for projects that take place in the watershed. IDNR is also responsible for permitting any floodplain or floodway impacts due to development. The agency also collects data that has been used for the watershed plan including water quality and fish data.

Illinois Department of Transportation

The Illinois Department of Transportation (IDOT) is responsible for the state transportation system and provides and overview of the department's direction for the future.

Illinois Emergency Management Agency

The Illinois Emergency Management Agency (IEMA) is a state agency that is similar to FEMA, with the goal of protecting the citizens of Illinois. The Agency works closely with IEPA and is involved in some aspects of the National Pollution Discharge Elimination System (NPDES) program.

Illinois Environmental Protection Agency

The Illinois Environmental Protection Agency's (IEPA) mission is to safeguard environmental quality, consistent with the social and economic needs of the State, so as to protect health, welfare, property and quality of life. IEPA has requirements and funding sources for watershed planning and implementation projects.

DuPage, Grundy, Kendall and Will Counties

The Counties oversee land that is not incorporated into a municipality, regulating land and development in accordance with county ordinances. Often municipalities have adopted the county ordinance, but have additional restrictions that they enforce. The Counties have collected data for the entire area that is important for the plan. Participation and coordination with county staff and elected officials is crucial to the success of the plan. The Counties may have funds available for implementation projects or may be able to provide technical assistance.

Local Farm Bureaus

The local Farm Bureaus represent the farmers in the watershed. The FB is an organization that provides public advocacy to its members within many levels of government while providing information regarding recent advancements in farming technologies.

Municipalities

The municipalities within and surrounding the watershed are responsible for regulating and maintaining the land within its current boundaries, as well as land that is annexed. Input into the plan from municipal engineers, planners and elected officials is critical to its success.

Park Districts

Local park districts are responsible for maintaining public land and open space within their boundaries. While many park districts tend to maintain ball fields and manicured park space, many of them also have less formal open space areas that include native plantings. Park districts can also serve as a way to educate residents and connect the public with the land. Park districts may serve as excellent partner organizations for implementation projects. Park district staff and elected official input is critical to the success of the plan.

Residents/Landowners

Residents and landowners of the watershed can have a large impact on the quality of resources within the watershed. The ways in which landowners manage their property can greatly affect water quality. There are many projects within this plan which are structured for their participation.

The Conservation Foundation

The Conservation Foundation is a local land and water protection not for profit organization which aims to preserve open space and natural lands, protect rivers and watersheds, and promote the stewardship of our environment. Their role in the plan is to facilitate and write the plan.

Townships

The local townships have the same purpose and role as the municipalities and counties in that they maintain land within their boundaries.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is a federal agency of civilian and military engineers and scientists that plan, design, build, and operate water resources and other civil projects. These projects also include navigation, flood control, environmental protection and disaster response. Two districts govern the watershed, the Chicago district and the Rock Island district. The Chicago district is responsible for the DuPage and Will portions of the watershed while the Rock Island district governs the Grundy and Kendall portions. These districts are the main permitting agency for any proposed project that may impact federally regulated wetlands or aquatic resources.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (USEPA) leads the nation's science, research, education, and assessment efforts. The mission of the USEPA is to protect human health and the environment. The USEPA oversees the IEPA and is often the ultimate funding agency in grant related projects.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) works to conserve, protect and enhance fish, wildlife, plants and their habitats for the continued benefit of the American people. The USFWS is a leader and partner in fish and wildlife conservation, known for its scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

U.S. Department of Agriculture - Natural Resource Conservation Service

The U.S. Department of Agriculture - Natural Resource Conservation Service (USDA – NRCS) is a federal agency that works in partnership with the American people to conserve and sustain natural resources, soil and water. Within the watershed, the local NRCS office may be able to provide technical and

monetary assistance with projects initiated to improve the quality of the Lower DuPage River and its tributaries.

2. Watershed Resource Inventory

The Watershed Resource Inventory is a summary of existing data that has been collected in the past within the Lower DuPage River watershed. The data will be used to characterize the watershed and detail the existing conditions. It is not meant to enumerate all data that has been collected within the watershed, but to highlight important watershed characteristics. It is our understanding that other than Illinois Environmental Protection Agency (IEPA) and coordinating agencies examining the watershed to gather data for Water Quality Reports, the area has not been looked at on a watershed basis.

2.1 Integrated Water Quality Report

Each State must report to the United States Environmental Protection Agency (USEPA) the quality of the surface water (lakes, streams, wetlands) and groundwater resources in their jurisdiction. States must report the quality of their waters in terms of the degree in which the beneficial or designated uses are attained. States are also required to report the reasons or causes and sources of non attainment. IEPA issues the Integrated water Quality Report every two years. The following explains the contents of the report as it relates to the Lower DuPage River Watershed.

2.1.1 Designated Uses

There are seven designated uses in Illinois. Five of the seven designated uses apply to the Lower DuPage River watershed: aquatic life, fish consumption, primary contact, secondary contact and aesthetic quality. For the *2008 Integrated Report*,[1] the IEPA assessed streams in the state to determine if they meet the designated uses. However, not all stream segments were assessed nor were all designated uses assessed. Within the Lower DuPage River watershed at most two designated uses were assessed: aquatic life and fish consumption.

The degree of support or attainment of a designated use is determined by various information including biological (fish and macroinvertebrate data), water chemistry, in stream habitat and toxicity data. Assessed designated uses in a segment are rated as follows:

Fully Supporting (good)

Not Supporting (fair)

Not Supporting (poor)

Waters in which one or more designated use is not fully supported are considered impaired.

The IEPA assessed six segments in the Lower DuPage River watershed, three on the DuPage River mainstem (GB-01, GB-11, and GB-16), two on Lily Cache Creek (GBE-01 and GBE-02) and one on Mink Creek (GBEA). Spring Brook Creek was not assessed. Of the six segments assessed,

[1] http://www.epa.state.il.us/water/tmdl/303d-list.html

four do not meet the assessed designated uses and are listed as impaired, including all main stem segments and one Lily Cache segment. Total Maximum Daily Loads (TMDLs) will be developed for the following parameters in three of the four impaired segments: chloride, fecal coliform and silver. It should be noted that although segments are listed instead of individual monitoring stations, stations are usually identified by the same code as the segment which its data is used for. Most often, the monitoring station is located within the segment.

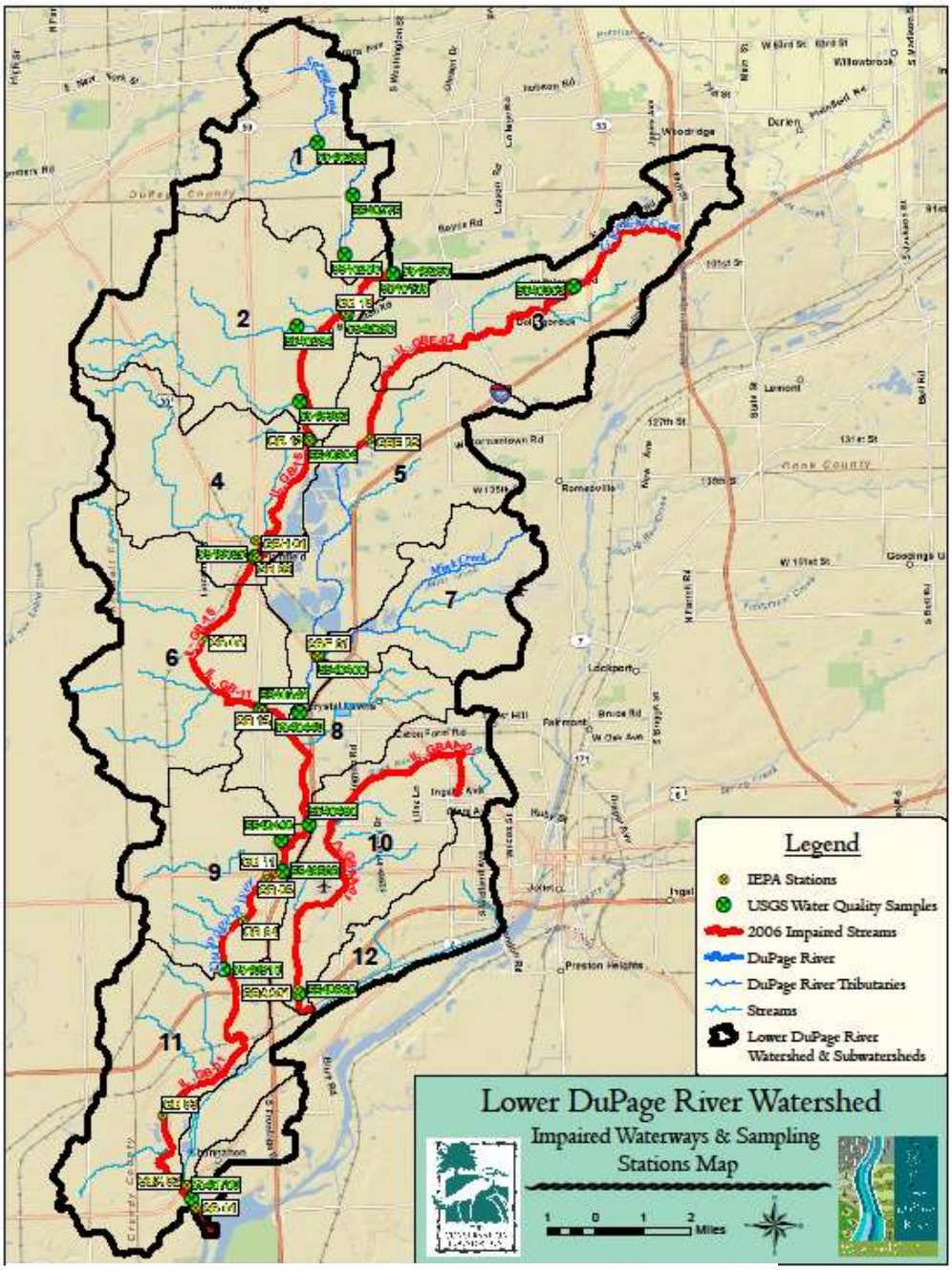

Figure 2-1: Impaired waterways and IEPA sampling sites.

Station Code	Basin	Waterbody	Intersection	County	Township	Range	Section	Quarter Section	Latitude	Longitude
GB-01	GB	DuPage River	Old Route 6 S Channahon	Will	34N	9E	17	NW	41.42039	-88.2275
GB-02	GB	DuPage River	Route 6 Channahon	Will	34N	9E	17	NW	41.42639	-88.2325
GB-03	GB	DuPage River	Minooka Bonita-Vista WWTP, 103 Jardine, 1.6 MI SE Minooka	Will	34N	9E	7	SE	41.44834	-88.2405
GB-04	GB	DuPage River	1 MI S Shorewood	Will	35N	9E	16	SE	41.50726	-88.2081
GB-05	GB	DuPage River	Route 59 Bridge Shorewood Old 66	Will	35N	9E	15		41.51983	-88.1986
GB-08	GB	DuPage River	Renwick Road SW Plainfield	Will	36N	9E	20	NE	41.5923	-88.2244
GB-09	GB	DuPage River	Route 59 at Plainfield	Will	36N	9E	9	NW	41.61685	-88.2025
GB-10	GB	DuPage River	Plainfield-Naperville Road	Will	37N	9E	14	NE	41.69024	-88.1662
GB-11	GB	DuPage River	Route 52 Bridge Shorewood	Will	35N	9E	10	SW	41.52157	-88.1948
GB-12	GB	DuPage River	127th Street 2 MI N Plainfield	Will	37N	9E	26	SW	41.65185	-88.1811
GB-13	GB	DuPage River	Route 59 Bridge 2.5 MI S Plainfield	Will	36N	9E	27		41.57095	-88.2005
GB-14	GB	DuPage River	3 MI N Plainfield	Will	37N	9E	23	SW	41.67222	-88.185
GB-15	GB	DuPage River	N Shorewood	Will	35N	9E	10	SW	41.52222	-88.1939
GB-16	GB	DuPage River	119th Furguson Road, West of Naperville	Will	37N	9E	23		41.66634	-88.1827
GB-18	GB	DuPage River	2 MI N Shorewood at Black Road Bridge	Will	35N	9E	3		41.53611	-88.1814
GB-19	GB	DuPage River	2 MI E Minooka on Shepley Road	Will	35N	9E	33	SW	41.46807	-88.209
GBA-01	GBA	I & M Canal	Spillway DuPage River	Will	34N	9E	17	SW	41.42063	-88.2287
GBA-02	GBA	I & M Canal	Route 6 Channahon	Will	34N	9E	17	SW	41.42764	-88.2309
GBAA-01	GBAA	Rock Run	0.5 MI E I-55/80 Intersection	Will	35N	9E	27	NE	41.48652	-88.1865
GBE-01	GBE	Lily Cache Creek	Route 30 Bridge 1 MI SE Plainfield	Will	36N	9E	23	SW	41.58721	-88.178
GBE-02	GBE	Lily Cache Creek	127th Street NNE Plainfield	Will	37N	9E	36	SW	41.65256	-88.1569
	GBEA	Mink Creek								
GBH-01	GBH	Norman Drain	Route 59 143rd Street Plainfield	Will	36N	9E	10	NW	41.62198	-88.2026
GBJ-01	GBJ	Spring Brook Creek	0.25 MI S Brook Crossings Park on Plainfield-Naperville Road	Will	37N	9E	12	NW	41.70781	-88.1669
GBJ-02	GBJ	Spring Brook Creek	0.25 MI SW Naperville on Plainfield-Naperville Road	DuPage	38N	9E	36	NW	41.73586	-88.1673

Table 2-1: The location of IEPA monitoring stations.

However, a monitoring station can be located outside the segment and there can be multiple monitoring stations for one segment. Data is collected at the monitoring stations by IEPA, the Illinois Department of Natural Resources (IDNR) and other partner agencies on a five year schedule. Data for these impairments were collected in 2003 unless otherwise noted.

2.1.1.1 Aquatic Life

The aquatic life designated use is assessed primarily using biological data. The attainment or non attainment of the aquatic life designated use is decided based on biological, chemical and in stream habitat data. IEPA uses a decision matrix weighing the different factors to determine if a segment is impaired for aquatic life. Specific metrics used to assess aquatic life for the Lower DuPage watershed include the fish Index of Biotic Integrity (fIBI) and the Macroinvertebrate Biotic Index (MBI). Water chemistry and in stream habitat are also taken into account.

The fish Index of Biotic Integrity combines several parameters to measure the health of the area's fish population and ranges from 10 to 60 with higher scores indicating higher quality areas. A value of 41 or below indicates impairment. Fish surveying is a joint effort by IEPA and IDNR. Sampling was conducted in 1997, 2001, 2003 and 2008. If new data was collected for a segment in 2003, it has been used for assessment basis in the *2008 Integrated Report*. If new data was not collected, older data may have been used for assessment purposes.

Station	Segment	1997	2001	2003	2008	Average
GB-19	GB-01	--	42	--	--	42
GB-16	GB-16	--	33	--	--	33
GB-11	GB-11	48	--	45 (2002)	43	44
GB-05	GB-11	--	28	--	--	28
GB-02	GB-01	--	14	--	--	14
GB-01	GB-01	38	48	57	58	50
Average		43	33	44	51	

Table 2-2: Fish IBI scores used to assess aquatic life.

IDNR summarizes the findings of the fish survey in the report entitled *Status of Fish Communities and Stream Quality in the Des Plaines and DuPage Rivers: 2003 Basin Survey*[2]. The report states that stream quality based on fIBI on the DuPage mainstem ranged from Moderate to Limited and dams appear to be limiting factors. For example, site GB-01 is below the Channahon Dam and is directly connected with to the lower Des Plaines River, near the confluence with the Illinois and Kankakee Rivers. This accounts for the site being the most species diverse location in the entire DuPage River Basin (including the East and West Branches in the Upper DuPage River watershed). Nine additional species were collected in 2003 in this location alone including two river redhorses (*Moxostoma carinatum*), a state endangered fish. However, the dam prevents further migration of fish upstream, regardless of whether the habitat would support the fish or not.

[2] Stephen Pescitelli and Robert Rung. December 2005.

The 2003 survey also found a reduction in the relative abundance of pollutant tolerant species including carp and green sunfish and an increase in smallmouth bass, a species classified as intolerant. The reason for the observed improvement from 1997 to 2003 is unclear.

The fIBI is the basis for determining Biological Stream Characterization[3] as follows:

51-60	A	Unique Aquatic Resource
41-50	B	Highly Valued Aquatic Resource
31-40	C	Moderate Aquatic Resource
21-30	D	Limited aquatic Resource
0-20	E	Restricted Aquatic Resource

The Lower DuPage received a rating of a B according to the above criteria.

MBI measures the abundance and pollutant tolerance of macroinvertebrate species. The index ranges from 0 to 11, with lower scores indicating higher quality. A value of 5.9 or above indicates impairment.

Station	Segment	2001	2003	Average
GB-19	GB-01	4.7	--	4.7
GB-18	GB-11	4.6	--	4.6
GB-16	GB-16	5.3	6.2	5.8
GB-11	GB-11	4.8	--	4.8
GB-02	GB-01	4.9	--	4.9
GB-01	GB-01	4.8	5.4	5.1
Average		4.9	5.8	

Table 2-3: MBI scores used to assess aquatic life.

IDNR (in conjunction with IEPA) also evaluates habitat using the qualitative habitat evaluation index (QHEI). Six variables are taken in account in calculating QHEI: substrate, instream cover, channel morphology, riparian zone, pool quality and riffle quality. Scores range from 0 to 100A QHEI value was calculated at stations GB-01 and GB-11 based on 2003 data. The QHEI scores were 87 and 68, respectively. A score above 60 is representative of habitat without impairment. Although a segment in Lily Cache Creek, GBE-02, is listed as impaired for Aquatic Life, no data was collected for this segment during the years we examined.[4]

2.1.1.2 Fish Consumption

The assessment of fish consumption is based on fish tissue data and fish consumption advisories issued by the Illinois Fish Contaminant Monitoring Program (FCMP), which determines levels of

[3] Bertrand *et al.* 1996.
[4] Personal communication, Howard Essig, IEPA.

contaminants in sport fish and issues consumption advisories for species accumulated contaminants above specified levels. Fish consumption is impaired within the watershed because of polychlorinated biphenyl (PCB) contamination. For segment GB-16 the FCMP recommends consuming carp as only one meal a week. For segment GB-01, carp, channel catfish, and smallmouth bass are recommended to be consumed no more than one meal a month[5].

2.1.1.3 Primary Contact

Primary contact means any recreational or other use in which there is a risk of ingesting water in quantities that would pose a health hazard. Assessment of primary contact is based on fecal coliform data. Fecal coliform is sampled using the geometric mean of five samples in a maximum 30 day period. From May to October the geometric mean cannot exceed 200/100ml nor can more than 10 percent of the samples during any 30 day period exceed 400/100ml, year round. However, sampling is not usually conducted at the required frequency.

2.1.2 Causes of Impairment

After an impairment is determined by IEPA, the next step is to determine what is causing the impairment, often an exceedance of a numeric water quality standard.

The causes of the impairments to segment GB-01 that have numeric standards are mercury, PCBs and silver. The PCBs were found to be at an elevated level of 10ug/kg, which is the limit for an elevated level, during the 2003 sediment sampling. The silver standard of 5µg/L was violated once out of 18 observations in 2000[6]. The phosphorous standard of 0.61 mg/L was exceeding three out of four sampling points in 2003.[7]

The causes of impairment for segment GB-11 that have numeric standards are chloride, DDT, hexachlorobenzene, mercury, PCBs, phosphorus and fecal coliform. Exceedances of the numeric standard were identified in sediment data for DDT, hexachlorobenzene, PCBs. An exceedance to the chloride numeric standard of 500mg/L was identified in 2002 and 2003. The phosphorus standard of 0.61 mg/L was exceeded many times from 1999-2002, but no exceedances were found in the 2003 data. Exceedances of the numeric standard for fecal coliform were also identified in data collected from 2002-2006. Data for total suspended solids from 1999-2005 was not found.

The causes of impairment for segment GB-16 that have numeric standards include dissolved oxygen, phosphorous, mercury, PCBs and fecal coliform. Sediment data for this segment was not provided by IEPA, which likely means that it has not been collected for this segment since prior to 1999. Exceedances of the numeric standard for fecal coliform were also identified in

[5] 2008 Illinois Fishing Information Guide
http://www.idph.state.il.us/envhealth/fishadv/2008_fish_advisories.pdf
[6] DuPage TMDL Stage 1 Final, p. 5-12.
[7] Des Plaines 2003 Water Quality Data provided by IEPA

data collected in 2003 and 2004. Phosphorus data was above the standard from 2000-2003. IEPA maintains a continuous dissolved oxygen probe at GB-16. Data was provided for dissolved oxygen exceedances.

After examining water quality data for segments GB-01, GB-11 and GB-16 from 1999-2003 and 2005, an exceedance in the mercury standard was not found which likely means that it occurred prior to 1999. The cause of impairment for segments GB-01, GB-11 and GB-16 is also listed as other flow regime altered, siltation/sedimentation (not GB-16) and aquatic plants which are all based on field observations and notes.[8]

Segment GBE-02 is listed as impaired for aquatic life. The cause of impairment is listed as unknown. As previously stated, this impairment is not based on data that has been collected in the last ten years. It is likely that part of the cause of impairment was due to an altered flow regime, the creek had been straightened and channelized. A restoration project was undertaken 2005 to stabilize the banks and restore more of a naturalized channel to the stream in this location.

Sources of PCBs include old electrical transformers, landfills and hazardous waste sites, circuit breakers, fluorescent light ballasts and other types of electrical equipment that contain electric insulting fluid. The manufacturing of PCB was banned in 1977, however PCB containing equipment still in use can fail.[9]

[8] Personal communication, Howard Essig, IEPA.
[9] http://www.chesapeakebay.net/pcbs.aspx?menuitem=19494

Name	Assessment Unit ID	Cat.	Size (miles)	Use Attainment	Causes	Sources
DuPage River	IL_GB-01	5	8	N582, N583, X585, X586, X590	319, 371, 375, 462, 478, 274, 348	58, 122, 132, 144, 177, 85, 10, 140
DuPage River	IL_GB-11	5	9.81	N582, N583, N585, X586, X590	138, 177, 246, 319, 348, 371, 403, 462, 478, 274, 400	85, 177, 28, 58, 122, 132, 10, 140
DuPage River	IL_GB-16	5	10.39	N582, N583, N585, X586, X590	319, 322, 462, 478, 274, 348, 400	58, 85, 122, 177, 10, 140
Lily Cache Cr.	IL_GBE-01	2	7.56	F582, X583, X585, X586, X590	N/A	N/A
Lily Cache Cr.	IL_GBE-02	5	9.56	N582, X583, X585, X586, X590	463	N/A
Mink Cr.	IL_GBEA	3	5.64	X582, X583, X585, X586, X590	N/A	N/A

Support Code	Use Support Level
F	Fully Supporting
N	Not Supporting
X	Not Assessed

Use ID	Use Description
582	Aquatic Life
583	Fish Consumption
585	Primary Contact
586	Secondary Contact
590	Aesthetic Quality

Source ID Description
N/A No Source Identified
10 Atmospheric Deposition - Toxics
28 Contaminated Sediments
58 Impacts from Hydrostructure Flow Regulation/modification
85 Municipal Point Source Discharges
122 Site Clearance (Land Development or Redevelopment)
132 Upstream Impoundments
140 Source Unknown
144 Crop Production (Crop Land or Dry Land)
177 Urban Runoff

Cause ID	Description
N/A	No Cause Identified
138	Chloride
177	DDT
246	Hexachlorobenzene
274	Mercury
319	Other flow regime alterations
322	Oxygen, Dissolved
348	Polychlorinated biphenyls
371	Sedimentation/Siltation
375	Silver
400	Fecal Coliform
403	Total Suspended Solids
462	Phosphorus (Total)
463	Cause Unknown
478	Aquatic Plants

Table 2-4: Impaired Segments, causes and sources. From Appendix B-2 2008 Integrated Report.

2.1.3 Total Maximum Daily Loads

The Clean Water Act requires that a designated agency, in this case IEPA, develop a Total Maximum Daily Load (TMDL) for each pollutant of an impaired water body. IEPA develops TMDLs for waters that are impaired by a pollutant, which include metals or pesticides. TMDLs are not developed for nonpollutant impairments. TMDLs set numerical pollutant reduction goals to improve impaired waters.

TMDLs are estimations of the maximum amount of a pollutant that a waterbody can receive and continue to meet water quality standards. TMDLs take into account point and non point sources of the particular pollutant, as well as a margin of safety, in order to accurately depict the amount of pollutant that a waterbody can receive. States and local communities then will establish controls to limit the amount of the pollutant entering the waterbody. The TMDL report will also identify potential contributing sources to the impairment.

There are three segments within the Lower DuPage River watershed in which TMDLs are being developed: GB-01, GB-11, and GB-16. TMDLs are being developed for silver, chloride and fecal coliform in the watershed. The table below shows acceptable levels of the parameters exceeded in the Lower DuPage that are surveyed by IEPA.

Parameter	Units	General Use Water Quality Standard
Chloride	Mg/L	500
Fecal coliform bacteria	Count/100 ml	200[10], 400[11] (May-October)
Silver	µg/L	5.0

Table 2-5: General Use Water quality Standards for TMDL parameters.

A TMDL is being developed for silver in segment GB-01. IEPA has listed urban runoff/storm sewers as a potential source of silver contamination. Additional potential source of silver include industrial and landfill waste.

A TMDL is being developed for chloride for segment GB-11. Potential sources for chloride include municipal point source discharges and urban runoff and storm sewers. Chloride TMDLs have been previously developed for the Upper DuPage watershed. Through their data collection, it is evident that chloride impairment in the area is due to snow removal activities. It is likely the cause of the impairment in the Lower DuPage as well.

TMDLs are being developed for fecal coliform in segments GB-11 and GB-16. Fecal coliform is a widespread case of impairment for primary contact throughout the watershed. At this point, it is unknown what the source of fecal coliform is, whether it be from wastewater treatment plants, failing septic fields, pet and wildlife waste, or a combination of factors.

[10] Geometric mean based on a minimum of 5 samples taken over not more than a 30-day period.
[11] Not to be exceeded by more than 10% of samples in a 30-day period.

2.2 Physical Watershed Characteristics

The physical conditions of the watershed, the soil, hydrology, and geology as well as the natural resources found within the watershed have a great influence over potential problems and solutions.

2.2.1 Historical Conditions

Pre-settlement data shows that the vegetation within the watershed was forested in pockets along the main stem of the river, but otherwise was comprised mostly of prairie.[12]

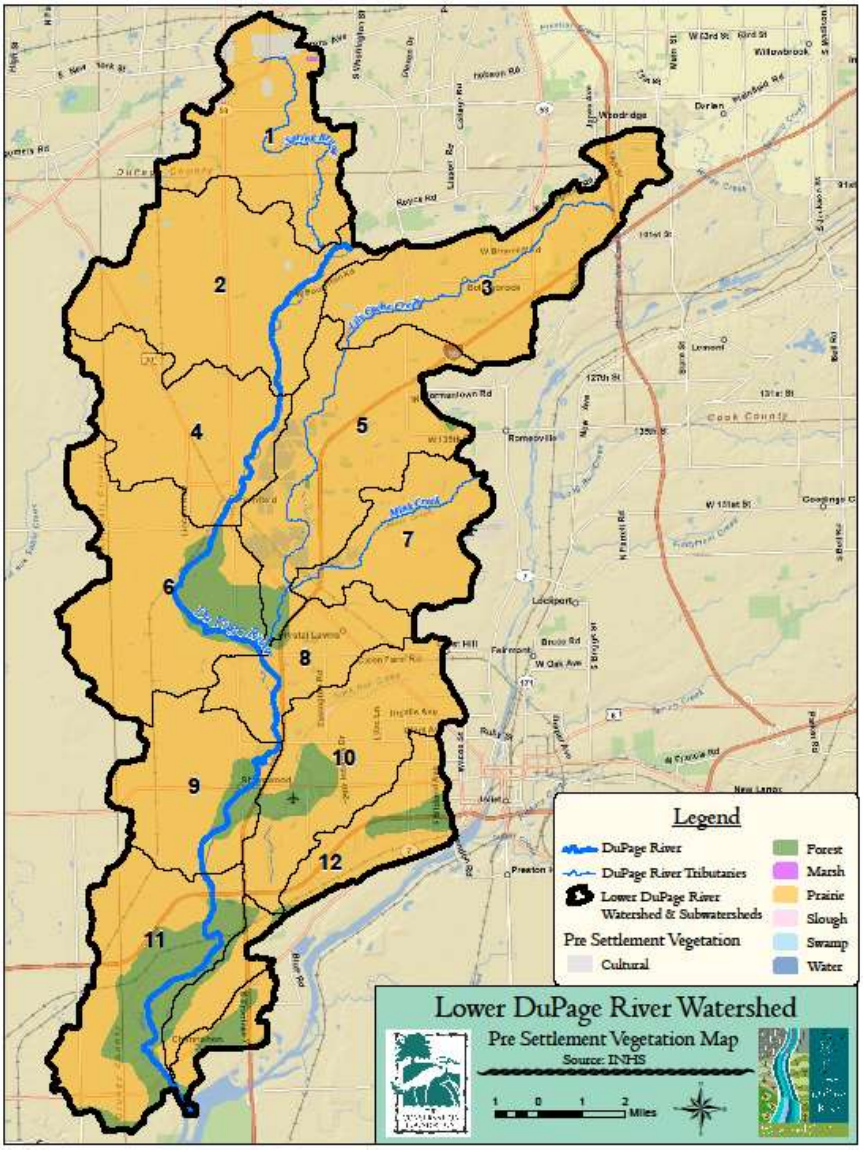

Figure 2-2: Presettlement vegetation

[12] http://www.inhs.uiuc.edu/cwe/maps/glo.html

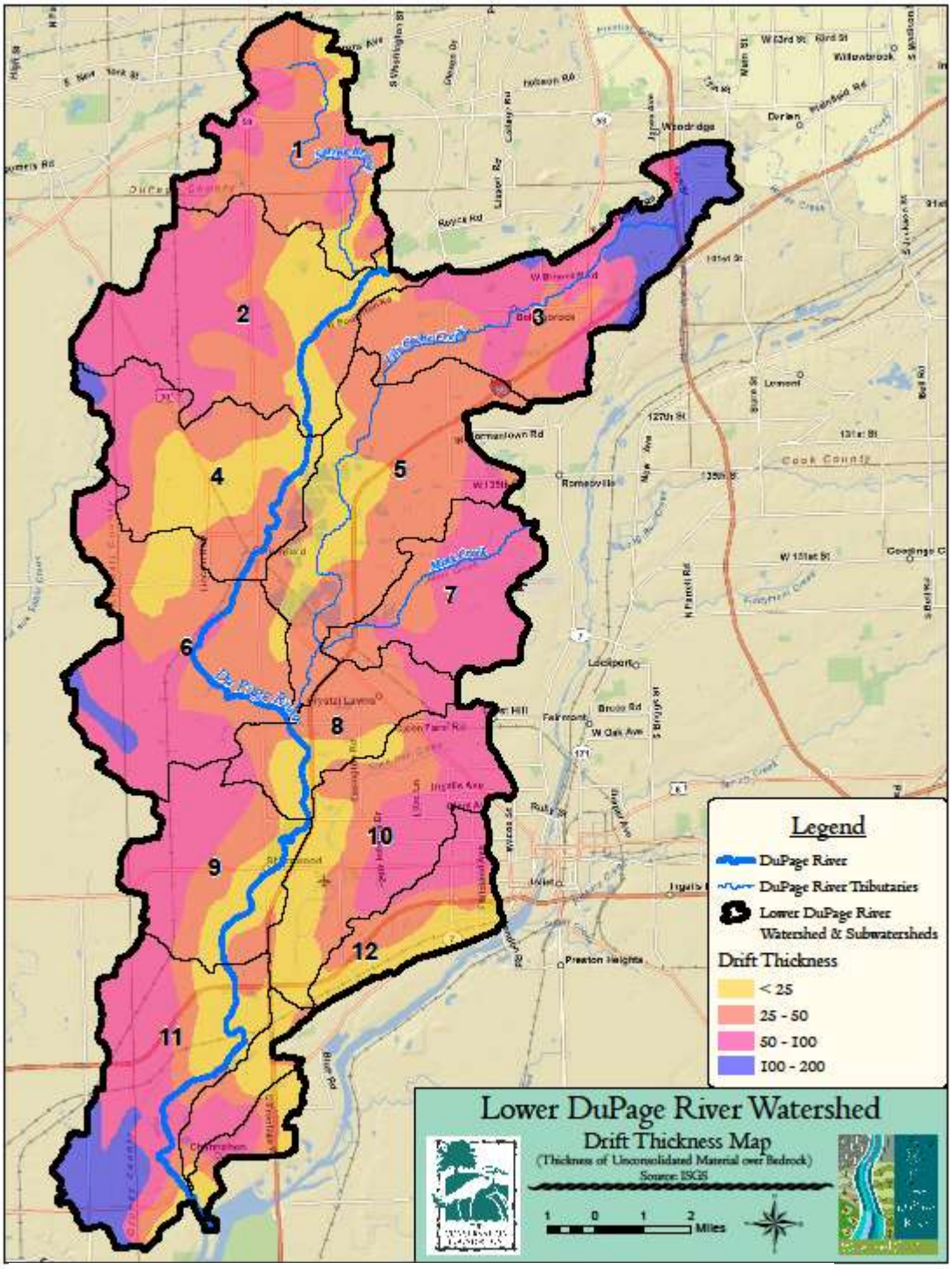

Figure 2-3: Drift thickness indicating depth of glacial deposits

2.2.2 Land Use

Agriculture and residential land uses are equally dominant in the watershed. Agricultural land use is dominated by row cropping of mostly corn and soybeans. There are other types of agriculture being conducted in the watershed including nurseries, tree farms, sod farms, animal production operations and dairy facilities. Residential use is dominated by single family homes, duplexes and townhouse units. There are very few commercial uses.

At the north end of the watershed on Spring Brook Creek, the Forest Preserve District of DuPage County holds the largest open space area at Spring Brook Prairie, covering 1,840 acres.

Land Use	Area (acres)	Percent
Residential	38,928.65	30.67
Commercial	4,758.33	3.75
Institutional	3,003.91	2.37
Industrial	6,681.51	5.26
Transportation, Communication, Utilities	3,602.99	2.84
Agriculture	40,006.39	31.52
Open Space	9,715.02	7.65
Vacant, Wetlands, Under Construction	16,558.90	13.04
Water	3,681.18	2.90
Total	126,936.90	100

Table 2-6: Land use in the Lower DuPage.

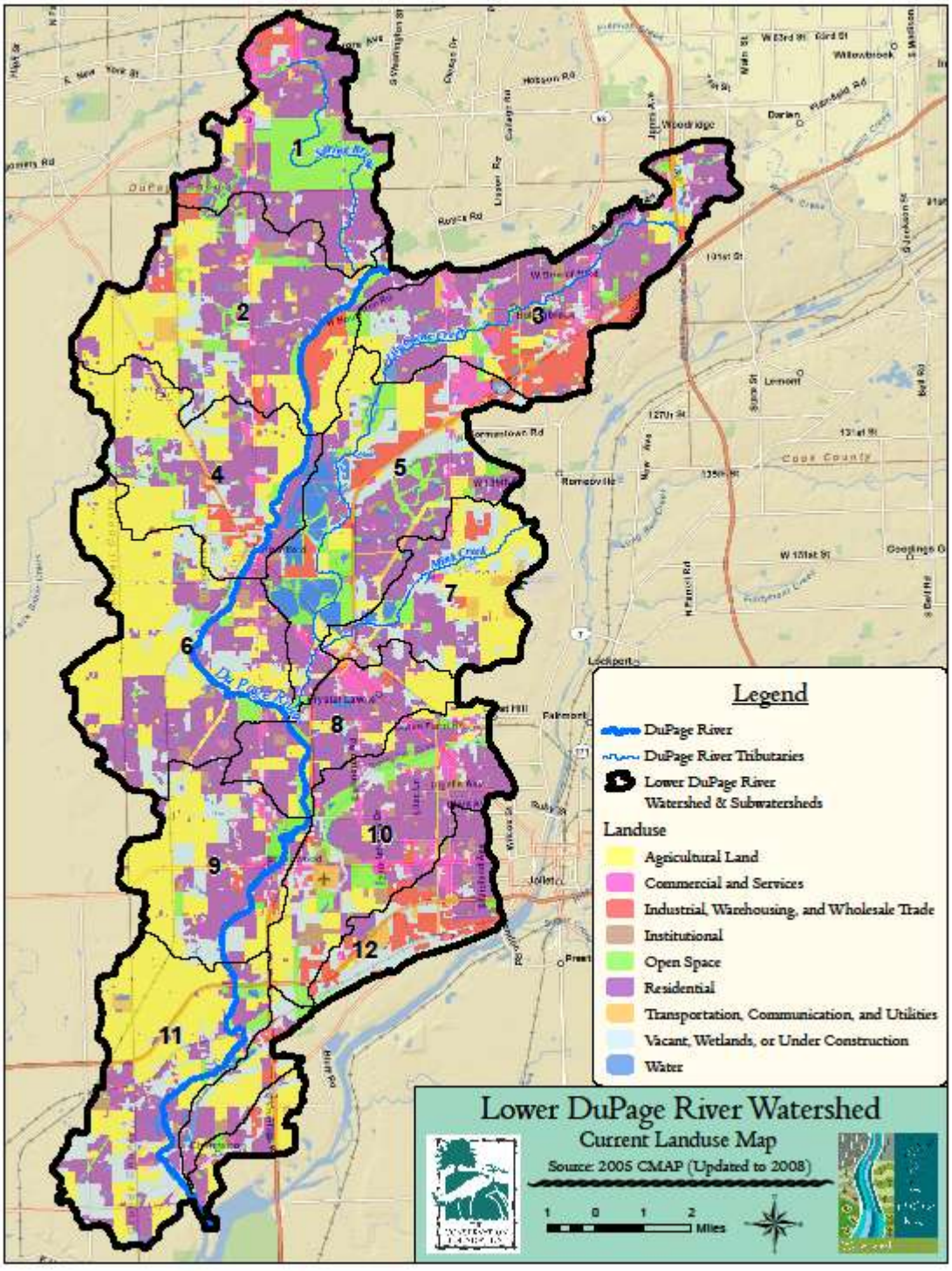

Figure 2-4: Lower DuPage land use map.

2.2.3 Land Cover

Impervious cover is considered all of the surfaces that prevent water from infiltrating into the ground. In this instance, the amount of land cover in roads, buildings and parking lots was used to calculate imperviousness. The percentage of impervious cover is directly related to the water quality and quantity in the watershed. The greater the area of imperviousness, the more degraded the water quality and habitat and the more difficult to mitigate these stressors. Stream hydrology is altered by watershed build out, causing streams to have a high bounce during rainfall events. Roads channel pollutants directly towards our streams, as storm water is not treated. Best Management Practices can mitigate for some of the impacts attributed to imperviousness.

Total impervious area amounted to 42% of the watershed, using 2001 National Land Cover data. Because the data set is a number of years old, the amount of imperviousness has likely increased, especially with the recent development boon. It should also be noted that developed open space was excluded from the imperviousness calculation. A conservative approach would include this type of land cover due to the relatively low permeability of the soil after an area has been mass graded and compacted.

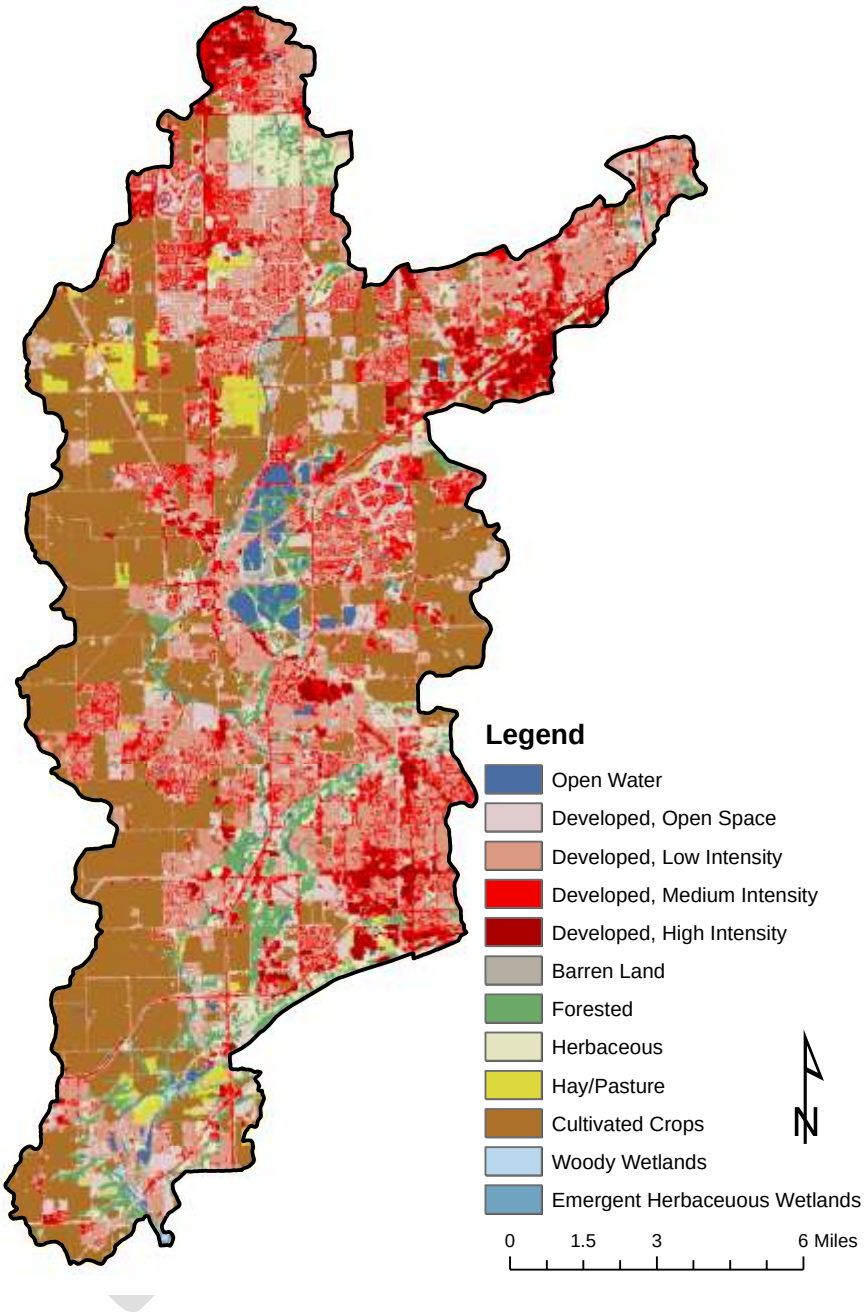

Figure 2-5: Land cover in 2001. Source: 2001 National Land Cover Dataset.

2.2.4 Topography

Elevations are higher in the north and west portions of the watershed and lower at the south and east end of the watershed, near the confluence with the Des Plaines River. This results in an overall flow from north to south. Elevations range from a high of 238 feet above sea level in _____ to a low of 153 feet above sea level in _____.

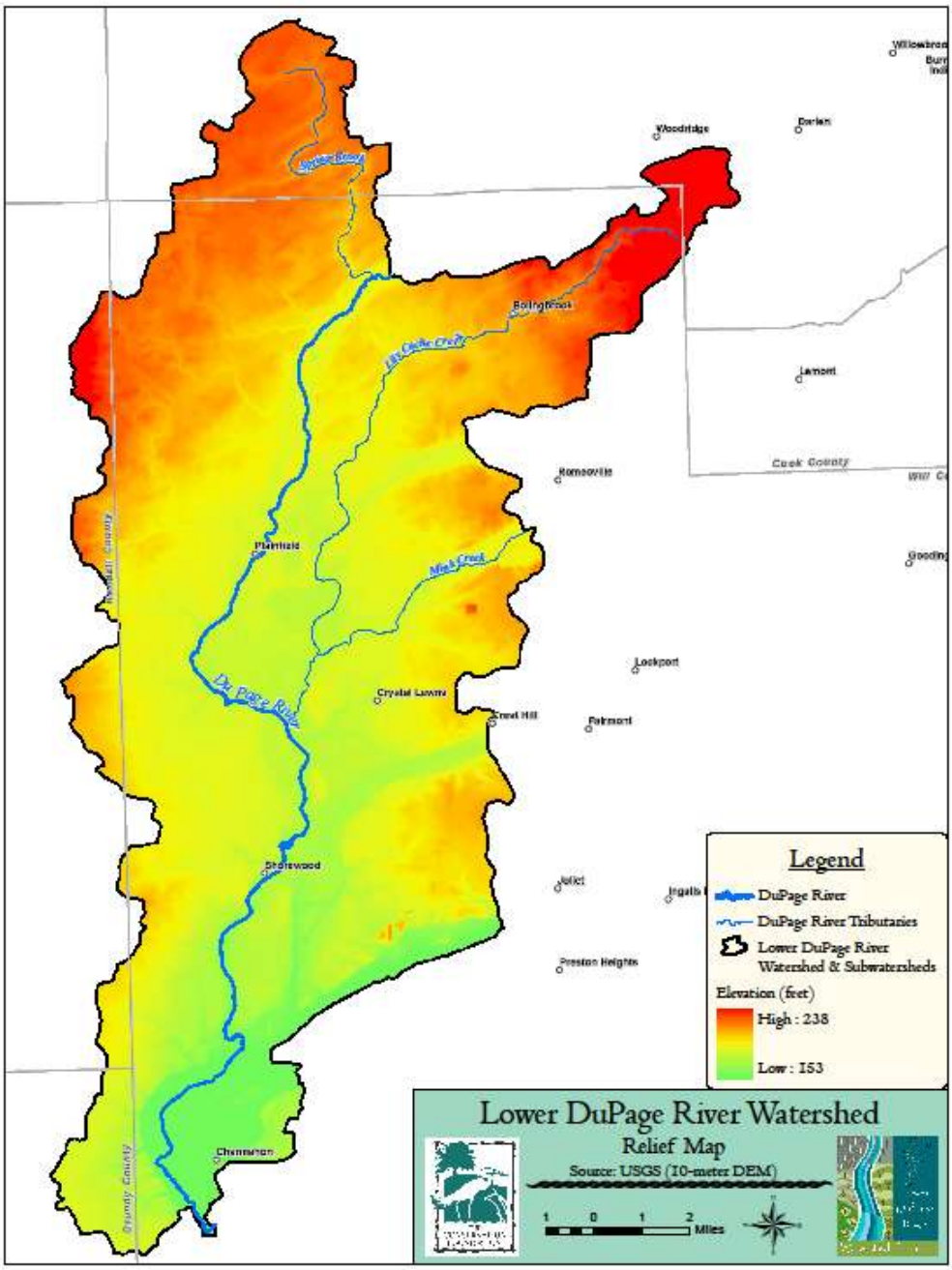

Figure 2-6: Elevation map of the Lower DuPage River watershed.

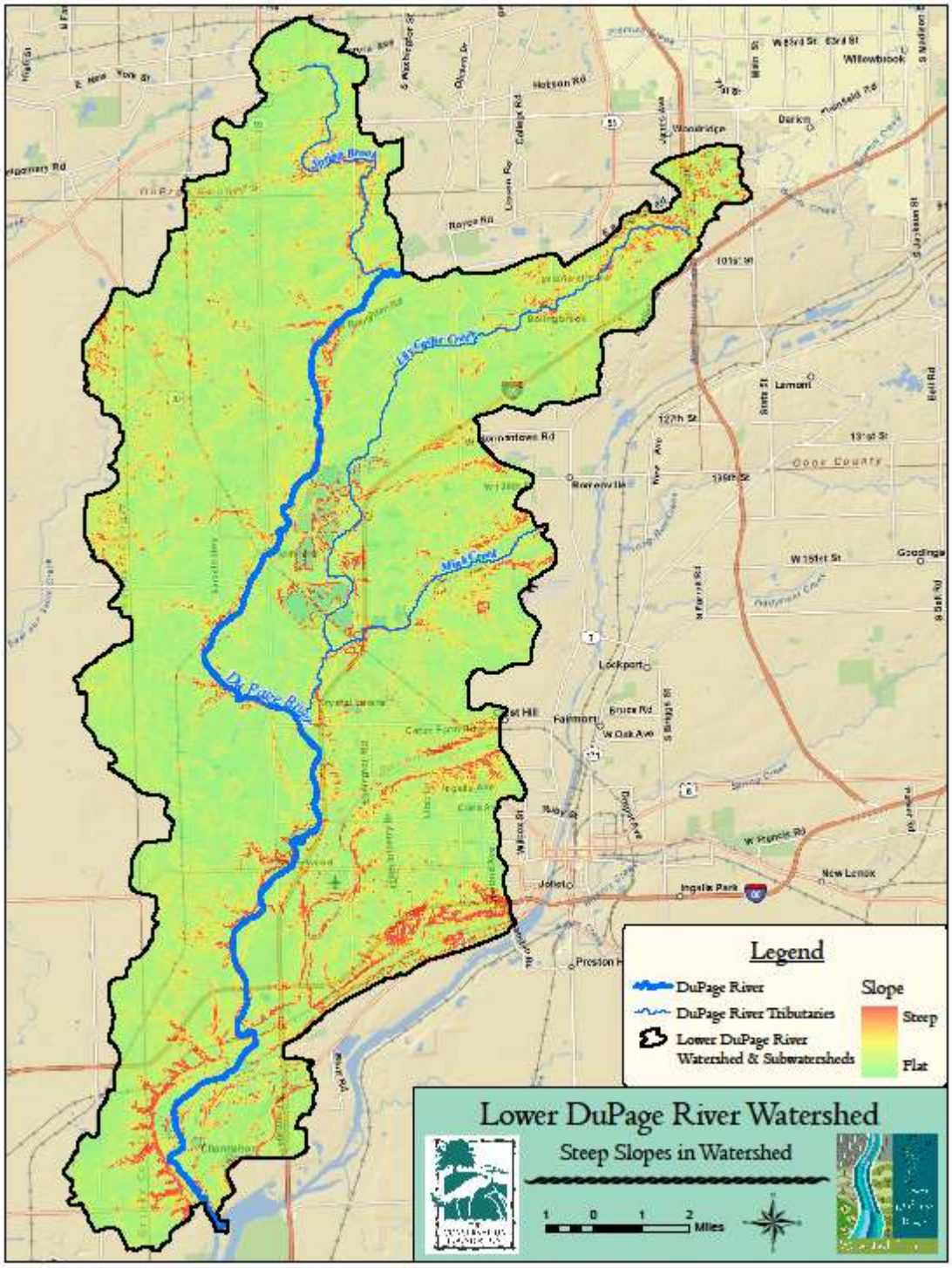

Figure 2-7: Map showing steep slopes within the watershed.

2.2.5 Soils

Soil affects land use planning, for example whether construction is more likely to cause erosion can often be foretold by looking at what particular types of soil are located on site. Soil properties can change drastically in short distances. Some soils are seasonally wet while others are subject to flooding. In some areas there is shallow bedrock. Clay and wet soils are unsuitable for septic fields. An area with a high water table is unsuitable for basements.

Soil forms through the deposition of geological material. Factors that affect soil formation include climate, plant and animal life, elevation and time.

2.2.5.1 Hydric Soils

Hydric soils are essential for wetland formation and identification. The three characteristics of wetlands are hydrophytic vegetation, hydric soils and wetland hydrology. Undrained hydric soils that have natural vegetation should support a wetland system. The extensive amount of mapped hydric soil shows that historically, a large amount of wetlands have been drained and converted to other uses.

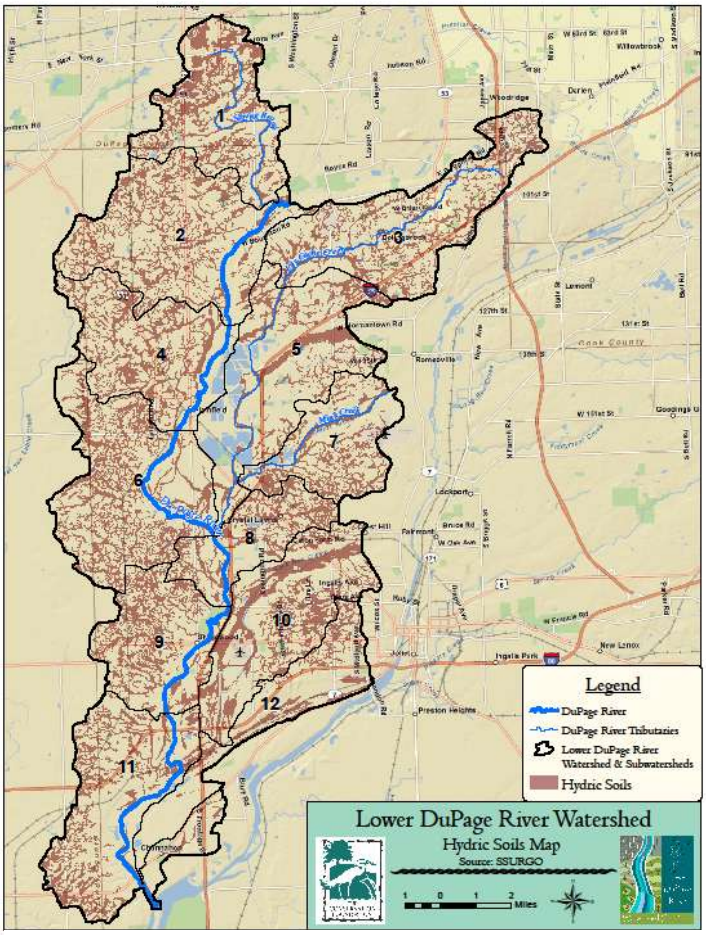

Figure 2-8: Map showing the location of hydric soils.

2.2.6 Wetlands

The U.S. Fish and Wildlife Survey National Wetlands Inventory (NWI) used aerial photography from the 1980's to map the nation's wetlands. Wetlands provide habitat, ground water recharge, flood protection and naturally cleanse water of pollutants. Wetlands have the potential to remove nutrients from the water that flows through them. They can also assist in the prevention and reduction of flooding.

The NWI shows that there is just under 9,000 acres of wetland located within the watershed. A majority of the wetlands in the area are lakes, likely due to gravel pit excavation. The NWI is not updated and often does not take into account small scale isolated wetlands. Wetlands that have been impacted by development since the NWI was created are also not reflected. The NWI only maps the location and general type of wetland; there is no indication of wetland quality in this database. There is no other wetland database in the watershed, except for the portion that is within DuPage County.

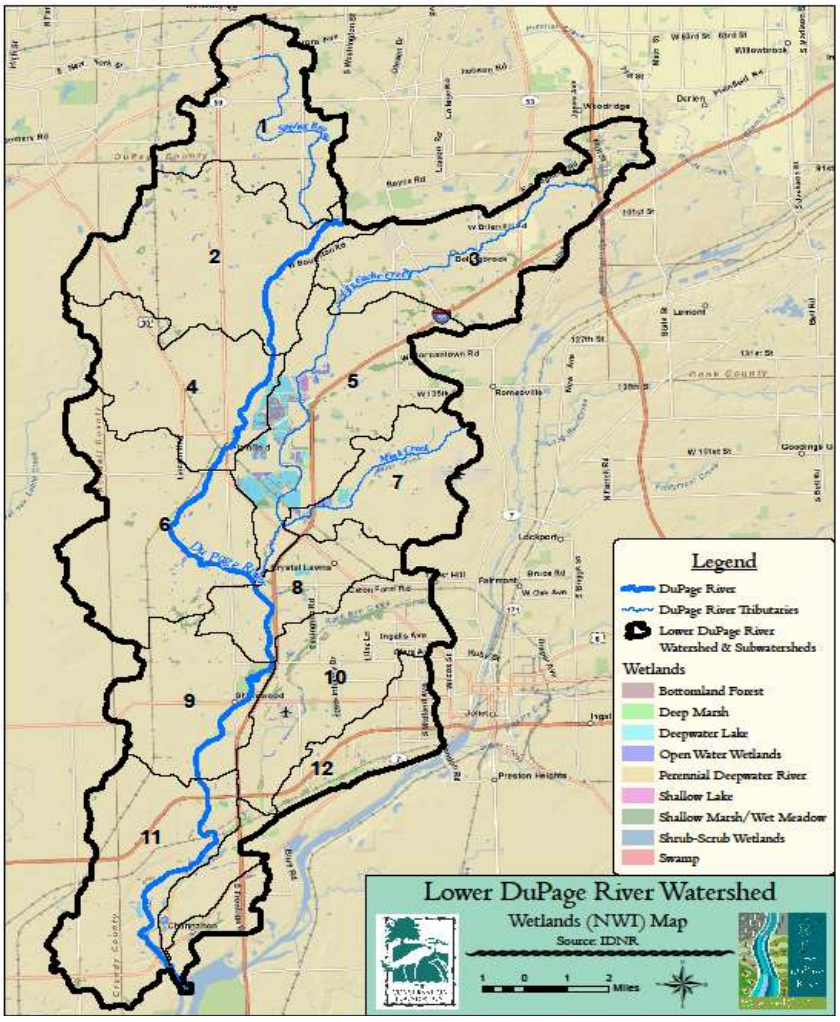

Figure 2-9: Wetland locations and types.

2.2.7 Floodplain

Floodplain maps identify areas that flood in the 100 year storm event for regulatory purposes, insurance reasons and to identify riparian corridors. Floodplains are flat areas, usually adjacent to a stream that experiences period flooding.

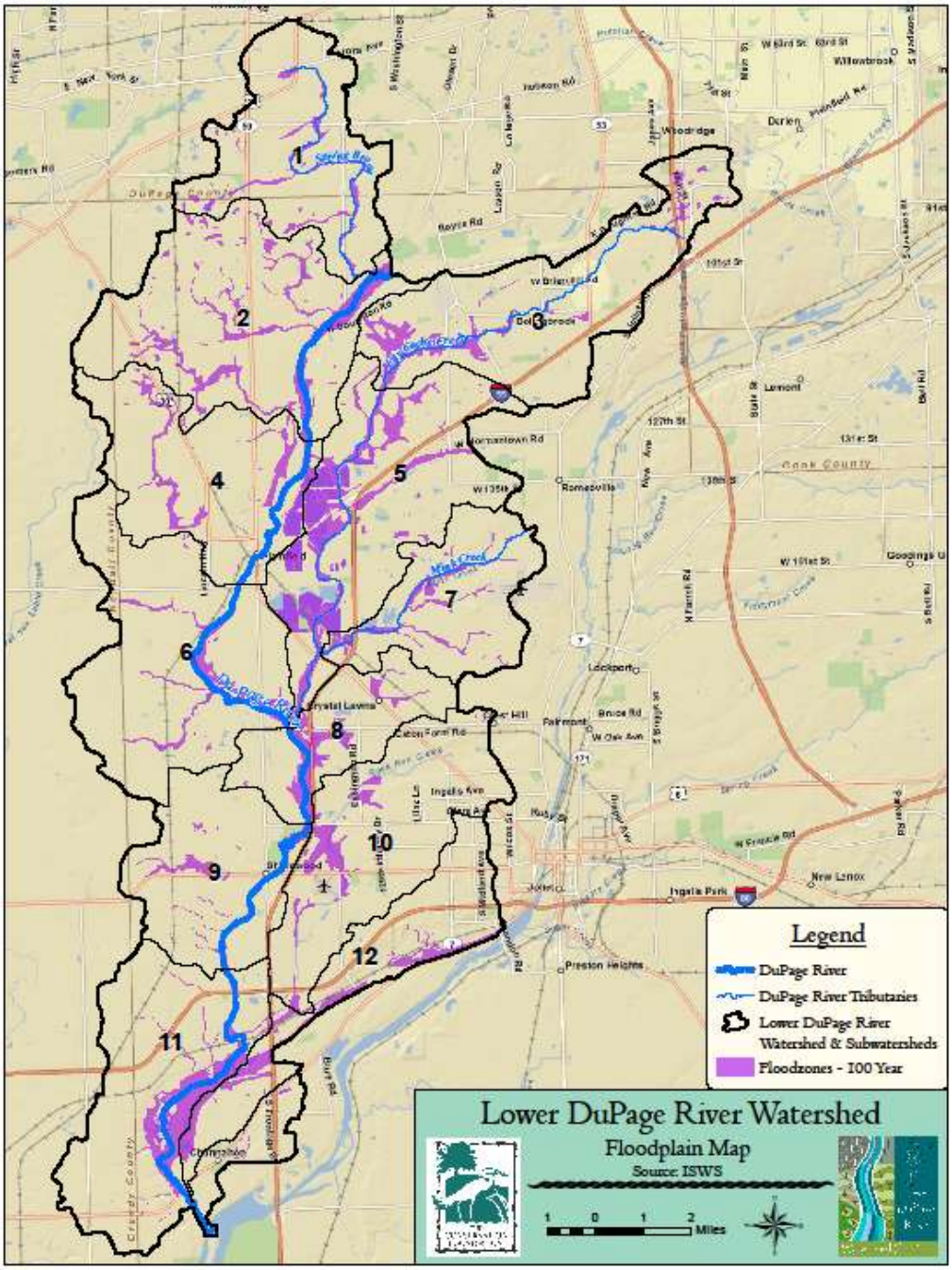

Figure 2-10: 100 year floodplain map